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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'MAGAZINE OF BOTANY AND ZOOLOGY,' AND OF LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

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"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ: ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; a vere eruditis et sapientibus semper exculta; male doctis et barbaris semper inimica fuit."—LINN.

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Erratum, p. 278, l. 10, for "Switzerland, to the height of 11,000 feet," *read*, "Switzerland, *and* to the," &c.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

No. 48. SEPTEMBER 1841.

I.—*Description of some Molar Teeth from the Eocene Sand at Kyson in Suffolk, indicative of a new Species of* Hyracotherium (Hyr. Cuniculus). By RICHARD OWEN, Esq., F.R.S., &c.

IN the Eocene sand underlying the red crag at Kingston or Kyson in Suffolk, from which the remains of *Quadrumana*, *Chiroptera*, and *Marsupialia* have already been obtained*, Mr. Colchester, the discoverer of those mammalian remains, has recently transmitted to me through my friend Mr. Lyell a second collection of fossils, including the teeth of small mammalian animals, some of which are referable to the small Pachydermal extinct genus *Hyracotherium*, established on a nearly entire cranium obtained by Mr. Richardson from the London clay near Herne Bay, in 1839†.

The teeth from Kyson are three true molars and one of the false molars, all belonging to the upper jaw. The crowns of the true molars present the same shortness in vertical extent, the same inequilateral, four-sided, transverse section, and nearly the same structure, as in *Hyracotherium leporinum*; the grinding surface being raised into four obtuse pyramidal cusps, and surrounded by a well-developed ridge, produced at the anterior and outer angle of the crown into a fifth small cusp.

These teeth are, however, of smaller size, as will be seen by the subjoined figures of a corresponding molar from the *Hyrac. leporinum*, fig. 1, and *Hyrac. Cuniculus*, fig. 2. The true molars of these two species further differ in a point not explicable on the supposition of their having belonged to a smaller individual or variety, for the ridge which passes transversely from the inner to the outer cusp is developed

1. 

2. 

* See Annals of Natural History, vol. iv. No. 23, Nov. 1839.

† Geological Transactions, 2nd Series, vol. vi. p. 203.

midway into a small crateriform tubercle in the teeth of the *Hyracotherium leporinum*, but preserves its trenchant character in the *Hyrac. Cuniculus*, even in molars which have the larger tubercles worn down.

The premolar, or false molar, in the series of detached teeth from Kyson, which is either the third or fourth, presents the same complication of the crown which distinguishes the *Hyracotherium* from the *Chæropotamus*, but with the same minor modification which distinguishes the true molars of the Kyson species from those of the *Hyrac. leporinum* of Herne Bay; i. e. the two ridges which converge from the two outer tubercles towards the internal tubercle are not developed midway into the small excavated tubercle, as in the *Hyrac. leporinum*, fig. 3, but are simple, as in fig. 4.

3. 

4. 

The disparity of size between the true and false molars appears to be greater in the *Hyrac. Cuniculus* than in the *Hyrac. leporinum*. This discovery of a second species of the genus *Hyracotherium*, which, hitherto, has been found only in the London clay, tends to place beyond doubt the equivalency of the Kyson sand, underlying the red crag, with the Eocene deposits at the estuary of the Thames, and corroborates the inference deducible from the previously described mammalian, ornithic and ophidian remains of the London clay, that it was deposited in the near neighbourhood of dry land.

I may add, that the collection of teeth and other small organic fragments from the Kyson clay, which included the molars of the small extinct Pachyderm above described, likewise included several vertebræ of a serpent, agreeing in every respect, save size, with those of the *Palæophis toliapicus*, recently described by me, from the Isle of Sheppey. The Kyson serpent must have been about seven feet in length: that of Sheppey exceeded ten feet; but I have lately had submitted to me for examination, by my friend Mr. Dixon of Worthing, vertebræ of a distinct species of *Palæophis* from the Eocene clay at Bracklesham, corresponding in size with those of a Boa Constrictor of upwards of twenty feet in length.

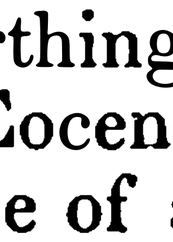
Fig. 1. Grinding surface of the crown of the last true molar, right side, upper jaw, of *Hyracotherium leporinum*, from Herne Bay.

Fig. 2. Ditto, of the corresponding molar of the *Hyracotherium Cuniculus*, from Kyson.

Fig. 3. Grinding surface of the last false molar (the fourth counting backwards), left side, upper jaw, of *Hyracotherium leporinum*, from Herne Bay.

Fig. 4. Ditto, of the corresponding tooth of the *Hyracotherium Cuniculus*, from Kyson.

Fig. 5. Last true molar, left side, upper jaw, of *Hyracotherium Cuniculus*, from Kyson.

5. 

II.—*Remarks on the Horny Sponges, with proposed divisions of the Order* Spongiæ. By John Hogg, Esq., M.A., F.R.S., F.L.S., &c.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,

Mr. Bowerbank having published some very interesting 'Observations on a Horny Sponge from Australia,' at p. 129 of the 'Ann. and Mag. of Nat. Hist.' for April 1841, I am induced to trouble you with a few remarks upon them.

The author there writes, "that, contrary to received opinions, they" (horny sponges) "are furnished with siliceous spicula." This opinion, however, which seems to me to have originated from Dr. Grant's examinations of some of our British horny sponges, and from the statement which he has made in the 'Edinburgh New Philosophical Journal' (for 1827, p. 122), where he says—"I have *never* observed any kind of spiculum in the horny species," is incorrect as far as it relates to *all* the *horny*, or subcorneous, sponges. Because, by referring to M. Lamarck's 'Hist. Nat. des Anim. sans Vertèb.,' tom. ii., edit. 1836, p. 538, it will be seen that M. Milne Edwards distinctly mentions some sponges which were described by M. Savigny and figured in the plates of his superb work on Egypt, as having "la disposition du réseau *corné* et des *spicules* qui constituent en quelque sorte la charpente de ces corps."

Now, since M. Milne Edwards has in the preceding page (537) expressly said that "on ne connaît pas d'espèces qui en présentent conjointement avec des épines calcaires et des fibres cornées," it is quite certain that the "réseau corné et des spicules" spoken of, and which were described by M. Savigny, must signify the skeleton of a *horny* net-work with siliceous spicula. Thus Mr. Bowerbank, by his late investigations, has fortunately confirmed this fact; and has discovered the presence of siliceous spicula in some *other* species of the horny sponges, which species were previously supposed to be entirely destitute of them. But as it was likewise generally thought that the siliceous spicula seldom or never put on more than *two simple forms*, it is of importance to find from that author's paper that he has proved the siliceous spicula in the horny sponges which he examined to exist under *several different* forms, some of which he has represented in the accompanying figures, (Plate III. Vol. vii.)

The next objects worth especial notice in that paper are, first, the reticulations of the transparent membrane. These,

indeed, strongly resemble those of the membrane of the *Spongilla fluviatilis*, which I have described at p. 386 of the 'Linnæan Transactions,' vol. xviii., and the second, the fixed sporidia;—the actual existence of these bodies in any of our British *sea* sponges I have never yet been able to witness, and which I account for from my not having examined them in their native localities at the proper season of the year. Although previously figured in Donati's work and in the 'Zoologia Danica,' the fixed sporidia were first distinctly pointed out by Dr. Ehrenberg, as having been seen by him in many sponges of the Red Sea.

The reticulated transparent membrane and the fixed sporidia, then, fully confirm the general description of the *Spongiæ Marinæ* which I gave at p. 400, 'Linn. Trans.,' vol. xviii., in these words :—"The sea sponges are furnished with a skeleton of fibres interlacing, crossing, and anastomosing with themselves; generally also strengthened with those singularly crystallized particles termed spicula; with a parenchymatous soft portion or jelly; with a fine and transparent enveloping membrane; with numerous minute pores; and frequently with larger orifices or oscules, which are more sparingly and irregularly dispersed over their surfaces; with passages or canals communicating through the pores and oscules one with another, along which the water finds a ready course or circulation, and affords nutriment to all the inner parts of the masses; with locomotive sporules; and in some species with fixed sporidia."

Mr. Bowerbank has however omitted to say whether these sporidia were softish or hard, and whether the parenchymatous portion or jelly was composed of minute globules or not; nor has that author given us the names of the species which he has described. Next, if we examine Mr. Bowerbank's plate, we see the fixed sporidia well drawn at fig. 8 in their natural position, but he has neglected to magnify any of them separately. Fig. 7 gives a representation of the *reticulated* transparent *membrane*, which, I believe, is quite new, and has never yet been figured in any engraving of the sponges.

Again, Mr. Bowerbank in the abstract of his paper, which was communicated to the Microscopic Society, and published in No. 1 (for March last) of the 'Microscopic Journal,' mentions some of the horny sponges of commerce that were received from the Mediterranean, in which spicula were likewise discovered; but the *vascular tissue* surrounding the fibres there described, I am strongly inclined to agree with Dr. George Johnston in thinking "as of no more than *specific* importance."

Also, it becomes me to correct the following passage from that Journal:—"Dr. Grant's observations were limited principally to the British species of sponge having siliceous or calcareous spicula; the true horny species not having up to that period been found on our coast. Sowerby, in his 'British Miscellany,' has subsequently figured the *Spongia pulchella* obtained from the southern and western coasts of England." Now Dr. Grant published his observations in the 'Edinburgh Philosophical Journal' for the years 1825, 1826, 1827, whereas Sowerby's 'British Miscellany,' vol. i., was published long before—in fact, in the year 1806; in which volume, at p. 87, Sowerby described the *S. pulchella* as a new species, specimens of which had been sent to him by Mr. Brown from Ireland about the year 1800, and by the Rev. Hugh Davies from North Wales in 1802. I may here add, that I have found this beautiful species on the coast of Durham, where however it is rarely met with. Having already observed upon the similarity of the *spicula* with *raphides**, I perfectly coincide with Prof. Jones in accounting the crystalline needle-like particles which so abundantly occur in many sponges, as being analogous to and most resembling those crystalline secretions of plants; and I must confess that I do not see any facts detailed in the papers of Mr. Bowerbank to lead me to alter my opinion respecting the *vegetable* nature of sponges.

The objectionable word '*keratose*' has, I am glad to see, called forth a just remark from the Editor.

I have been in the habit of using the word '*subcorneous*' in my own attempted arrangement of the *Spongiæ*, in which I have distributed many species without adopting the new generic names of *Calcispongia*, *Grantia*, *Halichondria*, *Halispongia*, *Tethya*, *Tethium*, part of *Alcyonium* of Lamarck, etc.; since I thought it better to consider the whole under the new genus *Spongilla*, and the old genus *Spongia* of Linnæus and Montagu.

The Order *Spongiæ* I some months ago separated for my own convenience into the following divisions:—

Division I. *Spongiæ Subcorneæ*. The Subcorneous Sponges.—Having fibres of a somewhat *horny* substance *without* any *spicula*.
Example of a British species: *S. pulchella* (Sow.).

Division II. *S. Subcorneo-siliceæ*. The Subcorneo-siliceous Sponges.—Fibres composed of a somewhat *horny* substance with numerous *siliceous spicula*.
No species hitherto discovered in Britain.

Division III. *S. Subcartilagineo-calcariæ*. The Subcartilagino-calca-

* See Linn. Trans., vol. xviii. p. 398.

reous Sponges.—Fibres of a somewhat *cartilaginous* substance, with the *spicula calcareous*, or consisting of carbonate of lime.
Examples : *S. compressa*, *S. botryoides*, &c.

Division IV. *S. Subcartilagineo-siliceæ.* The Subcartilagino-siliceous Sponges.—Fibres composed of a somewhat *cartilaginous* substance, with *siliceous spicula*.
Examples : *S. tomentosa*, *S. palmata*, and *Spongilla fluviatilis*.

Division V. *S. Subereo-siliceæ.* The Subereo-siliceous Sponges.—Fibres of a *corky* substance, with long *siliceous spicula*.
Examples : *S. verrucosa* (Mont.) and *S. pilosa* (Mont.).

At present, as far as I am aware, no sponges have been discovered either with *horny* fibres and *calcareous* spicula, or with *corky* fibres and *calcareous* spicula. The other parts of the sponges, such as the membrane and gelatinous portion, are of too fugacious a nature to afford any useful characters for the arranging of the Order ; the *skeleton* itself, consisting of fibres as well as spicula (which exist in so many sponges), clearly offers the best characters for that purpose. The preceding divisions I did in part derive from M. Milne Edwards's observations in his edition of M. de Lamarck's 'Hist. Nat. des Anim. s. Vert.,' tom. ii. pp. 535—541. And, inasmuch as no better arrangement of the *Spongiæ* has yet appeared, I am induced to think the preceding attempt may prove of use, and assist the observer in rendering perfect a general classification of them. But this cannot be effectually accomplished until further investigations shall have been made on the *Sea Sponges* in their natural state; and for the purpose of urging those who have the opportunity to do so, I will here repeat the remarks which I have before made in a note at p. 406, vol. xviii. of the 'Linn. Trans.' :—"The difficulty of preserving sponges, even in bottles filled with rectified spirit of wine, is so great, that no one who has not the means of examining them in a fresh condition and in their native element, can ever expect to throw much light on their variously-formed structures. The dried masses of fibrous skeletons, devoid of their true natural forms and colours, without their parenchymatous jelly and enveloping membrane, &c. as exhibited in our museums, can but little assist us in obtaining a correct knowledge of their natural history."

I remain, Gentlemen, yours truly,
JOHN HOGG.

London, May 1st, 1841.

III.—*Notes on the Zoology of the Outer Hebrides.* By JOHN MACGILLIVRAY, Vice-President of the Cuvierian Nat. Hist. Society of Edinburgh.

THE only account of the Natural History of the Outer Hebrides that has yet been published is that of Professor Mac-Gillivray*, and it being now upwards of twenty years since that gentleman visited the district, I have been induced to arrange a few notes relative to the species observed during a residence there in the summer of 1840. Several additions to his list are here noticed, and a few errors corrected—errors which the state of British Zoology at the time he wrote rendered altogether unavoidable.

Before proceeding further, it may be proper to mention that I was landed in Skye in the end of April 1840, was conveyed to North Uist, which I crossed, and established myself in Berneray, a small island in the sound of Harris. From this central point, excursions, sometimes of several days' duration, were repeatedly made to all the neighbouring islands, to Harris, the southern portion of which was traversed in all directions, and to North Uist. On the 29th of June I left for St. Kilda†, and was absent eight days; on my return I set off for South Uist, traversing Benbecula, and remaining upwards of a week. On my return I again visited Harris and the adjacent isles, spent some time in North Uist, and finally crossing to Skye in the end of August, walked through the west highlands to Edinburgh, which I reached after an absence of four months.

MAMMALIA.

The Otter, *Lutra vulgaris*, is sparingly distributed along the whole of the rocky coasts of the Hebrides. It is found chiefly among the loose blocks of stone by the shore, but occasionally frequents the inland lakes, especially in South Uist. The otters of the Hebrides belong exclusively to the dark variety, considered by Mr. Ogilby as specifically distinct, which, though said to be smaller than the other, is yet not always so; for one shot in the island of Vallay measured five feet, and another seen at Scolpig about nine inches less, being still above the average size. *Phoca vitulina*, Common Seal, is extremely abundant in the sound of Harris and the neighbouring inlets of North Uist, but less so elsewhere. The young are born about the beginning of June, and immediately follow their mother. One only is usually produced at a birth,

* Edinb. Journ. of Nat. and Geograph. Science, vol. ii. pp. 161 and 321.

† An account of which will appear in the October Number of the 'Edinb. New Philos. Journal.'

but in a single instance two cubs were observed following one female. During a storm I have seen them throwing themselves forwards, half out of the water, which movement they repeated several times in succession. Two individuals of *Phoca grœnlandica*, Harp or Greenland Seal, were observed by Mr. D. MacLellan and myself, on a small rock in the Atlantic, off the west coast of South Uist, in the month of July. They were seen through a telescope, at a distance of not more than 300 yards, as we were watching the strange movements of a large schooner which sunk in deep water a few minutes afterwards. Being then in the habit of daily seeing numbers of seals, I could scarcely have mistaken so marked a species for either of the two others. *Halichærus griseus*, Nilss., Great Seal, as determined by me from the examination of several individuals, also of two crania, and numerous skins, is equally plentiful with the Common Seal, from which it differs greatly in habits. It seldom enters the shallow sounds like the *Ph. vitulina*, with which it never associates, but frequents the open sea, upon the western or Atlantic coasts of the islands, where alone I have observed it. It breeds in November, leaving its young one upon the rock, and suckling it at each tide. The most noted places of resort of this species are the rocky islands of Haskir, twelve miles off the west coast of North Uist, and Gaskir, at a similar distance from the Harris coast. In the beginning of November a large boat filled with men leaves North Uist under night, and generally arrives at Haskir soon after daybreak. The men land upon the island armed with long clubs and separate into two bodies, one of which attack the seals upon the shelving rocks upon which they are found lying with their cubs, while the other cut off their retreat to the water. A short but fierce struggle then takes place; a few of the animals escape, the rest are killed by repeated blows about the root of the nose, their only vulnerable spot, and the rock is soon covered with the dying and the dead. About seventy are thus annually procured, but the number varies considerably, as many as 120 having sometimes been obtained. Many of them are of large size, one which I measured at Vallay being 7½ feet in length, exclusive of the head, and individuals of much larger size are not unfrequently met with.

Mus Musculus, Common Mouse, is of common occurrence: *M. decumanus*, the Brown Rat, was observed to feed on shellfish and crustacea in the uninhabited islands of the sound of Harris, the sea-banks of many of which I have seen perforated in all directions with their burrows.

Lepus Cuniculus, the Rabbit, has been introduced into South Uist and Barray, where it has multiplied prodigiously.

young birds. One of the old birds was also shot by my father from a covered pit in which he lay concealed, the bird being enticed by a hen fastened by a string at a little distance.

Falco peregrinus, the Peregrine Falcon, breeds in St. Kilda, and I believe in various other localities, and was occasionally observed in several of the islands. In the end of July, while crossing the moors of North Uist on horseback along with three companions, a male Peregrine flew past us with a *Lestris Richardsonii* in its talons, and another, probably the mate of the murdered bird, in hot pursuit, uttering incessant cries. A splendid specimen of the Jer Falcon, *F. islandicus*, was shot in North Uist a few years ago by my friend D. Arbuckle, Esq., and another was seen in the adjacent island of Pabbay by Mr. Nicholson (Berneray), but was not procured. *F. Tinnunculus*, Kestril, occurred not unfrequently; *F. Æsalon*, the Merlin, once or twice; and the Hen Harrier, *Circus cyaneus*, was rather abundant, especially among the bogs of the two Uists, where it breeds.

Hirundo rustica is the only species of Swallow that I met with in the Hebrides, where it did not arrive till the end of June. About a dozen were observed at the landing-place of Pabbay on the morning of my departure for St. Kilda; and a single individual had been caught alive in the school-house of Berneray and brought to me a few days before. That rare bird the Hoopoe, *Upupa Epops*, extends its occasional visits to the Hebrides; for I was informed by my friend Dr. M'Leod of a bird previously unknown in that part of the country, which, from description, was immediately recognised as the species now mentioned. An individual was found in an exhausted state lying by the road-side near Balelone in North Uist, after a long-continued easterly gale, and died shortly afterwards.

The Wren, *Troglodytes europæus*, is pretty common; the Robin, *Erythacus Rubecula*, and Hedge Chanter, *Accentor modularis*, occurred only in the glen of Rhodil, where alone, in all the Outer Hebrides, is there wood in any quantity. Of *Saxicola Rubetra*, Whinchat, a solitary pair was observed at Ob in Harris, where the nest was found; *S. Œnanthe*, the Wheatear, arrived in the beginning of May (in Skye about the end of April), and soon became very abundant throughout the range. I have sometimes found as many as three or four nests in the walls of a single hut. A nest of the Redwing, *Turdus iliacus*, was found by Mr. Bullock many years ago in the glen of Rhodil; but although I visited the spot repeatedly, I failed in again meeting with the bird. The Song Thrush, *T. musicus*, is plentiful everywhere, and identical with speci-

mens from the south, although eggs brought by me from Harrris are certainly smaller and darker than usual, and the nest is different. The Common and Shore Pipits, *Anthus pratensis* and *aquaticus*, are both common; the nest of the latter I have frequently found at a distance from the sea.

The Raven, *Corvus Corax*, is generally distributed, but is nowhere numerous, unless when attracted by a stranded whale or drove of grampuses. Although it generally builds in lofty rocks overhanging the sea, from which I have taken the young, yet I know of a nest in the island of Berneray at an elevation of certainly not more than fifteen feet, but still quite inaccessible from above, and nearly so from below. The owners of this nest made great havoc among the poultry in the neighbourhood, and I have known one of them to kill a full-grown duck and partially devour it. *C. Cornix* was the only other species noticed, though both *C. Corone* and *C. frugilegus* are met with in Skye. The Hooded Crow is very plentiful, especially in St. Kilda, and, like the Raven, approaches the huts early in the morning, searching the dunghills for offal of every kind. It lives chiefly on shell-fish and crustacea; but when in South Uist in the end of July, I daily observed large flocks of this bird feeding on the larvæ bred in the putrid sea-weed collected into small heaps for manure. In the Hebrides it breeds in rocks, chiefly maritime; but in the neighbouring island of Skye, I have taken the nest in a tree by the roadside, at the head of Loch Snizort. The Starling, *Sturnus vulgaris*, is very common, beginning to collect into large flocks in July, and remaining thus till the end of April.

Fringilla domestica, the Common Sparrow, I found in only a single locality—among the ruins of Ormaclate Castle in South Uist, of old the family-seat of Clanranald; *F. cœlebs*, the Chaffinch, occurred only in the glen of Rhodil, along with *Coccothraustes Chloris*, the Greenfinch. *Linota Montium*, the Twite, is abundant, and the only Hebridian species of the genus. *Emberiza Miliaria*, the Corn Bunting, is plentifully distributed over the whole range; *E. Schœniclus*, Reed Bunting, is rare, and *E. Citrinella*, Yellow Bunting, was seen only at Rhodil. *Plectrophanes nivalis*, Snow Bunting, I found so late as the middle of May, when I shot a pair on the sand-hill of Berneray. The Skylark, *Alauda arvensis*, is common.

Cuculus canorus, the Cuckoo, was seen and heard occasionally, especially in North Uist, about Loch Maddy, and elsewhere. The Rock Dove, *Columba Livia*, breeds in great numbers in the maritime caves and fissures, and nowhere more abundantly than in the island of Pabbay. During summer its food consists almost entirely of *Helix ericetorum* and

Bulimus acutus, shells very abundant among the sandy pastures.

The Red Grouse, *Lagopus scotticus*, is abundant; and the Ptarmigan, *L. cinereus*, occurs sparingly upon Ben Mhore and Hecla in South Uist, and Ronaval in Harris, but more plentifully upon the summits of the Forest Hills. A single individual was seen in St. Kilda a few winters ago by the minister, who informed me of the circumstance, which seems almost incredible, the nearest land being fifty miles distant, from which it looks a mere speck upon the ocean. Yet birds apparently less capable of enduring continued flight, as the Corncrake and Wheatear, annually visit St. Kilda.

Charadrius Hiaticula, the Ringed Plover, is very plentiful, as is also *C. pluvialis*, Golden Plover; the latter congregates into vast flocks about the end of July, which betake themselves to the shore at low water; and I have seen the "ebb" of Berneray, a curious reef of bare stones extending upwards of a mile, in many places completely covered with their dense masses. *Vanillus cristatus*, the Lapwing, is very abundant in several of the islands, as Ensay, Killigray, and Toroway, as well as the two Uists and Benbecula. The Oyster Catcher, *Hæmatopus ostralegus*, is plentifully distributed, breeding in almost every maritime situation, as well as by the inland lakes; the nest varies considerably, according to the locality. It is extremely probable that the Turnstone, *Strepsilas collaris*, breeds in the Hebrides, at least occasionally; for I have seen it in pairs so late as the middle of June in the island of Ensay, and shot it in the end of July and beginning of August upon the reef of Berneray. *Numenius arquata*, the Curlew, is common, but I did not find it breeding; *N. Phæopus*, the Whimbrel, was first seen on the 2nd of May, and had disappeared by the end of the month, hence the vernacular name of May-fowl. It is very plentiful, and usually met with in small flocks of about twenty or so, and on its arrival is very tame, but soon becomes more wary. It chiefly frequents the pastures, but occasionally resorts to the shore at low water; none remain to breed, for I never heard of any being seen after the end of May. *Tringa variabilis*, the Dunlin, is very common, leaving the coast for the heaths in May, and returning in the end of July along with the young of the year. The Sanderling, *Calidris arenaria*, I have observed so late as the middle of May; hence it may possibly breed in some part of the district. *Totanus hypoleucos*, Common Sandpiper, occurs by the margins of most of the lakes, where it breeds. *T. Calidris*, the Redshanks, was shot in Berneray in the end of May, and found in pairs on the island of Toroway in June, and at Vall-

ay in August, but was not observed elsewhere, nor was the nest found. When crossing the sand fords between South Uist and Benbecula in the end of July along with Mr. D. MacGillivray, we fell in with a large flock and several smaller ones of *Limosa rufa**, Bar-tailed Godwit, which allowed us to ride up sufficiently close to enable me to identify the species; they were probably on their way southward, after breeding in high northern latitudes. *Scolopax Gallinago*, the Common Snipe, is abundant in all the bogs; *Rallus aquaticus*, the Water Rail, occurred in North and South Uist; *Crex pratensis*, the Land Rail, was plentiful during the summer, frequenting at first the dense patches of *Iris Pseudacorus* in the marshy grounds, and resorting to the corn when that is tall enough to afford shelter. *Gallinula chloropus* and *Fulica atra*, the Water Hen and Coot, are both pretty common in such of the lakes as have the margin furnished with aquatic plants. *Lobipes hyperboreus*, the Red-necked Phalarope, occurs in small numbers about Scolpig in North Uist, and in the adjacent island of Vallay. In the latter situation it may usually be found about the drains and ditches in the neighbourhood of the Manse, where it was first observed by Mr. D. Macrae.

Anser brachyrhynchus, the Pink-footed or Short-billed Goose, breeds in great numbers in the small islands of the sound of Harris, as well as those of the interior of North Uist. This bird was seen in flocks so late as the beginning of May, was observed in pairs among the islands in the sound about the middle of the month, and had the young fully fledged and strong upon wing about the end of July; it had again collected into flocks by the beginning of August, for late in the night of the 8th of that month, as I was riding in great haste to overtake the ferry-boat for Berneray, while crossing the sandy margin of a shallow pool, I came suddenly upon a flock of geese amounting to several hundreds, judging from their cries, which startled my horse, and I may add, myself also. A large flock of Brent Geese, *Bernicla Brenta*, passed over head from the southward on the 2nd of May, while I was engaged collecting crustacea on the reef at Berneray: this is the latest date of their occurrence, for I could never hear of any remaining to breed. *Tadorna Vulpanser*, the Shieldrake, breeds in all the islands of the sound of Harris, with the exception of Berneray, Pabbay, and Shellay, and is plentiful in many parts of Benbecula and the two Uists. The eggs at first have a slight tinge of pink, which they soon loose. *Anas*

* The supposed species *L. Meyeri*, Leis., is plentiful along the Frith of Forth in many places; I shot several specimens last autumn at Musselburgh.

Boschus, Mallard, is not uncommon; and the Seal, *Querquedula Crecca*, has been known to breed in South Uist, but I never observed it there. The Eider Duck, *Somateria mollissima*, breeds in small numbers on some of the less frequented islets of the sound of Harris, as Skerry-vore, Shellay, and those between Killigray and Ob. The island of Haskir is the chief breeding-place of this bird, the numbers there found being represented as truly astonishing. *Harelda glacialis*, the Long-tailed Duck, was observed in pairs in the sound of Harris so late as the beginning of May, but none remained during the summer.

The Goosander, *Mergus Castor*, is pretty common, breeding by the larger lakes and occasionally by the sea, as near Loch Maddy in North Uist. *M. Serrator*, the Red-breasted Merganser, I have seldom observed inland, like the preceding; a few remain during the summer, and I took the nest with eggs on a small island between Killigray and Ob, in the sound of Harris. The Cormorant, *Phalacrocorax carbo*, is rather plentiful, breeding along with the next in St. Kilda, Shellay, and Towhead. *P. cristatus*, the Shag, is much more plentiful than the last, and may be found in most of the maritime caves, where it is so tame that I have several times seen them killed with stones thrown from above. Among many which I shot at Northtown, beside a cave which in days of old sheltered for a time one of the fugitives from Culloden, Mr. M'Leod of Berneray has one of a light brown colour: this being in the month of June, it could not be one of the young birds of the year, which are well known to have their first plumage of that colour. The Gannet, *Sula Bassana*, may be seen coasting along the headlands and entering the bays with the first dawn of morning, and retiring in the evening in long strings towards St. Kilda, where alone it breeds. When gorged with fish it is sometimes scarcely able to raise itself from the water, and I have seen it taken by the hand when asleep in this state. The Common Tern, *Sterna Hirundo*, was first observed on the 14th of May, and found breeding a few days after in company with the Arctic Tern, *St. arctica*, which is much more plentiful. On several of the smaller and less frequented islands on which I landed, many hundreds of their eggs were taken in a few minutes, and in some places one could hardly move without treading upon them; a loose cloud of terns of both species hovering about uttering incessant cries, and darting down to within a few feet of the invaders of their peaceful territory. The Laughing Gull, *Xema ridibundum*, is abundant in the marshes of the two Uists and Benbecula, also near Rhodil and in Berneray, breeding in all these situ-

ations. *Rissa tridactyla*, the Kittiwake, breeds only in Haskir and St. Kilda; in the latter place in large colonies. *Larus marinus*, the Great Black-backed Gull, is plentiful; its nest was found only on the small island of Shellay, at Lowhead, and in the interior of North Uist, among the small lakes. *L. fuscus*, the Lesser Black-backed Gull, is not so common as the others of the genus, but was found breeding in the same places as the preceding. Large colonies were noticed on several of the islets of North Uist, upwards of a mile from the sea. *L. canus* and *L. argentatus*, the Common and Herring Gulls, were equally abundant; the latter was never found breeding in the interior as the former occasionally was. *Lestris Richardsonii*, Richardson's Skua, breeds in several spots in the interior of North Uist, and a few stragglers might now and then be observed upon the coasts, chacing the terns and smaller gulls. The Fulmar, *Procellaria glacialis*, breeds in astonishing numbers upon the terrific cliffs of St. Kilda, but was not observed elsewhere, except when at sea in very gloomy weather; also in the evening and at daybreak, when I have seen them following in the wake of the boat, but seldom for any time. In St. Kilda I have taken them alive upon the rocks, but never observed them eject oil from their nostrils, as mentioned in ornithological works, though they *vomit* that fluid most copiously on being wounded or roughly handled. Such as I dissected had the stomach filled with clear oil, mixed with the horny mandibles of some *Sepiadæ*, on which, and not the "flesh of whales," as stated in books, the St. Kilda Fulmar may be presumed to subsist. *Puffinus Anglorum*, the Shearwater, was seen occasionally at sea, but on land only in St. Kilda, where it nestles in excavations formed by itself: like the next, it seems to be in great measure a nocturnal bird. The Stormy Petrel is extremely plentiful about St. Kilda, whence it issues about an hour before sunset: as to the species I am not quite certain, as I did not procure a single specimen; for although they sometimes came about the boat in great numbers, this happened only in very rough weather, when, as every one who has faced the Atlantic in an open boat during a heavy gale will readily imagine, shooting was rendered exceedingly difficult, and picking up the dead birds next to impossible.

The Dobchick, *Podiceps minor*, occurred in almost all the lakes of North and South Uist. The Eared Grebe, *P. auritus*, in the latter only, chiefly about Ormaclate. The Northern Diver, *Colymbus glacialis*, was plentiful until the beginning of June, when they all disappeared, and had not again returned when I left the country. *C. septentrionalis*, the Red-throated Diver, was observed on several of the lakes; and *C.*

arcticus, Black-throated Diver, was ascertained to breed in North Uist. I did not however find the nest of the latter bird, but mention the fact upon the authority of several of my friends who did so and know the species well—among others, Lieut. Macdonald of North Uist. The Guillemot, *Uria Troile*, was observed with the Razor-bill in vast numbers in the end of April, while crossing the Minch in the Uist packet, and that too during the whole extent, or about thirty miles. *Uria Grylle*, Black Guillemot, was found on all the rocky coasts, but was nowhere very numerous. The first young bird fully fledged was shot on the 14th of August. Of the Puffin, *Mormon arcticus*, I saw countless myriads in St. Kilda*, where they far outnumber all the other species. *Alca Torda*, the Razor-bill, is also very plentiful in St. Kilda, and, with the Puffin, breeds also in Haskir, but in far smaller numbers. When in St. Kilda I was told by some of the fowlers, that the Great Auk, *Alca impennis*, is still seen occasionally, but that none had been procured for many years back.

IV.—*Researches on the Structure of Annular Vessels.*

By Hugo Mohl†.

[With a Plate.]

Dr. Schleiden lately published some observations on the spiral formations in the cells of plants in the 'Flora' (see Annals and Mag. of Nat. Hist., vol. vi. p. 35), which interested me the more by reason of my having recently directed attention to the same subject (Flora, 1839, pp. 81–142), and especially as the result of his researches coincided with my own in all essential points concerning the structure of the cellular membrane of vegetables. His opinion principally differs from mine in two points, viz. the order of development of the secondary membranes and fibres in the woody fibre of *Taxus* and allied organisms, and the formation of the annular vessels.

I must wait for a more favourable opportunity to examine the first point; but, as regards the second, I will state the reasons which induce me to adhere to my former opinion, notwithstanding Schleiden has set forth a new theory respecting the development of the annular vessels.

Long ago (see 'Flora,' 1838, p. 378,) have I been opposed to the hypothesis, which is devoid of all foundation, although generally received even in the present day, that annular vessels owe their origin to the disruption of the spiral fibres of spiral vessels whose fragments become afterwards united in the form

* Where I procured a nearly white variety of this species.

† From the Flora, 1839, p. 673.

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Whoever has examined the development of spiral vessels and spiral cellules, and recognised their constant analogy with each other and with the dotted cellules, will not doubt for an instant that he sees in the fibre of spiral vessels, not a particular and independent organism, but rather the secondary membrane of the vascular utricles, divided in a spiral direction into one or more parallel bands. As regards the organization of this pretended fibre, I refer therefore to my work on the organization of the cellular membrane, because all that can be said on the structure of the membrane of the spiral cellule is equally applicable to the wall of the spiral vessel. But as respects what I have to say concerning annular vessels, it is necessary to examine with care some points relative to the spiral fibre.

In the memoir above quoted I have detailed their striæ, their great facility of tearing in a spiral direction, the hollows and furrows lying in a similar direction, and more especially the slits, which entirely penetrate the thickness of the cellular membrane, as the reasons which favour the opinion that the secondary cellular membranes possess a fibrous structure. All these phænomena, which are so frequently seen on the parts of the cellular membrane situated between the dottings on the cells, are also observable on the fibres of the unrollable spiral vessels; but are not so often recognised in the latter, either on account of the narrowness of the spiral fibre, or that frequently, even under the highest magnifying powers, the spiral fibre appears homogeneous. When, on the contrary, the fibre is of a considerable width, so that it rather resembles a flattened ribbon than a semi-rounded or quadrangular thread, it does not, in most instances, present a homogeneous aspect, but furrows more or less deep are observable in it in the direction of the fibre, either in one row or side by side, and in this last case they give to it a retiform appearance (Plate I. fig. 2. and 3, *Commelina tuberosa*). In other cases these furrows penetrate through the entire thickness of the fibre, which, at different points, is divided into two or more fibres placed side by side. These fibres either take a parallel direction, or the detached fibre at a greater or less distance reunites with the other, or else one of the fibres arising from division, leaving the other part, which continues in its primary direction, rises in a more oblique spiral direction, until it reaches the adjacent coil of the fibre into which it merges. Thus, in short, we observe, that almost all the modifications of form found in the secondary utricular layers result from the close union of all the constituent parts of the fibre, from their more or less de-

cided separation into isolated threads, from deviations in the course of these from that of the main-thread, or from a reticulated union of the isolated threads.

The direction in which the spiral fibre is wound has, indeed, no direct connexion with the organization of the vessel; nevertheless I think it necessary to make some remarks on this subject, because several erroneous statements, partly founded upon an imperfect knowledge of the spiral, have been advanced by some authors. I have elsewhere said that the great majority of spiral vessels were wound to the right; that is, the volution of the fibre is such, that, to an observer placed in the axis of the cylinder around which the spiral line rises, the fibre appears to mount from left to right, as shown in the vessel represented at figure 5. Like most other phytotomists, Schleiden says that the spiral fibre is wound sometimes to the right, sometimes to the left; and he thinks it possible to admit provisionally, as a general rule, that in spiral organizations "co-temporaneously" developed, those which are situated immediately side by side in the direction of the radius have similar directions (*homodromes*), whilst those placed side by side in directions parallel to the periphery have different directions (*heterodromes*); and in proof of this law he relies on the constant crossing of the pore-like fissures in contiguous parenchymatous and ligneous cellules when observed in sections made parallel to the medullary rays. I must confess my inability to conceive how Dr. Schleiden can allege the crossing of the porous fissures in support of the volution of the fibres in different directions, since it proves quite the contrary. This crossing is seen when two vessels or cellules furnished with pores are superposed, and the adjacent parietes wound in opposite directions; but it is evident that this last case is only possible when the winding in the two vessels is homodromous *. It is quite true that we generally see the porous fissures crossing each other in a section parallel with the medullary rays; which proves that the different layers of cells visible in such a section and placed one under the other, are wound in a homodromous direction; but as at the same time the cells of every such layer are homodromous with each other, it clearly follows that, generally speaking, all the cells of a plant are homodromous; and this, in fact, will be found to be so on an examination of different sections of the same plant.

Without doubt spiral vessels exist which are wound to the left; but although I have latterly found them more frequently than formerly, I must still persist in asserting them

* [This illustration may be easily verified by applying two quills together, with equidistant homodromous or heterodromous spirals scratched upon them.—Ed.]

to be much rarer than those wound to the right, and that they should rather be considered as exceptions to the rule, since, in most plants, we find a hundred spiral vessels wound to the right for a single one wound to the left. Doubtless it is true that these proportions vary in different plants, and I cannot yet say whether the finding in them more frequently spiral vessels wound to the left be a fact peculiar to certain species or only to certain individuals: generally they are, as I have said, wound to the right. The volution to the right or to the left, in spiral vessels, is quite independent of the organization of the surrounding parts, as is proved by the fact that, in certain cases, not only the fibres of two superposed utricles of the same vessel are wound in opposite directions, but sometimes even in the same vascular utricle (as I have seen in the Gourd) the parts of the spiral fibre separated from each other by rings are wound in an opposite direction (Plate I. fig. 9).

When we examine the fibre of the perfectly developed annular vessel (for which researches I have been accustomed to use the *Commelina tuberosa*), we find its organization perfectly analogous to that of the spiral fibre, in the rings being composed sometimes of an apparently homogeneous substance, and sometimes exhibiting traces of a determinate structure.

In the broad fibres, as in the *Commelina tuberosa*, the fibre frequently exhibits a great number of shallow linear furrows or perfect fissures, forming a net-work of very narrow and elongated meshes (fig. 1, 3). More frequently still these fissures are found in an uninterrupted line in the medial line of the fibre, or they become confluent, and thus divide the ring into two superposed rings (fig. 4 *a*, *a*, *Commelina tuberosa*). When this latter division takes place, it generally recurs on every ring of a vessel. Frequently, however, this does not occur; but divided and undivided rings alternate in an irregular manner, the undivided rings being sometimes of equal size, sometimes of half the size of the divided rings, and sometimes of a size very inconsiderable in comparison with the divided rings (Plate I. fig. 1, *Commelina tuberosa*).

The direction of this line of division is parallel to the lateral edges of the ring, so that, by this fissure, the ring is divided into two superposed rings, which sometimes touch and sometimes are placed at a little distance from each other. According to Schleiden, this line of division proceeds from the coils of the spiral fibre being more or less completely soldered together, and always in pairs. We easily perceive that, in this case, the line of partition should be directed spirally from one edge of the ring towards the other, and that it should not be parallel

to its edges; but as the latter is constantly the case, we must reject this explanation of the origin of the line of partition.

In the developed annular vessel, the rings are either entirely isolated, or two or three are joined together in different ways. It not unfrequently happens that the line of partition does not divide the ring throughout the whole of its circumference, but that the two superposed rings are united for a space variable in extent; in which case the parts separated are removed to a greater or less distance from each other, and are placed obliquely to the axis of the vessel. (Plate I. fig. 6, *Commelina tuberosa*: the same form is often met with in the *Canna indica*.)

In other cases, and this is the habitual organization, the rings are removed to a greater or less distance from each other, and are separated by a regular spiral fibre, which, according to the distance of the rings, describes one or more volutions, and frequently even a great number. Of this there are several modifications: very generally from a ring will proceed a spiral fibre of the same width as the annular fibre, the distance of whose coils is nearly equal to that of the rings in the portion of the vessel which exhibits this structure (fig. 9, of the Gourd); the other extremity of the fibre being similarly annexed to a complete ring, followed by rings, either isolated or again reunited by spiral fibres.

Very frequently also the spiral fibre placed between two rings does not proceed to a junction with the rings, but its extremities become attenuated and terminate at some distance from the ring. In the stem of the Gourd this is nearly as frequent as the preceding case (fig. 2 *a*, *Commelina tuberosa*; fig. 9, Gourd).

Often also, from two diametrically opposite points of a ring proceed two fibres in a continuous parallel direction.

Cases are sometimes met with, although rarely, where two rings are united by fibres slenderer than the annular fibre, which generally form a single coil, or at least only a small number of coils (fig. 1, 7, 8, *Commelina tuberosa*). This occurs in a very evident manner in the vessels whose rings are not homogeneous, but where the spiral fibre is divided by several fissures into threads united in net-work, as in the vessel represented in figure 1. The width of the fibres uniting the different rings presents no exact proportion to the width of the annular fibre, being sometimes about the half of it (fig. 8), sometimes considerably less (fig. 1). The point of union of the spiral fibre with the annular fibre is especially deserving of consideration. When examined with a sufficient magnifying power, we sometimes find (fig. 7, 8) that a part of the annular fibre separates itself to ascend in a spiral di-

rection; but that, in general, at the point of junction of the two fibres the annular fibre does not become thinner, the spiral fibre being attached only to the lateral edge of the annular fibre, which preserves an uniform thickness throughout its entire extent (fig. 1, 9, 10). There are even instances in which this union does not take place in the direction of the spiral, but where the spiral fibre terminates in two divergent branches (fig. 10 *a*, *Commelina tuberosa*) separating right and left, and confluent with the annular fibre.

An examination of the proportions above mentioned, between the annular fibres and the spiral fibres which unite them, must excite doubts of the accuracy of Schleiden's theory of the origin of annular vessels. In fact the division which takes place in many rings is, as we have seen, nothing less than a proof of the ring being composed of the two united fibres of a spiral fibre; whilst, on the other hand, the direction of this division parallel to the edges of the rings is quite opposed to Schleiden's theory, and shows us that, in these more or less divided rings, we see a transition from the simple ring to two rings, situated at considerable distances from each other. An organization entirely analogous is also found in the spiral fibre, for there are spiral vessels traversed in the middle by a narrow fissure (fig. 4, 6, *Commelina tuberosa*), by which the decomposition of the simple spiral fibre into two fibres placed at certain parallel distances is indicated.

What chiefly militates against the formation of rings by the united spiral coils of a spiral vessel, is the proportion which the rings bear to the spiroïd fibres which unite them. And first, when the organization of the vessels is very regular, the rings and the fibres are generally of the same width (fig. 4, 9), which could not be the case if the rings were composed of a double twist of the fibre. If then the spiral fibres which unite the rings are slender, the width of these fibres bears no exact proportion to the width of the rings and of the divisions perceived in them (fig. 1); moreover, the fibres are sometimes soldered to the rings, and sometimes separated from them. The spiral fibres, when they are united to the rings, cannot be considered in certain cases, and according to the form of the point of union, as a part of the fibrous mass which forms the ring, this part separating from the ring, and continuing in a spiral direction.

I have thought it right to explain these considerations, in the first instance, upon the annular vessels in a state of complete development, because observations made on developed vessels are necessarily more precise and certain than those made on young vessels; not so much on account of the larger size of the developed vessels, but because, in consequence of

the greater thickness of their fibres, of the greater distance of these organs from each other, and of the absence of the mucilage with which the young vessels are gorged, these developed vessels present a much clearer contour, and the organization of their fibres is more easily observed. Doubtless it is true that we ought not to infer from the structure of a developed organ the mode of its development; but the examination of this structure is nevertheless of very great importance in studying the manner of its development, since we always thence obtain the means of proving the truth of any theory propounded on the history of development, a theory which ought not to be in contradiction with the results of an examination of the developed organ. Now in the present case this contradiction assuredly exists between the structure of the developed annular vessels and the theory of Schleiden.

Let us now see what information the examination of the young vessels gives us of the mode of their development. At first I selected the stems of different plants, especially of *Tradescantia tuberosa*, because Schleiden announced that he had remarked the metamorphosis of spiral vessels into annular vessels in the youngest internodes of subterranean and ascending stems. The results have not been favourable to the theory of Schleiden. For this examination it is not proper to select vessels placed at the interior angle of the vascular bundles, because these pass too rapidly through the phases of their development, and their diameter is also too small; the coils of their fibres being moreover at first too close together to allow any observations made upon them to be considered as conclusive. The larger vessels, placed more towards the exterior, present less difficulties in these respects, though here also an unfavourable circumstance occurs, viz. that the rings in the course of their development, in consequence of the feeble longitudinal growth of the vascular utricles, remain very close together, which may, in some cases, render the distinction of the annular and spiral formations in the fibres difficult, and which, in all cases, makes it rather hard to decide whether there does or does not exist between each pair of rings a slender spiral fibre which is subsequently absorbed. However I think I have observed with certainty, that from the beginning, and so soon as I could distinguish the fibres on the interior surface of the vascular utricle, under the form of thin, more or less narrow, diaphanous edges, they were not absolutely spiral; but that, as in the developed vessels, they formed either complete isolated rings, or rings intermixed with spiral fibres; so that, with the exception of the thinness of the fibres, and of the small distance of the rings from each other, there

is no essential difference observable between them and the perfectly developed vessels.

The examination of the vessels of the stem not having, however, furnished me with a perfectly satisfactory result, and my former researches on the roots of Palms and other monocotyledonous plants having shown me the greater facility of studying the development in this organ than in the trunk, I submitted the roots of *Tradescantia* to a very attentive examination, the results of which I consider to be quite conclusive. The examination of the roots presents this great advantage over that of the stems, that in the larger vessels, placed nearer to the centre, the fibres are not developed until a sufficiently late period, when their longitudinal growth is already terminated. At the period when the fibres of the vascular utricles are developed, these utricles have not only already attained to a considerable size, but the fibres in them are also, from the beginning, arranged at greater distances from each other, and their successive development may be followed in detail step by step, from one end of the root to the other. This examination is rendered easier in consequence of the vessels being deposited in a very transparent cellular tissue. In these researches I have recognised with the greatest clearness, and with a perfect conformity to what I had previously observed in the roots of Palms, that, from the time when the fibres make their appearance, and when they are still so tender, narrow and transparent, that it is often only possible to see them with a faint light, they already present all the different modifications of form which are observed in the perfect vessels. We then find, as at a later period, the same alternation of annular and spiral and reticulated fibres; but I have never seen the least trace of the formation in all vascular utricles of a spiral fibre whose coils would unite in pairs, and the portions of the spiral fibre serving as the means of union be absorbed; and I consider it as perfectly impossible that this transition of spiral vessels into annular vessels, if it existed, could have escaped me, because in a great number of roots I have followed the vessels from the moment when the utricles presented closed cells with thin parietes, and enclosed a nucleus.

Hence it results that the development of the annular vessels agrees with the observations made on the perfect vessels. Researches into these two organs show that annular, spiral, and reticulated vessels afford three different forms, very intimately connected, and passing frequently one into the other; but that they must not be considered as temporary degrees of metamorphosis of the same vascular utricle. It is true that

sels which, when mature, are purely annular; so that I could not but believe that I had before me not mere persistent modifications of structure, but really stages of transition, even though I could not have regarded the observed forms as actually detected in the act of development; not to mention, among other circumstances, that the persistent ring is distinguished by the sharpness of its outline, the firmness and clearness of its substance, from the yellowish gelatinous transitory portion with its eroded and defaced margin observed in the moment of dissolution. I trust now that Mohl himself will be convinced of the rectitude of my assertions in these particular instances.

As regards the other forms, as they are figured by Mohl f. 1—6, 10 (Pl. I.), they do not come under the notion of annular vessels as defined by me in my treatise, but under that of reticular formations, whose reference to one or more deformed spirals is as easy or even easier than in porous organizations.

But, in general, I might pronounce the conclusion as to the mode of development from the perfect form as highly improper, for it cannot have escaped Mohl, that, after the formation of the original spiral, in many cases secondary threads are developed as members of union, which consist of quite a different substance, since they are soluble in boiling alkali, yet apparently do not differ from the spiral, and make the perfect comprehension of the fundamental spiral extremely difficult. I consider the part of Mohl's figure 10 marked (*a*) as of this nature. The formation of such secondary threads is frequently observable in reticulate vessels and in some forms of scalariform vessels. They occur, however, in the most remarkable degree in the large purely spiral vessels of the stems of *Scitamineæ*, as in *Hedychyum coronarium*, *Canna*, &c., when on their gradual decline they are filled with cells. Such a peculiar luxuriance of the threads then takes place that the originally pure spiral vessel is only distinguished from a porous vessel by the perfect regularity of the pores. Moreover what moves me especially to adhere still to my views, is the philosophic necessity, in a faithful investigation of nature, to limit the number of principles of interpretation so long as the impossibility of referring a phænomenon to an old principle does not imperatively require a new one.

As such in point of fact, as respects the present state of science, must I now freely regard Mohl's discovery of the primary development of annular organisms; and nothing now remains but to let both modes of origin stand separately by each other. I by no means, however, think that such will always be the case. The conciliation of this schism will then

only be effected, when the solution of a far greater puzzle, viz. the construction of the spiral and its peculiar genesis, shall be achieved; and I would beg Mohl to direct his attention to this, as I myself have done long since. Heartily should I rejoice with him should it fall to his lot to solve this problem as he has already done in so many other cases.

VI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin.

[Continued from vol. vii. p. 471.]

On the Evolution of Heat by Plants.

A very beautiful series of experiments on this subject has been published by MM. G. Vrolik and W. H. de Vriese*; they have continued their researches on the evolution of heat in the spadix of *Colocasia odora*; they were published at the end of 1838, but we received the journals too late to be able to insert them in our former Report.

The above-mentioned observers express their astonishment at the explanation given by M. Raspail of the evolution of heat in the spadix of the *Aroideæ*, but add that their new observations were not made in order to disprove Raspail's view, for that is not necessary. The first observations were made with the spadix of *Arum italicum*; they were made in the open air, and no rise of temperature was observed: in the interior of an orangery another flower exhibited a considerable increase of warmth, and also when the light was shut out and the spatha removed, still an increase of temperature took place, as was to be expected. Moreover experiments were made with the spadices of *Colocasia odora* under similar circumstances, both when the spadix was cut away and when only turned back; the maximum difference between the temperature of the air and the interior of the spadix was $19\frac{3}{4}°$ Fahr.

Moreover interesting experiments were made on the phænomena exhibited by the spadices of *Colocasia* in different gases, for which purpose a very excellent apparatus was contrived. The rise of temperature in two perfectly similar spadices which happened to be in perfection at the same time was observed, one in the common air and the other in the above instrument in an atmosphere of oxygen. The latter in

* Tijdschrift voor Natuurl. Geschieden. en Phys., vol. iii. pp. 190—230; also in Wiegmann's Archiv for 1839, p. 135.

half an hour exhibited a temperature 4° higher than the one in the air. Oxygen was passed into the apparatus from time to time; it was confined by means of water, which also absorbed the greater part of the carbonic acid produced by the inflammation (verbrennung) of the spadix. In nitrogen no rise of temperature was observed, and it could not be seen that any gas was absorbed; all vital activity, and even the colour, were lost.

M. de Vriese* has also communicated some observations made by a M. C. Hasskarl, in Java, on the spadices of *Colocasia odora*; he found 22° Fahr. as the greatest difference between the temperature of the spadix and that of the external air, and this in the morning at eight o'clock; the next morning there was only a difference of 10° Fahr.

M. Dutrochet† observed the evolution of heat in the spadix of *Arum maculatum* by means of a thermo-electric instrument, which MM. van Beck and Bergsma (vide former Report, p. 83) also employed; he found the highest temperature exactly at the time when the spatha opens, and this exceeded the temperature of the air by from 11° to 12° C. In another note‡ of the 11th of May, M. Dutrochet mentions, that during the night the temperature of every part of the spadix of *Arum maculatum* decreases, and increases again by day; it reaches its maximum early in the day, then diminishes, and disappears altogether in the night.

In the sitting of the Parisian Academy§ of the 10th of June, M. Dutrochet's researches on the temperature of plants (which had been delivered in on the 1st of July, 1838) were read. He says—plants possess a peculiar warmth; but this is completely absorbed by the evaporation of the sap, by the evolution of oxygen by day and of carbonic acid by night. It rather seems that, in the natural state, plants possess the property of producing cold, for they almost always have a lower temperature than that of the surrounding air. If however the evaporation is prevented, it becomes easy to observe the proper temperature of plants; for this purpose M. Dutrochet used a thermo-electrical apparatus. For the sake of comparison the experiments were made both with living and dead plants; the latter acquired the temperature of the surrounding medium, the former the same, with the addition of that which was hindered or destroyed by the evaporation; the latter M. Dutrochet reckons in maximo at $\frac{1}{4}$° Cels.; it is often only $\frac{1}{6}$°,

* Tijdschrift, &c., 5. iii. pp. 230—233.
† Comptes Rendus de 6 Mai 1839, p. 695. ‡ *Ibid.*, p. 741.
§ *Ibid.*, 10 Juin 1839, pp. 907—911.

or even $\frac{1}{10}$° or $\frac{1}{12}$°. The proper heat of young twigs and leaves vanishes during the night, or in general in the dark, and appears again under the influence of light. The higher the external temperature, the greater is the vegetable warmth. That part of the heat of plants which is carried off by the evolution of oxygen cannot be determined quantitatively.

M. Dutrochet had probably given the above researches into the safe keeping of the Academy, in order to secure to himself the priority of the discovery; however, the proofs that plants possess a peculiar heat resulting from their vital activity have been long since published in Germany; and in the second part of my 'Physiology,' published in the beginning of the year 1838, I have proved that an evolution of heat is exhibited not only by germinating seeds and by the fresh fruits of *Areca Catechu* when lying together, but also by leaves and herbs in general; "singly they do not exhibit any warmth on account of the evaporation, but so much the more when they lie together in masses." It must not be believed that I state this as a simple idea or theory, for I have convinced myself of its correctness with the thermometer in my hand; I have several times experimented with fresh-cut grass and fresh spinach leaves*. At the same time I showed, that those botanists who wished to prove or disprove the existence of vegetable heat could not choose a worse part for their experiments than the *wood*. The very low degree of warmth mentioned by M. Dutrochet is not sufficient to prove the existence of vegetable heat; for in my first Report (Wiegmann's Archiv, 1835) I have mentioned some experiments, according to which bad conductors, as for instance, the wood of chairs and tables in my room, exhibited an excess of heat of 2° R. above that of the air, etc. A note which M. Dutrochet has added to the above letter on the 6th of June 1839, states that his new researches confirm the former ones. In the stem of *Euphorbia lathyris* he saw the vegetable heat amount to $\frac{1}{3}$° C., but only so long as it was in a verdant state. He also remarked the heat in the roots, fruits, and even in the embryos. Complete exclusion of light totally prevents the rise and fall of temperature, but this does not always take place the first day; M. Dutrochet remarked the change of temperature by night and by day even on the second day of the experiment.

From some remarks on the above treatise of M. Dutrochet† made by M. Becquerel, it appears that he had used the thermo-electrical apparatus for determining the heat of plants two

* Is not the accession of heat in this case the result of fermentation?—Ed.

† Comptes Rendus de 17 Juin, p. 939.

years ago. The observations were made in company with M. Mirbel in the botanical garden on the twigs of an *Acacia*: observations on dead and living boughs gave directly the most striking differences of temperature. In the following year M. Dutrochet wished to institute similar experiments, and made use of the advice and experience of M. Becquerel*. In the sitting of the Academy of 1st of July, M. Dutrochet replied to the statements of M. Becquerel, and endeavoured to show that his observations by no means proved with certainty the existence of a peculiar heat in plants.

MM. Bergsma and van Beck†, in consequence of Dutrochet's researches, have sent a letter to the Academy at Paris, in which they describe their new experiments on the heat of vegetables, by which it is clearly proved that the transpiration is the cause of the difficulty in measuring the peculiar temperature. They chose (in January 1839) a hyacinth growing in a glass for their experiments. The glass was put into another vessel containing water of a higher temperature, in order in this manner to increase the activity of the roots.

The needles of the thermo-electrical apparatus were then inserted into the external parts of the flower-stalk, and instead of an increase of temperature, they observed a fall; the apparatus exhibited, viz. 17·5° C., while that of the water was 28·5°. The experiment was repeated several times with like success, as also with the pedunculus of *Entelea arborescens*, R. Br. This phænomenon is explained by the powerful evaporation which is caused by the increased activity promoted by the warm water. When the needles were inserted into the middle of the flower-stalk of the hyacinth, the temperature of the interior was found to be 1° higher than that of the surrounding air.

All the above treatises of Dutrochet, Becquerel, Bergsma, and van Beck, are to be found in the August number of the 'Annales des Sciences Naturelles.'

On the 21st of November M. Dutrochet‡ communicated to the Academy some new observations which he had made during the previous summer on the heat of vegetables; he states generally that plants possess a peculiar heat, which is principally located in the green parts. This heat exhibits a daily periodicity; it reaches its maximum towards midday, and its minimum during the night. M. Dutrochet communicated his special experiments on different plants, from which the daily variations of temperature may be recognised, *e. g.* in

* Comptes Rendus de 1 Juillet, p. 47. † *Ibid.*, 2 Septembre, p. 328.
‡ *Ibid.*, 18 Nov., p. 613.

Euphorbia lathyris, L., which exhibits a considerable heat, which vanishes completely during the night, whilst in other plants traces of it remain. The hour at which plants reach their maximum temperature is the same for each single plant, but different for different plants; thus for instance, *Rosa canina* at 10^h, *Allium Porrum* at 11^h, *Borago officinalis* at midday, *Euphorbia lathyris* at 1^h, *Sambucus nigra* at 2^h, and *Asparagus offic.* and *Lactuca sativa* at 3^h. The greatest heat is in the neighbourhood of the principal bud, and in woody plants often only in the green extremities. Other experiments confirm the fact, that plants growing in the dark lose their vegetable heat, but experiments on different fungi showed that these also possess a daily periodicity; *Boletus æneus* exhibited a heat of $\frac{1}{2}^\circ$ C.

Finally M. Dutrochet* has published a short note on the heat of the spadix of *Arum maculatum*. The spadix exhibited the greatest heat in the first day of blossoming, and by its influence the rapid opening of the spatha was produced; on the second day the maximum was not so high, and was situated principally in the male flowers, by which the dispersion of the pollen was effected. What *Arum maculatum* here exhibits on the large scale is also seen in the young twigs of all other plants.

On the Odours of Plants.

The Academy of Sciences of Brussels has given as a prize-question for 1838, "The production of odours in flowers," which, as it remained unanswered, was repeated for 1839. As an answer to this question, M. Auguste Trinchinetti de Monga, formerly Professor at the University of Pavia, has sent in a memoir, which has been rewarded with the silver medal; and M. Morren has, in the name of the Academy, delivered a circumstantial report of this work, from which we shall here select the most important parts.

The work is divided into two sections; the first treats of the odours of flowers in general: the author speaks of the difference between the odours of the flowers and of the other parts of plants, of the organs of flowers which exhale the odours or from which they proceed, of those in which they are prepared, of the chemical characters of these substances, of the manner of exhalation, and lastly, of the function of odours. In the second part he treats of the odours in respect to their intensity, their quantity at different periods of the development of the flower, and in respect to the hours at which they are perceptible; he at the same time gives methods to investigate them, and speaks

* Comptes Rendus de 16 Dec., p. 781.

principally of intermitting odours. There is found, says M. Trinchinetti, in all the parts of plants a certain odour arising from resinous or camphorous substances, as in the *Laurineæ*, *Labiatæ*, *Umbelliferæ*, and *Hesperideæ*; on the contrary, the odours of flowers are the effects of a particular function, by which a simple evaporation of the secreted substances is produced. [This, as well as most of the other statements, which are disproved by already existing observations, have been proved incorrect by the reporter M. Morren.] In general, the principal residence of the smell is in the upper surface of the corolla; if there is only a simple perigonium, the smell comes from its inner surface. The filaments have a smell similar to that of the corolla; the anthers, on the contrary, have a spermatic odour; the female organs are rarely odorous, as in saffron. The organs which evolve the odorous substances are, according to the author, always glands, which are said to have often escaped the observation of physiologists; however, M. Morren states that the author has applied the name of glands to some formations which certainly cannot be so called, *e. g.* he has held the resinous globules for glands, which I first discovered in the petals of *Magnolia grandiflora*; indeed M. Trinchinetti considers the papillæ on the petals to be organs in which these odoriferous matters are secreted. In relation to the chemical theory of the formation of odours, the author has only given that of Fourcroy and Couerbe; and he explains the exhalation of the odoriferous substances by a simple evaporation through organic and inorganic (?) pores, which takes place on the epidermis of the inner or upper surface of the flowering organs. If this upper surface be covered with wax, the result is said to become weaker; if the under surface be covered it remains the same, and turgescence increases the exhalation.

The question, "For what purpose do flowers smell?" is answered by M. Trinchinetti as follows:—It may be that the smells of plants were destined as a source of pleasure for mankind, and by these they exhibit their medicinal properties. However, nature strives doubtlessly to effect more than one object by these odours,—they are evidently intended to assist the sexual functions of the flowers; for M. Trinchinetti believes that the sexual organs are nourished by a sap which is prepared in the petals. The odorous exhalations of flowers exert a physical influence on the sexual organs, inasmuch as they diminish the tension of the steam which is so very injurious to the pollen which is burst by it, and thus fertilization cannot take place. He states that the flowers are surrounded by an odoriferous atmosphere which defends the sexual organs from the injurious influence of the aqueous vapours;

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(lxv. p. 165—175), he had already proved the identity of the red colouring matter in the flowers of the *Irideæ, Labiatæ, Rosaceæ, Ranunculaceæ, Geraniaceæ, Cannaceæ, Malvaceæ, Leguminosæ, Papaveraceæ, Myrtaceæ,* &c.; and that the red colour in the bracts of *Melampyrum arvense,* in the leaves of *Caladium bicolor,* in the fruit of *Prunus cerasus, Ribes rubrum, Sorbus ancuparia,* is similar, and that the identity extends to the red matter which colours the leaves in autumn.

From M. Morren* we have received anatomico-physiological researches on the appearance of indigo in *Polygonum tinctorium*; the work had been read to the Brussels Academy before the appearance of a similar one by M. Turpin, which was mentioned in the former Report, and is therefore to be considered as cotemporary with it. The views of MM. Turpin and Morren on the production of the indigo differ from each other. The former found this substance in the sap-globules of the cells which were coloured green by chlorophyll, but M. Morren believes that the indigo is produced in the intercellular sap (by which is meant the ordinary cell-sap). I may here state with certainty, from my own observations, that the blue colouring matter in *Polygonum tinctorium* is formed out of the previously green-coloured cell-sap globules. Whether however, in the colourless cell-sap of that plant, a substance is contained in solution which changes into indigo (as appears from M. Morren's statements) I cannot say, having made no decisive observations, and this is not at present the time for it.

The expressed sap of the leaves ought to be perfectly filtered and then treated for the formation of indigo, by which the question would be settled. Indigo is formed in all parts of *Polygonum,* but principally in the leaves; here it is found in the parenchym and also in the nerves, and only the "tissu fibro-vasculaire" does not contain a trace.

M. Morren directs attention to the regular position of the adventitious roots in this plant, which, as is so often the case with the genus *Polygonum,* grow out of the nodes.

M. Hünefeld† has communicated some more of his continued researches on vegetable colours; he has also found that there is not the same similarity between the colours of the different parts of plants, as for instance, the roots, leaves, flowers, and fruits, as would seem from outward appearances, and as some botanists have asserted. Very few changes of colour in plants are produced by the action of acid or basic substances. Moreover M. Hünefeld has published a long series of experiments

* Mém. de l'Acad. Royale des Sc., &c., de Bruxelles, tome xii.

† Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 65—80.

which he made on the behaviour of vegetable colours to several liquids, more especially æther, oil of turpentine, and some others, in the course of which several curious facts have been brought to light; the conclusions which M. Hünefeld has drawn, and which may interest us, are—the pigments of reddish yellow, or of *not*-yellow flowers, are probably all of an extractive nature.

For the examination of these colouring matters æther is a very useful solvent. The variety of colouring of a flower or leaf frequently arises from the deposition of one pigment over the other, or from their mixture. [On this subject better information is to be had from the newer phytotomic works.—*Mey.*] The principal change which the colours suffer in withering, etc. appears to be, that the assimilation of carbon only ceases by suppressed vegetation, while the absorption of atmospheric oxygen becomes excessive; for the easily oxidizable extractive matters, and tannin in oxidized extractive matter, become metamorphosed into gallic acid and into substances approaching more and more to humic acid, which then destroy the pigments.

M. Hünefeld* has also made a series of experiments to learn whether the formation of certain colours depends on iron contained in the plant. Quantities (one or two ounces) of the most different-coloured flowers were reduced to ashes. Some of these flowers contained evidently iron and manganese, others only iron, and traces of copper were found in the flowers of *Sambucus nigra*, which had already been noticed. The twigs and leaves of *Sambucus nigra* are said to contain no copper, but a considerable quantity of iron. Traces of manganese were found everywhere when sufficient quantities were burnt. As these metals, says M. Hünefeld, are found also in white flowers, and their quantities stand in no relation to the colours of the flowers, it seems that Meissner's theory is not correct. There is probably no vegetable which does not contain iron, and perhaps all the iron found in the human body is derived from this source.

[To be continued.]

VII.—*Indian* Cyprinidæ. By John M'Clelland, Assistant Surgeon Bengal Medical Service†.

Dr. Patrick Russell published in 1803 an account of 200 species of fishes found chiefly on the coast of Coromandel;

* Beiträge zur Chemie der Pflanzenfarben.—Erdmann & Marchand's Journal für prakt. Chemie, 1839, 1 Bd. p. 84—87.

† From the 'Asiatic Researches,' vol. xix. part ii. p. 217; having been presented to the Asiatic Society of Bengal on the 5th of September 1838.

there appears to be no copy of his work in Calcutta, nor have I been able to meet with it in India; but his collection appears to have embraced few *Cyprinidæ*, and scarcely any of those afterwards found in Bengal by Dr. Buchanan*. The fishes of Ceylon, as well as those of the Bay of Bengal, have recently excited the attention of naturalists †, while those of the Sunderbuns and the vicinity of Calcutta have long been objects of interest to collectors for the museums of France and the other parts of the continent where alone ichthyology seems to have been cultivated as a philosophical branch of zoology.

2. Dr. Buchanan appears to be the only author who has devoted his attention to the freshwater fishes of Bengal, and his success seems to have left little for others to do in the way of discovering new species. His 'Gangetic Fishes,' published in Edinburgh in 1822, contains descriptions of no fewer than eighty Cyprins, of which number he has only given figures of twenty-one. And unfortunately, Cuvier appears to have adopted such only as were figured in that work, leaving the rest as doubtful materials, which, from their extent, and the deficiency of the details connected with them, perhaps deterred him from the task of entering into, or finishing, his account of the Carps, in the hope of receiving further particulars regarding them from India.

3. It was partly with a view of supplying this deficiency that I devoted the time we spent on rivers, during our journey ‡ to Assam in the winter of 1835-6, to the examination and figuring of species. The obscurity of Buchanan's specific descriptions, which with few exceptions are chiefly composed of characters of generic value, rendered the task of identifying his unfigured Cyprins most difficult and uncertain. Nevertheless it appeared to me to be a desideratum that must be accomplished sooner or later by some one, and at length, after perseverance for the better part of three years, occasionally giving it up in despair, I succeeded in identifying most of the species unfigured by Buchanan, as well as in having made two series of finished drawings of them, one set for England and one for India. After all this, and after the present paper had been ready for publication in April last, my notice was, for

* Afterwards Dr. Buchanan Hamilton. As most of his publications have appeared under the name of Buchanan, authors should follow the example of Cuvier in the 'Règne Animal' and 'Histoire Naturelle des Poissons' in referring to the author of the 'Gangetic Fishes' by the name by which he is best and will be universally known, in proportion as his vast works on Indian statistics and natural history transpire.

† Mr. Bennett and my friend Dr. Cantor.

‡ I allude to the deputation of Dr. Wallich, Mr. Griffith, and myself to Upper Assam.

the first time, attracted by a remark of Buchanan, in consequence of which I thought it necessary to make inquiry for certain drawings alluded to, 'Pisc. Gang.' p. 316. I had heard of drawings at the Botanic Garden, but never saw them, and always supposed them to be merely the originals of published figures; but I confess I was quite unprepared to receive at that time a collection of drawings from Dr. Wallich, amounting to 150, beautifully executed, and including nearly all the unpublished species on which my painters had been so long employed, with the specific names in Buchanan's hand-writing marked under the figures, so as to leave no doubt or difficulty in referring them to corresponding descriptions in the 'Gangetic Fishes.' I am not prepared to state how many unfigured species this interesting collection contains, except in the particular family which is the subject of this paper. Along with these drawings I received intimation from Dr. Wallich, that two folio volumes of manuscripts and drawings on general zoological subjects, by the late Dr. Buchanan, still remain at the Garden. The descriptions alluded to may probably serve as a key to Hardwicke's 'Illustrations,' into which I perceive several figures of *Cyprinidæ* have been accurately copied, except in the colouring, from Buchanan's drawings; and as no descriptions of the plates of Hardwicke's work have been yet to my knowledge published, the source from whence the figures in question came does not transpire, and there is no allusion to it on the plates; at any rate it is unfair to General Hardwicke, as it is to Dr. Buchanan and to all who are engaged in pursuits connected with the natural history of this or any other country, to have the unpublished works of any man shut up for twenty-two years in a library that is not open to the public*.

* Buchanan's Researches regarding the fishes of India commenced on his arrival in the country in 1794, and ended with the publication of the 'Gangetic Fishes' in 1822. Anything that tended to lessen the value of a work that occupied so much of such a life is to be regretted. It is stated in a biographical notice of Buchanan in Chambers's 'Lives of Scotchmen,' that on his departure from India he was deprived by the Marquis of Hastings of all his extensive drawings and papers relating to every branch of natural history, *particularly botany*; "although to me," quoting his own words to the Edinburgh Philosophical Society, "as an individual, they were of no value, as I preserve no collections, and have no occasion to convert them into money, but I was merely desirous of seeing them safely deposited in the India House." In deciding that Buchanan's papers should be retained in India, it may be presumed that the object was, that they should here be rendered more useful to the country than they could be in England. It could scarcely have occurred to the Marquis of Hastings that these works would be consigned to oblivion, and the author in consequence superseded by his successors.

The following are the names of the unpublished figures of *Cyprinidæ* in this collection of drawings*.

Cyprinus Gugani, *Buch.*
——— Gorachela, *id.*
——— Joya, *id.*
——— Cachius, *id.*
——— Loubuca, *id.*
——— Phula, *id.*
——— Bhola, *id.*
——— Gora, *id.*
——— Borelio, *id.*
——— Rerio, *id.*
——— Dangila, *id.*
——— Balibola, *id.*
——— Bukrangi, *id.*
——— Loya, *id.*
——— Phulchela, *id.*
——— Titius, *id.*
——— Terio, *id.*
——— Sutiha, *id.*
——— Phutunio, *id.*
——— Gelius, *id.*
——— Kanipunte, *id.*
——— Casuatus, *id.*
——— Cursis, *id.*
——— Cursa, *id.*
——— Chola, *id.*
——— Conchonius, *id.*
——— Jogia, *id.*
——— Shakra, *id.*
——— Barna, *id.*
——— Vagra, *id.*
Cyprinus Borila, *id.*
——— Anjana, *id.*
——— Bata, *id.*
——— Bangana, *id.*
——— Pangusia, *id.*
——— Sarana, *id.*
——— Kunta, *id.*
——— Tor, *id.*
——— Sada, *id.*
——— Lati, *id.*
——— Gohama, *id.*
——— Godeyava, *id.*
——— Dheno, *id.*
——— Jauyali, *id.*
——— Paungsi, *id.*
——— Bimaculatus, *id.*
——— Sucatio, *id.*
——— Balitora, *id.*
Cobitis Gongota, *id.*
——— Balgara, *id.*
——— Cucura, *id.*
——— Guntea, *id.*
——— Botea, *id.*
——— Pangia, *id.*
——— Biltura, *id.*
——— Turia, *id.*
——— Scuturiginum, *id.*
——— Savona, *id.*
——— Corica, *id.*

* But although they seem to have been withheld from Buchanan himself, the following drawings from his original collection of unpublished figures of fishes have found their way from the Botanic Garden into Hardwicke's 'Illustrations,' without any acknowledgement to point out from whence they were derived.

Tab. 84. *Hypostomus sisor*, Buch.; *Sisor Rabdophorus*, id., Gan. Fish., two drawings.

Tab. 85. *Malopterus Kazali*, Buch. Two figures: name changed to '*Malopterus* (*Ailia*) *Bengalensis*,' Gray, in the pirated figures.

Tab. 86. fig. 1. *Cyprinus angra*, Buch. Pirated figure disguised under bad colouring, and named '*Cyprinus Hamiltonii*,' Gray.—Fig. 2. *Cyprinus goha*, Buch. Colouring much exaggerated. There are two figures of each species, so that this plate has been taken wholesale from Buchanan.

Tab. 87. fig. 3. *Cyprinus chedra*, Buch. A good copy of a very beautiful drawing in Buchanan's collection.

Tab. 89. fig. 1. *Syngnathus carce*, Buch. (*Kharke*, id., orig. draw.) Note —an error in spelling the generic name of this species, as written by

4. An examination of the viscera connected with the digestive organs, together with the form of the mouth, suggested the possibility of identifying something on which the natural arrangement of fishes might be founded. In those Carps whose mouths are constructed for the collection of vegetable food, I found, as might be expected, the greatest development of intestinal canal; in these the mouth is invariably either horizontal or directed downwards, as in the Cirrhins: all such

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Buchanan on the original drawing, is preserved in the pirated copy. Fig. 4. *Syngnathus deokpata*, Buch.

Tab. 91. fig. 1. *Mystus chitol*, Buch. Colouring much exaggerated in the pirated copy.

Tab. 93. fig. 1. *Cyprinus mosal*, Buch. Two figures, and two of *Cyprinus morala*, id. The coloured copy of this last is so badly executed, that the characteristic marks of the species, though well depicted in the original by the obscure transverse streaks crossing the sides, are quite omitted in the copy.

Tab. 94. fig. 1. *Cyprinus tileo*, Buch.

Tab. 95. fig. 1. *Ophisurus boro*, Buch. This species is referred to Buchanan's manuscripts, but nothing is said to point out from whence the drawing was obtained; but it is so accurately traced from Buchanan's original, as to remove any doubt on that score.—Fig. 2. *Ophisurus harancha*, Buch. By mistake on the part of the plagiarists in numbering the figures, the details of the first are given to the second species.—Fig. 4. *Muræna raitaborua*, Buch., disguised under the names of *Rataboura* '*Hardwickii*,' Gray; thus not only depriving Buchanan of the honour of figuring but also of naming a new species. As an instance of the little reliance to be placed on those who thus appropriate the works of others, it is necessary to observe, that the outline figure representing the lower parts of *Muræna raitaborua* is transferred to *Ophisurus bora*, in return for that of the last having been given on the same plate to *Ophisurus harancha*. In other plates not numbered, forming the 19th and 20th parts, are pirated as follows:—

Holocentrus? Kalkaya, B. MS., two figures, name changed to '*Pterapon trivittatus*.'—*Cottus chaka*, B. MS., name changed to '*Platycephalus chacca*,' marked '*natural size*.'—*Checlodipterus Bhutibue*, B. MS., name changed to '*Checlodipterus Butis*,' and the species referred to 'Hamilton,' but nothing said of the source of the two figures.—*Cyprinus morar*, B. MS., two figures, and *Cyprinus gora*, B. MS., forming an entire folio plate; the name of the latter changed to '*Cyprinus cora*.'—*Clupanodon chapra*, B. MS.; pirated figure called '*Alosa chapra*, N. Indian Ocean:' what the latter terms mean I cannot say, as the figure is from Buchanan's unpublished drawings of Gangetic species; like the remark 'natural size' annexed to *Cottus chaka*, it is certainly calculated to impress the reader with the belief that the author had seen the specimens from which the drawings were made. Neither of the remarks in question appear on the original drawings, which are characterized in Buchanan's hand-writing.

Buchanan died in 1829. The work to which so much of his labour has been transferred was published in 1833; and although no descriptions of the plates have yet appeared, it is no excuse for having suppressed the source from whence so many of them at least were derived, especially when it was thought necessary to acknowledge the source of other figures in the same work. These circumstances induced me to visit the Botanic Garden, with

types I have included under the head of *Pœonominæ* or herbivorous Carps, of which the Gudgeons and Gonorhynchs are the most remarkable.

5. In the last-mentioned genera the mouth is situated completely under the head, and is constructed in the Gudgeons for bruising soft vegetable substances, such as are found in

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the view of ascertaining if all the other plates in Hardwicke's 'Illustrations,' as well as those of fishes, were derived from the two folio volumes stated to be in the library of that institution. The following memorandum, which was made on the occasion, must be interesting to all who are in any way connected with zoological pursuits.

"Botanic Garden, 3rd September 1838.—Having obtained the requisite permission, I inspected Buchanan's zoological MSS. for the first time; they seem to contain descriptions and figures of the following animals:—

"Five species of *Simia*, one recently described by Dr. Harlan in the American Phil. Transac. as *Simia Hoolock*.

"Five species of *Felinæ*, one grey above and spotted beneath, a *Felis-leopardus albus*, and an *Ursus*.

"Six *Cervidæ*; a *Cervus niger*, Buch Several species of *Mus*, two bearing Buchanan's specific names; also an Ichneumon and a *Hysterix opeigura*, Buch.; three species of *Capra* bearing his specific names, as well as several species of Tortoises, two species of flying Foxes, two *Lacertæ*, and two *Paradoxuri*.

"Of birds I observed about sixty species of *Falconidæ*, about 150 Insessores, and about 74 *Grallæ*, including many rare *Tantalidæ*, and the species of *Ciconia* recently described as *C. cristata*, which appears to have been named nearly thirty years ago by Buchanan *Ardea crinita*; all which, in addition to the fishes, are drawn in duplicate, thus amounting to about 900 drawings." Although Buchanan was professedly a botanist, his researches appear to have extended to all branches of natural history except entomology. His volumes on Gangetic Fishes, published at his own expense, under the disadvantage of being deprived of the greater part of his figures, are the only part of his zoological labours that are known, yet his inquiries in other branches of zoology were equally extensive, and equally entitled to publicity. It now appears that two quarto volumes of MSS., written with his usual erudition, have been retained in the library of the Botanic Garden since 1815; while every periodical that has since appeared deprived him of some portion of those claims to priority which his papers ought to have secured to him had they been placed in proper hands, or deposited in an institution where their existence could have been known or appreciated.

Had such an injury to the advancement of information resulted from an oversight in an ordinary public office, the circumstance would excite less surprise; but that the works of a naturalist should be so treated in a public institution expressly intended for the promotion of science, is so unaccountable to me, that I cannot presume to express an opinion on the subject. But as the case stands, perhaps the best remedy that can now be applied, in justice to Buchanan as well as to others who are still engaged in scientific pursuits, would be to give a complete edition of his labours, botanical and zoological, to the public; at the same time it is right to say, that no atonement can now make amends for the injury that has been inflicted on Buchanan as a naturalist, or for the time that has been lost in allowing others to go over unnecessarily the ground which he investigated, instead of beginning where he left off.

exist*. This is exemplified by a comparison of typical with subtypical groups, as *Quadrumana* with *Feræ* in the orders of Mammalia, and *Insessores* with *Raptores* in the orders of birds; as this is true with regard to higher groups, it should be just as applicable to the lower assemblages when they happen to be equally complete in their parts.

11. The above inference, whether its principles be just or not, has proved to be perfectly correct, notwithstanding the remark of Linnæus, that Cyprins are perhaps the least carnivorous of the whole class of fishes, "feeding chiefly on seeds, grass, and even mud;" and the observation of Cuvier, "that they are the least carnivorous of all fishes." Those who have since written on the subject have for the most part adopted the views on this point of the great authorities just named.

12. A close investigation of our Indian species has led to very different results, and enabled me to form *Cyprinidæ* into three subfamilies. First, the *Pæonominæ*, or herbivorous Cyprins, already adverted to, which consist of species whose habits accord with the views of Cuvier and Linnæus; and *Sarcoborinæ*, or carnivorous Cyprins, consisting of several natural genera, and *Apalopterinæ*, including the *Cobitinæ* or Loaches, the *Pœcilianæ*, Cyprinodons, and other genera, which in the 'Règne Animal' appear to have little connexion with the family, as well as some new forms peculiar to India.

13. As the peculiarities of the first subfamily, consisting in the form of their mouth and digestive organs, have been pointed out, I shall now proceed to notice the characteristics in structure and habits of the several groups of *Sarcoborinæ*. Two of the most remarkable genera of this subfamily are the Perilamps and Opsarions; the first consisting of small insectivorous fishes remarkable for the brilliancy of their colours, always disposed in streaks. The second are lengthy, handsome species, larger than the Perilamps, though still of small size, and very bright in their colours, which are however disposed in cross-bars;—these are exclusively carnivorous, and remarkably voracious.

14. The Perilamps (*Perilampus*) form the connexion between the Systoms and Leuciscs. The mouth is placed in a directly opposite position from that which it occupies in the typical forms of the *Pæonominæ*; the jaws are directed upward, and their apices are placed on a level with the back or crown; their intestine is short, and in no instance exceeds the length of the body; and their food consists of insects only, which they derive by springing from beneath the surface of

* I here refer particularly to what Mr. MacLeay calls affinity of transultation, or that relation which the opposite points of a circle of affinities bear to each other.

the water, thus forming a direct contrast to the Gonorhynchs and other *Pæonominæ*, whose food is exclusively derived from sandy, rocky, or muddy bottoms. Eleven or twelve species of this new genus are described in this paper.

15. The Opsarions (*Opsarius*) differ from herbivorous Cyprins still more widely in their œconomy and habits. The body is long, the mouth widely-cleft and horizontal, and though without teeth, the symphysis of the lower jaw is armed with a sharp hook in the more characteristic, but which is blunter and less prominent the further we pass from the most typical forms; but this hook, more or less developed, is characteristic not merely of the Opsarions, but of the subfamily (*Sarcoborinæ*) to which they belong. It is received into a corresponding depression in the apex of the upper jaw when the mouth is closed. The back is straight; the dorsal is placed opposite to a long anal, both fins being situated near the caudal extremity, by which the power of darting or springing is rendered most perfect*. The abdominal cavity is long, and is chiefly occupied by a straight stomach of equal length, which is divided by a strangulation from a short fleshy intestine connecting the stomach directly with the vent, without any convolutions or elongation of the tube.

16. "The energies of nature," to use the words of Mr. Swainson, "are here concentrated as it were to the production of that form most adapted for one especial purpose," that of springing on their prey like the *Felinæ* or Cats, which they seem to represent. It is no uncommon thing to find an Opsarion so overgorged that the tail of its prey remains protruding from the mouth, to be swallowed after that portion which is capable of being received into the capacious stomach is sufficiently digested to admit of the introduction of the remainder†.

17. Two other genera of this subfamily remain to be noticed, viz. *Systomus* and *Leuciscus*. The first is made up chiefly of small species named Pungti by the Indian fishermen. If we were merely guided by their general appearance and the form of their fins, the only principle of division hi-

* The principal instrument of progressive motion in fishes is the caudal fin; other fins, as shown by Roget, are mere auxiliaries, serving to balance the body while it receives propulsion from the tail. Vide 'Bridgewater Treat.,' i. 286. This is correct in regard to fishes in general; but in the Opsarions and Perilamps, the dorsal and anal, from their position and size, contribute greatly to their velocity, being also situated on or near the tail; thus increasing the caudal surface, which, as Roget justly observes, operates as an oar does in sculling.

† I have seen Opsarions so often in this state, that I presume they are easier caught in it than in any other. A similar power of deglutition is recorded of sea-gulls by Blumenbach.

therto adopted in this family, they might be brought into the several subgenera, *Cyprinus proprius*, *Cirrhinus*, &c. of the 'Règne Animal.' Buchanan, who published his 'Gangetic Fishes' cotemporaneously with Cuvier's system, had not an opportunity of consulting its divisions, while those of Lacépède, Bloch, and previous writers were not reconcilable to Indian species; Buchanan therefore formed temporary groups for his own convenience, applicable to the local features of the family in this country. The Pungti, like all his other groups, were formed according to native opinions of their habits unshackled by artificial views, and being better marked than most genera, Buchanan's Pungti have more or less affinity to each other.

18. The stomach and intestine of the Systoms are in none of the species I have examined more than thrice the length of the body, and the former, which is thick and fleshy, usually contains the remains of insects. The mouth is small, and when opened the intermaxillaries project so as to form a narrow tube,—hence their generic name.

It is in the Systoms we first perceive a tendency to the hook or prominence on the apex of the lower jaw after quitting the herbivorous genera; and for this reason, as well as other peculiarities which appear to point them out as a typical or most perfect group, they are placed first in the list of carnivorous genera.

19. The Leuciscs, or white fishes, succeed the Perilamps. In this genus the prominence on the lower jaw is more distinct, and I have restricted the genus to such as possess this character, having at the same time the dorsal and anal small—the former placed anterior to the latter. They are all carnivorous, but not constructed for leaping above the surface like the Perilamps, nor for springing like the Opsarions; although the shortness of the intestines, size of the stomach, and prominence of the tooth on the lower jaw prove them to be scarcely less rapacious, yet I am not sure as to the accuracy of separating them from one or other of the preceding genera merely on account of the size and position of the dorsal and anal fins, particularly as the dental hook is only of importance in distinguishing them from some of the *Pæonominæ*.

20. After this outline of the structure of *Sarcoborinæ*, a few remarks regarding their colours will be necessary, as embracing another principle on which the divisions have been formed. The whole of the subfamily *Pæonominæ* are remarkable for their uniformly plain colours, consisting of olive-green, bluish grey, or brown, extended along the back, and softened off on the sides, so as to leave the lower surface of the body an impure white, partaking more or less of the colours of

the back. The fins partake of the sober hues of the adjoining parts of the body, the pectorals and ventrals, as well as the branchial membranes and irides, usually displaying after death a slight blush of red, caused by the capillary effusion of blood in those parts. Of the species with which I am acquainted not one possesses a brilliant spot of any pure colour; but when we approach the limits of the next group, we begin to find in the Gonorhynchs obscure dark spots on either side of the tail of some of the species, as *G. bimaculatus*.

21. But, on the other hand, as soon as we cross the verge of the herbivorous group and enter the carnivorous, we find such spots as those alluded to become brighter and more numerous, and the opercula and fins to be stained with yellow and red in deep and natural tints. To *Systomus*, the first genus of this group, the Gold-fishes*, commonly called Golden Carp, belong. The intestinal tube of the Systoms, though only thrice the length of the body, or half the length of the abdominal tube in those herbivorous species in which it is shortest, is nevertheless twice the length of the same organ in any of the other *Sarcoborinæ*. As we advance in this subfamily from the Systoms towards the Opsarions, we find, as has been shown, the abdominal tube diminishing in length; and in proportion as this takes place, and the habits of species become more carnivorous, we observe the brilliancy of the colours becomes more remarkable.

22. The Perilamps, as already stated, are followed by the Leuciscs. In these the diversity of colour is not great, but is compensated for by the metallic brilliancy of the nacre, or silvery pigment with which the scales and opercula are covered, and from which the genus has derived its name, *Leuciscus*, *Albus*, or white fishes, though not applicable to all the species; for there is one which is marked on each side with the bright longitudinal streak of the Perilamps, and, like the blending of the markings already observed between the *Pæonominæ* and *Sarcoborinæ*, the species in question, *Leuciscus lateralis*†, seems to unite the white fishes with the Perilamps.

23. The Perilamps in their structure naturally follow the Systoms, and present numerous bright longitudinal lines of various colours, but particularly blue on their sides. They are all small species, of little or no direct utility to man; nor is it possible to account for the peculiar brilliancy of their colours in any other way than as an instance of that inscrutable de-

* *Cyprinus auratus auctorum.*

† *Cyp. Daniconius*, Buch., which appears to me to be identical with *Cyp. Anjano*, id.; but if not, the latter species, on account of certain peculiarities about the mouth which seem to be wanting in the former, must be referred to the Perilamps.

sign, by which it would seem that, in pursuit of aquatic insects, on which they subsist, along the surface of waters, they become the better marks for Kingfishers, Skimmers, Terns, and other birds which are destined to keep the number of fishes in check, especially in deep waters beyond the reach of the Waders*.

[To be continued.]

VIII.—*Notes on Birds.* By T. C. Eyton, Esq., F.L.S.

No. IV.

Psophodes Crepitans, Vig. and Horsf.

Tongue nearly the same as in *Menura Lyra*. Trachea largest at the upper extremity, but gradually contracted towards the inferior larynx; the tube bound firmly down in the angle made by the rami of the os furcatum. The inferior larynx furnished with five pairs of muscles of voice, as among the Crows and Warblers; the sterno-trācheales weak, the other pairs of muscles connected with the trachea moderately developed. Œsophagus of moderate size, largest at the upper extremity, narrowed near the middle, and again slightly swelling above the proventriculus, which is of moderate size. Gizzard filled with the remains of insects, muscular, and of moderate size. Intestinal canal of large diameter in proportion to the size of the bird, largest a little below the duodenum; rectum short, about equal in diameter to the duodenum; cæca rudimentary; cloaca rather large.

Length of intestinal canal from stomach to cloaca $9\frac{1}{2}$ inches. Length of rectum $1\frac{1}{4}$ inch. Sternum rather elongated, and straight on the posterior margin between the fissures, which are two in number, one situated near each lateral margin, nearly closed posteriorly, deep, oval, and large. Keel shallow, nearly straight on its inferior edge, traversed by raised bony ridges as in *Menura*; the anterior edge of the keel and the manubrial process also resemble in shape those portions in the above-named genus.

Os furcatum long, without any process at the point where it joins the sternum; the rami rounded, and bending slightly inwards, so as to approach each other near the middle; coracoids, pelvis, ribs, scapula, and caudal vertebræ also as in *Menura*. The numbering of the vertebræ is

Cer. 11; Dor. 7; Sac. 11; Caud. 6; Ribs 8, 5 true, 3 false.

Remarks.—In the structure of the soft parts and tongue *Psophodes* comes very near to *Menura*; the trachea however differs in not having the muscles of voice so strong, and in their being disposed as among the Warblers and Thrushes. *Menura* and *Psophodes* also agree in the form and length of the coracoids, scapula, and ribs, showing in these parts an affinity to Scansores, though not so strongly marked as in *Me-*

* See remarks on *P. perseus* in a subsequent part of this paper.

nura and *Pteroptochos*. The bones forming the pelvis approach very nearly in form and disposition to those of *Menura*, differing in no particular except in their smaller size. The sternum is broader in proportion to its length than in that genus, and agrees in the form of its posterior margin with the Thrushes and Shrikes, generally not having the portion between the lateral fissures produced as in *Menura*. The os furcatum agrees with the last-named genus in having the rami rounded, and in being destitute of a process at the extremity approaching the sternum; but in having the rami bent laterally inwards near the middle, so as to approach each other, it agrees with the Shrikes and Thrushes.

Not having been able to obtain a specimen of the South American genus *Thamnophilus* to dissect, it is of course merely conjecture, when I state that I believe the anatomy of that genus will be found to approach very nearly to that of *Psophodes*; referring to the external characters, although the bill differs much in form, the nature of the plumage and the form of the tail and wings are very similar.

Craticus Tibicen, Vieill.

Trachea, muscles of voice, tongue, and œsophagus as among the *Corvidæ* generally. Intestinal canal of moderate length; cæca scarcely more than rudimentary; cloaca large; gizzard of moderate size, oval, flattened, muscular, interior surface (epithelium) hardened, transversely rugose, filled with the remains of insects.

Length of œsophagus	4 inches.
Length of rectum	$\frac{3}{4}$,,
Length of intestine	20 ,,
Length of cæca	$\frac{1}{4}$,,

The skeleton of *Craticus Tibicen*, like the soft portions, does not differ materially from the general structure found among the *Corvidæ*; the scapula, however, is rather broader near the hinder extremity than in the middle, and the sternum proportionably larger than in any other *Corvidæ* with which I have had an opportunity of comparing it. The number of the vertebræ are

Cer. 12; Dor. 8; Sac. 12; Caud. 8; Ribs 8, 5 true, 3 false.

BIBLIOGRAPHICAL NOTICES.

Wiegmann's Archiv für Naturgeschichte. Seventh Year. Part I. 1841. Berlin.

We have already apprised our readers of the intended continuation of this valuable journal, (established and so ably conducted by our friend the late Prof. A. Wiegmann of Berlin,) under the superintendence of Dr. Erichson, in conjunction with Dr. Grisebach in Göttingen,

Prof. von Siebold in Erlangen, Dr. Troschel in Berlin, Prof. A. Wagner in Munich, and Prof. Rud. Wagner in Göttingen. The abundance of excellent original articles in the first number which has just appeared, convinces us that no pains have been spared that this periodical should maintain its station among the first-rate journals devoted to Natural History. In the plan nothing has been altered; it will, as usual, be accompanied by annual reports; that on botany, so well executed by the late Prof. Meyen, has passed into the able hands of the celebrated Link. Many of the papers we shall from time to time place before our readers, but for the present we must confine ourselves to merely indicating the contents with a few extracts.

The first paper by Dr. Erichson is entitled 'A glance at the Classification of the Evertebrate Animals.'

The second paper by Sars is 'On the Development of *Medusa aurita* and of *Cyanea capillata*.' This article confirms the beautiful observations of Von Siebold on the younger stages of *Medusa aurita*. The author had likewise observed that *Strobila* is merely a young state of this *Acalephe*. The results which the study of the development of these animals has led to are too important not to be noticed in this place, and we trust some of the lovers of natural science who dwell near the coast may be induced to lend their assistance in the investigation of this branch of science, in which so much still remains concealed. The author has given at the end of the memoir a summary of the results of his investigations, which we subjoin.

1st. The oval or oval-cylindrical young escape from the eggs contained in the ovaria provided with vibratile cilia: on the eggs are observed the *Vesicula Purkinji* and the *Macula* (*Vesicula*) *Wagneri*; the yolk exhibits the usual partitions or furcations. The young collect in the cotemporaneously developed marsupial pouches appended to the four oval tentacula.

2nd. They soon quit the mother, and swim, like Infusoria, about for a time, at last adhere to some foreign body, to which they fix themselves with their unbranched end; at the other free end a mouth opens, around which a circle of tentacula is gradually formed.

3rd. In this polypoid condition, which may fairly be termed a larva state, they already multiply, and indeed in the usual manner of Polypes, by means of buds and so-called stolones. The new animals thus produced resemble perfectly the larva.

4th. Lastly, after the lapse of a still undetermined time, the larva voluntarily divides into a number of diagonal pieces, all of which become new animals. These do not resemble the larva, but are discoid creatures, which swim about freely; their periphery is divided into eight rays, bipartite at the extremity; and they have a quadrangular, tubular, pendent mouth. Gradually, as they grow, the rays become shorter, the spaces between them where the marginal tentacula issue forth grow larger, the mouth divides and changes into four oral tentacula—in short, these animals become perfectly identical with the original mother (the *Medusa* or the *Cyanea*). It is, therefore, not the larva or the individual developed from the egg which is converted into a perfect *Acalepha*, but its progeny, originated

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4. 'On Stinging Organs of the *Medusæ*, and the occurrence of peculiar formations in Evertebrate Animals, which appear to constitute a new class of locomotive organs,' by Rud. Wagner.

5. 'Zoological Notices,' by Dr. A. Philippi. These we shall subsequently give in continuation of those which have already appeared in the 'Annals.' We will now enumerate the various heads: 1. *Fossarus*, a new genus of Mollusks. 2. On the genus *Eulima*, Risso. 3. On the genus *Truncatella*, Risso. 4. On *Tornatella*. 5. *Onchidium nanum*, n. sp. 6. *Euplocamus laciniosus*, n. sp.

6. 'Contributions to a systematical knowledge of the Larvæ of Insects,' by Dr. Erichson. 1st part: The Larvæ of the Coleoptera.

7. 'Grouping of the Genera of the Rodentia into Natural Families, with descriptions of some new Genera and Species,' by Prof. A. Wagner. The first part of this paper consists of a review of the literature on this subject, in which great praise is bestowed on the labours of Mr. Waterhouse*, to whose classification, however, it is objected, that not all families are reduced to their proper limits, and that some have been discarded which must be re-established. The author divides the Rodentia into twelve families, founded not merely on external habits, but chiefly on the structure of the skeleton and the dentition; in some cases the intestines have likewise been consulted.

I. Pedimana. Digiti anteriores longissimi, pedes posteriores pollice instructi; cranium rotundatum, orbitæ postice clausæ.
Only one genus belongs here, *Cheiromys*. Hab. Madagascar.

II. Sciurina. Pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda dense pilosa; dentes molares $\frac{5}{4}$; ossa frontalia dilatata, processu postorbitali distincto instructa; foramen infraorbitale angustissimum.
Genera: *Sciurus, Pteromys, Tamias, Spermophilus, Arctomys*.
This family is represented in all parts of the world with the exception of New Holland.

III. Myoxina. Pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda elongata villosa; dentes molares $\frac{4}{4}$, ossa frontalia valde coarctata, processu postorbitali privata; intestinum cæcum nullum.
M. Wagner has separated the only genus of which this family consists into the four sub-genera, *Graphiurus*, *Eliomys*, *Glis* and *Muscardinus*. Geographical distribution confined to the Old World.

* Mr. Waterhouse's paper, 'Observations on the Rodentia,' &c. Mag. Nat. Hist. 1839, pp. 90, 184, 274 and 593; and 'On the geographical distribution of the Rodentia,' Annals of Nat. Hist. No. 33. (1840) p. 418; and Proc. Zool. Soc. for Nov. 1839; see also 'Observations on the skulls of the *Caviidæ* and *Chinchillidæ*,' Proc. Zool. Soc., April 1839, and 'Observations on various Rodents in the Zoology of the Voyage of the Beagle.'

IV. Macropoda. Artus distincte saltatorii, anteriores brevissimi, posteriores longissimi; cauda longa pilosa; foramen infraorbitale magnum.

The four genera belonging here are divided into two sections.

a. Dentes molares irregulariter incisi.

Dipus; *Scirtites*, mihi (*Alactaga*, Fr. Cuv.); *Jaculus*, Wagl.

b. Dentes molares ab uno latere partiti. (*Meriones*, F. Cuv.) *Pedetes*.

Geog. distrib. Over Asia and a small part of European Russia, Africa, Northern America, and one occurs on New Holland.

V. Chinchillina. Auriculæ magnæ; scelides antipedibus subduplo longiores; cauda producta, supra et ad apicem longius setosa; vellus molle; dentes molares $\frac{4}{4}$ e laminis 2–3 parallelis compositi.

Three genera: *Eriomys* (*Chinchilla*), *Lagidium* (*Lagotis*), *Lagostomus*.

Geog. distrib. South America.

VI. Psammoryctina. Habitus murinus, artus proportionales, auriculæ mediocres (rarius magnæ), foramen infraorbitale magnum, mandibulæ angulus in cuspidem elongatum excurrens, dentes molares $\frac{4}{4}$.

α. *Habrocoma.*
Octodon.
Psammoryctes.

β. *Capromys.*
Aulacodus.
Loncheres.
(*Nelomys* and *Echimys*.)
Cercomys.
Dactylomys.
Petromys.

Confined principally to South America.

VII. Cuniculina. Corpus crassum, cylindraceum, caput obtusum, oculi minuti aut tecti, auricula et cauda nullæ aut parvæ, artus anteriores posterioribus robustiores, pedes 5-dactyli, dentes primores exserti, lati, truncati.

α. Ungues anteriores breves.
Ommatostergus.
Spalax.
Chtonoergus.
Rhizomys.
Georhycus.
Ctenomys.

β. Ungues anteriores longissimi.
Siphneus.
Ascomys.
Thomomys.
Geomys.
Bathyergus.
Haplodon (*Aplodontia*, Richardson).

Geog. distrib. South-eastern Europe, Asia, Africa and America.

VIII. Murina. Oculi distincti, auricula et cauda plus minusve exsertæ, artus posteriores anterioribus longiores, pedes anteriores digitis 4 et verruca hallucari, posteriores 5-dactyli, cauda nuda aut minus pilosa; foramen infraorbitale longitudinale,

supra dilatatum, infra angustatum; mandibulæ angulus rotundatus, dentes primores inferiores acuminati.

a. Molares $\frac{2}{2}$.
Hydromys.

b. Molares $\frac{3}{3}$.

α. M. tuberculati.
Mus.
Cricetus.
Dendromys.
Akodon.
Hapalotis.
Pseudomys.

β. M. plani, opposite incisi.
Mystromys.
Rhombomys.
Psammomys.
Meriones.
Euryotis.

γ. M. alternatim incisi.
Arvicolidæ. Sigmodontes.
Sigmodon.
Neotoma.
Elimodon.
Reithrodon.
Ctenodactylus.
Myodes.
Hypudæus.
Fiber.

c. Molares $\frac{4}{3}$.
Sminthus.

d. Molares $\frac{4}{4}$.

α. M. tuberculati.
Perognathus.*

β. M. plani, incisi.
Saccomys.

Distributed over the whole earth.

IX. Castorina. Corpus robustum, magnum, pedes 5-dactyli, posteriores palmati; dentes primores validi, cestiformes, molares $\frac{4}{4}$ complicati, latere altero triplicati, altero implicati.

Castor, Myopotamus.

Geog. distr. Northern & temperate districts of Old & New World.

Myopotamus belongs to the southern half of South America.

X. Hystricina. Corpus aculeis teretibus validis, setis intermixtis vestitum; foramen infraorbitale maximum; claviculæ incompletæ; dentes molares $\frac{4}{4}$ complicati.

α. Philogæa.
Hystrix.
Atherura.

β. Philodendra.
Erethizon.
Cercolabes.
(*Synetheres* and *Sphiggurus*.)

Southern Europe, Asia, Africa and America.

XI. Subungulata. Corpus pilis tectum, cauda brevissima aut nulla, ungues subungulæformes, foramen infraorbitale permagnum, claviculæ incompletæ, dentes molares $\frac{4}{4}$.

a. Molares complicati.
Dasyprocta.
Cœlogenys.

b. Molares compositi.
Hydrochærus.
Cavia.
Kerodon.

Confined to South America.

XII. Duplicidentata. Dentes primores superiores duplicati, foramen infraorbitale parvum, foramina optica conjuncta, palatum osseum singulariter coarctatum, claviculæ partim incompletæ, partim completæ.

Lepus, Lagomys.

Distributed over the whole earth with the exception of New Holland.

* *Dipodomys*, Gray (see vol. vii. p. 521), will perhaps be placed here.

The new genera and species described are:—

Rhombomys. Dentes primores superiores sulcati; molarium laminæ obtuse rhomboideæ, medio dilatatæ; os interparietale transversim coarctatum; habitus murinus, cauda longa crassiuscula, dense et breviter pilosa, apice subfloccosa. This genus is founded on *Meriones robustus*. Fr. Cuvier's *Gerbille indéterminée* (Trans. Zool. Soc. ii. 2. p. 143) belongs decidedly here.

Rhombomys pallidus. Rh. supra pallide flavidus, subtus albido-lutescens, auriculis parvis; cauda crassiuscula, supra isabellina, infra lutescente, apice nigro-fasciculata; dentibus primoribus superioribus bicanaliculatis.

Body.....	5″	6‴	Tail without hair	5″	1‴
Projecting hair.	0	6	Length of ear...	0	6
Hinder foot to apex of the claw				1	5

Hab. South-eastern Russia.

Mystromys. Dentes primores læves haud sulcati, molarium lamellæ (2–3) medio anfractæ, parte altera paululum post alteram posita; auriculæ pilosæ amplæ, cauda breviter et dense pilosa, mediocris, apicem versus attenuata.

M. albipes. M. subbrunneo-griseus, nigro irroratus, subtus griseo-albidus, pedibus albis, cauda supra fusca, infra albida.

Body, in straight line..	4″	11‴	Body curved..	5″	3‴
Tail.....	2	4	Length of ear.	0	$9\frac{1}{2}$
Hinder foot with claw .	0	$11\frac{1}{2}$	Breadth of ear	0	7

Hab. South Africa.

Euryotis pallida, Wagn. E. supra flava, nigro intermixta, lateribus subtusque e lutescente albida; auriculis mediocribus; cauda supra nigra, basi flavida, subtus lutescente; dentibus primoribus superioribus bisulcatis, inferioribus unicanaliculatis.

The length of the largest specimen in a straight line is 5″ 9‴, curved 6″ 1‴; of the tail, the apex of which is wanting, 2″ 7‴; of the smaller specimen, the body curved = 5″ 3‴, tail 2″ 6‴.

Hab. South Africa.

Dendromys pumilio, Wagn. D. fulvus, subtus albus.

Body in straight line 2″ 8‴, curved 2″ 11‴; tail 3″ 8‴; ear 0″ 5‴; front foot with claw 0″ $4\frac{1}{2}$‴; hinder foot 0″ 8‴.

Hab. South point of Africa.

Pteromys aurantiacus, Wagn. Pt. supra aurantio-fulvus, subtus albidus, sparsim ochraceo-lavatus; patagio prope carpum in angulum acuminatum excurrente, cauda plana, disticha, castanea.

Body 5″ 10‴; tail somewhat mutilated 4″ 3‴; ear 0″ 5‴.

Hab. Island of Banca.

Lepus Mediterraneus, Wagn. *L. timido* multo minor, auriculis capite longioribus, medio nudiusculis, apice nigris; nucha artubusque ochraceo-rufescentibus, cauda supra nigra, infra albida, stria alba post oculos.

Body in straight line	13″	6‴	Curved....	15″	5‴
Head.....	3	5	Ears.....	4	3
Tail with hair about	3	0	Ear-fissure.	3	8

Hab. Sardinia, Gibraltar?

8. ' On the Genera and Species of the *Comatulæ*,' by Joh. Müller, which terminates the present part.

In concluding this notice, we may express the wish that the various parts may appear with more regularity than heretofore.

W. Francis.

The Naturalist's Library: Mammalia. Vol. xi. *Marsupialia, or Pouched Animals.* By G. R. Waterhouse, Esq., Curator to the Zool. Soc. Lond.

The eleventh volume of this valuable and deservedly popular work, containing a history of the 'Marsupialia, or Pouched Animals,' has just appeared. The confusion in which the Marsupials have been hitherto involved, renders a volume exclusively devoted to them peculiarly interesting; the author of the work being an able naturalist and possessing abundant facilities for the successful prosecution of his labours, of which he has availed himself with great acumen and industry in the execution of his task.

Mr. Waterhouse commences by an Introduction, in which a concise review is taken of the history of the Marsupialia from the time of Linnæus to the present day, in which the views of various naturalists are examined,—a preliminary step to an exposition of the principles by which he is guided in the arrangement of these singular mammals. The point at issue between some naturalists of great eminence—namely, whether the Marsupialia constitute a natural group, of which the component parts are linked together by such bonds of structural relationship as cannot be dissolved with propriety, or whether the group is unnatural, its assumed component parts belonging, in truth, to other orders—is discussed with great clearness.

Cuvier, Geoffroy St. Hilaire, De Blainville, and Owen, celebrated no less for anatomical than for zoological knowledge, insist upon the former position. Among their opponents are Storr, Illiger, Swainson, and Ogilby. After detailing the arguments of these scientific men, and giving the results of his own analysis of the Marsupials, which he considers as forming a natural order, Mr. Waterhouse, alluding to Mr. Swainson's erroneous assertions, "that *nearly* all our leading naturalists have acknowledged the artificial nature of the assemblage," thus writes: "I think we might, on the other hand, say with safety, that all the most eminent anatomists (these being at the same time zoologists) agree in uniting them . . . . . I could wish, however, that this important question should not rest upon *authority*;—but to go through the train of reasoning by which the anatomists have arrived at their conclusions, would require more space than can be spared in a volume like the present."

"It has often been stated that the Marsupiata consist of animals of most dissimilar organization, and are united together only by a single peculiarity; however little weight some zoologists may attach to this single peculiarity, its value was almost immediately appreciated by the anatomists and physiologists. But I will now proceed

to show that the animals under consideration are united by *many* peculiarities, these serving to distinguish them from all other quadrupeds; whilst the rich collections now in the British Museum, and in that of the Zoological Society, show that the most dissimilar forms of marsupial animals are linked together by species exhibiting the intermediate grades of structure."

Mr. Waterhouse next enters into an examination, brief but still satisfactory, of their structural peculiarities, in which he refers to the labours of Professor Owen and others who have thrown so much light upon them. With respect to the mode in which the species are worked out, we cannot speak too highly. In the instances (and they are not few) where a confusion of synonyms has perplexed the inquirer, we find the knot unravelled; and though, in many cases, names given by modern naturalists to old and previously described species must sink, we feel assured that the imposers themselves of these names will rejoice, so that science be but benefited. The descriptions are full and clear; nearly all of them, indeed, says the author, were "carefully drawn up by myself from the original specimens contained either in the museum at Paris, the British Museum, or that of the Zoological Society*."

We cannot conclude our notice of the present really valuable contribution to natural history without referring to the plates. These, to the number of thirty-four, are faithful delineations of the species represented, and are at once effective and artistical.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

May 20, 1841.—The following papers were read, viz.—

1. "Catalogue of Geological Specimens procured from Kerguelen's Land during the months of May, June, and July, 1840."

2. "Catalogue of Birds collected on board Her Majesty's Ship *Terror*, between the Cape of Good Hope and Van Diemen's Land."

3. "Description of Plants from Kerguelen's Land, collected in May, June, and July, 1840."

The above papers are by John Robertson, Esq., Surgeon of Her Majesty's Ship *Terror*, and were presented to the Society by the Lords Commissioners of the Admiralty, and communicated by the President of the Royal Society.

4. "On the Fossil Remains of Turtles discovered in the Chalk Formation of the South-East of England." By Gideon Algernon Mantell, Esq., LL.D., F.R.S.

In this paper, the author gives a description, accompanied with drawings of a remarkable fossil Turtle, referable to the genus *Emys*, and named from its discoverer, Mr. Bensted, the *Emys Benstedi*, which has been lately found in a quarry of the lower chalk of Kent,

* And here it may be observed, that the number of species at present known, all of which are described in the volume before us, amounts to ninety-seven. Desmarest, in his 'Mammalogie' (1820), has characterized only forty-three.

at Burham, which is situated near the banks of the Medway, between Chatham and Maidstone. The specimen discovered consists of the carapace or dorsal shell, six inches in length and nearly four inches in breadth, with some of the sternal plates, vertebræ, eight ribs on each side of the dorsal ridge, a border of marginal plates, and one of the coracoid bones. It is adherent to a block of chalk by the external surface of the sternal plates. The marginal plates are joined to each other by finely indented sutures, and bear the impress of the horny scales or tortoise-shell with which they were originally covered. The expanded ribs are united together throughout the proximal half of their length, and gradually taper to their marginal extremities, which are protected by the plates of the osseous border. Mr. Bell considers the species to which it belonged as being closely allied in form to the common European Emys, and as possessing a truly fluviatile or lacustrine character. The plates of the plastron, however, as also the coracoid bone, resemble more the corresponding bones of marine than of freshwater turtles.

GEOLOGICAL SOCIETY.

Dec. 16, 1840.—A paper "On the Relative Connection of the Eastern and Western Chalk Denudations," by P. J. Martin, Esq., F.G.S., was read.

The author advances this as the first of a series of papers on the construction of that part of the country usually considered as appertaining to the great chalk denudation of the Weald, or more properly, the upburst of the secondary formations between the tertiary of the respective basins of London and Hampshire.

In venturing on this field of inquiry, he professes also to take up the subject where it was left by him in two former memoirs, one published in 1828 under the title of a 'Geological Memoir of Western Sussex, with some Observations on Chalk Basins and the Weald Denudation,' the other in the 'Philosophical Magazine' for February 1829; and to extend the number of demonstrative facts that bear upon the theory of denudation by disruptive violence and contemporaneous aqueous abrasion, there brought forward as a corollary to Dr. Buckland's theory of 'Valleys of Elevation.'

In pursuance of this object, he begins by an examination into the arrangement of the great chalk dome of Hampshire and Wiltshire,—the *Patria* of the chalk of Pennant and Conybeare; its anticlinal lines of disturbance or upheaval, and their connections with those of the Weald and the smaller western denudations of Pewsey, Wardour and Warminster.

He finds that six great anticlinal lines are the main instruments of the upbearing of this abraded chalk; that the three which characterize the smaller anticlinal western valleys are projected onward, and in a manner decussate three others which emanate from the western extremity of the greater valley of the Weald, the vale of Wolmar Forest, from whence he starts his inquiry; and that these lines do not inosculate or enter into each other; approximating, indeed, but little in any part of their course; severally dying

close relation of the acts of upheaval and violent aqueous abrasion. This necessarily implies the belief that the date of these lines of disturbance is posterior to that of all the stratified beds of the south-east part of England, as maintained in the author's former essays, but into the full discussion of which he declines to enter till the whole subject is before the Society.

Jan. 20, 1841.—A paper was first read, "On the Teeth of Species of the Genus *Labyrinthodon* (*Mastodonsaurus Salamandroides*, and *Phytosaurus* (?) of Jäger) from the German Keuper and the Sandstone of Warwick and Leamington," by Richard Owen, Esq., F.G.S., F.R.S.

The Warwick sandstone having been considered by some geologists to be the equivalent of the Keuper*, and by others of the Bunter Sandstein†, and as its true position remains to be determined, Mr. Owen, in the preliminary remarks to his memoir, points out the assistance which the discovery of reptilian remains in the Warwick sandstone of the same generic characters as those of fossils obtained in the Keuper of Germany, may afford in determining the question.

Before he proceeds to describe the fossils forming the immediate object of his paper, Mr. Owen shows that the genus *Phytosaurus* was established on the casts of the sockets of the teeth of *Mastodonsaurus*; and that the latter generic appellation ought not to be retained, because it recalls unavoidably the idea of the mammalian genus *Mastodon*, or else a mammilloid form of the tooth, whereas all the teeth of the genus so designated are originally and, for the greater number, permanently of a cuspidate and not of a mammilloid form; and because the second element of the word, *saurus*, indicates a false affinity, the remains belonging, not to the Saurian, but to the Batrachian order of Reptiles. For these reasons, and believing that he has discovered the true and peculiarly distinctive dental characters of the fossil, he proposes to designate the genus by the term *Labyrinthodon*.

The only portions of the Batrachian found in the Keuper of Germany, which have hitherto been described, consist of teeth, a fragment of the skull, and a few broken vertebræ; and in the Warwick sandstone of teeth only. In this memoir, therefore, Mr. Owen confines his attention to a comparison of the dental structure of the Continental and English remains. The teeth of the *Labyrinthodon Jaegeri* (*Mastodonsaurus Jaegeri*, Meyer) of the Keuper are of a simple, conical form, with numerous fine longitudinal striations; and the teeth transmitted to Mr. Owen from the Warwick sandstone by Dr. Lloyd, bear a very close resemblance to them. Their external characters not being sufficient to establish either specific or generic identity, Mr. Owen had sections prepared for microscopic examination of portions of teeth of the *Labyrinthodon Jaegeri* forwarded to him by Prof. Jäger, and of the English reptile; and though, from his previous examination of the intimate texture of the teeth of the

* See Proceedings, vol. ii. p. 453. † Ibid, vol. ii. p. 565.

Plesiosaur, Megalosaur, as well as of the Crocodile, Monitor, and most recent Lacertians, he did not hope to detect such modifications of structure as would obviously mark specific or even generic identity, yet the slices exhibited such decided characters, and those of the German fossils agreed so intimately with the sections obtained from the Warwick specimen, that Mr. Owen was enabled not merely to separate these fossils from all known reptilian animals, but to establish a generic community of character in the Keuper and sandstone remains. It was not, however, until he had caused sections to be made in various directions, and had studied them attentively in comparison with the teeth of true Saurians, Batrachians, and other animals, that he was enabled to comprehend the principle of the singular cerebriform convolutions which pervade the dental structure of this remarkable reptile. The base of the tooth of the *Ichthyosaurus* approaches most nearly in character to the peculiarities of nearly the entire tooth of the *Labyrinthodon*. It is impossible to convey clearly without illustrations the structure alluded to. It may, however, be stated, that in the fang of the tooth of the *Ichthyosaurus* vertical folds of the external layer of cement (the enamel ceasing at the base of the crown) are inflected inwards, at pretty regular distances around the circumference of the tooth, towards the centre to a distance about equal the breadth of the interspaces of the inflected folds; the interspaces being occupied by corresponding processes of the dentine, which radiate from the central mass of that substance. The thickness of this interblended cement and dentine, surrounding the pulp-cavity, is about one-eighth of the diameter of the tooth.

The plan and principle of the structure of the tooth of the *Labyrinthodon* are the same as those of the tooth of the *Ichthyosaurus*, but they are carried out to the highest degree of complication. The converging vertical folds of the external cement are continued close to the centre of the tooth, and, instead of being straight, simple lamellæ, they present a series of irregular folds, increasing in complexity as they proceed inwards, and resembling the labyrinthic anfractuosities of the surface of the brain; each converging fold is slightly dilated at its termination close to the pulp-cavity. The ordinary laws of dental structure are, however, strictly adhered to, and every space intercepted by a convolution of the folds of the cement is occupied by corresponding processes of the dentine. These characters were presented by a transverse section of a fragment of a tooth of the *Labyrinthodon Jaegeri* from the German Keuper, which included about the middle third part of a tooth, and Mr. Owen considers that the entire length of the tooth might be $3\frac{1}{2}$ inches, and the breadth at the basis $1\frac{1}{2}$ inch.

The external longitudinal grooves, which correspond to the inflected folds of the cement, extend upwards from the base of the tooth to about three-fourths of its height, decreasing in number as the tooth diminishes in thickness, and disappearing about half an inch from the summit of the tooth. Each fold of cement penetrates less deeply as the groove approaches its termination; and Mr. Owen

conceives that the structure of the upper part of the tooth may be more simple than that of the lower, but he has not yet been able to extend his investigations to it.

The dentine consists of a slender, central, conical column or "modiolus," hollow for a certain distance from its base, and radiating outwards from its circumference a series of vertical plates, which divide into two, once or twice, before they terminate at the periphery of the tooth. Each of these diverging and dichotomizing vertical plates gives off throughout its course narrower vertical plates, which stand at nearly right angles to the main plate, in relation to which they are generally opposite, but sometimes alternate. Many of the secondary plates, which are given off near the centre of the tooth, also divide into two before they terminate. They partake of all the undulations which characterize the inflected folds of the cement.

The central pulp-cavity is reduced to a line, about the upper third of the tooth; but fissures radiate from it, corresponding in number with the radiating plates of the dentine. One of these fissures is continued along the middle of each plate, dividing where it divides, and penetrating each bifurcation and process; the main fissures extend to within a line or half a line of the periphery of the tooth; the terminations of these, as well as the fissures of the lateral processes, suddenly dilating into subcircular, oval, or pyriform spaces. All these spaces constitute centres of radiation of the fine calcigerous tubes, which, with their uniting clear substance, constitute the dentine. The number of these calcigerous tubes, which are the centres of minor ramifications, defies all calculations. Their diameter is the $\frac{1}{7000}$th of a line, with interspaces equal to seven diameters of their cavities.

Mr. Owen then compares the structure of the section of a tooth procured in the sandstone of Coton-End Quarry, and lent to him by Dr. Lloyd of Leamington. The tooth nearly resembles in size and form the smaller teeth of *Labyrinthodon* figured by Prof. Jäger. All the peculiarities of the labyrinthic structure of the Keuper tooth are so clearly preserved in this specimen, that the differences are merely of a specific nature.

At the upper part of the tooth a thin layer of enamel*, besides a coating of cement, is inflected at each groove towards the centre of the dentine; but about the middle of the tooth the enamel disappears, and the convolutions consist of interblended layers of cement and dentine. Thus, on the supposition that the tooth of the *Labyrinthodon* of the German Keuper be capped with enamel, its extent must be less than in the tooth of the Warwick sandstone.

The inflected folds are continued for a greater relative distance before the lateral inflections commence than in the German species, and the anfractuosities are fewer in number, and some of the folds

* Mr. Owen has subsequently ascertained that this is not true enamel, but a layer of firm dentine, separated from the rest by a thin stratum of fine calcigerous cells.

are reflected backwards from near the central pulp-cavity for a short distance before they terminate.

The modifications of the complex diverging plates of the dentine hardly exceed those of a specific character, and the dentine itself is composed of calcigerous tubes of the same relative size and disposition as in the *Labyrinthodon Jaegeri*.

In a section taken from the middle of a smaller and relatively broader and shorter conical tooth from the Warwick sandstone, Mr. Owen found that the anfractuosities were more complicated, with numerous secondary and tertiary foldings, and the external layer of cement was relatively thicker than in the *Lab. Jaegeri*.

The generic identity of the Reptiles, indicated by the teeth from the Warwick sandstones, with the *Mastodonsaurus* of the German Keuper, Mr. Owen believes to be fully established by the concordance of their peculiar dental structure above described. And in conclusion, he says, if, on the one hand, geology has in this instance really derived any essential aid from minute anatomy, on the other hand, in no instance has the comparative anatomist been more indebted to geology than for the fossils which have revealed the most singular and complicated modification of dental structure hitherto known; and of which not the slightest conception could have been gained from an investigation, however close and extensive, of the teeth of existing animals,

A paper by C. Lyell, Esq., F.G.S., was afterwards read, "On the Freshwater Fossil Fishes of Mundesley, as determined by M. Agassiz."

In a memoir on the boulder formation and associated freshwater deposits of Eastern Norfolk*, Mr. Lyell stated, on the authority of Mr. Yarrell and the Rev. L. Jenyns, that the scales and teeth of fishes which had been then procured in the fluviatile beds of Mundesley belonged to the *Esox lucius*, to a trout or an undeterminable species of *Salmo*, to a carp, probably the *Cyprinus carpio*, and to a distinct species of *Perca*.

This collection, with some additions recently sent to the author by Mr. Wigham, was examined by M. Agassiz during his late visit to England. The decision of Mr. Jenyns with respect to the distinctness of the perch, M. Agassiz fully confirmed; but he was of opinion that the pike differs from the *Esox lucius*, and that the supposed carp is a species of *Leuciscus*; and that the trout is not truly a trout, although one of the same great family.

From this examination, therefore, Mr. Lyell says it is apparent that these remains belong to species not identical with any European freshwater fishes hitherto described; but that they nevertheless belong to an ichthyological fauna, more modern and more nearly resembling the recent than any other with which M. Agassiz is acquainted in a fossil state.

Similar remains have been found by Mr. Lyell at Runton, near

* See Proceedings, *antè*, p. 171.

Cromer, but both there and at Mundesley the associated testacea all belong to living freshwater species; even the *Paludina minuta* (Strickland), which Mr. Morris has pointed out to the author to be identical with the *P. marginata* of Michaud, a living French species. It is a question therefore, the author states, whether these unknown fishes may not still inhabit the rivers and lakes of the more northern parts of Europe or America, especially as M. Agassiz is at present unacquainted with the freshwater fishes of Norway, Sweden, Spitzbergen, Iceland, Greenland, Labrador and Canada, and even of the northernmost parts of Scotland and the Shetland Islands; and in conclusion Mr. Lyell says, it seems natural to look northward for types analogous to the Mundesley fishes, because the beds in which they occur were deposited contemporaneously with the drift accumulated by the agency of floating ice.

ZOOLOGICAL SOCIETY.

Nov. 24, 1840.—William Yarrell, Esq., Vice-President, in the Chair.

A paper by W. J. Broderip, Esq., was read, in which the author proceeds with his descriptions of the new species of shells collected in the Philippine islands by H. Cuming, Esq.

HELIX (COCHLOSTYLA) TICAONICA. *Hel. testâ subpyramidali, truncatâ, anfractibus 5 ventricosis, ultimo longe maximo, apice subcomplanato, lineis incrementi subobliquis, levissimè striato; aperturâ modicâ.*

Var. *a. Brunnea, strigis obliquè longitudinalibus latis albis picta; apice subpurpureo; aperturâ albidâ; labii limbo subpurpureo.*

Var. *b. Brunnea, strigis obliquè longitudinalibus albis creberrimis fucata; fasciâ basali latâ obscurâ; labii limbo subpurpureo.*

In this variety the broad white stripes of the body-whorl are so frequent, that they run into each other, leaving only brown interstices here and there.

Var. *c. Brunneo-nigricans, strigis latis et maculis irregularibus albis rarioribus ornatis; labii limbo subpurpureo.*

In this variety, the stripes, so far as they go, are very distinct; but on the last part of the body-whorl they are broken up and interrupted so as to form spots. The ground-colour of the body-whorl is very dark chestnut-brown, with a darker, but very obscure, broad basal band.

Var. *d. Flavescens strigis albis fucata, fasciâ latâ basali brunneo-nigricante; labii limbo purpureo-nigricante.*

Var. *e. Ex albido flavescens seu subvirescens; anfractibus 2 ultimis strigis latis albis ornata; anfractu basali lineis transversis basalibus interruptis subobscuris vittato; aperturâ albâ; labii limbo ochraceo-rubro; apice roseo.*

Var. *f. Ex albido flavescens seu virescens; anfractu ultimo strigis latis albis interdum subangulatis ornato; fasciâ basali brunneo-lineatâ, latâ; aperturâ albâ; labii limbo vix ochraceo-rubescens.*

In this variety hardly any stripes are visible, except upon the body-whorl.

Var. *g. Ex albido pallidè et obscurè virescens, fasciâ basali lineatâ latâ; aperturâ albâ; columellâ violaceo-subpurpureâ; labii limbo vix pallidissimè rubente.*

Var. *h. Sordidè virescens lineis transversis obscuris vittata; fasciâ basali sordidè brunneâ latâ; aperturâ albâ; columellâ violascente; labii limbo pallidè rubente.*

Var. *i. Cinerascens; fasciâ basali latâ, lineatâ, brunneâ; aperturâ sordidè albâ; labii limbo brunneo-nigricante.*

The ground-colour beneath the epidermis is rich brown, which is exposed where the epidermis is abraded.

Habitant varietates a, b, c, d, e, f, g, h, et *i,* in insulâ Ticao.

Legit H. Cuming in sylvis.

Var. *k. Grandior, ex albido cinerascens lineis transversis obscurè brunneis cincta; fasciâ basali lineato-vittatâ brunneâ latâ; aperturâ albidâ; labii limbo purpurascente.*

In this variety the ground-colour is brown: the riband-like, broad basal band is dark brown.

Var. *l. Productior, e brunneo cinerascens, vittis brunneo-nigricantibus cincta; fasciâ basali latâ brunneo-nigricante; aperturâ obscurè purpurascente; labii limbo nigricante.*

The ground-colour of this variety is brown, which becomes deeper on the lower whorls, and is exposed where the epidermis is abraded.

Habitant varietates k, et *l,* in insulâ Masbate.

Legit H. Cuming in sylvis.

In none of the varieties do the markings appear before the third whorl, and in several only on the two last.

This species varies in size from about $2\frac{3}{4}$ inches long by 2 broad, to $1\frac{6}{8}$ inch long by $1\frac{1}{2}$ inch broad. (W. J. B.)

Bulinus Guimarasensis. *Bul. testâ obovatâ, nitidè glabrâ, anfractibus 5 subventricosis; lineis incrementi obliquè longitudinalibus striatâ; aperturâ et labii limbo albis.*

Var. *a. Ex-albido-subvirescens; fasciâ basali obscuriore; apice subroseo.*

Var. *b. Anfractibus superioribus, fasciâ suturali, ultimo fasciâ subbasali castaneo cinctis; apice castaneo-roseo.*

This species is nearly allied to *Bulinus citrinus,* but differs from it in many points. *B. Guimarasensis* is without transverse striæ, and the whorls are comparatively ventricose. In *B. citrinus* all the striped varieties which I have seen are marked longitudinally.

The var. *b.* of *Bul. Guimarasensis* has a narrow chestnut transverse line very near the suture of the body-whorl, the base of which body-whorl, below the transverse band, becomes greenish. A brown stripe adjoins and borders the columella.

Var. *α.* is $2\frac{1}{8}$ inches long by $1\frac{4}{8}$ inch broad.

Var. *β.* is less.

Hab. in insulâ Guimaras.

Legit H. Cuming in sylvis. (W. J. B.)

Bulinus cameloparDalis. *Bul. testâ productâ, gracili, subpupiformi, subdiaphanâ, anfractibus* 6 *haud ventricosis, ultimo cæteris longiore; aperturâ subovatâ, mediocri; lineis incrementi creberrimè substriatâ; ex albido flavescente, strigis fulvis, distinctis sublongitudinalibus ornatâ; aperturâ albidâ, labii limbo nigro-castaneo.*

Long. 2 poll. circiter; lat. $\frac{7}{8}$ poll.

Hab. ad Sibonga in insulâ Zeba.

Legit H. Cuming dumis adhærentes. (W. J. B.)

Bulinus Diana. *Bul. testâ valdè productâ, subdiaphanâ, anfractibus 7 haud ventricosis, ultimo cæteros interdum haud æquante, pallidè flavâ strigis albidis creberrimis fucatâ; aperturâ et apice albis.*

Var. *a*. long. $2\frac{2}{8}$; lat. 1 poll.

Var. *b*. *Flava haud strigata, aperturâ et apice albis.*

Legit H. Cuming.

The first variety was found by Mr. Cuming on the leaves of bushes at Tanhay in the isle of Negros.

The second or unstriped variety was taken by him in the island of Siquijor on leaves of trees. Among the latter, some faintly-striped individuals show the transition from one variety to the other. The young of the striped variety have stripes; but the young of the unstriped variety are of a uniform pale yellow. (W. J. B.)

Bulinus Calista. *Bul. testâ diaphanâ, anfractibus 7 subventricosis pallidè flavâ albido strigatâ; apice subroseo vel roseo-castaneo; labii limbo castaneo-purpurascente.*

Var. *a*. long. $2\frac{1}{8}$; lat. $1\frac{1}{8}$ poll.

Intervals in the whitish epidermis leave the yellow ground-colour in sufficiently well-defined longitudinal irregular stripes, which are often zigzagged. Found on bushes.

Var. *b*. *Gracilior, nana*. Long. $1\frac{7}{8}$; lat. $\frac{5}{8}$ poll.

The shell of this variety is rather thicker. Among them some occur with the lip barely tinged with ochraceous red and a white apex. Found on the leaves of trees.

Var. *c*. *Flava; apice roseo, labii limbo castaneo.*

Long. 2; lat. $\frac{11}{12}$ poll.

Found on the leaves of bushes. Some have an obscure narrow transverse band on the body-whorl.

Var. *d*. *Subflava, epidermide albo-cinerascente; fasciâ basali nitidè flavâ; apice et labii limbo albis.*

Long. $1\frac{7}{8}$; lat. $1\frac{1}{8}$ poll.

Found on the leaves of bushes. Among these some occur which still retain the coloured lip and tinged apex. In the very young state the shell is perfectly transparent.

Hab. ad Tanhay in insulâ Negros.

Legit H. Cuming.

The last variety bears a strong resemblance to *Bulinus Diana*; nor should I be at all surprised to see some intervening varieties that

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of the animal near the mouth of the shell, which is whitish or bluish-white, bordered with the dark chestnut of the lip. (W. J. B.)

BULINUS BULLULA. *Bul. testâ ovato-rotundatâ, diaphanâ, albidâ, anfractibus 4 ventricosis, lineis incrementi obliquè striatis; aperturâ magnâ, subumbilicatâ.*

Long. $1\frac{1}{8}$; lat. 1 poll.

Hab. in insulâ Mindoro.

Legit H. Cuming.

A milk-white line runs round the sutures. (W. J. B.)

Mr. Gould resumed the exhibition of his new species of Australian birds, and characterized the following species:—

EPHTHIANURA TRICOLOR. *Ephth. vertice, pectore, tectricibusque caudæ coccineis; gutture albo.*

Male.—Crown of the head, upper tail-coverts, breast and abdomen bright scarlet; lores, line above and beneath the eye, ear-coverts, occiput and back dark brown; wings brown, each feather margined with brownish white; tail dark brown, each feather having a large spot of white on the inner web at the tip; chin, throat and under tail-coverts white; irides straw-white; bill and feet blackish brown.

Female similar in colour, but having only a slight wash of the scarlet colouring, except on the upper tail-coverts, where it is as brilliant as in the male.

Total length, $3\frac{1}{4}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{3}{4}$; tail, $1\frac{1}{2}$; tarsi, $\frac{3}{4}$.

Hab. —— ?

MYZANTHA OBSCURA. *Myz. fronte flavescente-olivaceo; gutture, uropygio, et corpore subtùs cinereis,—plumis pectoralibus lunulâ apicem versus notatis, et ad apicem pallidè cinereis.*

Forehead yellowish olive; lores, line beneath the eye and ear-coverts black; head and all the upper surface dull grey, with an indistinct line of brown down the centre of each feather, giving the whole a mottled appearance; wings and tail brown, margined at the base of the external webs with wax-yellow, the tail terminating in white; throat and under surface dull grey, becoming lighter on the lower part of the abdomen and under tail-coverts; the feathers of the breast with a crescent-shaped mark of light brown near the extremity, and tipped with light grey; irides dark brown; bare skin round the eye, bill, and bare patch on each side of the throat, bright yellow; legs and feet dull reddish-yellow; claws dark brown.

Total length, $9\frac{1}{2}$ inches; bill, $1\frac{1}{4}$; wing, $5\frac{1}{2}$; tail, $4\frac{5}{8}$; tarsi, $1\frac{1}{8}$.

Hab. Western Australia.

PTILOTIS SONORUS. *Ptil. loris et strigâ per oculos ductâ, ad colli latera, nigris plumis auricularibus flavis,—et ponè has, notâ sordidè albâ;—gutture et abdomine pallidè flavescenti-cinereis, fusco-striatis.*

Crown of the head and all the upper greyish olive; wings and tail brown, margined on their external webs with greenish yellow; lores, space around the eye and broad line down the sides of the

neck black; ear-coverts pale yellow, behind which is an obscure spot of greyish white; throat and under surface pale yellowish grey striated with light brown; irides dark brown; bill black; legs and feet greenish grey. The female like the male in colour, but smaller in all her dimensions.

Total length, $7\frac{1}{2}$ inches; bill, 1; wing, $3\frac{3}{4}$; tail, $3\frac{1}{2}$; tarsi, 1.

Hab. South and Western Australia.

PTILOTIS CRATITIUS. *Ptil. vertice cinereo,—loris, strigâ superoculari, et plumis auricularibus nigris,—infrà et ponè has, penicillo angusto, et flavo; a rictu per gulæ latera ducta appendice nudo, corneo, ad marginem inferiorem libero, et bellè e gilvo cærulescente.*

Crown of the head grey; all the upper surface olive-green; wings and tail brown, margined with greenish yellow; lores, a large space surrounding the eye and the ear-coverts black, below which is a narrow line of bright yellow; from the gape, down each side of the throat for five-eighths of an inch, a naked fleshy appendage, free at the lower end, of a beautiful lilac colour and very conspicuous in the living bird; anterior to this is a tuft of bright yellow feathers; throat and under surface olive-yellow; irides and eyelash black; bill black; feet blackish brown tinged with olive.

The female is similar to the male, but smaller.

Total length, 7 inches; bill, $\frac{7}{8}$; wing, $2\frac{1}{2}$; tail, $3\frac{1}{2}$; tarsi, $\frac{7}{8}$.

Hab. Interior of South Australia and Kangaroo Island.

GLYCIPHILA ALBIFRONS. *Glyc. facie albâ; gutture nigro, albo minutè adsperso; vertice nigro, plumis albo angustè marginatis.*

Forehead, lores and a narrow ring round the eye, and a narrow line running from the angle of the lower mandible white; crown of the head black, each feather slightly margined with white; ear-coverts silvery blackish gray, behind which an irregular line of white; all the upper surface brown, irregularly margined with white, producing a mottled appearance; wings and tails brown, the primaries margined externally with yellowish green; chin and throat brownish black, the former minutely speckled with white; under surface of the wing buff; chest and abdomen white, striped with blackish brown on the flanks; irides dark brown; bill black; feet blackish brown.

The female is like the male in plumage, but smaller in size.

Total length, $5\frac{3}{4}$ inches; bill, $\frac{3}{4}$; wing, $3\frac{1}{4}$; tail, $2\frac{3}{4}$; tarsi, $\frac{7}{8}$.

Hab. Western Australia.

MELIPHAGA MYSTACALIS. *Mel. vertice et gutture nigris; strigâ superoculari angustâ, albâ; plumis auricularibus densis, albis, et penicillum posticè acutum efficientibus.*

Head, chin and throat black; over the eye a narrow line of white; ears covered by a conspicuous tuft of white feathers, which are closely set and terminate in a point towards the back; upper surface brownish black, the feathers edged with white; under surface white, with a broad stripe of black down the centre of each feather; wings and tail blackish brown, conspicuously margined with bright yellow; irides brown; bill black; feet blackish brown.

Total length, $6\frac{1}{2}$ inches; bill, 1; wing, 3; tail, $2\frac{3}{4}$; tarsi, .
Hab. Western Australia.
Nearly allied to *Meliphaga sericea*.

PLATYCERCUS ADELAIDÆ. *Plat. vertice, pectore, abdomine medio, crissoque coccineis; lateribus viridescenti-flavis; uropygio sordidè olivaceo-flavo.*

Fully adult male.—Crown of the head, lores, sides of the neck, breast and all the under surface scarlet, passing into pale greenish yellow on the flanks; cheeks and wing-coverts light lazuline blue; primaries deep blue, passing into black at the extremity; back of the neck yellowish buff; back black, each feather broadly margined with greenish yellow, some of these marginations tinged with blue, others with scarlet; rump and upper tail-coverts dull greenish yellow, the latter tinged with scarlet; two centre tail-feathers greenish blue; the remainder deep blue at the base, gradually becoming lighter until almost white at the tip; irides brown; bill horn-colour; feet grayish brown.

Total length, $13\frac{1}{2}$ inches; wing, 7; tail, 8; tarsi, $\frac{3}{4}$.

Hab. South Australia.

This species is subject to great change from youth to maturity; during the first few months it is almost wholly green, and this gradually gives place to scarlet on the head, rump, under surface and the margins of the back-feathers.

AQUILA MORPHNOÏDES. *Aq. capite cristâ suboccipitali brevi, ornato; facie nigrescente: corpore subtùs rufo: plumis et pectoris et abdominis strigâ centrali nigrâ notatis.*

Face, crown and throat blackish brown, tinged with rufous, giving it a striated appearance, bounded in front above the nostrils with whitish; feathers at the back of the head, which are lengthened into a short occipital crest, back of the head, back, and sides of the neck, all the under surface, thighs and under tail-coverts rufous, all but the thighs and under tail-coverts with a stripe of black down the centre of each feather; back, rump and wings brown, the centre of the wing lighter; primaries brownish black, becoming darker at the tip, and barred throughout with grayish buff, which is conspicuous on the under surface, but scarcely perceptible on the upper, except at the base of the inner webs; under surface of the wing mottled with reddish brown and black; tail mottled grayish brown, crossed by seven or eight distinct bars of blackish brown, the tips being lighter; cere and bill lead-colour, passing into black at the tip; eye reddish hazel, surrounded by a narrow blackish brown eyelash; feet and toes very light lead-colour.

Total length, $21\frac{1}{2}$ inches; bill, $1\frac{3}{4}$; wing, 15; tail, $9\frac{1}{2}$; tarsi, $2\frac{3}{4}$.

This species is very robust, and although but a small bird, is in every respect a true *Aquila*. It is nearly allied to, but much stouter than *Aquila pennata*.

Hab. Yarrundi on the Upper Hunter, New South Wales.

BUTEO MELANOSTERNON. *B. rostro grandi, et elongato: gulâ, pec-*

tore et abdomine nigris; primariis ad basin subtùs albis; caudâ cinereâ.

Crown of the head, face, chin, chest and centre of the abdomen, deep black, passing into chestnut-red on the flanks, thighs and under tail-coverts; back of the head chestnut-red, becoming black in the centre of each feather; shoulders whitish buff; all the upper surface deep brownish black, margined with chestnut-red; primaries white at the base, deep black for the remainder of their length; cere and base of the bill purplish flesh-colour, passing into black at the tip; irides wood-brown; feet white tinged with lilac.

Total length, 22 inches; bill, $2\frac{1}{2}$; wing, $19\frac{1}{2}$; tail, $8\frac{1}{2}$; tarsi, $2\frac{5}{8}$.

This species is nearly allied to the Red-tailed Hawk of North America, and the *Buteo Jackal* of South Africa, but from both of these it may be distinguished by the jet-black colouring and by its more lengthened bill. During flight the white at the base of the primaries is very conspicuous, and is strikingly contrasted with the black of the chest and the brown of the other part of the wings.

Hab. Interior of New South Wales.

FALCO HYPOLEUCOS. *Fal. corpore supernè cinereo-fusco: singulis plumis margine dilutiore cinctis: corpore subtùs albo; plumis strigâ fuscâ apud apicem in maculam latam desinente, ornatis.*

Head and all the upper surface grayish brown, the feathers of the head having a fine stripe of black down the centre, the remainder dark brown in the centre; chin and all the under surface white, with a fine line of black down the centre, passing into a spatulate form near the tip; outer webs and tips of the primaries brownish black, the extreme ends being whitish; their inner webs whitish, crossed by numerous narrow bars, fading into a point as they approach the edge; tail gray, obscurely barred with brown, and tipped with buff.

Total length 17 inches; bill, $1\frac{1}{4}$; wing; $12\frac{1}{2}$; tail, $7\frac{1}{2}$; tarsi, $1\frac{3}{4}$.

Considerably smaller, but closely allied to the Jerfalcon, *Falco Islandicus*.

Hab. Western Australia.

PODARGUS BRACHYPTERUS OR MACRORHYNCHUS. *Pod. rostro præ-grandi (ad magnitudinem corporis ratione habitâ) et producto; colore corporis obscuro, et minutè punctulato.*

Crown of the head and all the upper surface finely freckled gray and brown, with a stripe of black down the centre of each feather, the light colour predominating on the scapularies; feathers between the eyes and the nostrils chestnut-brown, sprinkled with black and tipped with white; shoulders and lesser wing-coverts deep reddish brown; some of the feathers tipped with a white spot, freckled with red in the centre; greater coverts and secondaries mingled gray and reddish brown, the former tipped like the lesser coverts; primaries reddish brown, regularly barred with buffy-white on their outer webs, and with interrupted tawny bands on their inner webs; tail light-brown, freckled with black and gray, and crossed by numerous irregular, narrow, dark-brown bands, freckled with gray; all the under

surface grayish white, each feather crossed by numerous fine and irregular bars of tawny and with a stripe of brown down the centre, the latter colour becoming chestnut and forming a semilunar mark down each side of the neck; thighs black; irides light yellow; bill and feet brown.

Total length 15 inches; bill, 25; wing, 9; tail, 7; tarsi, $1\frac{1}{8}$.

In its general appearance this bird closely resembles the *Podargus humeralis*, but is even smaller in size than *P. Cuvieri*, while at the same time the bill is fully equal in size to that of the former species; it also projects much farther from the face than in any other species inhabiting Australia.

Hab. Swan River, Western Australia.

MALURUS MELANOTUS. *Mal. vertice, gulâ, abdomine, humeris, caudæque tectricibus lazulino-cæruleis; loris, nuchâ, vittâ pectorali et dorso imo nigris.*

Male.—Crown of the head, crescent-shaped mark on the back, upper tail-coverts, throat and under surface rich metallic lazuline blue; ear-coverts metallic verditer-blue; lores, collar round the back of the neck, line from the base of the lower mandible down the sides of the neck, band across the breast and lower part of the back jet-black; wings brown, margined with pale green; tail greenish blue, tipped with grayish white; irides, bill and feet black.

Female.—Lores rufous; head and all the upper surface rufous brown; all the under surface brownish white; tail bluish green, tipped with grayish white; bill rufous; irides blackish brown; feet brown.

Total length, $4\frac{3}{4}$ inches; bill, $\frac{1}{2}$; wing, 2; tail, $2\frac{1}{2}$; tarsi, $\frac{7}{8}$.

This beautiful species may be distinguished from the *Malurus pectoralis* by its rather smaller size, and by the black band across the back.

Hab. Western belts of the Murray in Western Australia.

COLLURICINCLA BRUNNEA. *Coll. corpore supernè fusco; sic et corpore subtùs, at colore multo dilutiore; rostro nigro.*

All the upper surface pale brown; primaries and tail the same, but somewhat lighter; all the under surface brownish white, becoming almost pure white on the vent and under tail-coverts; thighs grayish brown; bill black; feet blackish brown.

Total length, $9\frac{1}{2}$ inches; bill, $1\frac{1}{8}$; wing, $4\frac{3}{4}$; tail, $4\frac{1}{4}$; tarsi, $1\frac{1}{4}$.

The sexes are alike in plumage.

This species rather exceeds in size the *Colluricincla cinerea*, Vig. and Horsf., and has a more curved, longer and stouter bill.

Hab. The north-west coast of Australia.

COLLURICINCLA RUFIVENTRIS. *Coll. corpore supernè intensè cinereo, olivaceo levitèr tincto; abdomine imo, crissoque rufis.*

Lores grayish white; crown of the head and all the upper surface deep gray, slightly tinged with olive; primaries and tail dark brown, margined with brownish gray; throat and under surface darkish gray, passing into buff on the vent and under tail-coverts; all the

feathers of the under surface have a narrow dark line down the centre; thighs gray; irides dark brown; bill black; feet dark brown.

Total length $8\frac{1}{2}$ inches; bill, 1; wing, 5; tail, $4\frac{1}{4}$; tarsi, $1\frac{1}{4}$.

The sexes are alike in colour.

About the size of *Colluricincla cinerea*, Vig. and Horsf., from which it may be distinguished by the uniform colouring of the back and the buffy tint of the lower part of the abdomen and under tail-coverts.

Hab. Swan River, Western Australia.

PACHYCEPHALA RUFOGULARIS. *Pach. mas: corpore supernè fusces-centi-cinereo; gulâ et corpore subtùs rufis; pectore vittâ fusces-centi-cinereâ obscurè notatâ.*

Fœm. a mare differt corpore subtùs albescenti-cinereo haud rufo.

Male.—Crown of the head and all the upper surface deep brownish gray; wings and tail dark brown, the feathers margined with grayish brown; lores, chin, throat, under surface of the shoulder and all the under surface reddish sandy brown, crossed on the breast by a broad irregular band of grayish brown; irides reddish brown; bill black; feet blackish brown.

Female.—Differs from the male in having the throat and under surface grayish white, the chest being crossed by an obscure mark of grayish brown and with a line down the centre of each feather.

Total length, 7 inches; bill, $\frac{3}{4}$; wing, $4\frac{1}{4}$; tail, $3\frac{1}{2}$; tarsi, 1.

This species is somewhat allied to *P. pectoralis*, but may be distinguished from it by the rufous colouring of the throat, and by the band across the chest being grayish brown instead of black.

Hab. South Australia.

PACHYCEPHALA INORNATA. *Pach. olivaceo-fusca, abdomine pallidiore; plumis corporis inferioris strigâ fuscâ centrali levitèr notatis.*

All the upper surface grayish olive; wings and tail brown, the feathers of the former broadly margined with lighter brown; all the under surface brownish gray, becoming nearly white on the vent and under tail-coverts, with a fine stripe of pale brown down each feather; irides dark brown; bill blackish brown, fleshy towards the base; feet blackish brown.

Total length, 7 inches; bill, $\frac{3}{4}$; wing, $3\frac{3}{4}$; tail, $3\frac{1}{2}$; tarsi, 1.

This bird has somewhat the appearance of the young or female of *P. gutturalis*, but its larger size and shorter and more robust bill distinguish it from that species.

Hab. Belts of the Murray in South Australia.

ZOSTEROPS CHLORONOTUS. *Zos. dorso olivaceo-viridi; gutture et crisso virescenti-flavis.*

Lores black; crown of the head and all the upper surface olive-green; primaries and tail feathers brown, margined with olive-green; throat and under tail-coverts light greenish yellow; breast and under surface gray, tinged with brown on the abdomen and flanks; irides wood-brown; bill brown, lighter on the under mandible; legs and feet dark-gray.

Total length, $4\frac{1}{4}$ inches; bill, $\frac{9}{16}$; wing, $2\frac{1}{8}$; tail, $1\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. Western Australia.

December 8.—W. H. Lloyd, Esq., in the Chair.

A paper by G. B. Sowerby, Esq., was read, in which the author continues his descriptions of the new shells collected in the Philippine Islands by H. Cuming, Esq.

Helix Monticula. *Hel. testâ suborbiculari, subconicâ, tenui, pallescente, lævi; spirâ brevi, subpyramidali, obtusâ; anfractibus quatuor tenerrimè (lineis incrementi) striatis, depressiusculis, ultimo magno, obtusissimè angulato, anticè depressiusculo, viridi; aperturâ subtrapeziformi, ungulis posticis acutiusculis; peritremate angusto, tenuitèr reflexo, albo; columellâ albâ.*

Long. 0·9; lat. 0·9 poll.

Hab. supra foliis arborum apud Lallo, provinciæ Cagayan insulæ Luzon, Philippinarum.

All the varieties of this pretty species are green in front, and the *apex* appears to be always colourless. The following six varieties occur:—

a. Yellow above; circumference orange-yellow; front green. From Lallo.

b. Yellow above; circumference orange-yellow, with a dark brown slightly interrupted band; green in front. From St. Jaun, in the province of Cagayan.

c. Yellowish white above, with a narrow dull yellowish green circumferential band; green in front. From Gattarang, in the province of Cagayan.

d. Volutions banded in the following order: band next to the suture yellowish white; then a pale green broader band; then a yellowish white band; then a dark brown circumferential band, with jagged edges; then another yellowish white band, and then green in front. From Lallo.

e. Small; pale yellowish, with a light band, consisting of short dark brown lines near to the suture; a dark brown circumferential band; front dull yellowish green. From St. Jaun.

f. Antesutural band consisting of irregular dark brown lines arranged side by side; then a yellowish white band; then a broad, dark brown, somewhat mottled and interrupted band; then another yellowish white band, and then the green front. From Abulug, in the province of Cagayan.

Helix Coccomelos. *Hel. testâ subglobosâ, tenuiusculâ, lævi, anfractibus quatuor rotundatis, lævigatis, striis incrementi solùm insculptis, ultimo maximo; aperturâ suborbiculari, peritremate reflexo; labio columellari albo, declivi, obtuso, depressiusculo.*

Long. 1·3; lat. 1·4 poll.

Hab. supra foliis arborum ad insulam Tablas dictam Philippinarum.

In general this species bears a great resemblance to a plum, for which reason I have called it *H. Coccomelos*. Several varieties may be distinguished.

a. Apex dark brownish red, softened off gradually to a pale yellow-green, which becomes gradually darker, until the body of the last volution is of a fine dark green: lip white.

b. Similar to *a*, only dark brown instead of green.

tesutural dark brown band, which becomes broader towards the lip. Found on leaves of bushes at Tanhay, in the Isle of Negros.

k. Ground-colour very pale yellow-brown; a brown circumferential band, which is only perceptible on the latter half of the last volution. From Loboc.

l. Shell of an uniform pale brownish colour. From Loboc.

m. *Apex* reddish-brown; upper part of the shell pale yellowish brown, increasing rapidly in intensity, so that nearly the whole of the last volution is of a dark chocolate-brown; *columella* white; lip nearly black. From Loboc.

MICROSCOPICAL SOCIETY.

At a meeting of the Microscopical Society held July 21st, J. S. Bowerbank, Esq., in the Chair, a paper was read from the Rev. J. B. Reade, M.A., F.R.S., on the process of charring vegetable tissue, as applied to the examination of the stomata in the epidermis of Garden Rhubarb. The author, after mentioning the great advantages derivable from charring objects for the microscope, which he first suggested, goes on to state that it is peculiarly advantageous for exhibiting delicate membranes, which cannot from their transparency be well seen by the ordinary method of viewing objects, in water between glasses. It having long been a disputed point with botanists, whether the stomata in plants were open or closed by a membrane, the author was led to examine the subject, and for this purpose took the cuticle of the common garden rhubarb, which was obtained by macerating the sheaths investing the flower-stalks for a few days in water and then charring it; from his observations he arrives at the following conclusions: That the application of the process of charring proves beyond a doubt, that the stomata in this tissue of the rhubarb are distinct openings into the hollow chambers of the parenchyma of the leaf; that the perforation is the rule and not the exception in the structure; and that the exception, where it exists, *i. e.* where the stomata are closed, proves the existence of the overlying membrane discovered and described by Dr. Brown. Some discussion then followed, in which Messrs. Gray, Lindley, and Quekett took a part.

MISCELLANEOUS.

Analogies of European and Indian Geology.—"Notwithstanding the difficulty of establishing the identity in remote quarters of the world, of rocks so vaguely characterized as the saliferous marls, yet when we have coal-measures affording a certain fixed point, or landmark to guide us, we cannot be very far out in fixing upon the green marls, or often friable sandstone, which extend along the lower ridges of many parts of the great Himalayan chain, immediately adjoining the plains of Hindostan, as the Indian equivalent of the beds in question. Along the southern side of Assam we have the same rocks as well as brine-springs, and an earthy limestone, probably

equivalent to the English lias. On the face of the Cherra mountain the green marl rests unconformably on old red sandstone (or that on which the coal formation rests), and gives support to the deposits of sand in which the marine remains are contained. It is here by no means destitute of fossils as in other localities; on the contrary, we found in it six species of univalve shells, a small species of *Echinus* and a large spined *Cidaris*. In a note which we made on the characters of a fragment of rock brought away from a submerged reef near Arracan, by the hull of a ship which struck upon it, we pointed out the resemblance between its appearance and that of the green conglomerates in question*.

"A description of the salt formations at the head of the Indus, and their relative position to the coal-measures recently found there by Mr. Jameson, will be the means of casting much important light on this subject in regard to India, and we have fortunately in the gentleman alluded to a geologist near the spot, fully alive to the importance of this and other questions of a similar nature. Another equally important question is the situation of the great repositories of salt in the vicinity of Ajmeer and other situations in Central India, where salt lakes abound. Lieut. Fraser, of the Engineers, we recollect, sent us a fragment of rock-salt, which was found imbedded in a basaltic rock when sinking a well at Mhow, about three feet from the surface. We have not heard that this curious fact has led to any further discovery or research in the neighbourhood alluded to.

"It would be extremely important if we could establish good distinguishing characters between the limestone of the coal-measures and that of the more ancient formations, but this, if a matter of difficulty in England, is at least an equally difficult thing in India. It is true, the subject has here been as yet little investigated, but we cannot place the least confidence in those practical men who employ names without thinking of their meaning, and speak confidently of lias, and carboniferous limestone, primitive limestone, &c., according as they happen to suppose any particular specimen they meet with in India to be one or other. The limestone so abundant in Kemaon, as to form the greater portion of that mountainous district, is so much like the limestone of the coal-measures at Cherra Ponji, that no one unacquainted with the peculiar relations of the two rocks would suppose them to be at all different. The geologist, however, perceives the vast difference between them at once: the one reposes on clay-slate, the other on sandstone; the one occurs in thick continuous beds, the other alternates with shale; the one abounds in fossils, which scientific men alone would think of looking for, and in the other the geologist alone would know that he might look for fossils in vain. Speaking of the difference between the limestone of the Silurian system and that of Coalbrook dale, Mr. Murchison says, that the organic remains, which are in great profusion in the latter, consist of shells and corals which are characteristic of the carboniferous limestone in many other parts of Great Britain, and *never* occur in

* Journ. Beng. As. Soc. 1838, p. 936.

the inferior limestones of the Silurian system. Among these the most prominent are the large *Productus hemisphericus*, and many corals, including *Lithodendron sexdecimale* (*Clodocora* of Ehrenberg), which is so abundant that it constitutes the greater part of the layers of black calcareous shale which divide the beds of limestone. The black limestone in which these remains are found is overlaid by a sandstone which separates it from the productive coal-beds, and is underlaid by strata belonging to the lower limestone.

"Mr. Murchison particularly alludes to a specimen of *Lithosortion floriforme*, a species of coral two feet five inches broad by one and a half high, which appeared in a quarry to retain the original position in which it grew, and conveyed the impression that it had remained undisturbed beneath the sea, while fine red sand at one time, and mud at another, were deposited around it.

"These corals are also found in the limestone of the Cherra Ponji coal-measures; and in a large heap of limestone collected by Mr. Inglis of Chattack, for the purpose of burning for lime, I found the first fossil I had observed in a similar rock in India, thus indicating the presence of a coal district. The object of the journey would not, however, admit of my visiting the quarry, but there can be no question that the rock alluded to is connected with the numerous indications of coal formations that have been found in that vicinity. One other corresponding character may be mentioned between the Cherra Ponji coal-beds and those of Coalbrook dale, namely, that the coal-measures do not graduate downwards into the older rocks. The limestone of Cherra, which alternates with beds of sandstone and shale, seems to rest immediately on the old red sandstone, as in the Coalbrook dale beds. Mr. Murchison observes, that the carboniferous limestone has not in Coalbrook dale any regular downward passage into the old red sandstone, as in other districts; on the contrary, the old red terminates at the southern end of the tract, and has never been found beneath the coal-measures. On the north bank of the Severn the underlying stratified rocks throughout the productive coal-field consists of various members of the Silurian system.

"Mr. Murchison concludes his observations on this coal-field by a notice of the faults and dislocations occasioned by trap rocks. The district affords proofs of having been raised up from beneath the surrounding new red sandstone in separate wedge-shaped tracts, the most remarkable dislocation being that which bounds the coal-field to the east. The coal-measures along this line are not less than 1000 feet thick, and as some of the lower seams of coal are thrown up to the level of the overlying strata of new red sandstone, the upcast is thus shown to have exceeded 1000 feet, though to what further extent has not yet been ascertained. It will be recollected that we formerly explained the elevated position of the Cherra coal-measures in precisely the same way that Mr. Prestwich and Mr. Murchison now account for the great upcast of the Coalbrook dale field*, the only difference in the two cases being, that in India the

* See Report of a Committee for investigating the Coal and Mineral Resources of India. Calcutta, 1838, p. 24.

dislocation is not confined to the coal-measures, but extends to the old red sandstone, the whole series of which, with the coal-measures reposing on them, having been at Cherra Ponji thrown 3000 feet above those which have been recently found by Major Lister and others at the bottom of the same mountains. It is of much importance to draw comparisons between geological phænomena of this nature in remote parts of the earth, as tending not only to put our theories to the test, but also to correct and give confidence to our views, which, however complicated they may appear when derived from a narrow field of observation, become gradually simplified and important in proportion as our data become general."—*M'Clelland's Calcutta Journal of Natural History.*

Suggestions for Experiments on the Conservation of Vegetative Powers in Seeds, circulated by a Committee of the British Association.—These experiments are intended to determine the following questions:—

1. What is the longest period during which the seeds of any plant under any circumstances can retain their vegetative powers?

2. What is the extent of this period in each of the natural orders, genera and species of plants? and how far is it a *distinctive* character of such groups?

3. How far is the extent of this period dependent on the apparent characters of the seed; such as size, hardness of covering, hardness of internal substance, oiliness, mucilage, &c.?

4. What are the circumstances of situation, temperature, dryness, seclusion from the atmosphere, &c. most favourable to the preservation of seeds?

To answer these questions satisfactorily will require the accumulation of a large mass of facts; and although there are many difficulties in the way of such an investigation, and many years may elapse before it can be brought to maturity, yet it is desirable that the British Association should commence the collection of materials for the purpose. It is proposed then to invite botanists and others to undertake the following series of experiments, and to communicate the results to the British Association.

These experiments are either Retrospective or Prospective.

A. Retrospective Experiments.

1. By collecting samples of ancient soils from situations where vegetation cannot now take place, and by exposing these soils to air, light, warmth, and moisture, to ascertain whether any, and if any, what, species of plants spontaneously vegetate in them.

N.B.—Care must of course be taken that no seeds obtain admittance into these soils from external sources,—such as the air or water introduced to promote vegetation.

These ancient soils are either *natural* or *artificial* deposits.

The *natural* deposits belong either to *past* geological periods or to the *recent* period.

a. The deposits of past periods are either secondary or tertiary.

N.B.—There seems every reason to believe that the age even of the latest of these deposits is far beyond the maximum

period through which vegetative powers can be preserved; yet as many accounts are recorded of seeds vegetating spontaneously in such soils, it would be well to set these statements at rest by actual experiment.

In such experiments, state the formation, and describe the geological phænomena of the locality, together with the depth from the present surface at which the soil was obtained.

b. Natural deposits of the recent period may be classed as follows:—

Alluvions of rivers.
Tidal warp land.
Shell marl.
Peat.
Surface-soil buried by landslips.
Ditto ditto by volcanic eruptions.

In these cases, state the nature of the soil, the depth from the surface, &c.; and especially endeavour to obtain an approximate date to each specimen of soil, by comparing its depth from the surface with the present rate of deposition, or by consulting historical records. It would be well to submit to experiment a series of samples of soil taken from successive depths at the same locality.

c. Artificial deposits are as follows:—

Ancient tumuli.
Ancient encampments.
The soil beneath the foundation of buildings.
The soil with which graves, wells, mines, or other excavations have been filled up.
Ridges of arable land, &c.

In these cases, state, as before, the depth from the surface, and ascertain from historical sources the approximate age of the deposit.

2. By trying experiments on actual seeds which exist in artificial repositories. These are,—

Seeds in old herbaria and botanical museums.
Seeds obtained from mummies, funereal urns, at Pompeii, Herculaneum, &c.
Dated samples of old seeds from nurserymen and seedsmen.

In these cases, state the circumstances in which the seeds have been preserved, and their date as nearly as it can be ascertained.

B. Prospective Experiments.

In this department of the inquiry, it is proposed to form deposits of various kinds of seeds under different conditions, and to place a portion of them at successive periods under circumstances calculated to excite the process of vegetation. In the case of certain species or families of plants, it would perhaps require many centuries to determine the limit of their vegetative powers, yet it is probable that a very few years would suffice to fix the maximum duration of the greater number, and that many interesting results might thus be obtained even by the present generation of botanists. It is proposed then to form a collection of the seeds of a great variety of plants, (including, wherever it is possible, at least one species of every genus,) and to pack them up (carefully labelled)

either alone, or mixed with various materials, as sand, sawdust, melted wax or tallow, clay, garden mould, &c. in various vessels, as glass bottles, porous earthen jars, wooden boxes, metal cases, &c., placed in various situations, as under-ground, in cellars, dry apartments, &c. At certain intervals increasing in extent,—say at first every two years, then every five, every ten, and, at the lapse of a century, every twenty years, a small number (say twenty) of each kind of seed, from each combination of circumstances, to be taken out and sown in an appropriate soil and temperature, and an exact register kept of the number of seeds which vegetate compared with those which fail.

Should it appear desirable for this project to be carried out by the British Association, they might most effectually accomplish it by committing a collection of seeds, formed on the above plan, to some qualified person, whose duty it should be, in consideration of a small annual stipend, to take charge of them, and at stated periods to select portions for experiment, keeping an accurate register of the results.

In this manner it is believed, that in regard to the large majority of plants, the limit of their vegetative durability would be determined in a very few years, and that a large mass of vulgar errors on this subject, which now pass current for facts, would be cancelled and exploded.

N.B.—The most effectual way of exciting vegetation in seeds of great antiquity, is to sow them in a hot-bed, under glass, and in a light soil moderately watered.

METEOROLOGICAL OBSERVATIONS FOR JULY 1841.

Chiswick.—July 1. Overcast. 2. Hazy: overcast and fine: slight rain. 3. Hazy and mild: very fine. 4, 5. Very fine. 6. Rain: fine. 7. Fine: rain. 8. Fine: clear. 9. Very fine. 10. Fine: rain. 11. Overcast. 12. Cloudy and mild. 13. Cloudy. 14. Showery. 15. Heavy thunder-showers: constant heavy rain. 16. Cloudy. 17, 18. Fine. 19. Very fine. 20. Heavy rain. 21. Overcast: rain. 22. Cloudy. 23. Cloudy and fine. 24, 25. Cloudy. 26, 27. Light haze: fine. 28. Cloudy. 29. Cold and dry: cloudy: slight rain. 30. Fine but cool. 31. Rain: cloudy.—The quantity of rain which fell on the 15th was unusually great, amounting to nearly an inch and a half in the course of the twenty-four hours.

Boston.—July 1. Rain. 2. Cloudy. 3. Fine. 4. Cloudy: rain P.M. 5. Cloudy. 6. Rain and stormy: rain early A.M.: rain P.M. 7. Cloudy: rain P.M. 8. Fine. 9. Cloudy: rain P.M. 10. Fine: rain early A.M. 11. Cloudy. 12. Fine: rain P.M. 13. Cloudy: rain P.M. 14. Fine. 15, 16. Fine: rain P.M. 17. Fine. 18. Cloudy: rain P.M. 19. Fine: rain P.M. 20. Rain: rainy day. 21. Cloudy: rain P.M. 22. Cloudy: rain P.M., with thunder and lightning. 23. Cloudy: rain P.M. 24—28. Cloudy. 29. Cloudy and stormy: rain A.M. and P.M. 30. Fine. 31. Cloudy: thunder and lightning P.M.

Applegarth Manse, Dumfries-shire.—July 1. Fine: one shower. 2. Fine and fair, but cloudy. 3. Sunshine and rain. 4. Slight showers. 5. Rain all day. 6. Fair and fine. 7. Cloudy A.M.: fine P.M. 8. Fine: one shower. 9. The same. 10. Wet afternoon. 11. Slight showers. 12. Slight showers, but heavier. 13. Heavy showers: thunder. 14. Incessant showers. 15. Heavy rain till noon. 16. Fair and fine. 17. Fair but threatening. 18. Fair and warm: thunder. 19. Fine with a few drops. 20, 21. Rain P.M. 22. Slight showers. 23. Cloudy but fair. 24. Fine all day. 25. Remarkably fine. 26. Showers. 27. Showers P.M. 28. One slight shower. 29. Fair throughout. 30. Fair but threatening. 31. Fair with a few drops.

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTON; *by* Mr. THOMPSON *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. VEALL *at Boston, and by* Mr. DUNBAR *at Applegarth Manse, Dumfries-shire.*

Days of Month. 1841. July.	Barometer.					Thermometer.							Wind.				Rain.				Dew-point.
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc.			Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc. 9 a.m.	Chiswick 1 p.m.	Bost.	Dumfries-shire.	London: Roy. Soc. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Lond.: Roy. Soc. 9 a.m.
		Max.	Min.		9 a.m.	8½ p.m.	Fahr. 9 a.m.	Self-register. Max.	Self-register. Min.	Max.	Min.		Max.	Min.									
1.		30 080	30 049	29·47	29·76	29 84				59	62·5	64	51		sw.	w.	w.			·05	22		
2.		30 123	30 086	29·52	29·98	30 01				60	63·5	65	53½		w.	calm	E.			·01	06		
○ 3.		30 126	29 989	29·58	29·95	29 82				55	67	64	56		sw.	calm	SSW.			·04			
4.		29 999	29 963	29·37	29·80	29 95				53	66·5	64	55		sw.	calm	E.			...			
5.		30 064	29 929	29·55	29·97	29 65				57	61	59	48½		NE.	calm	SE & S.			·59			
6.		29 805	29 635	29·03	29·58	29 68				52	60	64	52		w.	w.	NW.			·03			
7.		29 885	29 639	29·31	29·65	29 55				53	61	59	50		sw.	w.	w.			·08			
8.		29 898	29 742	29·20	29·63	29 70				45	58	60½	47½		w.	NW.	w.			·01			
9.		29 949	29 939	29·44	29·75	29 79				44	60	57	45½		w.	w.	WNW.			...			
0.		29 926	29 492	29·44	29·69	29 20				49	58	55½	45		sw.	calm	sw.			·36			
1.		29 572	29 266	28·77	29·27	29 39				43	57·	59½	47½		NW.	calm	NNE.			...			
2.		29 594	29 578	29·05	29·43	29 46				44	58	40	45		w.	w.	NNE.			·02			
3.		29 719	29 630	29·13	29·49	29 55				42	58	59	48		w.	calm	NW.			·02			
4.		29 726	29 570	29·25	29·56	29 57				45	60	57½	50		sw.	w.	NW.			·07			
5.		29 742	29 646	29·16	29·58	29 71				51	60	61	48½		s.	calm	NE.			·46			
6		29 977	29 874	29·40	29·86	29 87				44	61	61	47½		N.	calm	NE.			·01			
		30·013	29 820	29·53	29·85	29 75				49	63	63	40½		s.	calm	SSW.			...			
		29·742	29 634	29·24	29·68	29 70				48	64	67	49		-----	calm	W.			...			
		29·813	29 795	29·30	29·69	29 65				54	62	66	51½			ca m	sw.			·07			
		29 699	29 493	29·15	29·49	29 30				55	59	64	52							·29			
		29 665	29 469	28·92	29·33	29 43					63·5	64	53							·10			
		29 828	29·724	29·16	29·55	29 70					61	58½	48							·22			
		29 999	29·915	29·39	29·82	96														·01			
		30 133	30·085	29·66	30·05															...			
		30 127	30·071	29·65	30·06																		
		30 074	30·022																				
		29 990	29·943																				
		29 839	29·774																				

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being extended backwards behind the last molars; they are destitute of longitudinal grooves. The molars are $\frac{3-3}{3-3}$; the entering folds of enamel are very simple, there being but one external and one internal deep fold to each tooth.

In *Orycterus* the upper incisors are shorter and much more curved, and are furnished with a deep longitudinal groove in front; those of the lower jaw are destitute of grooves, are very deep from front to back, and slightly concave at the sides. The molars are $\frac{4-4}{4-4}$, nearly cylindrical, but their antero-posterior diameter is the shortest, excepting in the front molar of the lower jaw. In the skulls before me the teeth are worn, and exhibit scarcely any trace of folds of enamel entering into the body of the tooth.

In both genera the enamel of the incisors is colourless, and the incisors of the lower jaw are extended backwards to the condyle.

The skull of the *Bathyergidæ* is rather broad, much contracted between the orbits, and (as in other Rodents which live for the most part underground*) the cranial cavity is proportionally small. The nasal bones are narrow and elongated. In *Orycterus* they are nearly of equal width throughout, whilst in *Bathyergus capensis* they are considerably broader behind than before. The anterior root of the zygomatic arch is formed entirely of the superior maxillary bone, and incloses a small ant-orbital opening: the lower boundary of the zygomatic process of the maxillary is slightly concave, so that the anterior portion of the zygomatic arch is slightly thrown up from the plane of the palate. This is more decidedly the case in *Bathyergus Capensis*, in which the ant-orbital foramen is rather larger. The malar bone is of moderate size, and is extended backwards so as to enter into the composition of the glenoid cavity. The portion of the palate situated between the molar teeth is remarkably contracted, and this part descends below the level of the anterior portion of the palate, and is continued some distance beyond the last molar. The incisive foramina are very small, and there are no openings in the posterior portion of the palate. The glenoid cavity of the temporal bone is very broad. In *Orycterus* the posterior portion of the malar bone forms a longitudinal ridge, which no doubt tends to restrain to a certain extent the lateral motion of the condyles of the lower jaw, but in *B. capensis* this ridge is wanting. The auditory bullæ are of moderate size—larger in *Orycterus maritimus* than in *B. capensis*. In the former animal the upper surface of the skull forms nearly a straight

* Compare the skull of the burrowing Marmots with that of their congeners the Squirrels, and that of *Spalax* with the Rats.

line in the longitudinal direction, being but slightly arched, and the plane of the occiput is vertical; whereas in *B. Capensis* the plane of the occiput is slightly oblique, receding from the upper part.

Lower Jaw.—The lower jaw has the descending ramus (*a*) Plate II, thrown out from the outer side of the alveolus of the inferior incisor (*b*).

In *Bathyergus Capensis* the descending ramus approaches somewhat to a semicircular form: its greatest extent is in the longitudinal direction of the jaw, and its greatest depth is beneath the condyle; in front it is curved suddenly upwards and inwards so as to form an obtuse angle at (*c*).

In *Orycterus maritimus* the descending ramus is thrown much more boldly out from the alveolar portion of the jaw, and is of very great extent; the lower part is curved inwards, and the posterior part is produced far beyond the line of the condyle, becoming gradually narrower towards the extremity.

The coronoid process is small in these two genera, and situated in a line with the last molar. The condyloid process is short, and the articular surface is large and rounded.

As regards the characters furnished by the skull and lower jaw, the present group is very isolated. In the structure of the molar teeth and in the contracted form of the palate between them, *Bathyergus* approaches most nearly to *Spalax**, but in other cranial characters there is a wide difference.

The skull of the animal figured by Dr. Ruppell under the name *Bathyergus splendens* agrees in most of its characters with that of *Spalax*, and in some respects links that genus with *Rhizomys*; here the ant-orbital foramen is of moderate

* I was induced, owing to the remarkable form of the lower jaw, to place *Spalax* near to *Geomys*, but upon re-examination I fear I have given too much weight to that character. This genus I have no doubt will prove an aberrant form of the *Muridæ*, and I think it will be more correct to regard the *Arvicolidæ* as constituting a subfamily of that group than as a section of equal importance. Since the publication of the former parts of this paper I have had an opportunity of examining several skulls belonging to species of these sections which I had not before seen. The skull of *Rhizomys* I was only acquainted with through Temminck's figure; the skull itself I have now examined, and I am quite satisfied that the animal belongs to the family *Muridæ*. The skull of *Ascomys mexicanus* I find agrees in all essential characters with that of *Geomys* (see fig. 71. p. 596, Mag. Nat. Hist. vol. iii. New Series). The differences between *Ascomys*, *Geomys*, *Diplostoma* (Richardson) and *Pseudostoma* are, it appears to me, not of sufficient importance to entitle them to rank as distinct genera. These genera or subgenera form a very natural little section of the *Arvicolidæ*, differing from the more typical species of that group in having $\frac{4-4}{4-4}$ molars, and these small and of very simple structure, and also in the absence of any ant-orbital foramen for the transmission of a portion of the masseter muscle: the very small slit found at the root of the zygoma in these animals evidently serves only to admit the passage of the ant-orbital nerve.

size and opens obliquely upwards, the coronoid process is long as in *Spalax*, the lower incisor runs backwards and outwards, and the thin layer of bone covering its base forms a protuberance (*d*) on the outer side of the condyle (*e*), in this respect resembling both *Rhizomys* and *Spalax*. The descending ramus springs from the under side of the alveolus of the inferior incisor, and not from the outer side, as in the true *Bathyergidæ*. The posterior part of the descending ramus is not directed outwards, as in *Spalax*; but is on the same plane as the horizontal ramus, as in *Rhizomys*. The molar teeth agree closely with those of *Spalax*, as well as with *Bathyergus*, being nearly cylindrical, of equal size, and having but one external and one internal fold of enamel; the incisors are proportionally broader than in *Spalax*.

The great difference between the skull of *Bathyergus splendens* and that of *Spalax typhlus* consists in the form of the occiput, it being vertical in the former, or very nearly so; but I very much suspect that the peculiar form of occiput which we observe in *Spalax typhlus* (which is the only species of the genus the skull of which I have seen) does not constitute a character indicative of affinity. I think it very likely to vary in the different species of the genus.

On the whole, it appears to me, that the animal called *Bathyergus splendens* by Ruppell should be removed from the genus in which he has placed it, and might be arranged either with the species of *Spalax* or perhaps between that genus and *Rhizomys*, and I think it probable Rodents may hereafter be found connecting the *Bathyergidæ* with these genera.

EXPLANATION OF PLATE II.

Fig. 1. Skull of *Orycterus maritimus*.
- 1 *a*. Under side of do.
- 1 *b*. Under side of lower jaw.
  - *a*, *a*. Descending ramus.
  - *b*. Alveolus of incisor.
- 1 *c*. Lower jaw viewed from above.
- 1 *d*. Side view of do.

Fig. 2. *Bathyergus capensis*.

Fig. 2 *a*. Lower jaw of *Bathyergus capensis*, viewed from beneath.
- 2 *b*. Side view of do.

Fig. 3. *Bathyergus splendens* of Ruppell.
- 3 *a*. Side view of skull.
- 3 *b*. Lower jaw, view from above.
  - *d*. Termination of incisor.
  - *e*. Condyle.

X.—*Observations* on the Functions performed by the Hairs on the Stigma in* Campanulaceæ, Compositæ, *and other Plants*.

By Arthur Hill Hassall, M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

I have read with much interest some observations by M. Adolphe Brongniart on the 'Functions of the Hairs on the

* The principal of these observations were written during the summer of last year.

Stigma in the Fecundation of Campanulaceæ,' contained in a recent Number of the 'Annals,' and translated by W. A. Leighton, Esq. To this subject, previously to the appearance of these remarks, I had paid some attention. I do not, however, concur in all the conclusions arrived at by that able investigator.

If the flower-bud of any of the Campanulæ be examined a day or two prior to the expansion of the corolla, the stamens will be observed to envelope and conceal the whole surface of the pistil. If it be again examined, about the period of the unfolding of the blossom, the anthers may be seen to open and disclose their contents. As soon as this has occurred, the stamens having performed the office allotted them, begin to wither away, in consequence of the juices destined for their nourishment being now directed into a new channel. The pistil, immediately on the dehiscence of the anthers, increases rapidly in size, carrying with it in its upward progress, (as by a brush) by means of the hairs upon its surface, the pollen granules. This increase, amounting frequently to thrice the original length of the pistil, arises, partly, from the excitation of the new action now set up in it, but mainly from the accession of the nutriment formerly sent to the stamens, but now no longer required by them.

These hairs are found in all the Campanulaceæ, save only the small genus *Petromarula*, extending from the base of the style to the apex of the stigma, externally, and arranged in lines, corresponding in number and position with the stamens; they are directed horizontally and slightly curved at their extremities. Their surface is lubricated by a secretion, or perhaps, I should rather say, an exudation, serving to retain the pollen in contact with them. The office performed by these hairs is undoubtedly purely mechanical, acting, first, as collectors of the pollen, and subsequently, as props, to sustain it in contact with the fecundating surface—entangled amidst the hairs it is not readily scattered or disturbed. Adolphe Brongniart's account of the anatomy of the hairs I consider to be satisfactory; although I do not deem his comparison of their retractile movements to that of certain Annelides, or the tentacula of snails, to be at all analogous, the phænomenon in the latter cases being *voluntary* and *vital*, the result of complex organization; and, in the former, merely mechanical, presenting nothing peculiar or extraordinary in its nature, but arising simply from the absorption or drying up of the fluid contained in the hair itself, and in the expansion at its base*.

* The retraction of the hairs does not take place until some days after the application of the pollen, the greater part of which then falls off in con-

M. Brongniart states, "that the pollen grains undergo no modification either during their application to the hairs or when drawn along with them in their retractile movement, and consequently no connexion exists between them and the interior of the style." From this it follows, that fertilization can only take place through the medium of what are considered to be true stigmas, viz. the internal surfaces of the three (occasionally four) diverging rays on the top of the style. This statement is wholly opposed to the result of my investigations. The outer of the mass of pollen grains adherent to the hairs certainly suffer no material change; but if those in contact with the style be examined, a single pollen tube of considerable length may be observed to pass from the greater number of the granules, apparently losing itself in the tissue of the style, which I believe it to penetrate through the interspaces between the hairs. This view of the matter is further supported by the following corroborative evidence. 1st. The great mass of pollen collected on these hairs, contrasted with the small quantity, or even occasional *absence* of it, on what is called the true stigmatic surface. 2ndly. The structure of the surface itself—it being covered with papillæ resembling the hairs themselves in all save length. 3rdly. That this surface sometimes does not expand, and when it does, frequently but to a small extent, and this only when the process of fertilization is evidently far advanced, and the flower itself sometimes even beginning to fade.

From the observation of these facts, I have come to the conclusion, that not only the surface of the true stigma, but more particularly of that portion of the style itself which is covered with hairs, is essentially concerned in the fecundation of Campanulaceæ.

These collecting hairs are by no means peculiar to the Campanulæ, but exist in the whole of the family Compositæ, and in many genera of other orders. I have observed them in *Collomia grandiflora*, *Veronica chamædrys*, *Hyacinthus orientalis*, *Ixia maculata*, *Haworthia radula*, *Godetia rubicunda*, and *Epilobium hirsutum*. In the Compositæ they are admirably adapted to the office they are destined to perform, viz. that of harrowing up the pollen grains, being all sloped upwards and terminating in a sharp point. These hairs in *Haworthia radula* cover the true stigmatic surface, are longest near the circumference, and become mere papillæ towards the centre of the stigma. In *Veronica chamædrys* they also cover the stigmatic surface, but a depression is to be observed in the middle free

sequence of the loss of their support.—Adolphe Brongniart speaks of this retraction of the hairs as presenting a phænomenon unexampled in the vegetable kingdom.

from hairs, while in *Ixia* they are arranged along the edges of the stigmata. It is however to the structure of the stigmata of *Epilobium hirsutum* and *Godetia rubicunda* that I would particularly call attention, conceiving them to confirm in the strongest manner my opinion that the stigmatic function in the Campanulaceæ is not limited to that part which is usually considered to constitute the proper stigma. These are quadripartite, and each division of their true stigmatic surface is covered with hairs precisely resembling those of the Campanulaceæ.

I am about to try an experiment, the issue of which will determine the truth or fallacy of my deductions, as far as the Campanulaceæ are concerned. As each flower of *Campanula pyramidalis* comes into blossom, I intend to cut away the whole of the true stigmatic branches, leaving only the lower portion of the style covered with hairs and pollen. Should perfect seeds ripen upon this plant, the question will, I think, be satisfactorily decided.

August 1841.

XI.—*On some species of European Pines.* By Capt. S. E. Widdrington*, R.N.

In a paper which was read before the British Association at Newcastle (Ann. Nat. Hist., vol. ii. p. 163), the two species of *P. austriaca* and *P. Pumilio* were not fully described, nor their places in the system as to elevation assigned. This deficiency, which was caused by my not having seen these species growing in their natural sites, a recent tour in Austria and Upper Germany has enabled me to supply.

The *Pinus austriaca* of the English, *P. nigrescens* of the German botanists, partly covers, as it no doubt once did entirely, the plain of Austria to the south and east of Vienna. There is an extensive remnant of it between Neustadt and the foot of the Semering range, which divides Austria and Styria. It also partly clothes the hills near Baden; but in ascending the range it soon disappears, and is replaced by the spruce and Scotch firs. I am not aware of its being seen to the north of the localities I have mentioned, nor in the northern prolongation of the range, there called the Wiener Wald. In Styria I never saw it to the north of the river Muhr; but it ranges to the south of Styria, forming a sort of link between the European pine series and that of the Caucasus and of Asia. On considering the elevation and geography of these ha-

* Late Cook. Read in the Section of Zoology and Botany at the meeting of the British Association, Plymouth, and communicated by the Author. See his paper on *Pinus* and *Abies*, Ann. Nat. Hist., vol. iii. p. 296.

bitats, it must undoubtedly be placed in the zone below *P. sylvestris.* At the same time there is no question that it is sufficiently hardy to resist any cold to which it is liable to be exposed in these islands. The thermometer at Vienna fell last winter to 19° of Reaumur, and in 1830 to 22°, or nearly 18° below zero of Fahrenheit, a degree I believe seldom, if ever, seen in Britain, at least in modern times.

This species is very nearly connected with *P. taurica* or *Pallasiana*; the foliage is scarcely to be distinguished; but on comparing the cones of the two species, as grown in the Botanical Garden at Vienna, I was struck with a difference in the form of the scales, and had the satisfaction of being immediately told that the same remark had been made by Mr. Brown, who had examined them. As, however, experience has shown me the mistakes which are made by judging of pines from specimens grown in gardens, and especially in nursery grounds, where the treatment sometimes entirely alters the habit of the tree, I made application for, and was promised by the enlightened director of the botanical department, Mr. Endlicher, cones of both species taken from the natural forests at the proper season, which will probably enable the question of their identity or distinctness to be decided.

From the quick growth of this tree, the great beauty of its foliage, which is long, thick and tangled, and of the deepest green, as well as the great value of the timber, which the Austrian woodmen consider superior to that of *P. sylvestris,* it cannot be too strongly recommended to the attention of planters. It is equally fitted for the forest or the park, for use or for ornament, and its deep tints would form an admirable contrast with the light and transparent foliage of the elegant *Pinus hispanica.* The country is very much indebted to Mr. Lawson of Edinburgh, who first introduced this interesting species, and it cannot be too generally used with the *Laricio,* a congener, as a substitute for the *Pinaster,* which has rather unfortunately been tried in some parts of the West of England, the timber being comparatively valueless, and in every other respect very inferior to the species we are now considering. It cannot be too strongly urged on those who have the care of making fir plantations for future utility, to plant the evergreens, which are to *remain,* at the requisite distances, and to have the fillings-up entirely of larch. By adopting this method several advantages accrue. The woodmen make no mistakes in selecting, during the process of thinning, and no spaces are left too open or too close. The evergreens, which require more or less care when young, are more readily looked after, and their places supplied where necessary, in case of failure. The larch should be planted a year or two before the ever-

regular leader. Immediately above the ground it divides into a number of smaller stems and branches, which either sweep along the ground, their extremities pointing upwards, or rise at once at an angle of 30° to 45°, according as the neighbours or the locality have permitted it to expand. Very rarely—amongst countless thousands I did not see above one or two examples—one tree makes an attempt to grow straight and throws up a single stem, but the failure of attaining size or elevation shows in these instances the creeping, true habit of the tree. The height attained is rarely above 5 or 6 feet, the diameter of the largest trees being from 20 to 25 feet; though this size is rare, and the appearance is so regular, that in looking over an extensive level planted with it, it is quite as even as the surface of a gorse cover.

The foliage in form and colour resembles that of *P. uncinata*, but the spiculæ are shorter, though standing out in the peculiarly rigid manner of that species. The cones are small, dark-coloured, and differ from both *P. sylvestris* and *P. uncinata*.

From the localities it inhabits it must be placed very high in the series, by the side of *P. Cembra* and *P. uncinata*. I have been the more particular in describing this singular species, in order to guard those who may not have the opportunity of seeing it *in situ* from confounding it, as so many who ought to know better have done, with the stunted individuals of *P. Cembra*, *P. sylvestris* and *P. uncinata*, which are always found at the summit of their respective zones in the high Alps and Pyrenees, and have been called and compiled under the general name of *Pumilio*.

As to the œconomical uses of this tree, it is clear they amount to very little, its wood being only used for inlaying for furniture, such as parts of chairs and the like. To those, however, who possess extensive parks, by planting them fifteen feet apart, and taking care of them during their early growth, they would be curious and useful covers for game.

XII.—*Diagnoses Algarum novarum a cl. Dre. Ferdinand Krauss in Africâ Australi lectarum, auctore Dno.* Hering, Stuttgartiensi*.

Conferva natalensis, Hering. Pilis simplicibus tenuissimis, articulis diametro sesquilongioribus, superioribus æqualibus. *Conferva implexa*, Dillw. proxima. Port Natal.

Dasya tenella, Hg. Fronde continua, tereti, vage ramosa, ramulis bipinnatis, divaricatis.

* Communicated by Mr. Daniel Cooper.

Frons vix uncialis, crassitie capillari, hyalina; granula angulata, coccinea, in fronde hyalina seriatim digesta; ad Port Natal, sterilis.

222*. *Bryopsis setacea*, Hg. Pilis setaceis, subramosis, apice plumosis.

Fila tenacia, nitida, 2—3-pollicaria, setacea, simplicia vel rarius ramulo laterali instructa, apice ramentis brevibus, simplicissimis, lanceolato-pinnata. Color obscurè viridis, chartæ arctè adhæret.

Bryops. *Balbisianæ* proxima. *Hab*. ad Port Natal Point, Africæ meridionalis, scopulis littoralibus insidens.

Caulerpa filiformis, Hg. Frondibus planis, linearibus, subdichotomis, integerrimis.

Surculus cylindricus, filiformis, stramineus, infernè emittens radices fibrosas, fasciculatas; frons spithamæa, adscendens, basi cylindrica, annulato-rugosa, deinde plana, linearis, integerrima, subdichotoma, lineam lata; color gramineus, substantia membranacea.

Synon. *Amphibolis filiformis*, Sch.

Var. β. Fronde latiore ligulata.

Var. γ. Fronde breviore palmata. Forsan distincta species *Caulerpa palmata nominanda*.

Ad Cape Lagullas, Africæ meridionalis, in arena repens.

Alsidium ericoides, Hg. Fronde tereti, continua, filiformi, ramosa; ramentis brevibus, subarticulatis, subulatis, densè imbricatis vestita.

Radix callus exiguus, frons spithamæa, teres, ramosa, pyramidata, ramenta obtusiuscula, zonis obscurioribus notata.

Hab. ad Port Natal. Sub *Rhodomela ericoides* in collectione signata.

Sphærococcus (*Chondrus*) *scutellatus*, Hg. Fronde compressa, dichotoma, segmentis linearibus; capsulis sphæricis in margine disco-que ramulorum sessilibus, scutellatis.

Habitus *Sphæroc. crispi* var. *linearis*; frons cartilaginea, bipollicaris, vix lineam lata, segmentis superioribus cuneatis, obtusis; color exsiccati atro-purpureus.

Sphærococcus (*Gigartina*) *nodiferus*, Hg. Fronde cartilaginea, tereti, subdichotoma, segmentis irregulariter dentatis, obtusis, dentibus apice capsuliferis.

Color purpureus, frons crassiuscula.

Ad Port Natal, spec. manca.

Sphærococcus (*Gelidium*) *aculeatus*, Hg. Fronde cartilagineo-cornea, ramosa, verticillato-aculeata.

Radix callus exiguus, frons cartilagineo-cornea, 4—6-pollicaris, infernè teretiuscula, nuda, mox bi- vel trichotoma, lineam crassa, compressa, vel tri- aut quadrangularis, aculeata; aculei oppositi, terni aut quaterni verticillati, lineam longi, basi dilatati, subu-

* The numbers prefixed to the species refer to the numbers in Dr. Krauss's Fasciculi of Natal Specimens. A series of the species here described has been forwarded to the Herbarium of the Botanical Society of London, where they may be consulted on application.

lati, horizontales, interstitia bilinearia. Fructus ignoti, color coccineus; exsiccatus rigidus, chartæ minimè adhærens.

Hab. ad Port Natal.

272. *Martensia*, gen. nov. Frons plana, areolata, avenia, margine fenestrata; fructus duplex; sphærospermia longitudinaliter in reticulo simplici serie disposita; capsulæ sphæricæ, reticulo affixæ, sporidia subglobosa foventes.

M. elegans, Hg. Fronde tenuissima, lobata, segmentis cuneato-rotundatis. Hook. ic pl. 7. 697.

Frons basi affixa, semi usque pollicaris, tenerrima, tenax, cellulis angulatis areolata, margine demum fructificante, clathrato-fenestrata. Color amœnè roseus fugax. Chartæ arctè adhærens.

Port Natal ad lapides.

In memoriam amicissimi Georgii de Martens, auctoris Floræ Würtembergicæ, algarum maris Mediterranei scrutatoris indefessi. —Hering.

197. *Nemalion Natalense*, Hg. Fronde filiformi, ramosa, ramis elongatis, villosis, villis articulatis.

Color olivaceus, chartæ arctè adhærens. *Hab.* ad Port Natal Point, Afr. meridionalis.

Fucus minimus, Hg. Fronde plana ecostata, lineari, dichotoma, integerrima.

Vix pollicaris, fronde semilineam lata, spiraliter torta.

Port Natal.

XIII.—*Observations on the Structure of the Pollen Granule, considered principally in reference to its eligibility as a means of Classification.* By Arthur Hill Hassall, M.R.C.S.L., Corresponding Member of the Dublin Natural History Society.

It has often been a matter of surprise to me, that no one of the numerous and gifted votaries of those bright and beautiful creations, flowers, which are scattered with so profuse a hand over moor and mountain, on hill and through dale, should have fully investigated the structure of the pollen granule in the various tribes of plants, with a view to ascertain whether it could be rendered available for the purpose of classification.

Much has indeed been written upon its general anatomy; but the characters of the granules, as they occur in each genus of plants, appear to have been scarcely at all considered in this country, and almost the only figures which we possess of individual pollen grains are contained in Lindley's 'Introduction to Botany,' and were derived from a work of Purkinje on the subject*.

* These figures are but little more than mere outlines, and even in this single particular are generally very far from being correct.

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The structure, form, and size of the pollen granule varies considerably in different tribes of plants.

There are, however, certain types of structure and of form which occur more frequently than others. Of these, the cylindrical and elliptical are by far the most common; and next, in frequency of occurrence, are those granules of either a triangular or circular form, which are met with in nearly an equal proportion. A great variety of other forms are to be noticed, which it is the object of this paper especially to describe.

The term cylindrical is applied to all those grains which are more or less of an elongated form, are somewhat triangular, and taper towards each extremity, which exhibit a furrow along their upper surface, and are furnished with three pollen tubes; while the word elliptical is used to designate those granules which agreeing somewhat with the former in their lengthened shape, having also a line upon their surface, yet possess but one pollen tube.

On the application of any fluid to pollen of an elongated form, of less density than the fovilla contained in the cells, a remarkable alteration of shape takes place with great quickness. Each grain of pollen, prior to the contact of the liquid, lies on the object-glass of the microscope with its *long* diameter placed horizontally; immediately on its touching it the position of the long diameter is changed, it becomes vertical, and the pollen grain, losing in length, dilates and becomes of a triangular or circular form; and this change of form, which is here produced by the direct application of the water, occurs also naturally previous to the emission of the pollen tubes, arising partly from the absorption of fluid from the tissue of the anther, but mainly from the imbibition of the stigmatic secretion. But if a fluid of greater density than that within the cell be applied, no such change is seen to occur, a contraction of the pollen grain and an exudation of a portion of its contents taking place.

This alteration of form, in both instances, is very satisfactorily explained by a reference to the principle of endosmosis and exosmosis, which is most beautifully exemplified in the interesting though minute subjects of the present inquiry, and all the varied phænomena of which are referred by Dutrochet to capillary attraction.

Each pollen grain consists of a turbid fluid called fovilla, containing numerous active molecular particles; and this fluid is enclosed, according to most observers, in at least two membranes, the outer being called extine, the inner intine, and this is of a highly extensible nature. The only exception to this, according to Mohl, is the pollen of Asclepiadaceous

plants, which has but one envelope; but Fritzsche has asserted, according to Lindley, that these plants have both an extine and intine. Fritzsche also states, that in *Caulinia fragilis*, *Zannichellia pedunculata*, *Zostera marina*, and *Naias minor*, the pollen has really nothing but the intine present.

That there really are two coatings to the great majority of pollen granules does not admit of a doubt; while a third membrane, intermediate between the extine and intine, has been noticed, first by Mohl and subsequently by Fritzsche, who calls it exintine. Mohl observed it in the pollen of *Taxus*, *Juniperus*, *Cupressus* and *Thuja*; and Fritzsche finds it not only in these plants, but also in *Pinus*, *Cucurbita Pepo*, and *Tigridia Pavonia*; while Mr. Giraud* states (in the third volume of the 'Annals and Magazine of Natural History,' p. 127) that he has noticed it in the pollen of *Crocus vernus*. To these I may add the pollen of the different species of *Banksia* and *Dryandra* as possessing a third membrane, as well as the following list of plants, *Fuchsia fulgens*, *F. cylindrica*, *F. thymifolia*, *F. gracilis*, and *F. coccinea*, *Stachytarpheta mutabilis*, *Tilia americana*, *Calothamnus villosus*, *Zizyphus Paliurus*, and probably also *Grevillea linearis*, *Hakia pedunculata*, *Erythrina laurifolia*, *Didiscus cæruleus*, *Fumaria officinalis*, and all other species of *Fuchsia*. It is necessary to observe great caution in deciding upon the presence of a third membrane, as an appearance is frequently observed which might mislead; it arises from the entrance of water within the sac of the intine, separating the fovilla from it, forcing it inwards, and giving it a very defined margin.

At the commencement of this inquiry, I was induced to consider that the reticulation observable on the pollen of *Pancratium*, *Armeria*, *Statice*, *Passiflora*, &c. constituted the basis of a distinct membrane, and in the figures of these which will follow it is so represented. To this opinion I was led by noticing the raised appearance which it presents, especially round the circumference of the granules, as well as from the circumstance of the ends of each grain of pollen in *Pancratium* being destitute of the reticulation; but it is more correct, perhaps, to regard this reticulated appearance as produced by the apposition of the cells of which the extine is formed in these instances.

Fritzsche also speaks of a fourth coat, which is next the extine, and which he calls intextine, as belonging to the pollen of *Clarkia elegans* and other *Onagrariæ*. Of the existence

* Mr. Giraud, in the same communication, mentions having seen small opake particles on the surface of the pollen grain of *Polemonium cæruleum*, which exhibit a peculiar motion when the granules are placed in water.

of this membrane in *Clarkia* I have but little doubt, and I believe that it is also present in those species of *Fuchsia* which I have mentioned as possessing a third tunic, as there are in the pollen of these precisely the same appearances upon which the opinion of its presence is founded in *Clarkia elegans*.

The pollen granules of *Saponaria viscida* present, when viewed through the medium of oil, a very remarkable appearance, which I am only able to explain by supposing that it depends upon some peculiar inversion or pitting of the extine. It conveys the idea of a membrane of a circular form, smaller than the extine, being placed within it, and pollen tubes to the number of ten escaping through apertures in it and extending to the margin of the outer membrane. I refer to this appearance here in the hope of directing the attention of other observers to it, who may perhaps be able to afford a more particular explanation of its nature.

In the long axis of those granules to which the terms cylindrical and elliptical are here applied, as well as of many others, a line or furrow, as has been already remarked, is noticed, concerning the nature of which various conjectures have been hazarded, and none of which afford the true explanation of the phænomenon. Malpighi compared granules of pollen of this kind to grains of wheat, on one side of which a furrow exists; but this does not account for the furrow being visible in every grain at the same time; Guillemin, attempting to account for the constant presence of the line, says that it exists on both sides of the grain. He further supposes this furrow to be a slit intended to facilitate the admission of water into the interior of the granules, and the emission of their contents; neither is this explanation more satisfactory. Fritzsche states it to be a thin part of the extine where the sides of the pollen grain are contracted and meet, producing the appearance of a furrow; while Mr. Giraud regards this line as a mere furrow in the extine which disappears on the application of moisture, in which opinion Professor Graham coincides*; but neither of these gentlemen offer any explanation either as to its origin or use.

The true explanation of the nature of this furrow, about which there are so many opinions, is, that it is a deficiency in the external membrane of the pollen grain, intended to facilitate the egress of the pollen tubes, one of which may be distinctly seen to issue from each; and the fact of its being seen at the same moment in every grain of pollen is accounted for by reference to the form of these granules. Those grains

* See Ann. and Mag. of Nat. Hist. already referred to, and Prof. Graham's Third Annual Report, read before the Botanical Society of Edinburgh, March 1841.

readily from the extine, to which it does not appear to be organically united, as on the application of water it is seen to curl up and fall off the granules. It is also met with in *Centaurium*, *Scolymus*, *Dipsacus*, *Scabiosa*, and some allied genera; in these instances it sometimes has an attachment to the extine.

The extine, or protective membrane of the pollen grain, on which its shape depends, is of much greater substance than the intine, which is so fine, that rarely can any appreciable thickness of it be detected. It is seldom, if ever, a simple homogeneous membrane, being most generally formed by the apposition of a number of cellules held together by "organic mucus," which give to it a reticulated appearance, very obvious in many of the *Liliaceæ*, as well as in a great variety of other plants. In most hispid pollen, where the same reticulated structure may be traced, from the centre of each cell of the network, either one of the numerous spines which cover this form of pollen grain may be seen to arise, or, where this is absent, an aperture for the passage of a pollen tube will be apparent.

If this view of the structure of the extine be correct, then must it consist of two layers, as each cell forms a shut-sac.

By some observers the external tunic of the pollen grain is said to present a granular *structure*. It often presents a granular *appearance*, which is deceptive, and which I have found to arise from the circumstance of the particles in the fovilla being visible through their transparent coverings.

It has been matter of doubt whether the extine be extensible or not; that it really is so in some cases to a considerable extent, is apparent from the following fact, the only one with which I am acquainted which distinctly proves it. The surface of the pollen granule of *Canna indica* is covered with numerous points, having their free extremities perforated. When the pollen is immersed in water the spines disappear, leaving small apertures on the surface of the now smooth extine; each granule at the same time having enlarged to about thrice its original size. This change occurs with greater rapidity if a dilute mineral acid be used instead of water. All kinds of pollen appear somewhat larger in water, but this depends upon the magnifying power of that liquid. The intine does not expand in an equal proportion with the extine; but being pressed upon equally on all sides by the water which is imbibed by the extine, is forced inwards, and a large space filled with fluid is left between the two membranes.

After diligent and repeated search, I have at last succeeded in making out the plano-convex bodies (*Zwischenorpern*) described by Fritzsche as being particularly visible in some *Mal-*

vaceæ, in a species of *Hibiscus*, *H. africanus*. He represents them as existing in most hispid pollen, the apertures in which for the passage of the pollen tubes they close, being placed between the extine and intine, with their convex surfaces resting upon the latter. If the pollen of the above-named species of *Hibiscus* be allowed to remain in water for a short time, the pollen tubes will be seen to have emerged some distance from the intine; and upon the extremities of many of them those pieces of membrane will be noticed, which are however more frequently concavo-convex than plano-convex. Although I have not seen these bodies closing the apertures in the extine, it may be inferred with tolerable certainty that they perform the office ascribed to them, from their position at the terminations of the pollen tubes. Those who may wish to observe them will not experience the same difficulty that I have done, knowing the species and the manner in which to look for them. They are not present in the pollen of the *Ipomææ*.

The surface of all pollen is covered with a thick tenacious matter, which, according to Mohl, is most abundant upon that which is hispid; but it is at least as much so on the pollen of many species of *Liliaceæ*, which are not hispid, but reticulated. If this viscid substance is to be regarded as a secretion, then must the extine be provided with glands, or some other peculiar organization for its formation; for a true secretion can only result from organization of some kind or other, and, in the vegetable kingdom, may be defined to be a new product, eliminated from the sap through the instrumentality of glands or other structural media. My own opinion is, that it is a secretion, if not formed by the external membrane of the pollen grain itself, derived from the cell in which it is originally developed. I was at first inclined to consider it as a mere exudation, consisting of the thinner parts of the fovilla; but its appearance and consistence differ so much from this, that I believe the opinion to be scarcely tenable. This secretion fulfills an important indication in preventing the too easy dispersion of the pollen granules, which it slightly holds together, and which would be scattered far and near, wide of its destined mark, by every breath of wind.

Pollen granules, though usually separate, are occasionally found united. This union is either temporary, the medium which retains them in contact with each other being either a tenacious secretion, or filaments of the cellular tissue derived from the breaking up of the cells in which the granules are originally developed; or it is permanent and organic. We

find the first mode of union in the pollen grains of the *Epilobia**, *Salpiglossis atropurpurea*, and in *Lechenaultia formosa*, while the second is met with in all the genera of the natural order *Ericaceæ* which I have had an opportunity of examining, in the *Acaciæ*, *Mimosæ*, *Junci*, many species of *Orchidaceæ*, and in *Oxyanthus speciosa*. Some of these grains, though they usually are permanently attached, are yet capable of separation; but others of them again, as the *Ericaceæ*, &c., are so intimately joined, that they never become separated. The number of pollen grains thus united together is definite, being either four, or multiples of four up to sixteen, but the first number is of the most frequent occurrence; thus there are four in the *Ericaceæ*, *Epilobia*, *Junci*, *Orchidaceæ*, *Oxyanthus speciosa*, and *Salpiglossis atropurpurea*, *Lechenaultia formosa* and *Mimosa mexicana*. In *Acacia rigens* there are eight, disposed on the same plane; in *Acacia decipiens* twelve, six being disposed on the same plane, while three are placed in the centre, on either side of the flat figure so formed; and in *Acacia linearis* there are sixteen, eight upon the same plane and four on either side. It is to be observed, that dark lines run between every four grains, indicating either their original separation or their tendency to become so separated. When the union of pollen grains occurs in fours, they are either disposed upon the same plane, as in the *Epilobia* and *Lechenaultia formosa*, or they appear as if one was placed upon the other three, all the granules bearing precisely the same relations to each other, and whichever one is uppermost, the rest being similarly circumstanced in reference to it. One exception occurs to the law of the union of pollen grains in fours in *Epilobium roseum*, where they generally unite in threes.

As a rule, but one mode of arrangement prevails among the pollen grains of the same species.

Pollen grains are often held together by a thready substance, supposed to be derived from the rupture and breaking up of the cells in which they are primarily formed, in the meshes of which they become either entangled, or to which they are attached by the secretion which covers their surface. It appears to me that neither the origin nor use of these threads are rightly made out. They are found in great abundance in the pollen of the *Ericaceæ*; *Fuchsiæ*, *Œnotheræ*, and other *Onagrariæ*.

The size of the pollen granule differs as materially as does its form and structure, as will be obvious from a perusal of the following table of relative sizes, although in the same

* The granules in *Epilobium angustifolium* are not united, resembling much more those of the Clarkias than the Epilobiums.

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pentaphyllum, *Bessera elegans* and *Lythrum Salicaria*; in this last it is curious to notice, that while the pollen of the upper stamina is green, that of the lower ones is of a bright yellow.

Pollen tubes are prolongations of the intine, and are filled with the fovilla, which passes into them by gravitation. They vary much in number, size, and arrangement; they issue either through fissures or apertures in the extine, and where there are three envelopes, through similar provisions in the second also. Except in some few instances, I have not been able to discover any provision in the extine for the escape of the pollen tubes. These exceptions occur in the genera *Canna*, *Strelitzia*, *Roscoea* and *Hedychium*, all of which belong to closely-allied orders, and in which the extine, which is of great thickness, forms a shut-sac. If water, and more quickly if dilute nitric acid, be applied to the pollen, the granules are seen to enlarge a little, and the extine to crack irregularly, but often separating into three unequal pieces; while the intine, having undergone no change except a slight increase of size, and still containing the fovilla, frequently disengages itself from its envelope and floats away from it. This cracking of the extine is assuredly the natural means by which the pollen tubes are afforded an outlet; and it is not necessary that the intine should be denuded at any particular spot, for wherever it is so it possesses the power of elongation, or rather *growth*. In one or two cases the apertures are provided with valves, as in the different species of *Passiflora*, as first noticed by Purkinje. Fritzsche has described one valve in the grasses, two in the nettle, four in the orange, and six in the primrose. Although I have searched with care for these valves, I have not been able to detect any trace of them, and am strongly inclined to deny their existence in any of these plants.

The primary form of the pollen of the orange precludes the possibility of its being furnished with regular valves, the pollen tubes issuing through *fissures* and not circular apertures; while had a valve been present in the grasses, I think I must have detected it in the pollen of the *Zea Mays*, which is of a very large size, and in which the apertures for the escape of the pollen tubes are very visible. The nettle I believe to possess *three* pollen tubes.

The emission of the pollen tubes is produced, artificially, by the action of the mineral acids and water, and naturally, partly by the rarefaction of the contents of each pollen granule by the sun's heat * (the rarefied fovilla distends the shell

* The effect of heat upon the pollen has occasionally been demonstrated when I have been examining it under a strong reflected light of the sun, by the emission of the pollen tubes, and even rupture of the intine.

of the pollen grain, which produces pressure upon its contents, and assists in forcing them out in the only direction in which they can issue, namely, through the openings provided for the purpose), partly by the granules imbibing a portion of the stigmatic secretion, some of which gets between the outer and inner membranes, producing pressure upon the latter, and partly by the stimulating effect of that secretion.

Pollen tubes are supposed to be elongated by means of the distension or stretching of the intine. This opinion appears to me to be erroneously entertained. It is difficult to conceive any membrane to be endowed with such immense powers of expansion as would be required for it to afford a covering to the whole pollen tube, lengthened as it often is to such a great extent in its passage through the style. Thus in *Crinum amabile* the pollen tube has to pass through a space 1875 times the diameter of the pollen grain before reaching the ovarium. In *Cleome spinosa* 2719 times. In *Oxyanthus speciosa* 4489 times the diameter of the pollen grain, and in *Colchicum autumnale* 9000 times. Pollen tubes are frequently met with of considerable length on parts of the flower distant from the stigma, proving that the stigmatic fluid is not essential for their growth, although it doubtless favours it.

I am of opinion, therefore, that pollen tubes are growths and not mere elongations of the intine; and that as they grow a vacuum is formed within them, into which the fovilla passes. At the same time, I do not mean to deny the fact of the intine being extensible; it is no doubt highly so, as proved by the great length of the pollen tubes emitted under the action of dilute nitric acid in some cases.

Were pollen tubes but mere extensions of the intine, it might with reason be expected that the size of the granules and consequent extent of the intine would bear some relation to the distance which they have to travel through the stigmatic tissue before reaching the ovary, and that the greater the distance the larger would be the pollen grains; but no such relation exists.

I am at present inclined to regard the active molecular bodies in the fovilla, which have attracted so much the interest and attention of physiologists, as nothing more than particles of that fluid which have become separated into little masses or globules. The fluid nature of these particles is proved by their great diversity of form and size, by their transparency, and by their trailing, or "tailing *," as they

* "Tailing" is a term used by druggists to signify the elongation of form which the globules of impure quicksilver undergo in passing over paper.

pass along the surface of glass. Again, the internal membrane of the pollen grain of *Strelitzia humilis*, when denuded of the extine, presents a cellular appearance, which is owing to the presence of numerous globules of various sizes contained in the fovilla, of which, in this instance, it appears to be entirely composed, and which are seen through its transparent envelope. I could not detect any other bodies but these globules, which I regard as fluid for the reasons just given. The application of iodine to the fovilla, contrary to expectation, produced no effect, and a solution of potash but little apparent results.

I look forward to another opportunity of making more extended observations upon the nature of these so-called molecules.

Being anxious to ascertain whether stimuli would produce any effect upon the pollen, various solutions were applied with a view to determine this point. The results following the various applications employed were as follows:—solutions of the mineral acids, whether sulphuric, nitric or hydrochloric, all occasioned, with more or less degree of force, the protrusion of the pollen tubes. Their mode of action is not very clear; but it may be that they produce *some* astringent effect upon the outer coating of the pollen grain, so as to cause the principle of endosmosis to operate with greater power. Sometimes these acids, and more particularly the dilute sulphuric acid, rupture the inner membrane, and then the fovilla escapes from its interior; but most frequently the pollen tubes are emitted, covered by the intine, which remains entire, and it is to explain this protrusion of them that the above explanation is offered. The concentrated sulphuric acid almost always destroys the intine, and frequently also blackens and chars the extine. A solution of the nitric acid, in the proportion of two of the strong acid to three of water, is perhaps the best application for occasioning the emission of the pollen tubes; but it is as well to have solutions of all the acids of various strengths, for where one fails another will often produce the desired effect. The action of the hydrochloric acid is weaker than that of either of the others. Solutions of *æther* and *sal volatile* produced a marked effect. When either of these were allowed to fall from a glass on the pollen, its granules became distinctly agitated and moved about with considerable velocity, sometimes for the space of two or three minutes. A like effect, but to a much less extent, resulted from the employment of tincture of cantharides, tincture of capsicum, proof spirit, solution of nitrate of silver in proof spirit, and essence of ginger, while liquor ammoniæ and po-

wet would be attended with more serious results were it not for another wise and effectual provision. The individual flowers composing a bunch, as well as the different bunches of a plant or shrub, come into blossom at successive intervals, the order of their expansion depending mainly, I believe, upon the position of the flower, whether it be in a more direct line or not for the accession of sap, on the size of the peduncle, as well as on the order of the development of the flower buds themselves*: thus, if the pollen at one period be destroyed, it is soon replaced by the unfolding of more blossoms and bursting of anthers: this constitutes the second means by which the efficiency of the pollen is ensured. We find a third in the position of the stamens in reference to the pistil, which they often surround, embrace, or overhang, so as to render the application of the pollen to the stigmatic surface a matter of certainty.

Again the filaments of some anthers are furnished with elastic joints, which at a certain period, that is, when the pollen and stigma are in a fit condition, contract and start towards the pistil with a jerk, dispersing the contents of the anthers around them by the suddenness and violence of the motion. I may perhaps under this head refer to two instances of irritability, which I have never seen mentioned in books, and which are certainly not generally known. The first occurs in *Cornus canadensis*: the corolla of each flower, a number of which are contained in a common involucrum, consists of four segments; these for some time are folded over the other floral organs and meet in a common central point, where they cohere by means of some secretion. Towards their tips, on what is the upper surface, while thus closed, arises a long spine or hair. The stamina are also four in number, and arise from the top of the calyx in the intervals between the petals, and at about half their length are bent inwards towards the pistil at a very acute angle, being retained in this position by the corolla which infolds them. The base of each petal, as well as the angle of inflection of each filament, are furnished with an elastic joint, so that if one of the spines be slightly touched, not only does each segment of the corolla fly back, but the stamina, the restraint being removed from off them, start up, scattering the pollen of the anthers around them, some of which, it is beautiful to observe, in viewing this phænomenon under a low power of the microscope, invariably alights upon the stigma, and is there retained by means of the secretion with which it is furnished.

* The cause of the irregular ripening of many kinds of fruits and seeds admits of a similar explanation.

If the joint of the filament be touched where it protrudes between the petals, no such effect as I have described will be produced, but the moment the hair is touched it takes place; now the presence of these hairs affords a very interesting instance of design. They are connected with the joint of each petal by means of a raised line of elastic tissue which runs along their centre, and which doubtless serves to convey the impression or shock, imparted to the hairs most frequently by means of insects, to the joint, causing it to contract; the dispersion of the pollen and consequent fecundation of the ovule being thereby rendered more certain.

The second instance to which I shall refer is witnessed in the common stinging nettle, *Urtica dioica*: the number of stamina in this plant is likewise four; these are inclosed in a chalice or cup composed of four sepals, and the filaments are coiled inwards; on the reflection of these sepals, or on the occurrence of any shock, the filaments disengage themselves, and not merely straighten, but turn as much outwards as they were previously coiled inwards, the pollen being scattered, as in the former case, around them. If the filament of each stamen be examined with the microscope, one surface of it, that is, the one which formed the concavity before its disengagement, but after, the convexity, is observed to be ringed, in the same way as the elastic spring of the sporangia of Ferns. An analogous instance of irritability occurs in *Parietaria*, an allied genus*.

The stigmata of some plants, as for example of *Pavetta Caffra*, the *Campanulæ* &c., extend so much beyond and above the anthers, that it is difficult to conceive in what way the pollen can reach them; but observation affords an explanation of the means: at the time of the bursting of the anthers the stigma is on a *level* with *them*, and, apparently stimulated by contact with the pollen grains, subsequently rises up, carrying with it in its progress a quantity of the pollen.

Moreover, the application of the pollen to the stigma is rendered more certain by a cause, which, when not rightly considered, may appear trifling, but which, in its results, is far from being so. I allude to the agency of insects, and of these, especially to the *Aphides*, and our benefactor the Bee, that busy labourer for man, who in rifling a flower of part of its sweets, yet in doing so confers upon it the means of its perpetuity by dispersing the pollen around, some of which never fails to reach the stigma. To many insects the pollen doubt-

* I now know that *this second* example of vegetable irritability *or elasticity of tissue* is alluded to in Lindley's 'Natural Arrangement,' and also in Henslow's 'Descriptive and Physiological Botany.'

less forms an important article of food, as does also the honeyed secretion found in so many flowers, and are both the inducements which bring them so many visitants. The chief use of honey in the œconomy of a plant I conceive to be to allure insects for the purpose referred to.

The last provision to which I shall advert, consists in the amazing number of pollen granules produced by most flowers. In a single blossom of *Leontodon Taraxacum* I counted no less than 243,600 pollen granules. A flower of Pæony furnishes on an average 174 stamina, each containing 21,000 granules; these multiplied together give a total of 3,654,000; and in an entire Rhododendron plant the pollen grains amounted to the wonderful number of 72,620,000. This last result was arrived at by computing the number of anthers in each flower, with the contents of one, and the number of flowers and bunches. Great as these amounts are, they sink into comparative insignificance when contrasted with the myriads produced by a single forest tree. A bulrush gave 144 grs. by weight of pollen. Immense as the quantity of pollen is, provided for the fertilization of each flower, it is yet all necessary, so much being destroyed by various instrumentalities, to ensure the certainty of a process, the failure of which would be attended with such calamitous results. Nature is seldom uselessly prodigal of her resources.

It is interesting to observe the relation which frequently exists between the quantity of pollen and the more or less direct means of its application to the stigma; this relation, however, is modified by the number of ova to be fertilized. Upon this subject I hope shortly to make some detailed observations.

Various particulars referred to in the foregoing pages will be exhibited in the figures which are to accompany the second portion of this communication.

[To be continued.]

XIV.—*Indian* Cyprinidæ. By John M'Clelland, Assistant Surgeon Bengal Medical Service.

[Continued from p. 46.]

24. The Opsarions are *Cyprinidæ* that live upon other species of their own class; they are no less remarkable for the peculiarity of their colours than for their remarkable structure and habits. Instead of the longitudinal stripes of the Perilamps, they are characterized by transverse bands or spots, having a tendency to form cross bars on the sides. The analogy between the structure and character of the Opsarions

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26. The third subfamily, *Apalopterinæ*, consists of the old Linnæan genus *Cobitis*, the *Anableps*, *Pœcilia*, *Lebias*, *Fundulus*, *Molinesia* and *Cyprinodons*, as well as two other genera, *Platycara* * and *Psilorhynchus*, to be described in a subsequent part of this paper. These fishes are all remarkable for their long cylindric bodies, covered with a slimy mucus, the absence of spinès in any of the fins, and the shortness of their alimentary canal.

Mr. Gray has recently separated the Loaches with suborbitar spines from those that are without these singular organs. I have endeavoured to find further reasons to strengthen this division, a single character being insufficient to distinguish a natural group without some more general reference to habits and structure. Not having been successful, I am obliged to resort to another arrangement, which appears to be more natural, and at the same time equally obvious, the caudal of the one subgenus (*Cobitis propria*) being entire, and that of the other (*Schistura*) bifid, or divided into two lobes, as in the ordinary Cyprins. Colour is here a no less important guide than we have found it to be in *Sarcoborinæ*. Green, disposed in bars and zones crossing the body, characterizes all the *Schisturæ* except a single species (*Botia grandis*, Gray), in which the colour is green, with oblong light yellow spots, or rather short interrupted streaks, irregularly disposed in all directions.

The true Loaches (*Cobitis prop.*), on the contrary, are all brown, inclining in different species to red or yellow, disposed in nebulous blotches or obscure bars having a transverse tendency.

27. The structure of the digestive organs in the Loaches and *Schisturæ* does not appear to be very different; but in the latter the intestine seems to be somewhat longer than in the former, exceeding in the one genus the length of the body, while in the other it falls short of this. In both the stomach is a small lunate sac, placed crosswise with regard to the body, with both orifices in the front, thus differing in this peculiarity from all other *Cyprinidæ* that I have examined. The mouth is small, and placed in the lower surface of the head, and surrounded by minute cirri. Besides the difference in the caudal fins, length of intestine, and colour, in the two subgenera of *Cobitinæ*, the body in *Schistura* is often arched above and below, and compressed, the same as in *Cirrhinus* and the generality of Cyprins; but in *Cobitis pro-*

* Named by Mr. Gray as Buchanan's *Balitora*, which rather corresponds with my *Psilorhynchus*; *Psil. variegatus* being Buchanan's *Cyprinus Balitora*.

pria, or true Loaches, it is almost cylindrical, and generally very long. Some of the *Schisturæ* are possessed of an air-vessel, placed as usual in the upper part of the abdomen, of an oval shape, and divided into two lateral cells by a longitudinal septum; but in *Cobitis prop.*, or Loaches with entire caudal, I have not found any trace of that organ in the ordinary position: but in different species that I have dissected, it is placed in a small bony case over the entrance to the œsophagus; this case consists of a single subglobular cell, although in the European species it has been found to be bilobate. In those *Schisturæ*, on the other hand, which are without the abdominal natatory bladder, I find the organ situated over the entrance to the œsophagus, as in *Cobitis prop.*, but formed of two small globular cells, joined together by an intermediate tube.

28. Having thus explained the general principles on which I have subdivided the family, it may be useful to examine how far the results are likely to correspond with those laws that have been laid down as the basis of natural classification. With this view we should first of all endeavour to ascertain the denomination of the family, or its relation in point of rank to fishes in general; but as this could only be done after analysis of the whole class, we can only attempt to form an estimate on the subject by comparing *Cyprinidæ* with what seem to be analogous groups in other classes, to which the philosophical views of Mr. MacLeay, Mr. Swainson, Mr. Vigors, and other writers on the natural system, have been extended.

29. It might be unnecessary, in a communication of this kind, to offer any remarks on the general principles of the natural method of arrangement, as these are fully expounded in popular introductions that ought to be universally read, as well as in several papers that have been published within these last twenty years in the Transactions of the Linnæan and other learned societies; I may however remark, that in addition to those affinities by which animals are immediately connected, there are more remote relations, called relations of analogy, by which they typify or represent each other, "a principle which," as Swainson observes, "was in some degree perceived by Linnæus when he compared ruminating quadrupeds to gallinaceous birds*, both of which evince the greatest intelligence, docility and contentment under the domestication of man." Appendages to the head, whether in the shape of horns, crests, or fleshy protuberances, and the property of affording whole-

* Such analogies were, as Mr. MacLeay has shown, known to Aristotle, by whom, however, as well as by all subsequent writers up to the time of Mr. MacLeay himself, they were mistaken for affinities.

some and nutritious food, and otherwise contributing to the ease and support of man, are, according to Swainson, the chief attributes of the type to which the above analogy refers.

30. The Elephant, horned cattle, domestic poultry, &c., are common instances of the type alluded to; and if we compare their properties in their respective circles with the *Cyprinidæ* in the order of abdominal Malacopterygians, we may venture perhaps to look upon that family as the equivalent in its circle to other rasorial groups in theirs.

31. The mouth of *Cyp. Calbasus*, Buch., is small, and directed downwards; the anterior lip is compressed by a pendulous muscular snout, to which four short muscular cirri, different from the nervous filaments of *Siluridæ*, are attached*, and the posterior lip is fixed to the ligamentous union of the transverse apophyses of the lower jaw. In the Cirrhins the lower jaw is composed of two short branches or bony limbs, obliquely inclined towards each other from their articulation to the blunt apex of the jaw, where they are united by ligaments instead of symphysis at the approximation of a slender apophysis from each side. Figs. 4, 5, 20, 21, plate 54, show the under side of the right ramus of the lower jaw (natural size) of four species; *a*, being the point of approximation with its fellow at the chin, and *b*, the articulating extremity behind.

32. This structure is evidently adapted to the habit of collecting fruits, seeds, and other soft substances from the muddy and sandy bottoms of indolent streams, in which loose detached objects of the kind are most likely to occur, and where they may be easily collected, without bodily effort, by means of these soft pendulous and prehensile organs attached to the lips. If to these characters we add the great size of the species compared with the rest of the family, and the plain dusky colour of the Cirrhins, their analogy to the proboscidian types of quadrupeds seems almost complete. But there are still other remarkable points of resemblance between the Cirrhins and rasorial forms among the quadrupeds, in the deficiency of teeth, and the weakness of the union of the two limbs of the lower jaw.

33. In the Elephant this jaw is only formed for grinding such substances as are introduced to the mouth by the proboscis;

* The cirri of *Cyprinidæ* are soft, and capable of being contracted and elongated, as well as the loose muscular appendages of the snout to which they are attached, particularly in the genus *Cirrhinus*, Cuv.; but in *Pimelodus aor*, Buch., and most of the *Siluridæ*, I find the cirri are flat and cartilaginous, with a groove on either edge for the protection of a large nerve, an artery, and a vein. A *cirrus* so constructed is incapable of muscular action, and is strictly an organ of sense only, and not of prehension as in *Cyprinidæ*, and ought to be called a filament.

The most remarkable characteristic of rasorial birds is their shortness of wing, terrestrial habits, and consequent strength and size of their legs, which are formed for the principal support of the body, and in some almost supersede the use of wings. It may be thought difficult to find among fishes a terrestrial type; but as water is the natural element of this class, so the ocean is its metropolis; and those kinds that are confined to rivers and the interior of continents may be safely looked upon as more terrestrial than the rest, and consequently so far equivalent in their habits to rasorial birds; and while there is no instance of rasorial birds possessed of aquatic habits, or, as Swainson observes, "frequenting water or even its vicinity*," so no species of *Cyprinidæ* is known to belong to the sea. In India the *Cyprinidæ* are exclusively confined to fresh water, mostly keeping beyond the influence of the tides; thus evincing a propensity for land analogous to that of Rasores.

35. There is perhaps no point better settled in comparative anatomy, than that the pectorals of fishes represent the upper extremities of the higher classes of animals; short pectorals may therefore be said to be equivalent to short wings in birds; but it is a question of much interest to determine fully how this applies to the case before us, and if it is to be relied upon as a true analogy.

In the Frog and several reptiles the scapula has been found by Cuvier and Geoffroy to be composed of two osseous pieces, agreeing with the two upper bones of the posterior frame or jamb of the branchial aperture in fishes; and a third or lower bone assists in forming a girdle to which the pectoral fins are fixed in *Siluridæ* and most fishes of the same order, with the exception of the *Cyprinidæ*, and particularly the herbivorous section of the family (*Pæonominæ*). These bones were found by the most satisfactory analysis to represent the humerus, or bone which gives support to the third row of quill-feathers in birds. Below this bone there is a stylet, which in Cyprins is *merely rudimental*. It was found by Cuvier to represent the ulna and radius, or in other words, to be equivalent to the cubitus or bone which sustains the secondary quills in the wings of birds.

36. Thus two bones, which in birds constitute the larger portion of the wing, may be said to be almost deficient in herbivorous Cyprins, though they are more developed in many species of the carnivorous section of the family, and still more complete and uniform in other families of the same order, as *Siluridæ*.

37. It is hardly necessary to enter into further analysis to

* Geog. Dist. and Class. of Animals, p. 259.

prove that the pectorals of *Cyprinidæ* in general, but particularly of herbivorous Cyprins, are less complete than those of neighbouring groups, for we are at once struck with the fact on observing the small size of the pectoral fins in all our *Pæonominæ*, and the slenderness of the rays of which they are composed; while the large clumsy rays of the ventrals, and the strength of these fins, are circumstances that cannot be overlooked, and which, when viewed in comparison with the strong and fully-developed legs of Rasores (34.), supply all that is essential in the analogies between the groups in question.

38. In the most carnivorous species of *Sarcoborinæ*, on the other hand, and especially in some of the Opsarions, as *O. polioxus* and *O. pholicephalus**, remarkable instances are observed of excessive development in the pectoral fins; and this is always, as far as I have seen, attended with a proportionate want of size in the ventrals, which are so slender and small in this genus, and their structure so delicate, as to render it hardly possible to conceive that they can be of much use in aiding the movements of the body. Now the widely-cleft mouth or beak, great breadth of wings or pectorals, obsolete ventrals or feet, are common to Opsarions and Fissirostres, so that the first would thus appear to be a natatorial type of *Sarcoborinæ*, corresponding with that type in the order of perching-birds. To this, however, there is some objection; for if the *Sarcoborinæ* represent the *Feræ*, the most carnivorous genus of the subfamily (which Opsarions would seem to be) ought to represent the *Falconidæ*, in which there is only one genus (*Gypaëtus*) remarkable for short feet and great breadth of wing; but the cruel habits and voracious appetite of the Opsarions go to establish this last as the true analogy; this, however, as well as many other points, must remain to be decided by further inquiry. In the mean time we may be justified in the conclusion, that the *Feræ* among the Mammalia, and the *Falconidæ* among birds, have their representatives among the *Cyprinidæ*, and that the same type in each of the three groups seems to possess certain corresponding characteristics which may distinguish them from all adjoining groups, and that in describing these characters the same terms are as applicable to the one as to the other, which is quite sufficient to prove their corresponding analogies.

39. It may be objected to by those who have not paid much attention to the subject, that detached comparisons of this nature are of little value; still they are important, as the means of directing attention to characters that would other-

* Tab. 47, f. 2, 3.

wise be liable to be passed over unobserved; I am therefore disposed to pay little regard to such objections. The number of species and groups are now so much multiplied in every department of natural history, that detached descriptions are daily diminishing in value; and besides, it is so easy to make a new genus if not required to show our reason for doing so, that we need not be surprised that it should now have become a regular trade, and that many acquire a temporary fame with the unthinking part of mankind by the practice.

40. The first test of a natural group is the circularity of its contents. To ascertain whether the affinities of the *Cyprinidæ* are circular, it is necessary to recollect that the herbivorous Cyprins are characterized by their plain colours and great length of intestinal canal, which varies from six to twelve lengths of the body in the different groups; those with the shortest intestine (the Barbels) being in the centre of the subfamily, it follows that the two extremes must meet, or show a tendency to approximate or close. The herbivorous Carps are united to the *Sarcoborinæ* by means of the Gonorhynchs and Systoms, and show, like the last, a tendency to form a circle of themselves, though it is probable that the group is yet far from being complete. The *Sarcoborinæ* and the Loaches are united by two new types, the *Platycara* and *Psilorhynchus*; and the *Schistura*, in addition to approximating to the *Platycara*, unites, or shows a tendency to unite, both in form and habits, with the *Pæonominæ*, the group with which we set out; thus exemplifying the first principle of natural classification, namely, that every natural series of beings, in its progress from a given point, either actually returns, or evinces a tendency to return again to that point, thereby forming a circle*.

41. The second test of a natural group relates to the number of its types. On this point there exists some difference of opinion among writers on the natural system, which their profound inquiries are now doing much to remove. It is a question which, to understand sufficiently for practical purposes, requires an extensive knowledge of natural history, and a mind somewhat more imbued with the spirit of philosophy than has hitherto been considered requisite in those who venture to name new genera. It has already been said that the lower jaw of the Labeos agrees with that of the Cirrhins, in being formed of two bones articulated behind to the anterior process of the preoperculum, and that in front a transverse apophysis is given off on either side, so as to meet nearly in the middle, where they are united by ligaments and muscles at the chin, which is square, with a fissure in the middle.

* Swains. Nat. Class. and Geog. Dist. Anim., p. 224.

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presence or absence of a spinous ray are scarcely sufficient distinctions even for a subgenus; and the Catastomi and Labeos of America will, I presume, be found to arrange themselves naturally with the Cirrhins.

The lower jaw of the Gonorhynchs is composed of two limbs placed nearly parallel to each other, and, as in the Cirrhins, not united in front, but with this peculiarity, that the os hyoides is prolonged to the chin, at which situation the anterior extremities of the three bones are tied together with ligaments*.

In the Opsarions, and generally throughout the *Sarcoborinæ*, the second form of jaw prevails, with the addition of being more acute at the symphysis; this form also seems to prevail in the *Cobitinæ*, but in these the bones of the jaw are soft and flexible. The limbs of this organ are round and slender in *Cobitis prop.*, but firmly united in front by means of two expanded apophyses; while in *Schistura* they are flat and obliquely inclined to each other, so as to form, by means of their inner edges, a lengthened symphysis.

43. Thus we appear to have three primary types: the first distinguishes the Cirrhins, Labeos, and probably Catastoms; a second is peculiar to the Barbels, Opsarions, and numerous other genera; and a third is seen in the Gudgeons. From these three types being so prominently developed in the *Pæonominæ*, while one principle chiefly seems to run through all the *Sarcoborinæ*, it is perfectly legitimate to conclude, even from this circumstance alone, that the former should be the most perfect group of the two, and that its species should consequently be endowed with more diversified instincts; hence, although a vegetable regimen is the great characteristic of the *Pæonominæ*, still many of the species are omnivorous, and this is to be expected, especially among the Cirrhins and the true Carps (*Cyprinus prop.*, Cuv.). The Barbels, however, as well perhaps as the Breams, which appear to be peculiar to Europe, seem to partake more of carnivorous habits, and therefore must be held as the subtypical, while the Cirrhins are the typical†; and the Gudgeons and Gonorhynchs, from their possessing in the greatest perfection the single instinct for a tendency to which the *Pæonominæ* are most remarkable, viz. subsisting exclusively on a vegetable regimen, are as unquestionably the aberrant forms of *Pæonominæ*: on the other hand, the rapacious habits of the *Sarcoborinæ* mark them so con-

* Vide Journ. As. Soc. Beng., 1835, p. 40, where I described this structure in *Gonorhynchus petrophilus*.

† The Cirrhins being the most perfect forms of a typical group, are strictly, in the language of Mr. Swainson, *pre-eminently* typical.

spicuously as a subtypical group, corresponding as they do with the habit of that group in devouring other animals, that it is unnecessary in this place to offer a remark in support of a fact so plain.

44. The consideration of the third or aberrant group in *Cyprinidæ* involves some points which will not be so clear to those who have not studied the principles of natural classification. This group should possess three types, and these should be so related as to form a circle of affinities among themselves. This property has suggested the following proposition to Mr. Swainson, which tends to reconcile some diversity of opinion that formerly prevailed as to the number of primary types:—"The primary circular divisions of every group are three actually, or five apparently." The three aberrant types are named by Mr. Vigors ('Linn. Transac.,' vol. xiv.) from the corresponding groups in ornithology, natatorial, suctorial, and rasorial*. The third type I find to be represented by the Loaches; but before we enter into a consideration of that part of the subject, it is necessary to point out the two first types, which I have already only alluded to; this I must do by entering into more particulars than may seem to be necessary.

45. Buchanan, in defining his ninth division of the old genus *Cyprinus*, which is composed of Gonorhynchs, as I have already pointed out, gave them the barbarous name of *Garra*, and compares their habits to those of the Loaches, and observes that they are called *Balitora*, or sand-diggers, by the natives; a name, I may observe, which in Assam, and I presume also in Bengal, is applied to Loaches only. Indeed the Gonorhynchs, or *Garra* of Buchanan, are peculiar to mountains, from whence they are driven down during floods, and do not extend beyond the rapids that skirt their base; so that they can scarcely be said to be entitled to any Bengal name. In this group Mr. Gray detected a new genus, to which I wish he had given a more appropriate name than *Balitora*; for independently of the species being different from any of those described by Buchanan, and supposed by him to be the *Balitora* of the natives, Mr. Gray's genus is peculiar to mountain-torrents, the beds of which are usually rocky rather than sandy: for this reason, as well as from the fact of the *Balitora* of Gray forming a new type, distinguished by a flat head and

* As these terms have been applied conditionally by Mr. Swainson to *Mammalia*, I need make no apology for following the example of so good an authority in applying them to fishes. Indeed I have been guided entirely by the views of Mr. MacLeay, as exhibited in the 'Linnæan Transactions,' and the works of Mr. Swainson, from beginning to end of this paper.

other remarkable characters, I propose for it the generic name *Platycara**. Several specimens of this genus, corresponding, I suspect, with the spotted species of Gray, *P. maculata*, plate 49, fig. 2†, were brought down from Bouton by Mr. Griffith, but they were unfortunately in such a decayed state when opened that we have been unable to obtain from them a very full specific description. I have however, from these specimens, been able to satisfy myself on other points connected with their structure, and find not merely that they are distinct from the Gonorhynchs (*Garra*, Buch.), in consequence of their short fleshy abdominal tube, which does not, including the stomach, exceed the length of the body, while that of the Gonorhynchs is equal to eight lengths of the body; but that their broad and blunt head is more like that of a *Silurus* than a *Cyprinus*. Their character is rendered still more remarkable by the great breadth and position of the pectorals, situated almost beneath the eyes, and the fleshy pedicles or arms on which they are placed are decided analogies to natatorial forms. If we compare the characters of the *Platycara* with those of the natatorial types in the other classes, we are struck with the analogy—"a blunt truncated muzzle, an obtuse head with strong jaws for seizing animal food." The short intestines of the *Platycara* prove their habits to be carnivorous; and though the mouth is not very large, the jaws are remarkably strong, composed, as in the Gudgeons, of two limbs soldered in the middle, but much stronger than in the instance referred to. Among birds, the Owls, the natatorial group of Raptores, and the Fissirostres in the circle of perchers, as well as most of the Natatores, are distinguished above other birds for their breadth of wing, and the blunt or flattened form of the rostrum or the head, as has been proved by the philosophical analysis of the class by Vigors and Swainson‡.

46. For the next or suctorial form (plate 50, fig. 1, 2) we are

* From *platus*, broad, and *kara*, the head.

† From the importance here given to these species as forming a new type, I have transferred the two figures from Hardwicke's 'Illustrations,' in which there is no description of them, to plate 49.

Since the above was written, the collectors employed by my friend Mr. Griffith in the Kasyah mountains have obtained an additional species; and as their liberal employer has no object to serve beyond the interest of science, he has freely permitted me to make use of this or any similar object of zoological interest contained in his collections. The species alluded to, *P. nasuta*, is described in Prinsep's Journal of the Asiatic Society for November 1838, plate 55, fig. 2. See also plate 57, fig. 2 of this paper: in this species the pectoral pedicles are very slightly developed.

‡ The *Pœcilianæ*, Schn., to which I have added a subgenus *Aplochelus*, as well as the adjoining genera with flat heads and teeth, I also refer to the same type, plate 42, fig. 2, 3, plate 55, fig. 4.

and which had been regarded by the Rev. F. W. Hope as a species of *Pholidotus* (*Ph. irroratus*, H., Trans. Zool. Soc.*), and by myself as constituting a subgenus of *Pholidotus* (*Scortizus*, W., in Ann. d. Sci. Nat., 2nd Ser. t. i. p. 119), was naturally referable to the group of *Lucanidæ* typified by *Figulus*, MacL. (consisting of the genera *Figulus*, *Nigidius*, *Cardanus*, W., and *Ceratognathus*, W.), being, like those genera, furnished with a corneous hook at the extremity of the mando or internal lobe of the maxillæ. My drawings comprised a representation of the maxillæ, and exhibited this hook; but in the plate published in the 'Transactions of the Zoological Society' the figure of this organ was omitted.

The existence of two other Brazilian species of *Lucanidæ* closely allied to *Scortizus*, but of a narrower form, approaching that of the *Figulides*, and which also possessed a similar hook, appeared to confirm Dr. Burmeister's views, although the general form of *Scortizus irroratus*, and especially the partially squamose surface of the body, seemed equally to bring it into connexion with *Pholidotus*.

Having years ago discovered that the females of *Pholidotus* possess a similar hook†, although it is wanting in the males, it appeared to me that this circumstance gave a more direct clue to the solution of the question than any other that could be offered. The unique specimen, however, in Mr. Hope's collection being a female, it became necessary to examine the other sex, and fortunately the valuable collection of Brazilian insects of Mr. Miers afforded an example of both sexes; and on dissecting the male, I found, as I had anticipated, that its maxillæ were destitute of any corneous hook, thus proving the relationship of *Scortizus* and *Pholidotus*. Being further anxious to ascertain whether this sexual distinction might not also exist amongst the Figulideous species, the specimens of which hitherto dissected might possibly have been females alone—whilst the males hitherto undissected might have been destitute of such hook, which latter is in fact the character assigned by Mr. MacLeay to his genus *Figulus* in the 'Horæ Entomologicæ,'—I submitted all my exotic *Lucanidæ* (except those of the genus *Lucanus*) to the test of dissection, and the result has been the discovery of the existence of a similar sexual distinction in the genus *Lamprima*; whereas in *Nigidius* and *Ceratognathus*, W., the males of which are at once recognisable by the increased size of the mandibles, I found the

* *Lucanus maculatus*, Klug, in Nova Acta.

† Mr. MacLeay formed the female of this genus into the genus *Casignetus* in the 'Horæ Entomologicæ,' overlooking however this curious character, but suggesting its generic identity with *Pholidotus*.

maxillæ in this sex furnished with the hook as well as in the females. All my specimens of *Figulus* and *Cardanus*, W., are also similarly provided with the hook, but I have not distinguished between the sexes; so that I cannot affirm, although I fully believe, that both sexes of those two genera are also furnished with a hook, and consequently that the description of Mr. MacLeay of the genus *Figulus* is erroneous.

The genera in which I have found neither sex furnished with the hook are *Ceruchus*, *Platycerus*, *Ceratognathus*, W., *Syndesus* and *Rhyssonotus*.

In *Lepidodes*, W., a new subgenus of *Lucanus* which exhibits several of the characters of *Pholidotus* and *Rhyssonotus*, I found the unique female in Mr. Melly's collection to be destitute of a tooth.

I also found the females of *Chiasognathus* and *Sphenognathus* similarly destitute of the hook, although, from their close relationship with *Pholidotus*, I fully expected to find that they possessed it.

XVI.—*Insectorum novorum Centuria, auctore* J. O. Westwood, F.L.S.

Decadis primæ Coleopterorum Synopsis.*

Carenum, Bon.; *C. Spencii.* Subopacum, nigrum; tibiis anticis valde palmatis, elytris excavationibus rotundatis numerosis triplici serie (in utroque elytro) ordinatis; spatiis intermediis elevatis. Long. corp. lin. 9. Nova Hollandia. Mus. Melly.

Helota, MacL.; *H. Thibetana.* Ænea, lateribus cupreo-tinctis, valde rugosa et punctata tuberculisque oblongis distincta, elytris guttis 4-elevatis fulvis, antennis piceo-luteis, femoribus fulvis, apicibus æneis, tibiis fulvo piceoque annulatis. Long. corp. lin. 4. Habitat Thibet. Mus. Melly.

Triplatoma†, Westw., in Griff. An. K.; *T. apicalis.* Nigra, lævis, prothoracis lateribus luteis macula oblongo-ovali nigra; elytris fascia valde angusta ante medium alteraque pone medium (in medio interrupta) et subobliqua luteis; apicibus apiceque abdominis rufis. Long. corp. lin. $9\frac{1}{2}$. Habitat Africa tropicali. D. Raddon. Mus. nostr. *Elater cæcus*, Fabr., Pal. B. Col. pl. 7. f. 4. valde affinis.

Sternotomis, Perch. (*Sternodonta*, Dej., Lap.); *S. amœna.* Nigra, opaca, pronoto maculis duabus mediis lateribusque, scutello, maculis lateribusque elytrorum viridi-lacteis, maculis duabus in

* Figures and detailed descriptions of these insects are prepared, and will be published hereafter.

† Erotylidæ oblongæ, palpis maxillaribus simplicibus.

medio elytrorum maximis ; alterisque duabus posticis elongatis et valde angustis. Long. corp. lin. 11—16. Habitat Africa tropicali. D. Raddon. Mus. Melly, nostr.

Saperda, Fab.; *S. carissima.* Brevis, opaca, supra viridi-lactea, pronoto vittis tribus brunneo-fulvis, elytris fascia lata irregulari (in medio interrupta) ex humeris fere ad suturam ducta, maculaque magna communi discoidali, brunneo-fulvis; his etiam maculis 10, nigris rotundatis ornatis. Long. corp. lin. 5. Habitat Africa tropicali. Mus. Raddon.

Paristemia, Westw. (n. g. Longicorn. Lophonocero et Pteracanthæ Newm. affinis). Antennæ breves, crassæ, caput parvum, prothorax utrinque obtuse spinosus, elytra lateribus rotundato-dilatatis, apicibus simplicibus. Palpi breves.—*P. platyptera.* Nigra, prothorace rufo, utrinque striga e capite ad angulos posticos ducta nigra, elytris fascia latissima postice angulata et fere ad apicem extensa rufa. Long. corp. lin. $12\frac{1}{2}$. Habitat Africa tropicali. Mus. Raddon.

Lucanus, Linn. ; *L. Dux.* Ater, elytris nitidis, capite utrinque rugose punctato, pronoto tenuissime punctato, mandibulis longitudine capiti et thoraci æqualibus, valde curvatis, intus (dentibus tribus subapicalibus exceptis) inermibus ; capite pone oculos utrinque obtuse spinoso, prothorace utrinque bispinoso, angulisque posticis acutis, tibiis anticis apice externo 3-dentato ; 4 posticis inermibus. Long. corp. cum mandibulis unc. 4, lin. 2. Habitat Manilla. D. Cuming. In Mus. Brit. Affinis *L. bellicoso*, Lap., at major, et mandibulis basi intus inermibus. Vix varietas *D. Alcidis.*

Lucanus *DeHaanii.* Æneo-rufescens, elytris pedibusque fulvescentibus, capite maximo antice latiori ; oculis vix septatis ; mandibulis elongatis, dente uno ante, alteroque pone medium tribusque subapicalibus intus armatis ; antennis valde elongatis, clava 4-phylla, 1mo articulo clavæ maximo ; pronoto postice angustiori, pedibus longis, tibiis anticis in medio 1-spinosis, 4 posticis inermibus. Long. corp. cum mandibulis lin. 19. Habitat Borneo. Mus. Melly. Conf. *L. metallicus*, Bdv. Voy. Astrol.

Lucanus. (S. g. nov. Lepidodes. Corpus punctatum punctis albido-squamosis, caput ♂ magnum quadratum ; mandibulis crassis, porrectis subrectis intus et ad apicem valde dentatis, prothorax subrotundatus lateribus crenulatis ; oculis omnino septatis, antennarum clava 3-phylla ; tibiæ anticæ 5-dentatæ, 4 posticæ inermes. *L.* (*Chalcodi*) ærato proximus.) *L.* (*L.*) *rotundicollis.* Purpureo-fuscus, subnitidus, capite thoraceque dense punctatis, punctis albido-squamosis ; elytris tenuissime punctatis et squamosis. Corpore infra ut supra colorato et squamoso. Long. corp. lin. 10—14. Habitat Nova Hollandia. Mus. Curtis et Melly.

Passalus, Fab.; *P. fronticornis.* Niger, nitidus, subcylindricus clypeo in cornu longitudine capitis apice emarginato porrecto,

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wide the bill, and then—making the unerring dart at their victim*.

Common Swallow (*Hirundo rustica*). Two remained some time about the ship, perching on the rigging, and hawking over the deck in pursuit of flies.

April 23.—Wind S.E., 80 miles from Malta, and 50 from Cape Passaro, the nearest land. A Lesser Grey-shrike (*Lanius minor*), of which I had a near view several times; a Whitethroat (*Sylvia cinerea*), a Willow-Wren (*Sylvia Trochilus*), and a Black-headed Bunting† (*Emberiza melanocephala*), flew on board. Two individuals of the *Motacilla neglecta* remained for some time in the vessel, as did a Wheatear (*Saxicola Œnanthe*) all day. A House Marten (*Hirundo urbica*) flew into the cabin and was found dead shortly afterwards: it had not met with any molestation on board. The officers of the Beacon have frequently known birds of different species when crossing the Mediterranean thus fly into the cabin, secrete themselves and die. A Quail (*Perdix Coturnix*) was captured on board, and appeared to be dying at the time.

April 24.—Wind S.E., 90 miles E. of Sicily: Syracuse the nearest land. Several of the *Motacilla neglecta* flew on board; one of them entered the cabin very boldly, and entertained us much by its familiarity. Persons passing in and out of the room frighted it not from fly-catching, in which it succeeded by running, leaping, or taking short flights at its prey: this bird even alighted on ourselves and picked flies off our clothes.

Two or three Hoopoes (*Upupa Epops*) came on board, rested for a short time, and proceeded on their flight; a Turtle Dove (*Columba Turtur*) did the same.

A flock consisting of twelve Ibises (*Ibis falcinellus*, Temm.) were seen first at a distance coming from the south-west, flew close past the vessel, and continued directly in the same course, or towards the north-east, until lost to view.

April 25.—Wind N.E., 58 miles from Calabria, the nearest land: 135 miles from Mount Etna at sunset, when it was visible. A Scops-eared Owl (*Strix Scops*) was knocked down and captured just as he had clutched a Lesser Whitethroat (*Sylvia Curruca*), of which species two or three individuals came on board. A Shrike (*Lanius* ——), which from

* When, on the 16th of April, on our passage from Marseilles to Malta, and about twenty miles southward of the most southern point of Italy, two of the *Motacilla neglecta*, both males, flew on board the steam-packet; they were very tame, and remained in the vessel for half an hour.

† A continental species, and not the bird—*Emberiza Schœniculus*—known in some parts of the British Islands by this name.

the height it generally kept at I could not see well enough to distinguish its species, seized a *Sylvia Trochilus*, all of which it eat except the bill: of the latter species, one which was taken by ourselves met with better treatment, and perching quietly on the finger was so carried about to feed on flies, which, when taken near to, it seized, never leaving the hand if the fly could possibly be captured from it. A female Golden Oriole (*Oriolus Galbula*), a Redstart (*Phœnicura ruticilla*), and a Lark (*Alauda* ——), of what species I could not be certain, came on board—the Redstart was caught. Several of the *Hirundo rustica* about the ship. A Wryneck (*Yunx torquilla*) was captured, and on being taken within reach of flies, at once picked them up*. When turning about its neck in the manner peculiar to the species, this bird was compared by some of the officers to a particular species of snake found in Greece, and which, like it, has a dark band on the head and neck.

Two or three of the *Upupa Epops* and a *Columba Turtur* as yesterday flew on board, but did not remain long. "Large and small hawks" were reported to me as seen about the ship; but the Goatsucker and Cuckoo might, from their general appearance and mode of flight, be not improbably looked upon as "small hawks."

April 26.—Wind N.E., 86 miles from Zante, the nearest land: 130 miles from Navarino. A fine male Woodchat (*Lanius rufus*), a White-collared Flycatcher (*Muscicapa albicollis*), and one of Natterrer's Warblers (*Sylvia Natterreri*) were caught on board.

A *Sylvia Trochilus* and a Chiff-chaff (*Sylvia rufa*) were found dead in my cabin; they had not been caught or injured in any way on board, and must, I think, have died from fatigue: want of food could hardly have caused their death, as there were plenty of flies in the cabin. A *Sylvia Curruca*, a Sub-alpine Warbler (*Curruca leucopogon*, Gould), a *Saxicola Œnanthe*, a Whinchat (*Saxicola Rubetra*), a Pied Wheatear (*Saxicola leucomela*), and an *Alauda*, of the same species as noticed yesterday, flew on board, as did two or three individuals of *Motacilla neglecta*. Several of the *Hirundo rustica* about the vessel during the day, and some remained, perching on one of the boats, throughout the night. Three Bee-eaters (*Merops apiaster*) came from the south, and flew close past the ship without alighting. I saw four of the *Columba Turtur* come from the south today; two of them singly, the other two

* The birds which, in addition to the Wryneck, fed freely on flies, when taken within reach of them immediately after capture, were *Sylvia Trochilus*, *Motacilla neglecta*, *Hirundo rustica*, and *Hirundo urbica*.

in company: one only alighted on the ship, and in the evening was caught when asleep.

April 27.—Wind N., 45 miles from Zante, the nearest land, and in sight: 60 miles W. of the Morea. A Kestrel (*Falco Tinnunculus*) flew close past the ship, and a "much larger hawk," which did not come under my own observation, was stated to have been seen.

Two females of the *Oriolus Galbula* which flew on board were captured. Two or three males of the *Muscicapa albicollis* visited us today, and as many females either of this species or the Pied Flycatcher (*Muscicapa luctuosa*), but most probably the former.

A *Saxicola Rubetra* and a *Motacilla neglecta* came to the ship. About a dozen of the *Hirundo rustica*, which rested last night on the rigging, went off this morning. Throughout the afternoon and towards evening many more arrived, and continued flying about the ship in considerable numbers.

A few of the *Hirundo urbica* appeared this morning and remained through the early part of the day, confining their flight to the lee-side of the ship: in the afternoon still more were seen hawking about in company with *Hir. rustica*; as flies were numerous, they probably obtained plenty of food: at four o'clock P.M. all of this species were gone.

In the morning a *Merops apiaster*, coming from the south-west, alighted for a moment on the vessel and then flew towards Zante or in a north-east direction: soon afterwards a flock consisting of fifteen came from the same quarter, hawked about the leeward side of the vessel for a short time, and then proceeded north-east: an hour after their departure (ten o'clock) a flock of eight appeared, and alighting on a rope astern the ship, remained there for nearly an hour; they were perched close together, and so low down on the rope, that by its motion the lowest one was more than once ducked in the water, but nevertheless did not let go its hold or change its position for a drier one. These birds were but a few yards from the cabin-windows, and looked so extremely beautiful, that they were compared by some of the spectators to paroquets, and on account of their gaudy plumage not very inaptly. After these left us, others were seen throughout the day, but generally singly; they rarely alighted: all flew in the same course*.

A few Goatsuckers (*Caprimulgus Europæus*) appeared about the ship today and alighted; they were all single with one ex-

* When not very far to the westward of Cape Matapan on the 1st of May, a flock of twenty-nine of the *Merops apiaster* flew close past the ship towards the Morea.

XVIII.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. Meyen, M.D., Professor of Botany in the University of Berlin*.

[Continued from p. 35.]

Anatomy of Vegetables.

M. Decaisne† has published a short notice on the structure of the wood of the Misseltoe: he could not confirm the statement of M. Dutrochet, who says that the woody body is wanting in the articulation (Gliederung) between the internodes, and is only connected by a cellular layer of pith, so that, properly speaking, the internodes are connected together solely by the bark. According to M. Decaisne's observations, it is exactly in the internodes that the vessels of the bark are separated; and he says, that on this fact the articulation of this plant depends, but not on the separation of the fibres of the wood. The wood of *Viscum* exhibits no vessels (hereby is meant simple spiral tubes.—*Mey.*), and only in the pith were seen annular tubes; the nerves of the leaves did not possess any spirals. The number of the vascular bundles (Holzbündel) in young twigs is regularly eight, seldom seven or nine, and each is surrounded, both inwardly and outwardly, with a bundle of bast cells.

M. Dutrochet‡ attempted to demonstrate to the Academy that his former statements were correct.

Already in 1838 M. Morren§ had made some physiological observations on a new plant named by him *Malaxis Parthoni*, which, however, I have only lately seen. M. Morren indicates, that a colouring matter similar to indigo must be contained in the leaves of this plant, as in the flowers of *Calanthe veratrifolia* and in the leaves of *Mercurialis perennis*, &c. The presence of indigo in the *Orchideæ* was however discovered years ago by M. Marquart in Bonn. The air-rootlets which were examined by M. Morren were covered with a quantity of very fine hairs, consisting of single transparent cells, the walls of which were very thin, and exhibited within a rotation (cyclosis). [The universal appearance of these rotating streams in the root-hairs of Phanerogams I have already proved.—*Mey.*]

M. Morren observed, that in some of these hairs the globules collected together in masses and formed a kind of partition, by which the cyclosis was prevented; indeed he be-

* Translated and communicated by Henry Croft, Esq.

† De la Structure ligneuse du Gui. Comptes Rendus 1839, p. 204.

‡ Comptes Rendus, p. 215.

§ Notice sur une nouvelle espèce de Malaxis, &c. Bull. de l'Acad. de Sci. de Bruxelles, tom. v. No. 8.

lieves that this is as it were the commencement of the formation of partitions, which are observed to appear in *Confervæ*, &c. for the increase of the cells. I cannot agree to this hypothesis, for these partitions are formed in quite a different manner, and the appearance of a partition by which the cyclosis within a utricle is divided into two parts is quite an accidental and rare phænomenon. I myself observed it in the *Charæ* in 1825 (Linnæa, 1827, p. 66), and saw that thereby two streams were produced, which lasted until the obstruction was carried away. M. Morren observed spiral fibrous cells of various forms in the enlargements of the base of the stalk of this new *Malaxis*.

M. Morren* has published an interesting paper 'On the Discoid Pith of Plants,' which had been observed by Grew in *Juglans regia*, by M. Mirbel in *Nyssa aquatica* and *Phytolacca decandra*, as well as by DeCandolle in *Jasminum officinale*. M. Morren thinks it very probable that this structure of the pith may occur in many other plants; he himself found it in plants belonging to the families *Santalaceæ*, *Juglandeæ*, *Phytolacceæ*, *Jasmineæ*, and *Bignoniaceæ*; but he remarks, that some species of a genus exhibit this formation, while others do not. The figures which accompany this treatise of M. Morren were drawn from *Begonia argyrostigma*, *Juglans regia*, *Jasminum fruticans*, and *Phytolacca decandra*; the pith in these, as in many other plants, exhibits in the earlier periods of growth a homogeneous mass of cells, in which, finally, more or fewer horizontal clefts (slits) make their appearance. These slits are placed in regular order above one another; they increase gradually, and are finally separated merely by membranous dissepiments. M. DeCandolle believed that these cavities arose from a rupturing of the cellular tissue caused by the extension produced by the growth of the plant; but M. Morren has shown that they arise from a regular separation of the cells, and are therefore to be compared to the air-passages.

Mr. Patrick Keith† has made some observations on pith, in order to settle the two following questions:—1st, Does the pith appear in any part of the root? and 2ndly, Are the dimensions of pith changed after it is once fully developed? With respect to the first question, observations made on the roots of young plants of *Acer pseudoplatanus*, *Fagus sylvatica*, and *Corylus Avellana*, showed him that the principal root is also furnished with pith. The second question Mr. Keith answers by the examination of a three-year-old ash stem which was

* On the Discoid Pith of Plants, Ann. of Nat. Hist., Oct. 1839, p. 73–88.
† Of the Pith of Plants, Ann. of Nat. Hist., Ap. 1839, p. 77.

almost 9 feet high. The last sprout, or shoot, was $\frac{5}{8}$ths of an inch in diameter, and had a pith of $\frac{1}{4}$th of an inch in diameter in the thickest part; the middle shoot was $\frac{7}{12}$ths of an inch thick, and had a pith of $\frac{1}{6}$th of an inch in diameter; the oldest and lowest twig had $\frac{7}{8}$ths of an inch in diameter, and the pith was $\frac{1}{10}$th of an inch thick. In the same twig the pith was not found to be of uniform thickness, but became thinner from the upper towards the lower extremity.

Of the beautiful anatomico-botanical plates which have been published by M. Link*, we have now received a third number, in which a great many of the most various and well-chosen objects are represented. In this number we see the great advances which the artist, M. C. F. Schmidt, has made as to execution; some of the plates, particularly tab. viii., may be said to belong to the most successful of their kind. Most of the figures show the structure of the roots of plants, and exhibit the difference therein between root and stem. On tab. viii. is found the anatomy of prickles and thorns, of which we had as yet scarcely any delineations.

M. Korthals† has communicated some remarks on the glanduliferous hairs of *Drosera*, with which my own observations do not agree. These hairs are said to consist of fibres or extended cells, which are covered by a scarcely developed epidermis, and support on the end a small red globule, which in old age falls off, but is also covered by the epidermis. The fibres of the hair extend into the cavity of the apex, but before their entry are somewhat widened. In the interior of this cavity the fibres form a small, egg-shaped, projecting body, and round this columella are found a quantity of small, red, angular particles, &c.

As in my paper on the organs of secretion of vegetables I have given a description and figures of the glanduliferous hairs of *Drosera* which are totally different from the above, it is necessary to enter very fully into the subject; but before I attempt to interpret the statements of M. Korthals, I must state, that I do not know what he understands by "epidermis:" this is unfortunately the result of the change and supposed improvement of old, well-known names. In the above memoir I have shown that the hairs of *Drosera* have a very complicated structure; the hair itself exhibits in its interior a spiral tube which penetrates deep into the apex of the gland, but there is no trace of a cavity in this so-called gland-

* Ausgewählte anatomisch-botanische Abbildungen. Berlin, 1839.

† Remarques sur les poils du Drosera. Bull. des Sci. &c. en Neerlande, p. 49, Rotterdam, 1839.

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in unrollable spiral fibres. The fibres were extracted from the flower-stalks of the above stems with all possible care; and this was best effected by breaking the stalk into short pieces, drawing the ends about an inch or an inch and a half asunder, and then taking away the extracted fibres with a pair of wooden pincers, and throwing them directly into water, in order to free them in the first place from the adhering mucus, and secondly, from the tannic acid, from the presence of which they acquire a brown tinge when exposed to the air. The wool obtained in the above manner is equal to the finest sheep's wool, and surpasses it in whiteness, as also in the finer and more regular curling of the single filaments. The quantity obtained from the two stems was so considerable, that an artisan wished to make a glove out of it; and therefore it could not be difficult to obtain such large quantities of this material in the tropics (where every year thousands of pisang stems are cut down in some localities) as to be able to prepare valuable stuffs; indeed, shawls made of the fibres of the pisang could not be so expensive as the Persian ones.

MM. P. Savi and G. B. Amici* have made some communications concerning the stomata of plants. The observations of M. de Cesati on the stomata of *Ambrosinia Bassii*, which have not been confirmed by MM. Savi and Amici, were the cause of the research. M. de Cesati thought that he had observed a very peculiar structure in the cuticular glands and stomata of *Ambrosinia Bassii*; he speaks of a glandulous matter of which the outer edge of the stoma consists, which thereby presses apart the sides of the four inclosing cells. The real cleft is destined for the evaporation alone, whilst one of the two glandulous pads or circles is destined for the separation of carbon, the other for that of oxygen, &c. M. Savi examined *Ambrosinia* as far as regards its stomata, and found them similar in structure to those of other plants, as is shown by the figures; the stomata are usually formed by two semilunar cells, but they are covered by a second *cuticula*, which also exhibits a longitudinal cleft; even in the figure of a transverse section through the middle of such a stoma, this cuticle is represented with its slit. M. Amici also, in his answer to M. Savi, has confirmed the above statement with respect to the structure of the stomata of *Ambrosinia*. Finally, M. Amici proves that the priority of the discovery of the stomata in the bottom of the deep pits on the lower surface of the leaves of *Nerium* belongs to him, inasmuch as he communicated this

* Osservazioni sulla struttura ed esistenza degli stomi in alcune plante, &c. Mem. della R. Acad. delle Sc. di Torino, Serie ii. tom. ii. p. 49.

discovery in a letter to M. Mirbel in August 1830, and this letter has been used by M. Brongniart, although the observation is rejected. [The presence of stomata in the hairy pits of the *Nerium* leaves was first published by M. Krocker, jun. of Breslau, in his dissertation 'De Epidermide Plantarum,' 1833.—*Mey.*]

M. Morren* has examined anatomically several species of *Hedychium*, and has recorded his observations and accompanied them with figures. We receive information concerning the cells and their contents both in young and old leaves, as also on the occurrence of crystals in these different ages of the species of *Hedychium*; also several forms of crystals are mentioned as having been observed in these plants.

On the walls of the air-cells M. Morren found peculiar cells which were provided with green-coloured sap-globules, were of various forms, but very often corniform and hamate, sometimes symmetrical, sometimes umsymmetrical; they are said to be similar to the stelliform hairs of the *Nymphææ*, in which however I cannot agree, for these cells are nothing else than more or less regularly formed stellar-shaped cells, as they generally occur in the *Scitamineæ*. M. Morren also thinks that he has found that evaporation does not assist the formation of crystals in plants, inasmuch as it is exactly in the dry and peripheric parts of plants that crystals are not found. The other communications only confirm that which had been heretofore observed in *Hedychium*, or in other similar plants.

From M. Morren† we have received a similar work on the genus *Musa*: in it the formation of the stellar-formed cellular tissue is fully described, and some remarks are made on the acicular crystals found in the *Musæ* and other plants. The observations on the formation of the above-mentioned tissue confirm my former statements, viz. that those cells are produced from ordinary parenchym-cells. M. Morren saw the molecular motion in several cells of *Musa*, and after he had observed single parts of the plant in different stages of development, he arrived at the conclusion, that substances in the interior of the stellar-shaped cells make their appearance in the following order:—first appear self-moving gum or fecula-globules, then motionless chlorophyll (*i. e.* globules coloured by chlorophyll, *Mey.*), and then free globules and crystals: all these matters are formed successively. When considering the crystals which are found so frequently in the

* Bull. de l'Acad. Royale de Bruxelles, t. vi. no. 2.

† Observations sur l'Anatomie de *Musa*.—Bullet. de l'Acad. Roy. de Bruxelles, t. vi. no. 3.

parenchymatic cells of *Musa*, M. Morren observes, that the crystal-bearing cells, which M. Turpin has called Biforines, decidedly require a peculiar name, and that in the case of *Caladium rugosum*, where they exhibit only one opening, they must be called Uniforines; and that from the same reason it is necessary to call the other cells, without openings, which contain acicular crystals, by a determinate name, and he proposes for them Clestines (from κλειος).

I have shown in the former reports that there is no sufficient existing reason for giving these cells a distinct name as M. Turpin had done; but I can still less approve of these new appellations Uniforine and Clestine, because, if one examines the *Caladia* in regard to these cells, it is soon evident, that in different parts one and the same kind of cells is found in one place as Clestines, in another as Uniforines, and in others as Biforines, and the latter appear always as simple cells when in a young state: the different names would only lead us to suppose that there was here some actual difference. The opening of the so-called Biforines is evidently a purely physical phænomenon, as was proved in the former Report (p. 110). M. Morren remarks, that in the Clestines of *Musa* he had observed a gummous mass, an appearance which I myself have observed in other plants. The treatise is accompanied by good figures.

M. S. F. Hoffmann* has continued his observations on the hairs in the air-passages; he found them in all the species of *Limnanthemum* he examined, but without dots, and he convinced himself that they do not exist in *Villarsia*. Among the *Nymphææ*, the genus *Euryale* (*ferox*) exhibited such dotted hairs as are found in the air-cavities of the different organs of the genera *Nymphæa* and *Nuphar*.

M. Hoffmann treats of the same subject in the last part of the Tijdschrift of v. d. Hoeven and de Vriese for 1839, p. 269–271. In the same volume, p. 257–269, M. Hoffmann gives the results of his new researches as to *Lemna arrhiza* being a distinct species, as also anatomico-physiological observations on the formation of buds in the different species of *Lemna*: these communications are, however, only to be considered as the forerunners of a larger work which M. Hoffmann had sent to the press, and has just appeared in the first number for 1840 of Wiegmann's 'Archiv fur Naturgeschichte;' we shall therefore review it in our next Report.

* Nachtrag zu des Beobachtung der Luftrohrenhaare bei *Limnanthemum*, Gmelin, and *Villarsia*, V.—Linnæa, xiii. pp. 294, 296.

south, Bactria, the valley of the Oxus, Northern Asia, Chorasmia, and probably the whole of Europe, constitute the great primitive habitation of the Horse. Far to the north the species has no congener, but soon the *Hemionus* is known to be its companion; and further to the south, the Wild Ass extends eastward across the Indus to the Bramaputra, and west into Africa, far up the banks of the Bahar-el-Abiad and Atbara. Other congeners there are on this side the equator, but they are not sufficiently known, nor is their precise location determined."

The author however inclines to the belief that the nations who first subdued horses derived each their own race from the wild stock in their vicinity, observing in the descriptions by the poets and historians of antiquity, the uniformity of colours and characters recorded of the primitive breeds, such as the pied variety in the central mountains of Middle Asia, the dark bay southwards of the banks of the Jyhoun or Jaxartes, the dun more westward, as far as the Caspian, the white on the north shore of the Euxine, and the sooty and black in Europe. "We shall find," observes Col. Smith, "among these, races always clouded of two colours, others constantly marked with a black streak along the spine, often cross-barred on the joints, with dark or black extremities; and again, another, where circular spots, commonly clearer than the ground-colour, occur—whether they be bay, blackish ashy, or gray; the durability of these distinctions, not obliterated even in our time, during more than 3000 years of perpetual crossings of breeds, affords another and a strong argument in favour of an aboriginal difference of species in the single form of the Domestic Horse."

The 'Natural History of Fishes,' vol. ii., by J. T. Bushnan, M.D., &c., forms an introduction to the other volumes, belonging to the series, on this group of animals, treating of Fishes in relation to other animals, their natural habitat, structure, locomotion, &c.—the œconomical and commercial uses and advantages arising from our fisheries are also dwelt upon. The plates are selected for illustration of these various subjects, and therefore do not follow in any order of classification, as in the volume on Perches already published. Such a volume as the present one was much wanted, and has been ably executed by Dr. Bushnan.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

December 8, 1840.—W. H. Lloyd, Esq., in the Chair.

Mr. Gould completed the exhibition of his fifty new species of Australian birds, and characterized the following new species :—

A new *Entomyza* interesting as being the second species of that form. Mr. Gould received this bird from Port Essington, and believes that it there supplies the place of *E. cyanotis*, which is common on the eastern coast. Its distinguishing characteristics are its rather larger size, the markings of its throat being more strongly defined and the

basal half of the primaries being white; for which reason he proposes to characterize it as

ENTOMYZA ALBIPENNIS. *Ent. corpore suprà et alis e viridi aureo-olivaceis; primariis fuscis; pogoniis internis per dimidium basale niveis.*

Crown of the head and back of the neck black; lower part of the face, chin and centre of the chest slaty black; a crescent-shaped mark at the occiput, a line from the lower mandible passing down each side of the neck and all the under surface pure white; upper surface and wings greenish golden olive; primaries brown, the basal half of their inner webs snow-white; tail feathers brown, tinged with golden olive, all but the two centre ones tipped with white; bill, bare space surrounding the eye and feet in all probability the same as in *E. cyanotis*.

Total length, 12 inches; bill, $1\frac{1}{2}$; wing, 6; tail, $4\frac{3}{4}$; tarsi, $1\frac{3}{8}$.

Hab. Port Essington on the northern coast of Australia.

Nearly allied to *E. cyanotis*, but always distinguishable from that species by the white basal half of the primaries.

A new *Myzomela* differing from all the other members of the genus in its pied colouring and the black band across the chest, which suggests the specific name of

MYZOMELA PECTORALIS. *Myz. gutture et corpore subtùs albis, pectore fasciâ angustâ nigrâ transversìm notato.*

Forehead, crown of the head, the upper surface, wings, tail and a narrow band across the chest, black; throat, upper tail-coverts and all the under surface white; bill and feet black.

Total length, $4\frac{1}{2}$ inches; bill, $\frac{5}{8}$; wing, $2\frac{5}{8}$; tail, $1\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. North-west coast of Australia.

A second example of the genus *Dasyornis*, inhabiting Swan River, which I propose to call

DASYORNIS LONGIROSTRIS. *Das. colore ut in D. Australi; differt autem staturâ corporis minore, rostro grandiore.*

All the upper surface brown; wings, tail-coverts and tail rufous brown, the latter indistinctly barred with a darker tint; under surface gray, gradually passing into the brown of the upper surface; irides bright reddish brown; bill and feet dark horn-colour.

Total length, $7\frac{1}{2}$ inches; bill, $\frac{7}{8}$; wing, $2\frac{5}{8}$; tail, 4; tarsi, $\frac{7}{8}$.

Hab. Western Australia.

This is a somewhat smaller bird, but has a longer bill than *D. Australis*.

An entirely new form, belonging to the family *Saxicolinæ*, and nearly allied to *Petroïca*, I propose to make the type of a new genus, *Drymodes*, signifying a lover of woodland places:—

Genus DRYMODES.

Characteres generici.—*Rostrum* rectum, ad latera apicem versus paulò compressum, ferè longitudine capitis, apice levitèr denticulato, basi vibrissis parcè instructâ. *Alæ* mediocres, rotundatæ, re-

migum primo brevissimo, quinto longissimo. *Cauda* mediocritèr elongata, paulò rotundata. *Tarsi* longi, graciles, anticè superficie integrâ. *Digiti* mediocres, externus horum quàm internus paulò longior, posticus cum ungue quàm digitus intermedius cum ungue brevior.

DRYMODES BRUNNEOPYGIA. *Dry. fusca; primariis apud pogonia interna albo transversìm striatis; uropygio tectricibusque caudæ rufo-fuscis.*

Head and all the upper surface brown, passing into rufous brown on the upper tail-coverts; wings dark brown, the coverts and primaries edged with dull white; primaries and secondaries crossed near the base on their inner webs with pure white; tail rich brown, all but the two middle feathers tipped with white; under surface grayish brown, passing into buff on the under tail-coverts; irides bill and feet blackish brown.

Total length, 8 inches; bill, $\frac{7}{8}$; wing, $3\frac{7}{8}$; tail, $4\frac{1}{4}$; tarsi, $1\frac{1}{2}$.

Hab. Belts of the Murray in South Australia.

This bird, although of a large size and so sombre in colouring, is nearly allied to *Petroïca*.

The next is an extraordinary form among the *Muscicapidæ*, differing from all the other known members of that group in having the bill compressed laterally, for which reason I propose to constitute it the type of a new genus, with the following name and characters.

Genus PIEZORHYNCHUS.

Characteres generici.—*Rostrum* quàm caput longius, altius plusquàm latum, ferè cylindraceum, lateralitèr compressum, apicem versus denticulatum. *Nares* parvæ, rotundatæ, basales. *Alæ* breves, remige primo mediocri, quarto longissimo. *Cauda* aliquantò brevis et rotundata. *Tarsi* mediocriter elongati et paulò debiles. *Digitus* externus et medius inter se connexi usque ad articulum primum, externus longissimus.

The only specimen I possess was forwarded to me by E. Dring, Esq., surgeon of H.M.S. Beagle, by whom it was procured on the north-west coast of Australia. From the glossy nature of its plumage I propose to name it

PIEZORHYNCHUS NITIDUS. *Piez. fulgidè virescenti-niger.*

All the plumage, including the wings and tail, rich deep glossy greenish-black; bill and feet black.

Total length, $7\frac{1}{4}$ inches; bill, $1\frac{1}{8}$; wing, $3\frac{1}{4}$; tail, $3\frac{1}{4}$; tarsi, $\frac{3}{4}$.

Hab. North-west coast of Australia.

This very curious bird belongs, I conceive, to the *Muscicapidæ*, and is somewhat allied to *Seisura*.

A new *Praticola*, common on the plains round Adelaide, and forming the second example of the genus, is

PRATICOLA CAMPESTRIS. *Prat. fronte et plumis auricularibus rufis; gutture albescente; corpore subtùs et lateribus ex arenaceo luteolis fusco striatis.*

Forehead rufous, passing into the reddish brown of the crown and

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Nearly allied to but much less in size than *Muscicapa macroptera*, Vig. and Horsf., and from which it may also be distinguished by the base of the outer tail-feather being brown.

MYIAGRA LATIROSTRIS. *Myi. corpore suprà, alis caudâque intensè cæruleo-cinereis; capite et nuchâ fulgidè virescentibus; gutture et pectore arenaceo-luteolis; abdomine albo.*

All the upper surface, wings and tail dark blueish gray, with a shining greenish lustre on the head and back of the neck; throat and chest sandy buff; under surface white; bill much dilated laterally and black; irides blackish brown; feet black.

Total length, 6 inches; bill, $\frac{3}{4}$; wing, $2\frac{3}{4}$; tail, $2\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. North-west coast of Australia.

From the collection of Mr. Dring.

HIRUNDO LEUCOSTERNUS. *Hir. dorso medio, gutture et pectore albis; abdomine, uropygio, alis caudâque nigris et chalybeïo-cæruleo-nitentibus.*

Crown of the head brown, bounded with white; back of the neck brown; centre of the back, chin, throat and chest white; the remainder of the plumage black, slightly glossed with steel-blue; bill black; feet brown.

Total length, $7\frac{1}{4}$ inches; bill, $\frac{5}{16}$; wing, $3\frac{3}{4}$; tail, which is deeply forked, $2\frac{3}{4}$; tarsi, $\frac{7}{16}$.

Hab. Interior of Australia.

The only specimen of this bird that has ever come under my notice, was given me by Mr. Charles Coxen, who informed me it was shot by one of his men while flying in company with another over a small pool on the banks of the Namoi.

A small bird inhabiting the scrubs of the River Murray. It is a new form, nearly allied to *Acanthiza*. The generic term is suggested by the ruddy colouring of the throat.

Genus PYRRHOLÆMUS.

Characteres generici.—*Rostrum* quàm caput brevius, ad latera paulò compressum, ad apicem denticulo vix notando, vibrissis parvulis ad basin, naribus linearibus et operculo tectis. *Alæ* breves, rotundatæ, remigum primo perbrevi, tertio longissimo. *Cauda* brevis, rotundata, concava. *Tarsi* mediocres; digitus externus quàm internus longior.

PYRRHOLÆMUS BRUNNEUS. *Pyrrh. supernè brunneus; gutture rufo.*

Lores greyish white; all the upper surface and wings brown; tail brownish black, the three lateral feathers on each side largely tipped with white; centre of the throat rufous; the remainder of the under surface brownish grey, passing into sandy buff on the flanks and under tail-coverts; bill and feet blackish brown.

Total length, $4\frac{1}{2}$ inches; bill, $\frac{1}{2}$; wing, $2\frac{1}{4}$; tail, $\frac{7}{8}$; tarsi, $\frac{13}{16}$.

Hab. Belts of the Murray in South Australia.

The female differs in having no red on the throat.

A highly interesting Pigeon from the north-west coast, which, as it differs from all the other forms of its family, and is said to inhabit

the rocks, I propose to make the type of a new genus, with the name of

Genus Petrophassa.

Characteres generici.—Ferè ut in Peristerâ. *Alæ* autèm et rotundatæ sunt et admodùm breviores; deest etiam color metallicè æneus. *Cauda* magìs rotundata.

Petrophassa albipennis. *Petr. supernè fusca; gutture albo-guttato; primariis ad dimidium basale albis.*

Crown of the head and neck grayish brown, margined with sandy brown; all the upper surface, chest and tail rufous brown, the centre of each feather inclining to gray; lores black; abdomen and under tail-coverts chocolate brown; throat clothed with small feathers white at the tip, black at the base; primaries dark brown at their tips, the basal half pure white; bill and irides blackish brown; feet reddish brown.

Total length, $10\frac{1}{2}$ inches; bill, $\frac{7}{8}$; wing, $5\frac{1}{4}$; tail, 5; tarsi, $\frac{3}{4}$.

Hab. Western Australia.

Allied to the members of the genus *Peristera.*

Eudromius Australis. *Eudr. colore cervino vel luteolo; abdomine medio castaneo; parte inferiore nec non crisso albis.*

Forehead and all the upper surface light sandy buff, the centres of the feathers being brown; primaries brownish black with sandy buff shafts, and all but the first four broadly margined with the same; throat buffy white, below which a crescent-shaped mark of blackish brown; chest, flanks and under surface of the wing buff, passing into reddish chestnut on the abdomen, beyond which the vent and under tail-coverts are white; tail brownish black, the centre feather margined with buff, the outer ones with white; bill dark olive brown; feet yellowish brown.

Total length, $7\frac{1}{2}$ inches; bill, $\frac{7}{8}$; wing, $5\frac{1}{4}$; tail, $2\frac{1}{2}$; tarsi, $1\frac{3}{8}$.

Hab. Interior of South Australia.

This is a highly interesting species, since it is the only bird approaching the form of the British Dottrel found in any part of the world. This rare species has been sent me by my friend Captain Sturt, who procured it during his late expedition into the interior of Australia, behind Adelaide.

Rhipidura isura. *Rhip. corpore suprà sordidè fusco; caudæ rectricum utrinque externâ albo extrinsecùs marginatâ et latè terminatâ, proximâ albo ad apicem notatâ, iterumque proximâ apicem versus lineâ albâ tenuissimâ.*

All the upper surface dull brown; wings and tail darker brown, the outer feather of the latter on each side margined externally and largely tipped with white, the next having a large irregular spot of white at the tip, and the next with a minute line of white near the tip; chin and under surface buffy-white, with an indication of a dark brown band across the chest; bill and feet black.

Total length, 8 inches; bill, $\frac{5}{8}$; wing, $3\frac{3}{8}$; tail, $3\frac{1}{2}$; tarsi, $\frac{11}{16}$.

Hab. North-west coast of Australia.

In the collection of his Excellency Captain Grey and Mr. Dring.

Rather a large species, and is distinguished from the other members of the genus by the sombre hue of its plumage and the square form of its tail.

PSILOPUS CULICIVORUS. *Psi. abdomine crissoque albis; rectricibus caudæ, duabus intermediis exceptis, albo ad basin latè fasciatis.*

All the upper surface olive-brown; wings brown margined with olive; two centre tail-feathers brown; the remainder white, crossed by an irregular band of black and tipped with brown, the band upon all but the external feathers, so blending with the brown at the tip that the white between merely forms a spot on the inner web; lores blackish-brown; line over the eye, throat and chest light gray, passing into buff on the flanks, and into white on the centre of the abdomen and under tail-coverts; irides light reddish yellow; bill and feet black.

Total length, $4\frac{1}{4}$ inches; bill, $\frac{1}{2}$; wing, $2\frac{1}{4}$; tail, $1\frac{3}{4}$; tarsi, $\frac{5}{8}$.

Hab. Western Australia.

A new species and new form, which I first saw in the streets of Adelaide, where it was hopping about and presenting the appearance of the Sparrow in London. For this new bird I propose the generic and specific terms *Xerophila leucopsis*.

Genus XEROPHILA.

Characteres generici.—*Rostrum* breve, semiconi instar, ad basin robustum, ad apicem haud denticulatum, basi vibrissis anticè ductis parcè instructâ; naribus rotundatis et plumis minutis obtectis. *Alæ* mediocres, remigum primo brevi, tertio et quarto longissimis, tertiariis latis et paulò elongatis. *Cauda* mediocris, ad apicem quadrata, et aliquantò concava. *Tarsi* robusti; digitus posticus validus, digiti antici debiles, horum externus longissimus.

XEROPHILA LEUCOPSIS. *Xer. facie albâ; corpore supernè fusco.*

Forehead and lores white; upper surface olive brown; wings and tail brown, the latter passing into black near the extremity and tipped with white; all the under surface pale buff; bill and feet black.

Total length, 4 inches; bill, $\frac{3}{8}$; wing, $2\frac{1}{2}$; tail, $1\frac{3}{4}$; tarsi, $\frac{3}{4}$.

Hab. South Australia.

LICMETIS PASTINATOR. *Lic. albus, loris coccineis; remigum pogoniis internis necnon caudæ rectricum sulphureis, colore quàm in L. nasico intensiore cui speciei magnitudine corporis L. pastinator magnoperè præstat.*

Lores scarlet; general plumage white; the base of the feathers of the head and front of the neck scarlet, showing through and giving those parts a stained appearance; the basal half of the inner webs of the primaries, the inner webs of all the other feathers of the wing and the inner webs of the tail-feathers beautiful brimstone yellow; naked space round the eye greenish blue; irides light brown; bill white; feet dull olive gray.

Total length, $17\frac{1}{2}$ inches; bill, $1\frac{5}{8}$; wing, 12; tail, 7; tarsi, 1.

Hab. Western Australia.

Nearly allied to *Licmetis nasicus*, but of a much larger size.

plumis crebrè lineis transversis fuscis et tortuosis vel fractis striatis; pectore fasciâ nigrâ haud æquali ornato.

Crown of the head and occiput black; sides of the head, the neck and breast grayish white, each feather crossed by numerous fine zig-zag bands of brown, giving those parts a freckled appearance; wing-coverts black largely tipped with white; all the upper surface, wings and upper tail-coverts brown very minutely freckled with reddish brown; some of the feathers towards the hinder parts of the body tinged with gray; tail gray, crossed near the centre by an interrupted band of white, minutely freckled with white, margined with brown and slightly tipped with white; chest crossed by an irregular band of black, beyond which the under surface is white; under tail coverts grayish black tipped with white; irides brownish buff, brown predominating near the pupil; eyelash pale olive yellow; bill straw-white with olive and black culmen; legs and feet straw-yellow.

Total length, 40 inches; bill, 4; wing, 25; tail, 10; tarsi, $7\frac{1}{2}$.

Hab. Plains of the interior of Australia generally.

Anas nævosa. *Anas intensè fusca, plumis albo irroratis et longitudinalitèr notatis.*

The whole of the plumage dark brown, minutely freckled and spotted with irregular oblong marks of white in the direction of the feathers; the under surface the same, but lighter and tinged with buff; wings without a speculum; primaries plain brown; irides light brown; bill greenish gray, becoming much darker at the tip; legs bluish green.

Total length, 17 inches; bill, $2\frac{1}{2}$; wing, 9; tail, 3; tarsi, 2.

Hab. Western Australia.

The above is the description and measurements of a female.

Sula Australis. *Sula primariis alarum et secondariis necnon rectricibus caudæ duabus intermediis fuliginoso-fuscis; tarsis anticè digitisque viridi-flavis.*

Crown of the head and back of the neck beautiful buff; the remainder of the plumage white, with the exception of the primaries, secondaries and four centre tail-feathers, which are fuliginous brown with white shafts; irides olive white; bill brownish horn-colour slightly tinged with blue; space round the eye leaden blue; bare skin at the base of the beak and down the centre of the throat nearly black; front of the tarsi and toes sickly greenish yellow; webs brown.

Total length, 32 inches; bill, $5\frac{1}{2}$; wing, 19; tail, 10; tarsi, 2.

Hab. The Tasmanian Seas.

The specimen exhibited is from the River Derwent. Like the other members of its family, this species will allow of its being taken with the hand. Some of my specimens were so taken on a rock on the Actæon Islands.

The circumstance of being enabled to bring an entirely new Albatros before the notice of the Society is a source of great gratification to me, since the group to which it belongs had already been

paid much attention to by our early voyagers and later naturalists. The present bird differs from all the other species in the extreme caution with which it avoids rather than approaches the neighbourhood of vessels at sea. It is rather abundant in Bass's Straits and in all the seas off Van Diemen's Land.

From its shyness, I propose to name this species

DIOMEDEA CAUTA. *Diom. vertice albo; faciei colore e margaritâ cinereo; dorso, alis caudâque cinereo-fuscis; rostro pallidè vinaceo-cinereo; culmine, ad basin præsertim, flavo.*

Crown of the head, back of the neck, throat, all the under surface, rump and upper tail-coverts pure white; lores and line over the eye grayish black, gradually passing into the delicate pearl-gray which extends over the face; back, wings and tail grayish brown; irides dark vinous orange; bill light vinous gray, or bluish horn-colour, except on the culmen, where it is more yellow, particularly at the base; the upper mandible surrounded at the base by a narrow belt of black, which also extends on each side the culmen to the nostrils; base of the lower mandible surrounded by a belt of rich orange, which extends to the corners of the mouth; feet bluish white.

Total length, 31 inches; bill, $4\frac{1}{2}$; wing, $21\frac{1}{2}$; tail, 9; tarsi, 3.

Hab. Bass's Straits.

The above are the dimensions of a female; the male is considerably larger.

Nearly allied to, but larger than *D. melanophrys.*

THALASSIDROMA NEREIS. *Thal. gutture pectoreque fuliginoso-cinereis; dorso, uropygio tectricibusque caudæ cinereis; abdomine, lateribus et crisso albis.*

Head, neck and chest sooty gray; lower part of the wing-coverts, back, rump and upper tail-coverts gray, each feather very slightly margined with white; wings grayish black; tail gray, broadly tipped with black; under surface pure white; irides, bill and feet black.

Total length, $6\frac{1}{2}$ inches; bill, $\frac{9}{16}$; wing, $5\frac{1}{4}$; tail, $2\frac{1}{2}$; tarsi, $1\frac{1}{4}$.

Hab. Bass's Straits, on the south coast of Australia.

This beautiful fairy-like Storm Petrel is about the size of *Thal. Wilsoni,* and is remarkable as differing from most of the members of the group in having no white on the rump and in the pure white of the under surface.

Mr. Gould exhibited to the Meeting a new species of *Hypsiprymnus,* from Swan River, which he characterized under the name of

HYPSIPRYMNUS GRAII. *Hyps. fusco-cinereus; corpore subtùs albescente; caudâ mediocri, fuscâ, flavo lavatâ, ad apicem albâ; pedibus pallidè fuscis; auribus mediocribus rotundatis.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin. . . .	18	0
——— *caudæ*	11	6
——— *tarsi digitorumque* (sine unguibus). .	4	3
——— ab apice rostri ad basin auris	2	4
——— *auris*	1	1

This species most nearly resembles the *Hypsiprymnus rufescens* of Mr. Gray, but differs in being of an ashy brown colour above, and in having the hairs which clothe the back of the ears of the same general colour as those of the head, instead of black, as in the species just mentioned. The fur is long, and soft to the touch; the hairs both on the upper and under parts of the body are of a palish grey colour at the base; those on the under parts are dirty white externally, and those on the back are dirty white (inclining to ash-colour) near the *apex*, and tipped with brownish black: on the sides of the head and body a very faint yellowish hue is observable. The ears are sparingly clothed within with small yellowish hairs; externally they are clothed with fur, like that on the head. The feet are of a very pale brown colour. The tail is brown, tinted with yellowish, excepting the apical third, which is covered with longish white hairs.

December 22.—William Yarrell, Esq., Vice-President, in the Chair.

A letter from Mr. Frembly, R.N., Corresponding Member Z.S., was read. It is dated Gibraltar, November 28th, and refers to two species of Shark which that gentleman had forwarded for the Society's Museum.

The following paper, being a continuation of Mr. Broderip's descriptions of Mr. Cuming's new shells, was read:—

Helix (Cochlostyla) Daphnis. *Hel. testâ ovato-pyramidali anfractibus 5 ventricosis, ultimo cæteros conjunctos excedente; labii limbo castaneo-nigricante, aperturâ albidâ vel purpurascente.*

Var. *a. Ochraceo-albida, anfractibus 2 ultimis vittis angustis serie duplice dispositis, nigricantibus, cinctis; fasciâ sub-basali vittis albido-ochraceis interruptâ nigricante; aperturâ cæruleo-albidâ.*

Var. *b. Sordidè albido-flava vittis fuscis creberrimè cincta; aperturâ albidâ.*

Var. *c. Sub-ochracea, vittis raris distantibus rubro-nigricantibus ornata, anfractu basali fasciâ latâ centrali, rubro-castaneâ ochraceo subinterruptâ cincto; aperturâ subcæruleo-albidâ.*

Habitant varietates *a, b, c,* ad Argao in insulâ Zebu.

Var. *d. Sordidè ochracea lineis 3 fuscis, medio maximo clariore, cincta; aperturâ albidâ.*

Hab. ad Sibonga in insulâ Zebu.

Var. *e. Albido-flava strigis obliquis fulvis creberrimis ornata, et fasciâ basali latiore cincta; aperturâ albidâ.*

Var. *f. Albens strigis obliquis creberrimis nigris ornata et maculis magnis nigris interdum fucata; fasciâ basali angustâ nigrâ; aperturâ cæruleo-albente.*

Habitant varietates *e,* et *f,* in insulâ Siquijod.

Var. *g. Sordidè ochracea, strigis obliquis raris castaneo-nigricantibus fucata; basi nigricante ochraceo sordidè fucatâ; aperturâ purpurascente.*

Var. *h. Anfractibus 2 primis albidis, tertio et quarto fuscis; ultimo*

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Var. *a. Flava, castaneo-vittata.*

In this pretty variety a single chestnut band borders the base of each whorl, and on the body-whorl there is in addition a broad, sub-central, chestnut band.

Var. *b. Castanea, albo vittata.*

In this variety the rich chestnut is relieved by a white band that borders the upper part of the last two whorls, near the suture.

Var. *c. Castanea, fusco vittata.*

In this variety the upper part of each whorl near the suture is banded with brown.

Hab. in insulâ Tablas.—W. J. B.

Plekocheilus.

Plekocheilus gracilis. *Pl. testâ elongatâ, gracili, anfractibus* 4, *ultimo longissimè maximo, subdiaphanâ, anfractu basali transversim corrugato, strigis angulatis irregularibus longitudinalibus creberrimè fucato; anfractibus cæteris subroseis; aperturâ subaureo-flavâ; labii limbo lato, reflexo, albo.*

Long. $1\frac{3}{4}$; lat. $\frac{3}{4}$.

Hab. in insulis Feejee dictis?

Hitherto this form has only been discovered in the Western World. Mr. Cuming received the specimen above described from a captain of a ship, who said he had got it from a native of one of the Feejee Islands. A glance at the western species will satisfy the observer that the species above described is distinct.—W. J. B.

Mr. Waterhouse exhibited two new species of Birds from the Society's collection, and pointed out their distinguishing characters. The first is a small species of *Picus*, believed to be from the north-west coast of South America, and is remarkable for the absence of spots and markings, and the brilliant red colour of the upper parts of its body and wings: this red colouring commences on the back of the neck, and is continued to the tail, as well as over the whole of the wings; that is, over the visible portion of each feather, the inner shafts being of a brown colour. The whole of the upper surface of the head is of a brown-black colour; the sides are pale brown; the throat is pure white; the chest and whole of the under parts of the body are of a dirty white colour, indistinctly tinted with yellowish. The tail is of an uniform blackish brown colour, with the exception of the two outer feathers on each side, which are pale brown; on the apical half of the external feather there is a very obscure indication of bands. The beak is of a very pale horn-colour.

The principal characters may be thus briefly expressed:—

Picus callonotus. *Pi. capite pallidè fusco, suprà fuliginoso; corpore suprà alisque sanguineis; gulâ, pectore abdomineque albescentibus; caudâ obscurè fuscâ; rostro albescente.*

In size and general form this species agrees very closely with the *Picus minor* of Europe, but its beak is rather longer in proportion, being nine lines in length.

The second new species is one of the Icterine group, and in most

of its characters agrees with that division to which the term *Cassicus* is applied: it has the same stout conical bill, the upper surface of which is broadly expanded at the base, and encroaches on to the forehead: the *apex* is pointed. This bird, however, differs from any other species of the group to which it belongs, in the great length of its wings, which extend considerably beyond the tip of the tail, which is of moderate length, broad, and slightly rounded. The colouring of the plumage is also remarkable, and particularly the texture of the feathers, those of the body having a velvet-like appearance, whilst those of the wings have a distinct gloss, such as we see in the plumage of the Crows. No doubt, according to the views of many ornithologists, this bird would be regarded as a new genus or subgenus; the sectional name *Ocyalus* is therefore proposed, from Ωχυαλος, in allusion to the swiftness with which it is to be presumed a bird with such wings would move.

Subgenus Ocyalus.

Characteres ut in Cassico, *alæ autem longissimæ, et caudæ apicem transeuntes.*

Cassicus (Ocyalus) Popayanus. *Oc. niger, corpore purpureo relucente; alis nitore viridi; capite nuchâque suprà castaneo tinctis; caudâ flavâ, rectricibus quatuor intermediis in toto nigris, sic et apicibus reliquorum; rostro pallido.*

Long. tot. 11 unc.; *rostri*, $1\frac{1}{2}$; *lat. ad basin*, $6\frac{3}{4}$ lin.; *alæ*, $8\frac{1}{2}$ unc.; *caudæ*, 4.

Hab. Popayan.

MICROSCOPICAL SOCIETY OF LONDON.

At a meeting of the Microscopical Society, held August 18th, R. H. Solly, Esq., F.R.S., in the chair, a paper was read from Dr. Thomas Williams, in continuation of that of the Rev. J. B. Reade, on the Stomata of Plants, wherein the author states, that by having recourse to the process of charring, as described by that gentleman, he satisfied himself that the stomata in plants were closed by a pellicle; but from other experiments he infers, that this pellicle is formed by the air contained in the intercellular spaces and cells of the stomata, carrying before it, in its dilatation, a bubble of gelatinous mucus, with which the interior of the stomata are covered. The summit of the vesicle thus produced, when raised into contact with the heated glass, becomes carbonized, and being upon the same plane with the common surface, from the pressure of the plate of glass it appears as belonging to the epidermis, and extending from one edge of the aperture to the other. He concludes by stating, that the natural condition of the stomata is that of patency; but in consequence of the inspissation of the organic mucus, under certain circumstances and in certain genera of plants, a pellicle is generated over their orifices.

The Secretary, Mr. John Quekett, then read a paper by himself on the Anatomy of four species of Entozoa of the genus *Strongylus*

from the common Porpoise. The author stated, that the subjects of his paper were, with one exception, all found in the lungs of the Porpoise. Two of them had been long known, and had been described by Rudolphi and many others under the names of the *Strongylus inflexus* and *minor*; whilst a third, from the circumstance of its being found with the *inflexus*, had, by all others except Kuhn, been described as a younger specimen of that species, but by him as the *Strongylus convolutus*; whilst the fourth appeared hitherto either to have escaped notice, or else to have been confounded with the last; but his examinations of this Entozoon led him to consider it as a distinct species, and from the circumstance of its being inclosed in a sheath or case, he had named it the *Strongylus invaginatus*, at the suggestion of his friend Dr. Willis. The *Strongylus inflexus* was the largest of the Entozoa, and it occurred most abundantly in the bronchial tubes, and in such numbers as almost to close them up; but many specimens were found in the right auricle and ventricle of the heart, and in the principal blood-vessels of the lungs as well. The average length of the male is about seven inches, whilst that of the female is nine inches. The next species was found in common with the last, being twisted together in a knot around them both in the bronchial tubes and blood-vessels; it has been noticed as the young of the *inflexus*, but, on comparison, the author finds that the difference between the two is so marked as to leave no doubt of their being distinct species: Kuhn has named it the *Strongylus convolutus*. The third species is the smallest of the whole, some specimens not much exceeding an inch in length, and from this circumstance has been named the *Strongylus minor*. It occurred in the venous sinuses of the head and in the cavity of the tympanum, and some of them were of a reddish hue, probably owing to their living in blood. The fourth species, the *Strongylus invaginatus*, was found in small cysts in the lungs not connected with the blood-vessels, to the number of five or six in each cyst, which were easily extracted when the cyst was opened: the male was very much shorter than the female, and both were inclosed in a transparent sheath or case, which was in contact with the body of the worm only at the head and tail.

After describing the anatomy of each species, the author then proceeded to some interesting peculiarities connected with their ova, in which the gradual transition from vitelline globules to the perfect worm was beautifully seen. He then alluded to the curious fact of the *Strongylus inflexus* and *convolutus* living in blood and in air, and concluded with mentioning some other interesting points connected with these Entozoa, and the probable effects they produced in the œconomy of the animal. The paper was accompanied with drawings and illustrative diagrams.

Mr. Ross exhibited to the Society a new form of the Microscope, in which strength, durability, steadiness, and cheapness were combined; it was capable of exhibiting the usual test-objects, and the price only 12*l*.

the Kolehan from Singbhoom, rises to the north-west of Porahaut, and enters the Kurkye near the junction of that river with the Soobum-rekha; the Roro, twelve miles south of the former, a narrow but deep and swift stream, and the Eeleegarra and Toorul still further south, take a like course above the step; the Dés Nye runs westward and falls into the Kolekaro, near its confluence with the Koïl; and near the southern limits of the Kolehan, the different streams take a south and west direction, falling into the Bhundun and Byturnee, which last, running through vast and lonely forests, separates the Kolehan from Jushpoor and Rorwan in Moherbunj, and Kalkapershaud in Keonjur. There are two water-falls on the borders of the Kolehan, which I have never visited, but which, by the description of the natives, must be well worth seeing. The Bunnye, running between Sonepoor and Singbhoom, is said to roll its waters into a profound cave, from which spot it pursues its course underground, and is supposed to join the Kole Káro. The fall is called Paraá-ghag, and is a tiruth, but so remote from habitation and buried in such deep woods as to be seldom visited, except by the Sonepoor Koles and Bhoojans of Porahaut and Bundgaon. On the confines of Baumunghattee also is a singular cascade, described to me as a single thread of water pouring down a wall-like precipice of 200 or 300 feet in height. It is called by the Baumunghattee Oorias, Muchkandnee Jhurna; and by the Koles, Hakoo-yâmdah, meaning in either language, "The fall of the weeping-fish," from some whimsical story of the fish complaining of the impossibility of scaling the cataract, to emerge from the dreary abyss, through which the stream winds below. The peculiar distribution of the hills in this country, running in parallel ranges, precludes the formation of lakes, which are unknown.

These ranges are not of very great height, the loftiest, which are in Saruda, not appearing above 1000 feet above the plain. They are however intersected in parts by profound valleys, which give the hills, from that side, an appearance of great magnitude. They are chiefly quartz, in all stages of decomposition, permeated by limestone rocks; smaller detached ranges, issuing at right angles to these, are commonly of micaceous slate. From Chyebassa, proceeding easterly into Koochoong, are low ridges perfectly parallel, about half a mile to a mile apart, gradually increasing in height till the series is closed by the Choivria hills in Koochoong. They are composed of loose rocks, resembling (if they are not) clink stone; but the larger ridges are of coarse granite. The northern part of the Kolehan consists in a great measure of sterile plains, scattered with quartz boulders, stones, and pebbles, some crystallized. The beds of the nullahs are a shingle composed of jasper (of all hues), green-stone, quartz pebbles, and flint. The bed of the Byturnee is lined with flattened pebbles and lumps of jasper of bright yellow, red, purple, and black, disposed in parallel streaks or ribbons, as if artificially inlaid. The corundum is found in great quantities at Juggernathpoor on the upper step of the Kolehan, and several nullahs run through beds of argillaceous earth, from the brightest scarlet to pure white, which are highly in request among the natives. The whole of these streams wash down more or less gold, but the Koles know not how to collect

it. In Singbhoom a tolerable quantity is gathered by Hindoos, but of a third- or fourth-rate quality, also excellent iron ; of coal I never found any traces.

The open parts of the Kolehan are here and there scattered with a scrub-jungle, composed chiefly of the Polass and Assun, on which latter the tusser silk-worms are bred. The southern parts, where not cultivated, are covered by extensive plains of grass, interspersed with bushes; entirely along the west boundary are forests of saul trees, small and meagre on the hills, but reaching in the low rich valleys to a size perfectly prodigious. In Anundpoor, towards Gangpoor, are tracts covered entirely with the wild plantain, and many of the hills are clothed densely with bamboos. In marshy spots a strong serviceable species of cane or ratan is found. The wild mango tree is also very common in these forests, yielding a fruit far preferable to the common kind found in the "topes" throughout India ; it is small, round, and full of juice, as sweet as honey. The date and palm trees are not cultivated by the Koles, but are to be found near Hindoo villages in Singbhoom ; cheretta, wild indigo, and arrow-root are very common in the jungles. But to enumerate all the beautiful flowers which enrich these green retreats—the fruits and roots, to every one of which the natives attach some specific virtue or harm ; the inexhaustible variety of plants, shrubs and fungi, ferns, creepers, &c. which clothe, in all varieties of fantastic imagery, the shady dells ; or the cool banks of foliage-canopied streams,—would be a task far exceeding my powers or the limits of this memoir.

The animals found in the Kolehan are the same as in other parts of Central India, but not nearly so abundant as in better-watered jungles; besides which, the Koles and Oorias are inveterate hunters, and their attacks on game of all kinds are pursued on an exterminating scale.

The elephant, which is numerous in parts of the Jungle Mehals, comparatively close to Medneepoor, is, strange to say, unknown among the remote and wild regions of West Singbhoom ; the gowér is common in this latter region—two species are described by the natives, a red and a black kind ; the urna and smaller wild buffalo are very numerous about Anundpoor ; great varieties of deer haunt the hills, the saumúr (*C. rusa*), neelgye (*Damalis picta*), spotted deer (*C. axis*), barking deer or Muntjac (*C. muntjac*), chikerac or four-horned deer (*C. chicquera*) : all these species, though so shy when sought after as to be seldom met with, must be tolerably numerous, from the depredations they commit on the fields of gram, boot, moong, oorid, &c. which are planted near the jungles. The memina, a species of mouse deer, is also found among rocks and underwood. The antelope is confined to the wide open plains of Chynpoor in Singbhoom, and very limited in number. Tigers and leopards abound. Bears infest almost every clump of rocks throughout the plain ; they are all of the long-lipped species (*Ursus labiatus*). Hyænas inhabit similar localities, but are rare. There are no *wolves*, but there appear to be two distinct species of the jackal (*C. aureus*), one of which is much larger, stouter and ruddier than what I remember of the jackal of Bengal. The cry also is different, and is a wailing sound,

not much unlike, though infinitely louder than, the mewing of a cat; at all events the Koles distinguish the two animals, calling the large kind (from its cry) *Tow Koola,* and the common jackal *Kurmcha.* The little Bengal fox or corsac (*Cynalopex insectivorus*) is very numerous, yapping all the clear nights long during the cold season. The Indian badger or ratel (*Ratelus melivorus*) is found in the woods, but rarely. Porcupines (*Hystrix*) are numerous, but being nocturnal, are seldom seen. The short-tailed marus (*M. crassicaudata*) is met with among rocks, but is one of the rarest animals known. There are three kinds of squirrels, the common palm-squirrel (*Sciurus striatus*), the great red squirrel (*Sciurus macrourus*), and a large gray flying squirrel, peculiar, I believe, to the Kolehan and the Jungle Mehals. This last is exceedingly rare, as it lives on lofty trees in profound forests, and only moves forth at night. The wild dog (*Canis primævus*), *Koohia* and *Sona-kookoor* of the Oorias, and *Tannee* of the Koles, roams through the jungles in packs, occasionally visiting the flocks and herds on the plains. Their ferocity, speed and cunning have gained them a superstitious veneration among the Koles, and dread of their retaliating on their cattle deters the villagers from killing them. Of these also there are said to be two kinds; a large dog, in shape and colour like a Scotch greyhound or lurcher, which hunts by sight; and a smaller, red, bushy-tailed dog, which follows the other in packs of five to twenty, is less speedy and hunts by scent. The hare is larger than that of Bengal, inhabits gravelly ravines in scrub-jungle, and never takes to grass. Of monkeys there are only the two common species, the Lungoor and Mákor or Bunder (*Sara* and *Gye* of the Koles); the former live among rocks, the latter in dense thickets. Wild hogs are very numerous in some parts, but so wary as to be seldom killed. The rhinoceros is not known.

Birds of all kinds are scarce and wild, especially those fit for food, on account of the keenness with which the Koles pursue, trap, hawk, and shoot them. The double-spurred partridge is found among rocks, but is one of the most difficult birds to shoot, as it seldom takes wing, but creeps into caves and fissures. The deep moist woods afford immense varieties to the ornithologist.

Being a dry and stony country, the Kolehan is peculiarly prolific in snakes of all varieties: the covra is not so common as another species, the *Siarbinja* of the Oorias, and *Pago jarrus* of the Hos (*Cophias Russelii*), which is supposed to be equally deadly and far more vindictive; it is a subgenus of rattle-snake (without the rattle). A large and beautiful snake, coloured with black and yellow rings, the *Sakom bing* (*Pseudoboa fasciata*), is met with in ploughed fields; a long thin green whip-snake infests the rank grass-jungles at the bottoms of hills; the hartoo, a slender agile species, coloured like a ribbon with yellow and coppery purple, infests trees: all these are venomous. The Python or Ujgur (*Toonil bing*) is found in every jungle; it attains to dimensions which I have heard described, but which would sound too marvellous to be recorded without better proofs. Throughout Singbhoom, Chota Nagpoor, and the surrounding countries, a belief is current of a monstrous species of snake, the

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people, in consequence of the precautionary measures they take—their nutritive food and drink, and the open airy positions they build in. As a guard against infection or fire, their villages are small and scattered, and on the first appearance of any epidemic they leave their houses and flee into the jungles, living apart from each other. Singbhoom, on the contrary, from the obverse manners of the Oorias, is yearly scourged by cholera, fevers and small-pox. This latter disease, propagated by the Bramin inoculators, has within the last year spread with fearful havoc into the Kolehan, and most unfortunately simultaneously with the introduction of vaccine, to which the evil has alone been attributed. The rains are not heavy in the Kolehan, but the monsoon is accompanied by violent storms of wind from the north-west, with severe thunder and lightning, causing many fatal accidents. None of that sultry oppression incident to Bengal is felt at that time of year. The cold season is truly luxurious—"a nipping and an eager air" without fogs or mists. March, April and May are generally the only unpleasant hot months of the year; during this period not a drop of water falls occasionally for upwards of six weeks; the aspect of the country loses every trace of verdure, and the dried stony soil reflects with unbearable force the rays of the sun. Vegetation is vigorously restored on the commencement of the rains, and as these are not accompanied by the gloomy sky and unceasing torrents which fall in the plains of India, the landscape is pleasingly chequered by passing showers, and the tender foliage of the forests glistens alternately with golden breaks of sunshine or mellowed shades of green. To the south and east of Singbhoom, and in the most dreary and deserted parts of the country, are remains indicative of the former presence of opulent and industrious people, but so decayed by time, and engulfed in the labyrinths of untenanted forests, as to be unmarked by any record or history, save that they must have been of prior origin to the first known Bhooians of the country.—*Journal of the Asiatic Society of Bengal, No.* 19.

Fossil Foraminifera in the Greensand of New Jersey.—Prof. J. W. Bailey, in a recent visit to the cretaceous formations of New Jersey, has brought to light the interesting fact, that a large portion of the calcareous rock defined by Prof. H. D. Rogers as the third formation of the upper secondary, is made up, at the localities where he examined it, of great quantities of microscopic shells, belonging to the Foraminifera of D'Orbigny, which order includes those multilocular shells which compose a large part of the calcareous sands, &c. of Grignon and other localities in the tertiary deposits of Europe. Since the minute multilocular shells above alluded to were discovered, Dr. Torrey and Prof. Bailey have together examined specimens of limestone from Claiborne, Alabama, and have found in them Foraminifera, of forms apparently identical with those occurring in New Jersey. None of this order except the genus Nummulite have heretofore been noticed in our greensand formation. In this connexion we may also announce the interesting discovery recently made by Prof. Wm. B. Rogers, of

A vast Stratum of Fossil Infusoria in the Tertiary Strata of Vir-

ginia.—It occurs about twenty feet in thickness, beneath Richmond, and is found to be filled with new and highly interesting forms of *marine* siliceous Infusoria.—*Silliman's Journal, July* 1841.

Mr. R. C. Taylor's Model of the Southern Coal-Field of Pennsylvania.—At the Second Annual Meeting of American Geologists, held in April last, Mr. Richard Cowling Taylor, F.G.S., exhibited a highly interesting model in plaster of the Dauphin and Lebanon coal region, embracing altogether an area of seven hundred and twenty square miles, showing the range of the mountain elevations, with their relative height and position; also their elevation above tide level; the dip of the rocks, the position of the coal-seams, and much other useful information.

Mr. Taylor accompanied this exhibition with remarks explanatory and statistical in relation to this coal region, and made some observations on the importance of this mode of exhibiting the geological features of a country, expressing the hope that the day would come when models of this kind, representing the several states, and even the whole United States, shall be constructed. He also enlarged upon the propriety of following as closely as possible the actual conformation of the country in drawing sections, and of adopting uniform modes of illustration by colours, &c., and the importance of an equal scale of extension and elevation as far as practicable in such sections.—*From Silliman's Journal, July number*, where the remarks are published entire, with a coloured section.

METEOROLOGICAL OBSERVATIONS FOR AUG. 1841.

Chiswick.—August 1. Slight rain: cloudy and fine. 2. Fine with clouds: rain. 3. Hazy: cloudy and mild: rain. 4. Cloudy and fine. 5. Fine: slight rain. 6, 7. Fine. 8. Rain: cloudy and fine. 9. Very fine. 10. Very fine: rain. 11. Stormy and wet. 12. Fine. 13. Cloudy. 14. Rain: showery: clear at night. 15—17. Cloudy and fine. 18. Hazy: fine. 19, 20. Very fine. 21. Cloudy. 22. Cloudy: slight rain. 23. Rain: cloudy and fine. 24. Showery: clear. 25. Drizzly. 26. Hazy and mild. 27. Heavy dew: cloudy and hot. 28—30. Foggy in the mornings: very fine: evenings clear. 31. Overcast and fine.

Boston.—August 1. Fine: rain P.M. 2. Fine. 3. Cloudy: rain P.M. 4. Fine: rain early A.M. 5. Cloudy: rain P.M. 6. Cloudy and stormy. 7. Cloudy: rain P.M. 8, 9. Cloudy. 10. Fine. 11. Cloudy: rain early A.M.: rain P.M. 12 Stormy. 13. Cloudy. 14. Cloudy: rain early A.M. 15, 16. Cloudy. 17. Fine: rain P.M. 18, 19. Fine. 20. Fine: thermometer 77° half-past two P.M. 21. Fine: rain A.M. 22. Fine. 23, 24. Fine: rain early A.M. 25. Rain: rain early A.M. 26. Cloudy: thermometer 75° three-quarters past two P.M. 27. Fine: thermometer 75° quarter-past eleven A.M. 28, 29. Fine. 30, 31. Cloudy.

Applegarth Manse, Dumfries-shire.—August 1. Fair, but cool and cloudy. 2. Fair and fine. 3. Wet A.M.: cleared and was fine. 4. Fair and fine. 5. Rain all day. 6. Wet A.M.: cleared and was fine. 7. Wet, slightly. 8. Fine though showery: thunder. 9. Wet A.M.: became fine. 10. Showery. 11. Fair. 12. Showery all day. 13. Partial showers. 14. Wet A.M.: became fine. 15. Fine till P.M.: then rain. 16. Wet A.M.: cleared P.M. 17. Fair throughout. 18. Fair A.M.: wet P.M. 19. Fair and warm: air electrical. 20. Wet nearly all day: thunder. 21. Wet P.M.: flood. 22. Fine and fair. 23. Occasional slight showers. 24. Wet P.M. and evening: thunder. 25. Showery. 26. Rain early A.M.: cleared. 27. Fine: one shower A.M. 28. Wet morning: cleared. 29. Fine but cloudy. 30. Wet all day. 31. Fair and fine.

UNBAR *at Applegarth Manse, Dumfries-shire.*

Days of Month. 1841. Aug.	Barometer.						Thermometer.								Wind.				Rain.				Dew-point.
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc.			Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc. 9 a.m.	Chiswick 1 p.m.	Bost.	Dumfries-shire.	London: Roy. Soc. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Lond.: Roy. Soc. 9 a.m.
		Max.	Min.		9 a.m.	8½ p.m.	Fahr. 9 a.m.	Self-register. Max.	Min.	Max.	Min.		Max.	Min.									
1.	29·830	29 923	29 790	29·30	29·68	29·75	58·3	65 2	50 0	49		57	61	49		sw.		wnw.	·055	02	..		54
○ 2.	29·986	29 937	29 765	29·42	29·75	29·67	62·5	64 0	54 0	58		61	62½	44		sw.		sw.	·005	38	05		55
3.	29·742	29 691	29 411	29·16	29·53	29·38	62·8	70 8	60 4	57		64·5	63	53		sw.		ssw.	·377	38	..		59
4.	29·492	29 785	29 385	28·94	29·53	29·60	60·0	71 0	59 0	57		63	65½	51		n.		s.	·366	..	86		58
5.	29·796	29 742	29 609	29·17	29·42	29·21	65·0	69 0	60 0	57		64	71	53		sw.		e.	...	01	..		61
6.	29·748	29 851	29 663	29·05	29·34	29·55	60·6	66 0	58 5	57		62	60	54		w.		w.	·008	07	06		57
7.	29·962	29 893	29 798	29·33	29·59	29·50	64·0	69 5	60 5	58		62·5	61	52		w.		ssw.	·088	..	..		57
8.	29·738	29 716	29 619	29·12	29·38	29·41	61·0	71 4	59 5	52		63	60	55		s.		sw.	·008	01	01		59
9.	29·646	29 684	29 596	29·04	29·39	29·38	59.5	69 0	56 0	49		60	59	50		w.		w.	...	01	..		57
10.	29·874	29 800	29 678	29·26	29·49	29·58	61·0	72 5	53 0	55		61·5	58	48		s.		sw.	...	36	..		56
11.	29·512	29 662	29 458	28·95	29·49	29·56	61·4	67 5	58 0	46		60	60	45		sw.		nw.	·277	30	61		59
12.	29·958	29 923	29 888	29·34	29·70	29·74	59·2	68 0	51 0	41		57	61	44		nw.		nnw.	·080	..	45		51
13.	29·928	29 886	29 772	29·36	29·65	29·61	62·0	64 0	61 5	54		60	61	42		s.		e.	·013	30	..		56
14.	29·646	29 719	29 599	29·08	29·39	29·44	62·0	66 5	57 0	54		61	62½	53		sw.		sw.	·213	04	25	8	58
15.	29·766	29 746	29 687	29·16	29·49	29·62	64·5	68 6	57 0	50		61·5	67	55		sw.		w.	·036	..	..		59
16.	29·928	29 921	29 851	29·32	29·72	29·72	61·5	71 6	56 0	58		60	64	45		s.		sw.	·011	..	..		57
17.	30·018	30 056	29 969	29·35	29·73	29·94	64·5	71 5	60 0	56		63·5	62½	54		w.		nw.	...	..	..		60
18.	30·210	30 173	30 140	29·61	30·00	30·04	63·7	73 0	58 4	56		62·5	64	43½		w.		nw.	...		01		60
19.	30·276	30 197	30 006	29·60	30·00	29·95	63·5	69 5	56 0	47		61	61½	53		sw.		s.	...				57
20.	30·006	29 734	29 629	29·37	29·75	29·64	66·5	73 0	56 0	51		66	69	58		w.		w.	...				59
21.	29·684	29 903	29 797	29·00	29·55	29·52	66·7	77 5	53 0	48		67	61	49		s.		nw.	...				63
22.	29·978	29 874	29 800	29·36	29·65	29·48	63·0	73 0	56 0	54		59	61	48½		s.		e.	...				56
23.	29·904	29 884	29 797	29·30	29·60	29·78	58·0	68 0	57 0	44		57	63	49				w.	·416				57
24.	30·124	30 094	30 048	29·36	29·94	29·94	57·0	67 5	50 5	45		56	61½	41½				wnw.	·013				48
25.	30·148	30 079	30 059	29·44	29·83	29·90	57·0	65 0	52 0	60		55·5	64½	50				sw.	·130				...
26.	30·268	30 225	30 181	29·59	30·00	30·10	63·2	65 5	57 0	62		64	63	55				sw.	·061				61
27.		30·244	30 142	29·59	30·07	30·00	69·7	70 0	65 0	51		69	65½	56½				sw.	·011				64
28.		30·189	30 125	29·54	30·01	30·03	62·7			52		62·5	65	54				w.	...				59
29.		30·159	29 920	29·55	29·92	29·85	65·4			51		65	66	54½				sw.	...				
30.		29·998	29 840	29·35	29·73	29·60	63·5			67		65	61	56½				ssw.	...				
31.		29·844	29 729	29·16	29·69	29·80	66·7			45		65	62	50½				wnw.	...				
Mean.				29·29	29·680	29·716	62·5			52·93		61·8	62·1	50·5					Sum.				

a nearly perfect condition, but from their flattened state it is often difficult to determine their distinctive characters; this has however been attempted in the following descriptions, which have been drawn up after an inspection of several hundred specimens; and of a few individuals, which, having fortunatèly been found in indurated nodules in the clay, and thus preserved from compression, exhibit characters which the usual state of the fossils do not afford. The specimens described are partly from the author's collection, and partly from that of the Bristol Institution, which possesses an extensive series of fossils found in the same locality, collected by the zeal of Mr. S. Stutchbury. Some apology may seem necessary for having employed proper names so extensively in the designation of the species; but in a genus, the general characters of which are so similar, and in which the species are so numerous, it is difficult to find characteristic distinctions: this genus has also, by almost general consent, been adopted to commemorate the names of individuals, who have distinguished themselves either by their discoveries in the science, or by their love and patronage of it.

1. *Ammonites Elizabethæ.* Pl. III. fig. 1, 2, 3, 4.

Shell angular, arising from a series of spines on each dorsal edge, and two rows of tubercles on the sides of the volution, one near the middle, another smaller and compressed near the inner margin; radiated, the rays varying very much in number and elevation, curved or undulated, but becoming angular near the aperture of the adult shell, which has on each side a long, narrow, spatulate projection, the prolonged rays forming waves or loops on its surface; volutions six or seven, about $\frac{2}{3}$rds exposed; back narrow, concave, the rays passing over it and forming low obtuse ridges; siphunculus not visible.

The number and length of the spines and tubercles, and the mode in which they are combined with the rays, appear to indicate several distinct species, but on closer examination it is seen that all the varieties pass into each other, the same specimen sometimes containing more than one form.

The spines and rays vary from sixteen to upwards of sixty on the last volution, and they are large and elongated in proportion to the smallness of their number; in the simplest form, a single irregular ray, terminated on the dorsal edge by a long sharp spine, connects it with the tubercles, scarcely reaching the inner one in others; two, three, and sometimes four rays arise from the spine and unite in the middle tu-

bercle. The prolongation of the aperture appears to depend upon the growth of the shell, and it varies from a slight projection to $1\frac{1}{2}$ inch long; it is concave externally and convex internally.

2. *Ammonites Comptoni.* Pl. IV. fig. 1.

Shell discoidal, radiated, the rays alternately two short and one long; the long rays proceeding from the dorsal to the inner margin, where they become thickened, the two short rays not passing beyond the middle of the volution; they are curved backwards near the dorsal edge: in the young shell the rays are close, sharp, and slightly elevated; when full-grown the last volution has a few obtuse undulations, but is nearly smooth; back rounded, with a slight depression in the middle, formed by the nearly meeting rays; the whole shell without spines or tubercles; volutions 6 or 7, $\frac{2}{3}$rds exposed; aperture terminated on each side with a spatulate projection about $1\frac{1}{2}$ inch long when fully grown, and of similar characters with *Am. Elizabethæ.*

3. *Ammonites Stutchburii.* Pl. IV. fig. 2 and 3.

Shell discoidal, radiated; the rays curved, very regular, forming raised lines which reach from the dorsal edge to about the middle of the volution, where they meet a row of small, compressed, distant tubercles, beyond which is another row near the inner margin; these tubercles vary much in number and relative size; volutions $\frac{2}{3}$rds exposed; aperture forming a projecting beak, with waved striæ on its surface; back narrow, marked by the rays passing over it, and terminated on each edge by a range of serrated sharp points formed by the termination of the rays; volutions exposed, showing both ranges of tubercles.

4. *Ammonites Sedgwickii.* Pl. V. fig. 1.

Shell discoidal, nearly smooth on the last volution, but having a row of tubercles upon the inner margin; the spaces between them twice as large as the tubercles: in the young shell sharp raised lines proceed from the rounded back to about the centre of the volution, but do not reach the tubercles; they become indistinct towards the aperture; volutions $\frac{1}{4}$th exposed, the last about half the diameter of the shell; aperture not projecting, forming a well-defined twice-curved termination.

5. *Ammonites Lonsdalii.* Pl. V. fig. 2.

Shell discoidal, radiated (when young) with numerous waved, well-defined, raised lines, which become more obtuse and fewer as the shell increases in size; near the aperture they pass into fine striæ; the rays rise from the dorsal edges, and scarcely reach the middle of the side; the aperture forms a regular concave termination, except on the inner edge, where it bends back like the handle of a sickle; volutions $\frac{1}{3}$rd exposed, the last more than half the diameter of the shell.

6. *Ammonites fluctuosus.* Pl. VI. fig. 1 and 2.

Shell discoidal or lenticular, radiated (when young) with numerous sharp raised lines, which are alternately long and short; the short combining in twos or threes with the longer ones about the middle of the side, some remaining distinct: as the shell advances in age the inner half of the long rays becomes much thickened, until they form obtuse elevated ridges, with broad, concave, smooth spaces between, the short rays gradually disappearing; volutions numerous, $\frac{2}{3}$rds exposed; shell reaching 6 inches in diameter, without any appearance of projecting aperture.

7. *Ammonites Brightii.* Pl. VI. fig. 3, 4.

Shell discoidal, nearly smooth, but having several flat, obtuse ridges arising from the dorsal edge, which combine a little beyond the middle of the volution into a compressed elongated tubercle which reaches the inner margin; the tubercles are about one-third as numerous as the ridges, and meet them in a rounded right angle: in the young shell they are hardly visible, and also become obsolete near the aperture, the sides of which suddenly contracting to about one-third, again expand into a transverse oval projection, finely waved or striated; the back of the shell also projects in a point, and forms with the sides a concave arch; a sharp ridge on the back marks the siphunculus; volutions about 7, $\frac{2}{3}$rds exposed.

8. *Ammonites Gulielmi,* Sowerby, Min. Con., pl. 311.

This species differs considerably from the description given by Sowerby, although there can be no doubt of its being the same shell; when fully grown to about 5 inches in diameter, the inner thickened rays form strong, elevated, compressed spines or tubercles.

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9. *Trichotropis acuminatus.* Jeffreys in 'Malacological and Conchological Magazine,' No. II. p. 36. In Lerwick Sound: not uncommon. I found one specimen of the *Chiton albus* which was half an inch long.
   Pecten obsoletus, var. *omnino alba.* In Lerwick Sound; only one specimen.
10. *Crenella elliptica*, Brown [Mytilus decussatus, *Montagu*]. In Lerwick Sound: not uncommon.
11. *Arca fusca.* In Lerwick Sound: a single valve.
12. *Montacuta substriata*, Turton. Lerwick, attached to the ventral spines of the *Spatangus purpureus*, its usual habitat.
13. ——— *ferruginosa*, Turton. Scalloway; a single valve.
14. *Lucina lactea.* At Scalloway: rare.
15. ——— *spinifera* [Venus spinifera, *Montagu*]. In Lerwick Sound: rare.
16. *Cyprina minima*, Turton. In Lerwick Sound: not uncommon.
17. *Astarte? triangularis* [Mactra triangularis, *Montagu*]. In Lerwick Sound; one specimen only.
18. *Venus Virginea* and var. *Sarniensis*, Turton. Lerwick: not uncommon.
19. *Anatina prætenuis.* Lerwick and Scalloway: rare
20. ——— *intermedia.* Jeffreys in 'Malacological and Conchological Magazine,' No. II. p. 45. In Lerwick Sound: not uncommon.
21. *Psammobia florida.* In Lerwick Sound: not uncommon.

Swansea, Sept. 1841.

XXI.—*Brief and Practical Instructions for the Breeding of Salmon and other Fish artificially.* By Sir Francis A. Mackenzie, Bart.

In the autumn of 1840, having chosen a brook flowing rapidly into the river Ewe, a hollow spot adjoining to it was selected and cleared out, of the following dimensions: length 23 yards, breadth from 12 to 18 feet; and all large stones having been taken away, the bottom was covered 1 foot thick with coarse sand and small gravel, the largest stones not exceeding the size of a walnut. A stream from the brook was then led into this hollow, so as to form a pool of about 8 inches in depth at the upper and 3 feet at the lower end, thus giving it one uniform gentle current over the whole pool; whilst the supply of water was so regulated by a sluice as to have the same depth at all times, and a strong stone wall excluded all eels or trout, so destructive both to spawn and fry.

On the 13th of November, four pair of salmon, male and female, were taken by net from the Ewe, and carefully placed in the pool; on the 18th they showed a disposition to spawn, but on the 20th the whole were carried away by some ill-dis-

posed persons, and on examining the pool, only a small quantity of ova appeared to have been deposited. On the 23rd of November four pair of salmon were again caught and placed in the pool, which were observed to commence spawning on the day following;—caught them carefully,—squeezed gently about 1200 ova from a female into a basin of water, and then pressed about an equal quantity of milt from a male fish over them; stirred the two about gently, but well together, with the fingers, and after allowing them rest for an hour, the whole was deposited and spread in one of the wicker baskets recommended by Professor Agassiz, having about 4 inches of gravel below them and 2 or 3 inches of gravel above. A similar quantity of ova, treated in the same way, was also deposited in one of the copper wire bags, as used by Mr. Shaw, and both were then immediately placed under water in the pool; a little of the ova was buried in the open gravel at about 3 inches in depth. In another basket, and also in another copper wire bag, 2 or 3 inches of gravel were placed over the bottom of each, and both basket and bag laid in the pool, covered with about 4 inches of water. The ova of a female and milt of a male were then successively squeezed from two fish on the gravel in both basket and bag, and spread over it regularly with the hand one after the other; and after leaving them exposed, in this state, to the water for a few minutes, the whole was covered with 2 or 3 inches of gravel and left in the pool. These four pair of fish afterwards emitted voluntarily a small quantity of spawn which had been left with them, and on the 1st of December they were all turned out into the river. On the 3rd of December, caught three pair of salmon which had already partially spawned in the Ewe;—used another basket and also another wire bag, treating the spawn in the same manner as last described; these fish were then also allowed to deposit voluntarily the little spawn of which they had not been deprived, and afterwards turned out into the river. On the 19th of February examined the ova, and life was plainly observed in the baskets, wire bags, and unprotected gravel, both where placed artificially and where deposited by the salmon themselves.

19th of March, the fry had increased in size and went on gradually increasing, much in proportion to the temperature of the weather.

22nd, the eyes were easily visible, and a few of the ova had burst, the young fry having a small, watery, bladder-like sac attached to the throat.

18th of April, the baskets and bags were all opened; the sacs had become detached from their throats. the fry measured

about three-quarters of an inch in length, and they swam about easily, all marked distinctly as Par. The baskets recommended by Professor Agassiz proved superior to the wire bags of Mr. Shaw. In the latter only about 20 per cent. came to maturity, whilst in the former not above 10 per cent. proved barren, and in the baskets used 5th of December not above 5 per cent. was unproductive. It is impossible to say exactly the proportion of ova which came to life either of that artificially impregnated and deposited in the open gravel, or of what was spawned by the fish themselves naturally, but so far as could be judged, they succeeded equally well with that in the baskets. Perhaps the baskets may have a preference over the other methods tried, as affording more certain protection to the spawn during winter; and it is proper to state, that the last-described mode of depositing the ova and milt was most successful. There can be no doubt, from the success which has attended these experiments, that the breeding of salmon or other fish in large quantities is, comparatively speaking, easy, and that millions may be produced, protected from every danger, and turned out into their natural element at the proper age, which Mr. Shaw has proved by repeated experiments on a small scale to be when they have attained about two years of age. When the par marks disappear they assume the silvery scales of their parents, and distinctly show a strong inclination to escape from confinement and proceed downwards to the sea.

Professor Agassiz asserts, and I fully believe with truth, that the ova of all fish, when properly impregnated, can be conveyed in water of a proper temperature even across the Atlantic, as safely as if it were naturally deposited by the parent fish; so that any quantity of salmon or other spawn can (after impregnation on the banks of a river) be carried to other streams, however distant, which may be favourable for hatching. It may be right to observe, that as the fry are to remain two years in the artificial pools where hatched, fresh places must be used every second year for the spawn, as even one-year-old fry will destroy spawn, or their more infantile brethren, if left together; old spent salmon are also destructive both to spawn and fry.

It can only be ascertained by experience what kind or quantity of food will be required for the fry. Carrion hung at the top of the pool in which they are, would, in the opinion of Professor Agassiz and Mr. Shaw, supply them with maggots; but in this there are difficulties, and when tried by me this season, a few of the fry were found dead round the carrion given to them. The droppings of cattle allowed to

XXII.—*On* Epilobium angustifolium, *and species which have been confounded with it.* By Mr. H. O. Stephens.

To the Editors of the Annals and Magazine of Natural History.

There appears to be two species of *Epilobium* confounded by British botanists with *E. angustifolium*, Linn.; one is probably indigenous, the other certainly so. I shall endeavour to furnish discriminating characters.

1st. *Epilobium angustifolium*, Linn. Leaves scattered, rather broadly lanceolate, veined, smooth; inflorescence subspicate; petals unequal; genitalia declined; stigma large, *club-shaped*; capsule *short, turgid.* Species Plantar. 493; Aiton, Hort. Kew., tom. ii. p. 4; Smith, Eng. Flor., tom. ii. 212; Eng. Bot., tab. 1947; Hooker, ed. iii. 182; Lindley, 108. *E. spicatum*, DeCandolle, Prodrom., pars iii. p. 40. *Lysimachia speciosa*, &c., Raii Synop., 310. *Chamænerion*, Ger. Emac., p. 477. fig. 7.

This is the common plant of the gardens, and is figured in 'English Botany.' The leaves are of a very *dark green* colour, rather broadly lanceolate, distantly and faintly serrated, in general outline resembling those of *Salix alba*. The upper part of the stem, towards the spike of flowers, very obscurely angular; flowers deep crimson; capsules *short and very turgid.*

2nd. *Epilobium macrocarpum.* Leaves scattered, linear-lanceolate, veined, smooth; inflorescence subspicate; petals unequal; genitalia declined; *capsule very long, linear.*

This plant is of a lighter and more elegant habit than the former; the flowers are of a paler shade, inclining to rose-colour; upper portion of the stem, towards the inflorescence, of a coral-red, and acutely angular. Stigma much smaller than in *E. angustifolium*, barely club-shaped. Leaves very *pale* green, narrow, lanceolate, distantly and faintly toothed, in general outline resembling those of *Salix viminalis*. *Capsule very long, exceeding three inches in length*, quite *linear*, without the least turgescence.

This plant differs from *Epilobium angustifolium*, Linn., in the leaves being narrow-lanceolate, of a very pale green, in the smaller stigma, paler flowers and more angular stem; but the specific difference consists in the very long linear capsule, totally unlike the short and turgid seed-vessel of *E. angustifolium*, Linn. Modern British botanists deny (unnecessarily, I think,) *E. angustifolium* to be a native plant; it was considered as such by Gerarde and Ray; and as it abounds in Sweden in situations much like those in which it is found here, this strengthens the supposition of its nationality. However this may be, there can be no doubt that the second spe-

cies, *E. macrocarpum*, is indigenous; it cannot have escaped from cultivation, because the plant so common in gardens is *E. angustifolium*.

Discovered by my friend Mr. G. K. Thwaites in the lower portion of Leigh Wood, Somerset, in a coppice which had been cut two years ago, a situation very distant from any habitation.

HENRY OXLEY STEPHENS.

Bristol, 3 Terrill Street, Aug. 26, 1841.

XXIII.—*A List of Flowering Plants found growing wild in Western Norfolk.* By the Rev. GEORGE MUNFORD*, Corresponding Member of the Botanical Society of London.

THE tract of country embraced by the hundreds of Freebridge Lynn, Freebridge Marshland, Clackclose and Smithdon, and which forms the western side of the county of Norfolk, contains the remarkable district called Marshland—a part of the great level of the Fens, and the higher ground bordering on the Wash, which lies between the counties of Norfolk and Lincolnshire.

From the extent and variety of this field, it will easily be seen that the botanist will find in it ample space for the exercise of his favourite pursuit.

Local advantages, derived from a residence of almost twenty years in the principal and central town of the district, may be supposed to enable the compiler of the following list to correct, in some few instances, the errors into which others, not residing on the spot, may have fallen; and perhaps to point out here and there a new locality for some of the rarer plants growing in the neighbourhood.

It is with this view that, with the kind assistance of two or three botanical friends also residing on the spot, the attempt has been made to give, as far as possible, a correct and perfect list of the plants that are found growing wild in Western Norfolk.

As little more has been done than to collect into one place what was previously known, but scattered throughout several published works, it may appear that labour and pains have been unnecessarily expended; but the employment itself has served to fill up, and very agreeably to amuse, many a leisure hour, and will tend to refresh the memory when the power of searching for these favourite objects of pursuit in the place of their growth shall no longer exist.

* Read before the Botanical Society of London, 6th August, 1841.

The English Flora contains about 1500 vascular and 2800 cellular plants: 722 vasculars are here enumerated as growing wild in the district which forms the western side of the county of Norfolk. The writer's acquaintance with the cellulars is too limited to admit of his attempting to give any account of them in this paper. A catalogue of the plants growing in the neighbourhood of Yarmouth, on the opposite side of the county, has been published by Mr. James Paget, in which are found 725 vasculars and 450 cellulars; and the Flora of Central Norfolk, by Mr. R. J. Mann, is printed in the 'Magazine of Natural History,' New Series, vol. iv. No. 44; and in the 7th vol. of the 'Annals and Magazine of Natural History,' No. 43, an addenda by S. P. Woodward, Esq. These two lists contain together 708 vasculars and 121 cellulars. They are confined to the neighbourhood of Norwich, and embrace but a small portion of what may be called *central* Norfolk; so that the greater part of the county may yet be considered as unbeaten ground.

All the plants previously admitted into works of established authority as having been found wild in Western Norfolk are included in this list. To all these, and to others which I have not myself seen growing, the authority on which they are introduced is given; while for every species and locality not thus marked the compiler is responsible.

The arrangement made use of is that of Professor Lindley in his 'Synopsis of the British Flora,' as best agreeing with the advanced state of botanical science in England; and the nomenclature is for the most part that of Sir W. J. Hooker in his 'British Flora,' which is generally acknowledged to be the best authority in the present day for determining the plant intended.

The geography of plants is of much interest to the botanist, and every attempt to promote the knowledge of this branch of the science is worthy of observation. It is now universally admitted, that the geological character of every district exercises very great influence over its vegetation. An attempt has therefore been made to mark, as nearly as possible, the substratum of soil on which the rarer plants in the following list are found. Where the place of growth is not added, the plant may generally be considered as distributed throughout the district.

By a reference to Woodward's Geological Map of Norfolk, published in 1833, it will be seen that, proceeding eastward from Lynn, which is situated on the *alluvium*, we meet with a narrow strip of the *Kimmeridge clay and oolite* that runs in a direction north and south nearly the entire length of the di-

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Ranunculus β. reptans ; Barton-Bendish, Fincham : Mr. Dawson Turner.
——— *Lingua* ; N. Runcton : not common.
——— *Ficaria, sceleratus, bulbosus, hirsutus, repens, acris* ; very common.
——— *arvensis* ; N. Lynn, Thorpland, Hardwick, Barton-Bendish, Beechamwell.
——— *parviflorus* ; Gt. Bircham, Burnham, Rev. K. Trimmer.
——— *hederaceus* ; Hardwick, S. Wootton, Denver : not common.
——— *aquatilis* ; very common.
Caltha palustris ; very common.
Helleborus viridis ; plentiful in a plantation at Ingoldisthorpe : Miss Bell.
——— *fœtidus* ; castle-hill, Castle-Acre.
Aquilegia vulgaris ; thicket behind the Red Mount, Lynn : rare.
Delphinium Consolida ; W. Winch, Docking, Barton-Bendish : rare.

Berberideæ.

Berberis vulgaris ; Narborough, Barton-Bendish : rare.

Nymphæaceæ.

Nymphæa alba ; Lynn, E. Walton, Shouldham : common.
Nuphar lutea ; Lynn, E. Walton, Shouldham : common.

Papaveraceæ.

Papaver hybridum ; Barton-Bendish, B. G. ; Burnham, Miss Bell.
——— *Argemone, dubium, Rhæas* ; common.
——— *somniferum* ; borders of Castle-Rising Wood.
Glaucium luteum ; Heacham beach.
Chelidonium majus ; Gaywood, Congham.

Fumariaceæ.

Corydalis claviculata ; Woolferton Wood, Bawsey, Blackburgh.
Fumaria officinalis ; common.

Cruciferæ.

Cheiranthus Cheiri ; Grey Friar's Tower, Lynn : not uncommon.
Nasturtium officinale ; plentiful.
——— *sylvestre* ; banks of the Ouse, Stow Bridge, Downham : Miss Bell.
——— *terrestre* ; Middleton, Stow.
——— *amphibium* ; N. Runcton.
Barbarea vulgaris ; very common.
Arabis thaliana ; Castle-Rising, N. Runcton.
—— *hirsuta* ; S. Gates, Lynn, walls at Downham.
Cardamine hirsuta, pratensis ; very common.
——— *amara* ; Reffley Wood, Pentney : not uncommon.
Draba verna ; very common.
Cochlearia anglica ; very common.
——— *Armoracia* ; Outwell, on the banks of the Wisbeach canal.
Thlaspi arvense ; S. Wootton, Mr. Wardall : not common.

Teesdalia nudicaulis; Castle-Rising, Wimbotsham, E. Winch.
Iberis amara; E. Winch: Mr. G. Cooper in N. B. G.
Cakile maritima; abundant on Hunstanton beach.
Hesperis matronalis; Castle-Rising, E. Winch, Ingoldisthorpe: rare.
Sisymbrium officinale, Sophia; very common.
Alliaria officinalis; very common.
Erysimum cheiranthoides; Hardwick, Stow, Wimbotsham, Runcton-Holme, Downham, Denver: not uncommon.
Coronopus Ruellii; very common.
Capsella Bursa Pastoris; very common.
Lepidium latifolium; found at Magdalen a few years ago: Miss Bell.
——— *ruderale*; N. Lynn, S. Lynn.
Isatis tinctoria; in a field at Barton-Bendish, where it is never known to have been cultivated: B. G.
Brassica Napus, Rapa, campestris; naturalized.
Sinapis arvensis, alba, nigra; common.
——— *tenuifolia*; walls by the gas-works, Lynn.
Raphanis Raphanistrum; common.

Violaceæ.

Viola hirta; Marham, Mr. Crowe in Eng. Fl.; Shingham, Mr. Dawson Turner.
—— *odorata*; not uncommon.
—— *palustris*; Rev. W. Allen found it at Lynn some years ago: not now on that spot.
—— *canina, tricolor*; common.

Cistineæ.

Helianthemum vulgare; Hunstanton, Grimstone, Barton-Bendish, Beechamwell.

Droseraceæ.

Drosera rotundifolia; Royden Fen, Dersingham, Marham Fen.
——— *longifolia*; Rising Heath, Dersingham, Barton-Bendish, Marham Fen.
——— *anglica*; Barton-Bendish, Shouldham, Roydon, and Marham Fens.

Frankeniaceæ.

Frankenia lævis; salt-marshes, Titchwell, Rev. K. Trimmer: rare.

Polygaleæ.

Polygala vulgaris; Hardwick: common.

Malvaceæ.

Malva sylvestris, rotundifolia; common.
—— *moschata*; S. Wootton, Mr. Wardall: very rare.
Althæa officinalis; Tilney, Terrington, and throughout Marshland.

Hypericineæ.

Hypericum quadrangulum; Rising Wood, Mr. Wardall.
——— *perforatum*; N. Runcton, Barton-Bendish: common.
——— *dubium*; not unfrequent about Stow and Wimbotsham; Miss Bell in N. B. G.

Hypericum humifusum; Rising, Wimbotsham, Wallington.
——— *pulchrum*; Middleton, Heacham, Mr. Wardall.
——— *elodes*; bogs on Rising Heath, Dersingham.

Caryophylleæ.

Dianthus deltoides; Swaffham Heath, near Barton-Bendish: B. G.
Saponaria officinalis; W. Bilney, Hillington: not common.
Silene anglica; Runcton-Holme, Miss Bell.
—— *inflata*; Grey Friar's Tower, Lynn: common.
—— *maritima*; Hunstanton, Brancaster.
—— *noctiflora*; near Stow, Miss Bell; Barton-Bendish, Fincham, Mr. Dawson Turner.
—— *Otites*; between Swaffham and Narford by the old road-side, Mr. Wardall; Barton-Bendish, B. G.
Lychnis Flos Cuculi, dioica α. red, β. white; common.
Agrostemma Githago; common.
Spergula arvensis; common.
——— *nodosa*; Castle-Rising.
Sagina procumbens, apetala; common.
Mœnchia erecta: Burnham, Miss Bell.
Arenaria peploides; Hunstanton beach.
——— *trinervis*; Wallington, N. Runcton, Miss Bell: frequent.
——— *serpyllifolia*; common.
——— *tenuifolia*; Barton-Bendish, B. G.
——— *rubra, marina*; common.
Cerastium aquaticum; Stow, Miss Bell; Barton-Bendish, by the Car, Mr. Dawson Turner.
——— *vulgatum, viscosum*; common.
——— *semidecandrum*; walls at Stow, Miss Bell.
——— *arvense*; W. Winch, Magdalen, Narford.
Stellaria uliginosa; common.
——— *media*; very common.
——— *Holostea*; very common.
——— *graminea*; common.
——— *glauca*; S. Wootton, banks of the Ouse: common.

Lineæ.

Linum usitatissimum; Hunstanton, Downham.
—— *perenne*; Wisbeach, Fincham, Barton-Bendish.
—— *catharticum*; Barton-Bendish, Shouldham, Hunstanton, Wallington, Stow.
Radiola millegrana; Rising Heath, Runcton-Holme.

Acerineæ.

Acer Pseudo-platanus; not very common.
—— *campestre*; Reffley Wood, hedges: very common.

Geraniaceæ.

Geranium sylvaticum; Leziate, Mr. Crowe in B. G.
——— *robertianum, molle, pusillum*; very common.
——— *pyrenaicum*; E. Winch and W. Bilney, Mr. Crowe in Eng. Fl.

Melilotus officinalis; S. Lynn: not common.
Trifolium repens; abundant.
——— *subterraneum*; Hardwick, Burnham: not common.
——— *ochroleucum*; Runcton-Holme, near the river, Miss Bell.
——— *pratense*; abundant.
——— *maritimum*; Snettisham beach, Eng. Fl.
——— *arvense*; sandy fields: common.
——— *scabrum*; Wimbotsham, S. Runcton, Miss Bell; Snettisham beach, Mr. Crowe in Eng. Fl.
——— *fragiferum*; salt-marshes: very common.
——— *procumbens*; not uncommon.
——— *filiforme*; N. Runcton: common.
Lotus corniculatus; very common.
—— *major*; Stow, Denver, &c.: very common.
Medicago lupulina; N. Runcton, Stow.
——— *maculata*; salt-marshes: not uncommon.
——— *minima*; Narborough: rare.
Ervum tetraspermum, hirsutum; common.
Vicia Cracca, sativa; common.
—— *angustifolia*; Denver, and in a gravel-pit at Wimbotsham, Miss Bell.
—— *lathyroides*; Wimbotsham Mill Hill, Narborough.
—— *sepium*; Castle-Rising Wood, Mr. Wardall.
Lathyrus pratensis; common.
Ornithopus perpusillus; common.
Hippocrepis comosa; Shouldham, Mr. Dawson Turner; Marham, Eng. Fl.
Onobrychis sativa; Heacham: rare.

Rosaceæ.

Spiræa Filipendula; Castle-Acre, Westacre, Mr. Wardall; S. Runcton, Miss Bell; Barton-Bendish, Beechamwell, Mr. Dawson Turner.
—— *Ulmaria*; common.
Prunus spinosa; very common.
——— *insititia*; Burnham, Miss Bell.
——— *Cerasus*; Newbridge Wood, Snettisham, Mr. Wardall; N. Runcton, Crimplesham, Miss Bell.
Rubus suberectus (*nitidus*); Blackburgh Thicket (Mr. Mackay doubted this being *R. suberectus*), Miss Bell in N. B. G.
—— *fruticosus*; very common.
—— *corylifolius*; Stow, Runcton-Holme, Miss Bell.
—— *cæsius*; very common, Miss Bell.
—— *idæus*; S. Wootton, Barton Car, Blackburgh.
Fragaria vesca; Reffley, Castle-Rising and Wootton Woods.
Potentilla anserina; very common.
——— *argentea*; W. Winch, Middleton, Wimbotsham, Wallington, Denver, Barton-Bendish: not common.
——— *reptans*; very common.
——— *fragariastrum*; Stow Wood, Miss Bell.
Comarum palustre; common in fresh marshes.

Tormentilla officinalis; common.
Geum urbanum; very common.
—— var. *intermedium*; Stow Wood, Wallington and Woolferton Wood.
—— *rivale*; Reffley and Woolferton Woods: plentiful.
Agrimonia Eupatoria; not uncommon.
Rosa rubiginosa; S. Lynn, Middleton, N. Runcton.
—— *canina*; common.
—— *arvensis*; Stow, Miss Bell.
Alchemilla arvensis; Middleton, Mr. Wardall; Stow, Wimbotsham, Miss Bell.
Poterium Sanguisorba; Barton-Bendish, Marham, Mr. Dawson Turner; Heacham, Mr. Wardall.

Pomaceæ.

Mespilus Oxyacantha; very common.
Pyrus Malus; not uncommon.

Grossulaceæ.

Ribes rubrum; Stow Wood, Miss Bell; Castle-Rising Wood, Mr. Wardall.
—— *grossularia*; Stow Wood, Miss Bell.

Onagrariæ.

Epilobium hirsutum; very common.
———— *parviflorum*; Gaywood, Mr. Wardall; Runcton-Holme, Miss Bell.
———— *montanum*; Castle-Rising Wood, Mr. Wardall; Stow, Miss Bell.
———— *tetragonum*; S. Lynn, Mr. Wardall; Wallington, Denver, Miss Bell.
———— *palustre*; Stow, Miss Bell.

Circæaceæ.

Circæa lutetiana; Reffley Wood: common.

Halorageæ.

Myriophyllum spicatum; common.
Hippuris vulgaris; Gaywood River: common.

Umbelliferæ.

Daucus Carota; common.
Caucalis daucoides; Fincham, Mr. Dawson Turner; Marham, Mr. Crowe.
Torilis Anthriscus; common.
——— *infesta*; S. Runcton, Miss Bell.
——— *nodosa*; common,
Pastinaca sativa; Castle-Rising, banks of the Ouse.
Heracleum Spondylium; very common.
Angelica sylvestris; Stow Bridge, Miss Bell; Castle-Rising Wood, Mr. Wardall.
Silaus pratensis; S. Lynn, Stow: rare.
Fœniculum vulgare; Hunstanton: abundant.

Æthusa Cynapium; not uncommon.
Œnanthe fistulosa; common.
——— *pimpinelloides*; near Lynn, B. G.
——— *peucedanifolia*; Runcton-Holme, Miss Bell.
——— *Phellandrium*; very common.
Bupleurum tenuissimum; banks of the Nar, near Lynn, Mr. Wardall.
Bunium flexuosum; Wallington, Shingham, Reffley, Hardwick.
Pimpinella saxifraga; Barton-Bendish, Mr. Dawson Turner; Wimbotsham, Miss Bell.
Sium latifolium; Barton-Bendish, Mr. Dawson Turner.
—— *angustifolium*; Stow, Denver: common.
Helosciadium nodiflorum; common.
———— *repens*; Stow, Denver: common.
———— *inundatum*; Watlington, Miss Bell.
Carum Carui; marshes north of Lynn.
Apium graveolens; very common.
Ægopodium Podagraria; Barton-Bendish, Stow, Wimbotsham, Congham, Horsley's Chace, Lynn.
Anthriscus vulgaris; very common.
Chærophyllum sativum; W. Winch.
———— *sylvestris*; S. Lynn.
———— *temulum*; common.
Scandix Pecten-Veneris; common.
Conium maculatum; common.
Eryngium maritimum; Hunstanton beach.
Sanicula europæa; Reffley Wood: plentiful.
Hydrocotyle vulgaris; Rising Heath, Barton-Bendish.

Stellatæ.

Galium cruciatum, palustre; common.
——— *Witheringii*; Wallington, Miss Bell.
——— *saxatile*; N. and S. Runcton, Miss Bell.
——— *uliginosum*; common.
——— *erectum*; Middleton.
——— *tricorne*; Barton-Bendish, B. G.; Fincham, Mr. Dawson Turner.
——— *verum*; common.
——— *parisiense*; on a wall between Fincham and Lynn, B. G.
——— *Aparine*; very common.
——— *Mollugo*; Burnham, Miss Bell.
Asperula cynanchica; Shouldham, Ringstead Yards: rare.
Sherardia arvensis; common.

Caprifoliaceæ.

Lonicera Periclymenum; Blackburgh, Stow, Wallington, &c.
Viburnum Lantana; Cars, E. Winch.
———— *Opulus*; E. Winch, Stradset, Wimbotsham, Barton-Bendish.
Sambucus nigra; common.
Cornus sanguinea; common.
Hedera Helix; common.

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Pyrethrum inodorum; N. Runcton, Middleton.
Artemisia maritima; river-bank, Lynn, Brancaster.
——— *Absinthium*; Stow Bridge, Miss Bell.
——— *vulgaris*; common.
Tanacetum vulgare; common.
Anthemis Cotula; common.
——— *arvensis*; Gayton, Mr. Wardall.
Achillea Ptarmica; N. Runcton, Stow, Fincham: not common.
——— *Millefolium*; very common.
Bidens tripartita; N. Runcton, Castle-Rising, Stow, Stradset, Barton-Bendish.
—— *cernua*; N. Runcton, Watlington, Barton-Bendish.
Onopordum Acanthium; common.
Cnicus lanceolatus; Mr. Wardall.
—— *palustris, arvensis*; common.
—— *pratensis*; Roydon Fen, Barton-Bendish: rare.
—— *acaulis*; Ringstead Yards, Beechamwell.
Carlina vulgaris; Shouldham, Castle-Acre, Castle-Rising: rare.
Arctium Lappa; common.
Carduus marianus; Hardwick, Wimbotsham.
Centaurea nigra, Cyanus; common.
——— *Scabiosa*; Castle-Rising, Heacham.
——— *Calcitrapa*; Downham Bridge: rare.
Carduus nutans; common.
——— *acanthoides*; Denver: not uncommon; Miss Bell.
——— *tenuiflorus*; road-side between Stow and Lynn, Miss Bell.
Sonchus arvensis; Mr. Wardall.
——— *oleraceus*; very common.
Lactuca virosa; Castle-Acre, Miss Bell.
Prenanthes muralis; road from Narborough.
Lapsana communis; very common.
——— *pusilla*; Wimbotsham Mill Hill, gravel-pits and corn-fields at Stow, Miss Bell.
Leontodon Taraxacum; very common.
Barkhausia fœtida; Barton-Bendish and Beechamwell in several places, B. G.
Crepis tectorum; very common.
Picris echioides; common.
Hieracium pilosella; very common.
——— *paludosum*; Hunstanton.
——— *umbellatum*; wall in Wimbotsham, hedge-banks between Stow and Wimbotsham, Miss Bell.
Hypochæris glabra; Mill Hill, and in a planted gravel-pit at Wimbotsham, Miss Bell.
——— *radicata*; N. Runcton, Mr. Wardall; Stow, Runcton-Holme, Wimbotsham, Miss Bell.
Tragopogon pratensis; common.
Thrincia hirta; grass-plot, Stow, Miss Bell: common.
Apargia hispida; N. Runcton, Mr. Wardall; Stow, Miss Bell.
——— *autumnalis*; Stow, Miss Bell.
Cichorium Intybus; Hunstanton, Barton-Bendish; common.

Borragineæ.

Echium vulgare; very common.
Lithospermum officinale; Babingley, Wallington, Shingham: not common.
——— *arvense*; Hunstanton: common.
Symphytum officinale; Outwell, &c.: common.
Borago officinalis; Hunstanton: common.
Lycopsis arvensis; Castle-Rising: common.
Myosotis palustris, arvensis, versicolor; common.
Cynoglossum officinale; common.

Convolvulaceæ.

Convolvulus arvensis, sepium; very common.
——— *Soldanella*; beach at Hunstanton.
Cuscuta Epithymum; Rising Hill: rather rare.

Plantagineæ.

Plantago major, media, lanceolata, maritima, Coronopus; very common.

Plumbagineæ.

Statice Armeria, Limonium; very common.
—— *reticulata*; Holme-by-the-Sea: rather rare.
—— *spathulata*; Norfolk coast, Rev. K. Trimmer.

Oleineæ.

Ligustrum vulgare; N. Runcton: not common.
Fraxinus excelsior; common.

Ericeæ.

Calluna vulgaris; Rising Heath: abundant.
Erica Tetralix; Rising Heath: abundant.
—— *cinerea*; Dersingham Heath: abundant.

Pyroleæ.

Pyrola rotundifolia; Roydon Fen: very rare.

Apocyneæ.

Vinca minor, major; Newbridge Wood, Snettisham, Mr. Wardall.

Gentianeæ.

Erythræa Centaurium; Hunstanton: not uncommon.
Menyanthes trifoliata; Rising Heath, Fincham.
Villarsia nymphioides; plentiful in the Downham Canal.

Solaneæ.

Datura Stramonium; N. Runcton, Mr. Wardall.
Hyoscyamus niger; not uncommon.
Verbascum Thapsus, var. β.; Barton-Bendish, Mr. Dawson Turner in Eng. Fl.
——— *pulverulentum*; Brancaster, Burnham, Castle-Acre: rather rare.
——— *nigrum*; S. Wootton, Mr. Wardall; Beechamwell, Mr. Dawson Turner.

Verbascum pulverulentum, var. *β. nigro-pulverulentum*, Eng. Fl.; Beechamwell, Mr. Dawson Turner.
——— *Blattaria*; near Lynn, Hon. F. Howard in Eng. Bot.
Solanum Dulcamara, nigrum; common.
Atropa Belladonna; Reffley, Castle-Rising, Stow Bridge: not uncommon.

Primulaceæ.

Centunculus minimus; Rising Heath.
Glaux maritima; common.
Primula vulgaris; common.
——— *elatior*; Crimplesham, Barton-Bendish: rather rare.
——— *veris*; common.
Lysimachia vulgaris; N. Runcton, Barton-Bendish: not common.
——— *nemorum, Nummularia*; common.
Hottonia palustris; common.
Anagallis arvensis; common.
——— *cærulea*; I found a single specimen in the Lighthouse lane at Hunstanton in 1832, G. M.; I found a single specimen by the road side, Stow, Miss Bell.
——— *tenella*; Rising Heath: wet places.
Samolus Valerandi; not uncommon.

Lentibulariæ.

Pinguicula vulgaris; bogs on Rising and Wootton Heaths, and on Roydon Fen, between Barton and Fincham.
Utricularia vulgaris; Roydon Fen.
——— *minor*; E. Walton: common.

Scrophularineæ.

Veronica serpyllifolia, Beccabunga, Anagallis; common.
——— *scutellata*; S. Wootton, Mr. Wardall.
——— *officinalis*; S. Runcton, Stow, Miss Bell.
——— *Chamædrys, agrestis, polita, hederifolia, arvensis*; common.
——— *triphyllos*; Mill Hill, Wimbotsham, and several sandy fields at Wimbotsham and Stow, Miss Bell; fields at Barton-Bendish and near Swaffham Heath
Rhinanthus Crista-galli; common.
Pedicularis palustris, sylvatica; common.
Bartsia Odontites; common.
Euphrasia officinalis; common.
Linaria Cymbalaria; walls of the White Friar's precincts at Lynn, chalk-pit at Burnham.
——— *Elatine*; Hunstanton, Miss Bell.
——— *vulgaris*; very common.
——— *minor*; Heacham, Mr. Wardall; Shouldham, Miss Bell.
Antirrhinum majus; on the walls of the Alms-house at Castle-Rising.
——— *Orontium*; Stanhoe, Rev. K. Trimmer; Wimbotsham, Miss Bell; Fincham, Mr. Dawson Turner.
Digitalis purpurea; Mintlyn, Bawsey, Middleton, Blackburgh: not uncommon.

Thymus Nepeta; Snettisham, Mr. Wardall; Barton-Bendish, Mr. Dawson Turner.
Prunella vulgaris; common.
Clinopodium vulgare; Burnham and on the Norfolk coast, Miss Bell; Shingham, Mr. Dawson Turner.
Origanum vulgare; Hillington, Miss Bell; Shingham, Mr. Dawson Turner; Green lane between Narford Hall and the road from Narborough to Swaffham leading to Marham, Mr. Wardall.

Division II, MONOCHLAMYDEÆ.

Santalaceæ.

Thesium linophyllum; Limekiln Hill, near Shouldham, Rev. Mr. Forby in Eng. Bot.

Thymeleæ.

Daphne Mezereum; in a wood at Little Berwick, far from houses, Rev. K. Trimmer.

Polygoneæ.

Rumex maritimus; road-sides, Great Bircham, Wormegay, Miss Bell.
—— *palustris*; road leading to Downham Bridge, Miss Bell.
—— *pulcher*; road between Stow and Wimbotsham, near Stow Bridge, Denver, Wimbotsham and N. Runcton, Miss Bell.
—— *obtusifolius, acutus*; S. Lynn, Mr. Wardall; Stow, Miss Bell.
—— *sanguineus*, var. *viridis*; Stow, Denver, Miss Bell.
—— *crispus*; very common.
—— *Hydrolapathum*; banks of the Ouse, Miss Bell.
—— *Acetosa, Acetosella*; common.
Polygonum amphibium; common.
——— *Persicaria*; Fring, Rev. J. Bransby.
——— *lapathifolium*; Stow, Miss Bell; Barton-Bendish, Mr. Dawson Turner.
——— *Hydropiper*; common.
——— *minus*; Wormegay, Miss Bell.
——— *Bistorta*; Runcton-Holme, Miss Bell.
——— *arviculare*; common.
——— *Fagopyrum*; Castle-Rising, Narborough.
——— *Convolvulus*; Castle-Rising, Blackburgh.

Chenopodeæ.

Salsola Kali; Hunstanton beach.
Salicornia herbacea; river-banks.
——— *procumbens*; Holme-near-the-Sea.
——— *radicans*; Holme-near-the-Sea, Dr. Sutton in Eng. Fl.
Chenopodium Bonus-Henricus, urbicum, rubrum; common.
——— *murale*; Gaywood, Mr. Wardall; Downham, Miss Bell.
——— *album*; Gaywood, Mr. Wardall.
——— *olidum*; Mill Fleet, Lynn.
——— *maritimum*; salt-marshes.
——— *fruticosum*; Heacham.
Beta maritima; sea-bank, Lynn.
Atriplex portulacoides; sea-bank, Lynn.

Atriplex laciniata; Brancaster, Miss Bell.
——— *patula, angustifolia*; Hunstanton.
——— *littoralis*; salt-marshes.
——— *pedunculata*; east-bank of the Ouse just below Lynn, Dr. Smith, 1778, in Eng. Bot.; Plukenet in Eng. Fl.

Scleranthеæ.

Scleranthus annuus; common.
——— *perennis*; Snettisham, Mr. Crowe in Eng. Fl.

Urticeæ.

Parietaria officinalis; S. Gates, Lynn, C.-Rising castle.
Urtica urens, dioica; common.
Humulus Lupulus; Castle-Rising Wood, N. Runcton, Stow, Gaywood, Shingham.

Resedaceæ.

Reseda Luteola, lutea; common.

Euphorbiaceæ.

Euphorbia Helioscopia; Ingoldisthorpe: common.
——— *exigua, Peplus*; common.
Mercurialis perennis; Reffley Wood: common.
——— *annua*; new burial-ground, Lynn: rare.

Ceratophylleæ.

Ceratophyllum demersum; Stow, Miss Bell: common.

Ulmaceæ.

Ulmus campestris; common.

Division III. ACHLAMYDEÆ.

Amentaceæ.

Betula alba; Reffley Wood.
Alnus glutinosa; common.
Salix nigricans; Wormegay Fen, Mr. Crowe in Eng. Fl.
—— *Helix*; Runcton-Holme, Miss Bell.
—— *Forbiana*; Rev. Mr. Forby in Eng. Bot.; osier-grounds near Lynn, Mr. Crowe in Eng. Fl.
—— *Croweana*; Cranberry Fen, E. Winch, Mr. Crowe in Eng. Fl.
—— *fœtida*, var. β.; E. Winch and Wormegay Fen, Mr. Crowe in Eng. Fl.
—— *fusca*; E. Winch and Wormegay Fen.
—— *caprea*; Stow, Runcton-Holme, Miss Bell.

Cupuliferæ.

Quercus Robur; common.
——— *sessiliflora*; Snettisham.
Corylus Avellana; Reffley Wood.

Myriceæ.

Myrica Gale; Rising and Dersingham Heaths.

Callitrichineæ.

Callitriche verna; very common.

Subclass II. MONOCOTYLEDONES.

Division I. PETALOIDEÆ.

Aroideæ.

Arum maculatum; common.

Typhaceæ.

Typha latifolia, angustifolia; Wormegay, Stow.
Sparganium ramosum; common.
——— *simplex*; Denver Sluice, Miss Bell.

Fluviales.

Potamogeton densus, pectinatus, pusillus, gramineus, crispus, perfoliatus; Stow, Miss Bell.
——— *lucens*; Fordham, Hilgay, Miss Bell.
——— *natans*; Hunstanton, Miss Bell.
Zostera marina; Burnham, Miss Bell.
Ruppia maritima; Burnham, Miss Bell.
Zannichellia palustris; Burnham, Miss Bell.

Pistiaceæ.

Lemna trisulca; N. Lynn: not common.
—— *minor*; very common.
—— *gibba*; N. Lynn: rather rare.
—— *polyrrhiza*; Stanhoe, Rev. K. Trimmer.

Juncagineæ.

Triglochin palustre; marshes, Lynn, Marham.
——— *maritimum*; salt-marshes, Lynn.

Alismaceæ.

Alisma Plantago; very common.
—— *ranunculoides*; Roydon: not common.
Sagittaria sagittifolia; common.

Hydrocharideæ.

Stratiotes aloides; Lynn, Wimbotsham, Fordham: not common.
Hydrocharis Morsus ranæ; common.

Irideæ.

Iris Pseud-acorus; common.

Orchideæ.

Neottia spiralis; Fincham, Miss Bell.
Listera ovata; N. Lynn, Stradset, Reffley.
Epipactis palustris; in a moist meadow near E. Walton, Rev. J. Bransby.
Orchis Morio; Stow, Miss Bell; plentiful at Barton-Bendish, Mr. Dawson Turner.
—— *mascula*; common.
—— *ustulata*; Shouldham lime-kiln: very rare, B. G.

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Scirpus lacustris;
——— *maritimus*; very common.
Eriophorum vaginatum; Bawsey Bottom.
——— *angustifolium*; Stow, Rising, Dersingham, &c.
Cladium Mariscus; Marham Fen, Mr. Wardall.
Isolepis setacea.
Heliogiton fluitans; Dersingham, Rev. K. Trimmer.
Carex dioica; Castle-Rising.
—— *pulicaris*; Dersingham, Miss Bell.
—— *stellulata*; Middleton, Wallington, Bawsey.
—— *curta*; S. Lynn.
—— *ovalis*; N. Runcton, Stow.
—— *remota*; Gaywood.
—— *arenaria*; Rising Heath, Burnham.
—— *intermedia*; N. Runcton.
—— *divisa*; Runcton-Holme, Miss Bell.
—— *muricata*; E. Winch, Wallington.
—— *divulsa*; Stow Wood, Miss Bell.
—— *vulpina*; Lynn, Stow.
—— *teretiuscula*; Wormegay, Miss Bell.
—— *paniculata*; Wormegay.
—— *sylvatica*; Reffley Wood, Stow Wood.
—— *Pseudo-cyperus*; Gaywood, Wallington.
—— *limosa*; Cranberry Fen, E. Winch, Mr. Crowe in Eng. Bot.
—— *flava*; Runcton-Holme.
—— *Œderi*; Wet Common at Runcton-Holme, Miss Bell.
—— *distans*: N. Runcton, Stow Bridge.
—— *præcox*; E. Winch, S. Runcton.
—— *pilulifera*; Runcton-Holme, Miss Bell.
—— *panicea*; N. Runcton, Runcton-Holme.
—— *recurva*; Runcton-Holme, Miss Bell.
—— *cæspitosa*; N. Runcton.
—— *stricta*; Stow, Miss Bell.
—— *acuta*; N. Runcton, Wormegay.
—— *paludosa*; Stow, Miss Bell.
—— *riparia*; Lynn, Runcton-Holme, Stow, &c.
—— *vesicaria*; Pentney, Wormegay.
—— *ampullacea*; Pentney.
—— *hirta*; Middleton, Stow.
—— *filiformis*; near Stoke, Rev. Mr. Forby in Eng. Bot.

Gramineæ.

Rottbollia incurvata; Heacham, Runcton-Holme, and banks of the Nar.
Lolium perenne; Hardwick, &c.: very common.
Nardus stricta; N. Runcton.
Hordeum murinum; common.
——— *pratense.*
——— *maritimum*; sea-bank, Lynn.
Elymus arenarius; Hunstanton.
Triticum junceum; Hunstanton.

Triticum repens; very common.
——— *caninum*; corn-fields, W. Winch, Mr. Wardall: scarce.
Digitaria sanguinalis; sandy fields between Barton and Moundeford, B. G. Mr. Borrer has reason to believe that the species intended is *humifusa*, not *sanguinalis*: see 'British Flora.'
Alopecurus pratensis; common.
——— *agrestis*; Runcton-Holme, Wimbotsham.
——— *geniculatus*; common.
Phleum arenarium; Narborough, Messrs. Woodward and Crowe in Eng. Fl.
——— *pratense*; N. Runcton.
——— *Bœhmeri*; Narborough, Messrs. Woodward and Crowe in Eng. Fl.; Marham, B. G.
Phalaris arundinacea; common.
Ammophila arenaria; Hunstanton beach.
Agrostis Spica-venti; Runcton-Holme, Miss Bell.
——— *canina, vulgaris, alba*; Gaywood, Roydon Heath.
Calamagrostis lanceolata; in a run of water by Rising Mill: not plentiful: Mr. Wardall.
Arrhenatherum avenaceum.
Holcus lanatus, mollis; common.
Anthoxanthum odoratum; very common.
Cynosurus cristatus; very common.
Aira aquatica; N. Wootton: common.
——— *præcox*; very common.
——— *caryophyllea*; Narborough, Mr. Wardall; Wallington, Miss Bell.
Melica cærulea.
Avena flavescens.
Setaria viridis; Barton-Bendish, B. G.
Arundo Phragmites; common.
Dactylis glomerata; very common.
Triodia decumbens; boggy grounds, S. Wootton, Mr. Wardall; Runcton-Holme, Miss Bell.
Bromus secalinus; Stow, Miss Bell.
——— *mollis, asper, sterilis*; common.
Festuca ovina, duriuscula; common.
——— *bromoides*; walls and sandy spots about Wimbotsham, Miss Bell.
——— *Myurus*; Wimbotsham, Miss Bell.
——— *gigantea*; Stow, Miss Bell.
——— *pratensis*; common.
Poa fluitans, rigida, aquatica; common.
— *compressa*; Gaywood, Mr. Wardall; Wimbotsham, Miss Bell.
— *trivialis, pratensis, annua*; common.
— *distans*; banks of the Nar near Lynn, Mr. Wardall.
Briza media; common.

XXIV.—*Indian* Cyprinidæ. By JOHN M'CLELLAND, Assistant Surgeon Bengal Medical Service.

[Continued from p. 121.]

47. IT remains to notice the analogical relations of the Loaches, an exceedingly numerous group in India, many species of which are common in every pond throughout Bengal and Assam. In these fishes we shall find the characters of rasorial birds as well as quadrupeds so strongly depicted as to leave no doubt of their forming an equivalent type among *Cyprinidæ*.

When noticing the difference between the true Loaches (*Cobitis*) and *Schisturæ*, I omitted to mention, that in the dissections of five species of the former—all I have had an opportunity of examining—I could find no natatory bladder; while in the only species of the latter which I have been able to inspect, I found that organ, though small and peculiar in its form, yet sufficiently developed to lessen considerably the specific gravity; enabling the *Schisturæ* to swim with facility, though perhaps with less buoyancy and ease than other *Cyprinidæ**. But if a natatory bladder exists at all in the true Loaches (*Cobitis prop.*), or those whose caudal is entire, it must be in the manner described by Schneider, very small, and inclosed in a bony bilobate case which adheres to the third and fourth vertebræ; but even in this rudimental shape I have been unable to find an air-vessel in any Indian species yet examined†.

This peculiarity, together with their small and weak fins, as well as lengthened and cylindric form, approaching to that of the *Murænidæ*, afford satisfactory evidence that they are less adapted for swimming than any other *Cyprinidæ*, and may therefore be said to be more terrestrial in their habits,

* *Schistura dario* and *geta* have a membranous air-vessel placed in the upper part of the abdomen, as in ordinary Cyprins, but it consists only of a single lobe. *S. dario*, Buch., is the only species of the Linnæan genus which I have found to frequent deep waters in the open channels of the Ganges and Bramaputra.

† Since this was written, I have found the air-vessel in all these species situated in a small bony case immediately over the entrance of the œsophagus from the mouth. Plate 56, fig. 5, is a magnified representation of the organ (which is not larger than the head of a pin) as it occurs in *Cobitis guntea*, Buch., and other neighbouring species of the same subgenus. Fig. 4, plate 56, represents the same organ in several of the smaller *Schisturæ*, in which it is also placed over the entrance of the œsophagus, and in both cases probably answers the purpose of the branchial or pharyngeal teeth in the *Pæonominæ*, especially as the external surface of the bony crust which surrounds the air-vessel is, as represented in the figures, studded with minute spines.

from a suborbitar sinus analogous to the suborbitar sinus in Antelopes, the use of which in them is conjectural. The horn, which is concealed in this sinus in the Loaches, appears to be equivalent to the suborbitar chain in the Perch, and to the corresponding plates in the ordinary *Cyprinidæ*; it is somewhat flattened or palmated, as in many of the Deer tribe, ending in a sharp point which is directed forward: on the anterior margin, and near the base of the horn, a strong antler is given off; this is also very sharp, and turned forward like the point of the horn itself.

49. I have shown that *Cyprinidæ* is a natural group, that it is circular* in its affinities; that, for instance, in setting out

* "They might as well be called oval or square." "Why not linear?" The researches of zoologists during the last twenty years have fortunately left me nothing original to say in reply to this criticism, which perhaps deserves notice as coming from a member of the committee of papers, Mr. C——. Speaking of describing natural objects in the order in which they succeed each other in nature, Cuvier and Valenciennes observe, "He alone could build up such a pretension who would attempt to place animated nature on a single line, a project which we have long since renounced as one of the most false that could be entertained in natural history."—*Histoire Naturelle des Poissons.*

On the same subject another authority observes:—"The day is now happily gone past when zoologists thought that the infinite variety of animals which inhabit this globe owed their origin to the unsuccessful efforts of nature before she could attain the human structure as her term of perfection."—*MacLeay, Linn. Transac.*

"As to the rule of natural progression, is it linear? The idea of a simple scale in nature had long been discussed and finally abandoned."—*Swainson's Discourse on the Study of Natural History.*

As all natural objects have three relations of affinity, it is clear the chain that connects them cannot be straight, and not being straight, the next simplest form is circular; but there is no objection to the progression of affinities being square or oval, provided they can be proved to be so; it is less the form than the circumstance of the opposite extremes of a natural series meeting that is insisted on.

Some notion of circular affinities appears to have existed from an early date. Hermann, in his 'Tabula Affinitatum Animalium,' published in 1783, as Mr. MacLeay points out, refers to an earlier writer, who like himself seems to have had a glimpse of the same truth ('Linn. Transac.', vol. xiv. p. 49). M. Lamarck detected the existence of a double series, which setting out in opposite directions from a given point, met together in another. Unacquainted with the result to which Lamarck had been led, Prof. Fischer, in 1808, perceived a tendency in the series of affinities to form a circle; but these obscure intimations were first established by analyses in the 'Horæ Entomologicæ' of Mr. MacLeay, published in 1819. Since then Mr. Vigors submitted a general analysis of the whole class of birds to the Linnæan Society, in all the groups of which he found the affinities to confirm what had been observed by Mr. MacLeay during his examination of insects, as well as the views contained in a subsequent publication recorded in the 'Linnæan Transactions,' in which the same principles were applied by Mr. MacLeay to the whole animal kingdom. The birds of New Holland were subsequently examined by Messrs. Vigors and Horsfield with the same result (vide 'Lin-

from the Gonorhynchs, we pass through a succession of species connected together by direct relations, and after arriving at an opposite point (*Opsarius*), at which the forms, habits, and structure differ totally from those with which we set out, we are led back again through a succession of different forms from those through which we passed at first, to the point from which we started.

It has resulted from Mr. MacLeay's views applied to the analyses of the classes of birds, quadrupeds, and insects, that "the contents of such a circular group are symbolically (or analogically) represented by the contents of all other circles in the animal kingdom;" but as such analyses have not yet been carried through fishes and reptiles, the conclusion just quoted has been submitted rather as a proposition by the distinguished author of the 'Geography and Classification of Animals,' whose next proposition is, "That the primary divisions of every group are characterized by definite peculiarities of form, structure and œconomy; which, under diversified modifications, are uniform throughout the animal kingdom, and are therefore to be regarded as the *primary types of nature*." I shall now merely copy from the work referred to one of the tabular views of the parallel relations of well-known groups of Mammalia and birds, adding in the first column what appears,

næan Transactions,' vol. xvi.), and the whole of these observations have since been confirmed and their results more fully made out by Mr. Swainson, who also has extended his views to the Mammalia. About the same period with the publication of the 'Horæ Entomologicæ,' the progression of affinities began to acquire additional interest among botanists. M. Agardh and M. DeCandolle both published their views on the subject, the first in his 'Botanical Aphorisms,' and the second in the 'Mémoires du Muséum;' when, without knowing what had been done by Mr. MacLeay, Mr. Fries announced the same results in the Fungi, attained by a different form of analysis. Similar views have since been more extensively applied to plants by Professor Lindley, in the last edition of his 'Introduction to the Natural System.'

Writers on natural history in the present day may be divided into three classes; first, those who recognise no rules but such as appear to be laws of nature, and taking nature as their guide, form their views according to the result of observations which are not confined to external characters, but embrace all that concerns natural objects. The second class consists of naturalists who pursue the easier course of following authorities, but their works consist chiefly of technicalities derived from external characters indiscriminately applied to genera and species; their higher groups are consequently constructed according to rule rather than nature. The third class comprises describers of species, whose books are only remarkable for their size and expense. Nor can I altogether overlook upon this occasion another class of persons, who, though they are not naturalists, and scarcely even allow us to call them writers, yet exercise but too often an influence in societies detrimental to the objects of such institutions and the real advancement of science.

from my analysis of Indian *Cyprinidæ*, to be equivalent groups, and thus show at once how far this family of fishes is calculated to exemplify the great leading principles of analogy discovered by Mr. MacLeay.

Fam. of Cyprinidæ.	Analogical Characters.	Orders of the Mammalia.	Orders of Birds.	Tribes of Insessores.
	Typical.			
Pæonominæ	Pre-eminent in their powers of prehension, and in general organization; claws, spines or nails not acute.	Quadrumanæ.	Insessores.	Conirostres.
	Subtypical.			
Sarcoborinæ	Rapacious, feeding upon live animals; claws or other organs of torture acute.	Feræ	Raptores.	Dentirostres.
	Aberrant.			
	Natatorial.			
Platycara and Pœcilianæ .	Head or rostrum flat and large; anterior extremities more developed in proportion than the posterior—habits carnivorous.	Cetacea	Natatores.	Fissirostres.
	Suctorial.			
Psilorhynchus.	Size diminutive; upper jaw, mandible or snout prolonged; run, fly, or swim very fast.	Glires	Grallatores.	Tenuirostres.
	Rasorial.			
Cobitinæ	Head ornamented either with horns or soft appendages—habits granivorous or herbivorous.	Ungulata	Rasores.	Scansores.

50. It would be too much to expect from the materials of one zoological province to demonstrate satisfactorily all the properties of natural groups in the minor divisions of this family. That its typical and subtypical groups are circular is plain enough, from the diminution in the length of the intestinal canal we experience in passing from the Cirrhins to the Barbels; and again, from the Barbels through the Gonorhynchs to the Gudgeons that canal becomes longer, indicating an union between the latter and the group from which we set out.

The same thing is observed in passing from the Systoms through the Opsarions, Perilamps and Leuciscs; a tendency

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tions of the two groups cannot be made out. The only Indian Bream I am acquainted with (*Cyp. cotis*, Buch.) has the character of the Perilamps both in the form of its mouth and length of its alimentary canal; while, on the other hand, the old genus *Leuciscus* is not a natural group, some of the European species, as *Cyprinus cultratus*, being doubtless an *Opsarius**, while others are certainly herbivorous†, and might perhaps be referred to the Gudgeons; but until all these points be settled, it would be idle to dwell further on the parallel relations between the typical and subtypical groups.

52. *Cyprinidæ*, of all fishes of equal importance, are those that appear to have occupied least the attention of naturalists; a circumstance the more curious, as, in consequence of their being peculiar to fresh waters, they are more universally distributed in the interior of continents, where they ought to be more familiar and useful to man than any other family of the same class.

Regarding their distribution, little has hitherto been made known. It would not appear that there is any one species common to Europe and America; it is not however to be supposed that we are yet prepared to form an accurate comparison between the *Cyprinidæ* of the Old and New Worlds, since the majority of species in either seems as yet to be but ill defined. Nor is it to be supposed that ichthyology has yet been prosecuted in America to an extent at all likely to make us acquainted with the numerous species that must inhabit the extensive lakes and rivers of that continent. Of African species, few only are referred to by Cuvier, while the Nile is known to present some species that are not found in the south of Europe. The Chinese species may yet be said to be almost unknown, with the exception of a few determined by Cuvier from the very doubtful data afforded by paintings; although it is seldom that so favourable an opportunity is afforded for collecting information on any branch of natural history as that which the British embassies in China possessed for investigating the peculiarities of the freshwater fishes of that empire, from the length of time they passed in boats on some of the principal rivers. Nor is anything what-

* *Leuciscus cæruleus*, Yarrell, and *L. erythrophthalmus*, Cuv., appear to be Perilamps; *L. doubla*, *L. Lancastriensis*, Yarr., and *L. alburnus* are also insectivorous. I have mentioned this in a letter to Mr. Swainson in October last, and I have no doubt the hint will be sufficient to direct the attention of this philosophical naturalist to an examination of the whole of the English species.

† *Leuciscus vulgaris*, *L. idus* and *L. rutilus* are probably herbivorous, and, according to the length of their intestine, may either be added to one or other of the groups here indicated.

ever known, as far as I am aware, of the existence of Cyprins in New Holland, or any of the Polynesian Islands*. In India the fishes of several of the great rivers yet remain to be investigated, as those of the Irrawaddi, the Indus, and the Nerbudda. A collection of drawings of the fishes of the Indus, prepared during a scientific mission under Capt. Burnes, has recently been deposited in the museum of the Asiatic Society; and Mr. Griffith, to whom every branch of science is as dear

* This and other blanks in our knowledge of the animals of New Holland are now about to be supplied by Mr. MacLeay himself, who, in August last, embarked with the intention of pursuing researches in every department of the natural history of New Holland. On his departure from England, Mr. MacLeay intimated his desire to receive at Sydney, where he may remain for three or four years, insects, crustacea, and other neglected objects of a similar nature from India, in exchange for the productions of New South Wales, which he would be happy to supply. Few who entertain a just pride for the scientific character of our country, which Mr. MacLeay has been the means of elevating, would require the stipulation proposed to induce them to forward the views of one of our countrymen who has already been the means of exalting zoological pursuits to the highest place among intellectual occupations. Considering the intimate intercourse now established between Calcutta and Sydney, it is to be hoped that an appeal to India from such a quarter will not have been made in vain, and that all who are interested in the advancement of natural history will collect and forward whatever objects their particular localities may afford, with a view to facilitate the researches of the illustrious author of 'Horæ Entomologicæ.' Mr. MacLeay writes from London, 12th August 1838: "I am now on the eve of embarking for Sydney, where I intend to remain for the next three or four years; and what I would ask of you is, to exchange invertebrated animals, collected in India, as the Annelida, Annulosa, Cirripedes, Radiata, and Acrita, for other objects collected in New Holland; insects, spiders, and crustacea of India I at present desire above all, and shall feel obliged by any notes on their metamorphosis or œconomy. With regard to such notes, I need not say I shall bear in mind the axiom '*Suum cuique*.' If you will point out your particular *desiderata* in natural history, I will endeavour to add to your collections."

Mr. Swainson also writes as follows:—"At present I am engaged in ichthyological volumes, but as these will be published before you would have time to render me any assistance, I will rather entreat your aid in the class of Insects, which will next succeed in the 'Cabinet of Natural History.' My cabinet is remarkably deficient in the entomology of India, particularly among the smaller and less showy species. The best way of preserving beetles or coleopterous insects, as well as spiders, is by putting them into spirits; all other insects should be stuck upon cork. Common bazaar spirits answers the purpose of preserving insects very well, if it be strong enough to burn, which it would be well to try always before trusting to it; and instead of cork, remarkably light and convenient trays may be made of a common species of *Æschynomene*, called in Bengal *Sola*, and may be made so that a number of them fit into a box. The paste with which the *Sola* is fastened might be poisoned, and a little camphor rolled up in thin paper placed in each tray as a security against ants. I shall be happy to afford my aid to any friends of science in India, by forwarding any collections that may be entrusted to me for the eminent persons who have applied to us."

as the one in which he is fast rising to the highest station, is now engaged in making extensive collections of, and observations on, the fishes of the same river. The museums of Paris must already be well stored with Indian species collected by Messrs. Duvaucel, Jaquemont, and DeLessert, but I doubt if any of our British museums contain many of the commonest species of the Ganges.

Natural history is now assuming a station so important in the highest scale of intellectual pursuits, that any remarks at all calculated to impress on the minds of those who are connected with missions into new countries a lively sense of the interest that attaches to its most minute details, will not, we may be assured, be taken amiss. Information, however carefully collected on such occasions as those referred to, becomes comparatively useless when unaccompanied with specimens of the things to which it relates. We should ever recollect, that the easiest and best way to promote our own fame, and contribute at the same time to the advancement of natural history, is by making collections; nor are we without examples of the highest awards having been, though somewhat prematurely, conceded to collectors. Nevertheless, to render collections of the highest degree of real value in the present advanced state of science, those who make them should gather at the same time as much information as possible regarding the circumstances under which the various objects comprised in them live or occur; and it is in this that the intelligence of the naturalist may be best and most profitably displayed during his journeys in new countries.

53. The following tabular view of the distribution of *Cyprinidæ*, though avowedly imperfect, will serve to show how the leading groups are generally dispersed. Cirrhins, for instance, appear to be peculiar to India, or at least to the tropical parts of Asia, and the Catastoms to America; while both are represented in Europe by the true Carps. From the number of Gangetic species, the Barbels, like the Cirrhins, would seem to have their metropolis in India, from whence the genus is extended over the Caspian Sea and the Nile into Europe.

The Gonorhynchs would also seem, as a group, to be natives of the East, one species only having been found in South Africa, none in Europe, and eleven in India.

The greater part of the *Sarcoborinæ* are probably also Eastern fishes, with the exception of the Breams and Leuciscs, although some of the European forms set down under the latter genera may be found to belong either to the Perilamps or Opsarions.

The small subgenera of *Pœcilia* appear to be equally distri-

species in favour of India is so remarkable, that it is only by extending our consideration to other genera of the order *Malacopterygii abdominales*, that we find the equilibrium restored in the distribution of freshwater fishes. Thus the *Salmonidæ*, which form a large proportion of that order in the rivers of both Europe and America, are in India quite unknown; not one species of that extensive family having yet been found in this country, where the blank appears to be filled up by the excessive development of the *Cyprinidæ*.

54. One species of Tench*, four Leuciscs†, and one Gudgeon‡, are enumerated among the fossils of Œningen by M. Agassiz, who also describes two new genera§, *Rhodeus* and *Apius*, nearly allied to, but distinct from, the Perilamps and Systoms. They are distinct from the first by the dorsal and ventral margins being equally arched, and the caudal and anal fins being less developed; and from the second, by the absence of spines in either of the latter fins: both belong however to *Sarcoborinæ*, and will serve to render that group far more complete than it appeared to me to be before I saw M. Agassiz's splendid work. Two fossil species of *Cobitinæ* are also found in the same locality; one of these, *C. cephalotus*, Agass., belongs to *Schistura*. The marlstone in which these remains are found is justly considered by M. Agassiz to be a lacustrine deposit, and supposed to be coeval with the molasse of Switzerland and the sandstone of Fontainbleau, and consequently to correspond with the miocene or early tertiary period.

55. That the external covering of animals indicates the medium in which they live, we know by the hairy coat of the Mammalia, the feathers of birds, and the scales of fishes and Amphibia; nevertheless there are several families of fishes without scales, and many terrestrial Mammalia that are supplied with them instead of hair. In the naked fishes the body is defended by a copious oily mucus, which saves it no less effectually than scales from the abrasive influence of the dense medium through which they are destined to move; while their habits and form render the necessity for a scaly armour less essential to their safety, being capable of concealing themselves from enemies in sand and mud, as the

* *Tinca leptosoma*, Agass., 'Recherches sur les Poissons Fossiles,' vol. v. t. 51.

† *Leuciscus papyraceus*, Agass., vol. v. t. 36; *L. leptus*, Agass., vol. v. t. 57; *L. pusillus*, id. l. c.; *L. Œningensis*, id. and *L. heterurus*, id. l. c.

‡ *Gobio analis*, Agass., t. 57.

§ *Rhodeus elongatus*, Agass., t. 54, and *R. latior*, id. l. c. Of the genus *Apius*, M. Agassiz describes *A. gracilis* and *A. Brongniarti*, vol. v. t. 55; but the latter, as well as *Leuciscus papyraceus*, are from the lignites of Ménat.

Rays (*Raia*) and Eels (*Muræna*), or are of such a formidable character as to render any security against the injuries of their class unnecessary; such are the *Squalidæ* or Sharks, which may be said to be predominant among the fishes of the ocean, and the *Siluridæ*, which maintain a corresponding place in freshwater lakes and rivers. Notwithstanding this diversity, M. Agassiz has turned the external covering of fishes to a happy account in the study of fossil species, of which the scales alone are often the only vestiges that remain; thus a knowledge of eight hundred extinct species has been attained that could not have been characterized by ordinary means. Although the researches of M. Agassiz have added largely to the science of zoology, they have done still more if possible for geology, by "introducing a new element" into our calculations*; no one however is more aware than M. Agassiz himself, of the error into which some are led in supposing the lepidermal system to be based on principles that are in any way at variance with the natural classification of animals. By that system M. Agassiz has extended our knowledge of the natural characters of species, and introduced to the calculations of the zoologist as well as geologist a new element by which we must be guided in the study of fossil fishes, rather than a principle opposed to the classification of these or other animals according to their structure and habits.

XXV.—*Insectorum novorum Centuria, auctore* J. O. Westwood, F.L.S., &c.

Decadis secundæ, ex ordine Coleopterorum, Synopsis.

1. Cicindela *cupreola*, W. C. nigro-cuprea, purpurascenti tincta, sericans, capite magno, inter oculos striatulo; prothorace subcylindrico lateribus vix rotundatis, anticè et posticè parum constricto, elytris concoloribus immaculatis subvariolosis, punctis nonnullis majoribus aureis, lateribus nitidis, lineaque obliqua mediana in singulo quasi elevata et magis cuprea; pedibus fuscis, femoribus articuloque 1^mo^ antennarum luteis, labro ♂ inermi, ♀ tridenticulato. Long. corp. lin. 4. Habitat in insula Mauritii, D. Desjardin. Mus. Westw.

2. Cicindela (*Megalomma*, W. S. g. nov. Caput maximum, oculis valdè prominentibus. Labrum magnum, anticè integrum. Mandibulæ dentibus duobus inter apicem et dentem magnum basalem. Palpi labiales articulo penultimo valdè inflato. Antennæ et pedes longissimi. Prothorax capite multo angustior subglobosus, anticè et posticè constrictus. Elytra subbrevia. Tarsi

* Dr. Buckland's Bridgewater Treatise, p. 270.

antici ♂ articulis 3^bus basalibus subtus setis clavatis obsitis.) *C.* (*M.*) *vigilans*, W. Nigro-ænea ; capite inter oculos purpurascenti longitudinaliter striatulo, prothorace nitido æneo, annulo postico et elytrorum basi subaureis, elytris obscuris punctatis posticè magis æneis, antennarum articulo 1^mo, supra et subtus albido, palpis albidis articulo ultimo nigro, pedibus fuscis, femoribus ad basin coxis mandibulisque albidis, harum dentibus piceo-nigris. Long. corp. lin. 4. Habitat in insulâ Mauritii, D. Desjardin. Mus. Westw.

Obs. *C. viridula*, Quens., Sch. 1. 243, ex India orientali valdè affinis : differt imprimis tibiis tarsisque luteis.

3. Goliathus (*Eudicellus*) *ignitus*, W. Viridi-cupreo micans; capite ♂ tricorni, cornu medio capite plus duplo longiori, porrecto recurvo bifido luteo-brunneo, ramis divergentibus apice tuberculatis, elytris concoloribus immaculatis, tibiis castaneis, tarsis antennisque nigris. Long. corp. (corn. capit. excl.) lin. $17\frac{1}{2}$. Lat. ad basin elytr. lin. 8. Habitat Gold Coast, Africa occid. Mus. Raddon.

4. Goliathus (*Eudicellus*) *auratus*, W. Læte viridi-aureus; antennis et clypei marginibus nigris; hujus margine antico ♀ subrecto; elytris maculis duabus parvis triangularibus humeralibus alterisque duabus apicalibus nigris ; marginibus fulvo-aureis, tibiis tarsisque aureo-viridibus. Long. corp. lin. $16\frac{3}{4}$. Lat. ad basin elytr. lin. 8. Habitat Cammaroons River, Africa occid. Mus. Turner.

5. Goliathus (*Eudicellus*) *frontalis*, W. Læte viridis, subaureo nitens; capite ♂ tricorni, cornu medio fulvo, capite paullo longiori, basi crasso ante medium in ramos duos subparallelos lateribus serrulatis apiceque recurvis, diviso elytris flavo-circumdatis, maculisque duabus humeralibus alterisque duabus apicalibus nigris; clava antennarum fulva, ♀ clypeo antice ferè recto fulvo. Long. corp. ♂ (corn. cap. excl.) lin. 17, ♀ lin. 16. Habitat Gold Coast, Africa occid. Mus. Turner.

6. Parastasia, W. (gen. nov. Asiaticum ! Rutelidarum). Corpus breve crassum valdè gibbosum ; clypeo bifido mandibulisque angulo supero in dentem porrectum abienti ; maxillæ dentibus acutis armatæ ; tibiæ anticæ 3-dentatæ, dentibus 2^bus basalibus inter se approximatis, apicali remoto ; unguibus inequalibus, uno bifido.—*P. canaliculata*, W. P. nigra nitida, elytris fulvo-variegatis, plagis duabus elevatis obliquis utrinque (canali divisis) versus scutellum positis. Long. corp. lin. $9\frac{1}{2}$. Habitat in insulis Philippinarum, D. Cuming. Mus. Hope.

7. Alurnus, Fabr. ; *A. Cassideus*, W. Niger, pronoto utrinque luteo setoso, elytris ferè cordiformibus parum convexis luteo-fulvis, margine tenui nigro, plaga maxima triangulari e basi ad medium extensa et cum fascia transversa (posticè 4-furcata), media, connexa. Long. corp. lin. 12. Habitat in Mexico. Mus. Melly.

8. Cassida (*Calaspidea*, Hope); *C. Alurna*, W. Nigra, pronoto in medio

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however that that name has never been given by that author to any genus of insects, but was adopted by him by mistake —he supposing that certain *Carabidæ* of South America belonged to the genus *Cnemacanthus*, founded by Mr. G. Gray upon an insect which proves to be a native of Australia, which insect had previously received the generic name *Promecoderus* by Dejean. But in the notice in the 'Revue,' before mentioned, M. Guérin seems to think I may be excused, "ne sachant pas que le *Cnemacanthus* figuré par M. Gray était un vrai *Promecoderus**." Now I will venture to assert that the author of those remarks learnt those very facts from my paper, for they were there pointed out for the first time; and in the 'Magazine de Zoologie' he describes several species of *Odontoscelis* as members of Mr. Gray's genus *Cnemacanthus*. To make the matter more clear, I may mention that, according to the views of Dejean and Brullé, the genus *Cnemacanthus* or *Promecoderus* (these being synonymous) belongs to the family *Harpalidæ*, having the intermediate as well as the anterior tarsi dilated, and the genus *Odontoscelis* belongs to the family *Feronidæ*.

We will call the first of these genera A, and the second B. In 1829, Dejean names the genus A, *Promecoderus*, and in 1832 Gray names the same genus *Cnemacanthus*. In 1835 Brullé uses the name *Cnemacanthus* (quoting Gray as his authority for that name) for the genus B; and in 1838 Guérin follows Brullé in using the name *Cnemacanthus* (also quoting Gray as his authority for the name) for genus B, neither of these entomologists being aware that the insects they described belonged to a different section to that described by Gray under the name *Cnemacanthus*, though they might have suspected as much from the difference of habitat given.

In 1838 (published in 1839) genus B receives a name for the first time, viz. *Odontoscelis*†.

* To show how ignorant I was of this fact, I will quote two passages from my paper—"*Cnemacanthus* of Gray (which is the *Promecoderus* of Dejean)." Again, "*Cnemacanthus gibbosus* of Gray appears to me to be the *Promecoderus brunnipes* of Dejean, which is from Van Diemen's Land, and perhaps from some other parts of Australia, and not from Africa, as has been stated. The genus *Cnemacanthus* of Guérin and Brullé, being synonymous with Mr. Curtis's genus *Odontoscelis*, the species of which are from South America, must not be confounded with *Cnemacanthus* of Gray."

† I was not aware, when my first paper was written, that the name *Odontoscelis* had been previously used for a genus of Hemipterous insects (not that this in any way affects the question at issue); this fact I however soon afterwards had pointed out to me by Mr. White, and in my next paper I called Mr. Curtis's attention to it, and begged of him to propose some other name in its stead. To this request Mr. Curtis paid no attention; I shall therefore propose that the name *Scaritidea* be used to designate the

In 1840, Mr. Waterhouse having some new species of genus B to describe, characterized them under the name *Odontoscelis*, and did not call those insects *Cnemacanthus* simply because they did not belong to that group.

In 1841 Mr. Waterhouse is accused of partiality for his own countrymen's names, in adopting the term *Odontoscelis* instead of *Cnemacanthus* (a practice allowed to be of most pernicious consequences to the science); but *both* of these names being given by his own countrymen, the accusation is absurd.

Yours, &c.

G. R. Waterhouse.

XXVII.—*On the Eel, and on the Freshwater Fish of Austria.* By Capt. S. E. Widdrington*, R.N.

On the Eel.

In his account of this genus, Mr. Yarrell quotes a writer who appears to have paid some attention to the subject, and who states that its susceptibility of cold prevents its inhabiting various northern rivers, amongst others the Danube. Notwithstanding this high authority, being aware of the habits of the fish of burying itself in the mud during the winter, I confess I was not quite satisfied with this theory, and considered that if they were wanting in the Danube, some other cause must be found than the one assigned.

During a recent tour in Germany I was surprised to see eels put upon the table at Wurtzburg, which is high up the Mayn, and in a very cold country, during winter. I was subsequently informed that they are abundant at Hanau, lower down the same river, the waters of which must be at least as cold as those of the Danube.

On arriving at Vienna I mentioned the circumstance to Professor Heckel, who has charge of the ichthyological department, who informed me that great numbers were brought to Vienna from Ulm, which is high up the river, but that they had never been seen lower down. Subsequent inquiry, and having ascertained the very great pains which have been taken in investigating the natural history of the river, satisfied me that this account was true, and that it is next to impossible they should not have been detected had they frequented the Lower Danube.

genus of which I published a monograph, under the name *Odontoscelis*—unless M. Guérin is willing to use his sectional name *Cnemalobus* in a generic sense for the same group.

* Late Cook. Read in the Section of Zoology and Botany at the meeting of the British Association, Plymouth, and communicated by the Author.

The fish-market at Vienna is held on the river, well-boats being moored to the shore, whence the inhabitants of that luxurious capital are supplied with the most delicious fish brought from all sides. These people informed me that they drew part of their supplies of eels from Ulm, but that the greater part came from Bohemia, consequently from the head waters of the Elbe, which ought to be a still colder river than either the Rhine or Danube! This winter the thermometer was at 19° at Vienna, whilst at Dresden I was told it fell to 24° Reaumur.

Now, assuming the case to be as I have stated, that the habitat of the genus is confined to the upper streams of the Danube, we have the fact, that migration is not necessary to them*, although it is certainly their habit in this country. It must be remembered that Ulm is in a very cold country, being considerably higher than Vienna. There can be little doubt that the eels there hybernate in the mud. But why do they not remove to the more genial region, and to the admirable locality of the delta of that great river? The reason I take to be the following: the waters of the Danube may be divided into three classes; first, those of the Black Forest and that vicinity, and those which fall into the river from the left, towards Bohemia. These waters are more or less rich and fat, and of the description which afford the most abundant nutriment to fish, especially of the genus we have under consideration. Below Ulm, however, a change soon becomes visible; the great tributaries from the Alps begin to pour in, and soon alter the character of the water. These Alpine streams may be divided into two classes, those which proceed at once from the glaciers and the upper valleys, without meeting with large lakes to filter and purify them, like the Rhine, Rhone, and some others: these waters are charged with the comminuted particles of the rocks they have passed over, and are not only rapid, but have a peculiar strength and rawness, which I consider, combined with the want of food, renders them uninhabitable by the eel and by many other sorts of fish; even the trout are scarce and of bad quality which are taken from them, and the only good trout in the Alps are those from the lakes or the streams of the plains, where better nourishment is afforded to them. The second class of Alpine waters are those which have passed through and been purified by the lakes, from which they issue clear, softer and warmer than those we have mentioned. Even these rivers are not favourable to the propagation of fish in general, and I was sur-

* A paper by Chr. Drewsen, on the Migration of Young Eels, is to be found in Kröyer's Tidskrift, vol. i.

made out, all different from the *Acipenser*, that of the North Sea, and that last year a new genus was discovered in Dalmatia. In fact, the extent of the rivers and lakes, and the variety of climates and situation in the Austrian monarchy, probably make it the richest country in freshwater ichthyology in Europe. Nearly one hundred species have been made out, and are on the point of being made known to the public, by M. Heckel, to whose zeal and intelligence the science will be deeply indebted. The genera and species which have not been figured elsewhere are given with a degree of accuracy which it is impossible to excel, and which will form an epoch in designing.

The figures are drawn by a sort of pantograph, of M. Heckel's own invention, which performs its office with a minute precision I believe hitherto unknown, especially for the details of the scales. The more common species are given simply in outline, and the work, which is far advanced, is of extraordinary low price.

XXVIII.—*Information respecting Zoological and Botanical Travellers.*

PRIVATE letters from Demerara, of date 18th of August, inform us of the return of Mr. Schomburgk in safety from his first expedition. That gentleman writes, "The object of my last journey was to mark the boundary between British and Venezuelan Guiana, and in this object I have succeeded; but with regard to scientific researches, very little has been done. We had the most unfavourable weather; rain every day, and the rivers having inundated their banks contributed to our ill success. My brother is just about to despatch to Berlin such collections as he has made, viz. 220 species of birds, 800 insects, and 288 species of plants, with about 200 different objects in spirits."

"I procured" (he continues) "today a skin of that scarce animal the Black Tiger, *Felis nigra*; it is unfortunately much mutilated by the Indian who shot it, the tail and legs being cut off; bad as it is, it is another proof of the existence of that animal, of which we possess such uncertain knowledge. The skin measures from the nose to the insertion of the tail 4 feet 5 inches; at first sight the colour appears a glossy black; but on inspecting it closer, it will be observed that the ground-colour is a dark brown, covered with a number of spots of a shining jet, which are closer to each other than I have observed in any of the American *Felinæ*. These dark spots, which are of a less size than a shilling, extend still closer from the eyes to the region of the shoulders. On the abdomen and interior of the thighs the colour is lighter, and a slight admixture of strong white hairs is observed. To judge from the length of the skin, the animal it came from must have been approaching in size the greater Jaguar. I have

a skin of the latter before me, which measures from the nose to the tail 4 feet 5 inches, the width of the skin being 2 feet 8 inches; while that of the Black Tiger, which is half an inch less in size, measures in width 2 feet 10¼ inches. This may arise from the skin being more stretched; it proves nevertheless the strong make of the animal. I do not observe the tawny spot above each eye mentioned in my description of a skin from a similar animal given in the 'Annals' (iv. p. 325); this spot may vanish with the more advanced age of the animal."

The next journey which our traveller, at the date of his letters, was about to undertake, would last for a period of from eighteen months to two years, the expedition proposing to winter at Pirara.

Mr. Forbes.—Letters received from Mr. Forbes, dated Paros, Sept. 26th, inform us that he is successfully prosecuting his investigations among the Greek islands.

BIBLIOGRAPHICAL NOTICES.

A Manual of the British Algæ. By William Henry Harvey, Esq. London, 1841. 8vo. Van Voorst.

We hail with pleasure another of Mr. Van Voorst's excellent publications on natural history—A 'Manual of the British Algæ,' by Mr. Harvey. The author remarks in the Introduction, p. 53,

"The want of a work in the English language, entirely devoted to the British Algæ, in which fuller descriptions should be given than the scope of Hooker's 'British Flora' admitted of, and in which all the known species should be included, has long been felt by lovers of this branch of botany. Had my friend Dr. Greville completed, as was once his intention, his admirable 'Algæ Britannicæ,' no room would have been left for my humble labours, nor should I for a moment wish to take the subject out of such able hands. But his work unfortunately stopped short with the '*inarticulate*' tribes, nor has he at present any intention of resuming it. The task has consequently fallen on my shoulders, and my object will be gained and my ambition fully satisfied, if, in the following pages, I have succeeded in affording any assistance to the researches of my fellow-students. I could have wished, and indeed had intended, that the work should be illustrated with figures, at least of the genera; but my limited stay in Europe did not afford time to prepare them, and it does not now appear desirable to delay the publication till they could be got ready. However they might have added to the beauty of the book, the student will experience little loss by their omission who takes this Manual for what I wish it to be, a companion to the 'Algæ Damnonienses, *published and sold by Mary Wyatt, dealer in shells, Torquay*;' a most important work, now extending to four volumes, with a Supplement, composed of *specimens* of 234 species, beautifully dried and correctly named. These volumes furnish the student with a help, such as no figures, however correctly executed, can at all equal—Nature's own pencil illustrating herself."

Mr. Harvey's Manual is got up in the style and typography of the 'English Flora' of Sir J. E. Smith, and will range with it as a supplementary volume.

That a work such as the one now before us, embodying all the species added to our catalogue since the publication of the 2nd vol.

of the 'British Flora' (or 'English Flora,' vol. v. part 1.), the 'Flora Hibernica,' and Berkeley's 'Gleanings of British Algæ,' was very much required, will at once be evident when we enumerate the great accessions made to this most attractive department of our native botany. These are really most surprising, when it is considered that the works just named have all been published within the last very few years.

We have in this Manual thirty species described for the first time —these are, three *Ectocarpi*, a second species of *Myriotrichia*, a *Nitophyllum*, a *Polysiphonia*, a *Ceramium*, four *Confervæ*, a *Scytonema*, a *Calothrix*, three *Palmellæ*, a *Nostoc*, a *Meloseira*, a *Styllaria*, a *Gomphonema*, seven *Schizonemæ*, and three *Cymbellæ*.

Eleven species before known only as foreign, and belonging to as many genera, are for the first time added to the British flora,— they are *Laminaria fascia*, Ag., *Mesogloia moniliformis*, Griff. (*M. attenuata*, Ag.), *Polysiphonia formosa*, Suhr., *Callithamnion barbatum*, Ag., *Thorea ramosissima*, Bory., *Conferva refracta*, Ag., *Hydrurus Ducluzelii*, Ag., *Hygrocrocis Rosæ*, Ag., *Meloseira varians*, Ag.?, *Styllaria bidentata*, Ag., and *Schizonema ramosissimum*, Ag. Ten species, announced in different scientific periodicals since the publication of the three works just alluded to, here for the first time, in a consecutive work on the British Algæ, fall into the ranks in systematic order. The genera *Thorea* and *Hydrurus* are published for the first time as British, whilst *Aphanizomenon* and *Anabaina* make their earliest appearance in a systematic work upon our Algæ. A new genus which he calls *Eutomia* is proposed by the author for the *Echinella rotata*, Grev., and *Ech. oblonga*, Grev.; and he proposes to substitute *Helminthocladia* for *Trichocladia* of the 'Flora Hibernica,' in consequence of the latter so nearly approaching *Trichocladus* in sound. The much-disputed plant lastly named *Delesseria alata*, var. *β. angustissima* ('Brit. Fl.' vol. ii. p. 286), is raised to the rank of a *species* by the name of *Gelidium? rostratum*, but it still remains a desideratum to what genus it belongs!

What will perhaps be almost equally interesting to many of the lovers of this delightful portion of our flora, will be found in Mr. Harvey's volume in the additional localities enumerated for species with which they have already become familiar; and here we particularly mark the progress that has been made since the excellent introduction to Greville's 'Algæ Britannicæ' appeared—genera and species there particularized as known only to the British Islands, from being found on the southern shores of England, being now ascertained to range to the northern coasts of Ireland.

We are greatly pleased with the comprehensive manner, the entireness with which the general subject of Algæ is brought before us in the Introduction. This extends to fifty-seven pages, and affords a most gratifying illustration of the addition made to our knowledge as the stream of time rolls on. Already in our language have Dr. Neill in his Encyclopædia article on Fuci, and Dr. Greville in the introduction to his 'Algæ Britannicæ,' treated admirably of the general subject; but here we have it brought down to the present period, and by a botanist, than whom perhaps no one living is

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localities noted for *F. Mackayi*, an equally anomalous state of that plant (at least, as we considered), when it appeared growing in dense round balls of various size, but generally such as could be spanned by the hands—the fronds were extremely narrow, vesicles generally, and receptacles entirely wanting.

At p. 44 (Introduction) it is remarked, under the head of "*uses*" of Algæ, that—"On many of our coasts, as along the west coast of Ireland, the poorer classes are almost entirely dependent for the cultivation of their potatoes on the manure afforded by their rocky shores and frequent gales of wind." Of this we had a notable example when at the town of Galway some years ago. Turf-boats were discharging their cargoes of sea-weed (*Laminarieæ*) at the quay; and on inquiring whence it was brought, we learned, from Slyne Head, a place distant between fifty and sixty miles, and that some of the purchasers were, for the purpose of manure, about to convey it inland thirty miles!

At p. 36 the author observes, with reference to a passage extracted from the 'Algæ Britannicæ'—"Several of these [species], it is worthy of remarking, which are in England confined to the coasts of Devon and Cornwall, are found in Ireland along the shores of Clare and Galway, where the *Land Flora*, it will be remembered, contains several species otherwise peculiar to the South of Europe." There is, however, this important difference to be noted; that, while the *Land Flora* of the west of Ireland produces a few of the south European species which are not found elsewhere in the British Islands, and are their most northern stations, the *Marine Flora* has not presented us with any one of the southern plants which are not found upon other parts of the British shores. Mr. Harvey is silent upon one point which we could have wished he had adverted to, namely, the causes of the comparatively gigantic size that species attain in particular localities. At p. 41 it is remarked that—"The *Delesseriæ* appear in greatest perfection about 52° and 53°, those from the north of Ireland being much larger than individuals of the same species from the southern coasts of England." And again—"The *Nitophylla* are also chiefly northern, six being found in the Atlantic basin, and in greatest perfection on the north coast of Ireland." Now we cannot believe (and perhaps the author does not intend that we should) that the mere difference in latitude between the south of England and north of Ireland, or more strictly speaking, the county of Antrim, can so affect the size of these plants. We are instead rather disposed to attribute the magnitude which they attain in the latter locality, at least in part, to the limestone or chalk on which they grow, corroborative of which it may be mentioned, that on the different geological formation of the neighbouring coast of Down, the same species do not exceed one-third of the size. We have remarked too, though in a less degree, a difference of the same kind between the northern and southern shores of the Isle of Wight, the chalk of the latter producing examples of the same species incomparably finer and larger than the different formation of the other portion. The influence of different rocks upon Algæ, as affecting their distribution, growth,

&c., is a highly interesting inquiry, which has not yet met with the attention it deserves. It would be a pleasure to us to comment on many parts of Mr. Harvey's Introduction, but we must spare our readers, and refer them to what will be found much more to their taste—the book itself. Here they will find the subject amply discussed under the different heads—definition of Algæ; their colour and its characteristics; structure; propagation; geographical distribution; uses; the species resorted to for human food, for medicine, the fine arts, &c.

We have evidence of the care bestowed by the author upon the work, in now for the first time separating plants hitherto overlooked as identical, and again, bringing others together which had no claim to rank as distinct species. In both respects we are much gratified to find our own views very generally confirmed. We will look to some of these points. The second species of *Myriotrichia* we are pleased to see, having been long under the impression, (but without critical examination,) that the form now described as *M. filiformis* was distinct from *M. clavæformis*. *Nitophyllum punctatum* and *N. ocellatum* are judiciously brought together—in the same specimen we occasionally find both united. *Rhodomenia ciliata* and *R. jubata* run so into each other, that we are not satisfied of the propriety of keeping them distinct. The different seasons at which they are said to bear capsules—the former in winter, the latter in summer—*seems* a good reason for so considering them; but this is not a constant character, as we have found typical examples of *R. ciliata*, with fronds three-fourths of an inch in breadth, producing fruit plentifully throughout the month of August. These were procured on the southern coast of the Isle of Wight, where the species grows in remarkable luxuriance. *Rhodomenia sobolifera* we can hardly consider otherwise than a form of *R. palmata*: we have gathered it in profusion in two British localities, in one of which, both on stones, stems of *Laminariæ*, &c., it takes the place of the ordinary *R. palmata*, which is nowhere to be found. *Ceramium Agardhianum*, or rather *C. Deslongchampii* (see note to p. 100), now for the first time noticed in a British work, has always seemed to us so different from *C. diaphanum*, particularly that of 'English Botany,' that we kept them separated in our herbarium. Mr. Harvey believes them however not to be specifically distinct.

Need we dwell on the unparalleled advantages our "island home" presents for this attractive study, or observe, that whilst many of our flowering plants are unfortunately, when dried, but "mummies," as has been well observed, of their former selves, and generally in beauty yield to those of warmer climes, most of our Algæ retain in the Hortus Siccus their pristine loveliness, and in delicacy of form and splendour of colouring rival those of any country on the globe? Torn from their places of growth, and scattered abroad by the waves, they inspire

"A rapture on the loneliest shore."

But it is in their natural places of growth that they are especially to be admired. How beautiful to gaze upon the variety of foliage

waving in the basins of the rocky coast, when rendered approachable by the retiring tide! and here we shall occasionally perceive the fronds of the *Chondrus* tipped with a "paly flame" of bluish phosphoric light. A little deeper, we may sail over beds of *Cystoseira ericoides* clothed with iridescence so as strongly to resemble a tract of heath with its dew-drops presenting the hues of the rainbow at early sunrise. Still deeper appear the woods, as they may comparatively be called, of the *Laminariæ* with numerous fishes moving gracefully about, or quietly sheltering beneath their palm-like umbrage; whilst amid hosts of "creatures of the element," the beautiful sea-urchin conspicuously presents itself, moored to their stems or leaves. Even from their annihilation, from the smoke of the kelp-fire, the wild marine landscape occasionally derives its only image of softened beauty. Often on the lofty mountain's top, when enraptured with the majesty of nature, has the column of smoke, rising at a distance above the bleakest and least frequented shores, pointed out to us the presence of man and his labours, when none else was visible.

But it is not necessary to go to the sea for Algæ. In the freshwater and on the land—nay, within our houses—they are likewise to be found.

> "The stream that with a thousand crystal bubbles
> Bursts from the bosom of the desert rock
> In secret solitude,"

displays them on the first pebbles that it moistens; and in all our waters, from the petty drain to the expansive lake, do they occur, and many species are of considerable size and beauty. But the most minute sometimes enact the greatest part, as appears in former volumes of these 'Annals.' Glaslough (or Green-lake) in Ireland derives its name, according to Dr. Drummond, from a minute *Oscillatoria* that colours it*; and more recently Mr. Thompson has shown that an Alga belonging to a different tribe, and whose full length is but one-fortieth of an inch, is distributed in such quantity through a lake near Belfast, as to impart to the whole of its waters a dull green hue for a portion of every year†.

The reputation of Mr. Harvey as a botanist, and one who has especially studied the class of plants which forms the subject of the volume before us, is so high, that it would be quite supererogatory to dwell upon the excellent manner in which every part is executed. Again do we hail with sincere pleasure the appearance of this Manual, the first work which, containing full descriptions of every species, has been devoted solely to the British Algæ. A work upon our Mosses—'Muscologia Britannica'—reached a second edition long since: one treating of our Fungi has been some years in existence; and we hope, that at no very distant day, the volume at present under consideration will be followed by one illustrative of our native Lichens.

* Annals of Nat. Hist., vol. i. p. 1. † *Id.*, vol. v. p. 75.

Cuming, Esq., in the Philippine Islands. By G. R. Waterhouse, Esq., V.P.E.S.

Sp. 1. Pachyrhynchus venustus, W. *Niger, lævis; capite maculâ unicâ inter oculos, thorace maculis duabus suprà, maculâque unâ ad utrumque marginem, elytris viginti-duobus ovatis ornatis; his a squamis auratis, vel aureo-cupreis, effectis.*
Var. β. *differt elytris maculis octodecim ornatis.*
Var. γ. *differt elytris maculis sexdecim ornatis.* Long. corp. lin. $10\frac{1}{2}$;—$7\frac{3}{4}$.

Sp. 2. Pachyrhynchus gemmatus, W. *Niger vel cupreus, lævis; capite suprà maculis duabus, thorace suprà tribus, infrà duabus, et elytris sexdecim (duabus apud suturam) ornatis; his maculis a congerie squamarum metallicè splendentium effectis; squamis centralibus nitidè viridibus, circumgyrantibus aureo-rubris, et indè ocellos efficientibus.*
Var. β. *differt elytris maculis viginti-duobus ornatis.*

Sp. 3. Pachyrhynchus perpulcher, W. *Niger, lævis; thorace maculis (subocellatis) suprà quatuor, subtùs duabus, elytris octo-decim ornatis; his a squamis metallicè viridibus et cupreis effectis.*

Sp. 4. Pachyrhynchus Cumingii, W. *Splendidè cupreus; elytris levitèr punctato-striatis; rostro notâ transversâ basali, capite maculis oblongis* tribus, *harum unâ interoculari, unâ utrinque suboculari; thorace lineis marginalibus, et suprà lineis* tribus, *et unâ transversâ interruptâ, notato; elytris lineâ marginali, lineisque duabus longitudinalibus dorsalibus, necnon lineâ transversâ per medium excurrente, atque lineis duabus abbreviatis et ad angulos basales et ad subapicales; his lineis maculisque pallidè cyaneo-viridibus.* Long. corp. lin. $6\frac{3}{4}$.

Sp. 5. Pachyrhynchus speciosus, W. *Splendidè cupreus, vel niger; elytris punctato-striatis; capite lineis* tribus *longitudinulibus notatis; thorace annulis* tribus *elongato-ovatis; elytro utroque fasciis duabus transversis humeralibus ad marginem elytrorum externum confluentibus et prope suturam; duabus centralibus et ad suturam et ad marginem externum ductis necnon confluentibus; et lineâ aream semilunarem circumdante apicali, ornato.*

Sp. 6. Pachyrhynchus decussatus, W. *Ater, lineâ transversâ apud* thoracis *medium et pone hanc lineis tribus longitudinalibus, necnon margine externo aureo-viridibus; elytris, lineâ centrali transversâ, lineis quatuor ad basin longitudinalibus, et pone transversam, lineis duabus longitudinalibus, his lineam parvulam incurvam lateralem emittentibus; lineis omnibus sic et marginibus elytrorum splendidè aureo-viridibus.* Long. corp. lin. $7\frac{1}{2}$.

Sp. 7. Pachyrhynchus phaleratus, W. *Ater, lineâ transversâ apud thoracem medium, ad utrumque latus in duos ramulos divisâ spatium inæquale circumdantes; pone transversam, lineâ centrali longitudinali; elytris lineâ mediâ transversâ, lineis duabus ad basin longitudinalibus, et pone* transversam tribus *longitudinalibus; his*

sic et marginibus externis et basalibus, aureo-viridibus. Long. corp. lin. $7\frac{3}{4}$.

Sp. 8. Pachyrhynchus Schœnherri, W. *Splendidè cupreus; capite maculis tribus, earum unâ interoculari, unâ utrinque suboculari; thorace nitido, dorso binotato, ad latera lineis duabus; elytris octodecim punctis, (duobus apud suturam) ornatis; his notis, lineis maculisque pallidè viridibus.* Long. corp. lin. $5\frac{1}{2}$.

Sp. 9. Pachyrhynchus Erichsoni, W. *Æneus; capite maculis tribus, earum unâ interoculari, unâ utrinque suboculari; thoracis dorso binotato, lateribus bimaculatis; elytris maculis sexdecim ornatis; maculis omnibus colore flavo.* Long. corp. lin. 6.

Sp. 10. Pachyrhynchus Eschscholtzii, W. *Ater, nitore violaceo; thorace maculis duabus; elytris maculis quatuor rotundatis ad basin; sex ad medium, sex prope apicem, duabusque ad apicem, albescentibus.*

Sp. 11. Pachyrhynchus striatus, W. *Ater; elytris profundè punctato-striatis; capite maculâ inter oculos; thorace suprà trimaculato; elytris duodecim maculatis; maculis aureis; illis elytrorum ad basin quatuor, et ad apicem quatuor elongatis, ad medium quatuor, scilicet duabus externis rotundatis, et duabus dorsalibus transversis.* Long. corp. lin. 6.

Sp. 12. Pachyrhynchus roseomaculatus, W. *Niger; elytris distinctè punctato-striatis; capite maculâ inter oculos; thorace suprà trimaculato; elytris undecim maculatis; his maculis roseis; plerisque oblongis; maculâ unâ suturali obcordatâ.* Long. corp. lin. $6\frac{1}{3}$.

Sp. 13. Pachyrhynchus jugifer, W. *Ater; capite maculâ viridi inter oculos, et alterâ utrinque sub oculos; thorace medio lineâ transversâ, et pone hanc lineâ longitudinali a transversâ usque ad marginem posticum thoracis excurrente, his e squamis purpureo-aureis effectis, quibus latera quoque thoracis obtecta sunt; elytris squamis purpureo-aureis indutis, aream majusculâ rotundatâ prope scutellum, et fasciâ transversâ in medio elytrorum, ad latera et ad suturam dilatatâ, necnon lineâ per suturam a fasciâ transversâ ad notam apicalem currente, his notis denudatis.*

Sp. 14. Pachyrhynchus reticulatus, W. *Niger; capite lineis tribus longitudinalibus notatis; thorace elytrisque lineis splendidè viridibus vel cupreis areas polygonas circumdantibus reticulatè ornatis.*

Sp. 15. Pachyrhynchus multipunctatus, W. *Ater; capite maculis tribus, earum unâ interoculari, unâ utrinque suboculari; thorace nitido, dorso binotato, ad latera lineis duabus; elytris punctis plurimis ornatis; his lineis punctisque viridibus.*

Sp. 16. Pachyrhynchus inornatus, W. *Ater; elytris levitèr punctato-striatis.*

Sp. 17. Pachyrhynchus moniliferus, Esch.

Sp. 18. Pachyrhynchus chlorolineatus, W. *Ater; thorace medio*

lineâ transversâ, et pone hanc lineâ longitudinali; elytris lineâ transversâ centrali, lineis duabus longitudinalibus, et lineâ marginali, his viridibus, nonnunquàm splendidè aureis, vel cupreo-viridibus.

Sp. 19. Pachyrhynchus orbifer, W. *Niger; thorace medio lineâ transversâ, et pone hanc lineâ longitudinali a transversâ usque ad marginem posticum thoracis excurrente, his e squamis cæruleo-viridibus effectis; elytris squamis cæruleo-viridibus indutis, areis rotundatis denudatis.*

This species I suspect, as well as that described under the name *P. chlorolineatus*, is but a local variety of *P. moniliferus*. In specimens from some localities, the scales forming the markings are of a beautiful golden green colour. I have before me individuals in which the scales on the elytra arrange themselves into bands—one at the base of the elytra, one in the middle, and one near the apex; the first and last of these bands are curved. Such specimens make an approach to the *P. moniliferus*, but differ in the bands being much broader. Again, there are specimens connecting this intermediate variety more closely on the one hand with the *P. orbifer* (where the elytra are covered with scales with the exception of three circular areas arranged in a transverse line near the base of the elytra, three a little behind the middle, and one near the apex), and on the other with the *moniliferus*.

Sp. 20. Pachyrhynchus rugicollis, W. *Ater; thorace distinctè rugoso-punctato, punctis squamis viridibus ornatis; elytris rufo-piceis, vel piceis, levitèr punctato-striatis et ad apicem quasi squamis viridibus pulverulentis.*

April 5th.—W. W. Saunders, Esq., President, in the Chair.

The President exhibited various splendid species of moths from Northern India.

Mr. Bainbridge exhibited several species of insects found in cigars, including a small species of *Latridius* and a species of *Haltica*, which Mr. Waterhouse stated to be very similar to a unique British species. Some masses of excrement, apparently of a *Lepidopterous larva*, were also found. Mr. Gutch stated that it was cheroots and not Havannah cigars that were attacked by these insects.

Mr. Westwood exhibited some singular Coleopterous insects from the collection of Mr. Melly, including *Acropis tuberculifera*, Burm., and a new genus allied to *Lyctus* with remarkable antennæ, &c.

Some larvæ of *Trogosita Caraboides* were forwarded to the Society by Messrs. Norton, Kilburn, and Co., which were found among some China raw silk recently imported from Manilla, to which they had caused considerable injury, the silk having been eaten or gnawed in many places, by which the value of some bales was depreciated to the extent of twenty-five per cent.

An extract was read from a letter addressed to Mr. Westwood by Mr. James Duncan, relative to a silk cocoon which is attached by a long peduncle to the twigs of trees in India, and suggesting the

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globosus posticè constrictus. Elytra perbrevia valdè convexa, humeris prominulis. Pedes paulo grandes femoribus in mèdio crassescentibus, tibiis latis compressis; tarsis brevibus latis.

Doliops curculionoides, W.* *Obscurè viridi-æneus, indistinctè cærulescens, capite lineâ albâ longitudinali; elytris* 14 *guttis flavescenti-albis adspersis corporeque subtùs eodem colore maculato.* Long. corp. lin. $5\frac{1}{2}$.

The resemblance which this insect bears in size, form and colouring to a species of *Pachyrhynchus* (one of the *Curculionidæ*), which Mr. Cuming found in the same locality, is remarkable. From the short ovate form of the body it seems at first sight allied to *Dorcadion*, but in the form of the head, slender antennæ and feet, it appears to approach certain *Saperdæ*, and especially to *Colobothea*.

Mr. Cuming, who was present, stated that the ladies in Manilla keep specimens of the splendid *Agestrata luzonica* in cages, feeding them upon sugar-cane.

ZOOLOGICAL SOCIETY.

Jan. 26, 1841.—W. Yarrell, Esq., Vice-President, in the Chair.

Prof. Owen read his description of a new genus and species of sponge, which he proposes to name *Euplectella Aspergillum*.

"Mr. Cuming has entrusted to me for description," says the author, "one of the most singular and beautiful, as well as the rarest of the marine productions with which his researches in the Philippine Islands have enabled him to enrich the zoological collections of his native country. This production is, however, a member of the very lowest class of the animal kingdom, if even it be permitted to rank in that division of organized nature. After repeated examination and much reflection, I can arrive at no other conclusion than that the object about to be described is the skeleton or framework of a species of sponge belonging to that division of the class called Horny, in opposition to the calcareous and siliceous groups, and to the Alcyonoid family. It is a hollow, cylindrical, slightly conical, and gently curved case or tube, resembling a delicate cornucopia, with the apex removed. It measures eight inches in length, two inches across the base, and one inch and a quarter across the apex, which is truncated. The base or wider aperture of the tube is sub-elliptical, and is closed by a cap of coarse and somewhat irregular network, gently convex externally, the circumference of which is divided from the walls of the cylinder by a thin projecting plate, standing out like a ruff or frill. This marginal plate varies in breadth from one to three lines. The parietes of the circular cone consist also of a network of coarse fibres, but these exhibit the greatest regularity of disposition, and intersect each other at definite and nearly equal distances throughout the course of the cone. They consist of longitudinal, transverse, and oblique fibres, the latter being of two kinds, winding spirally round

* A figure of this remarkable insect has been published by Mr. Westwood in the 'Arcana Entomologica,' pl. 15, fig. 1.

the cylinder, but in opposite directions. The strongest fibres are the longitudinal and transverse ones, which are arranged at intervals of about a line and a half, and mark out regular square spaces of the same diameter: these spaces are kept of pretty equal size throughout the cone, from the circumstance of the longitudinal fibres diminishing in number as the cone decreases in size; the mode of diminution is not, however, by abrupt termination, but by the gradual convergence and final interblending of two contiguous longitudinal fibres, and the regularity of the interspaces is therefore disturbed at the intervals of such converging fibres. The fibre resulting from this union of two fibres bears a proportionate thickness to the additional material entering into its composition. The nature of such material is demonstrated at the apex of the cone by the resolution of the longitudinal fibres into their component filaments, each of them dividing at about two-thirds of an inch from their extremity into a fasciculus or pencil of extremely delicate, stiff, glistening, elastic threads, resembling the finest hairs of spun glass. The transverse fibres, in like manner, are resolved at the truncated apex of the cone into their component filaments, which intersect those proceeding from the longitudinal fibres, as well as similar pencils from the oblique filaments, the whole forming an irregular silky tuft, which almost closes the apical aperture of the cone.

"The longitudinal fibres are external to the transverse ones, to which they are connected by both the spiral fibres, and by smaller and less regular intersecting fibres at the angles of the squares; the area of each square is thus reduced more or less to a circular form: at about one or two inches from the apex, these connecting reticulate fibres begin to rise in the form of narrow ridges from the general surface of the network, and sooner on the convex than on the concave side of the bent cone. These ridges at first are short and interrupted; they are then more extended, but irregular in their course, some being transverse, others undulated or curved; but as they approach the base of the cone they are continued into broader ridges, which follow, with more or less regularity, the course of the oblique spiral fibres; the broadest of these ridges would measure two lines and a half. Their structure presents an extremely fine and irregular network, disposed, for the most part, in two plates, which converge as they recede from the general wall of the cone, and terminate in a sharp and well-defined edge. The component fibres of these reticulations, like those of the main network, are resolved into the fine silky filaments above mentioned. The fibres of the coarse irregular network which closes the basal aperture of the cone, and which constitutes the main characteristic of this Alcyonoid sponge, appear to be directly continued from, and, as it were, to include all those which enter into the composition of the longitudinal, transverse and oblique fibres of the wall of the cone; the frill-like ridge above described defining the line of transition from the one to the other. The inner surface of the reticulate parietes of the cone is even; not interrupted by any ridges or processes like those on the outer surface. The number of the longitudinal filaments at the base of the

cone is 60; that at the smaller end, where they begin to resolve themselves into their constituent filaments, is 30. The diameter of the longitudinal fibres is about $\frac{1}{40}$th of an inch; that of the transverse fibres is somewhat less. The oblique fibres, where they are most regular, average $\frac{1}{60}$th of an inch; the longitudinal fibres, where they begin to resolve themselves into their component filaments, expand in the direction of a line passing to the centre of the cone, and not in the direction of the plane of its circumference; maintaining, in the latter respect, nearly the same breadth to their entire unraveling; whilst in the other dimension they equal one line in breadth before they are wholly decomposed. Small portions of a finely reticulate plate were loosely attached to some parts of the internal surface. The fibres of these pieces consisted of minute filaments, irregular in their course, branching, anastomosing, and sending off abrupt processes like thorns. The component filaments of the parietal fibres are of two kinds; the one simple, cylindrical, and smooth; the others barbed at pretty regular distances through their whole course, like the hair of certain caterpillars. I have also observed a long filament, simple at one extremity, and becoming barbed at the other. They consist of material like the dried gluten of marine plants, containing a small proportion of azote, and burning away to a charry residuum.

"If the basal aperture of the cone were open, the resemblance to many of the beautiful reticulate Alcyonoid sponges would be very close: its closure by the reticulate convex cap, in the present instance, establishes the generic distinction; and in the exquisite beauty and regularity of the texture of the walls of the cone the species surpasses any of the allied productions that I have, as yet, seen, or found described."

A letter from G. T. Vigne, Esq. was read. In this letter, at the request of the Society's Curator, Mr. Vigne furnishes the following list of Birds constituting part of a collection this gentleman had formed during his travels in Thibet, Cashmere, &c.

Aquila Bonelli, Gould. Cashmere and Lower Himalaya.
Buteo —— ? Cashmere.
Accipiter fringillarius, Ray. Cashmere.
Falco biarmicus ? Temm. } Common in the plains under the Alpine
—— *Chicquera* ? Lath. } Panjab.
Athene Cuculoïdes, Gould. In the Alpine Panjab.
Caprimulgus Asiaticus, Lath. Plain of Attok.
Merops Apiaster, Linn. Cashmere and Persia.
Alcedo Bengalensis, Gmel. Cashmere.
—— *Smyrnensis*. Alpine Panjab.
Phœnicornis brevirostris, Vig. *Ib.*
Muscipeta castanea, Temm. *Ib.*
Turdus atrogularis, Temm. *Ib.*
Oriolus galbuloïdes, Gould. *Ib.*
Ixos leucogenys (*Brachypus leucogenys* of Hardwick and Gray's 'Indian Zoology'). Cashmere.

Note.—An allied species, differing in having red instead of yellow under the tail, is found in the plains of India.

sembles the Alpine Hare, but the latter has a small ear, whilst the present animal has a very large, broad, and open ear. I never heard that these Hares were gregarious, excepting from the necessity of seeking the same places in quest of food, and those being few and far between. The nature of the country would prevent any migration, such as that of the Alpine Hares.

"I never heard it utter any peculiar cry, and should think it not unlikely that the varieties said to exist in Tartary by Bewick, and to *whistle* sharply, like the chirping of a sparrow, must be the large Drun (?) or Thibetian Marmot, of which Jacquemont says he received a skin, and of which I and Dr. Falconer also have seen plenty. I had the skeleton of one, but unfortunately lost it."

Mr. Vigne moreover observes, that there are no Hares in Cashmere, though it is a country which appears to be particularly fitted for them; neither are there any gray or black Francolins, though all are found within four or five days' march of the Valley.

The Hare exhibited, Mr. Waterhouse observed, was an undescribed species*, and he proceeded to characterize it under the name of

LEPUS TIBETANUS. *Lep. cinereus, pilis flavescenti-albo nigroque annulatis; abdomine albo; pedibus suprà sordidè albis, subtùs sordidè flavescenti-fuscis, pilis densis indutis; caudâ mediocri, albâ, suprà nigricante; auribus longis, ad apicem nigricantibus: nuchâ sordidè albâ, indistinctè fulvo-lavatâ.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	18	0
——— *caudæ*	4	6
——— *tarsi*	5	0
——— *auris*	4	6
——— ab apice rostri ad basin auris	3	8

The Thibet Hare, compared with most other species of the genus, is most remarkable for its pale grayish colouring, and the almost total absence of brown or yellow tints in its fur. On the upper parts of the body the fur is of a pale gray hue next the skin; the hairs are blackish beyond the middle, and at the point, and broadly annulated with white or cream colour near the point; but interspersed with the ordinary fur on this part of the body are numerous hairs which are white at the base, though annulated like the others on the apical portion. The fur on the chest is also pale gray at the base, but externally it has a faint fulvous hue, though it might almost be described as dirty white, and the *occiput* and back of the neck are of the same hue. On the belly the fur is white, even next the skin. The legs and feet are almost white; a slight ashy tint is observable on the outer side of the hinder pair; they are rather densely clothed with fur, and that on the under side is of a yellowish-brown hue, but not very dark. The ears are very large, and well clothed with hairs; on the outer part, in front, these hairs have the same colouring as those on the back of the animal, but on the hinder part they are white, or nearly so, and the apical portion of the ear is broadly margined with black.

* At p. 234 we give Mr. Hodgson's description of this animal from the Journal of the Asiatic Society, dated February 1841.

The skull, compared with that of the common Hare, differs, in being much smaller, and proportionally narrower; the upper incisors have the groove rather more near the middle of the tooth. Following are the principal dimensions of the skull:—

	in.	lin.
Total length	3	4
Width	1	$7\frac{1}{8}$
Width between orbits	1	0
Length of nasal bones	1	5
Width at base	0	8
Length of bony palate	1	$2\frac{1}{3}$

Mr. Gould exhibited and characterized a new species of *Himantopus*, which he had received from New Zealand.

HIMANTOPUS NOVÆ ZELANDIÆ. *Him. fuliginoso-niger, dorso, alis caudáque nitore virescente tinctis. Exempla, fronte, loris, mento, collo anticè, et ad latera, sic et pectore crissoque albis, nonnunquam obveniunt.*

The whole of the plumage sooty black, with the exception of the back, wings and tail, which are glossed with green: examples sometimes occur with the forehead, lores, chin, front and sides of the neck, chest, and under tail-coverts white; bill black; feet pink-red.

Total length, 16 inches; bill, 3; wing, $9\frac{1}{4}$; tail, $3\frac{1}{2}$; tarsi, $3\frac{1}{4}$.

This bird is interesting, not so much for its beauty, but as adding another species to the very limited genus *Himantopus*, of which, until lately, only one was known. Mr. Gould regretted that no other information accompanied the specimens than that they were killed at Port Nicholson. From the great difference in their colouring it might be supposed that they are distinct, but he inclines to believe that they are either the result of age or season; in all probability the black plumage is that of summer.

MICROSCOPICAL SOCIETY.

At a meeting of the Microscopical Society, held October 20th, Richard Owen, Esq., F.R.S., President, in the Chair. The Secretary, Mr. John Quekett, read a paper by himself, "On the Minute Structure of Bat's Hair." After alluding to the great beauty of the hairs of different animals, as developed by means of the microscope, the author described briefly the formation and mode of growth of hairs generally, and stated that his attention was directed to those of the Bat tribe, in consequence of having on more than one occasion used a knife to separate them from the skin; and on examination subsequently it was seen that the curious markings on their surfaces, which render these hairs so interesting, were destroyed in some parts, but were still present in others. By repeating the scraping process it was found that minute scale-like bodies were detached, which were not unlike in shape the scales on the wing of a butterfly, but were very much smaller, and presented no trace of striæ on their surfaces; and it was on the arrangement of the scales, and on their

being more prominent in some species than in others, that the beautiful appearance of Bat's hair depended. The scales might be procured either by scraping the hair with a knife in a direction from the apex towards the root, or more easily by pressing them between glasses previously moistened by the breath. Many of them appeared to terminate in a quill, like that observed on the butterfly's scale; some few were flat, whilst others were curved, so as to fit the shaft of the hair, and presented a serrated edge. The scales were absent near the bulb, but abounded in all parts of the shaft situated above the skin; and when removed from many of the larger hairs, the fibrous nature of the shaft and its cellular interior were well displayed. He spoke of the hair of an Indian Bat, of which a small portion had been given him by Mr. Powell, in which, without any preparation, the scales could be beautifully seen, both detached and still adherent to the shaft; and he was led, from repeated observation, to consider a Bat's hair as composed of a shaft invested with scales, which are developed to a greater or less degree, and vary in the mode of their arrangement in the different species of these animals; and concluded by stating that Bats resembled quadrupeds principally in their mode of reproduction, and birds in their mode of progression, but resembled both in the structure of their hair.

Some discussion followed the reading of the paper, in which the President and others took a part.

MISCELLANEOUS.

Cyclostoma elegans, Lam., *an Irish Shell*.—In my catalogue of the Land and Freshwater Mollusca of Ireland, published in the 6th vol. of the 'Annals,' it is considered that there are not sufficient data for ranking *Cyclostoma elegans* with our indigenous species. I have lately seen a number of specimens of this shell, and am now enabled to announce it as such, although not so satisfactorily as could be wished. These were found by Mrs. W. J. Hancock washed up by the tide upon the strand at Mullaghmore, near Bundoran, on the western coast. Whether the *Cyclostoma* tenants the neighbouring sand-hills, or is brought from a distance by rivers to the ocean and then cast upon the beach where the examples here mentioned were obtained, is yet to be learned. Fully a hundred of them were collected in one day.

In reference to a *Cyclostoma* which Dr. Turton stated had been found in the west of Ireland, I troubled Mr. Jeffreys with some queries, which were replied to as follows, in a letter dated Swansea, Aug. 30, 1841:—"The specimen of *Cyclostoma productum* (Turton) which I received from Mr. Clark as forming part of the late Dr. Turton's collection is well figured in his 'Manual,' but it does not agree with the figure or description of *C. sulcatum* of Draparnaud, to which Dr. Turton doubtfully referred it. I have no doubt that it is an exotic shell, and that Mr. Gray's account of it (in his edition of Turton's Manual) is correct."—Wm. Thompson.

Belfast, Sept. 1841.

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tion of the whole of which will be found in Jameson's Edinburgh New Phil. Journ. vol. xxxi. (No. 62.) p. 371. But the writers are mistaken in supposing that this phænomenon had hitherto escaped notice, as a similar fact observed in the Flamingo was communicated to the Zoological Society by Prof. Owen in 1832. As it appears that the dissection of the Eider Duck was performed almost before it was cold, the doubt suggested in the Editor's note, whether the *mucor* may not have formed after death, is obviated, especially as a part of it was found in full maturity.

"August 28th, 1832.—Mr. Owen read some Notes on the Anatomy of the *Flamingo*, *Phœnicopteris ruber*, Linn.: they were derived from the examination of an individual which died about three months since in the Society's menagerie.

"The principal *diseased* appearances were in the lungs, which were filled with tubercles and *vomicæ*. I was much struck with finding the inner surface of the latter cavities, and that of most of the smaller ramifications of the bronchial tubes, covered over with a green vegetable mould, or *mucor*. As the individual was examined within twenty-four hours after its death, it seemed reasonable to conclude this *mucor* had grown there during the life-time of the animal. Thus it would appear that internal parasites are not exclusively derived from the animal kingdom, but that there are *Entophyta* as well as *Entozoa*."

["The fact here stated must be regarded as a very interesting and remarkable one: there is no reason, *à priori*, why *Entophyta* should not exist; but in the case now before us,—as a certain number of hours did intervene between the death and the examination of the Flamingo, and we have reason to believe that *mucor* will occasionally form very rapidly on dead animal substances, while the *vomicæ* and bronchial tubes of the animal must have contained matter in a high degree susceptible of being organized (whether by seeds and *ova* or otherwise) into either *mucor* or *animalcula*,—it is equally probable, perhaps, that the formation of the *mucor* did not take place until after death.—Edit."]

Philosophical Magazine, Jan. 1833, *New Series*, vol. ii. p. 71.

On some Mammalia, Birds and Fishes lately observed in the neighbourhood of Aberdeen.—Daubenton's Bat, *Vespertilio Daubentonii*, Leisl., lately added to our Northern fauna by my father (Edin. New Philos. Journ., October Number), occurs plentifully in the Cathedral here; a few weeks ago I found two clusters of about eighty individuals attached to the roof, since which time they seem to have retired to their winter quarters. Specimens from the locality in question will shortly be exhibited in the British Museum. An apparently undescribed *Nycteribia* was parasitical upon the bats, but seemed to be rare: an *Acarus* infested the wings, in which I have often found its nidus. Three species of Shrew have occurred this summer. *Sorex remifer* was taken but once; *S. tetragonurus*, Herm., and *S. rusticus*, Jen., more frequently, and in about equal numbers. Seven specimens of the two latter were procured from the stomach of a Short-eared Owl, which I lately shot in this neighbourhood. It may here be mentioned, that the owl alluded to was infested with an

Ornithomyia differing from all the Eproboscideous insects hitherto described as British.

On the 25th of September I met with a pair of the Lesser Whitethroat, *Sylvia sylviella*, at Don-Mouth, and shot one; it seems to be a very rare bird in Scotland, though plentiful further south. On the same day (after an easterly gale) I found on the beach a Pomarine Jager, *Lestris pomarinus*, a young bird of the year, with the central tail-feathers scarcely projecting beyond the rest. The Little Tern, *Sterna minuta*, is common here, there being a breeding-place of this species a few miles to the north of Don-Mouth. The only other localities in Scotland where I have observed it are Guillon Point and Tyne-Mouth, in East Lothian, where it occurs in small numbers.

A Shark $7\frac{1}{2}$ feet long was lately taken from a bag-net at the end of Aberdeen Pier, and was publicly exhibited for a few days. It seemed to me to differ in several respects from the Porbeagle, *Lamna cornubica*, and to agree best with the Beaumaris Shark of Pennant, which however is by many considered as a variety of, or even identical with, the species first named. The teeth, for example, were not serrated as they are in the Porbeagle*, and the snout was less elongated, being short and obtuse. Along with the shark was displayed an enormous Fishing Frog or Angler, *Lophius piscatorius*, which the fishermen say is not uncommon upon this coast.—John Macgillivray.

On the Common Hare of the Gangetic Provinces, and of the Sub-Himalaya; with a slight notice of a strictly Himalayan species. By B. H. Hodgson, Esq., Resident at the Court of Nepal.

(Lepus macrotus et Oïostolus, nobis.)

It has often been remarked, that the ordinary type of the genus *Lepus* in the Gangetic provinces differs materially from that of England, and it has been further alleged, that the Hare of the Sub-Himalayan ranges of hills is not similar to that of the plains below them. No one however has, I believe, heretofore been at the pains to verify or refute these allegations, which I therefore now propose to test, and to show that the former is sound, the latter unsound. I have specimens of the ordinary Hare of the plains and of the hills now before me, and after the most careful comparison, can discern no difference between them in size, proportions, or even in intensity of hue in the colours, further than as such everywhere varies with age, health and seasons. The type therefore of this genus in the mountains and in their subjacent plains (on this side the Ganges at least) is the same; and of this species, which we shall call *macrotus* (from the large size of its ears), the females are, as usual, somewhat larger than the males, being from snout to rump 19 to 20 inches, with an average weight of 6 lbs. and a maximum of $8\frac{1}{2}$ to 9, whilst the males fall short by 1 inch or more of this size, and seldom surpass 5 lbs. in weight. The general structure and proportions are those of *Lepus timidus*, but the size is much less, the English hare

* See Dr. Johnston's description in Parnell's 'Fishes of the Frith of Forth,' probably taken from Yarrell's standard work.

being ordinarily 8 lbs. and frequently reaching 12 lbs. ; and if I may trust my notes, as well as the fresh specimens now on the table before me, the females of *macrotus* invariably have six teats, of which two are placed on the very top of the thorax, and four remotely from them in a parallelogram in the central part of the abdominal region. This is a noticeable circumstance, if the six to ten mammæ of authors be ascribed to the genus with sufficient care, and if *timidus*, or the European type, may be thence presumed to have ever more than six. If so, the invariably restricted number of mammæ in *macrotus* will form one feature of specific independency; another will be deduced from its inferior size ; and a third from the greater length of the ears as compared with *timidus*, to which, in its general proportions and colours, it certainly bears a close resemblance ; even in colours however, there is at least one material and constant difference; that whereas the dorsal aspect of the scut or tail in *timidus* is black, in *macrotus* it is of similar hue with the back, but paler. Nor do I notice in *macrotus* any peculiarity of structure in the hair (towards tips enlarged, acuminate, and recurved) such as is ascribed to that of *timidus*. The general colour of the Indian Hare is a deep cinnamon-red, copiously mixed with black on the body superiorly, but unmixed upon the limbs and front of the neck and chest, and also on the nape and dorsal aspect of the neck near it ; pure white upon the head and body below, as well as upon the insides of the limbs near it, upon the genital region, posterior margin of the buttocks, and whole inferior and lateral surfaces of the tail. The front of the upper lip, the margin of the mouth, a circle round the eye, and a line thence to the nostril are always pale, rufescent, hoary, or purer white, and so also the bases of the ears dorsally, and a strip thence continued towards the shoulders, and bounding the purely ruddy hue of the soft nape. The superior margin of the ears on both sides is black, but the general hue of the fur on the ears anteriorly is similar to that of the head, whilst posteriorly and interiorly the ears are nearly nude. The mustachios (which are not undulated) are half black and half white, and though the arms or cubits are usually unmixed with black, yet this is not always the case, the animal in very high fur having the cubits, like the tibiæ (externally), powdered with black. The fur in general is very rich, full and soft, both the woolly and hairy portions, the former of which seldom exceeds an inch in length, whilst the latter varies from $1\frac{1}{8}$ to $1\frac{1}{2}$ inch. The hair has mostly four rings from the base, thus—bluish hoary, black, red and black. The wool wants the terminal black ring everywhere, and is for the most part white, but ruddy apically: the hair wants it on the purely red parts of the animal, such as the abdominal aspect of the neck and the limbs ; and both wool and hair are devoid of all rings, and wholly white upon the belly and parts adjacent, as well as upon the inferior surface of the head. Some hairs are wholly black or dusky on the back ; but in general, besides its bluish hoary base, every hair on that surface of the animal has two black rings divided by a red one, which latter is of a deep cinnamon hue, almost exactly, or if the reader pleases, brownish red. The buttocks posteriorly are less dashed with black than the middle of the back, which in fine furred animals

and weight 5 to 7 lbs. Head (straight) 4. Ears 5 inches. *Habitat.* Gangetic plains and Sub-Himalaya.

Of the Tibetan species I possess only some wretched remains, which enable me however to indicate the species thus:—

*Lepus Oïostolus**, with fur consisting almost wholly of wool, considerably curved, and interspersed rarely with very soft hairs. Slaty gray-blue for the most part and internally, but externally fawn-tinted above, and whitish below and on the limbs; some hairs on the back tipt with black beneath a subrufous ring. Tail white, with a gray-blue strip towards the back. Apparent size of the last. *Habitat*, the snowy region of the Himalaya, and perhaps also Tibet.

Hares of the first species are exceedingly abundant in the Nepalese Tarai and British districts near it, but less so in the mountains, though there also they may be found in most districts wherein the declivities of the mountains are not very precipitous nor wholly covered with dense forests. Hares love the lower and more level tracts within the mountains, where grassy open spots are interspersed with copsewood, under which they may safely rest and breed; for in the mountains the hare never resorts to holes or burrows; nor, I believe, voluntarily in the plains, though I have heard the assertion that it does so. In the plains, patches of grass interspersed with cultivation are the favourite resorts of this species, or Jhow shrubberies fringing the banks of nullahs, where occasionally the animals congregate in numbers wholly unknown to the mountains. The Indian Hare, or *macrotus*, breeds frequently during the whole year, and produces usually two young ones at a birth. The young are born with the eyes open, and furnished with teeth. In June 1835 I took two from the left horn of the uterus (none in the right) of a female; and these young, though unborn, had the eyes open, and the fur quite perfect. In fact, the young follow their dam as soon as they are born.

Cathmandoo, February 1841.

Nepal, March 1st, 1841.

The account of the Hares which I sent you was written *currente calamo*, and without my being at the trouble to look (shame on me!) at my own Catalogue of Mammals apud 'Linnæan Transactions,' where the Hare of the plains is named *Indicus*, and that of the Himalaya *Œmodius*. These names might do, and changes are bad; but tropical appellations are objected to, and in the plains there is another Hare, *nigricollis*, wherefore the names affixed to my paper with you should perhaps stand; but a note at the foot of the page should identify them with *Indicus* and *Œmodius* respectively of the Catalogue: thus, "These species are named respectively *Indicus* and *Œmodius* in my published Catalogue. Nor perhaps was it worth while to drop the local appellations, though *nigricollis* constitute a second species in the plains of India."—B. Hodgson.

Journal of the Asiatic Society of Bengal, vol. ix. p. 153.

* As the Tibetan Hare had previously been described by Mr. Waterhouse, we presume that Mr. Hodgson's name *Oïostolus* must give place to *Tibetanus*. See p. 226 of the present Number.—Ed.

THE HOOPOE—UPUPA EPOPS.

A fine specimen of the Hoopoe was shot at Longton, not far from Preston, on the 23rd of September last. I saw the bird in the hands of a bird-stuffer in Preston, therefore there can be no mistake respecting its identity. I never heard of one being taken before in these parts*.

JOHN SKAIFE.

8 Union Street, Blackburn, Lancashire,
Oct. 21, 1841.

THE HOOPOE.—THE ARCTIC GULL.

On September 25th last, a specimen of the Hoopoe (*Upupa epops*) was shot near Great Rolbright, Oxon; it had been seen in the vicinity three or four days, and when shot was very wild; first starting up from a wet furrow in a wheat-stubble field, and settling on a bare space in a turnip-field adjoining, where it would not suffer an approach near enough to be shot, but flew to a sainfoin ground adjoining, where, at a long distance, it was brought down on the wing.

On the 28th of the same month a young individual of *Lestris parasiticus*, Arctic Gull, was shot in this neighbourhood, which I have preserved.—T. GOATLEY.

Chipping Norton, Oct. 20, 1841.

ORNITHICHNITES, OR FOOT-MARKS OF EXTINCT BIRDS.

At the first meeting of the Association of American Geologists, founded in Philadelphia, on the 2nd of April 1840, (Prof. Hitchcock, Chairman, and Prof. Beck, Secretary,) among other proceedings, specimens were presented of the sandstones of Massachusetts, exhibiting the fossil foot-marks, so called†, and observations made in regard to them. This subject was of so much interest as to induce the Association to appoint a committee to visit the localities and to report their conclusions. These were delivered at the next meeting,
April 7, 1841.

Report on the Ornithichnites or Foot-marks of Extinct Birds in the New Red Sandstone of Massachusetts and Connecticut, observed and described by Prof. Hitchcock, of Amherst.

The undersigned, forming the committee to whom the subject of

* We have recorded two instances of its occurrence in the course of 1840:—in May, near Swansea, vol. vi. p. 236; and in September, near Halifax, *ib.* p. 159.—ED.

† On the subject of these fossil foot-marks see Prof. Hitchcock's paper entitled "Ornithichnology," in Silliman's Journal for January 1836, vol. xxix. art. xx., and the plates by which it is illustrated; also for April 1837, vol. xxxii. p. 175.

The account of Mr. Cunningham's and Sir P. G. Egerton's communications to the Geological Society, Nov. 21, 1838, (see 'Philosophical Magazine' for Feb. 1839, p. 148,) relative to the impressions at the quarries of Storeton Hill, near Liverpool, had been thus noticed in Silliman's Journal for July 1839, p. 394:—"We have recently received from Prof. Buckland fine copies of these impressions, and it is no more possible to doubt the genuineness of their originals, than those of the most recent impression of a foot made in any yielding surface of the present hour. The same is true of the impressions of Prof. Hitchcock, whatever doubt may have been felt by some persons who have never examined them."

the origin of the bird-tracks of Prof. Hitchcock was assigned, beg leave to present the following brief report:

It may be well previously to state, that the object of the meeting in appointing this committee was founded solely upon the desire to produce, if possible, unanimity of opinion, there being a few of the members who dissented from the views published by Prof. Hitchcock. In our country, the subject, as it undoubtedly ought, had attracted considerable attention. It had been very favourably received and republished in Europe, and from its great importance to Palæozoic geology, an attempt should be made to settle the question; for were the views of our highly respected member correct, we were made acquainted with the earliest period in which biped animals existed whose foot-marks were analogous to, if not identical with, those of the tread of birds. On the contrary, if wrong, we were presented with another class of facts, which show that certain appearances, supposed to belong solely to animal life, were held and presented by the vegetable kingdom likewise.

We shall now state, in a few words, what we suppose are the general facts upon which Prof. Hitchcock's views were founded, and then the facts of those who assumed the opposite opinion.

The first and most obvious impression upon the mind, on looking at the indentations or marks, is their thin tripartite form, resembling the tread or foot-mark of those kinds of birds which show three toes, the fourth one being rudimental, and are referable to no other known kind of animal. The tracks or foot-marks in several localities are arranged in a determinate order, like those of a bird or fowl moving in a straight line, the toes or marks in all such cases being alternate; that is, if the right foot be presented on the rock, the left would next follow, and thus right and left in regular succession, sometimes with many repetitions. In other instances the foot-marks presented no determinate direction or order, as might naturally be supposed of a bird or any other animal having no particular place or object in view.

In all cases where a succession of tracks was observed, there was an uniform correspondence as to size, and considerable regularity as to distance between the tracks. Whatever deviations were observed, they were not greater than might be supposed to take place in animals possessed of voluntary motion.

On some surfaces, not unfrequently one or more different kinds of track were exposed, belonging, as was reasonably conjectured, to different species and genera of ornithichnites.

That the slaty material of the rock showed that the impressing body possessed force or weight, for frequently the thin layers or laminæ were bent downwards for an inch or more, and that the mud of which the slate was formed was of a highly adhesive or tenacious character.

In all cases the foot-mark, or part impressed, was the fixed part of the rock; the part removed when the lower side was turned upwards showed the cast, or what corresponded with the toes or foot. That no trace of any organic matter could be perceived occupying the cavity or mould, the cast or part in relief being in all respects like the material of the rock of which it formed a part.

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his being. The discoveries of Prof. Hitchcock were published at a period when the minds of those who embraced the negative side of the subject were pre-occupied with the anomalous vegetation with which many of the Silurian rocks of New York abound, and to which provisionally the name of *Fucoides* had been given. From this imitative character, and from finding a few specimens presenting a tripartite or trifurcate form, &c. it appeared not only possible but probable, that the impressions from Massachusetts and Connecticut were with greater propriety referable to fucoidal bodies, than to those which Prof. Hitchcock had assigned them.

We may here remark, how essential it is that truth, or the facts which make manifest any truth, should first be presented to us; so readily is the mind impressed when not pre-occupied; and when a strong impression is made, be it ever so false, it is no easy matter to free ourselves from it. From this circumstance we can readily foresee the advantage which future generations will possess over those of the present and especially those of former times. As the progress of knowledge is certain, each day will lessen error and enlarge the domains of truth; and should man be true to his permanent interests, error finally will cease to have existence.

(Signed) Henry D. Rogers, Lardner Vanuxem, Richard C. Taylor, Ebenezer Emmons, T. A. Conrad.

[Note.—We have just seen an engraving of a large Fucoid which has very lately been found by Mr. Cunningham in the same Storeton quarry that has afforded *Labyrinthodon* and *Rhyncosaurus* footmarks, plainly showing how little resemblance an actual Fucoid bears to the Ornithichnites.—Edit.]

NATURAL HISTORY AS A BRANCH OF EDUCATION.

To the Editors of the Annals and Magazine of Natural History.

Dear Sirs,—It may be interesting to some of your readers to know, that the importance of Natural History as a branch of education* for the Christian ministry, has been recognised by the different Presbyterian bodies of this part of the empire. To the Reformed Presbyterian Synod (the Covenanters) belongs the honour of being the first to assign to this study a place in the College curriculum of its students. By a letter from the Natural History Society of Belfast, the subject was brought before the General Assembly of the Presbyterian church in Ireland at its late annual meeting in this town; and their College Committee, to whom the matter was referred, passed a resolution strongly recommending the students under its care to make themselves "extensively acquainted with Natural History in its several departments, not only on account of the great importance of the science, but of its special bearing on the sublime sphere of the Christian ministry."

The same subject was, in like manner, brought under the consi-

* [Mr. Patterson's Pamphlet on Natural History as a Branch of Education will be found reviewed in the preceding volume of the Annals, p. 498. —Ed.]

deration of the Association of Irish Non-subscribing Presbyterians, at their recent triennial meeting held in Newry; and a Committee of that body was appointed to consider and suggest to the proper authorities any improvements in the Undergraduate course which may appear desirable; and directions were given, that in the contemplated improvements, the study of Natural History should not be fogotten.

When the sober-minded Presbyterians of the north of Ireland are thus giving their deliberate testimony to the importance of the study, may we not hope that a time may yet come when it shall be universally introduced as a regular branch of education both in our schools and colleges?

I am, your very obedient,

Belfast, 27th Sept. 1841. ROBERT PATTERSON.

METEOROLOGICAL OBSERVATIONS FOR SEPT. 1841.

Chiswick.—Sept. 1. Very fine. 2. Slight fog: very fine: clear. 3. Very fine: showery: heavy ràin. 4. Stormy and wet. 5. Cloudy and fine: rain: cold fog. 6. Dense fog: hazy: foggy at night. 7. Foggy: rain. 8. Fine. 9. Overcast. 10, 11. Foggy: very fine. 12, 13. Very hot for the period of the season. 14. Dry haze: very fine. 15. Very fine: rain at night. 16—20. Very fine. 21. Hazy: very fine. 22. Rain: very fine. 23. Heavy rain. 24. Cloudy: rain. 25. Showery. 26. Showery: stormy with rain at night. 27. Fine: lightning and very heavy rain at night. 28. Rain: boisterous. 29. Boisterous: clear at night. 30. Boisterous, with rain: clear and fine.

Boston.—Sept. 1. Foggy: rain yesterday P.M. 2. Fine. 3. Rain: heavy rain P.M. 4. Cloudy: stormy, with rain P.M. 5. Cloudy: rain P.M. 6. Fine. 7. Cloudy: rain P.M. 8. Cloudy. 9. Fine. 10. Cloudy: thermometer 74° three o'clock. 11. Cloudy. 12. Fine: thermometer 80° half-past eleven o'clock A.M. 13. Fine: thermometer 74° three o'clock P.M. 14. Fine. 15. Cloudy. 16. Fine: rain A.M. 17. Fine. 18. Foggy. 19—21. Cloudy. 22. Cloudy: rain A.M. 23. Rain A.M. 24. Cloudy: rain early A.M. 25. Fine. 26. Cloudy: rain early A.M.: rain P.M. 27. Fine. 28. Stormy: rain early A.M. 29. Stormy. 30. Cloudy: rain early A.M.: rain P.M.

Applegarth Manse, Dumfries-shire.—Sept. 1. Fair till P.M., then rained. 2. Continued rain P.M. 3. Fair and fine. 4. Fair and fine, but cloudy A.M. 5. Fair and fine. 6. Fair and fine: hoar-frost A.M. 7. Cloudy A.M: rain P.M. 8. Wet A.M.: cleared up. 9. Wet nearly all day. 10. Wet throughout. 11. Cloudy A.M.: wet P.M. 12. Hot sun: fiery wind: thunder. 13. Clear: fiery wind: thunder. 14. Showery A.M.: wet P.M.: thunder. 15. Cloudy, but fair: thunder. 16. One shower. 17. Fair and clear. 18, 19. Fair and fine. 20, 21. Fair and fine, though windy. 22. Shower in the afternoon. 23. Fair and fine. 24, 25. Showers. 26. Wet A.M.: cleared and was fine. 27. Fair but threatening. 28. Heavy showers. 29. Heavy rain all day: thunder. 30. One or two slight showers.

Sun shone out 26 days. Rain fell 15 days. Thunder 5 days. Frost, hoar, 2 days.

Wind North-north-east 1 day. North-east 1 day. East-north-east 1 day. East 7 days. East-south-east 4 days. South-east 4 days. South-south-east 1 day. South 4 days. South-south-west 2 days. South-west 2 days. West-south-west 1 day. West-north-west 1 day. North-west 1 day.

Calm 9 days. Moderate 9 days. Brisk 4 days. Strong breeze 8 days.

Mean temperature of the month	53°·90
Mean temperature of Sept. 1840	53 ·30
Mean temperature of spring-water	50 ·80

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTON; *by* Mr. THOMPSON *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. VEALL *at Boston, and by* Mr. DUNBAR *at Applegarth Manse, Dumfries-shire.*

Days of Month. 1841. Sept.	Barometer.						Thermometer.							Wind.				Rain.				Dew-point.
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc.			Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc. 9 a.m.	Chiswick 1 p.m.	Bost.	Dumfries-shire.	London: Roy. Soc. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Lond.: Roy. Soc. 9 a.m.
		Max.	Min.		9 a.m.	8½ p.m.	Fahr. 9 a.m.	Self-register. Max.	Min.	Max.	Min.		Max.	Min.									
○ 1.	30 068	30·092	29·991	29 49	29·78	29 68	59 7	72 8	52 7			53	64	40½				S.					59
2.	29 896	29·843	29·752	29 37	29·55	29 49	60 2	67 7	51 3			57	60	53				S.					57
3.	29 744	29·691	29·439	29 20	[illegible]	29 60	65 3	69 8	54 7			56	59½	49				WNW.					58
4.	29 546	29·775	29·444	28 88		29 61	54 7	73 4	52 7			60·5	54	46½				NNE.	536				57
5.	29 874	29·823	29·753	29 36		29 68	53 2	57 6	47 2			51	59	36				NW.	402				54
6.	29 762	29·725	29·704	29 17		29 63	52 5	56 3	42 8			48	58	33½				SSW.	019				49
7.	29 800	29·734	29·582	29 31		29 37	55 7	58 7	45 8			50	56	34½				ESE.	...				50
☾ 8.	29 800	29·951	29·717	29 16		29 74	60 7	62 0	52 6			60	58½	48½				WSW.	183				54
9.	30 076	30·019	29·959	29 40		29 70	59 3	68 3	56 2			60	61	39½				SE.	.				55
10.	30 066	30·002	29·985	29 31		29 71	63 8	67 4	59 2			64·5	61	56				SE.					59
11.	30 122	30·052	29·976	29 47		29 88	59 8	69 4	57 2			60	61½	55				SSE.					60
12.	30 012	29·923	29·598	29 36		29 75	68 4	74 7	60 6			70	81	55				ESE.					64
13.	29 932	29·843	29·815	29 30		29 79	68 3	78 5	61 0			66·5	80	58				E.					64
14.	29 892	29·803	29·589	29 29		29 75	66 8	75 3	62 0			65	60	59½				SE.					65
● 15.	29 966	29·886	29·847	29 28		29 62	67 7	71 4	62 6			63	66	57				SE.					65
16.	29 910	29·876	29·820	29 27		29 70	65 2	73 0	60 4			62	65	56½				SW.	063				62
17.	30 036	29·967	29·913	29 40		29 85	58 3	69 6	50 6			57	65	52				S.					57
18.	29 964	29·903	29·892	29 43		29 88	54 7	67 7	49 8			56	64	42				E.					56
19.	30 070	30·037	29·972	29 52		30 00	60 5	66 2	50 7			58	66	43									54
20.	30 184	30·109	30·056	29 60		30 10	62 5	68 7	60 0			62	65½	50½									61
21.	30 018	29·969	29·700	29 54		29 90	60 3	70 0	59·7			59	59½	50									61
☽ 22.	29 692	29·627	29·613	29 20		29 55	59 4	67 2	58·2			58·5	59	49									61
23.	29 688	29·617	29·578	29 14		29 47	55 7	66 4	55·4														59
24.	29 578	29·526	29·480	29 05		29 40	58·3	62·2	56·0														53
25		29·481	29·398	28 92		29 26	57·5																
		29·480	29·422	28 94		29 30	58·2																
		29·567	29·471	28 97		29 30	56·8																
				28		28 94	58·2																

the table, afford practice and amusement to the sportsman; but these minute Mammalia are despised even by the native, who moreover, from his custom of suspending all chase of game after dark, is little likely ever to fall in with them.

J. Stuart, Esq., is a surgeon in the army, who has been frequently employed by the Colonial Government in superintending the quarantine to which vessels arriving unhealthy in Port Jackson are subjected. On entering between the heads of this noble firth, every vessel is boarded by the medical officers, and if found in a sickly state, instead of sailing up to Sydney, a distance of about seven miles, she is carried off to the right, and enters Spring Cove, where the passengers are landed at a Lazaretto, established on the north shore. Here they remain under the care of a surgeon for the necessary period; and Mr. Stuart, who has often undertaken this painful charge, has, by means of his admirable skill in drawing objects of natural history, and his powers of accurate observation, been enabled to employ to the advantage of every department of science those spare hours, which otherwise, in the midst of contagion and disease, would have proved so dreary.

From among several great novelties which I have found in his collection of drawings, I have selected the representation (natural size) here given, Pl. VII., of a quadruped which I shall call *Antechinus Stuartii*, and of which Mr. Stuart killed one male specimen at Spring Cove in August 1837. As this specimen has been unfortunately lost, and I have never seen it, I am obliged to describe it from his notes, hoping that the attention of naturalists will be drawn to the animal, and that some further knowledge may soon be acquired with respect to the habits and structure of the species.

Genus Antechinus.

Dentes incisores $\frac{6}{6}$; canini $\frac{1-1}{1-1}$; pseudomolares $\frac{3-3}{3-3}$; molares $\frac{4-4}{4-4} = 44$.

Caput elongatum, rhinario valdè producto. *Aures* grandes ad apicem angustiores obtusæ. *Oculi* mediocres prominuli. *Corpus* pyriforme anticè angustius. *Cauda* teres pilosa gracilis. *Pedes* digitis liberis plantigradi; anticè pentadactyli; digitis tribus intermediis longioribus; posticè pentadactyli digitis secundo et tertio longioribus, pollice brevi, unguibus brevibus acutis.

Antechinus Stuartii.

Antechinus fulvus abdomine artubusque subtùs albescentibus, caudâ ferè corporis longitudinem æquante.

Long. tot. usque ad apicem caudæ $9\frac{1}{2}$ unc.

This genus appears, in its system of dentition, to approach *Phascogale*, but it differs from that and all other carnivorous Marsupials in the formula of the incisors; for those carnivo-

rous *Marsupialia* of which the dentition is known, have all more incisors in the upper than in the lower jaw. In the number of incisors and canines, *Antechinus* agrees with *Centenes* among *Insectivora*, and with the *Ursidæ*, *Canidæ*, and *Felidæ* in general. From its number of teeth and general aspect, I conceive it will, when better known, be indubitably assigned to the group of *Insectivora*.

XXX.—*On two remarkable Marine Invertebrata inhabiting the Ægean Sea.* By Edward Forbes. M.W.S., For. Sec. B.S., &c.*

[With a Plate.]

The harbour of Nousa, in the island of Paros, though of small extent, is extremely rich in marine animals, abounding in Fish of various kinds, Mollusca, Annelida, and Radiata. As the surveying ship Beacon, Capt. Graves, has made this bay its summer quarters, I am enabled to examine its zoology under very favourable circumstances; and, through the kind assistance of the commander and his officers, especially Lieut. Freeland and Mr. Sprat, a number of rare and interesting animals undergo a careful examination daily.

The depth of the bay generally is from seven to ten fathoms; the bottom sand and weed, chiefly *Zostera*; at the entrance there is deeper water, from seventeen to thirty fathoms, with a bottom of corallines. The animals are different, according to the bottom and depth. The coast is generally of rock; in some places mica-slate, in others white marble. There are also a number of sandy bights, which in places where streams run in are crowded with *Cerithia*, in others are inhabited by sand-burrowing bivalves. Mixed with the sand are great numbers of minute Testacea and Foraminifera. In these sandy nooks live two animals, the one an Annelide, the other a Polype, so remarkable on account of peculiarities of form or habit that I have thought it might prove interesting to transmit this short notice of them to the Association, reserving the general natural history of the bay for a connected view of the marine zoology of the Cyclades, which I hope to submit to the Association at a future meeting.

The animals in question are, 1st, a Zoophyte of the family *Actiniadæ* which is free and vermiform, and which lives in a tube of its own constructing, a combination of characters, as far as I know, hitherto unnoticed among the Helianthoid Polypes; and 2nd, a tubicolar Annelide which lives in a strong gelatinous tube, bearing a remarkable analogy to the sac of certain Entozoa.

* Read in the Section of Zoology and Botany at the Meeting of the British Association, Plymouth, and communicated by the Author.

I notice them together, as, in each case, the peculiarity of the organization and habit is the result of a similar adaptation of form in two very distant tribes to a similar locality.

The body of the *Actinia* is cylindrical, terminating posteriorly in an obtuse extremity, anteriorly in a disc, in the centre of which is a circular mouth surrounded by numerous, rather short, linear tentacula, which spring from its internal margin. Round the margin of the disc is another circle of tentacula, thirty-two in number, very long, tubular and simple, resembling the tentacula of an ordinary *Actinia* or *Anthea*. These tentacula cannot be drawn within the mouth, but are highly contractile, and can be shortened to small dimensions. The disc and oral tentacula are white, the marginal tentacula are banded with yellowish brown; the neck or upper part of the body is white, and the remainder to the extremity yellowish brown. The body can be greatly lengthened, so as to assume the form of a worm or *Holothuria*. It is protected by a membranous tube, which is itself strengthened by an incrustation of gravel and shells in the manner of a *Terebellum*. In this tube the *Actinia* can move up and down freely; and when kept for some time in sea-water, the tube being injured, it came out of it altogether, and moved about, twisting its body in the manner of some Annelides. On being supplied with sand and gravel it proceeded to construct another tube, rolling itself in the sand, and secreting glutinous matter for the membranous lining. It eats voraciously, and attacks other animals that come within reach of its tentacula. It lives buried in sand, in places a few inches below the sea-level. Internally its structure is similar to that of others of its tribe. There are eight yellowish ovaries terminating in as many long, contorted threads.

In its habit of protecting itself by sand and gravel it resembles *Actinia viduata* and some other species, none of which, however, construct a regular tube. In its being free, and having no adhesive disc at its posterior termination, it reminds us of *Iluanthos*, a genus of *Actiniadæ* which I discovered three years ago on the Scottish coast, and which I described and figured in the 'Annals of Natural History,' vol. v. p. 181. It is evident the animal I now describe fills up an important gap among the Polypes, and leads to analogical considerations of great interest to the philosophical zoologist.

Whether the second animal I would notice, the tubicolar Annelide, be described, I do not know, but have reason to think it is not. It is one of the most beautiful creatures in a beautiful but much-neglected family. It lives in sand where the sea is three or four feet deep, and its position is indicated by funnel-shaped cavities. At times, in sailing over their ha-

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XXXI.—*On* Epilobium angustifolium, *Linn.*, *and species which have been confounded with it.* By W. A. Leighton, Esq., B.A., F.B.S.E., &c.

Without wishing to derogate in the most remote degree from the merit of Mr. H. O. Stephens and Mr. G. K. Thwaites as the discriminator and discoverer of *Epilobium macrocarpum*, I deem it but an act of simple justice to mention, that Mr. George Jorden, of Bewdley, has for very many years past observed two *Epilobiums* growing wild in the Shropshire portion of the Forest of Wyre, which he has always considered as specifically distinct; one, a large-flowered plant with a short stout capsule, and the other with smaller flowers and a very long capsule, which he considers an undescribed species. From the acute and careful observation to which Mr. Jorden has subjected these plants in the constant opportunities he has availed himself of in studying their habits and structure in their native localities, his opinion of their being distinct species is entitled to very considerable weight, more especially as he has confirmed it by the experience of long cultivation. He writes:—
"To me the specification of plants is not very clear and definite: those plants which are distinct in their Generation ought to be considered Specifically distinct, which, I believe, these two plants ever have been and ever will remain, and likewise in their structure, in the greater size of the flowers and seed-vessel. If I rightly understand the true meaning of Variety, it is the differing of a plant from its parent, and such difference not hereditary. Nature will not be shackled by rules nor bound by systems. I have grown these two plants between thirty and forty years in a highly manured soil, and regularly compared them with specimens growing in their native localities, but never found any perceptible difference in their structure, except that last year the stamens ran into petals from excess of nutriment. I suspect the large-flowered plant is not indigenous to this country by not producing fertile seeds, and its not being found but in few places except gardens; probably it is a continental plant, the plant [*E. angustifolium*] of Linnæus. The small-flowered plant [*E. macrocarpum*] is undoubtedly indigenous, and propagates itself by seed abundantly. This latter plant is grown, I find, in gardens in the neighbourhood of London: I never find it in gardens here, but only the large-flowered plant [*E. angustifolium*], probably furnished from the very old locality near Bewdley, and considered wild by botanists."

In July last Mr. Jorden kindly sent me living specimens and roots of these two plants, from which I then drew up the

following descriptions, which although agreeing in all essentials with Mr. Stephens's characters, will perhaps afford a few additional particulars not altogether uninteresting, as evincing the very close approximation of the two plants in everything except size of the flowers and the form and size of the capsules. Their chief differences are marked in *italics*.

E. angustifolium, Linn.

Stem 3—4 feet or more high, roundish, glabrous, shining, simple, virgate, branched. *Leaves* alternate, on very short petioles, *linear, acuminate, more or less rounded at the base, mucronate, shallowly but distinctly calloso-denticulate,* with a strong central rib, from which smaller lateral ribs are given off in an *oblique* direction, which again unite in curves at a short distance from the margins, dark opake green and wrinkled with veins on the upper surface, pale glaucous green beneath, glabrous. *Racemes* terminal and axillary, simple, leafy, smooth, slightly pubescent above. *Flowers* solitary, on simple densely pubescent *peduncles about equal to the germen,* lower ones in the axils of the upper leaves which diminish upwards into *bracteas,* arcuate in flower, more or less erect afterwards. *Flower-buds linear-oblong, obliquely acute. Sepals* 4, *linear, acute, one-third shorter than petals,* spreading, pubescent externally, glabrous within, purplish-red, 5—7-*nerved. Petals* 4, spreading, *orbicular, suddenly contracted into a short claw,* emarginate, wavy or wrinkled at the margin, pale pinky purple with darker veins. *Filaments* dilated and converging at the base, declined upwards, thickened immediately beneath the anther. *Pollen* triquetrous, occupying *four* divisions in length on a micrometer of $\frac{1}{1000}$th of an inch, pale whitish green. *Capsule scarcely an inch long, linear-oblong, subattenuate at both ends, slightly curved, subpatulous, distinctly* tetragonous. *Pistil* filiform, dilated upwards, *hairy above the base, at first as long as, afterwards one-third longer than, the stamens,* decurved, 4-cleft; *segments circinato-revolute.*

E. macrocarpum, Steph.

Stem 3—4 feet or more high, roundish, glabrous, shining, simple, virgate, branched above. *Leaves* alternate, on very short petioles, *linear-lanceolate, acuminate, somewhat attenuate at the base, acute, entire, obsoletely calloso-denticulate,* with a strong central rib, from which numerous lateral ribs are given off in a *nearly horizontal* and very slightly oblique direction, which are again united in curves at a short distance from the margins; dark opake green and wrinkled with veins on the upper surface, pale glaucous green beneath, glabrous. *Racemes* terminal and axillary, simple, leafy, smooth, slightly pubescent above. *Flowers* solitary, on simple densely pubescent *peduncles shorter than the germen,* lower ones in the axils of the leaves, which gradually diminish upwards into *bracteas,* arcuate in flower, more or less erect

afterwards. *Flower-buds obovate, somewhat attenuate at the base, suddenly contracted at the apex into a compressed curved point. Sepals* 4, *linear-lanceolate, attenuate into an acute point, as long as or slightly longer than the petals*, spreading, pubescent on the exterior, purplish red, glabrous within, 3-*nerved*. *Petals* 4, spreading, *subrotundo-obovate, subattenuate into a short claw*, emarginate, wavy or wrinkled at the margin, bright and deep rose-colour with darker veins. *Filaments* dilated and converging at the base, declined upwards, thickened immediately beneath the anther. *Pollen* triquetrous, occupying t*hree* divisions in length on a micrometer of $\frac{1}{1000}$th of an inch, pale, nearly white. *Capsule about* $2\frac{1}{2}$ *inches long, linear, straight, erect, nearly parallel with the stem, tetragonous, the angles rounded and nearly obsolete*, covered with pale dense minute pubescence. *Pistil* filiform, swollen upwards, *with a few hairs a little above the base, at first shorter than, afterwards as long as, or slightly longer than, the stamens*, decurved, 4-cleft; *segments at first erect, finally revolute.*

Some of these fresh specimens I forwarded with my descriptions to Mr. Borrer, who replies, (August 11, 1841,) "I have been used to the sight of a larger and a smaller *E. angustifolium*, the former in gardens and the latter in our Sussex forests, but it never came into my mind to compare them. I now find the latter to be your No. 1. [*macrocarpum*]; the former I have no doubt is your No. 2. [*angustifolium*], but I am not aware that it is in any Henfield garden. In my own I have the wild one only lately brought in. It agrees, as do my dried specimens, with your No. 1. in every respect, except that the flower-bud has not the remarkable pinched point, or in a few flowers only and in a very slight degree, and the sepals have traces, varying in distinctness, of a second lateral pair of nerves. I have a dried specimen of No. 2. from Mr. Dalton, labelled by him '*E. angustifolium*,' without any mention of the place it came from. Upon the whole, notwithstanding the very remarkable *, I cannot persuade myself that the plants are specifically distinct. I suspect that we have No. 2. [*angustifolium*] wild in the west of Sussex, which I must take the first opportunity of ascertaining."

It would be very desirable that the plants in the Linnæan Herbarium should be ascertained. The synonomy of continental botanists will be difficult to be determined by reason of the form of the capsule not entering into their characters, at least in such writers as I have means of consulting.

W. A. Leighton.

Shrewsbury, Nov. 1, 1841.

* Hiatus in Mr. B.'s letter.—Ed.

2. A circumstance which need only be cursorily mentioned here is the form of the cells in the different intervening steps in combination with the actual perforation of the primary membranes by resorption.

3. Another circumstance is more important. Generally several spiral deposits appear, and the rule is here that the succeeding deposits are arranged conformably with the preceding ones; however some exceptions are known, as for instance, after the first spiral deposit has become changed by the extension of the cell, a new layer is deposited over the whole inner surface and assumes the porous form. The different metamorphoses which are exhibited in such a striking manner by the spiral tubes in the fibro-vascular bundles of Monocotyledons, are explained by the author as resulting from a different extension of the several single elementary organs of these bundles. The distant banded annular vessels are said to be formed first, and in the form of spiral vessels; by the extension of the internodium the development is said to extend towards the exterior, and therefore the outer spiral tubes are wound so closely because the extension of the cells longitudinally is already nearly completed when the spiral deposits take place.

M. Schleiden comes next to the explanation of the production of the annular ducts, concerning which there has been so much written and disputed: he thinks that he has observed that the annular vessels are the cells in which the spiral deposits are earliest formed.

By drawings from the bud of *Campelia Zannonia*, Rich., M. Schleiden endeavours to explain the production of the annular ducts; they are formed out of spiral vessels: two whole whorls of the spiral fibre grow together and form a perfect ring, while the connecting ends of the fibre are corroded and at length completely absorbed by the cell; all the stages of transition are often visible in one and the same vessel, but in more advanced vessels the connecting volution is wholly dissolved. This is M. Schleiden's new hypothesis; I have read it through several times, but am not able to form an idea how rings can be produced from spiral volutions, if the free (eroded, or torn off, or absorbed) ends of the single whorls of the late spiral fibre do not join together. In the porous cells of the *Coniferæ* M. Schleiden thinks he has seen, in *Pinus sylvestris*, even in the latest zones, the cambium-cells before the formation of pores divided by fine black lines into narrow spiral bands, and these vanish when the pores are formed; of course, adds M. Schleiden, the primary wall of the cell being perfectly homogeneous. [I may be allowed to ask here, how

M. Schleiden convinced himself of the homogeneousness of this membrane. I formerly made known, that in old coniferous wood there is often an actual splitting of the entire walls of the cellular membrane, always in the direction of the juncture of the spiral bands of which the walls are composed, and that these clefts, which are often very large, always pass through the pores.]

The reticular figures on the bast-cells of the *Apocyneæ*, M. Schleiden derives from the superposition of two very fine layers which consist of oppositely wound spirals; and finally, he makes some remarks on the direction of the windings of spirals. M. Schleiden has laid down the following rule:—Of all spiral formations which are developed simultaneously, those which lie together in the direction of the radius are homodromous, those which lie together in the direction of the parallels to the periphery are heterodromous. As exceptions are mentioned the annular and spirally fibrous cells of the *Cacti*; but as confirmatory of the first statement, the general crossing of the pore-clefts of neighbouring cells, which was first observed by me, is brought forward.

M. Mohl* has endeavoured to disprove some of the views of M. Schleiden with which he does not agree, particularly that one, as M. Mohl says, which has extended to the present time, but is perfectly false, viz. that the annular vessels are produced from spiral vessels. He says, that even since the appearance of Schleiden's new theory, he still adheres to his former statements with regard to their origin.

M. Mohl first gives some descriptions of the structure of the spiral and annular fibres in their perfect state, in order to make clearer some points which M. Schleiden in his observations on the formation of the annular tubes had stated incorrectly; he describes particularly the lines and grooves which are often seen on the broad fibres of the *Commelineæ*. Sometimes these lines and grooves penetrate the whole thickness of the fibre, so that it is divided in some places into two or three fibres, and these either proceed in their course parallel to each other, or then join again after a longer or shorter course, or one of these fibres passes in a more perpendicular direction than the others, and joins the next whorl of the fibre.

The direction of the winding of the spiral fibre is next spoken of: he had formerly shown that the spiral vessels are generally wound to the right, and he states that he cannot agree with M. Schleiden and other phytotomists who main-

* Flora von 1839, p. 673—685, &c. Translated at p. 16 of our present volume: see also Dr. Schleiden in reply at p. 25.

tain that spiral vessels are indifferently wound either right or left. He finds left-wound vessels so extremely rare, that they may rather be regarded as exceptions to the rule. In a vascular tube in a gourd, M. Mohl saw that the different divisions of the spiral fibre which are separated from each other by rings were wound in opposite directions.

M. Schleiden demonstrated his new view of the formation of the annular ducts principally by means of the young shoots of *Campelia*; M. Mohl found, however, the roots of *Commelina tuberosa* much better, and gives excellent figures on the subject. All the modifications which have been observed under which the rings appear in the vascular tubes of this plant are fully described, and their connexion with the spiral fibre explained. According to my idea, M. Schleiden had quite correctly stated that the line of division in the broad spiral fibres of the *Commelineæ* is caused by two whorls of the fibre growing together, or in other words, that those spiral fibres consist of two fibres which lie close and parallel to each other; however M. Mohl makes objections to this, but which I cannot quite clearly understand.

M. Mohl found, as others have done, that the rings in the annular tubes are generally quite unconnected with each other, but that the connecting fibres of the rings (when such exist) do not stand in any determinate relation to the breadth of the annular fibres. [This is however in general the case only in the broad and compound spiral fibres of the *Commelineæ*.—*Mey.*] During the formation of the annular tubes in the stem of *Commelina tuberosa*, M. Mohl thinks that he observed distinctly that these tubes at their first appearance were not spirally wound, but that the fibres formed, as in the perfect vessels, isolated rings of different breadths, or else rays between which were seen some spiral fibres, so that, with exception of the small thickness and the short distance between the rings, there was no difference between these young vessels and the fully developed ones. This formation could be still better followed, step for step, in the roots of the *Commelina*; and from these observations M. Mohl draws the conclusion, that annular ducts, spiral vessels, and reticular vessels are three very nearly related forms which pass into each other, but that they cannot be regarded as temporary grades in the metamorphosis of the same vascular tube.

Much has been said in the former reports concerning this metamorphosis of the spiral into annular fibres, and it is to be hoped that the discussion will soon be ended; all that M. Mohl has brought forward against the new theory of Schleiden I myself can fully confirm, if that were necessary, both by former

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which projects out of the earth contains the smallest quantity of sugar, but often exhibits a large number of crystals, which are also very commonly found in the leaves of this plant.

In the report published in Berlin, 1838, p. 21, we announced M. Decaisne's excellent work on the *Lardizabaleæ*, which has now appeared*. M. Decaisne speaks at large on the anatomical structure of the stem of the *Menispermeæ* and the *Aristolochiæ*, in order to show that the arrangement of the natural families cannot be effected by means of the *structure* of the plant. The porous tubes of the *Coniferæ* and *Cycadeæ* have been found in *Gnetum* and *Tasmannia*, &c.; he moreover shows that Prof. Lindley made a great mistake in stating the structures of the *Menispermeæ* and *Aristolochiæ* to be similar, and that the want of zones in the stems which he examined led him to consider the *Menispermeæ* as standing in the middle between the Mono- and Dicotyledons. M. Decaisne then describes the structure of the wood of *Aristolochia labiosa*, *Ar. sypho*, *Ar. clematitis*; the latter is exactly similar to the first. He also examined *Menispermum canadense* and *Cocculus laurifolius*, and draws the following conclusions:—1. That the *Menispermeæ* are developed differently from the other Dicotyledons: annual zones are not present; each ligneous fascicle remains simple, and the bast when once formed does not visibly enlarge. 2. That the single ligneous fascicle of the *Menispermeæ* cannot be compared with those of the Monocotyledons, as is done by Prof. Lindley, for they increase annually, and are placed regularly around the pith; moreover the bast takes no part in their formation. 3. Some plants, as for instance *Cocculus laurifolius* and *Cissampelos Pareira*, have a very anomalous structure; and M. Decaisne here describes that of the stem of *Cocc. laurifolius*, which is quite similar to that of *Cissampelos* which I have described in my 'Physiology,' vol. i. p. 374. In *Cocc. laurifolius*, as in the Dicotyledons, a layer of spiral tubes the fibre of which could be unrolled was found only in the first deposit of wood, and close to the pith. Finally, 4. M. Decaisne declares that the *Aristolochiæ* cannot, on account of their structure, be so strictly classed with the *Menispermeæ*: their ligneous fascicles divide towards the bark; and the bast, which in a young state forms a circle, divides afterwards into two nearly equal parts, and these divide and subdivide again as the diameter of the branch increases; but the bundles of bast always bear a relation to

* Archives du Muséum d'Hist. Nat., i. Paris, 1839, p. 143.

the number of the ligneous bundles which have been formed by the above-mentioned division.

M. Schleiden has published 'Botanical Notices' (Wiegmann's Archiv, i. p. 211), in which several points of anatomy and physiology are treated of; I must refer the reader to the original treatise.

Observations on the presence of certain assimilated and secreted substances in Plants.

M. Morren* has published a short memoir on the presence of fatty and volatile oils in the cellular tissue of different plants, wherein attention is directed to several new facts. The author first gives a view of the results of observations on this subject, extracted from my works, and mentions that fatty or fixed oils are only formed *within the cells*, while the æthereal oils make their appearance in peculiar, more complicated organs, as in glands, oil-channels, &c. M. Morren says, that from this one might believe that the æthereal oils, on account of their many peculiarities, are more perfectly elaborated, and therefore require peculiar organs for their formation, while the simple fatty oils are produced in the common cells. However these statements are not complete, for in my 'Physiology,' vol. ii. p. 493, it is stated expressly, "The secretion of these volatile oils takes place in peculiar glands, either simple or compound; but in greater quantity in the internal glands. *In general however the volatile oil is deposited in the common cells of the different parts of the plant, where it appears in the sap more or less plainly in the form of small oily drops or even in large masses.* This is almost always the case in the petals, and it is very rare that the oil is secreted in internal glands." M. Morren observed the presence of drops of an æthereal oil in the cells of the epidermis of the stamens of *Sparmannia africana*, where it was first yellow and afterwards became red, and it is stated, that during the formation of this oil, the walls of the cells became thickened. Also in the cells of the epidermis of the upper surface of the leaf of *Ophrys ovata*, M. Morren found an æthereal oil, but it appears that it is only there during the time the plant is in blossom. [In another of the *Orchideæ*, namely, in *Pleurothallis ruscifolia*, in the cells of the upper epidermis of the leaves, I have observed an oil, which had some similarity with a fatty oil.—*Mey.*] For at a later period M. Morren could not discover it, and therefore he says that these observations prove to a certainty that the æthereal oil is formed in the cells and preserved there some

* Bulletin de l'Acad. Roy. de Bruxelles, vi. No. 6.

time, until it is absorbed in order to grease the cuticle (le derme), so that it may not be wetted by the rain. As yet, it has always been believed that the bluish wax-like substance which is found on plums executes this office; however he now begins to believe that it is the æthereal oil which is formed in the cells and then exudes.

In the epidermal cells of the leaves of *Colchicum autumnale*, M. Morren also found an oil (in spring), which did not move in water as the oils in the two above-mentioned plants did, and therefore it is probably a fatty oil; M. Morren thinks that this also exudes through the walls of the cells to the cuticle and protects it from rain. In the oily seeds of *Linum austriacum*, *Papaver spectabile* and *Brassica campestris oleracea*, it appeared to M. Morren that the oil was between the cells, and that within them there was no trace of it. Finally M. Morren mentions the large-stalked glands of *Passiflora fœtida* as secreting an æthereal oil on the surface. This is however by no means uncommon, and is the case more or less with all such stalked compound glands, and I have described the same in the simple glands on the surface of *Melissa officinalis*.

In a short memoir M. Morren* has described the circumstances under which gum is found in the reservoirs in the leaf-stalk of the *Cycadeæ*; he remarks, that when one cuts off the frond (wedel) of this plant so that more or less of the leaf-stalks remain on the stem, the gum exudes on this surface from the gum-passages; and that from this it follows that the gum ascends from the stem into the frond, but does not, as physiologists have up to this time believed [??], descend from the leaves into the stem. If the stumps of the leaf-stalks are only two or three inches long, the gum exudes in the form of a long vermicular body; M. Morren observed it two or even above four centimetres long; in all experiments the gum was seen to proceed upwards, but not downwards. I have repeated several of these experiments and certainly found them to be correct, but I have also made some others which perhaps likewise explain the phænomenon. If a strong frond be bent into pieces six to eight inches long, and these inverted in water, the exudation of gum from the openings of the reservoirs is observed; but here it passes downwards, and it seems to me that it may be explained by assuming an absorption of water by which the gum is expanded, and thus a quantity is forced out of the upper opening. When the gum exudes from the stumps left on the stem, one may suppose that a quantity of the nutritive

* Bulletin de l'Acad. Roy. de Bruxelles, vi. No. 8.

minated, every denticle seeming to be on fire." I have lately discovered that it is not only *probable* that many others exhibit the same phænomenon, but that it is absolutely certain that they do so. I had thought that in making the experiment it would be necessary to put the sea-weed to which the *Sertularia* was attached into a vessel of sea-water, but I find that it can be made with less trouble.

About two months ago I brought from the shore in a pocket *vasculum* or tin box, some Zoophytes attached to sea-weeds, and laid the vasculum on the lobby table till I should have leisure to examine them. When night came I put my hand into the vasculum to remove some of the Zoophytes for inspection, and on moving them I found to my surprise and delight that they began to sparkle. Remembering what I had read in the extract given above, as I took them up, I gave them a hearty shake, and they instantly became quite brilliant, like handfuls of little stars or sparkling diamonds. To ascertain what were the Zoophytes that emitted this phosphorescent light, it was necessary to take them up singly by candle-light, and afterwards to make the experiment in the dark. The first I tried was *Valckeria cuscuta*, with which I was successful. From *Sertularia polyzonias* and *Cellularia reptans* little light arose; *Laomedea geniculata* was very luminous, every cell for a few moments becoming a star; and as each polype had a will of its own, they lighted and extinguished their little lamps, not simultaneously, but with rapid irregularity, so that this running fire had a very lively appearance. *Flustra membranacea* also was very beautiful, though very different from the former; for as the cells are so closely and regularly arranged, it exhibited, when shaken, a simultaneous blaze, and became for a little like a sheet of fire. With *Flustra pilosa* I was very successful. That variety of it which is spread on a flat surface, and which, from the form that the polypidom assumes, is the *Membranipora stellata* of Thompson, on being bent or shaken, became doubly entitled to the name of *stellated*, for every polype in its cell lighted up a very brilliant little star, and for a short time the polypidom became like an illuminated city.

After some days, I repeated the experiment with other Zoophytes, and with similar success. A third time I brought home a well-filled vasculum; but as I happened to be otherwise occupied, it was allowed to lie unopened for five or six days, when, thinking that the Zoophytes would be dead, I cast them out along with the sea-weeds to which they were adhering. They lay in the open air for a night and a day, and as it rained heavily during the whole time, weeds and Zo-

ophytes were constantly drenched. When the second night had set in, I thought I would try whether there were any symptoms of remaining life. I shook *Laomedea geniculata*, but its tiny fires were quenched. *Membranipora stellata* lighted up just one bright star; and *Flustra membranacea* shed one faint gleam of light, and refused to repeat the fire, however much shaken.

About a week after, I brought home a fresh supply; and on repeating the experiment, not only did the Zoophytes sparkle, but my fingers in handling them became brilliant, being adorned with little stars.

The next time I made trial of these "minims" was in the end of October, when a very frosty morning had been succeeded by a very sunny day. On that occasion *Sertularia polyzonias*, *Cellularia reptans*, *Flustra membranacea*, and *Membranipora stellata* would emit no light. As the specimens had lain for hours on the shore exposed to the morning frost and the midday sun, it is probable that the polypes were dead. *Laomedea geniculata* was taken up quite moist and fresh, having been covered with sea-weeds; and when the darkness of evening came, not only did they brightly sparkle when roughly handled, but they emitted a strong smell of phosphorus. On being allowed to rest, they immediately ceased to be luminous; and though on being shaken or pressed with the fingers they shone forth again, if often repeated the light became fainter.

On this occasion I made an experiment with a creature belonging to another department. Having found a very large specimen of *Botryllus Schlosseri*, one of the *Mollusca tunicata*, I subjected it to the *experimentum crucis* by shaking it roughly in the dark, and I had the satisfaction of seeing that it was as much disposed as the Zoophytes to resent the insult. In this case, however, it was not the sparkling wrath of a pigmy multitude, but the overspreading glow of one massy creature, which all shone, though with a lurid and sullen-looking fire.

The last time I repeated the experiment was in the beginning of the present month of November. I tried *Sertularia pumila*, the Zoophyte mentioned by Mr. Stewart as phosphorescent; but though roughly shaken, it remained dark. I was equally unsuccessful with several others; but the tiny polypes had lain for hours on the shore, under a November sky, and the spark of life I suppose had become extinct. A specimen of *Laomedea geniculata*, which from being covered was quite fresh, was as brilliant as usual, and emitted as formerly its phosphoric odour. I tried for the first time the elegant *Plu-*

mularia cristata, and though it had been too long exposed to the cold air, it emitted, on being shaken, a little light. Only a few of the denticles sent forth their stars, and they were very minute, and of a darker red.

From these experiments, may we not surmise that the power of emitting phosphoric light is more generally possessed by the inhabitants of the deep than we are apt to imagine? We are not yet at liberty to say that it is possessed by all marine Zoophytes; but certain it is that it is by many. Neither are we entitled to say that it is possessed by all *Mollusca tunicata*; but we know for certain, what I think was not known before, that it is the property of one of them; and what is possessed by one, may also belong to more. As little are we entitled to say that it is possessed by all the little *Medusæ* which as transparent jellies abound in the sea; but as it is known that it is possessed by some of them, may they not in general be phosphorescent when agitated? And as they are at times very numerous in the sea, may not the beautiful phosphorescence of sea-water at certain seasons, when put in motion, be owing to them and to marine Infusories, which in numbers numberless are found in the deep? And is it certain that it is not possessed by some fishes? The first time I spent a summer night at sea was in the herring fishing season; and the sailors showed me how to ascertain whether the herring shoals were near at hand. When a smart blow was given to the vessel, the percussion was communicated to the deep, and immediately a flash of light was seen at a considerable depth, and this the sailors assured me was from the shoal of herrings. If this was phosphoric light emitted by these finny wanderers, then is this phosphorescent quality possessed by Zoophytes, *Medusæ*, *Mollusca tunicata*, and fishes. D. L.

XXXIV.—*Remarks on the Fruit of the Natural Order* Cucurbitaceæ. By Robert Wight, M.D., F.L.S., &c.*

The order *Cucurbitaceæ* is perhaps one of the most curious and inexplicable in the system of plants, and though at different times much studied by several eminent botanists, is still imperfectly understood; at least if we may judge from the fact, that no two writers on the distribution of plants according to their natural affinities seem to agree as to what families are its nearest allies. It is not now my intention to examine

* From the Madras Journal of Literature and Science, No. 28, p. 43.

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that by losing the general character of dissepiments they might almost be said to disappear; and thus at first sight a pepo would be said to be, and has been so described, a one-celled, fleshy, indehiscent fruit, with parietal placentæ, that send out sometimes false dissepiments towards the axis, as the cucumber and gourd."

This view, therefore, is essentially different from Dr. Lindley's; for, according to Arnott, the placentæ are virtually central, not parietal; the only difference between a pepo and an apple being, according to him, that the placentiferous margins of the carpellary leaf are introflexed, and extend outwards nearly to the parietes of the fruit, in place of remaining in the axis. Lindley, on the other hand, views a pepo simply as a one-celled fruit with parietal placentæ, the cavity being occasionally divided into spurious cells by projections of the placentæ. Neither are altogether consonant with appearances, though that of Arnott appears the most so; but both, in common with all others that have yet been promulgated, are incorrect both as to theory and fact.

While our ideas of the structure of the most essential organ of the plant, with reference to natural affinities, are thus vague, can it be matter of surprise that we are unable to trace its relations, and determine its affinities in the system of plants?

What then is a peponida? I have said above that it is neither a one-celled fruit with parietal placentæ, nor a three-celled one with introflexed central placentæ. But before I can say what it is, and point out the difference between it and a fruit of the usual construction, it is necessary to state what the usual structure is. This I shall do by means of a short extract from Lindley's 'Key to Structural Botany.'

"354. A CARPEL is formed by a folded leaf, the upper surface of which is turned inwards, the lower outwards; and the margins of which develope one or a greater number of buds, which are the ovules.

"355. When the carpels are stalked, they are said to be seated upon a *thecaphore*, or *gynophore*; Ex. *Cleome*, *Passiflora*. Their stalk is analogous to the petiole of a leaf.

"355 *a*. When the carpels are all distinct, or are separable with facility, they are *apocarpous*; when they all grow into a solid body, which cannot be separated into its constituent parts, they are *syncarpous*.

"356. The ovary is the lamina of the leaf.

"357. The style is an elongation of the midrib (174.).

"358. The stigma is the denuded, secreting, humid apex of the midrib.

"359. Where the margins of the folded leaf, out of which the carpel is formed, meet and unite, a copious development of cellular tissue takes place, forming what is called the *placenta*.

"360. Every placenta is therefore composed of two parts, one of which belongs to one margin of the carpel, and one to the other.

"361. As the carpels are modified leaves, they necessarily obey the laws of arrangement of leaves, and are therefore developed round a common axis.

"362. And as they are leaves folded inwards, their margins are necessarily turned towards the axis. The placentæ, therefore, being formed by the union of those margins, will be invariably next the axis."

From this we learn, in few words, that the carpellary leaf is always so folded that its midrib is towards the circumference, or forms the dorsum of the cell or carpel, while the placentiferous margins are placed in the axis; that the difference between a one-celled and many-celled fruit merely consists in the placentiferous margins of the carpellary leaves of the former not extending inwards to the axis, but stopping in the circumference and bearing their ovules attached to the walls of the cell—hence *parietal*. This position of the carpellary leaf is so constant, that the possibility of an inversion of this order of things in a pepo seems never to have entered into the calculations of any one of the numerous botanists who have given their attention to the investigation of the structure of this curious fruit; and yet such is simply the case. In a pepo the normal position of the midrib of the carpellary leaf is reversed, that is, is placed in the axis, and the placentiferous margins towards the circumference. That such is actually the case requires no argument to prove; we have only to cut the ovary of any true cucurbitaceous plant to be made sensible, at a glance, that it is so; though I confess that in none have I seen it so clearly made out as in *Coccinia indica*, owing to the carpels of that species remaining distinct, merely held together, not as usual by cohesion between the respective carpels, but by the tube of the calyx in which they are enclosed. Did I wish to illustrate the theory by means of a diagram, I could not devise one more perfect than a simple section of the ovary of that plant, merely extending the natural divisions, by dividing the calyx, so as to allow each of the carpels to be slightly separated in the representation, to facilitate the demonstration. This, however, is I think even unnecessary, for with the clue to the true structure which this species furnishes, there can no longer be any difficulty in understand-

ing it from the examination of any genuine species of the order*.

What effect this new exposition of the structure of the ovarium may have on the determination of the affinities of this order, I am, up to the present time, quite unprepared to say; but of this I feel certain, that, in so far as structure is concerned, they are as far removed from all their now reputed allies, as their peculiar habit removes them from all the parietose families, except *Passifloræ*, among which Bartling, Endlicher and Lindley have placed them. This very unusual structure, in short, marks them as a peculiar order, the affinities of which have still to be sought for.

I am equally unprepared to say to what extent this unlooked-for structure may influence our views in regard to other anomalous orders, especially those with solitary carpels; since, having established the fact that the usual structure may be inverted, it will naturally lead to new investigations, which may prove that the solitary carpels of *Leguminosæ* are not, as now supposed, necessarily the result of constant abortion of one of two carpella, but may be explained on some other theory more consonant with the almost invariably observed structure in that large and interesting order; which, like *Cucurbitaceæ*, stands an isolated family in the system of plants, through this one remarkable peculiarity,—a peculiarity so constant, in this tribe, that it goes far to prove the existence of that botanical nonentity, a terminal leaf. But, being unprepared to offer any matured opinions on these points, I forbear further speculation, and shall at once proceed with the Conspectus; trusting however, ere long, to be able to re-enter more at large on the consideration of this interesting inquiry.

The subjoined remarks I copy from the article *Cucurbitaceæ* in my forthcoming Number of the 'Illustrations of Indian Botany.'

"The following explanatory extracts from the letter which accompanied the Conspectus may not inappropriately be introduced.

"'I have lately been revising our East Indian *Cucurbitaceæ*, in consequence of Schrader's paper in the 'Linnæa,' vol. xii. At first I was inclined to consider it worse than useless to subdivide old genera, especially *Bryonia*, as he has done; but

* After this paper was in the printer's hands, it was suggested that some illustrations were desirable to render the verbal description more easily understood. The accompanying figures representing the three different forms of ovaries—one-celled with parietal placentæ, several-celled with central placentæ, and a peponida—were therefore prepared.

"Section 6 might with advantage be suppressed, and its only genus referred to section 5. Sections 7 and 9 would be better united, the anthers being the same in both; transferring, however, *Cucurbita* to section 8, on account of the anthers, which are similar to those of *Trichosanthes*, making the insertion of the filaments a matter of secondary consideration —a generic, not a sectional distinction.

"The difference between sections 7 and 8 would then be, not that in the former the anther is lobed and in the other entire, but that in section 7 the back is traversed by an elevated gyrose ridge, on the top of which the long gyrose anther is placed; while in section 8 there is no such elevation, the anther-cell being sunk into the substance of the connectivum, not elevated on a ridge with a deep furrow between each bend. To this may be added, that the connectiva in section 8 are elongated; hence, from the union of the three, a cylinder results, while in the other their union produces a sort of capitulum.

"*Bryonia Garcini*, doubtfully referred to *Bryonia*, is a new species of *Pilogyne*: *Bryonia leiosperma*, I find, from the examination of dried specimens, is a second species of *Mukia*, with which it agrees well in habit.

"Notwithstanding these differences of opinion, it is not my intention to alter the Conspectus, but print it simply as it reached me, the few additions I have to make being included within brackets—thus [ ]. Before proceeding further it may be well to explain what is meant by the term tri-adelphous, as applied to this family, which is of such frequent occurrence in the following characters. The normal structure of *Cucurbitaceæ* is to have five stamens, in place of which we usually find only three; but when these are carefully examined, it appears that two of them are twice the size of the third, and are actually made up of two united: each set is then called an adelphia or brotherhood, and the three together, tri-adelphous. This structure is readily seen in the *Pekunkei* (*Cucumis acutangulus*, Ainsley), where the anthers do not cohere. In those where they do cohere it is not so clearly seen, as they then require to be separated artificially before it can be made out.

"In some genera the anthers are described as being one- or two-celled: these characters require to be used with caution, as being generally of very difficult application in practice. Theoretically every anther is two-celled; and here, in examining a number of instances with particular care, under a high magnifier, I have found most of them actually two-celled, though on less careful examination they appeared only one-celled. If such is the case when examined with fresh speci-

mens, how much more liable to error must we be when working with dried ones!

CONSPECTUS, OR ABRIDGED CHARACTERS OF THE GENERA OF THE TRIBE CUCURBITEÆ* OF SCHRADER.

§ 1. *Filaments* 5, *inserted on the throat of the corolla; anthers distinct or* 3-*adelphous, anticous, straight; fruit baccate, few-seeded.*

1. Coniandra (Schrad.). Corolla 5-partite; connectiva conniving, oblong, conical; fruit beaked. *South Africa.*
2. Cyrtonema (Schrad.). Limb of corolla 5-partite; filaments 5, incurved; connectiva incrassated, 3-adelphous; anthers fixed laterally under the apex. *South Africa.*

§ 2. *Filaments di- or tri-adelphous, inserted on the tube of the corolla; anthers lateral, straight,* 2—3-*adelphous.*

3. Sicydium (Schlecht). Corolla 5-petaled, petals undivided; filaments 3-adelphous, dilated and incurved at the apex; anthers without a beak. *Mexico.*
4. Bryonopsis (Arn.). Corolla 5-partite; lobes obovate, entire, undulated; filaments 3-adelphous, inserted on the throat, straight; anthers pointless; stigma fringed; berry few-seeded. *East Indies—Courtallum.*
5. Achmandra (Arn.). Lobes of the corolla undivided; filaments tri-adelphous, very short; anthers anticous, inserted along the margins of the connectivum, linear, oblong; connectivum prolonged into a short beak beyond the anther; fruit baccate (always?) beaked. *East Indies. Bryonia epigæa, rostrata, deltoidea, and an undescribed species from Malabar.*

Obs. Perhaps this and the two last genera might be joined to *Melothria.*

6. Melothria (Linn.). Lobes of the corolla undivided, denticulated; filaments 3-adelphous; connectivum pointless; fruit baccate, not beaked. *America.*

Obs. Schrader notices an East Indian one, but that may perhaps be an *Achmandra.*

7. Ceratosanthes (Schrad.). Lobes of the corolla linear, bifid; filaments 3-adelphous. *America.*
8. Anguria (Linn.). Lobes of the corolla entire; stamens di-adelphous; fruit somewhat 4-angled. *America.*

§ 3. *Filaments* 3-*adelphous, inserted on the top of the tube; anthers all cohering by means of their connectiva, and applied at the back along the margins of the connectiva, sigmoid.* 2-celled. (?)

9. Schizostigma (Arn.). Style simple; stigma peltate, fleshy, cleft

* This tribe contains all the East Indian genera except *Zanonia.* Schrader refers *Erythropalum* of Blume to *Cucurbiteæ*, but that genus is very closely allied to *Mackaya* (Arnott in Jardine's Mag. of Zool. and Bot., vol. ii.), and does not belong to the order.

into 10—12 radiating linear lobes. *Andes of Mendosa.* (*Cucurbita asperata*, Gill.)

§ 4. *Filaments distinct or* 3-*adelphous, inserted on the throat of the corolla; anthers* 6- *or* 3-*adelphous, gyrose, anticous.*

10. Sphenanthe (Schrad.). *Mexico.*

§ 5. *Filaments* 3-*adelphous, inserted at the base of the corolla; anthers lateral, straight,* 3-*adelphous.*

11. Pilogyne (Schrad.). Calyx campanulate; segments of the corolla patent, much longer than the calyx; anthers 1-celled; style entire; stigma 1, pileate; fruit baccate, few-seeded, obtuse. *South Africa.* [*East Indies—Bryonia Garcini* ?]
12. Zehneria (Endl. ?). Lobes of the corolla quite entire; style trifid; stigmas 3, flabelliform, quite entire; fruit baccate, few-seeded, blunt. *South Africa, East Indies,* and ?*Norfolk Island.* —*Bryonia Mysorensis, B. Hookeriana.*

Perhaps this is only a subgenus of *Pilogyne.*

13. Karivia (Arn.). Calyx urceolate; corolla scarcely exserted; lobes minute, quite entire; anthers 2-celled; style entire; stigma pileate, 3-fid; fruit a peponida, many-seeded, blunt, or with a short thick beak. *East Indies, Bryonia umbellata. B. amplexicaulis.*
14. Rhynchocarpa (Schrad.). Lobes of the corolla denticulate, ciliated; style trifid; stigmas 3, jagged and toothed; fruit with a long slender beak. *Guinea.*

§ 6. *Filaments tri-adelphous, inserted at the base of the corolla; anthers all cohering, posticous, linear, straight.*

15. Mukia (Arn.). Style entire; stigmas 3, more or less cohering, erect; anthers distinct, 1-celled, lateral: [connectivum prolonged, forming a projecting point: a globose abortive ovary in the bottom of the calyx.] *East Indies—Bryonia scabrella.* [*B. leiosperma.*]

§ 7. *Filaments* 5- *or* 3-*adelphous, inserted at the base of the corolla; connectiva toothed or lobed; anthers applied at the back along the margins of the connectivum, and therefore flexuose, gyrose, or anfractuose.*

16. Bryonia (Linn.). Corolla 5-cleft; anthers tri-adelphous, 1-celled; style trifid; stigmas subreniform or bifid; fruit ovoid or globose, baccate, few-seeded. *Europe* and *East Indies—B. laciniosa,* India. *B. alba, B. dioica,* Europe. Perhaps also *B. Garcini* and *leiosperma,* but of these I have no male flowers by me to examine. [*B. Garcini.* Stamens tri-adelphous, 1-celled; cells linear, marginal, not sigmoid, anticous; style one; stigma dilated, peltate; ovary few-seeded; pepo inverse, reniform, 2-seeded. This is probably a new genus; but if not, seems to belong to *Pilogyne* rather than any other here. It cannot possibly belong to *Bryonia.*]

In the European plants, the type of the genus, there are two ovules

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perly speaking the stigmas subulate, as they cohere nearly to the apex by their central face, though the stigmatic surface extends for some distance outwardly, and presents a somewhat subulate outline.]

I reunite *Involucrarea* to this as a mere section depending on the bracteas, the character taken from the anther not holding good, at least *T. cucumerina* has frequently the anthers all united, and I suspect also *T. anguina*; perhaps they only become tri-adelphous after fecundating.

[In *T. anguina* they are never tri-adelphous, the anthers cohere to the last as represented in the accompanying figure. This last species, with *T. globosa* and *trifoliata*, Blume, and *Involucrarea*, Serange (*T. Wallichana*), form a very characteristic section, perhaps a subgenus, distinguished by their curiously bracteated male flowers.—R. W.]

24. Gymnopetalum (Arn.). Calyx constricted at the mouth; corolla (yellow) 5-parted; segments quite entire; anthers all closely cohering; fruit baccate, ovate, beaked, few-seeded; seeds large, roundish, with a blunt margin. *East Indies*. There are two species:—

1. *G. Ceylanicum* (Arn.). Leaves deeply 5-lobed; perianth glabrous. *Bryonia tubiflora*. W. and A.
2. *G. Wightii* (Arn.). Leaves 3—5, angle-lobed; perianth hairy. *Courtallum*.

§ 9. *Filaments usually tri-adelphous, inserted at the base of the perianth; connectiva entire, unless when produced into appendages beyond the anthers; anthers linear, posticous, bent upwards and downwards* (*calyx campanulate or rarely infundibuliform*).

25. Cucumis (Linn.). Corolla 5-parted; anthers tri-adelphous, or all of them slightly cohering, with appendages at the apex! Peponida fleshy, indehiscent, or rarely irregularly dehiscent, polyspermous; seeds ovate, compressed, sharp-edged. *Asia*, *Africa* and *America*.
26. Cucurbita (Linn.). Corolla campanulate, 5-cleft; filaments tri-adelphous at the base, or quite mon-adelphous; anthers all cohering, without appendages; peponida fleshy, indehiscent, polyspermous; seed with a slightly thickened edge. *Asia* and *America*.
27. Elaterium (Linn.). Petals scarcely united at the base; filaments mon-adelphous; anthers all cohering; style thick; stigma capitate; fruit a coriaceous, 1-celled, few-seeded capsule, bursting elastically by two or three valves. *America*.
28. Schizocarpeum (Schlch.). Corolla infundibuliform, quite entire; filaments 3-adelphous; anthers all cohering; peponida many-seeded, bursting by several valves that cohere by their apex. *Mexico*.
29. Coccinia (W. and A.). Corolla campanulate; segments acuminated; filaments mon-adelphous; anthers tri-adelphous, conniving, without appendages; peponida somewhat baccate, many-seeded. [Usually of an oblong oval shape, and bright red when ripe.] *East Indies*.

§ 10. *Filaments mon-adelphous, connate into a column, which is capitate at the apex, and then bearing the gyrose posticous anthers.*

30. Cephalandra (Schrad.). *South Africa.*

EXPLANATION OF THE FIGURES.

Fig. 1. A tricarpellary 1-celled ovary; that is, the placentiferous margins of the carpellary leaves meeting in the circumference, and bearing their ovules on the walls or parietes of the cell.

a. Supposed position of the midrib. *b.* Placentæ parietal.

Fig. 2. A tricarpellary 3-celled ovary, the laminæ of the carpellary leaves folded inwards until they meet in the axis, and there produce ovules.

a. Supposed position of midribs. *b.* Placentæ axillary.

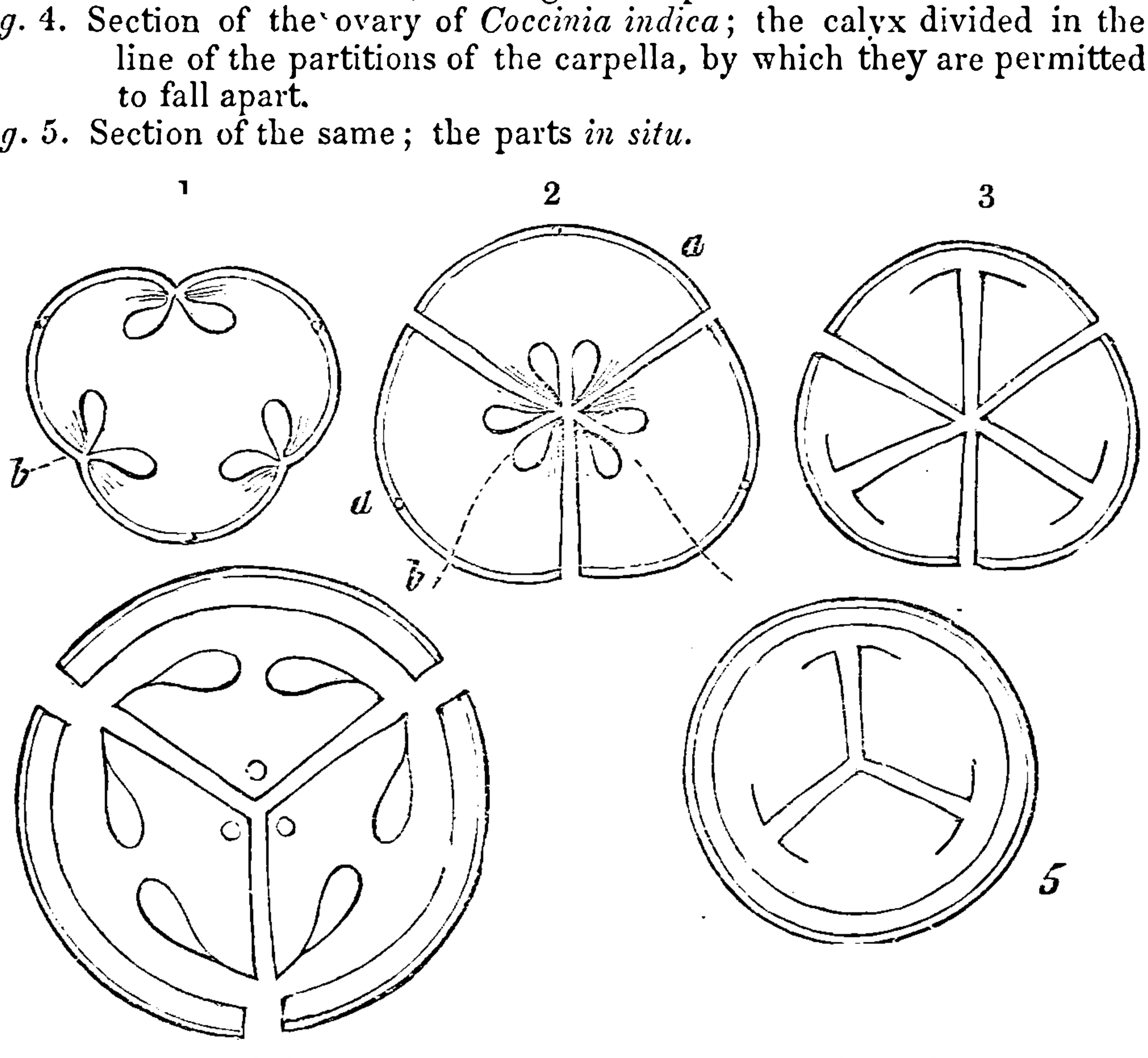
Fig. 3. An imaginary section of a *pepo* explanatory of Dr. Arnott's theory of its construction; copied, but with some modification, to render it more explanatory, from his figure in the Encycl. Brit.

a. Supposed position of the midrib.

b. The placentiferous margins represented introflexed, reaching nearly to the dorsal suture, dividing the carpel into two cells.

Fig. 4. Section of the ovary of *Coccinia indica*; the calyx divided in the line of the partitions of the carpella, by which they are permitted to fall apart.

Fig. 5. Section of the same; the parts *in situ*.



Obs.—The original is also accompanied by dissections of *Momordica Charantia, Trichosanthes anguina, Cucurbita maxima, Coccinia indica, Lagenaria vulgaris, and Mukia scabrella,* prepared with the view of showing that sections 7 and 9 are not distinguishable by the characters assigned, the anthers being lobed or entire; and that, by taking our characters rather from the form of the anthers than the insertion of the filaments, *Trichosanthes* and *Cucurbita* might be advantageously placed in the same section, leaving the character taken from insertion available as a generic distinction between them.

XXXV.—*Insectorum novorum Centuria, auctore* J. O. Westwood, F.L.S., &c.

Decadis tertiæ, ex ordine Dermapterorum, DeG., *Synopsis.*

Familia Mantidæ.

Vates (Burm. = *Theoclytes*, Serv.) *Ashmolianus*, W. Fuscus, capitis vertice rotundato, antennis gracillimis, prothorace longissimo angusto, lateribus serrulatis; hemelytris et alis abdomen haud tegentibus, cercis analibus latis foliatis, pedibus 4 posticis brevibus, femoribus ad apicem 3-foliatis tibiisque ante medium supra parùm foliatis. Long. corp. unc. $4\frac{1}{3}$; (prothor. unc. $1\frac{2}{3}$.) Habitat ——? In Mus. Ashmol. Oxon.

Toxodera (Serv.) *tenuipes*, W. Fusca, tegminibus brunneis posticè pallidis, alis infumatis, nigro fasciatis cyaneo-iridescentibus, coxis anticis longis anticè lobatis et spinosis, femoribus anticis basi vix crassioribus, femoribus 4 posticis longis apice subtus foliolis duobus minutis instructis, supra inermibus, cercis analibus latis foliatis, ut videtur 6-articulatis. Long. corp. unc. 5. Expans. tegmin. unc. $4\frac{1}{2}$. Habitat in Senegallia. Mus. Hope.

Familia Locustidæ.

Mastax *vitrea*, W. Fusca, facie fulvescente abdomine medio pallidiori, pedibus fuscis, femoribus posticis pallidius fasciatis, tegminibus et alis hyalinis parùm infumatis. Long. corp. unc. 1. Expans. tegmin. unc. $1\frac{3}{4}$. Habitat in insula Java. Mus. Hope.

Mastax *apicalis*, W. Lutea, capite supra, thoracis et abdominis dorso nigricantibus, hoc fascia pone medium apiceque extremo luteis, pedibus luteis nigro-maculatis, tegminibus et alis hyalinis, ad apicem tenuiter fusco-coloratis. Long. corp. unc. $\frac{3}{4}$. Expans. tegmin. unc. $1\frac{3}{4}$. Habitat in insula Sumatra, D. Raffles. Mus. Soc. Zool. Lond.

Mastax *guttata*, W. Nigricans, subtùs paullò pallidior, facie genisque luteis vertice angulato; abdomine ♂ ad apicem valdè clavato, femoribus posticis fulvo oblique bifasciatis, tegminibus fuscis, nitidis, guttis duabus versus apicem hyalinis, postica majori et ad marginem posticum extensa; alis hyalinis margine postico fusco. Long. corp. lin. 7. Expans. tegmin. lin. $14\frac{1}{2}$. Habitat in Sumatra, D. Raffles. Mus. Soc. Zool. Lond.; et in ins. Philipp., D. Cuming. Mus. Britann.

Obs. Genus *Mastax*, antennarum articulis paucis capiteque elevato *Proscopiam* approximat.

Opsomala *gladiator*, W. Luteo-fusca, virescenti parùm tincta, capite anticè in rostrum (prothorace ferè duplo longius) producto, antennis gracilibus, rostro brevioribus, prothorace carina mediana ferè obliterata, tegminibus pallidè fuscis, angustis, alis hyalinis vix incoloratis, abdomine longissimo, pedibus 4 anticis brevissimis, posticis vix abdomine longioribus. Long. corp. unc. $3\frac{1}{2}$.

autumn, would seem to be continued further into the winter in this island than elsewhere, a result attributable to the humidity and mildness of the climate. Its song may be heard as frequently in fine bright days during the month of October, and in the bird's most elevated haunts in the mountain pastures about Belfast, as at any other season. One note may be given on this subject: under the date of November 7, 1835, the following appears in my journal—I never heard more skylarks singing at any period of the year than in the early part of this day in the high pastures bounded by the heath in the Belfast mountains. The day was very fine and bright; the ground very wet from continued rain throughout the days and nights of the 2nd, 3rd, and 4th, early part of the 5th, and occasionally since, up to this morning. The skylark is generally noticed by authors as singing merely upon the wing, but it not very unfrequently does so when upon the ground, and an intelligent observer mentions that he has often seen it perched on whins when pouring forth its song. Montagu remarks, that this bird is "rarely seen on the extended moors at a distance from arable land," and later British authors repeat the observation. This may be of general application to England, but in Ireland the wild mountain pasture is a favourite abode, and there, as mentioned in the following note, the "most sweet voice" of the skylark may occasionally be heard at a rather late hour mingling with the bleating of the snipe:—June 22, 1840. When at half-past seven o'clock this evening on the highest part of the old road from Belfast to Crumlin (perhaps 850 feet above the sea), larks were busily engaged in singing on every side at the same time that snipes (*Scolopax Gallinago*) were bleating and giving utterance to their other calls. The mingling of their notes, which are so very dissimilar, had a singular but very pleasing effect.

In hard winters our indigenous larks congregate in large flocks, which remain with us unless the weather become extraordinarily severe, when they move more or less southwards: even when the winter is mild in the north of Ireland, these birds, generally in small or moderate flocks, migrate hither from Scotland, and have repeatedly been seen crossing the Channel by my friend Capt. Fayrer, R.N., during the several years that he commanded the government mail-packet which plies between Portpatrick and Donaghadee. Although the autumn of the year 1832 had been very fine and mild, so early as the 17th of October I saw a very large flock of larks, which had doubtless migrated to this country. In the winter of 1837–38, larks remained in flocks to a late period—on the 24th of March I remarked not less than sixty congregated.

An observant friend has on different occasions known several circular holes to be made by pairs of these birds, before fixing upon one for their nest. The skylark occasionally exhibits variety in its plumage, though less frequently than some others of our small birds. The collection of my friend Wm. Sinclaire, Esq., of Milltown, near Belfast, contains one of a black colour, which was shot in a wild state among a flock, and a white one is reported to me by a correspondent as in his possession. The stomachs of several larks which I examined, especially in winter, contained seeds and the remains of other vegetable matter, with an occasional insect-larva: they all exhibited fragments of stone.

As a sporting friend was shooting upon his moors in Ayrshire in the month of October, a lark pursued by a merlin (*Falco Æsalon*) came from the distance of about a hundred yards directly towards him and his servant, and alighted near their feet, apparently for safety—when it reached the ground, it is represented to have been so exhausted as to be unable to close its wings. A lark which had its liberty within the green-house of a relative, lived eight years there, and was eventually lost to him, by effecting its escape.

Nowhere perhaps is the skylark more sought for as a cage-bird than in Ireland, and the song given forth "right merrilie" from the little patch of green-sward within its prison seems to imply that the bird bears confinement well. Nevertheless, it is always with regret that we see the lark, whose nature is to pierce the clouds when singing, so circumscribed, and we cannot but wish for its own sake that it had the freedom of "fresh fields and pastures new;" yet we do not, like a class of persons in the world, *think only of the skylark.* To the poor artisan in the town this bird is of great service in enlivening him with its song, associated with which in his mind are doubtless scenes in the country, the love of which is instinctive to the human breast. The lark too is generally treated with affectionate care, and the first walk of its master in the very early morning before the day's task begins, has for its object the providing of a "fresh sod" for his pet bird*.

* The following anecdote, communicated by my venerable friend Dr. M'Donnell of Belfast, shows the high value once put upon a skylark:—"A rather poor chandler in Belfast, called Huggart, had a lark remarkable for its song. Mr. Hull, a dancing-master and great bird-fancier, going into his shop one day, said, he came to purchase his bird. 'Indeed,' replied the other, 'I do not think, Mr. Hull, you are likely to get home *that* bird, which delights all my neighbours as well as myself.' 'Well, I think I am,' was the reply: 'here are five guineas for it.' The sum was instantly refused, when ten guineas were offered, but also rejected. He was then told, 'It is now

Late in April in the present year I saw the skylark about Navarino, and at the end of the following month observed it near Smyrna.

The Woodlark, *Alauda arborea*, Linn.,

Is one of those unobtrusive species which is little known except to the lover of nature, and by him perhaps valued the more on that account. In flocks it is not at all to be met with, like the skylark. It is so very choice in the place of its abode as to be quite a local species, and in the counties of Down and Antrim frequents districts where the soil is warm, the country well cultivated and wooded, or scenery, which, like its song, is of a sweet, soft character;—cold clay districts, though equally improved and sheltered, cannot, so far as known to me, claim it for a tenant. In its favourite localities here, the Woodlark may be heard singing almost daily, and chiefly in the morning from September to June.

This species is enumerated as one of the birds of Dublin in Rutty's Natural History of that county, and has a similar place in Smith's 'History of Cork.' In the latter county, Mr. R. Ball informs me that it is not unfrequent, and being much prized for its song, is greatly sought after by bird-catchers. A friend living near Belfast kept woodlarks for a year or more in his aviary in company with other birds, but they never sang.

The Snow-Bunting, *Emberiza nivalis*, Linn. (genus *Plectrophanes*, Meyer.),

Is a regular autumnal migrant to the more northern parts of Ireland. Towards the south it becomes gradually scarcer, and in the extreme portions of that quarter, although the highest mountains in the island are situated there, it can only be called a rare and occasional visitant*. Its numbers are stated similarly to decrease from the north to the south of England. The island of Achil should perhaps, from its far western position, be particularized as being regularly visited by this bird—a fact communicated by my friend W. R. Wilde,

the fair-day, and the market full of cattle: go and purchase the best cow there, and I shall pay for her:' but Huggart still declined, and kept his lark."

* In a catalogue of the birds of the south favoured me by Dr. Harvey of Cork, the snow-bunting is noticed merely as having been met with at Dunscombe Wood, near that city. Dr. Burkitt, of Waterford, in a list of the native birds known to him obligingly sent to me since this paper went to press, notices it only as shot in the neighbourhood of that city in January 1832. To Mr. T. F. Neligan of Tralee, it was unknown as a bird of that quarter in 1837, but Mr. Wm. Andrews of Dublin informs me that specimens were obtained near Dingle during the last winter, 1840–41.

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Selby too gratifies us with the result of his observations on the species in the north of England. The snow-bunting is truly a most attractive bird, not only from its pleasing form and finely-varied plumage, but as one of the very few species met with in the depth of winter on the mountain-top, where, as it flits overhead uttering its pleasingly wild chirp, it brings before the mind the far-distant region within the arctic circle, whence it may have come.

In ascending in the month of July above the perpetual snow-line in the Alps of Switzerland, to the height of 11,000 feet, the greatest elevation I have reached, the snow-finch (*Fringilla nivalis*), a bird which at a little distance, in size, marking, and note, reminded me of the snow-bunting, was almost ever-present; and its little voice, with occasionally that of the Alpine Accentor (*Accentor alpinus*), seemed, in one sense, strangely out of unison with the stern grandeur of the scenery, where rarely any other sound broke upon the ear than the rent of the glacier or the distant fall of the avalanche.

The Common Bunting, *Emberiza Miliaria*, Linn.,

Is found throughout the island, and is permanently resident. On reading the opinion expressed by Sir Wm. Jardine some years ago (in his edition of White's 'Selborne'), that there is a migration of buntings to Great Britain in winter, I thought it might be likewise applicable to Ireland; but on subsequent consideration, did not see good reason to believe that there is any increase to the numbers of these birds bred in the country. The change from the summer to the winter haunts of the bunting might lead to such a supposition, as about the time that our winter birds of passage are arriving, flocks of buntings make their appearance in localities—often hedges along road-sides—which frequenting through the winter, they leave on the genial approach of spring: so late as the end of March they occasionally remain congregated. Their song may be heard in the north throughout the greater part of the year, including occasionally the months of November and December.

My observation is quite in accordance with that of White, who in his 'History of Selborne' remarks of the bunting, that —"in our woodland enclosed districts it is a rare bird." It is rather an inhabitant of simply arable than of the rich and wooded parts of the country, and where some little portion of wildness still exists, such as is implied in the common name it bears in the north of Ireland of *Briar*-Bunting. The ditch-bank run wild with "briars" or brambles has more charms for this bird than the "neat trim-hedge," and within the shelter

of such humble underwood it nestles. In severe frost and snow, buntings not only betake themselves to the roads for subsistence, but at such times may be seen in the less-frequented streets and stable-yards of the town of Belfast. The plumage of this species is very liable to be varied with white or cream-colour, and when with the latter, some examples which I have seen were of a very rich and handsome appearance. On opening some of these birds killed in winter, I have generally found them filled with grain;—the species is sometimes called the *Corn*-Bunting.

The Reed or Black-headed Bunting, *Emberiza Schæniculus*, Linn.,

Is a resident species distributed over the island, which from the prevailing humidity is peculiarly well suited to it. The reed-bunting is one of those birds which is nowhere numerous, and owing to the places of its abode—among the shrubby underwood and herbage in moist places and at the edge of waters—is not very commonly or popularly known. It is particularly interesting from being an inhabitant of localities in which comparatively few other birds are to be seen:—it has often been highly pleasing to me to observe a few of these birds gathering in to roost for the night upon the exposed roots of alders or willows that overhung the gently-flowing stream, and in a vicinity unsuitable to any of their congeners. Like them, however, reed-buntings will betake themselves during the snow-storm to the public roads for food.

In different parts of Ireland, the reed-bunting still has the undue reputation of being a sweet songster of the night, and is believed to be the veritable "Irish Nightingale," a name bestowed on the mysterious bird, be that what it may, which sings through the summer night, but which, in strict justice, may be claimed by the sedge-warbler. Montagu, with his usual acuteness, long since accounted for this error, and in the following words:—"It is somewhat extraordinary that the manners and habits of so common a bird should remain so long in obscurity; even modern authors tell us it is a song-bird, that it sings after sunset; and describe its nest to be suspended over the water, fastened between three or four reeds. There can be no doubt, however, that the nest as well as the song of the sedge-warbler have been taken and confounded for those of this bird; for, as they both frequent the same places in the breeding-season, that elegant little warbler is pouring forth its varied notes concealed in the thickest part of a bush; while this is conspicuously

perched above, whose tune is not deserving the name of song; consisting only of two notes, the first repeated three or four times, the last single and more sharp*." Reed-Sparrow and Black-cap are the names commonly bestowed on this bird in the north of Ireland.

Yellow Bunting, *Emberiza Citrinella*, Linn.

This handsome bird, differing from the last-noticed species in being a constant resident about the farm and the precincts of the rural dwelling, is very well known in Ireland, over which it is diffused in suitable localities. Its monotonous, and to my ear, mournful song, is heard in mild weather throughout much the greater part of the year. The nest, from being placed in an open hedge or rather bare grassy ditch-bank, is often easily discovered; but a person who from practical observation is well versed in the sites chosen by birds for their nests, remarks, that he has more frequently found that of the yellow bunting in whins than elsewhere. In a friend's garden near Belfast, a pair of these birds built their nest at the edge of a gravel-walk, and brought out four young, three of which were soon destroyed. In consequence of this, the nest containing the fourth was for greater safety placed in a bank a few feet distant, and the single young one was so well provided by its parents with food as quickly to grow to an extraordinary size. A similar fact in the case of the redbreast is mentioned in one of the preceding papers of this series; but in that instance the young one died, it was presumed, from over-feeding. The stomachs of such of these birds as have come under my observation in winter, generally contained grain. Yellow Yorlin is the common name bestowed on this species in the north of Ireland.

The Chaffinch, *Fringilla Cœlebs*, Linn.,

Is a common resident species throughout the cultivated and wooded parts of Ireland. It frequents the squares and gardens of the town, where occasionally its song is heard. The beauty of the nest of this bird, with lichens and moss intermingled in its formation, has often been commented on, and truly it is a very picturesque object; but the lichen is in many localities of necessity left out, and the moss becomes externally the component material. Particular notes of several nests are before me, all of which, except one that was built in a whin, were placed on the branches of trees: one other only is worthy of special notice. This came under the observation of my friend at Cromac, who reports it to have

* Ornithological Dictionary.

larly and beautifully marked: it is thus described in my notes:—"This bird is of the full adult size of the chaffinch in every measurement. The prevailing colour of its plumage is pure white, but the head is tinted with yellow; the entire back is of the richest canary-yellow; wing- and tail-coverts are likewise delicately tinted with canary-yellow. A few blackish-gray and cinnamon-brown feathers appear as follows: one or two on the head, some on the back, and some very few on the wings and tail, but altogether they are inconspicuous; these are the ordinary chaffinch feathers. The primaries and the long tail-feathers, together with their shafts, are pure white. The plumage altogether partakes as much of that of the canary as of the chaffinch."

The description of this species and its propensities, as observed by the author of the 'Journal of a Naturalist,' is admirable.

The Mountain Finch, *Fringilla montifringilla*, Linn.,

Is a species, which, from personal observation, and notes collected from various quarters, I could not have announced as a regular winter visitant to Ireland. The Rev. G. M. Black, however, informs me, that for several winters successively he has remarked a few at least of these birds on the mountains about Newtown-Crommelin, but in mid-winter only; they were occasionally in company with chaffinches. Almost every winter for many years past I have been aware of their occurrence in the north in very limited numbers, and have learned from correspondents in all quarters of the island that they are everywhere of occasional, but generally unfrequent occurrence, and have been met with in the most southern parts. On the 18th of October I once received a mountain finch which was shot in the neighbourhood of Belfast, and in November the species has been seen here associating with green-linnets and chaffinches, when for some time before and after the weather had been mild. Such birds had evidently come hither in the ordinary course of migration; but that others have been compelled to visit this island by severity of weather, I in one instance had interesting circumstantial evidence. This was a day or two before the very great snow-storm in the beginning of January 1827, when one of these birds, which was secured and sent to me, alighted on the Chieftain steam-packet when on the passage from Liverpool to Belfast. This had most probably been the forerunner of the many which, during the deep snow immediately following, were seen about the last-named place. The snow-storm as usual had commenced earlier in

an easterly direction than in Ireland, which to birds flying before it westerly would be the last place of resort in its latitude in the eastern hemisphere. In like manner, mountain finches may have crossed the Irish Sea in the very severe weather early in the present year (1841), as Mr. R. Davis, writing to me from Clonmel, states, that a flock of them were seen near that town, and several shot on the 5th of February* —he had not known them as visitants to that neighbourhood before. I have seen specimens of this bird which were shot during frost in the spacious yard of the Royal Society House, Dublin; and by T. W. Warren, Esq., of that city, have been assured, that at the most inclement period of the severe winter of 1837–38, some of these birds took shelter in the houses in the town of Dundalk. A pair of mountain finches kept in a very large cage with other species in a greenhouse attached to the dwelling of a relative near Belfast, screamed so constantly throughout moonlight nights as to disturb the family, and consequently they had to be expelled the place.

The House Sparrow, *Fringilla domestica*, Linn.,

Is common in Ireland. This bird is in some places much persecuted by individuals, who, knowing only the injury committed on the grain-crops and in the garden, are yet ignorant of the great benefit it confers by the destruction of caterpillars, &c. A notable illustration of a sparrow-destroying order which was given forth in our juvenile days may here be mentioned. An old soldier, who had been in the Peninsular War, was selected from the farm-labourers as being of course the best shot. With plenary instructions to destroy all sparrows, he spent day after day in going about the corn-fields for the purpose of shooting them. Although reports of the gun were frequently heard, there appeared no testimony to convict him of the shedding of blood. We spent one day with him, and whenever he saw that two or three sparrows had alighted together on the standing corn sufficiently near to him, and this was by no means seldom, he fired at them. Often as he did so, we can attest that not a bird fell, though how much of the grain was thereby sacrificed we cannot take upon ourselves to say, for *it* could not be missed. The shooter would not believe that this was owing to his want of skill, and more

* When lately at Freshwater Bay, in the Isle of Wight, I saw several stuffed specimens of the mountain finch on sale at the "Museum," as it is called. I learned that they had been shot in the vicinity during the frost and excessive cold above noticed, when many of them made their appearance, a circumstance of such rare occurrence that their species was unknown.

than once trampled down the grain to look after the *fallen* birds, which were then rejoicing afar off at their escape. When the wages of this sportsman and the value of ammunition he expended, together with the grain destroyed by him, are considered, there can be little doubt that the amount of damage which the sparrows could have done (and nevertheless did in this case do) must be trivial in comparison. Doubtless there have been similar cases. Many well-attested accounts have been published of the destruction of crops by insects in consequence of small birds, and sparrows in particular, being destroyed for their pilfering propensities; and when lately in France I was made acquainted with a recent instance of this kind. In the fine rich district of Burgundy lying to the south of Auxerre, and chiefly covered with vineyards, small birds had been some time before destroyed in great numbers. An extraordinary increase of caterpillars, &c. soon became apparent, and occasioned such immense damage to the crops, that a law was passed prohibitory of the future destruction of the birds.

The boldness and impudence of sparrows in obtruding themselves everywhere are somewhat redeemed by the comicality of their manners. Every one must have remarked instances of this. I was once much amused by observing a sparrow literally "dancing attendance" on a pet squirrel, during his breakfasting on bread in the wheel of his cage; the sparrow hopping about all the while and eagerly picking up the crumbs which fell from the rich man's table.

The freedom from all fear on the part of sparrows is particularly manifest in their feeding close to animals of all kinds in zoological gardens. They make themselves quite at home too in the company of the most gorgeous-plumaged birds: I recollect them regularly breaking through the meshes of a net (merely large enough to admit their bodies) covering over an aviary in which a friend kept a number of golden pheasants, that they might feed along with them. Under date of June 27th is a note in my journal to the effect that the cock-sparrow has quite gained on my affections of late by the assiduity with which he feeds his progeny. I have observed several of them on the highway attended by their young, generally three in number, and which, with quivering wings, besought and followed them for food, and never in vain. The parents too, by their fine erect carriage—which even cock-sparrows can assume—evidently showed much pride in their progeny.

The sparrow, though not an early rising bird, is awake betimes, and as a colony will keep chattering for perhaps an

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possession of the burrow of the sand marten before the vernal return of this species to the place of its birth; and certainly the intruder, perched at the entrance of its neighbour's burrow, peers about and chatters with as much confidence as if the domicile were its own by "right of descent." But few writers on natural history would seem to have observed the sparrow in such situations, but I have frequently done so, and when the sand-bank was in the close vicinity of trees and houses.

On account of the propensities heretofore alluded to or illustrated, the sparrows are perhaps the most amusing of our small common birds; but all bounds of propriety seem to be exceeded, when, so out of character with the scene, they, all begrimed, squat and chatter, and take up their abode on the stupendous cathedral of St. Paul's in London, under the canopy of which the ashes only of the mightiest among ourselves find a domicile.

Examples of this bird partly and altogether white sometimes occur; and a friend informs me that he once saw three white individuals in one nest. In his 'Catalogue of the Birds, &c., of Donegal,' Mr. J. V. Stewart remarks—"I have had a milk-white sparrow in confinement for two years; it was taken from the nest, is very sprightly and a female. At its moults there has been no change in the colour of its plumage: it has got the eyes of all albinoes*." Mr. R. Davis, jun., of Clonmel, mentions in a letter, that in February 1841 he "got a singularly deformed female sparrow, in which the upper mandible is slightly twisted to one side, the lower one nearly two inches long and turned down like that of a curlew: the bird was seen to feed by laying the side of its head to the ground."

In his 'Familiar History of Birds,' the Bishop of Norwich treats very pleasantly of the sparrow, as in the 'Journal of a Naturalist' does Mr. Knapp in his usual graphic manner. Bewick too waxes warm and eloquent in its defence against the sweeping denunciation of Buffon†.

The Grosbeak or Hawfinch, *Fringilla Coccothraustes*, Linn. (genus *Coccothraustes*, Briss.),

Is an occasional winter visitant to Ireland. A fine example in the collection of my friend, Wm. Sinclaire, Esq., of Milltown, near Belfast, was shot some years ago in the neighbourhood of Hillsborough, county of Down. The Rev. G.

* Mag. Nat. Hist., vol. v. p. 583.

† *Fringilla montana* appears in Templeton's 'Catalogue of Irish Vertebrate Animals' as "a doubtful native." To my ornithological friends and myself it is quite unknown.

M. Black has informed me, that in the winter of 1832–33? he for a long time witnessed a pair of these birds feeding upon the haws of some old thorn-trees at his seat Stranmillis, near Belfast;—he managed to approach within about fifteen paces, so as to see them very well. In his paper on the Birds, &c. of Donegal, Mr. J. V. Stewart gives an interesting account of two of these birds which he killed and examined anatomically. A portion of his observations are to the following effect. The communication is dated from Ards House, December 4, 1828: "I shot a pair of these birds a few days ago, in fine plumage. * * * A few hours after they were dead, I took a strong pair of scissors and a knife, using them as levers to force open their bills, and found the muscles had so firmly contracted, that, to effect my purpose, I had to use a wedge; a forcible proof it will be allowed of their strength. Their bills alone, however, are formed as a pair of *nut-crackers*, as the muscles of the neck, unlike those of the woodpeckers, are not strong*." Dubourdieu, in his 'Survey of the County of Antrim,' observes, that "the grosbeak (*Loxia*), like a greenlinnet, but larger, often resorts to the wooded farms in its neighbourhood [Lough Neagh] in winter." The crossbill is most probably here alluded to, and not the species under consideration. That the latter cannot be so, at least correctly, seems to me sufficiently evident from the circumstance that Mr. Templeton knew and corresponded with Dubourdieu, and in his catalogue of our native birds, he makes no mention whatever of the grosbeak. The Phœnix Park, Dublin, where there are literally woods of venerable hawthorns, has, above all places in Ireland, produced examples of this bird. Notes of its occurrence there in the following years are before me—in 1828–29, when the first individual (as I learn from Dr. J. D. Marshall) was obtained on the 6th of November, and about a dozen more altogether at various dates through the winter: in 1830?, when numbers were killed and supplied to my informant, a bird-preserver in the metropolis, who purchased them for a shilling each: in 1831, when the Rev. T. Knox records three individuals from this locality†: in 1832–33 I have been made aware of several having been killed; T. W. Warren, Esq., alone received four examples: and lastly, in January 1837. The Phœnix Park—the natural beauty of whose scenery is admirably depicted by Lady Morgan in her 'O'Briens and O'Flahertys' as a prelude to its being the scene of "The Review"—is very well adapted to be the permanent residence of the grosbeak; and although

* Mag. Nat. Hist., vol. v. p. 582.
† *Ibid.*, p. 734.

the greater portion of it may be too much frequented for so shy a bird as this is reported to be*, still it may be a pleasing task for some of the resident members of the Natural History Society of Dublin to ascertain whether, in any of the most retired glades or other portions of this spacious park which would afford freedom from molestation, such a remarkable and attractive species may not "increase and multiply." By the late T. F. Neligan, Esq., of Tralee, I was informed that a grosbeak was shot near Milltown, in the county of Kerry, at the latter end of October 1830 (?).

XXXVII.—*Information respecting Scientific Travellers.*

DR. CANTOR'S VISIT TO CHUSAN.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,

BY the last Indian mail I received a letter from my friend Dr. Cantor, a part of which relating to the natural history of Chusan seems to me so highly interesting, that I take the liberty of making the following extract for your pages.

"Immediately on my return from Chusan I sent you a roughly drawn up catalogue of my collections†. Owing to my severe illness there and tedious recovery, I have been obliged to work much slower than I used to do. You know that I was sent to China without being allowed time to procure one single article necessary for collecting, yet I succeeded in getting something, and that truly interesting. Up to this moment I have finished descriptions in sections of a few new forms of *Animalcula*; the rest are identical with European and Indian. Of terrestrial and freshwater *Mollusca*, from twenty to twenty-five new forms, and interesting as links, were procured: Benson has undertaken to describe them. The *Reptilia* are new, and of tropical forms totally distinct from the Japanese. The *Batrachia* are European, *Rana esculenta* and *R. temporaria*, *Hyla arborea*. The *Fishes*, with which I am now occupied, are new, and mostly tropical forms. The *Insects* I have sent to London. Of *Mammalia* and *Birds* I have very few, as already mentioned in the catalogue. With the *Plants* Griffith is at present engaged. The zoology of Chusan (30° N. L.) is, notwithstanding the vicissitudes of the climate, decidedly tropical or Indian. The flora appears to be Himalayan with European forms. THEO. CANTOR."

Calcutta, Sept. 26, 1841.

It is gratifying to learn that such prompt measures have been taken by Dr. Cantor for making known the results of his collections in Chusan, though from the briefness of his stay, and bad health when there, these must necessarily be but limited.—WM. THOMPSON.

Donegal Square, Belfast, Nov. 15, 1841.

* See an excellent account of the species by Mr. Doubleday in vol. i. of the Mag. Zool. and Bot.

† This I am sorry to say has not been received.

Letter to M. Fischer de Waldheim, Ex-President of the Society of Naturalists of Moscow.

(*Translation.*)

MY DEAR SIR, Moscow, Oct. 8, 1841.

As you have taken a lively interest in the success of the geological expedition which I have just completed, accompanied by my friends M. de Verneuil, Count de Keyserling, and Lieutenant Koksharoff, I hasten to communicate to you some of its chief results; and I do so with real pleasure, because in requesting you to present them to the Society of Naturalists of Moscow, I acquit myself of a duty towards a distinguished body which has done me the honour of placing my name in the list of its foreign members.

The wide extension in the North of Russia of the Silurian, Devonian and Carboniferous Systems, as proceeding from the last year's survey, by the same observers and our friend the Baron A. de Meyendorf, is already known to you from the abstracts of memoirs communicated to the Geological Societies of London and Paris. Our principal objects this year were,—1st. To study the order of superposition, the relations and geographical distribution of the other and superior sedimentary rocks in the central and southern parts of the empire. 2nd. To examine the Ural Mountains, and to observe the manner in which that chain rises from beneath the horizontal formations of Russia. 3rd. To explore the carboniferous region of the Donetz, and the adjacent rocks on the Sea of Azof.

Our last year's survey had pretty nearly determined the limits of the great tract of carboniferous limestone of the North of Russia. On this occasion we have added to its upper part that remarkable mass of rock which forms the peninsula of the Volga near Samara, and which, clearly exposed in lofty, vertical cliffs, and charged with myriads of the curious fossils *Fusilina*, constitutes one of the striking features of Russian geology.

The carboniferous system is surmounted, to the east of the Volga, by a vast series of beds of marls, schists, limestones, sandstones and conglomerates, to which I propose to give the name of "Permian System," because, although this series represents as a whole, the lower new red sandstone (*Rohte todte liegende*) and the magnesian limestone or *Zechstein*, yet it cannot be classed exactly (whether by the succession of the strata or their contents) with either of the German or British subdivisions of this age. Moreover the British lithological term of lower new red sandstone*, is as inapplicable to the great

* See Silurian System, p. 54.

masses of marls, white and yellow limestones, and gray copper grits, as the name of old *red* sandstone was found to be in reference to the schistose black rocks of Devonshire.

To this "Permian System" we refer the chief deposits of gypsum of Arzamas, of Kazan, and of the rivers Piana, Kama and Oufa, and of the environs of Orenbourg; we also place in it the saline sources of Solikamsk and Sergiefsk, and the rock salt of Iletsk and other localities in the government of Orenbourg, as well as all the copper mines and the large accumulations of plants and petrified wood, of which you have given a list in the 'Bulletin' of your Society (anno 1840). Of the fossils of this system, some undescribed species of *Producti* might seem to connect the Permian with the carboniferous æra; and other shells, together with fishes and saurians, link it on more closely to the period of the Zechstein, whilst its peculiar plants appear to constitute a Flora of a type intermediate between the epochs of the new red sandstone or "trias" and the coal-measures. Hence it is that I have ventured to consider this series as worthy of being regarded as a "System."

The overlying red deposits which occupy a great basin in the governments of Vologda and Nijni Novogorod, have not as yet been found to contain any organic remains except minute *Cyprides* and badly preserved *Modiolæ;* but when we take into consideration their thickness, geological position, and mineral characters, we are disposed to think that they may at some future day be identified with a portion of the "Trias" of German geologists. I am strengthened in this opinion by Count Keyserling's discovering, during our tour at Monte Bogdo, certain fossils which are unknown in other parts of Russia, but which are associated with the *Ammonites Bogdoanus* already described by Von Buch, and which that distinguished geologist refers to the type of the muschelkalk.

True lias does not exist in Russia, as Von Buch had decided from an examination of fossils sent to him, but the Jurassic or oolitic series is divisible into two stages. The lowest of these, which is much more developed than the upper, never occupies any considerable tract of country, being either distributed in patches, or hidden by newer accumulations. From the eastern flanks of the Ural chain in the 64° of N. latitude to the Caspian Sea, it preserves nearly the same mineral and fossil characters. This formation represents the inferior and middle oolite. The ferruginous sands, calcareous grits, and black schists of the Moskwa are of this age; and also those beds which we examined last year on the Volga between Kostroma and Kinshma, at Makarief upon the Unja, as well as those shales and sands which we have seen this year in many other

localities, particularly between Arzamas and Simbirsk, between Syzran and Saràtoft, at Saragula, and on the river Ilek near Orenbourg.

The upper oolitic group occurs in several situations along the Donetz, where it was first recognized by Major Blöde. It is calcareous, often oolitic, of light yellow colour, and contains many *Trigoniæ*, *Nerineæ*, &c., which enable us to compare it with the upper Jura of the Germans, or Portland and Coral rag division of my own country.

The cretaceous system, though composed of very different beds of marls, white chalk, sands and grits (sometimes green), offers for the most part the fossils of the white chalk of Europe, such as the *Inocerami* (Catillus), *Belemnites mucronatus*, *Ostræa vesicularis*, *Terebratula carnea**.

Above the cretaceous system, we have not been able to discover in any part of Russia, except in the Crimæa, the "nummulite limestone" which there sets on, and acquires a great importance in its range through Georgia, Egypt, and the Mediterranean basin.

The equivalents of the lower tertiary formations (Eocene of Lyell) seem to exist in one part only of your country (S. of Saràtoft). On the other hand, the middle and upper tertiaries (Miocene and Pleiocene) cover large surfaces on the Lower Volga, in Podolia, Volhynia, and also along the shores of the Sea of Azof and the Black Sea, where the youngest of these strata, very much resembling the "upper crag" of Norfolk, are beautifully displayed.

I have not time to enter upon the numerous and interesting phænomena of the Ural Mountains, the examination of which occupied us nearly three months. We there studied alternately the wonders of the gold alluvia, the sites of the entombment of your great mammalia, and sought for the causes of the astonishing metamorphism of the sedimentary rocks of that chain. For an explanation of the last class of phænomena, the works of Humboldt and Gustaf Rose must always be consulted. I will on this occasion simply say, that far from being *primitive*, as was supposed, this chain, with the exception of its eruptive masses, is entirely composed of *Silurian*, *Devonian* and *Carboniferous* rocks, more or less altered and crystallized, but in which nevertheless we have been able to recognise in a great number of localities my own *Pentamerus*

* After this letter was written, we found in the collection of Professor Eichwald at St. Petersburgh, a fine specimen of Exogyra and other fossils in a green sandstone from the Lower Volga, sent to him from a locality well known to us, which leaves little doubt of the existence also of a true representative of our greensand.—R. I. M.

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their currents and bottoms (on which of course the nature of marine deposits depend), must have been essentially different.

This discovery also proves the symmetry of the opposite edges of the *Moscow basin*; since in advancing from the governments of Tula and Kaluga on the south, we see the same ascending order as that which we before described in the Waldai Hills on the north. In both tracts the Devonian or old red rocks, with *Holoptychius nobilissimus*, and many fishes and shells of that system well known in the British Isles*, pass under the lowest strata of the carboniferous æra, and serve as a base line to those thin beds of poor coal associated with *Unio sulcatus* and *Productus gigas* (*hemisphericus*, Sow.), which are at present the subject of new researches on the part of the Russian Government.

The enormous space we traversed and examined, in all between 13 and 14 thousand miles, might well astonish you, if I did not assure you, that the arrangements for this journey, undertaken under the auspices of the Minister of Finance, Count de Cancrine, were admirably prepared by General Tcheffkine, whose clear directions, united to that spirit of hospitality which characterizes all Russians, and above all the inhabitants of the Ural and Siberia, rendered every enterprise feasible, and enabled us to overcome every obstacle.

I shall communicate to you at a later date, and before our large memoir is prepared, the general table of the order of superposition of all the formations of Russia, with sections†.

Accept, dear Sir, the assurance of the affection and esteem of your devoted servant,

RODERICK IMPEY MURCHISON,
President of the Geol. Society of London.

To His Excellency M. Fischer de Waldheim.

BIBLIOGRAPHICAL NOTICES.

Catalogue of British Plants (*Part* 1*st containing the Flowering Plants and Ferns*). By J. H. Balfour, M.D., Reg. Prof. of Botany, Glasgow; C. C. Babington, Esq., M.A., F.L.S.; and W. H. Campbell, Esq., Sec. Bot. Soc. Second Ed. Printed for the Botanical Society of Edinburgh, 1841.

THE names of the distinguished botanists to whom the Botanical Society of Edinburgh have delegated the task of preparation, are an abundant guarantee for the patient care, skill, and critical accuracy

* See Silurian System, p. 599.

† These documents, which were laid before His Imperial Majesty in MSS., are now in the hands of the engraver.

which have been exercised in the compilation of this excellent Catalogue, which for usefulness and comprehensive completeness very far exceeds the former edition, and indeed every other existing catalogue. It is, in fact, a perfect Manual of British Botany. The arrangement is alphabetical, each genus having its authority appended with the Linnæan Class and Order, and the Natural Order according to the classification of Dr. Walker-Arnott in the article 'Botany,' in the new edition of the 'Encyclopædia Britannica.' The species are similarly arranged, with the additions of the authority, nature, habit, duration, periods of flowering, and their relative scarcity or abundance and condition in the flora of Edinburgh. In the determination of the nomenclature it has been the aim of the compilers to make that of our British plants correspond, so far as possible, with that adopted by the best continental writers, which has necessarily rendered many important alterations necessary. In these amendments they have been chiefly guided by the works of DeCandolle, Koch, Nees von Esenbeck, Kunth and Leighton. To render confusion impossible in consequence of such changes either in genera or species, reference is constantly made to the names under which they appear in the 4th edition of Sir W. J. Hooker's 'British Flora.' The sources whence new species are derived are indicated by references to the works from which they are taken, and when they are still unpublished as British plants they are marked as additional species. The works thus referred to are 'Supplement to English Botany,' Babington's 'Primitiæ Floræ Sarnicæ,' Leighton's 'Flora of Shropshire,' and 'Transactions of the Botanical Society of Edinburgh.'

By far the most important feature of the Catalogue is the information which it affords to us of the *accelerating* progress of British botany. The number of Phanerogamous plants enumerated are, genera, 523; species, 1594; varieties, 230: and of Ferns, genera, 22; species, 55; varieties, 9: giving a total of genera, 545; species, 1649; varieties, 239. Of these more than 70 species are not included in the last edition (4th) of Hooker's 'British Flora,' published in 1838 (we mean *bonâ fide* additions not arising from mere change of name), and among them are 24 *species* which are *new* and *unpublished* as British plants, and consequently not comprised in any other lists of our native flora. These new plants are as follows:—*Alyssum calycinum*, Linn.; *Carex irrigua*, Sm.; *Centranthus Calcitrapa*, Dufr.; *Cerastium pumilum*, Curt.; *Echinospermum Lappula*, Lehm.; *Epilobium lanceolatum*, Seb.; *Eranthis hyemalis*, Salisb.; *Erysimum virgatum*, Roth.; *Galium insubricum*, Gaud.; *Gentiana Germanica*, Willd.; *Linaria purpurea*, Mill.; *Malcolmia maritima*, Br.; *Melissa officinalis*, Linn.; *Nasturtium anceps*, Reich.; *Oxalis stricta*, Linn.; *Pinguicula longicornis*, Gay?; *Ranunculus circinatus*, Sibth.; *Ranunculus fluitans*, Lam.; *Scirpus parvulus*, R. et S.; *Scrophularia Ehrharti*, C. A. Stev.; *Teucrium regium*, Schreb.; *Trifolium Bocconi*, Sav.; *Urtica Dodartii*, Linn.; and *Vicia gracilis*, Lois.

The typography, which is very free from material errors, is remarkably clear and distinct, and by its admirably contrasted variety and disposition all confusion is avoided, the eye at once alighting

upon that which it is in search of, a most material assistance in reference. We do not quite coincide with the compilers in all their rejections and admissions of species and varieties; but where there is so much to commend generally, it would be invidious to point out what may appear to us (and perhaps only to us individually) a few minor faults. We could however have wished that the indication of the relative scarcity or abundance and condition of the species had been extended to the whole kingdoms, and not confined to the flora of Edinburgh. In conclusion, we cordially anticipate that this admirable Catalogue will be the standard one in use with all botanists, whether as an index to the herbarium or for correspondence.

Arcana Entomologica, or Illustrations of new, rare, and interesting Exotic Insects. By J. O. Westwood, F.L.S., &c. Nos. 2, 3, and 4.

Since our former notice of this work three more numbers have made their appearance, at intervals of two months, and fully keep up the interest of the first number in the beauty and singularity of the insects represented. Amongst them we may particularize two splendid moths from Assam, contained in the collection of R. H. Solly, Esq., of large size, having all the appearance of species of the true genus *Papilio*; some curious *Tenthredinidæ* from New Holland and tropical Africa; a gigantic walking-stick insect; several new species of *Papilio*, chiefly from India, and a figure with details of that most anomalous animal the *Hypocephalus armatus*, accompanied by a series of observations from the pen of Dr. Burmeister on its affinities. The last number also contains a monograph of the Dipterous family *Midasidæ*, containing descriptions of not fewer than fifty species, nearly half of which are new, and of which a great number are figured.

Naturhistorisk Tidskrift, edited by Henrik Kröyer. Copenhagen, Vol. III. 1840–41.

The volume which we have just received contains the following articles,—and as some are continued through successive Numbers, the pages are added.

C. Staeger, Systematic Catalogue of the *Diptera* found in Denmark, pp. 1, 228.—J. W. Hornemann, Essay towards a Catalogue of Plants not cultivated, but which have been introduced in Denmark in former times, and of those of which the origin is uncertain, pp. 59, 113.—Review of new zoological works, p. 85.—Lünd, On the ancient animals of the Brazils before the last revolution of the world, pp. 85, 214. (From the 'Acta' of the Royal Society of Copenhagen.)—Eschricht, *Cirrhoteuthis Mulleri*, a new species of Cephalopod, p. 95. (From the 'Nova Acta Acad. Nat. Cur.,' vol. xviii. p. 11.)—G. Schiödte, Ichneumonidarum ad Daniæ Faunam pertinentium genera et species novæ, p. 96. (From Guérin, 'Magazin de Zoologie, d'Anatomie comparée et de Paléontologie, 1839.')—T. Cantor, Spicilegium Serpentium Indicorum, p. 100. (From the 'Proceedings of the Zoological Society, 1839.')—Eschricht, On the Porpoise and its Entozoa, p. 220.—Eschricht, On the *Salpa cordiformis*, p. 223. (From the 'Acta' of the Royal Society of Copenhagen.)—H. Kröyer, *Bopyrus abdominalis*,

dead bud of a tree; they appear to be constructed of the same material as the nests of the *Chlamys*. The insects undergo these changes within the nests, the larva fastening the orifice to the stem of the tree, and then turning itself round so as to escape (when arrived at the imago state) from the opposite end. In one of these nests a number of parasitical *Ichneumones adsciti* were found.

A note was read from the Rev. R. A. Cox, relative to the appearance of immense numbers of minute black caterpillars on the surface of pasture grounds in the parish of West Camel, Somerset, to the extent of twenty acres. The caterpillars were regarded by Mr. Stephens as those of a species of *Melitæa*, which are known occasionally to congregate in great numbers.

The following memoirs were read:

"Description of a new genus of *Carabideous* insects from tropical Africa," by G. R. Waterhouse, Esq.

Disphericus, W. *Caput elongatum, labrum brevissimum, anticè emarginatum, labium apice subemarginatum, palpi articulo externo obtriangulari, antennæ longæ, subcrassiores, thorax valdè convexus ferè globosus. Femora antica crassiora, tibiæ intùs emarginatæ.*

Disphericus Gambianus, W. *Ater nitidus, thorace globoso; dorso canaliculato, elytris ovatis valdè convexis profundè striato-punctatis interstitiis convexis.* Long. corp. lin. 8, lat. 3. Habitat in Africa tropicali, Gambia. In Mus. D. Melly.

This insect is remarkable for the spherical form both of the thorax and abdomen, and is considered by Mr. Waterhouse to be the connecting link between *Cychrus* and *Potamophilus*.

"A monograph of the genus *Panorpa*, together with descriptions of species of various allied genera," by J. O. Westwood, F.L.S.

After alluding to the recent monograph of Dr. Klug upon the family *Panorpidæ*, the author gives the following monograph upon the typical genus *Panorpa*.

A. Species Europææ.

1. P. communis, Linn. *Fusco-nigra, meso- et metathorace linea media lata lutea, abdominis apice rufo; alis ad apicem subacutis, hyalinis, venis, fasciis, maculisque nigris, stigmate elongato; vena 1ma longitudinali pone stigma, ter furcata.*
2. P. Germanica, Linn. *Fusco-nigra, meso- et metathorace linea media lutea, abdominis apice rufo-luteo; alis ad apicem rotundatis, hyalinis, venis, fasciis maculisque nigris, stigmate breviori, vena 1ma pone stigma, bis furcata.*
3. P. rufo-stigma, W. *Fulva, thorace luteo, lateribus nigris, alis hyalinis fusco-maculatis apiceque fusco, stigmate magno rufo, vena 1ma longitudinali post stigma, bis furcata.* Exp. alar. lin. 13. Habitat in Albania. D. S. S. Saunders. An var. P. Germanicæ?

B. Species Asiaticæ.

4. P. appendiculata, W. *Nigra, capite thoraceque fulvis, abdominis segmento 2do in ♂ appendiculo tenui valdè elongato, alis*

nigris albo variis. Exp. alar. 1 unc. Habitat in Madras. D. W. Elliott. In Mus. Britann. ♂ ♀.

5. P. Javanica, W. *Nigra, thoracis abdominisque lateribus rufescentibus, alis sublatis, hyalinis, fascia parva, posticè dentata antè medium alæ, fascia altera lata posticè furcata pone medium, apiceque lato nigris.* Exp. alar. lin. $13\frac{3}{4}$. Habitat in insula Java. D. Horsfield.

6. P. angustipennis, W. *Nigra, rostro rufo, lobis lateralibus thoracis luteis, alis valdè elongatis basi angustis, fascia tenuissima antè medium alteraque versus apicem posticè furcata, apice lato, posticè abbreviato nigris* ♀. Habitat in insula Java, vel "Tennasserim Coast."

7. P. furcata, Hardwicke in Linn. Trans.

8. P. Charpentieri, Burmeister Handb. d. Ent., ii. 958.

9. P. Japonica, Thunberg.

C. Species Americanæ.

10. P. rufa, G. R. Gray in Griff. Ann. K. (*P. fasciata*, Klug.)

11. P. lugubris, Swederus. (*P. Scorpio*, Fabr.)

12. P. nebulosa, W. *Obscure luteo-fulva, abdominis segmento 5to* ♂ *inermi, alis subcinereo-hyalinis, puncto magno nigro ad basin stigmatis, venisque brevibus transversis nebulosis.* Exp. alar. lin. 11. Habitat in America boreali. D. Doubleday.

13. P. punctata, Klug.

14. P. terminata, Klug.

15. P. Americana, Swederus. (*P. fasciata*, Fabr.)

16. P. venosa, W. *Obscure fulva, meso- et metathoracis lateribus obscuris, abdomine obscuro, linea dorsali pallidiori, alis pallide flavo-luteis, venis transversis, fasciis apiceque nigricantibus* ♀. Exp. alar. lin. 12. Habitat in Georgia.

17. P. confusa, W. *Fulva, alis luteo-hyalinis, venis nigricantibus, venis transversis fusco-tinctis, fasciis apiceque tenuibus nigricantibus, abdominis segmento 5to* ♂ *supra spina longa armato, 6to ad basin haud inciso* ♂ ♀. Exp. alar. lin. 11. Habitat in Massachusetts.

18. P. debilis, W. *Luteo-fulva, abdominis basi supra nigro, segmento 5to, cornu brevi obliquo armato, 6to basi supra emarginato, alis pallidis fasciis apiceque fuscis.* Exp. alar. lin. 11. Habitat in America septentr.

19. P. subfurcata, W. *Obscure fulva, capite magis rufescente, abdomine supra ad basin obscuro, segmento 5to, cornu brevi dorsali armato, alis fusco-fasciatis, vena pone stigma ad apicem vix furcata* ♂ ♀. Exp. alar. lin. 11–13. Habitat in Nova Scotia.

Euphania, W. *Caput prothorace haud occultatum infra in proboscidem longitudine mediocri productum. Antennæ longitudine alis æquales. Alæ longæ elongato-ovatæ, anticæ costa dilatata haud areolata, disci venis longitudinalibus ferè ut in Panorpa dispositis.*

Ungues tarsorum acuti basi tantum serrulati, pulvillo magno intermedio.

1. Euphania luteola. *Fulva, antennis nigris basi fulvis, meso- et metathorace piceis ad latera rufescentibus, abdomine piceo, segmentis 4 apicalibus fulvis pedibus piceis, femoribus fulvis, alis pallidè luteis, ad basin magis fulvis, venis discoidalibus fuscis, basalibus fulvis, stigmate fusco.* Exp. alar. lin. 15½. Habitat —— ? In Mus. Britann.

MEROPE, Newman.

Merope tuber, N. in Ent. Mag., v. 180. Habitat "Trenton Falls," Amer. septentr.

BITTACUS, Latreille.

1. B. affinis, W. *Testaceus, abdominis apice tarsisque posticis obscurioribus, alis pallidè fuscescentibus, stigmate fusco, venisque parum fusco-tinctis.* Exp. alar. lin. 19½. Habitat in Brasilia.

2. B. punctiger, W. *Fulvescens, femoribus setis paucis nigris e guttis minutis fuscis prodeuntibus, armatis; alis paullò latioribus nitidis flavido-hyalinis, stigmate ferè concolori guttisque numerosis paullò obscurioribus.* Exp. alar. lin. 20. Habitat in Georgia Americæ.

3. B. pallidipennis, W. *Totus fulvo-luteus, tibiarum summo apice nigricanti, alis pallidissimè luteis, unicoloribus, stigmate vix obscuriori.* Exp. alar. lin. 16½. Habitat —— ?

4. B. pilicornis, W. *Pallidè fusco-luteus, pedibus lutescentibus, alis hyalinis, stigmate vix colorato, antennis longe pilosis.* Exp. alar. lin. 18½. Habitat in America septentr. D. Doubleday.

June 7th.—W. W. Saunders, Esq., President, in the Chair.

The Rev. F. W. Hope exhibited a variety of new and splendid *Coleopterous* insects obtained by him during a recent visit to Paris. He also exhibited a piece of iron-stone, forwarded by Wm. Stephenson, Esq., Surgeon, Donnington, exhibiting impressions somewhat resembling those of the wing of a butterfly, but which the President considered to be the leaf of one of the fossil ferns (*Holopteris* —— ?), the veins being quite unlike those of any insect.

Mr. S. Stevens exhibited a small collection of Indian *Coleoptera* which he had recently acquired, including three species of *Paussidæ*, *Platyrhopalus denticornis*, *P. aplustifer*, W., and a new species, since described by Mr. Westwood in the Proceedings of the Linnæan Society under the name of *Paussus Stevensii*. Mr. Stevens also exhibited living specimens of several rare British *Coleoptera*, recently taken in Hainault Forest, namely, *Leptura scutellata*, *Calosoma Inquisitor*, *Elater balteatus*, &c. He also brought for distribution amongst the Members a number of living specimens of *Trichius nobilis*.

Mr. Marshall exhibited a portion of the comb of the honey-bee entirely destroyed by the larva of *Achroia alvearia*, which had now arrived at the perfect state, and observed, that the cocoons, when first formed, are of a pure white silk, but are soon afterwards found to be coated over with black particles of excrement. He noticed the difficulty which he experienced to account for this, unless, as he believed

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of *Tenthredo testudinea* upon young apples, devouring the interior of the fruit, being the only instance yet known of such habits amongst the *Tenthredinidæ*, although the larvæ of *Nematus intercus* and some allied species inhabit the interior of galls upon willow-leaves, upon the substance of which they subsist. The larvæ of the former insect emit a very powerful scent, similar to that of the bed-bug, and quit the apple as soon as it is fallen to the ground, in order to undergo their transformations in the earth, the eggs being deposited on the young fruit whilst the trees are yet in flower.

The following memoirs were read :—

"Descriptions of some nondescript Lamellicorn beetles in his collection," by the Rev. F. W. Hope, F.R.S., &c.

1. Nigidius grandis, H. *Niger auriculatus mandibulis brevibus robustis, externè in cornu luniferum elevatis, elytris fortiter sulcatis, thorace sparsim excavato punctatis.* Long. corp. lin. 10. Hab. Sierra Leone. D. Strachan.

2. Lucanus Burmeisteri, H. *Niger, mandibulis capite thoraceque longioribus dentibus binis ad apicem minoribus tertio ferè in medio multo fortiori, capite anticè elevato, thoracis lateribus in medio acuminatis, elytris castaneis, ad basin triangulo nigro variis, femoribus tibiisque inermibus.* Long. corp. (mandib. incl.) 3 unc. 4 lin. Hab. Mysore, India.

3. Dorcus Darwinii, H. *Atrofuscus, mandibulis dentatis nigris, capite posticè lato, subspinoso, thoracis disco in medio elevato, elytris convexis multipunctatis, tibiis anticis denticulatis, 4 posticis in medio unispinosis.* Long. corp. lin. $7\frac{1}{2}$. Hab. Chili.

4. Valgus argillaceus, H. *Fuscus, capite flavo-tomentoso, thorace anticè subcornuto denticulato, posticè angulis rotundatis, ano granulifero tomento asperso, corpore infra argillaceo, tibiis binis anticis dilatatis.* Long. corp. lin. $3\frac{1}{2}$. Hab. India orient.

5. Gnathocera Natalensis, H. *Smaragdina, capite ferè quadrato, marginibus elevatis nigris, thorace viridi varioloso, elytris viridi-opalinis crebrissimè punctulatis, podice posticè aureo, tarsis piceis.* Long. corp. lin. 7. Hab. Natal.

6. Dicheros ornatus, Burmeister's MSS. *Niger, capite medio excavato, posticè tridentato, thorace nigro, fascia obliqua rubra ferè interrupta, elytris nigris, macula lata flava, basi apice suturaque nigricantibus, pedibus nigris, femoribus rubro-corallinis.* Long. corp. lin. 8. Hab. India orient., Mysore.

7. Cælorrhina concolor, Burmeister's MSS. *Smaragdina aut viridi-opalina, clypeo anticè valdè emarginato, elytris concoloribus striato-punctatis humeris nigricantibus, corpore infra viride, segmentis abdominis medio opalinis.* Long. corp. lin. 12. Hab. Sierra Leone.

8. Schizorhina succinea, H. *Flava, capite anticè luteo, posticè nigricante punctulato, thorace fusco-flavo maculis duabus discoidalibus, elytris succineis, pectore nigricanti, femoribus flavis, tibiis*

tarsisque atro-piceis. Long. corp. lin. $9\frac{1}{2}$. Hab. Nova Hollandia.

9. Cetonia Indra, H. *Rubro-punicea, clypeo subemarginato, thorace quadrimaculato, elytris acuminatis atro-puniceis macula irregulari ochraceo-flava in medio disci alteraque minori ferè ad angulum externum; corpore infra rubro-puniceo, pectore segmentis abdominis utrinque ochraceo maculatis.* Long. corp. lin. 12. Hab. Manilla.

10. Agestrata Withillii, H. *Nigra nitida glabra, thorace binis foveis parum distinctis ferè ad scutellum positis, corpore infra atro pectore segmentisque abdominis aurantio maculatis.* Long. corp. lin. 19. Hab. Bombay.

11. Agestrata Gagates, H. *Nigra nitida, thorace lobato subconvexo glabro, corpore infra atro-nitido, segmentis abdominis utrinque aurantio maculatis.* Long. corp. lin. 16. Hab. India orient., Travancore.

12. Macronota vittigera, H. *Nigra, capite linea media aurantia, thorace trivittato vittis aurantiis, elytris bivittatis vittis ante apicem abbreviatis, podice in medio nigro lateribus flavis.* Long. corp. lin. $13\frac{1}{2}$. Hab. India orient., Mysore.

13. Pachytricha, H. *Corpus magnum obesum convexum; labrum porrectum bifidum; antennæ* 10-*articulatæ; maxillæ apice valdè penicillatæ; mandibulæ rectæ apice obtusæ; mentum apice valdè emarginatum; ungues intus dentibus duobus instructi.*

This genus is regarded by Burmeister as intermediate between *Glaphyrus* and *Chasmatopterus*.

P. castanea, H. *Picea, capite valdè acuminato, thorace anticè utrinque spinoso, scutello piceo, elytris castaneis, podice brunneo, pedibus piceis.* Long. corp. lin. 15. Hab. Nova Hollandia.

A memoir was also read by Mr. Westwood, "On the Australian genus *Cryptodus*, and upon *Parastasia*, the Asiatic representative of the *Rutelidæ*."

After noticing the singular character of the genus *Cryptodus*; and its location by Mr. MacLeay, at first in the family *Trogidæ*, and latterly, in Dr. Smith's African Researches, as one of the primary forms of the *Cetoniidæ*, including *Cremastocheilus*, *Genuchus*, &c. as its subgenera, the author institutes a comparative examination of its structure in detail with the last-named groups, as well as with the *Trogidæ*, and also with the *Phileurideous Dynastidæ*, which last are regarded by him as the true affinities of *Cryptodus*. The nine-jointed antennæ, upon which so much stress has been laid by Mr. MacLeay, is proved to be only a specific character, Mr. Westwood describing a new species with the following characters.

Cryptodus Tasmannianus, W. *Niger, nitidus, oblongus, punctatus, antennis* 10-*articulatis, mento basi rectè truncato, prosterno anticè producto, margine antico ferè recto.* Long. corp. lin. $9\frac{1}{2}$. Hab. Terra Van Diemenii. Mus. Westwood, &c.

Parastasia, W. Gen. nov. Asiaticum! e familia Rutelidarum.

Corpus valdè gibbosum, pedibus brevissimis; caput anticè bituberculatum; antennæ 10-*articulatæ; mandibulæ corneæ ad apicem extus curvatæ, angulo externo in dentem subrecurvum prominentem producto; maxillæ lobo externo producto tridentato.*

This genus appears to be confined to the islands of the Indian Ocean, especially those of the Philippine range. It is the first instance on record of a *Rutelideous* insect found in that quarter of the globe.

Sp. 1. Parastasia canaliculata, W. *Nigra, nitida, elytris fulvo-variegatis plagis duabus elevatis, obliquis utrinque versus scutellum.* Long. corp. lin. $9\frac{1}{2}$. Hab. Philippine Islands, Cuming. Mus. Hope.

Sp. 2. Parastasia bipunctata, W. *Nigra, prothorace rufo, nigro-bipunctato, elytris nigris, basi fulvis, singuli maculis duabus nigris.* Long. corp. lin. $8\frac{1}{4}$. Hab. Philippine Islands, Cuming. Mus. Brit.

Sp. 3. Parastasia discolor, W. *Nigra, prothorace rufo, elytris castaneo-rufis, basi scutelloque obscurioribus.* Long. corp. lin. $7\frac{1}{4}$. Hab. Philippine Islands, Cuming. Mus. Brit.

Sp. 4. Parastasia nigriceps, W. *Luteo-fulva, capite, prothoracis maculis duabus alterisque duabus ad basin elytrorum tarsisque nigris.* Long. corp. lin. $5\frac{1}{2}$. Hab. Philippine Islands, Cuming. Mus. Brit.

Sp. 5. Parastasia confluens, W. *Nigra, prothorace in medio rufo et impresso, elytris obscure rufis, singulo maculis duabus luteis ovalibus contiguis ante medium positis.* Long. corp. lin. $5\frac{3}{4}$. Hab. Philippine Islands, Cuming. Mus. Brit.

Sp. 6. Parastasia binotata, W. *Nigra, elytrorum singulo macula magna, prope scutellum fulva.* Long. corp. lin. $8\frac{1}{4}$. Hab. Java. Mus. Melly and Curtis.

Sp. 7. Parastasia Westwoodii, Waterh. MSS. *Piceo-brunnea, sordide opaca, thorace utrinque plagis obliquis fasciaque obscura in medio elytrorum nigris antennis basi femoribus tibiisque lucidioribus.* Long. corp. lin. $5\frac{3}{4}$. Hab. Sumatra. Mus. Zool. Soc.

Sp. 8. Parastasia Horsfieldii, W. *Nigra, elytris posticè piceis.* Long. corp. lin. $9\frac{1}{2}$. Hab. Java, Horsfield. Mus. East Ind. Comp.

Sp. 9. Parastasia bicolor, W. *Nigra, prothorace miniato.* Long. corp. lin. 6. Hab. Java, Horsfield. Mus. East Ind. Comp.

Mr. Westwood also exhibited figures of many new *Lamellicorn* groups, which he had for some time past been preparing for publication.

Professor Burmeister (who was present) stated, in confirmation of Mr. Westwood's observations on the relation of *Cryptodus* with the *Dynastidæ*, that he had observed that the tarsi and ungues in that genus were dissimilar in the sexes, as in some of the aberrant *Dynastidæ*, and that the genus *Trionychus* of Dejean appeared to him the nearest relation to *Cryptodus*, which he considered to be in no wise related to the *Cetoniidæ*, as regarded by Mr. MacLeay.

the outer wall of the shallow socket, there being no alveolar ridge external to it. The large anterior fang is three times the size of the first of the serial teeth, and the size of these gradually diminish as they are placed further back; the length of the common-sized being about two lines, and the greatest breadth one-third of a line. The apical two-thirds of each tooth is smooth, but the basal third is fluted, and anchylosed to the outer wall of the socket. The breadth of the upper jaw, opposite the middle of the dental series, was two inches six lines; in proceeding backwards the jaw gradually expands to three inches, and in proceeding forwards narrows, but in a less degree towards the anterior extremity, and then slightly widens or inclines outwards on account of the large tusks. Where the upper jaw is entire, a portion next the median suture, four lines in breadth, is separated from the maxillary bone by a longitudinal harmonia, and corresponds with the position of the nasal bone in the Crocodile. On comparing the structure of the cranium of the Labyrinthodon with the Batrachian condition of the same part, Mr. Owen shows that an important difference will be found to exist. In both the caducibranchiate and perennibranchiate species, the upper maxillary bones do not extend horizontally over the upper surface of the skull, but leave a very wide interval between the maxillary and nasal bones; and the palatal processes of the former contribute as little to form the floor of the nasal cavity: in the Crocodiles, on the contrary, the palatal processes of the maxillary bones extend horizontally inwards, and meet at the middle line of the roof, forming an unbroken floor to the nasal cavity. In the Labyrinthodon the superior maxillary bones, as already shown, extend inwards to the nasal bone, constituting with it a continuous roof to the nasal cavities; but the palatal processes, instead of reaching to the middle line, as in the Crocodiles, are very narrow, as in the Batrachia. The osseous roof of the mouth is principally composed of a pair of broad and flat bones, analogous to the divided vomer in Batrachia, but of much greater relative extent, approaching, in this respect, those of the Menopome, and defending the mouth with a more extensive roof of bone than exists in any Lacertian reptile: "physiologically, therefore," observes Mr. Owen, "the Labyrinthodon, in this part of its structure, comes nearest to the Crocodile; but the structure itself, morphologically, is essentially Batrachian." In the Menopome and gigantic Salamander, a row of small teeth extends transversely across the anterior extremity of the vomerine bones: and the occurrence in the Labyrinthodon of a similar row, consisting in each palatine bone of three median small teeth and two outer larger ones, marks most strongly its Batrachian nature; and from the outermost tooth a longitudinal row of small and equal-sized teeth is continued backward along the exterior margin of the palatine bone. The whole of this series of palatal teeth is nearly concentric with the maxillary teeth.

In Lacertine reptiles the examples of a row of palatal teeth are rare, short, and situated towards the back of the palate, upon the

pterygoid bones, as in the Iguana and Mosasaur. In Batrachia the most common disposition of the palatal teeth is a transverse row placed at the anterior part of the divided vomer in Frogs, the Menopome and gigantic Salamander, and at the posterior part in certain toads. In the Amphiume, on the contrary, the palatal teeth form a nearly longitudinal series along the outer margin of the palatine bones. The Labyrinthodon, as already shown, combines both these dispositions of the palatal teeth. The posterior palatine apertures are more completely circumscribed by bone than in most Batrachians, occupying the same relative position as in the Iguana. The posterior margin only of one of the anterior apertures is exhibited in this specimen, but from its curve Mr. Owen infers that the two apertures were not confluent, as in the Crocodile, the Frog, or the Menopome, but that they were distant, as in the Iguana.

From the physiological condition of the nasal cavity Mr. Owen is disposed to believe that the Labyrinthodon differed from the Batrachians and resembled the Saurians, in having distinct posterior nasal apertures surrounded by bone, and that its mode of respiration was the same as in the higher air-breathing reptiles. In the shedding and renewal of the maxillary and the transverse palatal teeth, Mr. Owen shows that the process took place alternately in each row, as in many fishes, whereby the dental series is always kept in an efficient state.

The author then describes a portion, sixteen inches long, of the left ramus of an under jaw from the Warwick sandstone, and considered to belong to the same species as the bone just described. It is slender and straight, and the symphysial extremity is abruptly bent inwards, and it presents, Mr. Owen says, almost as striking a Batrachian character as any of the bones just mentioned. The angular piece is of great breadth, extending on both sides of the jaw, and is continued forward to near the symphysis, forming the whole of the inferior part of the jaw, and extending upon the inner as far as upon the outer side of the ramus, the inner plate performing the function of the detached os operculare in the jaw of Saurians. The dentary bone is supported upon a deep and wide groove along the upper surface of the angular piece, which also projects beyond the groove, so as to form a strong convex ridge on the external side of the jaw, below the dentary piece. This character, which in the large bull-frog (*Rana pipiens*) is confined to the posterior part of the maxillary ramus, is in the Labyrinthodon continued to near the anterior extremity. The teeth are long and slender, gradually diminishing in size towards the anterior portion of the jaw, and the fragment presents a linear series of not less than fifty sockets, placed alternately a little more internally; and at the anterior inflected part of the jaw is the base of the socket of a large tooth. The anterior portion of the jaw being broken off, it is uncertain if the serial teeth were continued externally to the anterior tusk, a remarkable ichthyic character noticed in another species of Labyrinthodon.

The sockets of the teeth are shallower than in the upper jaw; the outer wall is more developed than the inner, and the anchylosed

bases of the teeth more nearly resemble, in their oblique position, those of existing Batrachia. Mr. Owen then describes the microscopic structure of the teeth, and he shows that, between the apex and the part where the inflected vertical folds of the cement commence, the tooth resembles, in the simplicity of its intimate structure, that of the entire tooth of ordinary Batrachia and most reptiles; and in the lower or basal half of the tooth the structure described in the previous memoir commences, and gradually increases in complexity. From the long and slender character of this ramus, Mr. Owen shows that the length of the head, as compared with the breadth, approximates more nearly to Crocodilian proportions than to the ordinary Batrachian ones; but that among existing Batrachia it resembles most nearly the Amphiume.

A dorsal vertebra from Coton End, which is next described, presents still further evidence of the Batrachian nature of the Labyrinthodon, in having concave but not deep articular cavities at the extremities of the body, a condition now known among existing reptiles only in the Gecko, and in the lower or perennibranchiate division of Batrachians. The body of the vertebra is elongate and subcompressed, with a smooth extended, but not regularly curved surface, terminating below in a slightly produced, longitudinal, median ridge; and it exhibits the same exceptional condition in the Reptilian class as do the vertebræ of existing Batrachians, in having the superior arch or neurapophysis anchylosed with the centrum. From each side of the base of the neural arch extends obliquely, outwards and upwards, the remains of a thick and strong transverse process; and from their strength and direction Mr. Owen gathers indications of a necessity for an expanded respiratory cavity, and that they supported ribs.

A symmetrical bone, resembling the episternum of the Ichthyosaurus, is also described. It consists of a stem or middle, which gradually thickens to the upper end, where cross-pieces are given off at right angles to the stem, and support on each a pretty deep and wide groove, indicating strongly the presence of clavicles, and thus pointing out another distinction from Crocodiles, in which clavicles are wanting.

In concluding the description of these remains of the *Labyrinthodon leptognathus*, Mr. Owen says, that they prove the fossil to have been essentially Batrachian, with striking and peculiar affinities to the higher Sauria, leading, in the form of the skull and the sculpturing of the cranial bones, to the Crocodilian group, and in one part of the dental structure, in the form of the episternum, and the biconcave vertebræ, to the Ichthyosaurus; while in the bony palate there is a deviation from the Batrachian character, and a resemblance to the Lacertian type. Another marked peculiarity in this fossil is the anchylosis of the base of the teeth to distinct and shallow sockets, by which it is made to resemble the Sphyræna and certain other fishes. From the absence of any trace of alveoli of reserve for the successional teeth, Mr. Owen believes the teeth were reproduced, as in many fishes, especially the higher Chondropterygii, which formed

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maxillary, and is thence continued along the whole outer contour of the intermaxillary bone. Now in the Labyrinthodon the intermaxillary bone presents the same peculiar modification of the Batrachian condition of this bone as in the higher organized Batrachia, the palatal process of the intermaxillary extending beyond the outer plate both externally and, though in a less degree, internally, where it forms part of the boundary of the anterior palatal foramen, whence the outer plate rises in the form of a compressed process from a longitudinal tract in the upper part of the palatal process; it is here broken off near its margin, and the fractured surface gives the breadth of the base of the outer plate, stamping the fossil with a Batrachian character conspicuous above all the Saurian modifications by which the essential nature of the fossil appears at first sight to be marked.

In the anterior frontal bone, Mr. Owen says, there are also indications of Crocodilian structure. Its superior surface is slightly convex, and pitted with irregular impressions; and from its posterior and outer part it sends downwards a broad and slightly concave process, which the author considers the anterior boundary of the orbit. This process presents near its upper margin a deep pit, from which a groove is continued forwards; and in the corresponding orbital plate of the Crocodile there is a similar but smaller foramen.

From these remains of the cranium of the *Labyr. pachygnathus*, it is evident, Mr. Owen states, that the facial or maxillary part of the skull was formed in the main after the Crocodilian type, but with well-marked Batrachian modifications in the intermaxillary and inferior maxillary bones. The most important fact which they show is, that this Sauroid Batrachian had subterminal nostrils, leading to a wide and shallow nasal cavity, separated by a broad and almost continuous palatal flooring from the cavity of the mouth; indicating, with their horizontal position, that their posterior apertures were placed far behind the anterior or external nostrils; whereas in the air-breathing Batrachia the nasal meatus is short and vertical, and the internal apertures pierce the anterior part of the palate. Mr. Owen therefore infers that the apparatus for breathing by inspiration must have been present in the Labyrinthodon as in the Crocodile; and hence still further, that the skeleton of the Labyrinthodon will be found to be provided with well-developed ribs, and not, as in the existing Batrachia, with merely rudimentary styles. Since the essential condition of this defective state of the ribs of Batrachia is well known to be their fish-like mode of generation and necessary distention of the abdomen, Mr. Owen likewise directs attention to the probability that the generative economy of these fossil reptiles may have been similar to that of existing crocodiles.

A fragment of a vertebra presents analogous characters to the vertebra of the *L. leptognathus* previously noticed.

Of the few bones of the extremities which have come under Mr. Owen's inspection, one presents all the characteristics of the corre-

sponding part of the humerus of a toad or frog, viz. the convex, somewhat transversely extended articular end, the internal longitudinal depression, and the well-developed deltoid ridge. The length of the fragment is two inches, and the breadth is thirteen lines. The ridges are moderately thick and compact, with a central medullary cavity. In its structure as well as in its general form, the present bone agrees with the Batrachian, and differs from the Crocodilian type.

Again, in the right ilium, about six inches in length, and in the acetabulum, there is a combination of Crocodilian and Batrachian characters. The acetabular cavity is bounded on its upper part by a produced and sharp ridge as in the frog, and not emarginate at its anterior part, as in the crocodile. Above the acetabulum in the frog the ilium gives off a broad and depressed process, the lower extremity of which is separated from the acetabulum by a smooth concave groove, both of which are wanting in the crocodile, there being only a slight rising of the upper border of the acetabulum. These characters, however, are well developed in the Labyrinthodon: but the process, instead of being depressed is compressed, and its internal extremity is pointed and bent forwards, representing the rudiment of the long anterior process of the ilium in the *Batrachia anoura*; but it does not attain in the Labyrinthodon the parallel of the anterior margin of the acetabulum, and the bone terminates in a thick truncated extremity a few lines anterior to the acetabulum; an essential feature of resemblance to the Crocodiles and difference from the Batrachians. But the most marked difference in this fossil from the crocodile is the length of the ilium posterior to the acetabulum, in which it agrees with the analogous portion of the frog and other tailless Batrachia; while, on the contrary, there is an agreement with the Crocodilian type in the mode of articulation to the vertebral column. In the frog a transverse process of a single vertebra abuts against the anterior extremity of the produced ilium. In the crocodile the transverse processes of two vertebræ are thickened and expanded, and joined to a rough, concave, articular surface occupying the inner side of the ilium, and a little posterior to the acetabular cavity. In the Labyrinthodon is a similar well-marked, rough, elongated, concave, articular surface, divided by a non-articular surface, and destined for the reception of the external extremities of two sacral ribs. The Labyrinthodon likewise agrees with the crocodile in the lower part of the acetabulum being completed by the upper extremity of the pubis, the anterior and inferior part of the ilium offering an obtuse process at the posterior part of the lower boundary of the acetabular cavity.

As the fragment of the ilium was discovered in the same quarry as the two fragments of the cranium and the portion of the lower jaws, Mr. Owen thinks they may have belonged to the same animal; and if so, as the portions of the head correspond in size with those of the head of a crocodile six or seven feet in length, but the acetabular cavity with that of a crocodile twenty-five feet in length, then the hinder extremities of the Labyrinthodon must have been of dis-

proportionate magnitude compared with those of existing Saurians, but of approximate magnitude with some of the living anourous Batrachia. That such a reptile, of size equal to that of the reptile whose remains have just been described, existed at the period of the new red sandstone, Mr. Owen says, is abundantly manifested by the remains of those singular impressions to which the term Cheirotherium has been applied. Other impressions, as those of the *Cheirotherium Hercules*, correspond in size with the remains of the *Labyrinthodon Salamandroides*, which have been discovered at Guy's Cliff. The head of a femur from the same quarry in which the ilium was found, is shown to correspond in size with the articular cavity of the acetabulum. The two toe-bones, or terminal phalanges, are stated to be strictly Batrachian, presenting no trace of a nail, and from their size are referred to the hind-feet of the *L. pachygnathus*.

Thus, observes Mr. Owen, all these osseous remains from the Warwick and Leamington sandstones agree in their essentially Batrachian nature, and, in this interesting conclusion, with the fossils of the German keuper; and he concludes this portion of the memoir with some observations respecting the so-called Cheirotherium footsteps. He has long believed that they were the foot-prints of a Batrachian, and most probably of that family which includes the toad and frog, on account of the difference of size in the fore and hind extremities; but, in consequence of the peculiarities of the impressions, he has always considered that the animal must have been quite distinct in the form of its feet from any known Batrachian or other reptile. Now then, he observes, we have in the Labyrinthodon also a Batrachian reptile, differing as remarkably from all known Batrachia and from every other reptile in the structure of its teeth: both the footsteps and the fossils are, moreover, peculiar to the new red sandstone; and though the generic name Labyrinthodon may be susceptible hereafter of being expanded to the appellation of a family, yet, he asks, may it not be justifiable to consider the term Cheirotherium as one of the synonyms of Labyrinthodon?

Labyrinthodon scutulatus.—The remains, to which this specific designation has been applied by the author, composed a closely and irregularly aggregated group of bones imbedded in sandstone, and manifestly belonging to the same skeleton; they consist of four vertebræ, portions of ribs, a humerus, a femur, two tibiæ, one end of a large flat bone, and several small osseous, dermal scuta. The mass was discovered in the new red sandstone at Leamington, and was transmitted to Mr. Owen by Dr. Lloyd in the summer of 1840.

The vertebræ present biconcave articular surfaces similar to those of the other species. In two of them, the surfaces slope in a parallel direction obliquely from the axis of the vertebræ, as in the dorsal vertebræ of the frog, indicating an habitual inflexion of the spine, analogous to that in the humped back of the frog. The neurapophyses are anchylosed to the vertebral body. The spinous process rises from the whole length of the middle line of the neurapophysial

MISCELLANEOUS.

Three new species of Monkey; with Remarks on the genera Semnopithecus *et* Macacus. By B. H. Hodgson, Esq.

Whoever has occasion to refer to the family of the *Simiadæ* in works of zoology, will, I think, be struck with the fugitive and doubtful manner in which several proximate forms are generically separated from each other; and this impression is peculiarly likely to arise, if the reference be made with a view to classifying the ordinary Indian species. Are the larger ones (Langoors) *Semnopitheci* or *Cercopitheci*? Are the smaller ones (Bander) *Macaci* aut alium quid? It is universally laid down, that the *Semnopitheci* and *Cercopitheci* both have cheek-pouches; yet is there not really any trace whatever of these pouches in their prototypes, the Langoors of India, not at least in those of Nepal: and whilst Cuvier's type of the former genus has andromorphous canines, Horsfield's has these teeth as formidably developed as in the true Carnivora; the difference in *this* case being consequent only on nonage or feminity, though insisted on by authors as essentially diagnostic of separate types or genera.

Again, what animal exhibits the typical characters of *Macacus*? If *Rhesus*, then are our Indian Banders not *Macaci*, as generally alleged, for they have neither the elongated snout nor the very short tail of that species: nor are their canines longer than in the Langoors, to which they bear a strict likeness in the outline of the profile and in the facial angle; the only differences in these respects being caused by the greater dip between the brows at the base of the nose, owing to the superior saliency of the orbital bones, and by the shortness of the round terminal nares.

Without further preface, I shall now proceed to give a summary description of our Nepalese species of Langoor and of Bander, prefixing to each an amended indication of the generic character, for the reasons above assigned.

Simiadæ.

Genus Semnopithecus.

Generic character. Facial angle 45 to 50; face flat; nose short, with long, narrow, lateral, nares; head *depressed*; limbs long; thumbs small, remote; callosities large; *no* cheek-pouches; fifth tubercle on the last molar present or absent (a trivial idle mark); canines variable, large only in grown males, for the most part; stomach sacculated and banded as well as intestine; tail very long, commonly tufted, and usually exceeding the length of the animal. Very agile; grave deportment; gregarious; not docile.

Species new. *Schistaceus hodie* (*Nipalensis* of Catalogue). Habit of *Maurus*. Dark slaty above; below and the entire head, pale yellow; mere hands and feet somewhat darkened or concolorous with the body above; a pencil of black hairs radiating upwards from the brows, concolorous; tail longer than the body, and more or less tufted; skin black; nude on face, and on last phalanges of anterior digits; hair on the crown short and radiated, on the cheeks long,

directed back, and hiding the ears; piles or fur of one sort, nor harsh nor soft, more or less wavy, three to five and a half inches long on the body, closer and shorter on the tapered tail; thirty inches long: tail without the hair, thirty-six; hand, six and a half; foot, eight and a half. Females smaller, with shorter canines.

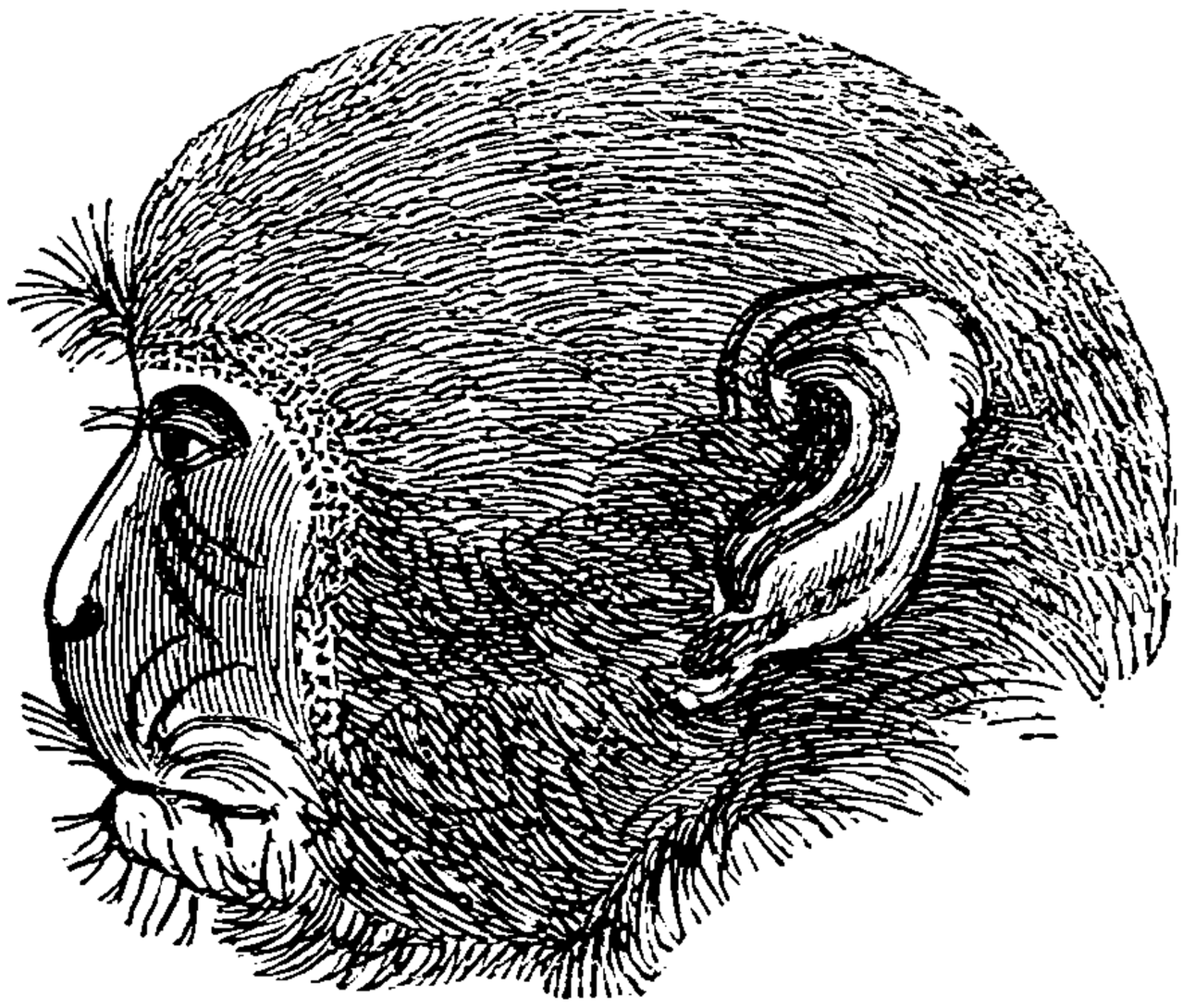
Hab. Tarai forest and lower hills, rarely the Kachár also.

Genus Macacus.

Pithex (Πίθηξ, antiq.) *nobis.*

Generic character. Facial angle 50. Muzzle not elongated; callosities large; buttocks often nude; structure compacter, but generally resembling that of *Semnopithecus*, only that the thumbs are larger, the orbits more salient, the head rounder; cheek-pouches distinct and large; the canines similarly variable, being large and grooved in grown males only; the nares short, round and terminal; the stomach simple, though the cæcum and rectum be sacculated; and, lastly, the tail shorter, though usually equal to half the length of the animals. Agile, lively, gregarious, familiar, intelligent, and very docile in confinement.

1st. *Species, new*: *Oinops* (οἴνωψ) *nob.* (*Nipalensis** of Catalogue), Tail, without the hair, half the length of the entire animal; ears partially exposed; buttocks posteally nude, and like the face, carneous red; colour of fur a full brownish yellow-red or deep rusty, passing into slaty grey on the anterior quarters, and purpurescent slaty internally. Twenty-two inches long. Tail, without the hair, ten; hand four and a half; foot six; pile or fur of one sort, as in the last,



Head of Macacus Oinops.

and of like quality and set generally: two to three and a half inches long on body, shorter on the tapered, untufted tail, and not radiating on the crown of the head. Females smaller, with less canines. *Hab.* Tarai and lower hills.

2nd. *Species, new*: *Pelops* (πηλὸς et ὤψ) *nob.* Structure and aspect similar to the last. Colours more sordid or purpurescent, slaty, partially merged in rusty; buttocks posteally (except the callosities)

* Topical names dropt, as seldom appropriate.

clad; face nude and dusky, flatter than in the last. Twenty inches long. Tail, less hair, nine and a half; hand four and a quarter; foot five and seven-eighths. *Hab.* Northern region of hills exclusively. Fur fuller and more wavy than in *Oinops*.

N.B. In all the above three species the digits are basally connected by membrane, which in the posterior extremities reaches forward beyond the first phalanges. In the first, the thumb scarcely reaches the base of the metacarpus; in the second and third species, it extends only half way down the first phalanx of the index. In the posterior extremities the same digit has a size and strength, especially in the *Macaci*, more analogous to those of the thumb in our hand. In *Semnopithecus* this digit extends a little beyond the base of the metacarpus; in the *Macaci* to the end of first phalanx of proximate digit.—*Journal of the Asiatic Society of Bengal*, vol. ix. p. 1211.

Nepal, March 1841.

PILOT FISH.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,—As an illustration of natural history, I send you an account of a Pilot-fish (*Naucrates ductor*) which I obtained November 8th, to which a singularity attaches, in its having been caught in fresh water. The person who sent it to me was passing Plympton St. Mary Bridge, in this neighbourhood, and observed several individuals vainly endeavouring to catch a strange fish in a shallow part of the river (Tory-brook, a branch of the Plym), but which vigorously evaded their efforts; he instantly cut a rod from the hedge, and after some time succeeded in spearing it. I got it the same day, quite fresh, and observed that it displayed several variations from Mr. Yarrell's description ('British Fishes,' vol. i.), not sufficient however to constitute specific differences: thus, the circular bands did not appear to surround the body of the fish, being not at all distinguishable on the back, which was a fine purplish black; on a side-view the bands scarcely reached above the lateral line; the iris, instead of being of a golden yellow, was a fine deep brown, and the extreme points of the pectorals, ventrals, and tail were white and translucent; the fish was 12 inches long, $1\frac{1}{2}$ high, 7 inches round at the vent, and weighed $11\frac{1}{2}$ ounces. In a day or two however, as the colours faded, the beautiful metallic blue of the abdomen turned to a dull iron-gray, the bands became easily distinguishable all round the fish, and the brown-coloured pigment of the iris gradually contracted, leaving beneath a shining yellow circle; I therefore infer that Mr. Yarrell's account was taken from a specimen not perfectly fresh.

The Pilot-fish is by most writers stated to be rare among us, but of all the Mediterranean species I think it is the most numerous. Mr. Yarrell ('Brit. Fish.') mentions instances of several being obtained here in 1831 and 1833, in addition to which I have notes of several others; thus, in July 1835, two were caught, one of which is in the museum of the Plymouth Institution. In October 1838, two followed a ship into Catwater, one of which I caught myself; and

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Tringa subarquata : these, as well as the Knott, *Tringa canutus*, are very plentiful at this season of the year. On their first arrival they are very tame, and fall an easy prey to the fowler.

I have seen a pair of the Common Skua, *Lestris Cataractes*, but was not able to procure either of them, though I followed them in a boat for several hours.

As soon as time will allow me, I will send you an account of my journey to Orkney. At present, as the season is now coming on for collecting aquatic birds, I shall be occupied in supplying the wants of any of my correspondents.

November 14, 1841.

I killed on the 8th of this month, a beautiful specimen of Arctic Skua (*Lestris parasiticus*), about two miles from hence, on the road to Kingsgate; it was alone in a ploughed field, and allowed me to approach within thirty yards before it offered to rise. According to Mr. Jenyns it is apparently of rare occurrence in this country. Mr. Thompson says it has repeatedly occurred in the Bay of Dublin and near Belfast. I have seen them on three occasions about Sandwich flats, but never been able to obtain one before. My bird is a young female, with the central tail-feathers projecting about two inches.

On the 12th inst. I obtained a splendid specimen of the Common Skua, (*Lestris Cataractes*); it was shot near Sandwich flats, where it was in company with another. Though numerous in the Shetland Islands, it is rare in the southern parts of Britain. A short time since I saw five, and have often heard of their being seen by fishermen, who call them Dung-birds, from their habits of pursuing other birds and compelling them to disgorge their food. During the late windy weather, on the 28th of October, I obtained three specimens of the Common Rotche (*Mergulus Alle*). One was taken alive, at Newgate, about half a mile from Margate; it was found in a hole in the cliff, and did not show the least inclination to fly; another was found dead on the rocks near the Reculvers. They are good specimens.

On the 18th of October, whilst out near Richborough Castle, about two miles from Sandwich, suddenly there got out of the lonely grove a beautiful specimen of the Golden Oriole (*Oriolus Galbula*). It immediately alighted on some neighbouring trees, and by a little of the manœuvring which is requisite in collecting, I succeeded in shooting the bird. It is a male, and forms a good pair to the one I procured last spring for the Margate Museum.

November 21.

I have now to add the capture of another rare species,—Richard's Pipit (*Anthus Richardi*), shot near Birchington, about a mile from the spot where I shot one last year, as mentioned at p. 398 of your 6th volume, and, from its extreme youth, I have every reason to believe it was bred at no great distance. I am certain that it was not able to take a long journey, for, as the bones were very soft and not perfectly set, and many of the quills or stubs are not passed into feathers, I am sure it was not more than ten weeks old; I shall therefore look closely after the parent birds. In spring I intend to visit the Shetland Islands for the purpose of collecting.

3, Bath Road, Margate. S. Mummery.

DUROCHER AND BOWMAN ON GLACIAL OR DILUVIAN PHÆNOMENA.

The remarkable appearances which have been ascribed by Seftström (Taylor's Scientific Memoirs, Part IX.) to diluvial and by Agassiz to glacial action, have engaged the attention, among others, of Mr. Bowman and M. Durocher.

M. Durocher states, as the result of an examination of the great valleys of the Pyrenees, of the Ariège, the Garonne, the Adour, &c., that he has observed in their diluvian phænomena the three kinds of fundamental facts that characterize the diluvium of the North, and that of the Alps; viz., polish of the rocks, accompanied with streaks and furrows, the transport of erratic blocks, and the deposition of gravel on the sides of the upper parts of the valleys, and in level terraces as they descend to the plain.—*Comptes Rendus*, Nov. 2.

Mr. Bowman has also been engaged during the summer in an examination of the valleys of the Dee and the Conway, with a view to the investigation of similar phænomena in Wales, the result of which he has published in the 'Philosophical Magazine.'

METEOROLOGICAL OBSERVATIONS FOR OCT. 1841.

Chiswick.—October 1. Thick haze: cloudy. 2. Very fine. 3. Cloudy: rain. 4. Fine: rain at night. 5. Cloudy: rain. 6. Fine: cloudy: clear at night. 7. Fine: rain. 8. Overcast: slight rain. 9. Cloudy: rain. 10. Overcast: rain. 11. Very fine: rain. 12. Heavy showers. 13. Fine: stormy with rain at night. 14. Boisterous. 15. Heavy rain. 16. Rain: densely clouded: rain at night. 17. Overcast: stormy. 18. Clear and windy: rain at night. 19. Cloudy: fine. 21. Clear: frosty at night. 22, 23. Overcast: rain at night. 24. Cloudy. 25. Overcast: foggy. 26. Foggy: stormy with rain at night. 27. Boisterous with very heavy rain. 28—30. Rain. There were only four days in the month on which rain did not fall, leaving a proportion of wet days perhaps unequalled in the neighbourhood of London.

Boston.—Oct. 1. Fine: rain yesterday P.M. 2. Fine. 3, 4. Fine: rain P.M. 5 Rain: rain early A.M. 6. Cloudy: rain early A.M. 7. Fine. 8. Fine: rain P.M. 9. Fine. 10. Cloudy: rain P.M. 11. Fine. 12. Cloudy: rain early A.M. 13. Fine: rain P.M. 14. Cloudy. 15. Cloudy: rain early A.M. 16. Rain: rain early A.M. 17. Rain: rain early A.M.: stormy night. 18. Stormy. 19. Cloudy: rain early A.M. 20. Stormy: rain at night. 21, 22. Fine. 23. Rain. 24. Cloudy: rain early A.M. 25, 26. Fine. 27. Cloudy: rain P.M. 28, 29. Stormy: rain early A.M. 30. Stormy: rain early A.M.: rain P.M. 31. Cloudy.

Applegarth Manse, Dumfries-shire.—Oct. 1. Rain for an hour. 2. Fine clear sunshine. 3. Dull, cold and rainy. 4. Fair but dull. 5. Showery afternoon. 6. Wet nearly all day. 7, 8. Dropping day. 9. Fair but threatening. 10. Wet all day. 11. Wet afternoon. 12. Heavy rain A.M.: cleared up. 13, 14. Heavy rain P.M. 15—17. Showers. 18. Fair throughout. 19. Showery afternoon: frost A.M. 20. Very heavy rain. 21. Fair and frosty. 22. Frost A.M.: cloudy and moist P.M. 23. Showers. 24. Fair but cloudy. 25. Fair and clear. 26—28. Fair and bracing. 29. Fair and bracing: frost. 30. Fair A.M., but showers P.M. 31. Slight showers.

Sun shone out 26 days. Rain fell 19 days. Frosty mornings 4 days.

Wind north 2 days. North-north-east 2 days. North-east 6 days. East-north-east 1 day. East 1½ day. East-south-east 1 day. South-east 2 days. South-south-east 2 days. South 1 day. South-south-west 2 days. South-west 4½ days. West 2 days. West-north-west 1 day. North-west 1½ day. North north-west 1½ day.

Calm 3 days. Moderate 9 days. Brisk 10 days. Strong breeze 6 days. Boisterous 2 days. Stormy 1 day.

Meteorological Observations made at the Apartments of the Royal Society by the Assistant Secretary, Mr. ROBERTON; *by* Mr. THOMPSON *at the Garden of the Horticultural Society at Chiswick, near London; by* Mr. VEALL *at Boston, and by* Mr. DUNBAR *at Applegarth Manse, Dumfries-shire.*

Days of Month. 1841. Oct.	Barometer.					Thermometer.						Wind.				Rain.				Dew-point.
	London: Roy. Soc. 9 a.m.	Chiswick.		Boston. 8½ a.m.	Dumfries-shire.	London: Roy. Soc.			Chiswick.		Boston. 8½ a.m.	Dumfries-shire.		London: Roy. Soc. 9 a.m.	Chiswick 1 p.m.	Bost.	Dumfries-shire.	London: Roy. Soc. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Lond.: Roy. Soc. 9 a.m.
		Max.	Min.		9 a.m. 8½ p.m.	Fahr. 9 a.m.	Self-register. Max.	Min.	Max.	Min.		Max.	Min.									
1.	29·478	29·598	29 424	·28 94	29 48	55 7	64 3	53 6			51	55	49	ENE.	N.	calm	SW.	·100	·20	14	.	56
2.	29·812	29·773	29 730	29 26	29 77	53 3	61 0	49 0			52	52	35	SW.	W.	calm	SW.	·313	...	..	.	53
3.	29·832	29·792	29 745	29 30	29 75	52 5	60 8	47 7			49	53	34	N.	NW.	calm	SE.	...	.13	..	.	57
4.	29·718	29·703	29 329	29 17	29 41	54 9	58 4	51 3			55·5	62½	42	N.	NE.	calm	E.	·125	·36	09	.	53
5.	29·160	29·124	29 888	28 65	28 82	53 2	60 5	51 7			53·5	53	46	S.	S.	calm	NE.	·272	·22	63	.	54
6.	28·848	29·925	29 808	28 33	28 79	52 3	58 8	49 0			52	50	44	SSE.	W.	calm	ENE.	·205	·04	09	.	53
☾ 7.	29·040	29·038	29 991	28 45	28 90	53 3	59 7	48 6			49	54	47	S.	SW.	calm	NNE.	·063	·04	..	0 2	52
8.	29·200	29·224	29 027	28 69	29 38	52 7	59 3	48 8			50	54½	47	S.	SW.	calm	NNE.	·012	·03	..	.	51
9.	29·778	29·872	29 712	29 18	29 61	50 7	58 2	48 5			51	54½	44	WSW.	W.	NW.	W.	·027	·03	11	.	50
10.	29·878	29·835	29 612	29 35	29 20	54 3	57 2	48 4			48·	55	47	S.	S.	calm	SE.	...	·21	..	.	49
11.	29·660	29·596	29 441	28 99	29 11	53 8	58 7	52 7			55	55	47	SSW.	SW.	calm	S.	·150	·34	08	.	52
12.	29·254	29·596	29 202	28 70	29 38	52 7	60 0	49 3			51	53	44	S.	W.	SW.	SSE.	·352	·24	02	.	52
13.	29·922	29·973	29 859	29 30	29 47	49 7	55 7	46 0			48	54	40½	W.	NW.	NW.	W.	·186	·04	..	.	47
◉ 14.	29·860	29·821	29 698	29 16	29 25	58 3	59 8	49 8			57	57	49½	S.	SW.	calm	SSW.	...	·02	14	2 0	53
15.	29·550	29·799	29 492	28 84	29 53	56 4	63 7	54 2			55	53	47	SW.	NW.	W.	W.	·022	·50	04	.	53
16.	29·474	29·520	29 349	28 95	29 40	51 8	60 2	46 0			45	52½	40	S.	W.	calm	NW.	·441	·04	39	.	50
17.	29·516	29·519	29 409	28 89	28 88	54 7	58 8	47 8			47	53½	36	W var	W.	calm	SSW.	·033	·01	11	.	51
18.	29·704	29·829	29 591	28 96	29 62	52 5	62 6	50 5			48·5	53	40		W.	NW.	NNW.	...	·42	03	.	49
19.	29·628	29·962	29 524	29 12	29 55	46 3	56 3	47 0							NW.	NW.	SW.	·427	...	30	.	46
20.	29·926	29·911	29 611	29 35	29 07	47 8	51 7	43 2							SW.	SW.	SW.	...	·04	..	.	44
21.	29·896	30·162	29 818		29 87	42 7	55 0	40 7							W.	W.	WNW.	·019	...	12	1	42
☽ 22.	30·170	30·124	29 861		29 60	41 8	49 0	37 7							SE.	calm	ESE.	...	·01	..	.	36
23.	29·456	29·449	29 034		28 88	53 8	55 5	42 0							S.	SE.	E.	...	·21	01	.	45
24.	28·944	29·964	29 924		28 80	49 3	58 3	48 6									NNW.	·250				47
25.	29·098	29·234	29 061				55 6	44 0														46
	29·352	29·460	29 318				52 8	37 2														39
	29·460	29·465																				45

like serratures; they are also nearly erect, or at least ascending, not prostrate and placed in a rose-like manner as is the case in the preceding forms; their foot-stalks also are considerably longer. This is the *var. punctata* of Don, and probably the *S. punctata* of Linnæus; it is well represented by tab. 622. and 623. of Reichenbach's 'Iconographia.'

Fig. 6. from Turk Mountain, and fig. 7. from the Gap of Dunloe, are remarkably common in the neighbourhood of Killarney: in them the leaves are always oval, with deep, acute, tooth-like serratures; they are erect or ascending, and have usually long foot-stalks. This is the *var. serratifolia* of Mackay, figured by Reichenbach in his tab. 624.

All the preceding I consider as forms of *S. umbrosa*, although in *punctata* and *serratifolia* the cartilaginous margin is scarcely observable. In all of them the leaves taper off into the dilated flat foot-stalks, which are remarkable for being quite flat above and scarcely convex even below (fig. *a*.).

2. *S. elegans*.—We have here a plant which I can scarcely persuade myself to consider as a species; and yet, if not one, it is very difficult to say to which of the species it should be referred. Mr. Don considered it as a form of *S. Geum*; but from that its truly round leaf (fig. 8.) and its foot-stalks, which are flat above and convex below (fig. *b*.), but not semicylindrical, appear to separate it. From *S. umbrosa* it is distinguished by its leaves not contracting into their foot-stalks and by the convex under-side of the latter. In cultivation and in "exposed situations" its foot-stalks are about as long as the leaves and spread in a "stellate form," but when growing, as was the case with my specimens obtained from near to the summit of Turk Mountain, in the hollow of a rock, the foot-stalks are often twice as long as the leaves, all of which turn themselves towards the light. Upon the whole, it appears to me to be better to consider this as a species until further observation may have determined the value of its claims to that rank. It is figured in tab. 625. of Reichenbach's 'Iconographia.'

3. *S. hirsuta*.—This again is considered as only a variety by many botanists, in which case it is always referred to *S. Geum*; but it has so very different an aspect when growing, and its oval leaves (fig. 9, 10.), with linear foot-stalks which taper slightly from below, present so manifest a character, that I cannot do otherwise than consider it as a species. Its foot-stalks (fig. *c*.) are semicylindrical and channelled above and very hairy. I have gathered it in the Gap of Dunloe and on Connor Hill.

4. *S. Geum*.—This is a very marked species, characterized

by having transversely oval or somewhat kidney-shaped leaves, never contracted below and never longer than broad, combined with semicylindrical hairy foot-stalks which are channelled above. Several varieties are recorded, depending upon the presence or absence of hairs upon the surfaces of the leaves, or upon their under-side being reticulated with purple, but they appear to be scarcely worthy of separate description. Fig. 11, 12, 13, and *d.* represent the leaves and foot-stalks of this plant, which is very common in Kerry, and found but rarely in Cunnamara.

Reichenbach states concerning all these plants, viz. *S. punctata*, *S. serratifolia*, *S. elegans*, *S. Geum*, and *S. hirsuta*, "hæc .... e seminibus sine mutatione eductæ."

The following are what I consider as their respective specific characters:—

1. *S. umbrosa* (Linn.). Leaves obovate, with cartilaginous crenations, or sharp notches tapering at the base into dilated flat foot-stalks; panicle racemose; capsule superior. *α. crenata*, leaves bluntly crenate, spreading (not a native of Britain). *β. crenato-serrata*, leaves acutely crenate or subserrate, spreading. *γ. punctata* (Don), leaves nearly round, acutely serrate, erect. *δ. serratifolia* (Mackay), leaves oblong, acutely serrate, erect. *Eng. Bot.*, t. 663; *Reich. Iconog.*, t. 622, 623, 624.—Found in Mayo, Galway, and Kerry, Ireland. *Var. α.* introduced from the Pyrenees. This variety may have been found *wild* in England, but I believe it to have always been an escape from cultivation.

2. *S. elegans* (Mackay). Leaves round, smooth, shining, acutely serrate; foot-stalks broad, flat above, convex below; panicle racemose; capsule superior. *Reich. Icon.*, t. 625.—Grows on the summit of Turk Mountain, near Killarney, in very small quantity.

3. *S. hirsuta* (Linn.). Leaves oval, acutely serrate; foot-stalks linear, semicylindrical, channelled, hairy; panicle racemose; capsule superior; foot-stalks slightly tapering upwards. *Eng. Bot.*, t. 2322; *Reich. Icon.*, t. 621.—Gap of Dunloe and Connor Hill, Kerry.

4. *S. Geum* (Linn.). Leaves transversely oval or reniform, acutely crenate or serrate; foot-stalks linear, semicylindrical, channelled, hairy; panicle racemose; capsule superior. *Eng. Bot.*, t. 1561; *Reich. Icon.*, t. 628. Leaves always rather broader than long, usually hairy, sometimes glabrous, often beautifully reticulated with purple beneath.—Plentiful in Kerry, rare in Galway.

St. John's Coll., Cambridge, Nov. 29, 1841.

[See vol. vi. pp. 217, 314, 401; and vol. vii. p. 48.—Ed.]

XXXIX.—*On doubts respecting the Existence of Bird-catching Spiders.* By W. S. MacLeay, Esq., F.L.S., &c.

To Richard Taylor, Esq.

Dear Sir,

Some time in the beginning of 1840 I observed here, in the grounds of Elizabeth Bay, a young bird suspended in the geometrical web of an enormous spider which belongs to the same section as the European *Epeira diadema*. Although very common in the neighbourhood of Sidney, it remains as yet an undescribed species. The bird was the *Zosterops dorsalis* (of Vigors and Horsfield), which is so destructive to fruit in the gardens of this colony, and from the state of its feathers was evidently just flown from the nest. It was, when observed, already half-eaten, and the spider was in the act of sucking its juices. It appeared to have been dead two or three days. On recounting the circumstances to my father, he told me that he had already been witness of a similar fact. Having occasion about that time to write to Mr. Shuckard on another subject, I mentioned the fact to him, being anxious, from the love of truth, to retract a remark which I had made in a paper of mine printed in the Transactions of the Zoological Society some years before, namely, that "I disbelieved the existence of any bird-catching spider."

I have long desisted from noticing mis-statements of what I have published; because I now always hope that a reference to my publication will enable unprejudiced persons to arrive at the truth of my meaning. It is very different however with respect to my private letters; and I find, on a perusal of Mr. Swainson's late volume on Entomology in Lardner's Cyclopædia, that Mr. Shuckard, in referring to the above-mentioned private letter, has so singularly misunderstood my meaning, as to leave me no other resource than to request of you to publish in your 'Annals' the following correction of his mistakes.

Mr. Shuckard (page 382) says, that "the fact of *Mygale* catching birds in their nets and feeding upon them has been doubted; but the probability of this has been substantiated and confirmed by a communication recently received from W. S. MacLeay, Esq., who informs us, that in the vicinity of Sidney he has met with a true bird-catching spider; having himself found one of the *Epeiridæ* actually devouring the young of a *Gasterops* that had no doubt lately flown from the nest; and which is not a solitary instance, as his father had previously observed a similar fact. He therefore retracts his

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residence in the Himalaya as a means of enabling me to determine the extremes of cold which the principal Mammalia of a hot country were capable of enduring.

I dwelt in a lonely house in the middle of the oak-forests which overlooked the broad valley of the Dehra Dhoon, about 4000 feet perpendicular below. It had been the head-quarters of the Surveyor General, and its height above the sea had been most unexceptionably determined trigonometrically and barometrically at about 6800 feet. The N. lat. was 30° 26′. The mean temperature in the month of December observed at sunrise was 37·7, and at half-past two for the same period, 45. For the month of January for the same times it was 35·9 and 42·5, making the general mean for the two months 40·3 Fahr.

Snow generally falls there late in November or early in December; but the season I was there we had none till Christmas, after which we had several falls, and on the northern slopes the ground remained covered with it until I left, early in February.

Flocks of the large Monkey of the plains (the Hunaman of the Hindoos, and the *Semnopithecus Entellus* of naturalists) inhabited the oak-woods around, feeding upon the acorns, of which they appeared very fond. In the severest weather they seemed quite as much at their ease as at other times, and made no effort to descend to the warm valley of the Dhoon beneath, though such a change would have cost them but little exertion. I left this spot for the interior of the Himalaya early in February, and, late in that month, near the sources of the Touse, met with a large flock of these animals. It was on the northern slope of the valley. The cold was very severe, and full three foot of snow upon the ground. They were in a forest of Deodar and Morinda, busily feeding on the seeds of the fir-cones. The height above the sea could not have been less than from 8000 to 9000 feet.

The common Leopard* of the plains (*Felis Pardus antiquorum*) was also numerous in the oak-forests during December and January. I caught one in a trap, and saw the tracks of them constantly on the snow following those of the Ghooral. While near the sources of the Touse in February and March, I also observed their tracks at great heights, indeed above the limit of forest, *i. e.* near 12,000 feet above the sea, following those of the Wild Goat or *Taare* (*Capra Jemlica*).

The Tiger is very scarce in the Himalaya, even in summer-

* Mr. Everest has very kindly presented the specimens mentioned to the British Museum collection.—J. E. Gray.

time, being too large and unwieldy an animal to follow the Caprine races over the precipitous ground. I however met with their tracks on the snow near my house; and while shooting in the oak-forest, from 5000 to 6000 feet above the sea, had one of my people carried away by one. They can go wherever the Stag (*Cervus Hippelaphus*) can obtain a footing, and remain on a mountain north of Massoori (Nagtiba, near 10,000 feet in height) all the year round. They live principally on stags and also bears.

The Hyæna is very rare in the Himalaya, and I only once saw one. It was early in March, about 6000 feet above the sea.

The common Wolf is numerous in the plains, but I have never seen or even heard of them in the Himalaya.

The Jackal is rare there, and I have never met with them but in the low and warm valleys.

The Fox of the Himalaya is much larger than the diminutive fox of the plains, and greatly resembles the English one.

The Wild Elephant is not found beyond the base of the hills, but the slopes there are so steep that it would be impossible for so heavy an animal to obtain a footing. However, at a village called Burkote, about twenty miles from the source of the Jumna, young elephants are reared for the Rajah of Tisee. The spot is within the limit of Deodar Forest and also that of winter snow. The animals remain in an open shed during the year.

Before concluding, I will not omit calling your attention to the high temperature of Dehra in the Dhoon, which, in N. lat. 30° 19′, and 2380 feet above the sea, has a mean annual temperature of 70° to 71° Fahr., being the same as that of the summit of the hill on the island of Penang in N. lat. 5° 15′, and at nearly the same height above the sea, viz. 2280 feet.

This may be attributed to three causes:—1st, the situation of Dehra at the foot of the southern slope of the Himalaya, screened from the north by enormous mountains; next, its position, several hundred miles from the sea, and its contiguity towards the south to very wide sandy plains which are intensely heated by the sun; and lastly, the circumstance that almost all the rain there falls during the summer-time. The south-west monsoon blows nearly from the equator, and brings with it aqueous vapour at a high temperature, which is deposited and soaks into the ground very deep, communicating its temperature to the soil.

Be the causes what they may, the circumstance of the tem-

perature of the year being the same in the sixth degree of N. lat. and the thirty-first is remarkable, as showing the great extent to which climate may be modified by locality.

ROBERT EVEREST.

XLI.—*Report of the Results of Researches in Physiological Botany made in the year* 1839. By F. J. MEYEN, M.D., Professor of Botany in the University of Berlin*.

Observations on the presence of certain assimilated and secreted substances in Plants, continued from p. 257.

M. HUNEFELD† has with great diligence attempted to prove the presence of amylum in the flowers of plants; he found it in the flowers of *Calendula officinalis*, in which plant it has been already proved to exist by other chemists. M. Hünefeld then mentions thirty other plants in whose flowers he discovered amylum with more or less distinctness; whether however, he adds, the amylum of flowers always becomes blue by iodine, he must still leave undetermined; in the flowers of *Calendula* it becomes blue, but in the others the colour was more of a dark green. It appeared probable to M. Hünefeld, that it was the yellow colour of the flowers only which caused this green tint; but he has left this important point undetermined, although it were easy to settle by a good microscope. He contradicts himself in his statements, for globules in the flowers which are not coloured blue by iodine cannot be considered as amylum. Amylum, even that from mosses, is always coloured blue; and even when it becomes brown by iodine, it is modified amylum. M. Hünefeld mentions *Tropæolum majus* as one of the few plants which contain amylum in the stem; this however is a tolerably common phænomenon. Decoctions of the flowers of *Calendula*, *Tropæolum*, *Helianthus*, &c. exhibited no trace of amylum, which is easily explained by the microscopical examination of the parts thus treated; the amylum swells within the cells, but does not pass through their walls.

M. P. Savi‡ of Pisa has published some observations on the physical phænomenon seen in the leaves of *Schinus Molle*

* Translated by Henry Croft, Esq., teacher of Chemistry in London.

† Erdmann's and Marchand's Journal für praktische Chemie, 1839, 1er band, p. 87—90.

‡ Memorie Valdarnesi per cura del Dott. Corinaldi. Pisa, 1839, p. 42—48.

nus is mixed with water [to which I also cannot agree.—*Mey.*], and thereby the drops are prevented from coalescing into one single mass. From this fact one might also conclude that the juices which separate within these vessels are of two different kinds, or that the sap, by its action on the plant, is changed partially into one more liquid and transparent, which has exactly the appearance of lymph. 5. Lastly, that the walls of the vessels press, by their elasticity, on the sap which they contain and drive it towards the opening, just in the same manner as a bladder or a gut which is filled very full with water, lets it escape as soon as a puncture is made in its side. M. Savi proceeds to say, that the second phænomenon abovementioned is easily observed when a small quantity of the resinous sap of *Schinus* is poured on the surface of water; we see directly that the sap expands with great celerity into a thin plate or layer; if small pieces of the dried leaves of any plant be then thrown on this thin oily plate, they are seen to be driven about as by strong impulses, and to move backwards from the spot on which they were thrown. This property of expanding itself is common not only to the liquid resin of *Schinus*, but also to all the *Terebinthaceæ*, *Euphorbiaceæ*, *Urticeæ*, *Asclepiadeæ*, and also, according to Carradori, to the fatty and volatile oils. The latter ascribes this property to the attractive force which is exerted upon the above fluids by water, by which each drop of the liquid on the surface is forced to extend itself as far as the cohesive power of the fluid will allow. M. Savi speaks at length on this point; but the existing facts are quite sufficient to prove that this motion of the *Schinus* leaves on water is not to be explained by a contractility of the tissue. Finally, I must remark, that the phænomenon with the green parts of *Schinus* does not always show itself, but only when the plant is in luxuriant growth.

A paper by Prof. Lindley* was read before the Linnean Society on the anatomy of the roots of the *Ophrydeæ*, in which he shows, that salep which is prepared from the roots of certain *Ophrydeæ* does not consist chiefly of amylum, as is generally supposed by authors of the present day (?), but that it is composed of a substance like bassorin. After Dr. Lindley has mentioned the opinions of the most recent authors, he gives the results of his own microscopical investigations; from which it appears that the tubes of the *Ophrydeæ* universally contain long cartilaginous nodules of a mucilaginous substance which is not coloured by iodine, and also some amylum globules

* Phil. Mag., vol. xiv. p. 462.

which are contained in the parenchym surrounding the nodules. The tubers of several South American *Ophrydeæ* when dried have the appearance of a bag filled with pebbles, or as if the epidermis had contracted over the hard interior body. A transverse section of a fresh root of *Satyrium pallidum* explains the above appearance: the hard nodules, as transparent as water, are mingled together with the soft parenchym, and they are twenty times as large as the neighbouring cells. These nodules are easily separable, and appear as hard as horn; on section they appear perfectly homogeneous; cold water has scarcely any effect upon them, but in hot water they become tumid, and are partly changed into a transparent jelly. An aqueous solution of iodine has no visible effect on them in their natural state. On charring some slices of salep, Dr. Lindley found that these apparently homogeneous nodules consisted of very minute cells, filled with a substance of the same refractive power as themselves. Finally, Dr. Lindley declares, that the error of considering salep to consist chiefly of starch, arose from the mode of preparation. The tubers of the *Orchideæ* are first parboiled and then dried; by this means the starch which surrounds the nodules is dissolved, and on drying is precipitated upon their surface, and hence they become blue when treated with iodine. Dr. Lindley's statements with regard to the structure of these roots are so very peculiar, that I felt it necessary to examine the subject myself. The examination of two kinds of salep-roots, as also comparative observations of a fresh tuber of *Orchis militaris*, soon showed, that in the structure of the Orchideous roots there is nothing differing from the general rule. Those hard horny nodules are nothing more than hardened masses of tragacanth gum which fill the individual cells, which in this case are often of a large size; Berzelius had already referred the salep mucilage to tragacanth gum, and in different *Orchideæ* this substance appears to differ only according to its several degrees of hardness. In the cells of the roots of *Orchideæ* is universally observed the presence of a cellular nucleus, and round this is formed a thick mucilaginous mass, as also a greater or smaller number of minute, nearly round globules, which are generally coloured yellowish brown by iodine, but sometimes bluish. The mass of this thick mucilage, as also that of the globules, continually increases within the cells, and in those tubers which can be advantageously used for the preparation of salep, the contents of the single, often very large, cells assume a gelatinous consistency, and on drying become as hard as horn, and may then easily be mistaken for nodules. I have now before me some sections of dried salep-

roots which contain within this hardened mucilage a large quantity of starch, for the whole substance is coloured violet by iodine, and indeed throughout the whole mass, which does not accord with Lindley's observations. All the cells are filled with balls of tragacanth gum; some of them are ten or fifteen times larger than the neighbouring ones, but there are no cells which contain solely amylum grains; but out of a great number of sections, single large gum nodules may be found, in which the globules, similar to those of starch, may be easily distinguished lying round the old nucleus in the interior of the nodule.

Very remarkable is the fact, that most of the walls of these large cells containing gum appear as if composed of smaller cells, by which these membranes often assume a very beautiful appearance; on closer examination I found that this apparent net of cells consisted of superficial deposits, similar to the cell-like formations on the surface of pollen grains. Even in very young tubers traces of these formations may be seen on the *inner* surface of the membranes of those large parenchym cells which are rich in gum.

M. E. Meyer* read a paper to the Physico-Œconomic Society of Königsberg on the 18th of September, 1839, on amylum, in which he explains fully the appearance and structure of the amylum grains according to former observations, and mentions their use; he, however, incorrectly states that it is not yet clearly determined whether the layers of the globules are deposited from without, for the genesis of the globules with which we are acquainted shows this quite clearly. M. Meyer communicates an interesting fact, viz. that in the summer of 1838, on account of the excessive moisture in that part of the country, that rare malformation, the production of tubers on the parts of the potatoe plant which are in the air, was very abundant; this malformation extended itself over whole fields, and M. Meyer saw some specimens which were covered to the top with tuberculous swollen sprouts, and were partly covered with real tubers. The statement, that potatoes possess the largest grains of starch yet known, is probably only a slip of the pen; but it is a curious statement, that the pith of plants never contains amylum, as also that the stems of Palms and *Cycadeæ* never have pith, whence it would result that sago could not be prepared from their pith.

M. Fr. Tornabene Casinese† has written a treatise on the

* Frorieps Neue Notizen, Nos. 253, 254, Nov. 1839.

† Sull'humore crystallino nelle foglie seminali delle piante. Memoria sopra alcuni fatti di anatomia e fisiologia vegetale. Catania, 1838. 4to, p. 3—28.

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sodium, but considerable quantities of chloride of potassium; while in the old plants there is less chloride of potassium, but a nearly equivalent quantity of chloride of sodium. The quantity of carbonate of soda is nearly equal in both young and old plants. The young plants of *Salsola brachiata* also contain less chloride of sodium than the old ones, while the quantity of carbonate of soda remains the same.

M. Göbel thinks it is perfectly immaterial whether young or old plants are used for procuring soda, for the quantity of carbonate of soda is the same in both cases. The plants might therefore be burnt at any time, and the value of the impure soda would not materially differ. The analyses of *Halimocnemis crassifolia*, *Salsola clavifolia* and *brachiata*, both in their young and old state, show "that the quantity of soda has remained nearly constant in all." The quantity of potash is always greater in the young plants than in the old ones, and strikingly so in *Salsola clavifolia*; so that one might really be led to believe, "that in the course of the vegetative process potash is metamorphosed into soda, or, at least, is got rid of in some manner or other." If this were correct, it would certainly be a wonderful discovery, but I may be allowed to propose a question which is not answered in M. Göbel's treatise: Were the old specimens of the three above-mentioned plants (which M. Göbel did not collect himself) from exactly the same spot as that from which, in the same manner, M. Göbel gathered the young ones? Probably this was not the case, and as all these salts are extracted from the soil, a difference therein will of course make a change in the results of the analyses. We must therefore consider this metamorphosis of one substance into the other as yet unproved. M. Göbel also states, that in other plants the quantity of potash is larger in the young than in the old ones. With respect to the relative value of the Halophytes for the fabrication of soda, M. Göbel gives the following list:—1. *Salsola clavifolia*, young dried individuals, 42 per cent.; 2. *Halimocnemum caspium*, young specimens, 22·9 per cent.; 3. *Salsola Kali*, young specimens, 25 per cent.; 4. *Kochia sedoides*, old specimens, 9·16 per cent.; 5. *Salsola brachiata*, young specimens, 33 per cent.; 6. *Halimocnemis crassifolia*, young specimens, 30 per cent.; 7. *Tamarix laxa*, young specimens, 33·6 per cent.; *Anabasis aphylla*, young specimens, 19 per cent., &c.

On the movement of Saps in Plants.

The so often advertised prize-essay of M. C. H. Schultz*

* Extr. des Mém. de l'Acad. des Sciences, tom. vii. des savants étrangers. 1839.

has at length appeared; it is written without any regard to the literature which already exists on this subject, so that probably many persons who are not so perfectly acquainted with the literature of vegetable physiology may be deceived by the supposed novelty of the numerous observations here brought forward.

The work would certainly have been very valuable if it had been printed directly; but now, at a time when the more delicate anatomy has made such great advances, and since the genesis of almost all the elementary organs of plants is tolerably well known, we look in vain in this treatise for all those true improvements of our science; but, on the other hand, the number of the actually incorrect observations (which may easily be shown) is so very large, that I might fill whole pages with an enumeration of them. M. Schultz has purposely separated all the vessels which are figured from the plants by maceration, and of course there must thus arise a great number of mistakes in the figures; indeed several of them must be considered as ideal sketches, not as representations of nature.

The purpose of this treatise is—to prove the existence of a peculiar vascular system in plants in which the circulation of a peculiar sap, viz. the lacteous sap (Milchsaft) or latex, takes place: M. Schultz denominates this circulation "Cyclosis," but every one who is acquainted with the subject will probably find this new name quite unnecessary.

On the existence of this circulation of the latex it is well known there has been much discussion, and my readers will remember that the subject has often been mentioned in the former Reports*; there are however, unfortunately, but few botanists who regarded the observations on this subject with an impartial eye, and I believe that M. Schultz and myself are the only ones who have always endeavoured to prove its existence. In different notices I have circumstantially described how the experiment is to be made with a good microscope, in order to discern the circulation in uninjured plants; but some elder botanists, who saw clearly that Schultz's view was not correct, *would not* see this movement; indeed the opposition to the new theory went so far, that when one wished to show it them they made off, and for several days were not visible.

M. Schultz has in this treatise done all in his power to prove that the latex moves in a peculiar system of vessels, like the blood of animals in the capillary vessels, and he has given a quantity of figures from different plants to illustrate their mode of anastomosing. Notwithstanding all this, one may read, in the Regensburg Botanical Journal of 1839, p. 277,

* See Mr. W. Francis's translation, London, 1839, p. 33.

that this subject was talked over at the meeting at Freiburg, and that several botanists, as M. Treviranus, Von Martius, &c. declared that they had seen this motion of the latex only in *injured* plants. M. de St. Hilaire, who was present, was asked whether the members of the French Academy had convinced themselves of the correctness of M. Schultz's statements, and he replied, that "For the present they had only translated the paper, but had as yet formed no judgement thereupon."

Rather contradictory to the above are several of the statements made by M. Schultz in a late paper on the results of his work, in which, among others, he very modestly says, "We will satisfy ourselves with having made the beginning, and with having pointed out the principles of a determinate direction of the science, the further development of which the judgement of the French Academy will promote not less than the publication of the memoir."

There are two things which it appears to me, from my own observations, M. Schultz has represented very incorrectly, viz. the three hypothetical stages of development of the vessels of the latex, the contracted (vasa laticis contracta), the expanded (vasa laticis expansa), and the articulated (vasa laticis articulata); and moreover the bringing together of the most different formations under the common name of the latex-vessels, or "vessels of the vital sap."

The contracted latex-vessels are said to form the youngest state of the vessels, and in them there is the greatest vital activity; they possess (it is said) the power of expanding and contracting themselves, and indeed to such an extent, that they almost disappear [!]. In the expanded latex-vessels the expansion predominates, but they still possess a contractile power. At a later period, by means of the interrupted contracted parts of the latex-vessels, they become articulated, and the contracted and expanded parts have now become permanent.

From my own observations, I must declare the whole description of the different stages of development of the latex-vessels to be entirely false: the latex-vessels can neither contract nor expand; and that the articulation is not caused by contraction, may be seen by a simple observation of such cells as lie one above the other and are filled with latex. Indeed the whole description is so strange, that I did not know for several years what M. Schultz meant by his contracted latex-vessels, until he published the remarkable treatise mentioned in the former Report, p. 74. Herein it was seen that M. Schultz had denominated "contracted latex-vessels" those fine currents of gum which are so often seen in the cells of plants, both in the Fungi and the Phanerogams, and which are to be

belonging to the group of *Insectivora*, I have had an opportunity of examining a skeleton, now in the possession of Major Christie, and which Mr. Stuart himself had prepared at the time the animal was killed. This skeleton, by the presence of the marsupial bones, distinctly shows that the quadruped in question belongs to the group *Marsupialia*. It also demonstrates that there was an important error in the dental formula as given me in the MS. of Mr. Stuart,—the very error, indeed, which led me to think that the animal might eventually be found to belong to the *Insectivora*. The true dental formula, as taken by me from the skeleton, is as follows:—

Incisors $\frac{4-4}{3-3}$ + canines $\frac{1-1}{1-1}$ + pseudomolars $\frac{3-3}{3-3}$ + molars $\frac{4-4}{4-4}$ = 46.

Now this formula is that of *Phascogale*, from which genus our animal however differs in the three lateral incisors of the upper jaw being of equal size, and also in the pseudomolars being all of equal size. I am however in hopes of soon possessing a specimen from Spring Cove, when I shall be able to determine how far this animal differs from the genus *Phascogale*, or whether it may not be safely assigned to it.

I remain, &c.

Elizabeth Bay, near Sidney, Aug. 9th, 1841. W. S. MacLeay.

XLIII.—*Notice of a hitherto unobserved Character distinctive of the Sexes in certain* Cetoniidæ. By J. O. Westwood, Esq., F.L.S., &c.

In a short notice published in these 'Annals' for October last, I communicated the curious discovery, that whilst the females in certain groups of *Lucanidæ* possess a short horny tooth at the extremity of the basal or internal lobe of the maxillæ, their males are destitute of this character. I have now to announce the existence of precisely the same sexual distinction in certain groups of *Cetoniidæ*. Until very recently the maxillæ of the species in this family have been described as possessing entirely membranous lobes, with the exception of *Cremastocheilus*, in which this organ is horny, and armed in both its lobes with strong curved corneous teeth. More recently Gory, Perchéron, and MacLeay have detected corneous teeth in the maxillæ of other *Cetoniidæ*, which character has accordingly been employed, especially by the last-named author, to characterize many of the groups which he has proposed in his quinarian arrangement of the family, published in Dr. Smith's 'African Zoological Researches.'

None of these authors were however aware that the possession of a corneous tooth in the mando or inner lobe of the maxillæ is in some cases a sexual character; and consequently, as they have omitted to notice from which sex their descriptions have been derived, the characters of all their groups will require a careful revision before they can be considered as satisfactorily established.

Having some years ago, whilst making the dissections of the typical *Goliathi* for the 'Coleopterist's Manual,' ascertained the remarkable dentation in the maxillæ of the types of that group, which differ so materially from all the other *Cetoniidæ* in this respect, I have carefully examined these organs in the other allied *Cetoniidæ*, especially as I had determined to figure some of the more curious forms in my 'Arcana Entomologica.' For this purpose I made, in the spring of the present year (1841), drawings of several species and of their anatomical details, some of which were published in the first number of the work just mentioned, which appeared on the 1st of May. We here find the maxillæ of *Mycteristes rhinophyllus*, male, armed on the upper lobe with several teeth; and the same is the case in both sexes of *M. Cumingii*; the maxilla of the female of that insect being like that of the male, I did not figure it. In *Dicronocephalus Hardwickii* ♂ the lower lobe of the maxillæ is quite simple, and the upper lobe corneous, straight, and acute at the tip. So far, it is true, no sexual variations were observed; but on dissecting the male *Goliathus* (*Eudicellus*) *Morgani*, of which Mr. Hope possesses both sexes (in April 1841), I observed that the maxilla was destitute of any tooth on the lower lobe; whereas I found the females of *G.* (*E.*) *frontalis* and *aurata*, in Mr. Melly's cabinet, armed with a strong tooth on this part; and on returning to town from Liverpool (which I had visited in company with Dr. Burmeister, in order to study Mr. Melly's collection), I found the same character in the female of *G.* (*E.*) *Morgani* in Mr. Hope's collection*. I likewise detected the same character in the mando of the female of *G. polyphemus* in Mr. Turner's collection, and also in the female of *G. torquatus* in Mr. Hope's; whereas in the male of the latter species, as Prof. Burmeister informs me, the inner lobe of the mando is unarmed.

Since Dr. Burmeister's departure from England, I have been much engaged in dissecting the majority of the genera and a great number of the species of the *Cetoniidæ*, with the view of investigating the natural classification of that family,

* I have recently received a letter from Prof. Burmeister, dated Nov. 14, 1841, in which he mentions his having discovered this sexual distinction in *Gol.* (*Eudicellus*) *Daphnis*, *Smithii*, and the species allied thereto.

and have discovered analogous differences in several other species. In *Stephanorrhina* (Burm.) *guttata*, Oliv., the male has the mando unarmed, whilst it is furnished with a short acute horny tooth in the female.

In *Jumnos Roylii* (*Cetonia R.*, Hope, in Prof. Royle's work on the Himalaya), the male* has the apex of the inner lobe of the maxilla scarcely produced beyond a straight line; whereas in the female it is armed with a strong curved tooth. In the *Rhomborrhinæ* (*Cetonia opalina*, *Mellii*, &c.) the males have the lower lobe almost unarmed, whilst in the females it is strongly hooked. In *Cetonia* (*Coryphe*) *elegans* both lobes of the maxillæ are obtuse in the male, but much more acute in the female; whilst in *C.* (*Trigonophorus*, Hope) *Hardwickii* the apex of the lower lobe is much more acute in the female than in the male, although conical and corneous in the latter.

In *Goliathus* (*Dicronorrhina*, H.) *micans*, on the other hand, the lower lobe is unarmed in both sexes; and the same may be said to be the case in the three fine African species unknown to Gory, Perchéron, and MacLeay, which constitute a small group, to which I have given the name of *Tmesorrhina* (Arc. Ent., pl. 19), except that in the females the mando is slightly produced into a small point. In *Coryphe MacLeaii* the mando is produced in both sexes into an angulated point, rather more acute in the female than in the male; but in *Coryphe umbonata* and *Diceros bicornuta*, I have not found any distinction in the maxillæ of the opposite sexes. The same is also the case in the interesting African *Schizorrhina cyanea*, Oliv., only here the maxillæ are of different form.

To those who have investigated the structure of the trophi of insects, a difference of the kind, mentioned in this and my former notice as occurring in some *Lucanidæ*, will be considered interesting, because, of all the organs, none exhibit so constant an uniformity of structure as the maxillæ. "Maxillam constantissimam invenimus, vix in congeneribus variat"—and "Maxillæ et labium tunc constantissima, semper simillima," observes Fabricius; and Mr. MacLeay places it in the least variable position in his table of the variation of the organs of insects ('Horæ Ent.,' p. 5). The only notice I have found of a sexual difference in this part is in the genus *Nemognatha*, belonging to the Heteromerous Coleoptera, where the upper lobe is exceedingly elongated, which character has been surmised to be sexual (K. and S., Introd., vol. iii. p. 317).

The discovery of this sexual distinction will render neces-

* The male of this insect agrees with *Jumnos Ruckeri* ♂, as figured in the Transactions of the Entomological Society, in the curious toothing of the fore-tibiæ. It is the female which is figured in Dr. Royle's work.

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journal for June last, as detailing similar observations made three months before the reading of the paper.

The passage is the following :—

"I have ascertained that all the more transparent Zoophytes," (under which title I include the marine orders of the Hydroid, Asteroid, and Ascidian classes, which embrace all the species individually noticed by Mr. Landsborough) "possess highly luminous properties. This fact I first discovered in a specimen of *Laomedia gelatinosa*, and subsequently in a great variety of other species. If a portion of it, adhering to the sea-weed to which it is attached, be taken from the water and agitated, a great number of bright phosphorescent sparks will be emitted; these sparks proceed from each of the denticles of the coralline containing polypi, and the phænomenon is equally apparent whether the specimen be in or out of water. The imagination could scarcely conceive a more beautiful spectacle than would be furnished by the shining of countless myriads of these tiny lamps, lighting up the dark recesses and caves of the ocean." ....."The fact of the phosphorescence of one species of *Sertularia*, *S. pumila*, was, I have lately learned, discovered by Stewart some time since; but the announcement of it did not, it appears, lead to further inquiries into this interesting subject."

From a perusal of the above account, to which I shall add some additional observations, it is manifest that priority of upwards of a year, of the discovery of the general phosphorescence of Zoophytes, is due to me, and not to Mr. Landsborough.

I have stated that the phosphorescence is equally apparent whether the specimen be in or out of water, that is, in air or water; and this is the fact, the only requisite in either case for its development being the friction of motion.

Numerous friends, among others G. J. Allman, esq., of Bandon, can bear witness to the exceeding brilliancy of the phosphorescent light emitted by a great variety of species which I was frequently in the habit of exhibiting to them. Once each week I received from the master of a trawling vessel on the Dublin coast, a large hamper of Zoophytes in a recent state; in the evening these were taken into a darkened room, and the spectators assembled; I then used to gather up with my hands as much of the contents of the hamper as I could manage, and tossing them about in all directions, thousands of little stars shone out brightly from the obscurity, exhibiting a spectacle, the beauty of which to be appreciated must be seen, and one which it has been the lot of but few persons as yet to have looked upon. Entangled among the corallines were also numerous minute luminous Annelides, which added their tiny fires to the general exhibition.

Provided the Zoophytes had not been exposed to wet or

frost, which destroys their vitality, the same appearance could be repeated on the second and third night, but with diminished brilliancy.

With respect to the phosphorescence of some Fishes, *Mollusca tunicata*, and the *Medusæ*, spoken of by Mr. Landsborough, instances of it in all these are I believe on record; and of the phosphorescence of the latter distinct mention is made by Professor Rymer Jones in his 'Outlines of the Animal Kingdom;' and indeed it is to the *Acalepha*, the animals composing which class vary in size from particles almost imperceptible from their transparency to creatures exceeding a foot in extent, that the ocean is principally indebted for its luminous properties. I well remember the admiration, not unmixed with wonder (for then I knew not to what agencies the power by which water seemed suddenly to kindle and glow, as though turned to liquid fire, was to be attributed), which I felt when first I viewed the beautiful phosphorescence phænomenon of the ocean. Beautiful as this spectacle is even in our own seas, in warmer latitudes, and in the Mediterranean, it is far more splendid; but to be seen at all it is necessary that the water should be disturbed in some way—the slightest breeze curling the surface of the tranquil ocean, calls forth from its waters a flash of phosphorescent fire as it sweeps along—the wave, as it falls from the vessel's side and breaks into ten thousand pieces, reveals innumerable globes of animated fire suddenly called forth from the darkness which enveloped them—each stroke of the dripping oars scatters thousands of living gems around them, unequalled in brilliancy by the glittering of a kingly diadem—a golden path of light, increasing in breadth as the distance becomes greater, follows, like an attendant comet, the wake of the vessel urged onwards by the impelling wind—and the fisher's net, just raised to the water's edge, and laden with spoil collected from the secret beds and hiding-places of the great deep, seems converted into a golden framework set with precious jewels, by the presence of numerous zoophytes entangled in its meshes. Indeed, in whatever way the water is agitated, the same beautiful appearance follows; if a little be placed even in the palm of the hand, and shaken, bright scintillations will be emitted; but, of course, the phænomenon will be more striking in proportion to the quantity of water put into commotion.

ARTHUR HILL HASSALL.

Cheshunt, Herts, Dec. 8th, 1841.

[NOTE. In publishing Mr. Landsborough's paper, we might, with great propriety, have taken occasion to direct the attention of our readers (and it was perhaps an oversight on our part to have omitted it) to that passage in Mr. Hassall's, in which he had detailed his

interesting observations of the luminous properties of Zoophytes. At the same time, it does not appear that Mr. Landsborough, in communicating his observations, has laid any claim to priority. Not having seen Mr. Hassall's paper, his record of phænomena of the same class which have come under his personal notice has still its independent value. The observations of each of our correspondents will be most acceptable to the lovers of natural history; and the degree of originality which they may possess will no doubt be duly estimated by those who are most extensively acquainted with what has been written upon the subject. Both agree in stating that the inquiry was suggested to them by the remark of Mr. Stewart.—Ed.]

XLV.—Excerpta Botanica, *or abridged Extracts translated from the Foreign Journals, illustrative of, or connected with, the Botany of Great Britain.* By W. A. Leighton, Esq., B.A., F.B.S.E., &c.

No. 7. *Notes on the genus* Corylus. By Ed. Spach. (Ann. des Sc. Nat. n. s. xvi. 98.)

Generic Characters.

Flores monoici, hiemales, foliis multò præcociores : *masculi* 5- ad 8-andri, aperianthi, in amenta squamosa, ebracteolata, cylindracea, gracilia, multiflora, jam æstate præteriti anni nascentia moxque perulis denudata dispositi; *fœminei* perianthio adnato prædíti, staminibus (imò rudimentariis) omninò orbati, in glomerulos parvos sub-multifloros, sub anthesi gemmaceos sessiles perulis (per actâ anthesi tandem deciduis) obtectos, post anthesin demùm in ramulum foliatum excrescentes aggregati, *singuli involucrati.*

Amenta mascula lateralia v. lateralia terminaliaque (in ramulis præteriti anni), e singulis gemmis ad rachin breviusculam nunc gemina (rarò solitaria), nunc 3 ad 6-spicata, jam virginea pendula. *Squamæ staminiferæ* pluriseriatim imbricatæ, unifloræ, concavæ, unguiculatæ, haud peltatæ, subverticales, subcoriaceæ, ciliolatæ, staminibus longiores, cuneato-obovatæ, mucronatæ, anticè appendicibus 2 (squamæ subconformibus et paulò longioribus) infernè cum ungue confluentibus instructæ. *Stamina* secus squamarum basin inordinatim inserta. *Filamenta* brevia, capillaria, indivisa, æstivatione recta. Antheræ monothecæ, ellipticæ, 2-valves, dorso affixæ, apice barbatæ. [Filamentis indivisis, antheris monothecis, staminibusque igitur quasi dimidiatis, *Corylus* a cæteris affinibus generibus omnibus differt.]

Glomeruli fœminei solitarii, sub anthesi laterales (ad ramulos præteriti anni, nunc ex iisdem axillis ac amenta mascula, nunc ex axillis inferioribus, semper autem ex aliis gemmis), squamosi. *Involucra* (sub anthesi minima, perulis obtecta, setulis rigidis simul ac ovaria densissimè vestita) subcampaniformia, variè divisa, in rachi brevissimâ spicata, imbricata, geminatim inserta, pleraque postea abortientia ; par quodvis bracteâ solitariâ herbaceâ

scales, and not superposed in two regular series. The bracteas at the base of the female involucres, far from being always oval or entire, are on the contrary various in form, sometimes entire, and sometimes more or less cut. These bracteas are persistent and accrescent, whilst in the nearly allied genera *Carpinus* and *Ostrya* they are deciduous shortly after flowering. The female involucres are constantly one- and not two-flowered, not sometimes one- and sometimes two-flowered. They are not aggregated without order, but are always inserted in pairs in the depressions (*fossettes*) of a very abbreviated rachis, each pair being accompanied by a bractea. The limb of the perianth of the female flowers is never completely obliterated, but is always perfectly visible on the young fruit under the form of a subapicular, pubescent, undulated, or irregularly denticulate swelling. The inferior flowers of each cluster are almost always abortive, as is also the case with a greater or lesser number of the superior flowers; consequently the fruit borne on one peduncle are very variable in number, and frequently reduced to one or two. Lastly, the fructiferous involucres are neither always tubular nor always bipartite.

The hybernal flowering, the appendages of the staminiferous scales, the single-celled anthers, the accrescence of the bracteas of the female flowers, and the hypogeal cotyledons, constitute, conjointly with the female inflorescence and the structure of the fructiferous involucre, the chief essential characters by which *Corylus* is distinguished from the two nearly allied genera *Ostrya* and *Carpinus*. In these latter genera the flowering is vernal, the staminiferous scales are without appendages, the anthers two-celled, either completely disunited or at least parted in the middle. The whole, or greater portion of the female flowers are fertile, and produced in large pendent spikes. Their accompanying bracteas are fugacious, and the cotyledons are developed into seminal leaves.

Sectio I. AVELLANA, Spach.

Involucrum fructiferum inerme, 2-partitum (rarò 3-partitum, nonnunquam uno latere tantùm usque ad basin fissum), subcampaniforme; segmentis inciso-dentatis, v. palmatis. Nux involucro longior v. brevior.

1. CORYLUS COLURNA, *Linn.* Wats. Dendr. Brit., tab. 99.—*Corylus byzantina*, Seb. Mus. 1. tab. 27. fig. 2.—*Corylus byzantina* et *Corylus Colurna*, Hortul. Arborea, corticis stratis exterioribus in lamellas crassas deciduas solubilibus. Involucris fructiferis (sæpissimè 2-partitis) nucibus subduplo (plusve) longioribus: segmentis conniventibus, multifido v. multipartito-palmatis.

Hab. in Thraciâ (ex auctoribus antiquioribus); in Bannatu Hungariæ (ubi, ex cl. Rochel, sylvas extensas efficit); in Italiâ superiori (ex cl. Reichenbach. Flor. Germ. excurs.).

This species is thus characterized by Willdenow:—"C. stipulis lanceolatis, acuminatis; calyce fructûs duplici: exteriore multipartito, interiore tripartito, laciniis palmatis; foliis subrotundo-ovatis, cordatis." By Poiret (Encycl.), "C. stipulis linearibus, acutis; calycibus profundè dissectis; fructu maximo:" and by Reichenbach, "C. nuce abbreviatâ; calyce fructûs patentissimo, duplici: exteriore multipartito; interiore tripartito; laciniis palmatis; foliis subrotundo-ovatis cordatis inciso-angulatis." Many of these characters are incorrect, and none of them sufficiently constant for specific definition.

The fructiferous involucres, or calyx of the above-cited authors, is in this, as in all the other species, simple; that which has been incorrectly taken for an exterior involucre or calyx being nothing more than the involucres of the abortive flowers and the bracteas of the fertile ones, which are equally found at the base of the fruit in the other species. The involucres of the abortive flowers always remain very minute. The form and size of the bracteas vary infinitely in all the species, and afford no good character. According to Reichenbach, the fructiferous involucre of *C. Colurna* is very patulous; but that distinguished botanist appears to have fallen into error from the examination of badly dried specimens, since the involucre is constantly straight and connivent up to the summit or nearly so, as we have determined from an examination of a great many different varieties in a living state. This structure of the fructiferous involucre is in fact the sole character by which the fruit of *C. Colurna* can be distinguished from that of certain varieties of *C. Avellana*; for although, in general, the segments of the involucre of *C. Colurna* are much more deeply laciniated than is ordinarily the case in *C. Avellana*, still there are some varieties of the former which have the segments split only to one-third, or at most to one-half, and some very common varieties of *C. Avellana* which have the involucral segments very deeply palmatifid. The involucre of *C. Colurna* is sometimes nearly glabrous, sometimes more or less pubescent, sometimes almost cottony, and often bristled with hairs or glandular bristles. Its size is as variable as in *C. Avellana*, or rather as in all the species. The straps (*lanières*) of its segments are very entire, or jagged, or inciso-dentate, or bi- or tri-furcate, more or less acuminate, or only pointed, very frequently more or less divaricated at the summit, generally narrow, being either linear, linear-lanceolate, demi-lanceolate or subfalciform, less frequently very broad and

falciform, or demi-lanceolate, or oblongo-lanceolate. According to Willdenow and Reichenbach, one of its distinctive characters was the tripartite involucre; but an examination of a large quantity of the fruit has demonstrated that this is only an accidental variety which occurs also in *C. Avellana*, and which is very much rarer than the normal condition, in which the involucre is divided to its base into two nearly equal segments. Another variety, much more common both in *Colurna* and *Avellana*, has the involucre divided only on one side down to its base, as in that of *Carpinus*.

The nut, as in all the species, is either more or less compressed, or subcylindrical, or obscurely 3- or 5-gonous, sometimes subglobose, sometimes obovate, oval, ovoid or oblong, whilst in size it is equally variable. The number of fruits borne on each peduncle affords no distinctive character, being in all the species either solitary or aggregated, from 2—7 or rarely more.

The male catkins of *C. Colurna* are generally longer than those of its congeners, but in other respects their structure is similar. This is not the case however with the fertile flowers.

The most variable organs of *Corylus* are undoubtedly the leaves and stipules; and their different modifications of form, size, and pubescence are so inconstant on each individual, as to render it vain to employ them even as *characters of varieties*.

The leaves of most species are generally suborbicular or ovali-orbicular, though frequently oboval, oval, oval-oblong, elliptico-oblong or oblong; in general they are suddenly terminated in an acute, more or less elongated point; less frequently they are obtuse or gradually tapered into a point. Their base is cordate (sometimes slightly so, sometimes more or less deeply so); less frequently rounded, rarely pointed, sometimes nearly equal, and sometimes more or less unequal. Their margins, from base to summit, are doubly or unequally dentate, or crenulate, or jagged, often moreover more or less strongly angular or incised, or sometimes even pinnatifid; sometimes plane, and sometimes undulated or crisped. Both surfaces are sometimes more or less pubescent, sometimes so only on the under surface; sometimes, though very rarely, glabrous on both surfaces, except the axils of the nervures of the inferior surface, which are always more or less strongly bearded. The petiole is cylindrical or obscurely trigonous, not channelled, more or less short, hairy, pubescent, hispid or glabrous. The hairs or bristles sometimes glandulose, sometimes not so. These variations of pubescence occur also on the stipules, young shoots and peduncles.

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Corylus americana, auctor. plur. (non? Willd.*).—*Corylus heterophylla*, Fisch. ! †.—*Corylus Turtschaninovii*, Bess. in Florâ, 1834, Beybl. vi.—*Corylus bulbosa*, Turtsch. (ex Bess., *l. c.*).—*Corylus alba, C. americana, C. arborea, C. Avellana, C. barcelonensis, C. bicarpa, C. corymbosa, C. crispa, C. glomerata, C. grandis, C. heterophylla, C. laciniata, C. maxima, C. minor, C. nana, C. ovata, C. pedemontana, C. pumila, C. rotunda, C. rubra, C. striata, C. subconica, C. sylvestris, C. tenuis*, and *C. urticæfolia*, Hortul.

Fruticosa, dumosa, v. rarius subarborescens et unicaulis. Cortice lævigato v. demùm rimuloso, nunquam deciduo. Foliis sæpiùs suborbicularibus v. ovato-subrotundis. Involucris-fructiferis (sæpissimè bipartitis) nucibus subbrevioribus, v. paulò longioribus (rariùs subdimidio longioribus); segmentis inciso-dentatis v. palmatifidis, demùm plus minusve patulis.

The characters generally attributed to this species are, stipules oval or oblong, obtuse; leaves cordiform, orbicular, acuminated; fructiferous involucre inciso-dentate, and spreading at the summit. This definition, with the exception of the inconstant characters, is no otherwise defective than in seeming to indicate that the fructiferous involucre of *C. Avellana* is not bi- or tripartite as that of *C. Colurna*, and that this structure of the involucre constitutes the difference of the two species; but, as before mentioned, the involucre of *C. Avellana* differs essentially from that of *C. Colurna* in its segments being more or less patulous and not connivent; for in the most usual, and consequently the normal state, the involucre of *C. Avellana* is likewise divided to the base into two nearly equal segments; less frequently this involucre is divided to the base on one side only, as in the Yoke-Elms, (*Charmes*); and very rarely it is divided to the base in three unequal segments. As to the other pretended distinctive characters of *C. Avellana*, they are as inconstant as those of *C. Colurna*, and consequently are valueless as specific distinctions. We shall therefore merely repeat, that the leaves, stipules and nut of *C. Avellana* present all the variations of form and size above described; that its fructiferous involucre varies in pubescence like that of *C. Colurna*, and the hairs of the involucre, petioles, peduncles, and young shoots are in like man-

one of the commonest varieties in our woods, viz. with an involucre scarcely as long as the nut, slightly or not at all glandulose, and slightly inciso-dentate.

* The *C. americana* of Willd. (*Spec.*) has been since considered by its author himself as a distinct species from *C. americana*, Mich., and he has named it *C. pumila*. This is unknown to us, but, judging from the definition of its author, it can scarcely be anything else but a new synonym of *C. Avellana*.

† We cannot detect any difference between *C. heterophylla*, Fisch., and the ordinary *C. Avellana*.

ner either terminated by a gland or not; that the involucre is sometimes shorter than, sometimes as long as, and sometimes longer than the nut; that nevertheless it rarely exceeds the nut by more than one-third, whilst in *C. Colurna* the nut is often two to three times shorter than the involucre; and lastly, that the segments of this involucre, slightly inciso-dentate in certain varieties, are, on the contrary, more or less deeply palmatifid in other varieties, not only in those in cultivation, but also in those which are very common in woods; and in this latter case the secondary segments (*lanières secondaires*) are sometimes equal, sometimes more or less unequal, very entire, or jagged, or inciso-dentate, or pinnatifid; in form sub-linear, or linear-lanceolate, or lanceolate, or semi-lanceolate, or oblongo-lanceolate, or suboval, or deltoid, and sometimes acute, sometimes acuminate.

The more notable modifications of the fructiferous involucre afford the following varieties:—

α. *brachychlamys*, Spach.—*Corylus Avellana sylvestris* et *Corylus Avellana ovata*, Willd.—Involucre a little shorter or a little longer than the nut; segments irregularly inciso-dentate; nut obovate, or oval, or oblong; involucre pubescent, or hispid, glandular, or non-glandular. This variety appears to be commoner than all the others in the woods.

β. *schizochlamys*, Spach.—Involucre generally as long as, or about $\frac{1}{3}$rd longer than the nut; segments palmatifid as far as the middle or beyond; straps (*lanières*) chiefly jagged or inciso-dentate. Nut variable in form. Involucre sometimes hispid and glandular, sometimes only pubescent with or without glands. This variety is common in the woods in the environs of Paris.

γ. *macrochlamys*, Spach.—*Corylus Avellana glomerata*, Hort. Kew.—*Corylus Avellana maxima*, Audib. Cat. Involucre large (often about 18 lines long and as many broad), one-half longer than the nut; segments palmatifid; straps (*lanières*) inciso-dentate, or subpinnatifid, broad, acute. Nut large, subglobose. Cultivated variety.

δ. *cylindrochlamys*, Spach.—*Corylus Avellana grandis*, Hort. Kew.—*Corylus Avellana maxima*, Willd. Involucre (15—18 lines long) subcylindrical, a little longer than the nut; segments inciso-dentate at the summit. Nut obovate or subglobose, or ellipsoid, very large. Cultivated variety known by the name of *Filbert*.

Of the numerous variations of the leaves of this species, the two following alone merit special notice:—

Corylus Avellana urticæfolia, Audib. Cat.—*Corylus laciniata* et *Corylus urticæfolia*, Hortul. Leaves deeply sinuato-pinnatifid; segments acute, inciso-dentate.

Corylus Avellana crispa, Loud.—*Corylus crispa*, Hortul. Leaves inciso-angular and crisped.

Sectio II. TUBO-AVELLANA, Spach.

Involucrum fructiferum inerme, monophyllum, ultra nucem in tubum nunc bifidum, nunc trifidum, nunc uno latere tantùm fissum, ore clausum, apice dentatum v. laciniatum productum.

3. CORYLUS TUBULOSA, Willd. Guimp. et Hayn. Deutsch. Holz. tab. 152.—*Corylus maxima*, Mill.—*Corylus arborescens*, Duroi; Mœnch.—*Corylus rubra*, Borkh.—*Noisetier franc*, Poit. et Turp. Arbres fruitiers, tab. 12. Fruticosa, dumosa, v. rarius subarborescens. Cortice lævigato v. demùm rimoso nunquam deciduo. Foliis sæpiùs subrotundis v. ovato-subrotundis. Involucris-fructiferis conoideis, nucibus nunc paulo, nunc subdimidio longioribus.

Hab. in Austriâ, Hungariâ, Italiâ superiori (Reich. Fl. Germ. excurs.), nec non in australioribus Europæ regionibus.

—— *β. purpurea.*—*Corylus tubulosa purpurea*, Audib. Cat.—*Corylus purpurea*, Hortul. Foliis involucrisque purpureo-fuscis. Varietas hortensis.

The *C. tubulosa*, known under the name of the true Filbert (*Noisetier franc*), has been considered by many authors as only a variety of *C. Avellana*; but it appears to us incontestably distinct, from the structure of its involucre, although we have been utterly unable to discover other differences between these two species. The leaves and stipules vary as in *C. Avellana*. The fructiferous involucre is $1\frac{1}{2}$—2 inches long, downy or hispid, generally glandular, sometimes bi- or trifid, sometimes divided on one side only, and irregularly inciso-dentate or laciniated at the summit. Nut oblong, or oval-oblong, or oval, more or less compressed, sometimes violet, sometimes of a brown-red colour. The integument of the seed is purple or white.

4. CORYLUS ROSTRATA, Hort. Kew.; Willd. Arb. tab. 1. fig. 2. *Corylus americana*, Walt. Carol.—*Corylus cornuta*, Duroi. Fruticosa, pumila. Foliis sæpiùs oblongis v. oblongo-obovatis, duplicato-serrulatis (vix aut ne vix angulosis). Involucro-fructifero basi subgloboso, supernè longè cylindraceo-tubuloso, nuce multò longiore, sæpiùs hispidissimo. (V. s. sp.)

Hab. in Americæ septentrionalis montibus Alleghanies.

This species, according to the authors of the 'Flora of North America,' does not rise to more than three or four feet. The leaves are much smaller than those of the preceding species, slightly cordiform at the base. The tube of the fructiferous involucre is in length about eighteen lines, slender, ordinarily bifid as far as the middle, with laciniate segments.

worth preserving. Outwardly it was constructed of roots interwoven with mosses, but in the lining of the nest, mixed with black and white hairs, were swans-down and thistle-seed, this last evidently made use of on account of its plumed appendages, all of which remained attached to the seed. It was late in the autumn when this nest was observed, so that the period at which the thistle-seed was obtained is unknown. A correspondent remarks, that he has removed nests containing the young to a considerable distance without their being forsaken by the parent birds. My friend at Cromac supplies a note to the effect that he once took all the eggs, three in number, out of a green-linnet's nest and put in their place a similar number of those of the titlark: the next morning he found that a fourth egg had been laid by the green-linnet, which he afterwards saw several times on the nest, but further, the result is unknown to him.

That green-linnets collect into flocks, and remain so for the winter is well known, and I have so remarked them about Belfast feeding in the highest cultivated fields adjoining the heath of the mountain-top, and again in low-lying tracts somewhat distant from any plantation or place where they would roost for the night. In summer likewise they are occasionally congregated. Two excellent observers have noticed them as follows—one, in the vicinity of the town just mentioned, remarked a flock of not less than thirty, feeding on a mountain pasture on the 27th of June; and the other saw them come in numbers at the same season to meadows at the sea-side when ready for cutting, and he conjectured, for the purpose of feeding on the seed of the dandelion (*Leontodon Taraxacum*), which plant was there very abundant—both localities were near to tilled ground and plantations of trees and shrubs.

A correspondent mentions, that by placing one of these birds in a cage-trap he has caught numbers. I have known some, when taken young and caged, and after being so kept for some little time, to be given their liberty every morning, when they returned to their cage in the evening to roost as regularly as in a perfectly wild state they would have done to their favourite tree or shrub.

The only food which I have found in the stomachs of a number of these birds killed during winter was grain and seeds of different kinds.

The Goldfinch, *Fringilla Carduelis*, Linn., though found over the four provinces of Ireland, is by no means generally distributed, and in some extensive districts which seem in every respect most favourably circumstanced for it, is not

to be found at all, or only as an occasional visitant. Of all our indigenous birds, the beautiful goldfinch seems the most capricious. In one instance it is known to me as entirely deserting a part of the country which it had regularly frequented, after a small portion of a mountain-side covered with thistles from time immemorial had been reclaimed and planted with forest trees. From other localities too, I have known the goldfinch without any apparent reason flit away, and, unlike many other birds, never revisit the place of its nativity. As the country around Belfast has become more populous, their number has decreased. The romantic neighbourhood of Cushendall, about forty miles distant, is now their stronghold in this quarter, and there the goldfinch is the most common bird. It is pleasing to witness the social manner in which they feed, several being often engaged regaling upon the seed of a single thistle; and on a moderate-sized plant of the more humble knapweed (*Centaurea nigra*) I have seen four of them thus occupied at the same time—the seed of the ragwort or ragweed (as it is called in the north of Ireland) is a favourite food. They are very easily alarmed when feeding, and fly off hurriedly in little companies uttering their pleasing and lively call.

Although this species will frequent gardens and well-kept grounds, especially for the purpose of nestling, it seems to prefer such parts of the country as are in some degree wild, and its visits to the farm are certainly not to be considered as complimentary to the owner, for when most out of order and run to weeds it is most attractive to the goldfinch. During snow, these birds have been taken in trap-cages baited with flax-seed, and sometimes in company with chaffinches. For two years successively, goldfinches nestled in a cherry-tree within ten paces of a house in which I lived, when they and their young (in each instance four in number) proved most interesting—I have seen their nests in willows and pear-trees, and in one of the latter of moderate size, the goldfinch and thrush at the same reared their broods, both of which in due time escaped in safety. One correspondent mentions his having had their nests in the elder, and another, in noticing apple-trees in which he had observed them, remarks that they were generally placed on the outer portion of the branches.

In addition to seeds of various kinds found in the stomachs of examples killed in the months of January and February, I have observed the remains of coleopterous insects, but only very rarely. The goldfinch is treated of in a very interesting manner in the 'Journal of a Naturalist.'

Siskin, *Fringilla spinus*, Linn.—Templeton, in his 'Cata-

logue of the Vertebrate Animals of Ireland,' calls this bird a "rare visitant," and to my ornithological friends and myself it is known only as a winter bird of passage resorting at uncertain intervals to this island. Rutty, in his 'Natural History of Dublin' (1772), says, that siskins "come to us in the beginning of winter and go away the beginning of spring," implying their regular periodical appearance. That they may occasionally even breed in some parts of the county of Wicklow, and certain suitable localities in the north, is not improbable.

I first saw this species in a wild state in the neighbourhood of Belfast, in the winter of 1826 or 1827, probably the latter, as in that year siskins were met with (and for the first time) by Sir Wm. Jardine in Dumfries-shire. On November 22, 1828, my brother shot one near Belfast when feeding on a thistle, and in March 1829, he saw about eight of these birds in our Botanic Garden very busily engaged in feeding among the branches of some larch-firs then partially in leaf. Early in the winter of 1835 many—both old and young—taken alive about the town of Antrim, were brought to Belfast for sale, and an example was shown to me which had been killed with a stone out of a flock consisting of from twenty to thirty individuals near Ballymena in the same county. On the Christmas-day of that year, an intelligent observer saw about twenty feeding together on thistles in the county of Down: on the 25th of February 1836, I met with a couple, one of which was an adult male, on the wooded banks of the river Lagan near Belfast, where the alder predominates, and so late as the 6th of April, saw one which had been then obtained in the last-named county;—during the winter of 1835–36 these birds were unusually plentiful from the north of the island to the neighbourhood of Dublin, where, and in the adjacent county of Wicklow, large flocks were seen and numbers killed: examples were likewise procured that season in the county of Cavan. Early in the winter of 1836–37 some of these birds were shot in the counties of Dublin and Wicklow, and again in the winter of 1829–30. A friend who has numbered nearly eighty years and knows the siskin well, recollects its visiting the north of Ireland occasionally throughout his life, and its frequenting in some numbers a large garden attached to a store in the town of Belfast to feed on flax-seed, of which some was always strewn over one of the walks. The same gentleman saw several of these birds about Ballantrae in Ayrshire, a few days before Christmas 1839.

Of those before mentioned as brought alive to Belfast, some were purchased by my friend Wm. Sinclaire, Esq., who thus

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cultivator of flax in the north of Ireland, by placing no value on the home-grown seed, unwittingly presents a rich autumnal treat to the grey-linnet. After this plant has been subjected to steeping, the seed parts freely from the stem when the bundles are flung out of the pool upon the neighbouring banks, and here these birds may be seen congregated to feed upon it so long as any seed is left. The linnet has always seemed to me to have a predilection for deserted quarries (especially of limestone), doubtless for the sake of the seeds of the various plants which spring from the debris—and also for the borders of the sea-shore unaffected by cultivation, where many hundreds may often be seen associated together. So early as the 10th of July I once saw several flocks, some containing fifty individuals, on the marine sand-hills at Portrush, near the Giant's Causeway: one of these birds which fed within six paces of me was regaling on the seed of a dandelion, which it extracted with great rapidity; on rising from the ground its call was uttered and repeated for some time on the wing*. Under date of September 21, the following note appears in my journal:—For some time past I have daily seen flocks of from two to three hundred grey-linnets about the rocks at the sea-side near Bangor, county of Down. When perched today (which was very fine) on low rocks whose bases were washed by the sea, they kept up a pleasing concert, reminding me of that produced by an assembled multitude of redwings (*Turdus Iliacus*) on fine days in the early spring.—On the shore of Belfast bay I have seen this bird at the end of April perched on the top of fucus-covered stones—the legitimate haunt of the rock pipit—singing most vigorously, though whin-covered rocks, a favourite resort of the species, were quite contiguous. When in the month of June visiting low rocky islets in the sea, the breeding-haunts of terns (*Sternæ*), I have met with this bird. Occasionally in autumn as well as spring, the true song of the linnet may be heard trilled forth by individuals which form part of a large flock. On the 1st of September I have remarked the red upon the breast to be as bright as in June. To witness a flock of grey-linnets feeding is a very pleasing and interesting sight. Several may be seen in different attitudes busied in extracting the seed from a single thistle or ragweed, which all the while keeps moving to and fro with their weight. The ear too is at the same time gratified with the lively call, which is constantly uttered by one or more of the party. When two

* In this respect the *lesser redpole* is said by Mr. Selby to differ from the grey-linnet, which he considers to be silent on the wing, but in the north of Ireland there is not this distinction between the species.

or three are engaged on the petty surface of a ragweed-top, and others fly to it, some of the first comers, apparently on the principle that the world is wide enough for all, generally move off and leave it to the later guests; occasionally, indeed, the interruption produces a little buffeting, but which soon terminates, and in this respect is unlike the general *mêlée* of the sparrow, where the row, originating with a pair, soon becomes general; or the regular "stand-up fight" of the robin, a couple of which, when feeling "blown" after a set-to, literally stop to take breath, after the approved manner of the Fives-Court, and this done, are at it again as hard as ever, until the victory is decided.

Sir Wm. Jardine has very pleasingly remarked in a note to his edition of Wilson's 'American Ornithology,' that "every one who has lived much in the country must have often remarked the common linnets congregating towards the close of a fine winter's evening perched on the summit of some bare tree, pluming themselves in the last rays of the sun, chirruping the commencement of their evening song, and then bursting simultaneously into one general chorus, again resuming their single strains, and again joining, as if happy, and rejoicing at the termination of their day's employment." In one locality where I had daily the gratification of thus observing them, the effect was heightened by the trees—black Italian poplars, stunted from growing in a retentive clay—on which they alighted and dotted with their numbers to the very apex, having pyramidal-formed heads, and accordingly presenting several pyramids of birds, each giving forth its peal of music. When this ceased, the birds descended to roost in fine large Portugal laurels growing beneath and around the trees. The time, &c. of their resorting to these poplars was noted on a few occasions during one season, thus—on February 16th, a great number appeared at four o'clock; on the 9th of March, kept up their strain until half-past five o'clock; March 30th, did the same until half-past six o'clock, and though their numbers have become much thinned, 120 were reckoned on this occasion. So late as the 5th of May some came in flocks to roost; this evening fifteen were observed in company. The whin is the grey-linnet's favourite plant for nestling in, and next to it the hawthorn may be ranked, whether in a hedge or growing singly. This is a favourite cage-bird in the north of Ireland, where it is consequently much sought after by bird-catchers, who call it simply *grey*.

The Mountain-Linnet, *Fringilla montium*, Gmel., is one of the least known of our indigenous *Fringillidæ*, and was believed by Mr. Templeton to be only a "winter visitant." But

it nestles in the heath-clad mountains of at least the more northern parts of the island*, and from its occurrence to me in such localities in mid-winter, I am disposed to believe that severity of weather only drives it from such haunts. It is distinguished in the north of Ireland from the other linnets (*Linariæ*) by the name of "*Heather*-grey." A friend frequently before alluded to, remarks that he has seen these birds every winter for some years past in large flocks about Clough, in the county of Antrim, where they chiefly frequent the stubble-fields in the neighbourhood of the mountains. A person conversant with this species states, that he has frequently had its nests among heath on the top of the Knockagh, a mountain near Carrickfergus: in this plant they were generally placed, but in some instances were built in dwarfed whins which grew amid the heath. A venerable sporting friend has always met with these birds about their nests (which he remarks were placed in "tufts of heather") when breaking his dogs on the Belfast mountains preparatory to grouse-shooting. From the county of Fermanagh I have had specimens of this bird. Mr. R. Ball includes it among the species found in the neighbourhood of Dublin.

[To be continued.]

XLVII.—*Extracts from a Lecture by* M. Dumas *on the Chemical Statics of Organized Beings* †.

If, in the dark, plants act as simple filters which water and gases pass through; if, under the influence of solar light they act as reducing apparatus which decompose water, carbonic acid and oxide of ammonium, there are certain epochs and certain organs in which the plant assumes another, and altogether opposite part.

Thus, if an embryo is to be made to germinate, a bud to be unfolded, a flower to be fecundated, the plant which absorbed the solar heat, which decomposed carbonic acid and water, all at once changes its course. It burns carbon and hydrogen; it produces heat, that is to say, it takes to itself the principal characters of animal life.

But here a remarkable circumstance reveals itself. If barley or wheat is made to germinate, much heat, carbonic acid and water are produced. The starch of these grains first changes into gum, then into sugar, then it disappears in producing carbonic acid, which the germ is to assimilate. Does a potato

* Since the above was written, Mr. R. Davis, jun., of Clonmel, has informed me that it is common and breeds in the county of Tipperary.

† The lecture from which these are extracts has appeared in the Philosophical Magazine for November and December 1841.

tion from which carbonic acid is continually disengaged, in which consequently carbon undergoes combustion.

You know that we were not stopped by the expression *cold-blooded animals*, which would seem to designate some animals destitute of the property of producing heat. Iron, which burns vividly in oxygen, produces a heat which no one would deny; but reflection and some science is necessary in order to perceive, that iron which rusts slowly in the air disengages quite as much, although its temperature does not sensibly vary. No one doubts that lighted phosphorus in burning produces a great quantity of heat. Unkindled phosphorus also burns in the air, and yet the heat which it develops in this state was for a long time disputed.

So as to animals, those which are called warm-blooded burn much carbon in a given time, and preserve a sensible excess of heat above the surrounding bodies; those which are termed cold-blooded burn much less carbon, and consequently retain so slight an excess of heat, that it becomes difficult or impossible to observe it.

But nevertheless, reflection shows us that the most constant character of animal existence resides in this combustion of carbon, and in the development of carbonic acid which is the result of it, beginning also in the production of heat which every combustion of carbon occasions.

Whether the question be of superior or inferior animals; whether this carbonic acid be exhaled from the lungs or from the skin, does not signify; it is always the same phænomenon, the same function.

At the same time that animals burn carbon, they also burn hydrogen; this is a point proved by the constant disappearance of hydrogen which takes place in their respiration.

Besides, they continually exhale azote. I insist upon this point, and principally in order to banish an illusion which I cannot but believe to be one of the most prejudicial to your studies. Some observers have admitted that there is an absorption of azote in respiration, but which never appears unaccompanied by circumstances that render it more than doubtful. The constant phænomenon is the exhalation of gas.

We must therefore conclude with certainty, that we never borrow azote from the air; that the air is never an aliment to us; and that we merely take from it the oxygen necessary to form carbonic acid with our carbon, and water with our hydrogen.

The azote exhaled proceeds then from the aliments, and it originates from them entirely. This, in the general œconomy of nature, may in thousands of centuries be absorbed by

plants, which, like Jerusalem artichokes, draw their azote directly from the air.

But this is not all the azote which animals exhale. Every one gives out by the urine, on an average, as M. Lecanu has proved, 230 grains of azote a day, of azote evidently drawn from our food, like the carbon and hydrogen which are oxidized within us (*que nous brûlons*).

In what form does this azote escape? In the form of ammonia. Here indeed, one of those observations presents itself which never fail to fill us with admiration for the simplicity of the means which nature puts in operation.

If in the general order of things we return to the air the azote which certain vegetables may sometimes directly make use of, it ought to happen that we should also be bound to return ammonia, a product so necessary to the existence and development of most vegetables.

Such is the principal result of the urinary secretion. It is an emission of ammonia, which returns to the soil or to the air.

But is there any need to remark here, that the urinary organs would be changed in their functions and in their vitality by the contact of ammonia? the contact of the carbonate of ammonia would even effect this; and so nature causes us to excrete urea.

Urea is carbonate of ammonia, that is to say, carbonic acid like that which we expire, and ammonia such as plants require. But this carbonate of ammonia has lost of hydrogen and oxygen, so much as is wanting to constitute two molecules of water.

Deprived of this water the carbonate of ammonia becomes urea; then it is neutral, not acting upon the animal membranes; then it may pass through the kidneys, the ureters, and the bladder, without inflaming them; but having reached the air, it undergoes a true fermentation, which restores to it these two molecules of water, and which makes of this same urea true carbonate of ammonia; volatile, capable of exhaling in the air; soluble, so that it may be taken up again by rain; and consequently destined thus to travel from the earth to the air and from the air to the earth, until, pumped up by the roots of a plant and elaborated by it, it is converted anew into an organic matter.

Let us add another feature to this picture. In the urine, along with urea, nature has placed some traces of albuminous or mucous animal matter, traces which are barely sensible to analysis. This, however, when it has reached the air, is there modified, and becomes one of those ferments of which we find so many in organic nature; it is this which determines the conversion of urea into carbonate of ammonia.

These ferments, which have so powerfully attracted our attention, and which preside over the most remarkable metamorphoses of organic chemistry, I reserve for the next year, when I shall give you a still more particular and full account of them.

Thus we discharge urea accompanied by this ferment, by this artifice, which acting at a given moment, turns this urea into carbonate of ammonia.

If we restore to the general phænomenon of animal combustion that carbonic acid of the carbonate of ammonia which of right belongs to it, there remains ammonia as the characteristic product of urine.

Thus, By the lungs and the skin, carbonic acid, water, azote;
By the urine, ammonia.

Such are the constant and necessary products which exhale from the animal.

These are precisely those which vegetation demands and makes use of, just as the vegetable in its turn gives back to the air the oxygen which the animal has consumed.

Whence come this carbon, this hydrogen burnt by the animal, this azote which it has exhaled in a free state or converted into ammonia? They evidently come from the aliments.

By studying digestion in this point of view, we have been led to consider it in a manner much more simple than is customary, and which may be summed up in a few words.

In fact, as soon as it was proved to us that the animal creates no organic matter; that it merely assimilates or expends it by burning it (*en la brûlant*), there was no occasion to seek in digestion all those mysteries which we were quite sure of not finding there.

Thus digestion is indeed but a simple function of absorption. The soluble matters pass into the blood, for the most part unchanged; the insoluble matters reach the chyle, sufficiently divided to be taken up by the orifices of the chyliferous vessels.

Besides, the evident object of digestion is to restore to the blood a matter proper for supplying our respiration with the ten or fifteen grains of coal, or the equivalent of hydrogen which each of us burns every hour, and to restore to it the grain of azote which is also hourly exhaled, as well by the lungs or the skin as by the urine.

Thus the amylaceous matters are changed into gum and sugar; the saccharine matters are absorbed.

The fatty matters are divided, and converted into an emulsion, and thus pass into the vessels, in order to form depôts which the blood takes back and burns as it needs.

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or even Lagrange* had supposed, but which precisely, as it becomes complicated, tends more and more to enter into the general laws of inanimate nature?

You have seen that the venous blood dissolves oxygen and disengages carbonic acid; that it becomes arterial without producing a trace of heat. It is not then in becoming arterial that the blood produces heat.

But under the influence of the oxygen absorbed, the soluble matters of the blood change into lactic acid, as MM. Mitscherlich, Boutron-Charlard and Fremy observed; the lactic acid is itself converted into lactate of soda; this latter by a real combustion into carbonate of soda, which a fresh portion of lactic acid decomposes in its turn. This slow and continued succession of phænomena which constitutes a real combustion, but decomposed at several times, in which we see one of the slow combustions to which M. Chevreul drew attention long ago, this is the true phænomenon of respiration. The blood then becomes oxygenized in the lungs; it really breathes in the capillaries of all the other organs, there where the combustion of carbon and the production of heat principally take place.

To sum up, then, we see that of the primitive atmosphere of the earth three great parts have been formed:

One which constitutes the actual atmospheric air; the second, which is represented by vegetables, the third by animals.

Between these three masses, continual exchanges take place: matter descends from the air into plants, enters by this route into animals, and returns to the air according as these make use of it.

Green vegetables constitute the great laboratory of organic chemistry. It is they which, with carbon, hydrogen, azote, water and oxide of ammonium, slowly build up all the most complex organic matters.

They receive from the solar rays, under the form of heat or of chemical rays, the powers necessary for this work.

Animals assimilate or absorb the organic matters formed by plants. They change them by little and little, they destroy them. In their organs, new organic substances may come into existence, but they are always substances more sim-

* The reader will no doubt admire how entirely M. Dumas passes by all English philosophers,—even him with whom these trains of investigation originated. "This beautiful discovery [of the chemical action of light, heat, and the component parts of atmospheric air upon plants], for the main principles of which we are indebted to Dr. Priestley, shows a mutual dependence of the animal and vegetable kingdoms on each other which had never been suspected before his time."—Sir J. E. Smith's Introduction to Botany, see p. 162—170.

ple, more akin to the elementary state than those which they have received. By degrees these decompose the organic matters slowly created by plants; they bring them back little by little towards the state of carbonic acid, water, azote and ammonia, a state which allows them to be returned to the air.

In burning or destroying these organic matters, animals always produce heat, which radiating from their bodies in space, goes to supply the place of that which vegetables had absorbed.

> Thus all that air gives to plants, plants give up to animals, and animals restore it to the air,—an eternal circle in which life keeps in motion and manifests itself, but in which matter merely changes place.

The brute matter of air, organized by slow degrees in plants, comes, then, to perform its part without change in animals, and serves as an instrument for thought; then vanquished by this effort and broken, as it were, it returns brute matter to the great reservoir whence it came.

BIBLIOGRAPHICAL NOTICES.

A List of the Genera of Birds, with their Synonyma, and an Indication of the typical Species of each Genus. By George Robert Gray. Second Edition. 8vo. London, 1841.

Mr. Gray's 'Genera of Birds' is a systematic catalogue of all the generic groups which have been proposed by ornithologists, with their synonyms, and a reference under each genus to some one well-ascertained species by way of type. Having on a former occasion (see Annals of Nat. Hist., vol. vi. p. 410, vol. vii. p. 26) published a commentary on this work when it first appeared, I am induced to offer a few further remarks on this new and improved edition. If the former work was deserving of high praise as a first attempt to introduce order and system into a chaotic mass of scattered observations, this edition may be still further commended on the ground of the great additional accuracy and completeness which it exhibits. In these days of hasty and superficial book-making, it is rare to meet with a work in which so much labour and research is condensed into so small a space, and as a tabular index of the present state of ornithology, it is one of the most complete works ever produced in any branch of zoology.

A work of such a nature is well adapted to supply statistical results. The actual number of genera enumerated in it amount to 1119. To these genera no less than 1961 Latin or systematic names have been given by different authors, so that 842 superfluous generic names have already been introduced into the science of ornithology. Yes! it is a humiliating fact, that into this most fascinating portion of Nature's Eden, no less than 842 *weeds* have been deliberately planted by the hands of those who professed to be the cultivators of

the soil; weeds which, though they may be rooted out of the systematic arrangement, must yet, in the shape of synonyms, continue for ever to choke up the writings and load the memories of ornithologists, throwing a dusky veil of human mystification over the fair face of Nature. Does not this fact prove the necessity of naturalists agreeing upon some general rules and principles to be followed in constructing their nomenclatures? It is not, I think, asserting too much to say, that if ornithologists had had a good code of laws for their guidance, and had not in many cases yielded to personal vanity or to an indolent neglect of the labours of their predecessors, nearly the whole of these 842 useless generic names might have been spared to the science, and would have been available in other departments of zoology, from which they are now for ever excluded. Mr. Gray's work, if diffused as widely as it deserves to be, will, it may be hoped, go far in checking the daily growing evil of multiplying words without multiplying facts; and we may hope that this work will have many imitators in other branches of natural history, some of which are even in a more chaotic state than ornithology.

The principle of priority which Mr. Gray has followed in selecting his nomenclature is now daily gaining ground among judicious naturalists, but there are one or two points in which I think he has carried his principle too far, on which I now proceed to remark.

In his former edition, Mr. Gray extends the law of priority (with a few exceptions) no further back than 1760, the date of Brisson's work, but in the present edition he gives the benefit of this law to Mœhring's 'Genera Avium,' published in 1752, and to the first edition of Linnæus' 'Systema Naturæ,' in 1735. Now if this arrangement had *worked well* there would have been no good ground of objection to it, but it happens unfortunately that these two works have lain almost dormant from the time of their publication till 1841, when Mr. Gray has drawn them from their dusty shelves. In the mean time, many of the generic names found in these old works have been used in totally different senses by later authors, and have been now current for thirty or forty years. To these later genera Mr. Gray gives new names, and restores their former names to the old genera of Mœhring and of Linnæus's first edition, from which they have been so long removed. For instance, he follows Mœhring in giving the generic name *Spinus* to the common Bunting, *Tragopan* to a Hornbill, *Scops* to the Demoiselle Crane, *Cinclus* to the Turnstone, *Catarrhactes* to the Guillemot, So, after Linnæus's first edition, he applies the name *Grus* to the Balearic Crane, *Numenius* to the Snipes, and *Graucalus* to the Cormorants. The ornithologist will immediately remark that these names have long been applied to genera widely different from those here mentioned, genera upon which Mr. Gray is obliged to impose fresh names, either selected from later authors or new-coined for the occasion. He gives, for instance, the new name *Megalornis* to the common Crane, and *Cracticornis* to the Curlew.

These alterations of names so long established are not merely inconvenient, but it is to be feared that they will fail of their desired effect, that of producing uniformity of nomenclature. We cannot,

hibit, *when correctly spelt*, a difference from all preceding ones, though it amount only to a single letter.

At the same time, the principle proposed by Mr. Gray should operate as a *caution* to naturalists, when constructing new generic names, to avoid, as far as possible, such terms as closely resemble those already adopted.

The number of generic groups enumerated in this work amounts, as before stated, to 1119. It is to be hoped that this number will in future be increased only by the discovery of new forms. It is after all a mere matter of taste, how far the process of forming new genera by subdividing old ones shall be carried. Subdivide as we may, the diversities of structure will never be exhausted until each species is made into a genus, for there is rarely an instance of two species, however closely allied, that precisely agree in the proportions of all their parts. We may therefore cease from subdividing when we think that the limit of convenience has been attained; and most persons will admit that it has been reached, if not exceeded, in the case before us, where about 5000 species (for no more are known *with accuracy*) are distributed into no less than 1119 genera. Mr. Gray is of opinion that these genera might be advantageously condensed to the number of about 800, and in this I quite agree with him.

The systematic classification adopted by Mr. Gray is considerably improved in this edition, though there are still several groups which I think might be better arranged. Most of these cases were pointed out in my former commentary; and as the question of affinities is, in the present state of our knowledge, in great measure open to opinion, it is very natural that Mr. Gray's views should occasionally differ from mine.

The alphabetical index is a valuable appendage to the present edition, but one thing is still needed, a list of the books which have been consulted in compiling this work. Many of the authorities for genera have been extracted with great perseverance from works of extreme rarity in this country, and it would have been a great aid to the student if the titles of these works had been enumerated in Mr. Gray's book. I would suggest that this defect might be in some degree supplied if Mr. Gray would send such a list to this Magazine.

I now proceed as before to remark on the details of Mr. Gray's volume, but it will be seen, that from the far greater accuracy of the present edition, my criticisms will be much less numerous than on the former occasion.

At page ix of his preface, Mr. Gray states, through an oversight, that the number of genera of birds in Linnæus' last edition is 104, when in fact they are 78. It follows that the calculations deduced therefrom are erroneous. The proportion of species to genera in the 'Systema Naturæ' will be twelve to one, not nine to one.

Page 7 of the text. For the reasons above stated, I trust that the name *Scops* will be retained for the genus of Owls which has so long borne it, in which case the type should be called *Scops zorca* (Gm.), not *Scops aldrovandi*, Bon.

P. 8. The name *Asio*, Briss., 1760, should supersede *Otus*, Cuv., 1799, and the type will then stand as *Asio otus* (Lin.).

The genus *Glaucidium* belongs to the subfamily *Surninæ*.

P. 10. The name *climacteris*, applied to the type of *Scotornis*, is, I believe, a mistake for *climacurus*.

P. 12. *Erolla*, Less., 1831, should give way to *Peltops*, Wagl., in Oken's 'Isis,' 1829.

P. 13. In my former criticism on the use of the word *Capito* I was misled by its erroneous application in Mr. Gray's first edition to the *Bucco tamatia* of Gmelin. Mr. Gray has now cleared the difficulty by showing that *Capito* and its synonym *Nyctactes* are equivalents of *Micropogon*, Tem., and he has therefore given a new name, *Chaunornis*, to *B. tamatia*, Gm. In a supplementary note, p. 102, Mr. Gray points out that this genus ought in strictness to bear the name of *Bucco*, Lin., as the only species of *Bucco* mentioned by Linnæus belongs to this group. There is indeed no denying that modern authors have departed from the original type of *Bucco*, Lin., in restricting that name to the East Indian Barbets; but this application of the term (though incorrect) is now so universally adopted, that I decidedly think it has acquired a prescriptive right which it would be very injudicious to set aside.

P. 18. *Heliothryx* should be written *Heliothrix*.

P. 20. It appears from Cuvier's 'Règ. Anim.' that the *Merops moluccensis*, Gm., is the type of Commerson's genus *Philedon*, and that name is long anterior to *Philemon*, Vieill.

P. 23. *Dendroma*, Sw., cannot be synonymous with *Diglossa*, Wagl., as it is described by Swainson with the margins of the beak entire. *Dendroma* appears to me to be equivalent to *Philydor*, Spix, and to include his three species *superciliaris*, *albogularis*, and *ruficollis*.

P. 24. The earliest specific name of *Xiphorhynchus procurvus* seems to be *trochilirostris*, Licht., and that of *Sittasomus sylviellus* is *erithacus*, Licht.

P. 26. *Thriothorus* should be written *Thryothorus* (from θρύον, a reed, θορέω, to leap).

Thryothorus arundinaceus, Vieill., should be called *T. ludovicianus* (Lath.).

According to my observations, the *Edela ruficeps*, Less. (*Orthotomus edela*, Tem., P. C. 599. f. 2.), is the same as *Motacilla sepium* of Raffles, but is not the *Orthotomus sepium* of Horsfield.

P. 28. The earliest binomial specific name of *Locustella* is *rayi*, Gould. It is a misapprehension of Ray's meaning to call the bird *Locustella avicula*, Ray. He uses the word *avicula* not as being *less* general than *Locustella*, but *more* so. He intended to say, "a small bird called *Locustella*," and not "the species of *Locustella* called *avicula*," which would be his meaning if *avicula* were a specific name.

The genus *Erythropygia*, Smith, ought, I think, to be separated from *Aedon*, Boié, notwithstanding the similarity of plumage. *Erythropygia* is a South African group connecting *Cossypha*, Vig., with *Saxicola*, while *Aedon* is an European genus near *Acrocephalus*.

Mr. Gray quotes Pl. Enl. 651. f. 1. both under *Phyllopneuste hippolais* and *Phylloscopus trochilus*. The latter citation is the correct one.

The genus *Phyllopneuste*, as typified by *P. hippolais*, ought, I think, to be united with *Acrocephalus*.

The name *Lusciniola*, Gray, 1841, should not supersede *Calamodyta*, Bon., 1838. *Lusciniola* is not used *generically* either by Brisson or Ray; and I have before remarked, that if we cross the boundary line of modern science fixed by the introduction of the binomial method, we must carry back our nomenclature not merely to Ray or Aldrovandus, but to Pliny and Aristotle, nay to Hesiod, Homer, and Moses.

P. 29. The genus *Adornis*, Gray, 1841, ought to retain the name *Curruca*, Bechst. (restricted), used also by Meyer, Cuvier, Fleming, Bonaparte, Swainson, &c., both on the ground of priority and because it includes the bird called *Curruca* by Brisson, which is the female of *Curruca orphea* (Tem.). The *Motacilla hortensis*, Gm. (*Sylvia hortensis*, Lath.), and the figure of Buffon, Pl. Enl. 579. f. 1, also refer to *C. orphea*, fem. The true "Pettychaps" (*C. hortensis*, auct.) is the *Sylvia hortensis*, var. *β*. of Latham, which was first clearly distinguished by Bechstein.

P. 31. Mr. Gray gives no synonyms for *Iora scapularis*, Horsf., but it ought to stand as *Iora tiphia* (Lin.), Vig.; *Sylvia zeylonica*, Lath.; *Fringilla multicolor*, Gm.; *Muscicapa cambayensis*, Lath.; *Iora scapularis*, Horsf.; *Motacilla subviridis*, Tickell.

P. 33. It does not appear why *Helinaia*, Aud., 1839, is used instead of *Vermivora*, Sw., 1827.

The bird figured by Gould, 'Birds of Europe,' pl. 138, is not the *Anthus aquaticus*, Bechst., of South Europe, but is the British and North European species *A. obscurus* (Gm.), Tem.; *Alauda petrosa*, Mont.; *Anthus rupestris*, Nils. See Temminck, 'Man. Orn.,' pt. 4. p. 628.

P. 35. Why is the name *Petrocossyphus*, 1826, preferred both to *Monticola*, 1822, and *Petrocincla*, 1825?

P. 37. *Garrulax belangerii*, Less., is a synonym of *G. leucolophus* (Hardwick), not of *G. perspicillatus* (Gm.). The earliest synonym of *Malacocercus striatus* is *Turdus griseus*, Gm.

P. 39. The following genus should be inserted near *Pycnonotus*: Oreias, Tem., 1838, < *Ixos*, Tem. Type, *O. azureus*, Tem., Pl. Col. 274.

P. 40. The following genus should be inserted near *Alectrurus*: Copurus, Strickland, 1841, < *Platyrhynchus*, Spix, < *Muscipeta*, Cuv. Type, *C. filicauda* (Spix), Av. Braz., vol. ii. pl. 14; *Muscicapa leucocilla*, Hahn.

P. 41. The reference Buff., Pl. Enl. 276, belongs to *Pitangus sulphuratus*, and Pl. Enl. 212. to *Scaphorhynchus pitangua*.

The earliest specific name of the North American *Tyrannus*, Pl. Enl. 676, is *carolinensis*, Gm.; the next in date is *pipiri*, Vieill., Ois. Am. pl. 44. This bird is not the *Lanius tyrannus*, Lin., which is the *T. dominicensis*, Briss., Vieill., O. Am. pl. 46.

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P. 53. Insert the genus ENODES, Tem., 1838. < *Lamprotornis*, Tem. Type, *E. erythrophrys*, Tem., Pl. Col. 267.

P. 56. Erase *Oriolus caudacutus*, Gm., from the synonyms of *Dolichonyx*, as it is also cited under *Ammodromus caudacutus*, p. 61.

P. 57. Add *Chlorion*, Tem., 1838, to the synonyms of *Emberizoides*.

P. 59. *Citrinella serinus*, Bon., should be called *C. brumalis* (Gm.), and *Petronia rupestris*, Bon., should stand as *P. stulta* (Gm.).

P. 61. The true *Fringillaria capensis* (Lin.) is figured in Pl. Enl. 158. f. 2, and is distinct from *F. flaviventris* (Vieill.) (*F. flavigaster*, Rupp.), Pl. Enl. 664. f. 2.

P. 62. The specific name of *Agrodroma* should be *campestris* (Bechst.), not *rufescens*. Temminck makes it an *Anthus*, not an *Alauda*, and it unquestionably should be placed next to, if not in, the genus *Anthus*, and not among the *Alaudinæ*, into which group it was forced by Mr. Swainson, in order to fill a gap in the quinary system.

P. 63. *Crithagra* should stand in the *Fringillinæ* next *Serinus*.

P. 69. Mr. Gray's new name *Laimodon* should be written *Læmodon*, αι in Greek becoming *æ* in Latin. (See Linnæus, Phil. Bot., § 247.)

Is Mr. Gray correct in quoting *Bucco barbatula*, Tem., under his *Barbatula nana*? Levaillant's pl. 56. (the basis of *B. barbatula*, Tem.) seems very different from the description of *Bucco parvus*, Gm. (the basis of *Barbatula nana*).

Calorhamphus fuliginosus (Tem.), mihi, is certainly not the *Bucco lathami*, Gm. See Lath. Syn. pl. 22.

P. 70. Is not the genus *Sasia*, Hodgs., identical with *Microcolaptes*?

P. 73. *Pseudornis*, Hodgs., is more allied to *Cuculus* than to *Oxylophus*, but seems to be sufficiently distinct from both to deserve a generic rank.

P. 77. Latham describes his *Phasianus leucomelanus* with a *black crest*. It must therefore be the *Lophophorus cuvieri*, Tem., and not the *Euplocamus hamiltoni*, as stated at p. 102.

P. 80. I do not find a "*Perdix olivacea*" in Latham's 'Index Ornithologicus;' therefore, if the name *olivacea* originated with Hodgson, it should give way to the prior name *megapodia*, Tem.

P. 88. Independently of the objections which exist to our reviving the obsolete nomenclature of Linnæus' first edition, there can, I think, be no doubt that the Curlew, and not the Snipe, should be regarded as the type of his genus *Numenius*. The latter name was given to the Curlew in allusion to the *crescent*-shaped form of the beak, (from *νέος*, new, and *μήνη*, moon,) a character which does not apply to the Snipes.

Those who retain the Whimbrel as a distinct genus should call it *Phæopus vulgaris*, Flem., but there is certainly no good ground for separating it generically from the Curlews (*Numenius*, Lath.).

The *Scolopax pygmæus*, Gm., is said by Temminck to be the same as *Pelidna platyrhyncha*, and as nothing is said of its having

three toes, it cannot be referred with certainty to *Erolia*. The latter bird should therefore be called *Erolia variegata*, Vieill., 1816 (not *E. varia*, Vieill., 1824).

P. 89. *Pelidna subarquata* ought not to be distinguished as a genus from *Pelidna cinclus*. Both have the beak curved, though not quite in the same degree.

P. 90. *Microptera*, Nuttal, is synonymous with *Philohela*, Gray.

P. 95. *Camptolaimus* should be written *Camptolæmus*.

P. 99. If the claims of Mœhring to a share in our modern nomenclature be disallowed, then the name *Gavia*, Boié, 1822, may be restored to the *G. eburnea* (Gm.). H. E. Strickland.

Works lately Published.

Bartlett's Index Geologicus, or Geology at One View; published under the auspices of the Geological Section of the Devon and Cornwall Natural History Society; a Diagram, 3 ft. 6 in. by 2 ft. 9 in., in Case, or mounted on Rollers and varnished, with a coloured Section of Strata, on copper; showing the relative position of all the different stratified and unstratified Rocks, with the classification and arrangement, *in situ*, of Animal and Vegetable Fossil Remains, with the mineral accompaniments of each stratum.

Mr. Clifford of Tunbridge Wells has just republished 'Flora Tunbrigensis,' with an additional list of new plants, and a life of the author, the late T. F. Forster, Esq., F.L.S., communicated by his son, Dr. T. Forster, F.L.S., &c.

Dr. Forster has also just published 'Observations on the Abnormal Affections of the Organs of Sense and Intellect,' &c. 8vo.

Vegetable Organography; or, an Analytical Description of the Organs of Plants; by Professor DeCandolle. Translated (unabridged) by Boughton Kingdon, Esq.

A History of British Forest Trees, indigenous or introduced; by P. J. Selby, Esq., of Twizell.

A Treatise on the Management of Freshwater Fish, with a view to making them a source of profit to Landed Proprietors; by Gottlieb Bocchius.

A new edition of Lambert's Genus *Pinus*, including all the new species of this important family of Trees, with direction for their cultivation, &c. Royal 8vo.

British Moths and their Transformations; in a Series of Plates by H. N. Humphreys, Esq., with Descriptions by J. O. Westwood, Esq., F.L.S.

Transactions of the Manchester Geological Society. Vol. I.

Preparing for Publication.

The Geology and Mineralogy of Engineering; comprehending the elements of the sciences of Œconomic Geology and Mineralogy applied to the Arts. By E. W. Brayley, Jun., Fellow of the Linnæan and Geological Societies, Associate of the Institution of Civil Engineers, Corresponding Member of the Royal Geological Society of Cornwall, &c.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

February 9, 1841.—William Horton Lloyd, Esq. in the Chair.

A letter from P. C. Blackett, Esq., dated January 27, 1841, was read. It relates to the parent stock of the domestic Dog (*Canis familiaris* of authors), and gives some account of the habits of the European Wolf. The pups of this animal, it is said, were considered valuable about sixty or seventy years back, and that they were easily domesticated, and became as familiar and attached to their master as the common domesticated Dog.

A monograph on the genus *Nematoptera*, by J. O. Westwood, Esq., F.L.S., was read.

In this monograph numerous new species are added to those already characterized by Dr. Klug and others. The genus *Nematoptera* (*Nemoptera*, Latr.) was placed by its founder, Latreille, in the family *Panorpidæ*, owing to the rostrum being elongated as in that family; but Mr. Westwood agrees with Drs. Klug and Burmeister, in arranging the species in the *Hemerobiidæ*, since they agree with this family, not only in the structure of the mouth, but also in the general arrangement of the nervures of the wings.

Following are the chief characters of the species:—

Sectio 1ma.

Alæ anticæ latissimæ ovatæ, coloratæ, serie duplici vel triplici cellularum in area anali.

Sp. 1. NEMATOPTERA PETIVERI. *Nem. alis anticis ovatis, pallidè flavis; fasciis quatuor sinuatis; costa ad basin immaculata; macula oblonga ante mediam, altera media tertiaque subapicali, nigris, punctisque nonnullis versus marginem internum et in discum alæ ejusdem coloris.*

Expans. alar. antic. 2—2¼ unc. Long. alar. postic. 1¾—1⅚ unc.

Syn. The Feather-tailed Smyrna Adderbolt, *Petiver*, Gazoph. tab. 73. f. 11.

Phryganea e Moldavia, *Linnæus*, Kongl. Vetensk. Handl. 1747. p. 176—178. tab. 6. fig. 1.

Ephemera Coa, *Hasselquist*, Iter Palæstinum, p. 423. (1757).

Panorpa Coa, *Linnæus*, Syst. Nat. Edit. x. Ditto, Edit. xii. vol. ii. p. 915. *Fabricius*, Syst. Ent. p. 314. Ent. Syst. Suppl. p. 208.

Panorpa halterata, *Fabr.* Mantiss. Ins. p. 251.

Nemoptera sinuata, *Olivier*, Enc. Méth. viii. p. 178. *Lamarck*, Hist. Nat. iv. p. 419. *Klug*, Monogr. Panorp. p. 13. No. 2.

Sp. 2. NEMATOPTERA COQUEBERTII. *Nem. alis anticis latissimè ovatis, pallidiori-flavescentibus; fasciis tribus valdè sinuatis; costa in areas angustas divisa, singula area linea obscura notata, macula media costali, altera intermedia, 3tiaque versus apicem costæ obscuris; disco et basi punctis numerosis nigris; areaque anali lata duplici serie punctorum et unica strigarum nigrarum.*

Expans. alar. antic. 1⅔—1⅚ unc. · Long. alar postic. 1½ unc.

Sp. 5. NEMATOPTERA DILATATA. *Nem. fusco-brunnea; alis anticis hyalinis; posticis ante apicem biextensis fuscis; apice angusto lacteo.*

Expans. alar. antic. 2 unc. Long. alar. postic. $1\frac{7}{10}$ unc.

Syn. N. dilatata, *Klug*, Monogr. Panorp. p. 14. tab. annex. fig. 1. *Burmeister*, Handb. ii. p. 987.

This very distinct species has the hind wings comparatively short, with the expansions considerably larger than in *N. extensa*. It is from South Africa.

Sp. 6. NEMATOPTERA FORSKALLII. *Nem. alis anticis hyalinis, vena postcostali flava; alis posticis "triclavatis"; stylo flavo; clava 1ma fusco-flavescenti; 2da dimidio minori cærulea; 3tia terminali oblonga cærulea; apice extimo obtuso.*

"Corp. long. poll." Alæ posticæ, "3 poll. vel corpore triplò longiores."

Syn. Panorpa halterata, *Forskall*, Descr. Anim. p. 97. tab. 25. fig. E. (copied in Encycl. Méth. pl. 98. fig. 1., under the name of *Panorpe d'orient*).

Nec N. halterata, *Fabr.*, *Olivier*, *Dumeril*, *Klug*.

Sp. 7. NEMATOPTERA BARBARA. *Nem. alis erectis pallidis; costa late fusca; posticis linearibus longissimis subbiclavatis nigris apice dilatatis in medio coarctatis; fasciis tribus albis, intermedia minori.*

Syn. Panorpa Coa, *Fabricius*, Mantiss. Ins. i. p. 251.

Panorpa halterata, *Fabricius*, Ent. Syst. Suppl. p. 208.

Nemoptera barbara, *Klug*, Monogr. Panorp. p. 14.

Sp. 8. NEMATOPTERA PALLIDA. *Nem. alis anticis hyalinis immaculatis venis fulvescentibus punctoque minuto stigmaticali albo; posticis longissimis linearibus albis apice vix latioribus, fascia tamen fusca dilatata pone medium alæ.*

Expans. Alar. antic. $1\frac{9}{10}$ unc. Long. alar. postic. $\frac{2}{12}$ unc.

Syn. N. pallida, *Olivier*, Enc. Méth. viii. p. 179.

N. halterata, *Klug*, Monogr. Panorp. p. 14 ?.

Subsectio 2.

Alæ posticæ absque dilatatione.

(*a.*) Fasciatæ.

Sp. 9. NEMATOPTERA AFRICANA. *Nem. corpore luteo, brunneo vario; alis anticis apice rotundatis hyalinis; spatio inter venam mediastinam et postcostalem luteo; his venis fulvo-testaceis, umbra fuscescenti apicali post stigma albidum; alis posticis basi pallidioribus; fascia fusca ante apicem album.*

Expans. alar. antic. 2 unc. Long. alar. postic. $2\frac{1}{8}$ unc.

Syn. Nemopteryx africana, *Leach*, Zool. Misc. vol. ii. p. 74. tab. 85. fig. inf.; *Griffith*, Animal Kingd. vol. xv. p. 324. pl. 105. fig. 4.

Sp. 10. NEMATOPTERA BACILLARIS. *Nem. pallida, dorso brunnea vario; alis hyalinis, anticis (apice angustioribus subacutis) costa pallida, ad apicem infuscata; stigmate albo; posticis linearibus longissimis, basi pallidis, ante apicem latè fuscis; antennis longitudine alarum anticarum.*

Expans. alar. antic. $2\frac{1}{8}$ unc. Long. alar. postic. $2\frac{1}{2}$ unc.
Syn. N. bacillaris, *Klug*, Monogr. Panorp. p. 15. tab. annex. fig. 2. *Burmeister*, Handb. d. Ent. ii. p. 986.

Sp. 11. NEMATOPTERA LATIPENNIS. *Nem. rufo-testacea; linea dorsali media fusca; alis anticis dilatatis rotundatis; umbra cinerea post stigma album; posticis in basi rufescentibus; fascia fusca ante apicem album.*
Long. corp. 6‴; alar. antic. 10‴.
Syn. N. latipennis, *Burmeister*, Handb. d. Ent. ii. p. 986.
This species inhabits South Africa, and is described by Burmeister from the Museum of Halle.

Sp. 12. NEMATOPTERA ANGULATA. *Nem. pallida, brunneo varia; antennis fuscis longitudine alarum anticarum; alis anticis apice angulatis, hyalinis; vena mediastina et postcostali fulvis (spatio intermedio luteo), punctoque parvo in cellula singula areæ costalis fulvo; stigmate fusco; alis posticis longissimis ferè linearibus, dimidio basali brunneo; fascia lata ante apicem album fusca.*
Expans. alar. antic. $2\frac{1}{4}$ unc. Long. alar. postic. $2\frac{1}{2}$ unc.
Syn. Nemoptera angulata, *Westw.* in Trans. Ent. Soc. vol. i. Journal of Proceedings, p. 75.
Inhabits South Africa.

Sp. 13. NEMATOPTERA COSTALIS. *Nem. lutea, brunneo varia; antennis luteo-fulvis, alis anticis multò brevioribus; alis anticis apice rotundatis hyalinis; vena mediastina et postcostali fulvis (spatio intermedio luteo), punctoque parvo in cellula singula areæ costalis fulvo; stigmate fusco; nubila apicali alba, internè umbra tenui lutea marginata; alis posticis albidis ad basin fuscescentibus; fascia fusca ante apicem album.*
Expans. alar. antic. 2 unc. Long. alar. postic. $2\frac{1}{8}$ unc.
Syn. N. costalis, *Westw.* in Trans. Ent. Soc. i. LXXV.
Inhabits South Africa.

Sp. 14. NEMATOPTERA OLIVIERII. *Nem. corpore testaceo brunneoque variegato; alis hyalinis; anticis valdè angustis; costa pallidè fusca, lineaque (areæ costali posticè conjuncta) tenui stigmateque albidis; posticis linearibus basi fasciaque testaceis.*
Expans. alar. antic. $1\frac{1}{4}$ unc.
Syn. N. halterata, *Olivier*, Enc. Méth. viii. p. 178. (nec Forskallii).
N. costata, *Klug*, Monogr. Panorp. p. 14.

(*b.*) Alæ posticæ setaceæ haud fasciatæ.

Sp. 15. NEMATOPTERA SETACEA. *Nem. pallida; dorso pedibusque fuscescentibus; alis anticis hyalinis, ad apicem subinfuscatis macula alba; posticis setaceis apice albis.*
Long. corp. lin. 6. Expans. alar. antic. 12—13 lin.; alar. postic. 14—15 lin.
Syn. Nemoptera setacea, *Klug*, Monogr. Panorp. p. 15. tab. annex. f. 3. *Burmeister*, Handb. d. Ent. ii. p. 986.
Inhabits South Africa.

Sp. 16. NEMATOPTERA CAPILLARIS. *Nem. pallida; dorso luteo va-*

rio ; alis anticis hyalinis, nervis fusco alboque variegatis, reticulatis ; macula ad marginem anticum ante-apicali alba ; posticis longissimis setaceis albis ; basi hyalinis reticulatis.

Long. corp. lin. 4. Expans. alar. antic. $10\frac{1}{2}$ lin. Long. alar. postic. $13\frac{1}{2}$.

Syn. N. capillaris, *Klug*, Monogr. Panorp. p. 16. tab. annex. fig. 4. *Burmeister*, Handb. d. Entomol. ii. p. 985.

Inhabits Arabia.

Sp. 17. NEMATOPTERA ARISTATA. *Nem. albida; alis albo-hyalinis; anticis macula ante-apicali fusca ; posticis setaceis.*

Long. corp. lin. $2\frac{1}{2}$.

Expans. alar. antic. 9. Long. alar. postic. $7\frac{1}{4}$.

Syn. Nem. aristata, *Klug*, Monogr. Panorp. p. 16. tab. annex. fig. 5. *Burmeister*, Handb. d. Ent. ii. p. 985.

Inhabits Ambukohl.

Sp. 18. NEMATOPTERA ALBA. *Nem. alba immaculata ; oculis solùm nigris ; alis anticis hyalinis, venis albidis ; posticis longis setaceis et coloris albi paullò obscuri.*

" 7 ou 8 lignes de largueur les ailes étendues," *Oliv.*

Syn. Nem. alba, *Olivier*, Enc. Méth. viii. p. 179. *Klug*, Monogr. Panorp. p. 16.

Inhabits Bagdad. Found in the houses in the evenings of May.

Sp. 19. NEMATOPTERA FILIPENNIS. *Nem. luteo-fusca ; alis anticis albo-hyalinis ; stigmate fusco ; posticis longissimis, basi nigricantibus latioribus ; apice albo filiformi.*

Long. corp. lin. $3\frac{1}{2}$. Expans. alar. antic. lin. $11\frac{1}{2}$. Long. alar. postic. 1 unc. 3 lin.

Habitat in India orientali. In Mus. D. W. W. Saunders, F.L.S.

Mr. Gould exhibited to the Meeting fine specimens, male and female, of the *Macropus laniger* of Quoy and Gaimard, and a species of *Hypsiprymnus* nearly allied to the *H. minor*, but which differs considerably in the form of the skull, and especially in having the muzzle broader, the sides being swollen; it also differs from *H. minor* in having the tail and tarsi proportionally shorter. This species being new, Mr. Gould characterized it as follows, under the name

HYPSIPRYMNUS GILBERTII. *Hyps. colore corporis supernè e cinereo, fusco, nigroque commixtis, lineâ nigrescente a naso ductâ cum colore frontis se intermiscente ; corpore subtùs e cinereo albo.*

	unc.	lin.
Longitudo ab apice rostri ad caudæ basin....	16	0
——— *caudæ*.....	6	3
——— *tarsi*	3	0

This species was procured by Mr. Gould's assistant, Mr. Gilbert, at King George's Sound.

The following two papers, being a continuation of the descriptions of Mr. Cuming's shells, were read.

The first of these papers is by W. J. Broderip, Esq.

BULINUS MACULIFERUS. *Bul. testâ plerumque sinistrorsâ, elongato-*

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Long. $1\frac{7}{10}$. Lat. $\frac{9}{10}$ poll. circ.
Hab. in insula Camote.
Legit H. Cuming in sylvis, foliis arborum adhærentem.

In a great number of the beautiful land-shells of the Philippine Islands, collected by Mr. Cuming, and herein-before described, the pattern, upon immersion in water or other fluid, becomes entirely obliterated till evaporation restores the colours to all their pristine brilliancy. In the species now before us, the very reverse is the result of immersion. The external whitish porous epidermis which veils the shell when dry, suffers the bright colours to shine out when immersed in water. *Bul. velatus* is described above, as it appears on immersion, and before it becomes dry: but in the latter state the beauties of the shell are shrouded, and the colour of the sutural bands, peeping out between interstices in the epidermis, gives to these bands a moniliform appearance.

I sent to Sir David Brewster, as the highest authority on such subjects, four or five species of those land-shells from which the pattern disappears upon immersion; but I have not as yet forwarded to him any upon which the colours come out when so treated. Sir David has been so obliging as to send me the following letter, which I now lay before the Society:—

"Dear Sir,—I beg to return you my best thanks for the very interesting specimens of land-shells from the Philippine Islands, which you have been so kind as to send me. The disappearance of the white pattern by immersion in water or any other evaporable fluid, and its subsequent reappearance when the shell is dry, are phenomena perfectly analogous to those of *hydrophanous opal*, *tabasheer*, and other porous substances.

"The phenomenon in the land-shells is still more beautiful when we examine them by *transmitted* light. The pattern which is *white* by *reflected* light, is *dark* by *transmitted* light, and *vice versâ*. This is particularly beautiful in the *Helix pulcherrima*, where the ground of the *white* pattern is almost *black* by reflected light, and of a light *reddish* colour by transmitted light, the pattern which is *white* by reflection having a *dark red* colour by transmitted light.

"In all these shells, the difference of structure by which the pattern is produced, does not exist in the shell, but in the *epidermis*, and hence the pattern may be wholly obliterated by removing the epidermis. It appears to me, from very careful observations, that the epidermis consists of two layers, and that it is only the upper layer which is porous wherever the pattern is white. These *white* or porous portions of the epidermis differ from the other parts of the upper layer only in having been deprived of, or in never having possessed, the element which gives transparency to the membrane, in the same manner as hydrophanous opal has become *white*, from the expulsion of its water of crystallization.

"When the shell is immersed in water or any other fluid, the fluid enters the pores of the white epidermis, and having nearly the same refractive power as the epidermis, no light is reflected at the separating surface of the water and the pores which contain it, so that

the light passes through the membrane, which thus loses its white appearance. When the water escapes from the pores by evaporation, or is driven from them by heat, the membrane again reflects white light from the numerous surfaces of its pores.

" As the colouring matter resides in the shell itself, its peculiar colour is seen through the epidermis as distinctly where it is porous as where it is not porous, when the porous portion has been rendered transparent by the absorption of a fluid.

" If we apply oil or varnish to the white pattern, we may obliterate it permanently, or we may change it into a pattern entirely different from the original one.

" If these observations appear to you to have any interest, you are welcome to make any use of them you please.

" I am, dear Sir, ever most faithfully yours,

" D. Brewster."

It will be observed, that Sir David Brewster points out how the application of oil or varnish to the white pattern may obliterate it permanently; such a case has already happened more than once: persons who have become possessed of some of the species whose patterns are lost on immersion, not content with their natural beauties, and unaware of their peculiarity, have had recourse to art, and by applying oil or varnish, have spoiled their specimens,—a proper punishment for trying to mend nature.

Jan. 26, 1841.—William Yarrell, Esq., Vice-President, in the Chair.

A continuation of Mr. G. B. Sowerby's descriptions of new species of shells, collected by H. Cuming, Esq. in the Philippine Islands, was read.

Helix monochroa. *Hel. testâ suborbiculari, tenuiusculâ, subpallescente brunneâ, haud nitente; spirâ mediocri; anfractibus quatuor, ventricosis, rugulosis, ultimo maximo, cæteris multò majori; fasciis binis medianis saturatioribus, binis pallidioribus; suturâ distinctè impressâ; aperturâ subelliptico-semilunari, intus albâ; labio externo latiusculo, rotundato-reflexo, extùs subfusco; labio interno tenuissimo, columellari subdilatato, umbilicum mediocrem partim tegente.*

Long. 1·3, lat. 2· poll.

Hab. ad insulam Tablas dictam.

This species appears to be very distinct from any of those given by De Férussac, as well as from the *Helix Cailliaudi* of Deshayes, with which I have compared it. Besides the rugulosities which cover the external surface, oblique lines of growth are easily distinguishable, which are stronger near the suture.

Helix chlorochroa. *Hel.* testâ *globoso-suborbiculari, tenuiusculâ, pallidè brunneâ, haud nitente; spirâ elevatiusculâ; anfractibus* $4\frac{1}{2}$, *ventricosis, lævibus; striis solùm incrementi tenuibus insculptis, ultimo maximo, cæteris multò majori; fasciâ unicâ albidâ medianâ; suturâ distinctâ; aperturâ rotundato-sublunari, intùs albâ; labio externo rotundato-reflexo, fuscescente, interno tenui; labio columellari lato, albicante, subsinuoso, profundè ineunte; umbilico nullo.*

Long. 1·6, lat. 2· poll.

This species bears a general resemblance to the last, though it may easily be distinguished by its more elevated spire and the absence of an *umbilicus*. Besides the lighter-coloured band, the shell is usually mottled with paler light-brown markings. A variety occurs of a much darker colour, but similarly marked.

HELIX SPHÆRION. *Hel. testâ globoso-orbiculari, tenui, lævi, unicoloris, haud nitens; spirâ brevi, paululùm elevatâ; anfractibus quatuor, ventricosis; striis solùm incrementi, tenuibus insculptis, ultimo maximo, cæteris multò majore; suturâ lineâ albâ distinctâ; aperturâ rotundatâ, anfractu ultimo tenuiter modificatâ, intùs albicante; labio externo fuscescente, anticè paululùm reflexo; labio columellari albo, latiusculo, profundè ineunte.*

Long. 1·3, lat. 1·6 poll.

Hab. supra folia arborum propè Tanauan ad insulam Leyte dictam Philippinarum.

This species is most like *H. Coccomelos*, but may be distinguished from that by its thin, scarcely reflected outer lip. Two varieties in colour have been found, one of which is of a very dark chocolate-brown, and the other of a pale yellowish brown. Another variety, very much resembling this last, has been found at Lobock, in the island of Bohol, which differs only in the lip being rather more reflected.

HELIX MIRABILIS, De F. *Hel. testâ subglobosâ, imperforatâ, lævi, nitidâ, candidâ, epidermide olivaceo-lutescente indutâ; spirâ elevatiusculâ, obtusâ; anfractibus $4\frac{1}{2}$ rotundatis, ultimo maximo, plerumque fasciis duobus rufo-fuscis cincto; suturâ distinctâ; aperturâ subobliquâ, elliptico-rotundatâ; peritremate albo, latiusculo, reflexo; columellâ albâ, latiusculâ, anticè sinuatâ; labio interno tenui.*

Long. 1·6, lat. 1·3 poll.

Hab. supra folia arborum propè Albay, provinciæ Albaiensi ad insulam Luçon Philippinarum.

Syn. *Helix galactites*, Lam. (Hist. Nat. des Anim. sans Vert. vi. part 2, p. 69. April 1822).

Helix mirabilis, De Férussac (Hist. Nat. gen. et part. des Mollusques Terr. et Fluv., t. 31, f. 4, 5, 6. 1819).

A representation of this fine species, without the *epidermis*, was published by De Férussac in 1819, under the name of *Helix mirabilis*; his name is therefore here adopted. But Lamarck in 1822, although he quotes De Férussac's name and plate, has given it the name of *H. galactites*, which of course must give way to De Férussac's.

It appears extremely probable that both Lamarck and De Férussac have confounded with this species a variety of *Helix metaformis*, De F., the latter author having figured a var. of that species under the name of *H. mirabilis*, var. See his Tab. 104, f. 6 et 7, and Lamarck, describing his var. β. as "*testâ supernè in conum elongatâ.*"

"I must here acknowledge my obligations to M. Valenciennes, who

b. Shell pale yellow brown; apex white; circumference of the columella nearly black; a pale brown band close behind the suture of the first volutions. Found on leaves of trees near Manilla.

c. Shell light brown, paler near the apex, which is reddish brown; circumference of the columella nearly black; two narrow brown bands, one of which is placed at the circumference of the shell, and the other close to the suture in front. Found on leaves of trees near Manilla.

d. Shell light brown, with a dull hydrophanous epidermis, paler toward the apex, which is dark mahogany brown; circumference of the columella nearly black; two broad, very dark brown bands, one of which is placed at the circumference of the shell, the other close to the suture in front. Found on leaves of trees at San Mateo, in the province of Tondo, isle of Luçon.

e. Shell brown, with a lighter coloured irregular hydrophanous epidermis; paler near the apex, which is dark brown; circumference of the columella very dark brown; two brown bands nearly similar to those in var. *c*. This is rather a coarse variety, and appears to be a slight example of monstrous growth, its spire being rather unusually elevated, and the volutions consequently more prominent. Found on leaves of trees near Dolores, province of Pampamga, isle of Luçon.

HELIX CINCINNIFORMIS. *Hel. testâ ovato-oblongâ, pyramidali, tenui, lævigatâ, striis incrementi tenuissimis solùm insculptâ, apice spiræ obtuso; anfractibus quinque tenuitèr rotundatis; suturâ distinctâ; aperturâ obtusè subtrapezoidali, posticè acuminatâ; peritremate tenuitèr reflexo, albo; columellâ rectiusculâ, subincrassatâ, albâ.*

Long. 1·8; lat. 1·2 poll.

Hab. Supra folia arborum ad insulam Luban, Philippinarum.

Mr. Cuming has obtained three varieties of this species, viz.:—

a. Colourless.

b. White, a broad nearly black belt surrounding the columella, a pale reddish brown band at the circumference of the shell, and a darker brown antesutural band articulated with white hydrophanous specks of epidermis; apex dark brown.

c. Shell white, with a broad nearly black belt surrounding the columella, a spiral dark brown band in the centre of the last volution and continuing to the apex, and an antesutural dark brown band, articulated with whitish specks of hydrophanous epidermis.

HELIX LEUCOPHÆA. *Hel. testâ ovato-oblongâ, subpyramidali, crassiusculâ, lævi, obscurâ, brunneâ; epidermide hydrophanâ pallescente indutâ; apice obtuso; anfractibus senis, subrotundatis; aperturâ rotundato-subtrapeziformi, posticè acuminatâ, labio externo crasso, reflexo, albo, margine fusco; columellâ subincrassatâ, rectiusculâ albâ, anticè subsinuatâ.*

Long. 2; lat. 1·2 poll.

Hab. Supra folia arborum ad montes Igorrotes insulæ Luçon, Philippinarum.

This species has occurred in several localities, and there are seve-

ral varieties, all remarkable for a more or less russet brown hydrophanous epidermis. They are

a. Shell of a nearly uniform colour, rather lighter near the suture, and very irregularly speckled with dark brown shining spots, caused by the partial abrasion of the epidermis. From the mountains of the Igorrotes, in the northern part of the island of Luçon.

b. Shell of an uniform brown, with a nearly white sutural band interrupted with brown shining spots. From the same locality.

c. Shell of a light brown colour, with a dark band surrounding the last volution. Found on leaves of trees at Sual, in the province of Pangusinan, island of Luçon.

d. Shell of an uniform light brown, speckled with dark brown, and with a dark brown antecircumferential band. Found on leaves of trees at Dolores, in the province of Pampamga, isle of Luçon.

e. Shell small, of an uniform brown, with a nearly white antesutural band, and a pale band near the circumference of the last volution. From the mountains of the Igorrotes.

f. Shell brown, longitudinally streaked with nearly white, and having a nearly white antecircumferential band. Found on leaves of trees at Gattananga, in the province of Cagayan, island of Luçon.

g. Shell of an uniform dark brown. This appears to be a dwarf variety, being much shorter in its proportions than the others. Length 1·5; breadth 1·05 of an inch. Found on leaves of trees at Sinait, in the province of South Ilocos, in the island of Luçon.

Feb. 23.—William Yarrell, Esq., Vice-President, in the Chair.

Mr. G. B. Sowerby's descriptions of the shells collected by H. Cuming, Esq. were continued.

HELIX COLUMBARIA. *Hel. testâ suborbiculari, rotundato depressâ, lævusculâ, fulvescente, brunneo-variè-zonatâ, sæpius propè suturam albido tessellatâ; spirâ brevi, obtusâ; anfractibus quinis plùs minùsve rotundatis; peripheriâ rotundatâ; aperturâ transversâ subauriformi; peritremate incrassato, continuo, reflexo, subsinuoso, intùs anticè nonnunquam unidentato; dente obtuso; umbilico parvo, partim obtecto.*

Long. 0·73; lat. 1·4 poll.

Obs. *Testâ pone aperturam sæpius coarctatâ.*

Hab. Sub lapidibus et ligno putrescente apud Calauan, provinciæ Laguna, insulæ Luçon, Philippinarum.

The following varieties of this interesting and elegant species have occurred to Mr. Cuming:—

a. Shell somewhat striated, striæ forming the lines of growth, many of those on the under side white, pale brown with brown bands (one at the periphery, one close to the suture, and one beneath). Distant, squarish, striated patches of white epidermis ornament the broad band in front of the suture: aperture white: found at Calauan.

b. Shell slightly striated, striæ as in the last, forming the lines of growth; ground colour pale yellowish brown, with a rather darker brown band close in front of the suture, a narrow brown band at the

periphery, and a broad one beneath, where this variety is also ornamented with brownish white mottlings: peritreme white, with a single white tooth within at the lower part. From Calauan.

c. Pale brown, darker, and articulated with brownish white patches in front of the suture; a narrow brown band at the periphery, where it is mottled with brownish white; peritreme flesh-colour, with a single white tooth within at the lower part. From Albay.

d. Light brown, having a brown antesutural band, articulated with brownish white, a brown band at the circumference and a broad brown band beneath; and brownish white mottlings spread over both these last-mentioned bands; peritreme as in the last. Found at Albay.

HELIX CONCINNA. *Hel. testâ oblongo-pyramidali, tenui, lævigatâ, epidermide fuscâ albido-marmoratâ indutâ; spiræ apice obtuso; anfractibus senis, planulatis; suturâ distinctâ; aperturâ rotundato-subtrapeziformi; labio externo incrassato, tenuiter reflexo, fusco; columellâ albâ, subincrassatâ, anticè subsinuatâ.*

Long. 1·3; lat. 0·75.

Hab. Supra folia arborum ad Sanctam Jaun, provinciæ Cagayan Insulæ Luçon, Philippinarum.

The ground colour of this very elegant little shell is of a dark chestnut-brown, and this is covered all over, except a small portion about the aperture, with an hydrophanous epidermis of various shades of brown, beautifully marbled with white and brownish white. Near the apex the shell is lighter coloured, but the apex itself is darkish brown.

HELIX CURTA. *Hel. testâ subovatâ, pyramidali, tenuiusculâ, lævigatâ, epidermide supernè pallescente, subtùs fuscâ indutâ; spiræ apice obtuso; anfractibus subsenis, rotundatiusculis; suturâ distinctâ; aperturâ sublunari, ad latus columellæ sinuatâ; labio externo reflexo, latiusculo, albo; columellâ obliquâ, latâ, anticè obliquè truncatâ, albâ.*

Long. 1·2; lat. 0·9 poll.

Hab. Supra folia arborum apud Bauang, provinciæ Pangusinan insulæ Luçon, Philippinarum.

The shell itself is of a pale yellow-brown colour, lighter at the third volution, where it begins to put on a pale tint of chestnut-brown, which becomes darker as it approaches the apex, which is brown.

HELIX MERETRIX. *Hel. testâ suborbiculari, rotundato-depressâ, crassiusculâ, lævi, fulvescente, brunneo-variè-zonatâ, albidoque marmoratâ; spirâ brevi, obtusâ; anfractibus quinis, subrotundatis; peripheriâ rotundatâ; aperturâ transversâ, subauriformi; peritremate incrassato, continuo, reflexo, subsinuoso; umbilico mediocri, partim obtecto.*

Long. 0·65; lat. 1·4 poll.

Hab. Supra truncos arborum apud Sual, provinciæ Pangusinan, insulæ Luçon, Philippinarum.

Shell with a low, depressed spire, of a yellow-brown colour, with

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liest stages of development, together with the vesicle and the membranes of the ovum at a later period, as showing in this low form of animal the conformity of structure and laws with those which prevail in the higher forms.

In the third section, the author speaks of the deposition of the ova, and of the habits of the species, as observed in specimens collected and preserved by him for that purpose. These habits he regards as particularly curious. The female excavates for herself a burrow, by digging with her mandibles in the soil, which she has previously moistened with a fluid, supplied, as the author believes, by her immense salivary glands. With this she forms a soft pellet, which she removes from the burrow with her mandibles and anterior legs; and thence, after being brought to the top of the hole, it is passed on to the next pair, and by these on to the next in succession, until it is entirely removed out of the way; after which, she deposits her eggs and closes the burrow with moistened clay. Great difficulty was experienced in preserving the eggs during the observations, from the circumstance that their shell is soft, and dries quickly when exposed to the air. To avoid this, the author had recourse to the plan of inclosing the eggs in a glass tube, filled with clay, and closed with a cork; the eggs being placed in a cell next to the glass.

The fourth section, which constitutes the most important part of the paper, gives the history of the evolution of the embryo. The process is divided by the author into different periods. After a few observations on the earlier changes of the egg, and the proof that they consist in an alteration in the size and appearance of the cells out of which the embryo is formed, he states his having observed that the egg bursts at the end of twenty-five days, by means of a fissure along the dorsal surface, as described by Savi and Waga; and that, in opposition to the remarks of Degeer, the young Julus, as first stated by Savi, is perfectly apodal. The author has also discovered a singular fact, entirely overlooked by all who have attended to the development of these animals, namely, that the young Julus at this time is still an embryo, and is completely inclosed in a shut sac, which terminates in a distinct *funis* at the extremity of the body, and in the proper *amnion*, or fœtal envelope of the animal. He finds, also, that the funis enters at the posterior penultimate segment of the dorsal surface of the body, and not at the dorsal surface of the thoracic region, as seen by Rathke in the Crustacea. The embryo, he says, is retained in connexion with the shell, between the two halves of it, for seventeen days, by means of the funis, which is continuous with a second, or external membrane, *the chorion*, which lines the interior of the shell. He states that the liberation of the embryo from the shell is not effected by any effort of its own, but by the expansive force of the growth of its body. He describes, also, another important fact which had been overlooked by previous observers, relating to the mode and place of origin of the new segment of the body in the Julidæ. The new segments are always produced in a *germinal membrane* immediately before the penultimate segment, which segment, with the anal one, remains permanent throughout the life of the animal. The

production of the first set of new segments is commenced even before the animal has burst from the amnion. After leaving the amnion, the young Julus possesses six pair of legs, as stated by Savi and Waga; but the author remarks, in addition, that, notwithstanding this, it is still inclosed in another tunic, the proper skin of the embryo, beneath which new segments are being formed, and which begins to be detached before the embryo has left the amnion. He suggests whether this may not be the representative of the proper tunic of the germinal vesicle. After minutely describing the embryo, and showing that its body is still formed of cells, he states that four pairs of new legs are forming beneath this tunic, and that, on the twenty-sixth day, the young animal throws off this covering, and the legs are developed, and also the six new segments, to a further extent. The animal then takes food, the segments become developed to the same extent as the original ones, until the forty-seventh day, when it again changes its skin, new segments are again produced, and new legs to those segments last formed. In this way it passes through several changes, developing first segments and then legs.

One remarkable circumstance stated is, that the production of segments is *sextuple* in the Julidæ; but this does not hold in other genera, in some of which it is *quadruple*, and in others *double;* but these peculiarities appear in all cases to be characteristic of each distinct genus. In conclusion, he confirms the observation already made by M. Gervais, that the number of eyes is increased as the animal advances in its transformations. The author concludes by stating that he proposes continuing these observations on the Myriapoda at some future period.

The paper is accompanied by drawings of the parts described, and of the successive changes which take place during the development of the animal.

GEOLOGICAL SOCIETY.

April 7, 1841.—A paper was read, entitled "A Notice on the Occurrence of Triassic Fishes in British Strata," by Sir Philip Grey Egerton, Bart., M.P., F.G.S.

Were the muschelkalk abstracted from the continental series of beds called the Trias, and the keuper made to rest on the bunter sandstone, Sir Philip Egerton says, it would be difficult, if not impossible, to define the proper limits of these formations. The new red sandstone of England, the equivalent of the trias, presents this difficulty, every endeavour to find the muschelkalk having failed; and therefore geologists are compelled either to consider the keuper, the upper member of the trias, to be also wanting, or to be merged in the mass of alternating marls and sandstones comprising the new red series. Lithological structure, consequently, being of no value, palæontological evidence, the author says, becomes of great importance. The beautiful results arrived at by Mr. Owen respecting the Batrachian remains found near Warwick, tend, Sir Philip Egerton states, to render the existence of the keuper extremely probable,

though a specific identification with the analogous fossils of the German keuper has not been ascertained. The only instances on record of muschelkalk fishes found in Great Britain, are scales from the Bone Bed at Aust Cliff, and referred by Professor Agassiz to *Gyrolepis Albertii* and *G. tenuistriatus*, common continental muschelkalk fishes. This bed it is well known occurs at the base of the lias, and rests conformably on the green and red marls of the new red sandstone. A thin stratum replete with remains of saurians and ichthyolites occupies a similar stratigraphical position near Axmouth; and Prof. Agassiz, during his visit to England in the autumn of 1840, identified in a series of specimens obtained by Miss Mary Anning, one Placoid, two Lepidoid, and one Sauroid fish, with well-known muschelkalk species. He also determined the existence of fifteen other species from this deposit, none of which have been yet noticed in the continental Triassic group. Two, if not three, of the above muschelkalk ichthyolites are also found at Aust; and a comparison of the Aust and Axmouth species gives five as common to the two localities, twelve as confined to the former, and two to the latter. The only conclusion, Sir Philip Egerton states, which he feels justified in advancing from the facts adduced in this communication is, that the beds in question, hitherto considered as belonging to the lias, must be removed from that formation, inasmuch as they present a series of fishes not only specifically distinct from those of the lias, but possess in the Ganoid genera the heterocerque tail, an organism confined to the fishes which existed anterior to the lias.

Appended to the paper is a systematic catalogue, compiled from the 'Poissons Fossiles,' of the Ichthyolites hitherto described, from the keuper and muschelkalk of the Continent, together with those recently discovered at the Aust Passage and near Axmouth. The following extract from that document contains the species common to the Continent and England:—

Order.	Genus and Species.	English Localities.	Continental Localities and Formations.	
Placoid.	*Hybodus plicatilis.*	Axmouth.	Passim.	Muschelkalk.
Ganoid.	*Gyrolepis Albertii.*	*Ibid.*—Aust.	Passim.	Ibid.
„	——— *tenuistriatus.*	*Ibid.*—*Ibid.*	Passim.	Ibid.
„	*Saurichthys apicalis.*	*Ibid.*	Bayreuth.	Ibid.

MICROSCOPICAL SOCIETY OF LONDON.

At a meeting of the Microscopical Society, held November 24th, N. B. Ward, Esq., in the Chair, a paper was read from the Rev. J. B. Reade, entitled, "A Postscript to the Rev. J. B. Reade's paper on the Process of Charring Vegetable Tissue as applied to the Stomata in the Epidermis of Garden Rhubarb;" in which the author, after alluding to the experiments of Dr. Williams, as communicated to the Society in August last, which appeared to lead to the conclusion, that the process of charring was of very doubtful efficacy in determining delicate structure, suggests that the overlying membrane in stomata was really nothing more than an inspissation of gelatinous mucus raised by heat into contact with the glass, and by the pressure

sure through the external surface, but they occupy its very centre; each grain being separately encysted by the cartilaginous matter of the skeleton, the whole being surrounded by a thick coating of the same substance. The author describes at length the mode in which this curious structure appears to have been built up, and illustrates his descriptions by highly magnified drawings of the manner in which the grains are built into the fibrous skeleton. Spicula were of rare occurrence in this specimen; when observed they were imbedded in the external coating of the cartilaginous fibres; they are short and comparatively thick in proportion to their length, decreasing very slightly from the middle to near the points, and are terminated acutely but somewhat abruptly.

The third species is the *Spongia fragilis* of Montague, or *Duseideia fragilis* of Johnston's manuscript. It is massive, variable in form, of a dull ochreous yellow colour, and has the surface asperated by the projection of fibres, which contain numerous grains of sand imbedded in a manner similar to those described in treating of the last species. There are also other fibres which are tubular in their structure, containing few or no grains of sand, but an abundance of spicula remarkable for their great variety in form and size.

No spicula were found in the fleshy matter of the sponge, but a considerable number of round or oval bodies were present, which presented every appearance of being cytoblasts.

The author concludes his paper by some observations on the present state of our knowledge of the structure of the *Spongidæ*, and notices certain changes that will become necessary in their systematical arrangement when our information regarding their structure is more matured.

The paper was illustrated by drawings of the Sponges, and the various descriptions of spicula contained in their structures.

MISCELLANEOUS.

NIGER EXPEDITION.—MR. FRASER.

A letter has just been received, by the Zoological Society, from Mr. Fraser, the naturalist to the Niger expedition, dated from the mouth of the river Nun, West Africa, August 14, 1841. In the first part of his letter Mr. Fraser alludes to a collection of specimens which he had formed during his passage out, and forwarded to England. The collection consists of three mammals, twenty-eight reptiles, fifty birds, upwards of thirty fishes, and about forty boxes, bags, &c., containing insects and shells. The letter contained some interesting facts relating to the habits and localities of several different species, and the writer expressed a hope that they would not be regarded as a specimen of what might be expected, as he had purposely abstained as much as possible from using his materials for preparing specimens until his arrival at the Niger.

Little Auk.—In the 'Annals and Mag. of Nat. Hist.' for December, I perceive a notice by Mr. Townsend of the occurrence of *Mergulus*

Alle at Ipswich, and three more examples are mentioned by Mr. Mummery as having been met with near Margate. It would appear that the strong northerly winds which prevailed at the end of October caused a considerable number of these birds to take refuge in the interior of our island. I have heard of no less than *nine* instances in this part of England, six of these birds having been picked up in Worcestershire and three in Shropshire. The whole of these were obtained on or about the 28th of October, the very day mentioned by Mr. Mummery as that on which his specimens were procured. At the same time a young *Stercorarius Richardsoni* and a young *Sula bassana* were obtained near Worcester, and have been added to the rich ornithological collection of the Natural History Society in that city.

I have further heard of two or three instances of the occurrence of *Mergulus Alle* near Oxford, during the last week in October.

H. E. Strickland.

Worcestershire, Dec. 4th, 1841.

New Crustacean Animal.—We learn that at Kerguelen's Land Captain Ross had found a Crustacean animal, which of all yet known appears to come the nearest to the extinct group of Trilobites. Captains Ross and Crozier left Sidney early in August, determined, if possible, to pass the winter in the vicinity of the Antarctic pole.

Mus agrestis, Linn.—In a recent communication by M. de Selys-Longchamps to the Academy of Sciences at Brussels*, he has stated his belief that the *Mus agrestis* of Linnæus is a distinct species from the *M. arvalis* of Pallas, and from all the other Europæan *Arvicolæ* described by him in his 'Etudes de Micromammalogie.' This opinion is founded upon the examination of a skin lately sent him from Stockholm; and he thinks it probable that it is identical with the *A. neglecta* of Thompson, described in a former Number of this Magazine†.—L. J.

DISAPPEARANCE OF THE SYLVIA RUBECOLA IN PARTS OF BELGIUM AND GERMANY.

To the Editors of the Annals and Magazine of Natural History.

The disappearance, of late years, of that familiar warbler the Redbreast, *Sylvia rubecola*, is a circumstance worthy of being recorded in your 'Annals.' Being occupied for some time past in making out the ornithology of Belgium, I have been struck, during my researches, with the absence of this bird, which used to be common when I first visited the continent in 1819, though even then not so frequent as it is in England. For several years it has totally disappeared from the provinces of Brabant, and East and West Flanders, and is so scarce in parts of Germany that it is difficult to meet with a specimen. Unwilling to rely on my own judgement alone, I

* See L'Institut, No. 413. p. 404.
† No. for June 1841, p. 270.

questioned several of our Flemish bird-catchers, who told me that for near ten years this bird has been getting scarce, and is now no more seen as a winter visitant of our gardens, a few only appearing in the forest of the Ardennes in summer, but disappearing in autumn. The bad habit of eating this and other song-birds which practised by the poor, may have contributed to drive away this interesting species from our countries. I should like to know whether the same thing has been observed in other districts. Yours, &c.,

T. Forster.

Chair of Entomology.—The following names were presented by the Section of Anatomy and Zoology of the Académie des Sciences as Candidates for the Chair of Entomology at the Museum of Natural History, vacant by the death of M. Audouin :—

1. M. Milne Edwards: 2. M. Straus-Durckheim: 3. M. Guérin Menneville.

At the following sitting, Dec. 13, M. Milne Edwards was elected.

Menura superba.—Mr. Gould gives the following account of the Menura or Lyre-bird of Australia. This bird, like the Brush Turkey (*Talegalla Lathami*, Gould), has been classed by ornithologists in various groups, but perhaps most generally it has been regarded as one of the Gallinaceous order. Mr. Gould's observations, however, all tend to prove that it ought to be arranged among the Insessores, and is most nearly allied to certain South American genera of Ground Thrushes, such as *Pteroptochos*, *Scytalopus*, &c.

The Menura is a terrestrial bird, and but rarely takes to the wing. When pursued it generally escapes by running into the thick brushwood: it is so extremely shy, the author observes, that of all the birds he ever met with the Lyre-bird is by far the most difficult to procure.

Whilst among the brushes he has been surrounded by these birds, pouring forth their loud and liquid calls, for days together without being able to get a sight of them, and it was only by the most determined perseverance and extreme caution that he was enabled to effect this desirable object, which was rendered the more difficult by their often frequenting the almost inaccessible and precipitous sides of gullies and ravines. Its food appears to consist principally of insects, especially those of the Coleopterous order, and Centipedes. Mr. Gould also found the remains of shells of snails in the gizzard, which he remarks is strong and muscular. The nest is placed either on the ledge of a projecting rock, at the base of a tree, or on the top of a stump, but always near the ground.

The natives state that the eggs are two in number, and of a light colour, freckled with red.—*Proc. Zool. Soc.* May 11, 1841.

Anthus Richardi.—Mr Mummery informs us of his having shot another specimen of Richard's Pipit, in the neighbourhood of Birchington, in the Isle of Thanet, where he had before taken specimens in 1840, and in November last.

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Descriptions of several new Plants from the Kingdom of Nepaul, taken from Specimens preserved in the Herbarium of Aylmer Bourke Lambert, Esq.—(Mem. Wern. Nat. Hist. Soc., vol. iii. 1821.)

An Illustration of the Natural Family of Plants called *Melastomaceæ*.—*Ibid*, vol. iv. 1823.

A Monograph of the Genus *Pyrola*.—*Ibid*, vol. v. part 1. 1824.

Memoir on the Classification and Division of *Gnaphalium* and *Xeranthemum* of Linnæus.—*Ibid*, vol. v. part 2. 1826.

Prodromus Floræ Nepalensis. 12mo, Lond., 1825.

Description of the genus *Malesherbia*, of the Flora Peruviana, &c. (From the Edinb. New Philos. Journ., 1827.)

Descriptions of *Columellia*, *Tovaria*, and *Francoa*.—*Ibid.*

Observations on *Philadelphiæ* and *Granateæ*.—*Ibid.*

On the Affinities of the *Empetreæ*.—*Ibid.*

On the Characters of *Darwinia*, *Brunsfelsia*, &c.—*Ibid.*

Attempt at a new Classification of the *Cichoraceæ*.—*Ibid.*

On the Affinities of *Vellosia*, *Glaux*, &c.—*Ibid*, 1830.

Monograph of the Family of Plants called *Cunoniaceæ*.—*Ibid.*

On the Characters and Affinities of certain genera, chiefly belonging to the Flora Peruviana.—*Ibid*, 1831–32.

Remarks on the Rhubarb of commerce, the Purple-coned Fir of Nepaul, and the Mustard-tree.—*Ibid.*

Descriptions of some new species of *Malesherbia*, *Kageneckia*, *Quillaja*, and of a new genus of the order *Salicariæ*.—*Ibid*, 1832.

Note on the Cow-tree of the Caraccas.—*Ibid.*

On the Characters and Affinities of the genus *Codon*.—*Ibid*, 1833.

On the connexion which subsists between the calyx and ovarium in certain Plants of the order *Melastomaceæ*.—*Ibid.*

Attempt at a new arrangement of the *Ericaceæ*.—*Ibid*, 1834.

On the anomalous structure of the leaf of *Rosa berberifolia*.—*Ibid.*

Monograph of the genus *Saxifraga*.—Linn. Trans., vol. xiii.

Descriptions of nine new species of the genus *Carex*, natives of the Himalaya Alps in Upper Nepaul.—*Ibid*, vol. xiv.

Description of *Cowania*, a new genus of Plants, and of a new species of *Sieversia*.—*Ibid.*

Description of a new genus belonging to the natural family of Plants called *Scrophularinæ*.—*Ibid*, vol. xv.

On the Origin and Nature of the Ligulate Rays in *Zinnia*; and on a remarkable multiplication observed in the parts of fructification of that genus.—*Ibid*, vol. xvi.

Descriptions of the new genera and species of *Compositæ* belonging to the Floras of Peru, Mexico, and Chili.—*Ibid.*

On the Plant which yields the Gum Ammoniacum.—*Ibid.*

Observations on the *Tropæolum pentaphyllum* of Lamarck.—*Ibid*, vol. xvii.

Additional Observations on the *Tropæolum pentaphyllum* of Lamarck.—*Ibid.*

On the modifications of Æstivation observable in certain Plants formerly referred to the genus *Cinchona*.—*Ibid.*

Remarks on some British Ferns.—*Ibid.*

Descriptions of five new species of the genus *Pinus*, discovered by Dr. Coulter in California.—*Ibid.*

Descriptions of Indian *Gentianeæ*.—*Ibid.*

Descriptions of two new genera of *Coniferæ*.—*Ibid*, vol. xviii.

Description of a new genus of *Bignoniaceæ* (*Catophractes*).—*Ibid.*

Descriptions of the Indian species of *Iris*.—*Ibid.*

Account of the Indian species of *Juncus* and *Luzula*.—*Ibid.*

A Monograph of the genus *Disporum*.—Linn. Trans., vol. xxviii.

A Monograph of the genus *Streptopus*.—*Ibid.*

The new Series of Sweet's British Flower Garden was conducted by Mr. Don solely. [Commenced about 1830.]

List of the Plants collected by Mr. Fellows in Asia Minor, with descriptions of the new species.—1841.

J. E. BOWMAN, Esq.

We have also to notice with sincere regret the decease of our much-respected friend and correspondent J. E. Bowman, Esq., F.L.S. & G.S. In our last Number we had occasion to mention the result of investigations in which he had been engaged in Wales during the past summer, upon the question of the traces of glacial or diluvial agency, relative to which in Scotland he had formrely favoured us with some communications. We shall have a future opportunity of noticing his contributions to natural science.

METEOROLOGICAL OBSERVATIONS FOR NOVEMBER 1841.

Chiswick.—November 1. Rain. 2. Hazy: fine: foggy. 3, 4. Foggy: hazy. 5. Hazy. 6—8. Hazy: very fine. 9. Overcast: windy at night. 10. Overcast and fine. 11. Very fine. 12. Showery. 13. Cloudy: clear and fine: rain. 14. Rain: stormy: clear. 15. Frosty: hazy: sleet. 16. Frosty: clear. 17. Sharp frost: clear. 18. Stormy with sleet: cloudy and cold. 19. Densely overcast: rain: clear. 20. Foggy: overcast. 21. Stormy with rain. 22. Rain: clear at night. 23. Clear: overcast. 24, 25. Clear and fine. 26. Frosty and foggy. 27. Foggy: rain at night. 28. Hazy and damp: heavy rain at night. 29. Heavy rain. 30. Boisterous: barometer very low.

Boston.—Nov. 1. Cloudy: rain P.M. 2. Cloudy. 3, 4. Foggy. 5, 6. Cloudy. 7—9. Fine. 10. Cloudy. 11. Fine: rain early A.M. 12. Cloudy: rain early A.M. 13. Fine. 14. Stormy. 15—17. Fine. 18. Cloudy. 19. Snow and stormy: rain A.M. and P.M. 20. Foggy: rain P.M. 21. Rain. 22. Fine: rain P.M. 23—26. Fine. 27. Cloudy: rain early A.M.: rain P.M. 28. Cloudy. 29. Cloudy: rain early A.M. 30. Rain and stormy: rain early A.M.

Sandwick Manse, Orkney.—Nov. 1. Cloudy: clear. 2. Frost A.M.: clear. 3, 4. Clear. 5. Clear: aurora borealis. 6. Rain. 7, 8. Showers. 9. Rain. 10. Clear shower: aurora borealis. 11. Cloudy. 12. Cloudy: rain. 13. Snow showers. 14—17. Snow lying: showers. 18, 19. Snow lying. 20. Snow lying: rain. 21. Showers. 22. Rain. 23, 24. Fine. 25. Frost: clear. 26. Showers. 27, 28. Frost. 29, 30. Rain.

Applegarth Manse, Dumfries-shire.—Nov. 1. Slight rain. 2. Hard frost. 3, 4. Slight frost. 5. Moist after frost. 6. Cloudy A.M.: rain P.M. 7, 8. Dull: showery P.M. 9, 10. Dark and squally: rain P.M. 11. Showery but mild. 12. Showery but boisterous. 13. Showery: snow on hills. 14. Snow shower: frost all day. 15. Hard frost. 16. Hard frost: clear and fine. 17. Hard frost: cloudy. 18. Milder: slight snow. 19. Thaw: fine and mild. 20, 21. Wet. 22. Fair but dull. 23, 24. Showery and squally. 25. Frosty and clear. 26. Frosty but cloudy. 27. Rain. 28. Drizzling. 29, 30. Very wet and squally.

Sun shone out 20 days. Rain fell 17 days. Frost 9 days. Snow 2 days.

Wind North 1 day. North-north-east 1 day. North-east 5 days. East-north-east 2 days. East 6 days. South-east $1\frac{1}{2}$ day. South 2 days. South-south-west 1 day. South-west $3\frac{1}{2}$ days. West-south-west 1 day. West 3 days. West-north-west 1 day. North-west 1 day. North-north-west 1 day.

Calm 9 days. Moderate 9 days. Brisk 6 days. Strong breeze 4 days. Boisterous 2 days.

Mean temperature of the month	38°·67
Mean temperature of November 1840.....	41 ·20
Mean temperature of spring-water	45 ·60
Mean temperature of spring-water, November 1840 ...	45 ·60

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson, *at the Garden of the Horticultural Society at* CHISWICK, *near London*; *by* Mr. Veall, *at* BOSTON; *by* Mr. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE, *and at Sandwick Manse*, ORKNEY.

Days of Month.	Barometer.								Thermometer.										Wind.					Rain.					Dew-point.
		Chiswick.			Dumfries-shire.		Orkney, Sandwick.		London: R.S.			Chiswick.			Dumf.-shire.		Orkney, Sandwick.												
1841. Nov.	London: Roy. Soc. 9 a.m.	Max.	Min.	Boston. 8½ a.m.	9 a.m.	9 p.m.	9½ a.m.	8½ p.m.	Fahr. 9 a.m.	Self-reg. Mx.	Self-reg. Mm.	Max.	Min.	Boston. 8½ a.m.	Max.	Min.	9½ a.m.	8½ p.m.	London: R.S. 9 a.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	London: R.S. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Lond. R.S. 9 a.m.
1.	29·948	30·063	29·901	29·42	29·80	29·99	29·92	30·13	46·5	53·2	46·3	52	45	47·5	49½	42	47	41	w.	w.	calm	nnw.	w.	·175	·10	.....	.....	·9	46
2.	30·238	30·226	30·187	29·73	30·11	30·11	30·22	30·22	47·2	50·3	46·2	53	37	45	45	28	39	41	n.	ne.	calm	nne.	se.	·072	.....	·13	.....	.....	45
3.	30·368	30·369	30·309	29·84	30·15	30·21	30·23	30·28	48·3	51·4	46·6	55	36	43·5	49	33	45	45½	n.	e.	calm	e.	s.	.....	.....	.....	.....	.....	46
4.	30·424	30·372	30·340	29·94	30·29	30·26	30·30	30·31	47·3	53·5	46·2	48	40	46	47	33	47	45	e.	e.	calm	ene.	se.	.....	.....	.....	.....	.....	45
5.	30·400	30·379	30·341	29·87	30·20	30·19	30·27	30·10	47·0	50·0	46·0	50	44	47	45½	32	42	43	se.	se.	calm	e.	se.	.....	.....	.....	.....	.....	45
☾ 6.	30·450	30·391	30·366	29·92	30·14	30·04	30·00	29·92	48·8	50·9	45·4	58	35	47	52	42	50	50	s.	s.	sw.	s.	s.	.....	.....	.....	0·10	·12	46
7.	30·436	30·391	30·351	29·90	30·14	30·13	29·98	29·94	46·5	55·6	44·4	53	37	43	53	48	48½	47	s.	w.	calm	ssw.	w.	.....	.....	.....	.....	·14	46
8.	30·370	30·333	30·306	29·75	30·05	30·08	29·94	29·96	46·3	52·8	43·3	51	39	44	51	46	47	46	s.	sw.	calm	sw.	w.	.....	·01	.....	.....	·55	46
9.	30·328	30·291	30·198	29·73	29·99	29·79	29·64	29·44	44·3	51·7	42·6	50	45	40	49	46½	51	48½	s.	sw.	calm	se&sw	sw.	.....	.....	.....	.....	·56	44
10.	30·180	30·127	30·061	29·60	29·78	29·72	29·68	29·64	50·3	51·7	44·6	53	44	48·5	50	48½	44	43½	w.	w.	calm	sw.	nw.	.....	.....	.....	.....	.....	45
11.	30·018	29·976	29·934	29·45	29·80	29·77	29·76	29·84	50·3	53·8	48·7	55	35	49	49	40	37	44	s.	w.	calm	wnw.	nw.	.....	·40	·14	.....	·10	46
12.	29·584	29·561	29·515	29·20	29·31	29·18	29·42	29·33	50·8	55·5	45·2	63	32	42	44	34½	38	38	s.	w.	calm	w.	e.	·416	·06	·06	.....	.....	47
● 13.	29·468	29·431	29·102	28·94	29·19	29·14	29·44	29·54	42·2	52·7	40·0	48	34	39	40½	29½	35	34	sw.	w.	w.	w.	e.	.....	·27	·07	.....	·20	41
14.	29·044	29·480	29·050	28·71	29·54	29·44	29·56	29·51	38·3	48·6	36·4	41	23	42	40	32½	35	36	wnw.	nw.	ne.	n.	nw.	·258	·04	·05	.....	·06	36
15.	29·486	29·479	29·307	29·10	29·35	29·34	29·50	29·55	34·3	42·5	32·6	37	25	30	42	25½	31	36	sw.	se.	calm	ne.	n.	.....	·04	.....	0·41	·08	32
16.	29·454	29·588	29·431	29·11	29·37	29·43	29·50	29·51	33·4	39·3	32·8	35	15	27·5	37½	22	36½	32	w.	w.	calm	ne.	n.	.....	.....	.....	.....	·07	32
17.	29·706	29·700	29·414	29·38	29·49	29·36	29·52	29·49	29·7	35·9	28·2	39	32	27·5	32½	18	34	30	s.	se.	calm	ne.	nw.	.....	·12	.....	.....	·06	29
18.	29·280	29·666	29·316	29·05	29·29	29·38	29·33	29·46	34·3	38·3	30·3	42	25	38	38	27	35	36½	n.	ne.	calm	e.	s.	·122	·12	.....	.....	·09	33
19.	29·462	29·474	29·266	29·21	29·28	29·20	29·40	29·25	43·7	44·8	34·8	47	27	34	39½	33	36	34	se.	se.	se.	e.	s.	·063	·24	.....	.....	.....	40
20.	29·366	29·375	29·195	29·07	29·13	28·88	29·16	29·10	39·5	48·4	36·8	52	40	33	39	29	36	37½	s.	s.	calm	e.	se.	·183	·18	·15	.....	.....	37
☽ 21.	29·376	29·382	29·291	28·99	29·08	29·00	28·97	29·10	45·7	50·8	40·0	55	51	40	40	34	42	37½	sse.	s.	calm	e.	w.	·183	·30	·06	.....	·26	41
22.	29·204	29·455	29·170	28·69	28·82	29·01	29·06	29·09	54·4	56·2	46·7	58	31	54	43½	34	35	39	s.	sw.	sw.	w.	se.	·166	·21	·40	0·70	.....	49
23.	29·694	29·736	29·656	29·16	29·23	29·42	29·19	29·38	41·3	57·4	39·8	47	26	37	43½	33½	37	39	s.	s.	calm	wsw.	s.	·188	.....	·02	.....	·30	43
24.	29·916	29·957	29·881	29·48	29·50	29·59	29·46	29·56	38·0	48·2	37·6	45	27	36	43	35½	35	38	s.	nw.	calm	sw.	w.	.....	.....	.....	.....	.....	38
25.	29·800	29·913	29·783	29·42	29·65	29·74	29·71	29·90	38·3	45·6	37·3	44	23	35	43½	29	38	37½	nw.	nw.	calm	nw.	nw.	.....	.....	.....	.....	.....	38
26.	29·904	29·894	29·798	29·56	29·73	29·65	29·85	29·83	33·2	43·6	32·7	47	37	28	34	23	35	33	nw.	e.	calm	ne.	n.	.....	·02	.....	.....	·09	35
27.	29·704	29·697	29·583	29·41	29·54	29·47	29·82	29·77	44·3	45·5	32·6	51	42	38	41	32½	31	32½	se.	sw.	s.	ene.	ne.	.....	·11	·05	.....	·03	39
○ 28.	29·666	29·634	29·464	29·28	29·40	29·20	29·63	29·42	45·3	52·2	44·6	54	43	41·5	45	38½	38	40½	s.	sw.	calm	ne.	e.	·111	·60	·15	.....	.....	43
29.	29·236	29·176	948	28·70	28·82	28·65	28·98	28·72	50·4	54·2	45·2	58	49	51	47½	39	43	40	s.	sw.	calm	s.	e.	·575	·54	·25	1·16	·30	48
30.	28·952	29·250	28·845	28·38	28·44	28·70	28·57	28·79	53·8	58·6	51·2	54	40	50	47	41	44	42	sse.	sw.	sw.	se.	e.	·338	·05	·58	.....	·41	52
Mean.	29·782	29·825	29·710	29·33	29·866	29·535	29·600	29·600	43·9	49·8	40·8	49·90	35·30	40·8	44	34·3	39·73	39·58						Sum. 2·850	3·41	2·11	2·37	3·51	Mean. 42

clusively on their appropriation, although, upon the whole, I incline to refer them all, with the exception of three or four doubtful ones, to the true *angustifolium*. Below I have inserted their localities, with a view of directing the attention of botanists in their respective neighbourhoods to their more correct and certain appropriation by subsequent examinations. One highly interesting result however is, that as so many of these specimens are in all probability referable to the true *angustifolium*, and as their localities range from the extreme south of England far into Scotland, the right of this species to be regarded as indigenous to Britain appears to be clearly established; whilst the occurrence of *brachycarpum* generally in gardens renders it probable that its naturalization in the habitats where it occurs has been originally from the outcasts or escapes of cultivation. I have looked into all the books, British and continental, within my reach in the hope of elucidating the synonymy, but with little success. The figure of 'English Botany' is evidently our *brachycarpum*, the form of the capsule and the direction of its peduncle being very characteristic; and as the locality from whence the specimen figured was gathered bears very suspicious marks of being anything but a wild station, it seems highly probable that the other habitats of the Cheviot Hills, Teesdale, and the north of England there mentioned, are rather referable to the true *angustifolium*. The descriptions of Smith's 'English Flora' and Hooker's 'British Flora' are necessarily too uncertain for accurate appropriation. The description of *E. angustifolium*, Linn., and its variety *β. bracteatum*, in Wimm. and Grab. 'Fl. Siles.,' vol. i. p. 368, leaves no doubt that these writers were acquainted with both our plants, notwithstanding they make no mention of the capsules. Their *E. angustifolium* is the true *angustifolium*, Linn., and their variety *β. bracteatum* is as certainly our *brachycarpum*, since they thus describe the former: "Folia brevissimè petiolata, lineari-lanceolata acuminata basi attenuata, ... integerrima superne obsolete denticulata. Sepala petala æquant. Petala breviter unguiculata subrotundo-cuneiformia;" and the latter, "Corollis amplis sepala superantibus, foliis minus acuminatis basi rotundatis." Mention is also made of the bracteas being larger in their variety *β.* than in the species, a circumstance which likewise occurs in our *brachycarpum*, but apparently not with sufficient constancy to be applicable as a character. To our *brachycarpum* I am also disposed to quote the *E. angustifolium* of Bertoloni, 'Fl. Italica,' vol. iv. p. 291, from the apparent correspondence of the description of the capsule and the direction of its peduncle: "Pedunculi post anthesim ascendenti-

patuli. Capsula crassiuscula." From the Shropshire specimens noted in my 'Flora' of that county as having been seen by me proving to be *brachycarpum*, and from my knowledge of the situation of the other localities quoted in that work rendering it probable that the plants growing therein are not truly wild, but rather outcasts or escapes, I cannot refrain from adding the *E. angustifolium* of Fl. Shropsh. as a synonym of *brachycarpum*.

For the present, however, the characters, &c. may stand as follows:—

E. angustifolium, Linn.

Leaves linear-lanceolate, acuminate, somewhat attenuate at the base, acute, entire, obsoletely calloso-denticulate; peduncles shorter than the germen; sepals as long as, or slightly longer than, the petals; pistil as long as, or slightly longer than, the stamens, segments at first erect, finally revolute; capsule very long ($2\frac{1}{2}$ inches), linear, straight, erect, nearly parallel with the stem, tetragonous, angles rounded and nearly obsolete. "Sp. Plant. 493." Linn. Herb. *α*. Wimm. et Grab. Fl. Siles., vol. i. p. 368.—"*E. persicifolium*, Pour.," Smith. Herb.—*E. macrocarpum*, H. O. Stephens in Ann. Nat. Hist., vol. viii. p. 170. Leighton, *ib.* p. 247.

Wyre Forest, Shropshire! *Mr. G. Jorden.* Cauldron Snout! *Prof. Henslow.* Leigh Wood, Somersetshire. *Mr. G. K. Thwaites.* Sussex Forests. *Wm. Borrer, Esq.* Forfarshire. Dalnacardoch, Perthshire. Loch Lubnaig, Perthshire. Aberdeenshire. By a rivulet at foot of Cheviot. Singleton, Chichester? Esher, Surrey. Shirley near Southampton. Coola's Castle, Shanklin, Isle of Wight. *Watson Herbarium.* In meadows near Sheffield, and in several other places in the north. *Ray.* On the Cheviot Hills. *Mr. Winch.* Teesdale. *Rev. Mr. Harriman.* South of Scotland, frequent. *Hooker.*

E. brachycarpum, Leighton.

Leaves linear, acuminate, more or less rounded at the base, mucronate, shallowly but distinctly calloso-denticulate; peduncles about equal to the germen; sepals shorter than the petals; pistil $\frac{1}{3}$rd longer than the stamens, segments circinato-revolute; capsule short (about 1 inch), linear-oblong, subattenuate at both ends, slightly curved, subpatulous, distinctly tetragonous.—*E. angustifolium* (non Linn.). E. Bot. t. 1947. No. 2 and 3 Smith. Herb. Bertoloni, Fl. Ital., vol. iv. p. 291. Stephens in Ann. Nat. Hist., vol. viii. p. 170 (excl. syn.). Leighton, *ib.* p. 247. Leighton, Fl. Shropsh. p. 166.—*β. bracteatum*, Wimm. et Grab. Fl. Siles., vol. i. p. 369.

Near Bewdley! *Mr. G. Jorden.* Trapp's Coppice, Buildwas, Shropshire! *Miss Moseley.* Near Preston Boats, Shrewsbury! *Rev. W. R. Crotch.* Red Barn near Shrewsbury! *Fl. Shropsh.* Between Capel Cerrig and Cernioge, North Wales! *Miss Moseley.* Near Esher, Surrey, possibly originating from a garden? Moffat Water? Falcon

Clints, Durham? Banks of the Swale, Richmond, Yorkshire. *Watson Herbarium.* On a rising ground beyond Robin Hood Inn in the road to Kingston-upon-Thames. *Eng. Bot.*

In conclusion, I would mention a suggestion of Mr. H. C. Watson's, which to my mind is of very primary importance, and the resolution of which by cultivators of our British plants will go far to settle the question of the real claims of *E. brachycarpum* to the rank of a species. I will quote Mr. Watson's own words: "It may be worth ascertaining whether luxuriance at root does not enlarge the leaves and shorten the capsule. Fruit is often imperfect when roots are strong and well nourished, especially in creepers." In the roots of the plants forwarded to me by Mr. Jorden, I did not observe any perceptible difference of luxuriance; but Mr. Jorden's observation, that *E. brachycarpum* never produced fertile seeds, so confirmatory of Mr. Watson's remark, must be carefully borne in mind, as it goes far to render such luxuriance under cultivation very probable.

W. A. Leighton.

Dec. 24, 1841.

XLIX.—*Remarks on* Lottia virginea. By Josh. Alder, Esq.

Some misunderstanding has lately arisen concerning the characters and synonyms of the little mollusk whose shell has been long known to British conchologists as the *Patella parva* of Da Costa. This species was referred by Maton and Rackett, and by Montagu, to the *Patella virginea* of Muller; an opinion which was generally adopted by succeeding authors, until Dr. Johnston, in a short article published in the second volume of the 'Magazine of Zoology and Botany,' gave some reasons for supposing it to be incorrect. Audouin and Milne Edwards having stated that the animal of the "*Patelles roses*" found in the English Channel differed entirely in the structure of the branchiæ from the true *Patellæ*, Dr. Johnston was induced to examine the *Patella virginea* of our shores, and "I soon satisfied myself," he says, "that those found on the coast of Berwickshire at least were formed like the true *Patella*, the cloak of the animal being ciliated all round with a fringe of short equal filaments. The accuracy of this observation I have recently had occasion to confirm in company with my friend Mr. J. Alder. It follows, therefore," he adds, "that the shell usually called *Patella virginea* by British conchologists is not that so named by Muller, but is probably his *Patella tessellata*, in which the margin of the cloak is ciliated." The opinion that our species is the *Patella tessellata* of Mul-

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other points of structure. Not having succeeded, however, in detecting vibratory cilia upon their surface, I rather incline to consider them as corresponding to the tentacular filaments which are found at the extreme edge of the cloak in all our British *Patellæ* as well as in *Lottia testudinalis*, though entirely wanting in this species, to which the term "*margine integerrima**" may therefore very appropriately be applied.

In tracing this species through all its stages, I find that in its very young state the red markings of the shell are not in regular lines, but have a tessellated or chained appearance exactly similar to those of Mr. Forbes's *Lottia pulchella*; in fact, I cannot perceive any difference between my shells and specimens of *Lottia pulchella* kindly presented to me by Mr. Forbes.

That the specimens collected on this coast are really the young of the larger species I can have no doubt, having observed it in all stages of growth, and traced the transition of the chained markings of the centre until they become linear at the edges of the half-grown shells. In more advanced stages of growth, however, the apex becomes thickened and the early markings obliterated.

From what has been stated, then, I think I am warranted in coming to the conclusion, that this species is a *Lottia* of Gray (*Patelloidea*, Quoy); that *L. pulchella* of Forbes is the young state of the same; and, after an examination of the figures and description in the 'Zoologia Danica,' I must also add, that I consider it to be the true *Patella virginea* of Muller†.

Newcastle, Dec. 9, 1841.

L.—*The Birds of Ireland.* By Wm. Thompson, Esq., Vice-Pres. Nat. Hist. Society of Belfast.

[Continued from p. 360.]

No. 9.—*Fringillidæ; Sturnidæ; Corvidæ.*

The Bullfinch, *Pyrrhula vulgaris*, Temm., is one of those birds which is distributed over the island, but is at the same time, in one sense, a local species. Mr. Selby observes that it is "common in all the wooded districts of these islands,"—but

* See Muller's description of *Patella virginea*.

† *Patella tessellata*, Mull., appears to me to be a variety of *Lottia testudinalis*, which sometimes approaches very near in appearance to *L. virginea*. The tessellated markings, the distinct longitudinal striæ, and the brown impression inside the shell, are all characters of the former species, and constitute the principal difference between them. The cloak of *L. testudinalis* is also (as I have stated above) fringed with filaments at the external margin, while that of *L. virginea* is entire.

this will not apply to Ireland. In many of the *artificially* wooded districts, it is either not to be found at all, or is only known as an occasional visitant; but where any extent of indigenous or natural wood remains, and there is sufficient growth of the more shrubby trees, the bullfinch may be looked for almost with certainty. In some picturesque and extensive glens in the county of Antrim and near Belfast, this bird was common so long as the hazel and holly of natural growth maintained their ground, but as these were swept away, the bullfinch deserted such localities as abodes, and "few and far between" are now even its temporary visits. In the neighbouring county of Down, this bird finds a home in sequestered situations where the hazel predominates, and in this shrubby tree commonly nestles. In "nature's wild domain," the bullfinch looks eminently beautiful, and can be admired without the alloy associated with its appearance in the garden or the orchard, where it proves so destructive. Its call-note and song have generally met with little admiration from the historians of the species, but being sweetly plaintive, are to me extremely pleasing.

Small seeds were the only food in the stomachs of a few bullfinches which came under my observation in winter.

Mr. Selby (in his 'Illustrations of British Ornithology' and the 'Naturalist') and Mr. Knapp, give very interesting accounts of the bullfinch from personal observation, and particularly with reference to the plants which it attacks.

Pine Bullfinch, *Pyrrhula Enucleator*, Temm.—See Annals, vol. vii. p. 478.

Crossbill, *Loxia curvirostra*, Linn.—This bird has long been known as an occasional visitant to Ireland. In Harris's 'History of the County of Down' (1774), it is remarked of crossbills, that "many of them were seen at Waringstown in 1707." Smith, in his 'History of Cork' (1749), observes, that "these birds have been seen in this county, but are rare." Rutty, in his 'Natural History of Dublin' (1772), says of the crossbill—"it has been seen at Ireland's Eye, and we have had several flights of them to the counties of Wicklow and Dublin, particularly in 1714." Mr. R. Ball informs me, that during his residence at Youghal, this species was known to him as occurring but once in the south, upwards of thirty years ago, when it committed great devastation in the orchards: its appearance in the south of the county of Cork, about twenty-nine or thirty years ago, has been reported to me by others, who state that it was looked upon as an extraordinary rarity—probably the same flight of birds is alluded to by all. Mr. Ensor, in an article contributed to the 6th vol. of the 'Magazine of Natural

History' (p. 81), and dated Ardress, county Armagh, remarks—"there was a flight of these birds in my plantations for weeks in 1813 or 1814*." In 1821, when crossbills were so abundant in Scotland, they visited Ireland also, and some were killed about Belfast—here a venerable friend has from his early years known them as occasional winter visitants, and has captured them when feeding, by means of fishing-rods smeared with bird-lime.

Since my own attention has been given to the subject, the crossbill is recorded either in my notes or otherwise as occurring at the following times and places:—"in the county of Wicklow, about December 1828" (Dr. J. D. Marshall); and on the 26th of this month, when an example was obtained near Belfast; it was on the top of a larch-fir, apparently feeding on the cones when fired at, and being only wounded, clung so tenaciously to the branch that it was with difficulty got down; in the winter of this same year the species was shot in the county of Tyrone or Armagh—near Belfast in the winter of 1829–30; in the month of January in this latter year, specimens were procured in the county of Wicklow;—Dr. Burkitt, of Waterford, writes to me that "crossbills visited us in 1831, and were said to be very destructive to orchards near the city;"—near Belfast in July 1833, when several in red plumage were obtained;—December 22, 1835, one was shot at Crumlin, county of Antrim, and about the same day another was killed when feeding in company with a few others in larch-firs near Lurgan, county of Armagh;—about the 1st of February 1836, two, shot near Tanderagee in the last-named county, came under my inspection; the point of the lower mandible extended beyond the profile of the upper in one of them; their stomachs were filled with larch-seed: a specimen was shot near Belfast in the same month. When visiting Tollymore Park, county of Down, this year (1836), in the month of August, I was informed by the intelligent gamekeeper that a pair of crossbills had bred there in the summer just then passed; he saw them with their three young ones: although he had before observed this species here in the winter, he had not done so in summer until that time;—July 1837, I saw two examples in Dublin which were shot in the neighbourhood of the Dargle, county of Wicklow, at the end of June, when many more were in company with them: they attracted attention by their noise, which was described to resemble that produced by the breaking of sticks, and the observer on looking up saw the birds hanging to the upper branches of fir-trees engaged in opening the cones for the seed.—In the winter of 1837–38, the following note of specimens which were sent to Dublin to be preserved was obligingly made for me by T. W. Warren, Esq., and H. H. Dombrain, Esq.: "Oct. 20. Numbers seen and some killed in the neighbourhood of Booterstown,

* *Loxia coccothraustes* is the scientific name applied to the bird referred to, but from the observation that it is significantly called "cross-beak," it seems to me warrantable to conclude that *Loxia curvirostra* is meant.

kindly communicated that "in the last shooting-season" several crossbills were killed in that neighbourhood.

Mr. Robert Davis, jun., of Clonmel, a very zealous and observant naturalist, replied in February 1837 to a query respecting the occurrence of crossbills in that part of the country, that he had not heard of them since their appearance in great numbers about the year 1802. I was afterwards informed by this gentleman, that "about the 18th of January 1838, a flock of these birds appeared at Ballibrado, near Cahir, and five of them were killed; they were very tame, and were observed to feed like a parrot, holding the fir-cones in one claw." He remarks again, that "on the 16th of August the same year, four crossbills were sent me from Ballibrado, where they still continue in considerable numbers. I cannot hear of their occurrence anywhere else, except in the neighbouring demesne of Kilcommon"--"two more [he continues, writing on the 12th of September] were sent me since, but like the others were much damaged, as, in consequence of their tameness, the person who shot them fired from too short a distance. They appeared to be as follows—adult males; males passing from the red state into the adult; young males just getting a few red feathers; and I suppose females, in the brownish-gray state: from what I hear they would seem to be moulting fast." On the 11th of January 1839, Mr. Davis again observes—"Crossbills are still to be seen at Ballibrado, where they have been all winter, and when last noticed, about a week since, appeared to have paired. I am rather of opinion that they bred here last year, but it does not amount to more than a surmise grounded upon their appearance so early, accompanied by such a number of young, and principally from the destruction of the cones of the spruce-fir having been noticed throughout the year." On May 18, 1839, my correspondent, in transmitting the skins of two specimens for my examination, continues—"from ten to twenty crossbills have remained all the winter, and up to the present time at Ballibrado, but, though some search was made, no nest was discovered. About five or six weeks since, two or more clutches of young birds were seen accompanying the old ones who were observed feeding them. The young bird I send was shot in the act of taking food from an old cock; it was sent me five weeks ago [early in April]; the other bird sent varies a little in colour from most specimens, and was shot about three weeks before that time. The young one had every appearance of a nestling, feet soft and weak, bill not strong, and a great number of the large feathers not fully produced*." On July 18th the same year, Mr. Davis observed that the "crossbills had not been noticed in their usual haunts, nor, indeed, anywhere for two months back."

* This bird is of adult size: the head, back, and rump, or whole upper plumage, is yellowish green, with a dark olive centre to each feather, this dark marking occupying more of the feathers anteriorly than towards the tail; the entire under plumage is yellowish-white, with an olive-brown streak down the centre of each feather; tail and larger wing-feathers dark brown, with the outer margin yellowish-green.—W. T.

Notes on the plumage, and sometimes full descriptions from the recent specimens which came under my examination, were drawn up; but it is sufficient to observe here, that they were in every state from that put on at the first moult to maturity; by far the greater number were in the bright red plumage: one only (that already noticed) displayed the markings of the young previous to the first moult.

I have not had the gratification of seeing crossbills in a wild state in Ireland; but early in September 1837, my attention was directed to them by Mr. Selby and Sir Wm. Jardine as they were on wing from one plantation to another in the demesne at Twizell and at Chillingham Park, Northumberland.

Authors generally report the crossbill as arriving in Great Britain in June, but it has mostly been a late autumnal or a winter visitant to Ireland, leaving the country again early in the spring—like other birds of passage. Mr. Yarrell's remark with reference to England, that crossbills "were more abundant during the greater part of 1836, 1837, and 1838 than was known for some years before"—might it not be said, than was ever known before in three successive years?—applies to Ireland also, as shown in the preceding notes. In endeavouring to account for the cause of the more frequent visits of crossbills to the British Islands of late years, we should perhaps know in the first place if any change has occurred in their metropolis or chief quarter whence they come; but, ignorant of this, we can only look at home and see if there be any attraction for them now that the country was deficient in before. Sir Wm. Jardine observes: "in the south of Scotland at least, where an immense extent of young pine timber has been planted within thirty years, the crossbill has undoubtedly become more common, and we know now remains through the year*." In Ireland likewise, plantations including the *Coniferæ*, but above all, the larch, have greatly increased within the same period, and may be the means of prolonging the stay of crossbills, or inducing them to remain occasionally throughout the year. And as somewhat corroboratory of this, it may be noticed, that plentiful as these birds were of late years, we have heard but little of damage done to orchards by them as in earlier times, the seed of the *Coniferæ* having generally afforded abundance of food. Still, I cannot but think that the primary cause of their more frequent migrations hither must be looked for in their aboriginal abode. A friend of excellent judgement to whom this idea was mentioned, is rather inclined to consider crossbills as a wandering tribe having no proper home, but who pitch their tent and take up their

* Naturalist's Library, British Birds, vol. ii. p. 340.

abode at a place just so long as it suits them, without contemplating a return to any particular region.

Bewick and Yarrell, in their respective histories of British birds, treat us with delightful and copious accounts of the appearance of crossbills in England in the olden time, when, like a more potent enemy—"they were attacked with slings and crossbows," valiantly "never thinking of flying off till some of them, stricken by stones or apples, or leaden bullets, fell dead from the trees." The grand point of view in which birds were considered at that period (1593) is not omitted to be mentioned, as in one account it is stated that "their flesh was sufficiently savoury and delicate," and in the other, that "they were very good meate*."

White-winged Crossbill, *Loxia leucoptera*, Gmel.—The only record of the occurrence of this bird in Ireland is the following, communicated by Mr. Templeton to his friend Mr. Dawson Turner, and published in the 'Linnæan Transactions'—"Shot at Greenville, near Belfast, January 11, 1802." This is the first notice of the species as a visitant to the British Islands. Mr. Templeton's drawing represents the female bird as described by C. L. Bonaparte.†

* *Loxia pytiopsittacus* is included in Templeton's 'Catalogue of Irish Birds,' from the supposed occurrence of the species in one instance. A coloured drawing of the specimen, of natural size, was fortunately made by that accomplished naturalist. It represents the *L. curvirostra* with the point of the lower mandible not reaching beyond the profile of the upper. At the foot of the drawing, *L. pytiopsittacus* is followed by a note of doubt, which does not appear in the printed catalogue.

† It is remarked by Rennie of some species of our small birds, that its nests about a cotton mill in Ayrshire were found to be lined with cotton. At Whitehouse, near Belfast, (as I have been informed by James Grimshaw, jun., Esq.,) the chaffinches and common sparrows which built around two cotton-mills always made use of cotton in the construction of their nests. The mills were a quarter of a mile distant from each other, and all the nests of these birds erected in the intervening plantations, as well as in the vicinity of the mills, exhibited the foreign product, not only as lining, but more or less of it on the outside. On remarking to my informant that its conspicuous colour would betray the presence of the nest, and not accord with the theory that birds assimilate the outward appearance to surrounding objects, he stated, that on the contrary, the use of the cotton in that locality might rather be considered as rendering the nest more difficult of detection, the road-side hedges and neighbouring trees being always dotted with tufts of it, owing to the constant passing of the workers from the one mill to the other.

The same gentleman mentions, that when lately (Nov. 1841) in Manchester, a lady of his acquaintance there told him of her having last summer lost a piece of very valuable old lace which was left out to dry, and that on the spouts being cleared of sparrows' nests, the lace was discovered uninjured as partly lining one of them.

A note upon a canary-finch may here be given.—Sept. 9, 1833. A bird

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flocks consisting of from half-a-dozen to two hundred individuals are seen every morning coming from the north-east, passing over a point of land where a river enters Belfast Bay about a mile from the town, and continuing in the same course until lost to view. They are generally seen only for one and a half or two hours—from eight to ten o'clock A.M.—none appearing before the former hour, and rarely any after the latter, except when the wind is high, and then the flight is protracted until noon; when very stormy they do not come at all. At the season of their earliest appearance, there is daylight between four and five o'clock in the morning, and their not being seen before eight o'clock leads to the belief that they have left some distant place at an early hour. On the same morning the flocks all take the same line of flight, but the direction varies when the wind is sufficiently strong to affect their move-

erly in the autumnal course. When they commence migration very late in the season, as was the case in 1838, they make up for lost time by an increase of numbers. Thus they were first seen in that year on the 23rd of October, when they made their appearance at half-past eight o'clock A.M., and continued passing in flocks of from twenty to one and two hundred individuals, until two o'clock. The following day, I had the gratification of witnessing a flock consisting of about two hundred, going through their beautiful evolutions, preparatory to roosting on a bank of *Arundo phragmitis* at the side of the river Lagan, near Stranmillis. From a great height in the air, they several times swept down almost vertically to the reeds, and, though the flock in each instance seemed to lose some of its numbers there, the great body sprang up again to a considerable altitude, and renewed its elegant manœuvres. Every time that they descended to the reeds, it was from the highest range of flight the stoop was made: when flying over at half the elevation, and they wheeled downwards, they never drooped so low as the reeds. At twenty-five minutes past four o'clock they had all alighted. Concealed by a high hedge, I had the opportunity of watching them from a short distance, and perceived by their flitting from one part of the reeds to another, that they were very restless for some time. In thus changing their quarters they rarely rose above the tops of the *Arundo*, and when at rest were perched so low down as to be invisible. After alighting they kept up a very noisy concert, in which no sound like their whistle was heard, but rather a medley different from and more guttural than their ordinary chatter.

I have seen small flocks of starlings on a few other occasions during the time of migration roosting here, and have (different from what has just been mentioned) remarked single birds perch so high up on the reeds as to sway them horizontally. These plants were always preferred here, for roosting in, to trees, though these, of various size, up to the most lofty, are quite contiguous. By Mr. Wm. Todhunter, late of Portumna, I have been informed, that after a hurricane in September 1836? nearly nineteen hundred of these birds were washed ashore on the banks of the Shannon. The reeds in which they placed their trust were snapped asunder in consequence of their weight. Starlings are stated by Mr. Todhunter to be vastly more numerous during winter than summer in that quarter. This gentleman remarked that they frequented the same woods for roosting-places for two or three winters only: in the course of eight years, during which he lived at Portumna, they thus changed three times.

ments. Those which come within the hours already mentioned very rarely alight; but when a flock arrives during the day it occasionally does so, apparently as if it had flown from a greater distance than the earlier comers, and required rest and food before proceeding further. The number of birds that come in this course is not very great. The average of five or six flocks seen in a morning may consist of about 250 individuals; the greatest number ever seen in one day may have amounted to 1500; and those altogether seen throughout the migratory period may be estimated at about 15,000. Of my three informants, two live in the district over which the starlings fly, and consequently have had daily opportunities of seeing them in their season (one indeed has done so for the last half-century), and the other was in the habit of going to the place every morning in the hope that the flocks would pass over within shot, which they often did. In only one instance did any of these persons see starlings return this way in spring, namely, on the 13th of March, when a flock appeared passing north-eastward, in the direction whence they come in autumn* —on the 23rd of that month, a flock consisting of sixty was once observed by myself returning in this course.

These birds very rarely stop anywhere in the vicinity of Belfast on their southward migration; but a low lying tract of marshy meadows, when flooded by excessive rain, has occasionally tempted the latest comers to remain a few days, and till the end of December 1833, a flock of about 200 frequented a district at the base of the mountains three miles from the town. The only instance in which one of the shore-shooters before mentioned met with these birds about the bay in winter, was some years ago during heavy snow after Christmas, when they appeared in immense flocks. So numerous were they, that some of the little grassy patches rising above the ooze near the shore could not contain them, and a portion of the flock kept hovering above their more fortunate brethren who had found a resting-place. On such petty islets of greensward or on heaps of "sleech-grass" (*Zostera marina*) only did

* The autumnal flights of these birds can be traced as coming from Scotland. Capt. Fayrer, R.N., in a letter dated Portpatrick, Oct. 23, 1831, and published in the Proceedings of the Zoological Society of London, remarks, that "very large flocks of starlings have arrived within the last few days. They start before sunrise and steer to the southward." I have had circumstantial evidence of this fact myself, as some years ago, when shooting at the latter end of October about Ballantrae, in Ayrshire, flocks of these birds were numerous, where subsequently, from the 12th of August to the middle of September, a very few individuals only, which had their nestling-places in the neighbourhood, were to be met with.

he on this occasion, or ever in autumn, see them alight—the sand or bare beach was always avoided. In the middle of March, flocks of starlings have occurred to me in unusual localities, and were supposed to be moving northward on migration; and during the first week of April 1837, large flocks were seen in "unaccustomed places" in Down and Antrim, having doubtless been kept from crossing the channel by the prevalence of the north-east wind and very cold weather.

Although the multitudes seen about Belfast are on their way southward, the extensive marshy tracts of the most northern counties (Antrim, Londonderry and Donegal) display throughout the winter their hosts of migratory starlings. Mr. Knapp remarks that these birds sometimes associate, but not cordially, with fieldfares (*Turdus pilaris*): the Rev. G. M. Black informs me that at Newtown-Crommelin, in the county of Antrim, where they are in immense flocks throughout the winter, they are always associated with these birds *, and as there are neither reeds nor trees near the place, he is of opinion that they must spend the night in company upon the ground. That the fieldfare in some districts remains during the night upon the ground is mentioned in a former paper of this series.

Mr. R. Ball remarks, that "starlings seem to have fixed on our celebrated round towers as favourite nestling-places," and certainly they are admirably suited to such a purpose, there is so little danger of molestation. Ruins generally, old trees, rocks †, and occasionally chimneys, are resorted to for nestling. These birds, it may be remarked, are not spread over Ireland as they are over England in the breeding-season, but are confined to comparatively few and favourite localities. Within the memory of old persons they built annually in the steeple of St. Ann's church, Belfast, and in other places within and about the town, but have long since ceased to do so ‡.

* In his 'History of Cork,' Smith quaintly observes—"They company with redwings and fieldfares, yet do not go off with them."

† When at the peninsula of "the Horn" (co. Donegal), and at the largest of the South Islands of Arran, I was informed that they build in the lofty rocks which rise above the ocean—in the latter locality they nestle also in ruined buildings. In Dr. J. D. Marshall's memoir on the Statistics and Natural History of the Island of Rathlin, published in the Transactions of the Royal Irish Academy in 1836, it is remarked of the starling,—"This is one of the most common birds in Rathlin. It is found over the greater part of the island, but principally about Church Bay, where the houses are more numerous, and where there are a few trees and shrubs. In July they were assembled in flocks of from one to two hundred, dispersing themselves over the fields and along the sea-shores. They frequented the more rocky parts of the pasture-fields. * * * * They build among the rocks."

[‡ They still frequent the precincts of the Charterhouse in the centre of London.—Ed.]

miliar History of Birds' and the 'Journal of a Naturalist,' their habits are admirably treated of: in the former work the singular flight of a large body before retiring to roost is described in the most graphic manner. Mr. Knapp correctly observes, that "they seem continually to be running into clusters," which, in the winter season, "brings on them death," as they become thereby a temptation to the shooter; but an instance to the contrary may here be mentioned. A small flock observed by a shooter of my acquaintance alighted in a field where his cow was grazing, and clustering on the ground about her head, kept pace with her movements, watching it was believed for some favourite food which she aroused; hence the birds, though fairly within shot, could not be fired at, lest the cow should be brought down by the same discharge!

The starling is to be met with very generally over the continent. Holland may, from the nature of the country, be called its metropolis. Southward, I have in August seen it in the Pontine marshes between Rome and Naples; and eastward, observed numbers in the middle of the month of May about the ruined walls of Constantinople, near the celebrated Seven Towers. On comparing an example killed in Ireland with one from India labelled "Suharunpoor; January," they proved identical in species.

The Rose-coloured Pastor, *Pastor roseus*, Temm., has at rare and uncertain intervals during the summer and autumn visited all quarters of the island, including the range of the most western counties. In the course of three successive years this bird has been met with. It has generally appeared singly and during the cherry season, and has in several instances been taken alive.

In a letter from Dr. R. Graves of Dublin to a mutual friend in Belfast, dated Nov. 1830, it is mentioned, that "among my late acquisitions has been the *Turdus roseus*, shot in a cherry orchard in the county of Clare [in the summer of 1830?] by one of my pupils, whose father says he shot a bird of the same species thirty years ago in the same orchard." Dr. Graves was at that period forming a collection of native birds, and subsequently I saw the pastor alluded to, together with other rare species which he possessed. In the first volume of the 'Magazine of Natural History,' p. 493, a letter appeared from Mr. C. Adams Drew, dated Ennis, June 25, 1828, in which the writer states that—"It is now above twenty years since, on visiting my friend Mr. Lane at Roxton, I found him in his garden endeavouring to shoot a strange bird which had for several days previous been making sad havoc among his cherries. After two or three unsuccessful attempts on the part of Mr. Lane, the bird at last fell

insect and vegetable food. They were shot together near Lough Neagh. *Clausilia rugosa* and *Limneus fossarius*, with earth-worms, and seeds of many kinds, have been found in others.

[A starling which I once had was exceedingly fond of calcavella. After having sipped a teaspoonful with avidity, he would dance in an ecstasy of delight, repeating his own name, 'Jacob.'—R. T.]

to my barrel. * * * Its cry resembled that of the water-ouzel. It was quite a *rara avis* in this country, no one knowing anything of it." A description of the bird follows, proving it to have been the *Pastor roseus*. The specimen was given to a gentleman mentioned, with the intention that it should be preserved for the "Dublin Museum." It is possible that the same example of the bird may be alluded to, in both of the foregoing letters. In the 'Zoological Journal,' No. 4, p. 489, Mr. Vigors states that a rose-coloured pastor, shot near Wexford in 1820, is in his collection. One obtained in the year 1830 has already been noticed. I have been informed by Dr. Harvey of Cork, that a bird of this species "was captured at Carrigataha, adjoining Ballibrado, in the county of Tipperary, in June 1833, by Mr. Fennell, who baited a fish-hook with a cherry, which the bird swallowed, and was thus taken." A pastor which I saw in the possession of Mr. W. S. Wall, bird-preserver, Dublin, was noticed in a letter from the Rev. Thomas Knox as "shot in a garden near Dublin on the 20th of July 1833. On dissection, the bird proved to be a female; the eggs were small and not distinct; gizzard muscular; the skins of cherries visible, by which fruit the inside of the gizzard and mouth were stained bright pink." When in Dublin on the 26th of June 1834, I saw in the bird-preserver's just mentioned an example previous to its being skinned of an adult male *P. roseus*. It was taken in a cherry-net in the garden of Richard Long, Esq., Longfield, Cashel, on the 7th of that month, and had been kept alive for a fortnight. In July 1836, Lieut. Davis, R.N., of Donaghadee, sent to the Belfast Museum an individual of this species, which was captured early in the month, in a garden near that town. It had been kept alive for a few days: on dissection it proved to be a male, and was in adult plumage. About the middle of the same month a second example, which came under my examination, was shot at Hillsborough, in the same county. On the 12th of August that year, a third was made known to me as obtained in Ireland: this was shot near Kenmare, in the county of Kerry*; and sent by Dr. Taylor, the distinguished botanist, resident in that neighbourhood, to Mr. R. Ball of Dublin. In the summer of the following year (1837), as I learn from Mr. T. W. Warren of Dublin, a pastor, which he saw in a fresh state, was shot from among a flock of starlings in one of the islands of Arran at the entrance of Galway Bay; it was preserved for Mr. Thompson of Clonskea Castle, the proprietor of the islands. In June 1838, as reported to me, one of these birds was sent from Ashbourne, about ten miles from Dublin, to Mr. W. S. Wall, to be preserved. The stomach was found on dissection to be filled with cherries. Dr. Farran of Feltrim, in the vicinity of the metropolis, likewise informed me, that on the 7th or 8th of July 1838, a *P. roseus* was shot when feeding on the same fruit at Newbarron, near Fieldstown, a few miles from Dub-

* In a letter from Mr. William Andrews of Dublin, dated Nov. 14, 1841, it was mentioned, that "three specimens of the rose-coloured pastor have been shot near Tralee, one in the garden of Colonel Crosbie."

lin*. On the 13th of September 1838, I saw two specimens which had been killed in different parts of the north of Ireland. One was shot about the 1st of that month in the plantations about Bangor Castle, county of Down, where another was seen in company with it; they had been observed for some time before: on dissection, no food was found; it proved to be a male, as the plumage denoted. The other example was shot by Alex. Tyler, Esq., at the Umbra, Magilligan, county of Londonderry, about the 10th of September. Having the opportunity of examining this bird in a fresh state, I drew up the following description.

	inch.	line.
Entire length	8	9
Bill from rictus to point	1	2½
Upper mandible, measured along the ridge from forehead to point	0	9
Wing from carpus to end of longest quill	5	0
Tail extending beyond closed wings	1	0
Tarsus	1	3
Middle toe and nail	1	3
Hind toe and tail, measured in a straight line	0	9

Tibia feathered to the tarsal joint. Colours, those of the adult male as described by authors (as are likewise those of the one above noticed from Bangor Castle), and as such contradistinguished from the plumage assumed until the second year as described by Temminck (Man., part 3, p. 76). On dissection it proved a male; it was in excellent condition. Its stomach, with the exception of a large coleopterous insect, was entirely filled with the seeds of gooseberries.

In April 1838, I learned from Mr. H. H. Dombrain of Dublin, that he had received a rose-coloured pastor which had been captured some years before at Woodhill, Ardara, in the county of Donegal, the seat of Major Nesbitt: it was taken alive in the green-house in an exhausted state, and died a few hours afterwards.

On a comparison of Irish examples with specimens obtained in India (in the same locality with the starling already mentioned), the species proved to be the same.

The Chough †, *Fregilus Graculus*, Selby, is noticed in Harris's 'Down' (1744), and Smith's 'Cork' (1749), as one of the birds of those counties, and in the latter is said to be "very common, frequenting rocks, old castles and ruins upon the sea-coast." The species is more generally diffused around the rock-bound shores of Ireland than British authors would lead us to believe it is on those of Scotland and England, and

* As it was not until some months afterwards that the notes were communicated, the same individual may possibly be alluded to by both my informants; in which case there would be an error about the month.

† Red-legged jackdaw of the north of Ireland; cliff-daw of Kerry. Smith states in his 'History of Cork,' that the Irish name for this bird implies a Spanish jackdaw.

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5th of March 1836, when a pair appeared, and one of them (in beautiful adult plumage) was shot at Dunbar's Dock, Belfast. That day and the preceding were very stormy, and the wind southerly: their haunts to the southward are all far distant. The stomach of the specimen was filled with insect larvæ.

When on a tour with Mr. R. Ball in the summer of 1834 to the west and south of Ireland, choughs occurred to us at Achil Head, and the largest of the South Islands of Arran, &c., in the west; and in the south, were heard about the Lower Lake of Killarney; and were seen at Cable Island, near Youghal. Colonel Sabine has noticed that they breed in the rocks at Ballybunian, on the coast of Kerry; and the late Mr. T. F. Neligan of Tralee, in mentioning to me some years ago that they were very common about the marine cliffs of that county, stated, that numbers build in the rocks of inland mountains, four and five miles distant from the sea. The choice of such places is not rare in Ireland. Some of the latest writers on British ornithology appear to think that the chough never leaves the vicinity of the sea, and in one work it is inadvertently stated that the species is "never observed inland," although Crow Castle is noticed by Montagu as one of its haunts. This is situated in the beautiful vale of Llangollen in North Wales, where the Lombardy poplar spiring above the other rich foliage around the picturesque village of the same name, imparts, in addition to other accompaniments, quite an Italian character to the scene. But to particularise further in Ireland: the Rev. G. M. Black observed a pair of these birds throughout the breeding-season about a ruin between Newtown-Crommelin and Cushendall in the county of Antrim, and three miles distant from the sea: at Salagh Braes, a semicircular range of basaltic rocks in the same county, and nearly twice that distance from the coast, the chough nestles. The gamekeeper at Tollymore Park, county of Down, informed me in 1836, that he had shot these birds in the mountains of Mourne, which are regularly frequented by them, and where they build in the inland rocks. Here for some years previously, he annually discovered two or three of their nests, whence he has taken the young with the intention of rearing them, but in this he was unsuccessful. This intelligent gamekeeper assured me, that once in the mountains here, he came upon seven choughs attendant on a poor sheep, which was in a particularly weak state when lambing. About half of the young animal was protruded, and had been nearly consumed by three of these birds, which were busily engaged preying upon it*. He had not a gun with him at the time, but was so wroth at witnessing this cruelty of the chough, that in the latter part of the day, when armed, he sacrificed three of these birds; all which came within his range. He believes that choughs would even destroy a weakly animal. They are seen by him commonly frequenting the entrance to foxes' earths, for the purpose, he conceives,

* Mr. Hogg contributes to Macgillivray's 'British Birds' (vol. i.) a similar account of the carrion-crow, with horrible details of what to human sympathy would seem its cold-blooded cruelty to sheep, when in the act of parturition.

of feeding on "sheep-shanks" and other similar rejectamenta. As the chough is not considered a carnivorous bird, I was most particular in questioning my informant as to the species, and of his accuracy there cannot be a doubt. Montagu mentions that his tame bird was fed partly on raw and boiled flesh-meat.

Mr. R. Davis, jun., of Clonmel, informs me respecting the chough, that it has been shot within a mile of that town, and that he has seen the species at Helvick Head in the county of Waterford, and great numbers at Loop Head on the coast of Clare;—about the marine cliffs generally of the latter county, Mr. W. H. Harvey states that it is common. Mr. Davis writes—"although Mr. Selby says 'it has been remarked that the chough will not alight on the turf if it can possibly avoid it, always preferring gravel, stones or walls,' I have seen hundreds freely alight and feed on it, and have observed them feeding like rooks in a ploughed field." I have myself observed these birds on the short pasture of the marine cliffs, but consider that they have the predilection noticed by Mr. Selby, whose remark however may refer merely to Montagu's tame bird. Mr. Davis further states, that "great numbers of choughs breed in the precipices over the lakes in the Cummeragh mountains, county of Waterford, about seven Irish miles from the sea, where they are very rarely molested, on account of nestling in almost inaccessible spots. Here the young were ready to fly on the 6th and 7th of August 1836: on the 28th of April 1841, I got four of their eggs from this locality."

I have seen examples of the chough which were killed about Portpatrick in Wigtonshire, and on the Ayrshire coast; and have heard the call of the species in the evening about the ruined castle at Ballantrae in the latter county. In July 1826, when in the valley of glaciers on the south side of Mont Blanc, I was attracted by the well-known but somewhat distant call of the chough, and on looking up saw an immense flock bending their way towards the pinnacles or *aiguilles* of that "monarch of mountains*."

The Raven, *Corvus Corax*, Linn., is distributed over Ireland, and is more especially to be seen within a day's foray of the rocks in which it can roost or nestle. As sites for the raven's building, rocks are preferred to trees in this island, and wherever there is a range of cliffs suited to the purpose this bird is sure to be found, unless the eagle or buz-

* The call of the closely allied *Pyrrhocorax pyrrhocorax*, Temm., likewise an inhabitant of the Alps, is unknown to me, but in the present instance my attention was arrested by the similarity of the note to that of our native bird.

This to my ear is very lively and pleasing, and cannot be mistaken for that of the jackdaw. The flight of the chough too is peculiar, though, as in others of the *Corvidæ*, the quills are much expanded, and give a deeply fringed appearance to the wing as the bird flies overhead. A friend remarks upon the flight as "singularly waving; they flap their wings, then sail forty or fifty yards, and so on gradually until they alight."

zard monopolize the locality. From time immemorial ravens have been considered to inhabit the same rock. In the lower districts of England certain trees have for such a length of time been resorted to by this species for nestling, as to have acquired the name of Raven-trees. In like manner, a wild and unfrequented locality in the Belfast mountains bears the name of the Crow Glen, in consequence of a pair of ravens having for a series of years nestled there in a cliff. Persecution has long since driven them from the spot, which however still retains the name. Their place was for some years supplied by a pair of kestrels (*Falco Tinnunculus*); but as their nest, though not easy of approach, could, with some difficulty be reached, it was always robbed of its young tenants, and this species too has ceased to nidify there*.

I have with much interest observed in the month of October, about the fine basaltic cliffs of the Cave-hill, near Belfast, and long after the breeding-season was past, that as evening set in, a few ravens would appear together hoarsely croaking about the rocks, whilst at the same time hosts of jackdaws were garrulously chattering, and several kestrels added their shrill voices as they careered gracefully about in company. After some little time they all retired to the rocks for the night.

On one occasion I had interesting evidence of the power of sight in the raven. A nest of young rats not more than three or four days old had been dug up in a stubble field, and after being killed were left there. Very soon afterwards two or three ravens passing over the place at a great height, on coming above the spot dropped almost directly down upon them. The young rats had not been ten minutes dead at the time, and consequently could hardly have emitted any effluvia. Besides, they were so small, that even had they given out any to the air, it seems hardly possible that it could have ascended to the great elevation at which the birds had been. Sight alone, I conceive, must in this instance have been exerted.

Mr. R. Davis, jun., of Clonmel, remarks, that ravens, if taken young, can be reared so as not to injure other birds, as he "for a

* Ravens are generally so very wary and mistrustful of man, that the following note (communicated by my brother) may be worth insertion. "In the middle of March 1828, a pair of ravens had a nest in Grogan's Glen, in the Black Mountain (near Belfast). It was near the top of the highest rock; was formed of sticks and lined with wool; it contained seven eggs of a dark green colour, blotched over with black. The birds were very tame, the first day I saw them approaching within three or four yards, and hopping about near me so long as I remained, when their glossy plumage looked very beautiful." Their tameness arose simply from their being unmolested in the locality, perhaps in consequence of a belief among the country people, that it is "unlucky" to kill a raven; for this very pair of birds was known to carry off eggs, young ducks, &c., from the nearest farm-yards. But, as is usual in such cases, one of the poor ravens, by thus putting its trust in man, was shot a few days afterwards by a vagrant gunner.

Neligan of Tralee, mentioned to me, that ravens chiefly frequent the sea-shore in the county of Kerry, where he had often seen them feeding on putrid fish. Great numbers of these birds are in some works (especially those treating of American ornithology) described as flying in company. Although ravens may be seen every day in the year around Belfast, the most I have heard of being seen on wing together did not exceed twelve in number. About Navarino and Athens I have met with the raven—at the latter place Chateaubriand introduces it, in his description of sunrise as seen from the Acropolis*.

Mr. Waterton, in his 'Essays on Natural History,' gives a highly interesting account of the raven, but to his great grief, this bird has not for many years been seen about Walton Hall.

Sir Wm. Jardine, in his 'British Birds,' points out with an accurately observant eye the favourite haunts of the raven. Mr. Macgillivray treats very fully of its habits, and gives much desirable information (vol. i.); as Audubon likewise does, from personal observation in America. The raven is honoured with a place in those delightful articles in 'Blackwood's Magazine' for 1826, entitled 'A Glance over Selby's Ornithology,' in which the keen observer of the habits of birds is evident, through the wit and imagination investing the whole subject.

Carrion Crow, *Corvus Corone*, Linn.—This species was noticed by Smith as one of the birds of the county of Cork; but that it is not well known in Ireland is sufficiently indicated by the absence of its name from Mr. Templeton's published catalogue of the native vertebrate animals. In the MSS. of that eminent naturalist it is remarked—"I have not seen this bird, but from what I have heard am inclined to think it is found about Dundalk." Its not being distinguished from its equally sable congener the rook, is one reason for the carrion crow being considered more rare than it really is†. About the river Lagan, within the flow of the tide, and along the shores of Belfast Bay, this bird is by no means scarce, and feeds upon any animal matter cast up by the waves, but more

* 'Itinéraire de Paris à Jérusalem.'

† Since the above was written, the 1st volume of 'Tracts relating to Ireland, printed for the Irish Archæological Society,' has appeared. In 'A Brife description of Ireland, made in this yeere 1589, by Robert Payne,' it is stated,—"There is not that place in Ireland where anye venomous thinge will liue. There is neither mol, pye, nor carren crow." In a note to this, Dr. Aquila Smith of Dublin (who edited the memoir) remarks—"Of the *carren* or carrion crow (*Corvus corone*), we have not any authority as to the date of its introduction into Ireland. Moryson [in 1617] says, we have not the blacke crow, but onely crowes of mingled colour, such as wee call Royston crowes," part iii. b. 3. p. 160. Although the attractive magpie may have been introduced to this country, I cannot think that the carrion crow ever was, but believe it to be strictly indigenous; its comparative scarcity in this island, together with the reason adduced above, caused it, I conceive, to be overlooked.

especially rejoices in the carcases of horses, which after being skinned are left upon the beach. The refuse of the slaughter-house, when spread on meadows for manure, particularly attracts it inland.

The carrion crow is known to me as found in the north, east, and west of the island: in the south, as already mentioned, it was noticed by Smith, yet was never seen by Mr. R. Ball during his residence at Youghal. About Clonmel, however, Mr. R. Davis, jun., states that it is always to be found, though not very common. In the neighbouring county of Kilkenny, the attention of a gentleman of my acquaintance was one day attracted by a "black crow" having an extraordinary white appearance about the head. It flew about a hundred yards after it was first seen, and then alighted on the ground. On running up to ascertain the cause of the phænomenon, he was astonished to see the identical bird fly off an ordinary crow; but on reaching the place where the bird had "pitched," a duck's egg was found, which being carried in the bill had produced the appearance described—the egg was still whole *.

When at Glenarm Park, county of Antrim, in 1833, I was informed by the gamekeeper, a native of England, and who knew the bird well there, that he had seen a few about Glenarm, and that in the breeding-season one of these birds and a gray crow (*C. Cornix*) were constantly associated together for some weeks, and he had no doubt were paired. A Scotch gamekeeper who very soon afterwards supplied the place of my informant, told me the following year that he had occasionally killed the carrion crow in Glenarm Park, but considered the species rather rare†. He assured me that when gamekeeper in Scotland, he had repeatedly seen the carrion and gray crow paired, and knew an instance of such a pair being mated for two or three years, and building in the same tree annually. The identity of the gray one was sufficiently manifest by its being minus a foot, which had not improbably parted company from its owner in some trap. In the instances which came under the observation of my trustworthy informant, the gray crow was considered to be the male, on account of its comparative absence from the nest, &c. The young birds in one nest examined by this gamekeeper were stated to have exhibited, some the plumage of the gray, and others, that of the carrion crow.

This species is sometimes, if not generally, infested with parasitic insects (lice) to an extraordinary degree, so much so, as in one in-

* In Macgillivray's 'British Birds' (vol. i. p. 526), an instance of the carrion crow bearing off the egg of a wild duck whole is recorded by Mr. Weir who witnessed it—this gentleman and Mr. Hogg contribute full and interesting narrations of this bird to the work. The contributions of the latter, called a "Shepherd" in the preface, have all the racy spirit of the mountain air about them. Mr. Waterton states that the carrion crow carries eggs off, "not in his bill but on the point of it, having thrust his upper mandible through the shell."

† I saw specimens which had been obtained there exhibited as "vermin" on one or both occasions.

stance to deter a friend from skinning one he had received, just after it was shot. On mentioning this to another amateur taxidermist, it was remarked, that in skinning one of these birds, he became "covered" with its parasites. According to my own observation, birds of prey, or species partly carnivorous, are more infested with lice than others; and particularly with those belonging to the most active and stirring genera of their attractive tribe! From Mr. Denny's forthcoming work, 'Monographia Anoplurorum Britanniæ,' we expect much novel information on this subject.

THE GRAY CROW*, *Corvus Cornix*, Linn., is a common species in Ireland, and resident in all quarters of the island. In the north and east it has come under my own observation at every period of the year, and is fully as numerous in summer as at any other time, although at this season it is absent from England. In summer I have remarked it to be common in the west and south, and my correspondents there agree in noticing it as a resident species.

From what has been written on the gray crow as a bird of Great Britain, it would appear to be more common in Ireland generally, than in England, or on the mainland of Scotland. The sea-shore or its vicinity is the favourite haunt of this bird, but it is likewise resident in far inland localities. Sir William Jardine states, that according to his observations rocks are preferred as a nestling-place; and Mr. Macgillivray (vol. i. p. 533) seems to doubt its building at all in trees; but around Belfast it prefers trees in the immediate vicinity of its "beat" to rocks which are a little more distant, and where the raven and jackdaw find a home. In some very fine and tall beech trees on a lawn bordering the bay, several pairs of these birds have built for many years, and two or three of their nests occasionally appearing in a single tree, suggest the idea of an infant rookery. When however more nests than one appear in any tree, they are I believe the erections of different years, or are not tenanted at the same time. In wooded glens, and other localities where the *Coniferæ* bore a very small proportion to the deciduous trees, I have remarked the partiality of this bird for nestling in the pine. Mr. William M'Calla of Roundstone, states that "the gray crow is very common in Connemara, and breeds in all the wooded islands of the lakes, in other woods and thickets, and even in thorn-bushes in the vicinity of houses: it lays from three to five eggs. These birds are not accused of doing much harm to the keepers of poultry, the dead animal matter at all seasons on the shore supplying abundance of food." He further remarks, that gray crows "are very cunning in seeking their food, and that in the upper part of Roundstone Bay they may be observed picking up the *Buccinum boreale* [*undatum*?], rising with them into the air and then letting them fall on the rocks to break them: in this they are frequently unable to succeed, and have to drop

* In the north of Ireland it is commonly called by this, its most distinctive appellation.

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been such in the inland neighbourhood, so many as seventeen have been reckoned on a single tree. In a rabbit warren at the wild peninsula of the Horn, in the north-west of the county of Donegal, I once, on the 27th of June, saw forty of these birds in a dense flock. A note appears in my journal stating that, on the 3rd of April and several previous mornings, seven or eight of these birds frequented an old garden in the town of Belfast, and one or two of them were occasionally to be seen perched on the back of a cow kept there. By George Mathews, Esq., of Springvale, county of Down, I have been informed that a relation living there, had a pet gray crow which followed him about the place. When not so engaged, it sometimes went to feed with its brethren on the shore, but always hurried back to its master when whistled for.

In the middle of May last, I met with this species in the Valley of Sweet Waters, near Constantinople, and at the beginning of June, in the islands of Delos and Paros.

LI. *Descriptions, &c. of a few rare or undescribed species of British Diptera, principally from the collection of* J. C. Dale, Esq., M.A., F.L.S., &c.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,

Having some Diptera in my British Collection of Insects which I could not ascertain the names of, I forwarded a few to Mr. Haliday for his opinion; and wishing that other entomologists should profit thereby as well as myself, I think I cannot do better than to make it public through the medium of the 'Annals.'

I am, yours obediently,

J. C. Dale.

Curtis's Guide, genus 1157, Limnobia. (Subgenus Dicranomyia?)
Sectio.—Nervo cubitali furcato ramis liberis.

Areola disci nulla.

Areola brachiali anteriore posteriorem superante.

L. flavo-limbata (C. G., species 39^{b}).—Fusca, thoracis et scutelli limbo, pectoris vittâ laterali dilatatâ et ventris incisuris flavis: alis obscurè hyalinis, stigmate pallido, nervis pubescentibus.

♂ ♀ Long. $2\frac{1}{2}$—3; alar. 6 lin.

? Synon. *L.* (39 C. G.) *pavida*, A. H. H., Ent. Mag. I. From a late letter it appears to be different from *pavida*, though allied to it.

"Fusca nitida. Antennæ fuscæ thoracis longitudine. Mesothoracis scutum et scutellum flavo-marginata. Pleuræ magnâ parte flavæ. Abdominis incisuræ ventrales et dorsalis ultima tenuiter flavicantes. Terebra rufescens gracilis recurva. Forceps ♂ brachiis linearibus reflexis. Pedes fusci. Halteres fusco-pallidi. Alæ obscure-hyalinæ, nervis pubescentibus, stigmate obsoleto lutescente ad apicem nervi subcostalis. Nervus subcostalis marginem attingit adversus fuscam nervi cubitalis. Nervus mediastinus cum subcostali connexus paulo ultra ortum radii, et cito marginem attingens. Nervus

cubitalis furcatus, ramo anteriore brevi ($\frac{1}{3}$ posterioris), areola externa 2da dimidio tertiæ paulo longior : brachialis 2da parum brevior 1mâ."—Hal. MS.

This species I find in plenty in a damp part of a small coppice here during the end of June and beginning and middle of July.

Curtis's Guide, genus 1157, LIMNOBIA. (Subgenus IDIOCERA ?)

L. sex-guttata.—Fusca, antennis medio flavicantibus, thorace schistaceo vittâ duplicatâ fuscâ, pedibus ferrugineis, alis obscurè hyalinis albo fuscoque variegatis, guttis 3 marginalibus albis ante apicem.

♂ Long. $2\frac{1}{2}$; alar. $5\frac{1}{2}$ lin.
♀ —— 3. —— $7\frac{1}{4}$,,

" Fusca. Antennæ thoracis longitudine articulis intermediis flavicantibus basi fuscis extremis valdè attenuatis. Thorax schistaceus vittis 2 fusco-ferrugineis in scutellum continuatis. Venter fusco-testaceus. Terebra rufescens gracilis recurva. Pedes cum coxis ferruginei. Femora et tibiæ apice, tarsi præter basin fusci. Alæ obscurè hyalinæ, indistinctè albo-maculatæ. Costa fusco-punctata. Nervi transversi et axillaris apex fusco-maculati. Costa fusco-limbata a furcâ nervi cubitalis usque in apicem, guttis 3 albis, unicâ in areolâ singulâ. Nervus subcostalis exit adversus furcam nervi cubitalis. Nervus mediastinus adversus apicem areolæ brachialis 2dæ exit, et cum subcostale connectitur contra ortum radii. Cubitus furcatus ramis liberis, posteriore apice incurvo. Areolæ externa 2da (quæ petiolata) dimidia longitudine anterioris, nervo posteriore ejusdem basi rectangulatim fracto et appendiculato (scilicet areolæ disci incompletæ) ; areolæ brachialis posterior multo brevior anteriore."

I discovered this exceedingly pretty *Limnobia* on a boggy spot on Cosmore common near this place, and afterwards lost another out of my net in the New Forest, and lastly, on the sea-coast at Charmouth I took two or three more specimens.

The dates are June 22, 1840.
July 1, 1839 (Cosmore common).
July 8, 1840 (Charmouth).

It appears to be very rare. Mr. Haliday says it is very distinct, and one of the prettiest species he ever saw ; it was quite new to him. I have also given a pair to Mr. Curtis.

I have a ♂ *Limnobia fasciata* from the lakes of Cumberland, taken by G. Wailes, Esq. Mr. Haliday says it is also found in Lapland. The *L.* (or *Idioptera* ?) var. ? of *marmorata* ? or *pulchella* ? I took in tolerable plenty, in one particular spot only (where the common *marmorata*, though it varies much, did not occur), and they agree in size and markings as well as may be. The date is end of May 1840 and 1841, and at no other time ; this seems in favour of its being a distinct species.

Curtis's Guide, genus 1217, OXYCERA.

O. longicornis.—" Nigra, maculâ laterali verticis, orbitâ internâ supra antennas repandâ, thoracis vittâ laterali, scutello et abdominis limbo flavis ; antennis capitis longitudine apice parùm attenuatis. ♀ "

Mr. Haliday has this unique species, and I cannot give the exact measure, but it is about the size of *O. muscaria.*

" Nigra subglabra. Antennæ solito longiores et graciliores, articulis extremis parùm attenuatis, unde stylus indiscretus : os flavum : orbita postica et interna flavæ, hæc supra antennas in margine frontis inflexa. Vertex

utrinque maculâ flavâ. Thorax vittâ laterali flavâ pone alas dilatatâ. Scutellum flavum. Abdomen limbo tenui flavo. Halteres albidi. Alæ hyalinæ nervis introrsum flavicantibus. Pedes cum coxis ferruginei: tibiæ anticæ apice, posteriores medio, tarsi antici toti, posteriores apice fusci."

"Seems very much similar to Macquart's *O. tenuicornis*, but the peculiar marking of the head may afford a distinction, as Macquart leaves us to infer that his agrees in that with *O. muscaria*, very different from yours."—*Hal. MSS.* (*in litteris*). This (at present) *unique* insect I believe I took at the same place and time on Cosmore common with the *Limnobia 6-guttata*, but had previously taken it for a *var.* of *O. muscaria* (*pygmæa*, Fall.?). Mr. Haliday considers it very distinct.

While I am on the genus *Oxycera*, I may as well mention that *he* thinks he saw *O. hypoleon*? in the cabinet of the late Mr. Tardy of Dublin; but as it is some years since, and he has no opportunity of again inspecting it, he will not be positive. If we can ascertain this to be British, our list will contain—

1. *O. hypoleon*? near Dublin (*Mr. Tardy*?).
2. *O. pulchella*, tolerably common in England, Scotland (and Ireland?).
3. *O. trilineata*, common everywhere.
4. *O. formosa*, pretty common everywhere.
5. *O.* { *muscaria*, Cosmore common, Portland. / *pygmæa* (var. *affinis*), Charmouth, &c.
6. *O. Morrisii*, Curtis, Br. Ent. plate 441. This seems to be widely distributed: I have taken it here, near Charmouth, near Cambridge, and Castle Edendene; and Mr. Haliday took it in Ireland.
7. *O. pardalina*? I never took, except near Lyme, but I think Mr. Haliday has observed it in Ireland. My specimens do not quite agree with Meigen's figure; the spots on the abdomen are not so united as in his figure.
8. *O. analis*, confined to Glanville's Wootton, as far as I know or can learn.
9. *O. leonina*, the rarest of all; I have a *pair*, both from Charmouth; the ♂ *I* took.
10. *O. terminalis*, found here and at Charmouth, and at Pinny, near Lyme Regis.
11. *O. longicornis*, Mr. Haliday as above.

Curtis's Guide, genus 1290, Cænosia, Meig.

(*This is not given as a new species.*)

C. mollicula? of Fallen and Zetterstald?? "Cæsia antennis palpis pedibusque flavis; abdomine antice pallido diaphano." (Long. $2\frac{1}{4}$ lin.) *Mas.*

C. testacea, Desv., et speciebus cognatis (sc. *pallidicorne*, Desv., *nemorali*, &c.) gracilior, fronte angustiore, pedibus multo longioribus et rarius setigeris. Desvoidio Palusia audiret.

"Frons vittâ atrâ postice bifurcâ. Facies pallescens. Antennæ facie breviores, flavæ, articulo 3° pallidiore oblongo obtuso, aristæ subtiliter villosulæ. Thorax cæsius, absque vittis. Abdomen compressum, segmentis 2 anticis pallido-diaphanis lineâ dorsali ferruginosâ. Pedes elongati flavi. Tarsi ob-

volume of 'English Botany' comprising two very distinct species; the barren figure only belongs to *Bryum annotinum*, the others in fruit being evidently *Bryum capillare*. It may be supposed, that as Mr. Wilson has lately communicated to the editors of the 'Supplement to English Botany' specimens with capsules, this singular gemmiferous moss will gain proper attention; but as this eminent botanist has given no reference except to Hedwig and Bridel, I fear the confusion will be rather perpetuated. It may not therefore be thought amiss to point out the following synonyms.

Bryum annotinum, *Huds.*, 490; *Hedw. Sp. Musc.*, 183. t. 43; *Smith, Fl. Brit.*, 1378; *Hull*, 255; *Sipth.*, 291; *Turn. Musc. Hib.*, 123; *Engl. Bot.*, vol. xxvi. 1862 (the barren stem with leaf and gemma under it); *Suppl.*, vol. iii. 2856; *Swartz, Musc. Suec.*, 50; *Roth. Germ.*, vol. iii. 232; *Bridel. Br. Un.*, vol. i. 662.

Bryum annotinum, lanceolatum, pellucidum, capsulis pendulis, *Dill. Musc.*, 399. t. 50. f. 68.

Mnium annotinum, *Linn. Sp.*, pl. 1576; *Weir*, 151; *With.*, 805; *Hoff. Germ.*, vol. ii. 215; *Necker Meth.*, 232; *Leers Herborn.*, 23.

Trentepohlia erecta, *Roth. Catal.*, vol. i. 139; *Hoff.*, vol. ii. 17. t. 14.

In the 'British Flora,' vol. ii. p. 60, the fructified specimens in 'English Botany,' 1862, are properly referred to *B. capillare*, and no notice is taken of *B. annotinum*. In the second edition of 'Muscologia Britannica,' p. 202, it is introduced under *B. turbinatum* with a mark of doubt; in the first edition of this work it does not occur, nor has Dr. Taylor inserted it in Mackay's 'Flora Hibernica,' although it is well described in Dawson Turner's 'Muscologiæ Hibernicæ Spicilegium.'

I have formerly found this moss at Walthamstow in Essex, in fruit, but more abundantly barren male plants with beautiful gemmæ in the axils of the leaves, red when ripe. Leers describes them purple, I do not recollect that peculiar tinge; in dried specimens they usually fall off. The botanical student should be informed that Mr. Wilson's specific difference, "stem very short; leaves crowded, erect, lanceolate, nerved, subserrulate at the apex; capsule oblong-pyriform, pendulous; lid convex, apiculate," applies only to the fertile plants, the leaves on the barren stems being distant, never crowded. The magnified figures are excellent, except in want of gemmæ, it being understood that all the leaves belong to the fertile stems; the unmagnified are not so satisfactory, the perichætial leaves not being shown; these are accurately represented by Dillenius in his 'Historia Muscorum.'

I cannot suppose that *B. turbinatum* is an enlarged variety of this species growing in bogs; if it were so, *annotinum* must

continue the trivial name, not only because it is *Mnium annotinum* of Linnæus, but, as applied to the genus *Bryum*, it is older than *turbinatum*.

I am, my dear Sir, yours sincerely,
EDWARD FORSTER.

Woodford, January 17th, 1842.

LIII.—*On Bird-catching Spiders, with remarks on the Communication from* W. S. MacLeay, Esq. *upon that subject, in the January number of the Annals.* By W. E. SHUCKARD, Libr. R.S.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,

I AM unwilling to have it supposed that in my reference in Lardner's Cyclopædia to Mr. W. S. MacLeay's private letter, mentioned in his communication in your last number, I had made any use of it beyond what I understood to be in conformity with his express wish; and shall therefore merely refer to the passage in his letter which I shall quote below, not merely permitting, but desiring me to make known his retractation of an opinion which he had expressed in his paper on *Mygale* in the 'Transactions of the Zoological Society.'

With respect to the errors which he has ascribed to me, I readily acknowledge two, not that I made them willingly or wilfully, for I see them only now that they are pointed out to me; one of these however is but partly mine, namely, mistaking *Zosterops* for *Gasterops*, which must be attributed in a great measure to Mr. MacLeay's letter being, as he himself states, hastily written; and being myself no ornithologist, I did not investigate the name, but took it as it seemed to present itself to me. My second error is, that I said, "He therefore retracts his observations upon *Mygale* in the Zoological Transactions." This, I admit, was deduced from too hasty a reading of his letter; but certainly I did not mean it to imply that Mr. MacLeay retracted *all* his observations upon *Mygale*, as he infers, but those only which referred to the subject in hand, namely, the *possibility* of its propensity to feed upon small birds—when it could catch them.

With respect to the "tale of *Mygale* catching birds being either 'substantiated or confirmed' by another spider of totally different habits having been observed to catch them," although Mr. MacLeay may "deny," I certainly never asserted; I merely mentioned the *probability* of it from the analogy, as the most powerful, most rapacious and ferocious genus of the class was quite as likely to prey upon

small birds when it could catch them, for there is nothing in their organization to prohibit their indulging in such a repast when falling in their way; and I still consider that Mr. MacLeay's statement with regard to one of the *Epeiridæ* lends authority by analogy to the assumption that such might be the case. If even it be the exception to the rule of their insectivorous habits observed only by his father and himself, and which he remarks nobody but themselves has witnessed at Sidney, this gives further plausibility to Madame Merian's statement; for might not she have observed a similar divergence from ordinary habits in the case of *Mygale* in the Brazils to that which was detected by Mr. MacLeay and his father in the case of one of the *Epeiridæ* in New Holland? But Madame Merian is not the only authority upon which this peculiarity in the habits of *Mygale* is based. We possess much more recent, and much weightier evidence; and as to Langsdorff's* total denial of it, this may pass current for what it is worth, when we reflect how absurd every positive negation is in natural history, merely because the fact has not come under the observer's notice, provided always there be no insuperable objection arising from organization to the possibility of its occurrence. Perty† says of Langsdorff's statement: "C. Langsdorff meâ opinione perperam negat, M. avicularem aves parvas apprehendere, et devorare, addens, eam insectis solummodo victitare. Observatores recentissimi, priscorum indicia repetentes, non tantum avibus sed etiam reptilibus minoribus, præsertim Sauriis ex Anolis genere nutriri asserunt." Baron Walckenaer, who has made the *Arachnidæ* the study of his life, gives his opinion deduced from the observations of recent travellers in the following words: "The Theraphoses," the tribe of which *Mygale* is the first and chief genus, "include the largest species of *Arachnidæ*, and catch in their *nets*! not only very large insects, but also small birds, such as humming-birds‡." In support of this he cites Milbert's 'Voyage à l'Isle de France,' and Palissot de Beauvais, who says of the *Mygale Blondii*, that at night it ascends trees, enters the nests of humming-birds and sucks their eggs or the blood of their young ones. Percival, in his 'Account of Ceylon,' says of the *Mygale fasciata*, "There is an immense spider found here, with legs not less than four inches long, and having the body covered with thick black hair. The *webs*! which it makes are strong enough to entangle and hold even small birds, which form

* Reise um die Welt. i. Bd. 63. † Delect. Animal. Artic., p. 37.
‡ Walckenaer, Aptères, tom. i. p. 205. 1837.

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actually *devouring* the young of a *Zosterops* that had no doubt lately flown from the nest. My father had witnessed the same circumstance before, so that there is a *spider* which will feed on the juices of a warm-blooded animal. However, its more common food consists of *Gryllidæ* and large *Lepidoptera*."

Having shown that I had authority for saying that *Mygale* makes nets and catches birds in them, I think the *probability* of the accuracy of the accounts enumerated above of their feeding upon birds was a legitimate deduction from the analogical discovery of one whom we know to be a fully competent observer, and I therefore suggest the comparison of the two extracts, which is all that either party said upon the subject, and which will necessarily reduce my "tissue of mistakes" to two, namely, 1st. The mistake of one name for another, which in Mr. MacLeay's autograph was exceedingly similar; and 2ndly, my too hastily stating that he retracted his observations upon *Mygale*; whereas it should have been merely that he retracted his disbelief that any spider fed upon the juices of a warm-blooded animal. For this mis-statement I beg to apologize to him, although it is very venial, considering the array of authorities quoted above in support of the opinion that *Mygale* is a red- and warm-blood-thirsty creature, and that it constructs a web.

I am, Gentlemen, truly yours,

W. E. Shuckard.

Robert Street, Chelsea, January 2, 1842.

LIV.—*On a new species of* Araucaria *from New South Wales; and on* Nuytsia floribunda. By H. Bidwill, Esq.*

Description of a new species of *Araucaria* from about forty miles N.W. of Moreton Bay, New South Wales.

A tree from 100 to 200 feet high, often without branches for 100 feet. Branches very slender, lax, verticillate; branchlets very numerous, slender; leaves sessile, of two different kinds on different parts of the branches; some $\frac{3}{4}$ths of an inch long, somewhat triangular, slightly incurved, very like those of young specimens of *A. imbricata*; the others lanceolate, 2 inches long, $\frac{1}{2}$ an inch wide, recurved; both somewhat mucronate, surrounding the stem as in other species, but not so numerous; the long ones are probably produced in summer, and the others in winter. Neither cones nor male flowers seen. Scales from top of cone containing abortive seeds 3 inches

* We have to thank Mr. Bidwill for the male twig which accompanied his description; and shall be happy to avail ourselves of his offer.—Ed.

long, 1½ broad, spongy, hooked at end; seed 1½ inch long, egg-shaped, compressed, free from the scale, apparently not winged; whether diœcious or not, not known. Ripens seed in January, when the natives collect from great distances to feed on it. It is said there is also another species, but I have not seen it.—H. Bidwill.

Note on Nuytsia floribunda.

In the government garden at Sidney is a single plant of *Nuytsia*, which flowers every year, but does not ripen many seeds. I this year picked up several and sowed them, but they have not come up. As I was particularly anxious to preserve the plant, I invariably looked around it for seedlings whenever I entered the garden, and a few days since discovered two just breaking the ground. I then found that this curious plant has three (!) cotyledons, which are awl-shaped and perfectly equal in size and appearance. As I never recollect to have heard of a plant with three cotyledons before, I thought it worth mentioning, in order to compare it, if possible, with *Schœpfia*, *Gaiadendron*, *Aucuba*, &c., the other terrestrial genera of (so-called) *Loranthaceæ*. I should like to know if it is to be found in English collections *.—H. B.

Sidney, July 5, 1841.

LV.—*Information respecting Scientific Travellers.*

Some account of the Natural History of the Island of Chedooba, from the Report of Edward P. Halstead, Esq., Commander of Her Majesty's Sloop Childers †.

The island of Chedooba measures 15½ miles in length, viz. from 18° 40′ to 18° 55′ 30″ N. latitude, and 17 miles in width, viz. from 93° 30′ to 93° 47′ E. longitude, and shows on the map as a square the S.W. angle of which has been reduced. With its dependency of Flat Island on the south coast, it covers an area of about 200 square miles. Its general appearance and character is that of a fertile, well-wooded island of moderate height and irregular outline. A band of level plain, but little raised above the sea, extends around its coasts, of far greater width on the east than on the west; within this lie irregular, low, undulating hills, varying in height from 50 to 500 feet, enclosing several higher detached mounds, of steep, well-wooded sides, the loftiest of which, near the south part of the island, rises nearly 1400 feet.

The view from the top of these higher summits presents, imme-

* On reference to Mr. Loudon's 'Arboretum et Fruticetum Britannicum,' it appears not to have been as yet introduced.—Ed.

† From the Journal of the Asiatic Society of Bengal, No. cxiii.

diately below, a scattered irregular mass of hills, confined principally to the western part of the island, covered with jungle, interspersed with grass plains of more or less extent. To the eastward a broad flat plain intersected with patches of jungle; and surrounding all, lie the cultivated rice-fields with the different villages on their verge nearest the sea, the coast of which to the westward is everywhere strewed with broken and detached masses of rock jutting far out.

In introducing to notice the more natural productions of the island, in the vegetable kingdom, it may be well first to speak of the soil in which they are found.

This is with little exception of one character, a loose friable earth of light yellow colour, having the general clay base much modified with decayed vegetable matter, the angular fragments of soft sandstone having passed from a greenish into a dirty yellow colour, and being in a state of rapid decomposition.

The exceptions to this were found in a few spots to consist of a soil bearing more of the character of mould. The above soil extends throughout the interior parts of the island, embracing all the hills higher and lower down to those flatter lands which have been noticed as applicable for the extension of rice cultivation, and constitutes that of the jungles, which are co-extensive with it.

These in their general character are open, consisting much of detached clumps of bamboo or of trees from 1 foot to 18 inches in diameter, well separated below, but in their branches having creepers thickly entwined. Throughout the lower jungles, open spaces, some deserving the character of small plains, are of very frequent occurrence. On the higher hills the trees are closest of growth and largest of size, but still clear of understuff.

Timber of great size, and some of valuable quality, is to be found, but it is confined to the very summits of the highest hills, and is therefore partly inaccessible, nor would its amount ever remunerate the labour of constructing roads for its transport. The soil in which these grow is of the same nature as that described above; but within a few hundred feet of the summits, all of which are very steep, it is piled up in the loosest possible manner. The stroke of an axe or dáh on an extensive hill-top would so shake it for a space of 150 yards around, as to make observation in the quicksilver of an artificial horizon impossible.

Precisely at the spot where this loose texture commences—commences the growth of the large timber, increasing in size thence to the summits, and from the trees not being deciduous (or at least not so at the same season), a most marked line of separation is thus traced out between these and the smaller leafless jungle below.

The wood oil-tree was the most conspicuous in growth and size of the larger trees of these summits. One was felled on the west hill, which measured in diameter at the respective ends of a 60-feet length, 4 feet 6 inches and 3 feet 6 inches; and another is left standing as a mark, on the summit, which measures 21 feet 4 inches in girt at 6 feet from the ground. The wood of this tree will not, I

crimson flowers and flocks of birds. Its wool is sometimes used for stuffing pillows or beds.

The Gamboge tree was found of large size, and in considerable quantity, in clearing the jungle from the summit of the N.W. Peak; it was well known to the natives; but no use is made of its beautiful gum, which covered the stems in considerable quantities. It lives in the higher jungles.

It is not doubtless the only tree in these wilds yielding a valuable gum, but want of acquaintance with botanical science prevented researches of that kind, which might have led to useful discovery. The safety and facility, and even enjoyment with which such researches may be carried on in the fine season, in the woods of Chedooba, seem however to point them out as a spot very eligible for the careful examination of an able botanist, unless indeed they be considered too limited in extent to exhibit a sample of the general character of the jungles of this coast.

A very brilliant crimson gum was found to flow in great quantity from a large creeper (Tallee-medzou-nowy) which is very common. If dried speedily in the sun, becoming very brittle, but retaining its colour; it is of very astringent quality, and is used in some diseases as a medicine by the native quacks.

I may not fail to mention another creeper, whose properties are as valuable as interesting, and not the less so from its being found everywhere, both high and low. It is truly a traveller's friend, and the wandering Mug well appreciates its value. With his dáh he cuts off a junk and quenches his thirst with its contents, a pure, tasteless, cool water, of which it contains as much as its large numerous pores will hold, and which are immediately emptied by holding the piece perpendicular. A piece about 2 feet in length, and as thick as a small wrist, gave rather more than half a pint of water. In the rainy season it would have given double that quantity.

In travelling through the jungles, the liquid of this water-creeper (Jabroon nony) is the constant beverage of the natives, when not otherwise supplied with that necessary, and its universal presence makes him very independent in his choice of road.

The rattan is everywhere found in the jungles, and performs all the ordinary duties of rope; it grows to a great size; two were taken from the West Hill 114 feet in length, and $1\frac{1}{2}$ inch diameter.

Although Chedooba may not be looked to for supplying valuable timber to other parts, yet for its own consumption, and most, if not all domestic purposes, it possesses amply sufficient to meet any demand. For such purposes plank may easily be brought down from the hill, whence the whole tree must be immoveable. The lower jungles contain woods perfectly adapted to such uses; and in those of the Eastern Plains was found the Thew-gaan growing plentifully, some of the trees between 2 and 3 feet in diameter, and which itself would supply material for almost all purposes. The wood of this tree is hard and close-grained, of a yellow colour and most durable. In the southern provinces of Tenasserim it grows to an immense size, and in the Sandoway district; hereafter its qualities may

be appreciated by other than the natives, with whom its durability has given rise to the proverb that 'a Cemoe of Thew-gaan lasts 99 years.'

Of the productions of the animal kingdom, the island exhibits but a limited variety.

Of wild animals, the deer is the largest and most plentiful; they are very numerous throughout the island, though I never either heard or saw but one species, that which is generally known as the 'barking deer.' The natives run them down with dogs; they have no means of shooting them. The flesh was found less dry and unflavoured than was expected.

Next in size and number to the deer is the wild hog, the only species on the island. They are not large, but numerous, especially in the jungles which lie closest to the rice lands, on which they commit heavy depredations, and our assistance was frequently invoked to destroy at least some of the enemy. But in general the labour of the day was deemed enough for our party without trenching on the hours of rest, which was necessary in order to comply with the request.

Jungle cats are found, but are not numerous; but one was ever seen by any of our party.

Squirrels are plentiful, and of large size, though of but one species; a dark brown in colour throughout, with exception of the throat, and a narrow stripe along the belly of yellowish white. One was shot of the size of a full-grown rabbit; it was a male; his lady in company was of more delicate size.

Monkeys we heard of, but I much doubt their existence on the island; at least it is strange, that in so long and extensive a traverse of it such an animal was neither seen nor heard.

The freedom from any formidable wild beast is a circumstance of advantage in these countries, which may not be passed over without remarks; it contributed largely to the comfort and freedom with which we were enabled to penetrate through the Chedooba, forming a source of congratulation when obliged to take up a night's lodging or a day's journey in the jungle.

The natives state that a tiger did once attempt a landing on the island, but fortunately being seen while yet swimming towards the shore, time was afforded to the inhabitants of the nearest village to prepare for his welcome; and before he could gain footing, either for attack or escape, he was cut in pieces with their dáhs, since which his example has never been followed.

I know not how far the swimming qualities of a tiger may bear witness to the truth of this story, but the feat in an opposite direction was safely performed by one of the elephants which were placed at our service, which, after breaking from his ropes, swam the straits, and landed safely on the opposite coast of Ramree, a distance of seven miles at the least, where he was recaptured and sent back.

Of reptiles, one snake was seen, and a few lizards and insects; the most numerous and beautiful are the butterflies, which were found even on the highest peaks. Bees are plentiful, but the jungles alone

supply the honey, which is very sweet and good, and serves throughout the island in the place of sugar.

Fish forms a very important part of the diet of the Mug, and mainly in this view are the villages of Chedooba formed around the shores. It is very plentiful, though not of any great variety. The most common is a species of Bonito, a muscular fish of rapid motion and great strength, though seldom arriving at a weight of 4 lbs. It has a very thick smooth skin, without scale, and is of silvery white, longitudinally spotted with blue. On the western coast, in the sandy bays, they are very numerous, and are taken in great plenty with hook and line.

The bamboo supplies the fishing-rod, and in the evening, when most readily taken, the shore may be seen with twenty natives in a line from the nearest village, as close together as they can stand, up to their middles in the water, with their baskets slung on their backs, and casting their lines as rapidly as if fly-fishing, laughing and joking at their success, without the least fear of driving their prey away, though they must be among their legs. The flesh of these fish is very firm and nutritious.

Very great quantities of a tiny little fish, most similar to, if not in fact, the Anchovy or a small Sardine, are taken on the same coast. They are dried in the sun without any preparation, a day or two's exposure being sufficient for the purpose, and exported in great quantities to Ramree and the neighbouring coast. The method of taking them is perhaps peculiar, and forms an interesting and lively scene. The morning is the time of the best 'take,' at which period, and when near high water, young and old assemble on the sand in groups, with flat open-mouthed baskets of bamboo work, awaiting the opportunity for a catch. This occurs when the shoals of tiny fish are driven for supposed safety close into the beach by their larger, persecuting, and ravenous brethren. Then away dashes the nearest group of expectants into the water, to the back of the surf which is constantly though not heavily rolling in on the coast, and, driving back the original pursuers, face round in shore and place the flat mouths of their baskets in line together, just outside the retiring wave, receiving from it its finny contents. Sometimes more than a gallon will be thus deposited in a single basket.

The uncertainty as to where the shoal will come in, and the rapidity and ability with which the fortunate group take advantage of their opportunity, afford all the excitement and amusement to these cheerful people of a game of chance, and cannot be looked on by a stranger without interest. Flocks of cranes, crows, kites and gulls, of many sizes, colours and voices, looking out for the stragglers on the sand that have escaped the mouths of the fishes and the baskets, form an addition to the scene.

The gray mullet, of good size and flavour, is got from the creeks of the east side of the island. Rock fish are plentiful, but not easily taken; when intended to be preserved, they are split into quarters, kept together at either end, and then opened by strips of bamboo, and the whole hung up to dry in the sun. Skate were frequently

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which he believes have hitherto been either imperfectly elucidated or altogether neglected.

The neck or true body of the worm is thickly studded with oval corpuscles, the average long diameter of which is $\frac{1}{1352}$nd of an inch, and the short diameter $\frac{1}{2030}$th. These corpuscles are composed of a shell of carbonate of lime inclosing an internal granular matter. Mr. Gulliver thinks it probable that they are the ova of the worm. They are almost exclusively confined to the body, not one of them being found in the caudal vesicle; but the tissue of the latter is throughout pervaded by oil-like spherules.

In a description of the configuration and arrangement of the hooklets, the author shows that the two sets, though alike in form, are quite distinct in size, and arranged alternately; and that each claw has a blunt lateral process, which has been mistaken for an ovum; and this process, when seen foreshortened, has the appearance of an oval body distinct from the claw.

The paper is illustrated by several figures, exhibiting the form and structure of the corpuscles supposed to be the ova, of the tentacles, as well as of body, caudal vesicle and cyst of the *Cysticercus*, from the omentum of the Mexican deer.

Genera Plantarum secundum Ordines Naturales disposita, auctore Stephano Endlicher, 1836—1840.

A work to which reference could be made with almost a certainty of finding the complete characters of any genus of plants has long been a desideratum with botanists, and from the labour, not to say knowledge, requisite for the production of such a book, many of them have almost despaired of its ever appearing. We feel therefore peculiar pleasure in congratulating botanists in general, and more particularly Prof. Endlicher, on the completion of the above gigantic undertaking, the earlier portions of which have been long enough in our hands to give us practical experience of its usefulness. This book is closely printed in very large 8vo, consisting of 1483 pages, and containing nearly 7000 genera, and is so arranged as to form either one or two volumes at the pleasure of its possessor. A collection into one place of the descriptions given by the first observers of the several genera would have constituted a valuable work; but here we find the characters of each genus in an order reduced to the same form so as to contrast with each other, and thus point out in a peculiarly satisfactory manner the distinctions of each genus from every other. This is a point far too much neglected by botanists in the description of species as well as genera, and we are therefore rejoiced to find that it has been so carefully attended to in the work before us.

The author states that it is his intention to publish supplements, containing corrections and additions, as often as a sufficient quantity have been collected, and expresses a hope that all botanists will communicate to him such new genera as they may describe, or errors which they detect. We have no doubt that this very reasonable request will be most cheerfully complied with, and that thus we shall

have the advantage of possessing a Genera Plantarum complete up to the time of publication of each of the supplementary parts.

Nomenciator Botanicus, seu Synonymia Plantarum Universalis, auctore E. T. Steudel, M.D. Ed. 2. 1840-41.

The completion of the above laborious undertaking points out in a peculiarly clear manner the great advance in the knowledge of species that has been attained during the last twenty years. In the former edition of this work (if such it ought to be called), which appeared in 1821, there are 3376 genera and 39,684 species recorded, whilst in the present edition, which has appeared at intervals during the years 1840 and 1841, the names of 6722 genera and 78,005 species are recorded; thus almost doubling the number of ascertained genera and also of species. It is probable that no previous period of similar extent would show any approach to so great a relative advance in our knowledge of the Phanerogamic plants, to which division the present work is confined.

We need scarcely say more concerning a work that must recommend itself so strongly by its mere usefulness to the notice of botanists, but may add that, as far as English publications are concerned, it appears to include nearly everything up to the conclusion of the 17th volume of the Linnæan Transactions.

Enchiridion Botanicum exhibens Classes et Ordines Plantarum; accedit Nomenclator Generum, auctore S. Endlicher, M.D. 1841.

The great work that we have already noticed by Prof. Endlicher had hardly been completed when he again comes before us with the present volume, which contains very full descriptions of the natural orders of plants; a complete list of the genera included under each; and numerous observations on their affinities, geography, qualities and use in medicine, for culinary purposes, and in the arts. We cannot too strongly recommend this book to all botanical students.

PROCEEDINGS OF LEARNED SOCIETIES.

LINNÆAN SOCIETY.

June 15, 1841.—The Bishop of Norwich, President, in the Chair.

Read, an Extract from a Letter from William Griffith, Esq., F.L.S., to R. H. Solly, Esq., F.L.S., dated Meerut, March 29, 1841.

Mr. Griffith states, that in its placentation, ovula, and protrusion of the embryonary sac, *Osyris* approaches *Santalum*, but presents in some particulars still more curious anomalies. First, the embryonary sac of *Osyris* seems to be produced beyond the base of the ovulum, passing down through the placenta and through the central tissue of the young fruit to its base. Secondly, the first steps of the growths consequent on fecundation take place outside the protruded sac, which may be found unaltered in the placenta of the ripe fruit. Whether the first cells, constituting the rudiments of the part in

which albumen is subsequently deposited, are derived from the *boyau* or from the embryonary sac, Mr. Griffith states, that he has not been able to determine; but he imagines that they are derived from the *boyau*. He adds, that if his views of the seed of *Loranthus* being derived from the *boyau* solely be correct, *Osyris* is intermediate between *Loranthus* and *Santalum*; and intimates his intention of sending, on his arrival at Calcutta, a Supplement to his paper on *Loranthus*, published in the Society's Transactions.

Read also a paper "On a reformed character of the genus *Cryptolepis* of Brown." By H. Falconer, M.D., Superintendent of the Hon. East India Company's Botanic Garden at Saharunpore.

Dr. Falconer's character is as follows:—

CRYPTOLEPIS, *R. Br.*

Calyx 5-partitus. *Corolla* infundibuliformis, 5-fida; tubo intùs processubus 5 carnosis, obtusis, inclusis, cum limbi laciniis alternantibus, instructo; fauce nudâ. *Stamina* imo corollæ tubo inserta, inclusa; *filamenta* brevissima, distincta; *antheræ* sagittatæ, dorso penicillato-barbatæ, basi stigmatis margini adhærentes. *Massæ pollinis* solitariæ, granulosæ, corpusculi glandulæformis appendiculæ lineari tenuissimæ applicitæ. *Ovaria* 2. *Stylus* brevissimus. *Stigma* dilatatum, margine attenuatum, apiculo conico. *Squamulæ hypogynæ* nullæ. Folliculi divaricatissimi, ventricosi, apice acuto recto. *Semina* ad umbilicum comosa.

Frutex *volubilis, glaberrimus, succo lacteo scatens;* foliis *oppositis, brevè-petiolatis, lato-ellipticis cum acumine subulato brevi, suprà lætè-virentibus, subtùs albido-glaucis, transversè venosis;* petiolis *supra basin articulatis;* corymbis *axillaribus, brevè-pedunculatis, curtutis;* floribus *subsessilibus, majusculis, citrinis;* corollæ *limbo patulo, segmentis ligulatis.*

C. Buchanani, Rœm. et Sch., iv. p. 409.

C. reticulata, *Royle, Illustr.*, p. 270.

Nerium reticulatum, *Roxb. Flor. Ind. Orient.*, ii. p. 9.

Hab. passim in Indiâ Orientali.

In his Monograph in the Wernerian Transactions, Mr. Brown referred the genus *Cryptolepis*, which he there established, to *Apocyneæ*, placing it next to *Apocynum*, and in this he has been followed by all subsequent writers; but Dr. Falconer states that it has the whole stigmatic apparatus of *Asclepiadeæ*, with granular pollen as typically developed as in *Cryptostegia* or any other of the *Periploceæ*, although in a less considerable degree of evolution. He regards it, however, as constituting the closest known transition from that family to *Apocyneæ*. He thinks the extreme minuteness of the appendiculæ may account for their having escaped Mr. Brown's observation in the dry specimen; but adds, that there are two other points of difference, which lead him to suspect his plant to be distinct from that described by Mr. Brown. These are the want of hypogynous scales, of which he finds no trace, and which he believes to be wanting in the series of Periploceous genera allied to *Cryptolepis*; and the axillary, and not interpetiolar, inflorescence. He also gives a detailed description of the sexual organs, and states that he has never been able to observe the pollen tubes either naturally or artificially produced.

sufficient depth to escape the frost. About the 20th of April the survivors reappear in a feeble state, until invigorated by the returning warmth.

Mr. Ord kept a number of these Tortoises for several years in his garden, where they had an ample range, abundance of suitable food, and convenient places of winter resort. They regularly deposited their eggs, but seldom produced young, a circumstance which he attributes to the destruction of the eggs by ants. He gives from his books of memoranda the details of observations made in the years 1814 and 1832 on their mode of laying and depositing their eggs, and the circumstances attending their hatching.

The earliest deposit observed took place on the 22nd of June 1814. The Tortoise scooped out the earth with her hinder feet, using them alternately, as deep as she could reach, when the earth at the bottom of the hole was loosened. The first egg was secured in this loose earth, and five other eggs were laid and deposited in the same manner, at intervals of four or five minutes, the earth being scraped from the sides of the hole and carefully pressed upon each egg as it was deposited, and the hole itself being finally covered over with the loose earth carefully packed and pressed. The animal kept in one position during the whole process, not looking once at the deposit. The eggs appeared to pass with facility, and shortly after laying the last egg, she uttered a guttural sound, several times repeated. The number of eggs appears to vary from three to six.

In June 1832 Mr. Ord renewed his observations. Two of the female Tortoises then in his possession having been disturbed when about to lay, abandoned the place; one of these laid on the subsequent day, and the other not until the second day after, whence Mr. Ord concludes that they possess the power of retaining their eggs under certain circumstances. The eggs were always laid about or after sunset; and some of the Tortoises, if not all, laid twice during the season. Of a deposit made on the 28th of June, one of the eggs (that nearest the surface) was hatched on the 24th of September. On struggling out of the shell the young animal seemed to be almost blind; its case was very soft and cartilaginous; and in the centre of the under shell, or between the abdominal and the femoral shields, there was a large umbilical process. It measured an inch in length and could crawl with ease. On the 14th of October another young Tortoise made its appearance from the same deposit; it was livelier and larger than that first hatched, measuring an inch and three-quarters in length, and its eyes were completely open. Mr. Ord conjectures that it had emerged from its shell some days previously, but had only then made its way to the surface. On the 15th another made its appearance, of a size between the other two; and on the same day Mr. Ord inspected the deposit and found a fourth young one, still in its shell, but struggling to get free, in which it succeeded during the afternoon. It was rather larger than any of the rest, and had remained in the shell one and twenty days longer than the first. On the 29th of September, Mr. Ord examined a deposit of eggs laid on the 26th of June. None appeared to have hatched, but the shell of the uppermost having

been partly eaten by the ants, he opened it and found a perfectly formed fœtus, measuring an inch in length, attached to a yolk-bag three-quarters of an inch long. On the 21st of October Mr. Ord examined one of a number of eggs which he had removed from their deposits on the 24th of September, and found it to contain a living young, not quite so large as that last mentioned, and having a much larger yolk-bag; and on the 1st of December he took up all the eggs of which he had any knowledge, none of which (although some were still living) were sufficiently matured for exclusion; a circumstance which he attributes to a deficiency of the usual summer heat and to severe early frosts. Of the four young ones hatched, one escaped; and the remaining three hybernated with the adults, reappeared in the spring, and lived in the garden for several years.

November 16.—E. Forster, Esq., V.P., in the Chair.

Read, "Descriptions of some Vegetable Monstrosities," by the Rev. William Hincks, F.L.S., F.R.S.E., &c.

In this paper, which is a continuation of one read before the Society towards the close of the year 1839, Mr. Hincks arranges the monsters described by him under the several heads of adherences, transformations, and increased or diminished developments of particular parts.

The adherences comprise, first, a case of the union of five grapes into one fruit in so complete a manner as to render it probable that the flowers were also united; secondly, an instance of cohesion between four peduncles of *Centaurea moschata*, without fusion of their capitula; and thirdly, the common case of adherence of two flowers of *Fuchsia fulgens*. The latter is introduced for the purpose of remarking how frequently, when the usual number of organs in a circle results from the suppression of certain parts rudimentally present, the same cause which produces adherence with the nearest flower, also developes all the rudiments, and thus increases the number of parts. On the other hand, in cases of union by fusion, that is, where the united flowers form one enlarged flower, Mr. Hincks observes, that one organ at least is generally sacrificed at each point of junction.

Of transformations Mr. Hincks notices two: first, a terminal bud of an *Azalea*, gathered about the period when the plant ceased to produce blossoms, which is partially converted into a flower, the leaves nearest the centre being imperfectly changed into stamina, and surrounded by many of petaloid aspect, while the outer leaves differ from the ordinary appearance only in having a little colour; the organs are not arranged in circles, and one leaf only, and that among the most remote from the centre, assumes the form of a pistillum. The second transformation described occurs in a specimen of *Gentiana campestris*, in which all the parts of the flower are converted into leaves, which are somewhat petaloid and crowded into a rose-like tuft: this kind of transformation is similar to that described and figured by M. De Candolle in *Trifolium repens*.

The first case of increased or diminished development noticed by

Mr. Hincks affects a specimen of *Anagallis arvensis*, resembling one described by M. Moquin-Tandon as found by M. Gay, in which an increased development of the exterior circle is accompanied by diminution in the interior ones: the effect produced is stated to be very unequal in different flowers, but the more the calyx is enlarged, the more the interior circles are contracted. The second case is the well-known wheat-ear carnation, *Dianthus Caryophyllus imbricatus*, L., which is noticed as probably affording the best example of the monstrous multiplication of a particular circle. A third case occurs in a capitulum of *Matricaria*, in which the bracteæ, consisting under ordinary circumstances of paleaceous scales, are enlarged into full-sized leaves, completely deforming the flower: the rose-ribwort is noticed as a phænomenon of the same kind. Fourthly, Mr. Hincks mentions a monstrous variety or highly developed form of *Convallaria multiflora*, cultivated at Kew, which he presumes to be the *var. bracteata* of De Candolle and Duby: in it the number of flowers usually reaches five or six, and each of them proceeds from the axilla of a small leaf on the pedicel. And lastly, the author notices under this head a case of abortion or atrophy affecting the leaf of a fern cultivated by Messrs. Rolleston, by which in one instance the whole side of a frond, and in another the secondary veins with the parenchyma at both sides are entirely suppressed; a phænomenon which he has also observed in *Scolopendrium officinale*.

Read also the commencement of a paper "On the Influence of the Dew-point on the Temperature of Plants," by D. P. Gardner, M.D., of Hampden Sidney College, Virginia, communicated by the Secretary.

December 7.—R. Brown, Esq., V.P., in the Chair.

Read, "On the Structure of the Nut known as Vegetable Ivory," by Daniel Cooper, Esq., A.L.S.

Read also the conclusion of Dr. Gardner's paper "On the Influence of the Dew-point on the Temperature of Plants."

ENTOMOLOGICAL SOCIETY.

August 2nd, 1841.—John Walton, Esq., V.P., in the Chair.

Mr. S. Stevens exhibited a number of minute British *Coleoptera* recently captured in Kent, including specimens of a species of *Micronyx* Schönh., a genus not hitherto recorded as British, but which Mr. Curtis had described as a species of *Pissodes* (*P. pygmæus*). Mr. Curtis still however considered his insect as distinct, being smaller than Mr. Stevens's specimens; but Mr. Walton stated that he possessed specimens smaller than any of Mr. Curtis's.

Mr. F. Parry exhibited two cases of splendid insects (chiefly nondescripts) from the Himalayas.

Mr. Westwood stated that three specimens of *Carabus Schönherri* were taken on Ben Lomond in 1822 by A. Melly, Esq., in whose collection he had recently observed them. Mr. White also stated that there was a specimen in the British Museum cabinet, taken on Ben Lawes by Dr. Leach, which had also been supposed to be this species.

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lateribus roseis, elytris viridibus purpureoque tinctis; corpore infrà aurato-viridi. Long. corp. lin. 15¼. [*Hab.* Cochin China. Duvaucel. M. Dupont.

Sp. 6. C. Wilsoni, H. *Aurato-viridis, lateribus thoracis subroseo-tomentosis, elytris viridibus, antennis atro-violaceis, thorace subconvexo, tomentoso, medio viridi, lateribus æneis roseo colore tinctis, elytris viridibus, lateribus auro fluentibus, femoribus tibiisque violaceo-æneis, tarsis cyanescentibus.* Long. corp. lin. 18. [*Hab.* Madras and Neilgherry Mountains.

Sp. 7. C. Smaragdinus, H. *Viridis, antennis palpisque nigro-violaceis, scutello nigro-æneo, elytris atro-viridibus subtilissime punctulatis, corpore infrà cyaneo-viridi, femoribus tibiis violaceis tarsisque atro-piceis.* Long. corp. lin. 14. [*Hab.* Madras.

Sp. 8. C. Delessertii, Guerin.

Sp. 9. C. Duponti, H. *Viridis, thorace antice convexo, angulis lateralibus subdepressis, elytris viridibus tenuissime punctulatis, corpore infra subaurato-viridi, pedibus obscurioribus.* Long. corp. lin. 12. [*Hab.* Malabar. Mus. Dupont.

Sp. 10. C. rosicolor, H. *Puniceo-viridis roseoque colore tinctus, thorace vix convexo, punctato postice subprotenso roseo, elytris fortiter striato-punctatis, sutura marginibusque externis elevatis et roseis, pedibus flavo-testaceis, tarsis obscurioribus.* Long. corp. lin. 11½. [*Hab.* Java. Mus. Dupont.

Sp. 11. C. Proteus, H. *Aurato-viridis, antennis nigricantibus, thorace convexo sub lente subtilissime punctulato, elytris auratis splendidis, marginibus lateralibus elevatis, sutura violacea, pedibus viridibus, tarsis piceis.* Long. corp. lin. 16. [*Hab.* Manilla.

Sp. 12. C. Stephensii, Hope. In Gray's Zool. Miscell. [*Hab.* Nepaul.

Sp. 13. C. Leachii, H. *Chalybeo-viridis thorace cærulescenti, elytrisque acuminatis et æneo-virescentibus, thorace in medio parùm convexo, elytris viridibus, corpore infra cærulescenti, pedibus concoloribus.* Long. corp. lin. 17. [*Hab.* East India. Singapore.

Sp. 14. C. Echscholtzii, H. *Chalybeo-violaceus, capite inter oculos vix foveolato, antennis atro-violaceis, elytris sub lente tenuissime punctulatis, pedibus violaceis, tarsis infra piceo-pilosis.* [*Hab.* Manilla.

Notice of a hitherto unobserved character distinguishing the sexes of certain *Lucanidæ*. By J. O. Westwood (since published in the Annals of Natural History, vol. viii. p. 121).

Descriptions of some *Dynastidæ*, in the collection of the Rev. F. W. Hope, illustrating the natural relations of the genus *Cryptodus* with figures. By J. O. Westwood.

Rhizoplatys, W. (Subg. nov. e genere Phileuri.) *Corpus oblongum subconvexum. Clypeus anticè acuminatus posticè tuberculo armatus. Antennæ articulo 1^mo latissimo. Maxillæ galea tridentata, mandone inermi. Mentum magnum heptagonum, labium et articulos duos basales palporum labialium obtegens. Ungues pedum anticorum inæquales, articulo basali tarsorum posticorum suprà elongato-acuminato.*

Rh. cribrarius, W. *Piceo-niger prothorace rudè punctato, excavatione profundâ in parte mediâ et anticâ, utrinque tuberculis duobus elevatis armato, elytris irregulariter punctatis.* Long. corp. lin. 10. [*Hab.* Senegal?

Actinobolus, W. *Corpus oblongo-ovatum convexum. Clypeus anticè in lobos 5-rotundatos productus. Antennæ articulo 1^mo lato. Os inferum mento magno obtectum. Labrum transversum. Labium et palpi labiales (nisi apex articuli ultimi) mento obtecta. Mandibulæ corneæ, curvatæ apice acutæ.*

Act. radians, W. *Piceo-rufus antennis tarsisque nigricantibus, capite posticè et prothorace anticè varioloso-punctatis, hoc lineâ dorsali impresso, elytris striato-punctatis.* Long. corp. lin. 9. [*Hab.* Brazil.

A review of the characters of the *Phileurideous Dynastidæ* in comparison with those of *Cryptodus* and the two groups above described, was then made, and a description was added of a genus "which possesses a structure of the organs of the mouth quite unlike that of every other *Dynastideous* group;" namely,

Leptognathus, W. *Corpus oblongo-ovatum convexum. Clypeus (os omnino obtegens) anticè in lobos duos rotundatos elevato-productus. Os inferum minutum mento magno clausum. Mandibulæ minutæ bipartitæ (ferè ut in Cetoniis). Maxillæ lobis duobus minutissimis membranaceis (supero vel galeâ vix distinguendo). Prothorax magnus, ♂ anticè subquadratus impressione magnâ transversâ notatus.*

Leptognathus Latreillianus, W. *Piceo-niger, nitidus, prothorace rude punctato postice sulco impresso, elytris rude punctato-striatis striis ante apicem confluentibus.* Long. corp. lin. 8–10. [*Hab* Senegal.

September 6th.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

The President read an extract from a letter received from S. S. Saunders, Esq., in Albania, giving an account of some experiments made with *Mygale Ionica*, whence it appeared that the peculiarity previously observed and described by him in his memoir on that insect, consisting of the formation of a trap door at each end of its tube, was only an accidental circumstance.

Mr. Tulk exhibited a specimen of *Tachina pacta*, Meig., together with the abdomen of *Carabus violaceus*: the former insect had been reared from one of four pupæ found in the interior of the abdomen of the latter. The *Carabus* was found dead amongst moss on the 16th August, 1841, and the first imago appeared on the 21st, the second on the 23rd, the other two still remained undeveloped. These four pupæ almost entirely filled up the cavity of the abdomen. An oval aperture existed in the margin of the third ventral arc of the abdomen, near the margin of the elytra, and was probably that by which the larvæ made their way into the interior, after having been hatched from eggs deposited on the exterior of the living beetle.

He also exhibited some specimens of *Pediculus Melittæ*, K., found

upon the body of *Volucella bombylans*. Mr. Newport stated, that notwithstanding this fact he was convinced, by a series of observations, that these supposed *Pediculi* were in reality the young larvæ of *Meloe*.

Mr. Hope communicated a letter and drawing received by Prof. Royle from Dr. Malcolmson in India, illustrating the habits of a large species of *Lamia* which had destroyed some large trees, and the reply he had written to the queries of the latter gentleman as to the name, habits, and means of destruction of the insect in question.

Mr. Ingpen exhibited a species of *Clytus* which had been reared from the sugar-cane, having remained at least three years in the larva state.

Mr. G. R. Waterhouse exhibited a specimen of a *Coleopterous* larva, which he had found on the stems of water plants, which he regarded as the larva of *Donacia micans*, and of which he read a detailed account.

Mr. Hope communicated a letter he had received from Dr. Cantor, stating that he had kept *Fulgora candelaria* alive for a length of time, and had never observed the slightest luminosity, the existence of which was also denied by several intelligent Chinese with whom he had spoken. If at all luminous, he considered that the luminous property might only be developed at particular seasons.

Mr. Yarrell exhibited a large globular nest, of beautiful white silk, formed by an English spider, and which was half filled with minute spiders just hatched.

Mr. S. Stevens exhibited an extensive series of rare *Curculionidæ* captured by himself near Arundel, of which he has since published a list in the "Entomologist," including *Apion dissimile*, Germar, a species new to Britain.

Mr. Walton mentioned that he had recently captured both sexes of the rare *Apion lævigutum* at Birch Wood, the species having been previously only found in Suffolk, and females alone known, these were of a blue colour, but the male is black, as in *A. Sorbi*. He likewise brought for distribution amongst the members a number of specimens of *Apion Limonii*, which he had recently captured in great numbers upon the *Statice Limonium* at Holme-juxta-mare, on the coast of Norfolk, where this beautiful plant covers hundreds of acres.

Mr. Newport announced the recent discovery of *Scolopendrilla notacantha* of Gervais, which he had found at Sandwich in Kent.

Mr. Westwood exhibited a fossil which he had obtained at Stonesfield, and which from its form appeared to be the large elytron of a beetle, especially as Dr. Buckland had obtained many elytra from that place, and which, in his Bridgewater treatise, were described as Buprestideous, but which Mr. Westwood regarded as *Prionideous*, Dr. Buckland having exhibited them to him together with some *trilobites* recently received from Cincinnati, together with another, supposed to be a *Calymene*, but which Mr. Westwood regarded as the abdomen of *Pinnotheres*. This distinction was important, since, if correct, it implied the existence of recent animals in the supposed older formations (of which the fossil tooth recently found at Stones-

Anaides fossulatus, W. *A. nigro-fuscus, subnitidus, punctulatus, setosus, antennarum clavâ pallidiori, tibiis anticis dentibus tribus armatis.* Long. corp. lin. $3\frac{1}{2}$. [*Hab.* South America. Mus. Hope.

Silphodes, W. (Gen. nov. ad fam. Geotrupidarum pertinens.) *Corpus ovatum, subconvexum, marginibus reflexis. Labrum porrectum, breve, in medio emarginatum. Mandibulæ robustæ, corneæ, margine externo valdè rotundato, apice in dentibus duobus minutis declivibus producto. Maxillæ lobo externo magno, rotundato. Mentum subquadratum, lateribus rotundatis. Pedes longi, graciles, unguibus inæqualibus et irregularibus.*

Silphodes Sumatrensis, W. *S. piceo-castaneus, capite latiori, elytris striato-punctatis, margine longe-setoso.* Long. corp. lin. $3\frac{1}{2}$. [*Hab.* Sumatra. Sir S. Raffles.

Silphodes Philippinensis, W. *S. piceo-castaneus, capite thoraceque magis rufescentibus, elytris irregulariter valdè punctatis, striâ suturali alterisque* 8 *longitudinalibus* (*per paria dispositis*) *e punctis confluentibus formatis.* Long. corp. lin. $4\frac{1}{2}$–6. [*Hab.* Philippine Isles. Mr. Cuming.

Silphodes Gambiensis, W. *S. castaneo-fuscus, prothoracis et elytrorum marginibus suturâque rufescentibus; elytris sub lente tenuissime punctatis striisque tribus è punctis majoribus in singulo elytro.* Long. corp. lin. 6. [*Hab.* Gambia and Senegal. Mr. Tebbs. Mus. Brit.

October 4th.—W. W. Saunders, Esq., F.L.S., President, in the Chair.

Mr. Westwood exhibited some beautiful insects from the Gold Coast, Africa, and Port Philip, Australia, from the collection of Mr. Raddon, including a new species of *Goliathus* (*Eudicella ignita*, W.), some fine *Cerambycidæ*, &c. Also a new and singular genus of large size allied to *Cicada*, from New Holland, from the collection of Mr. Curtis, and which that gentleman proposed to name *Cystosoma Saundersii*. Also a common house-spider, to the hind extremity of the cephalothorax of which remained attached the exuvium of the dorsum of the former cephalothorax, although it had remained alive in that state several days. He also exhibited a drawing of a new modification of the pad-like cushion on the under-side of the basal joints of the fore tarsi of a new species of *Cicindelidæ*, from the Mauritius (constituting a new and distinct subgenus), in which the whole of the under-side of the limb was thickly clothed with clavate setæ, visible to the naked eye.

The following memoirs were read:—

Notices of the cannibal habits of various caterpillars. By G. A. Thrupp, Esq.

Additional observations upon, and descriptions of new species belonging to the genera *Cryptodus*, *Mæchidius*, and *Parastasia*. By J. O. Westwood, the substance of which is incorporated in the abstract of the proceedings of the meetings of July 5th, and September 6th, 1841.

GEOLOGICAL SOCIETY.

May 19th, 1841.—A paper "On the Agency of Land Snails in corroding and making deep Excavations in compact Limestone Rocks," by the Rev. Professor Buckland, D.D., F.G.S., was first read.

During the meeting of the Geological Society of France at Boulogne, in September 1839, Dr. Buckland's attention was called by Mr. Greenough to a congeries of peculiar hollows on the under surface of a ledge of carboniferous limestone rocks. They resembled at first sight the excavations made by Pholades, but as he found in them a large number of the shells of *Helix aspersa*, he inferred that the cavities had been formed by snails, and that probably many generations had contributed to produce them*.

A few years since, the Rev. N. Stapleton informed the author that he had discovered at Tenby, in the carboniferous limestone on which the ruins of the castle stand, perforations of Pholades 30 or 40 feet above high-water level; but having recently examined the spot, Dr. Buckland ascertained that these excavations were the work of the same species of Helix as that which had formed the cavities in the limestone near Boulogne, and he found within them specimens of the dead shells as well as of the living. The mode of operation by which the excavations were made, he conceives, is the same as that by which the common limpet (*Patella vulgata*) corrodes a socket in calcareous rocks, and he is of opinion that the corrosion is due to the action of some acid secreted from the body of the limpet or helix.

That the perforations, both at Boulogne and Tenby, were not the work of Pholades, Dr. Buckland says, is evident,

1st. From their size and shape, which, instead of the straight and regular form accurately fitting the shell of the animal by which each hole was perforated, are tortuous, irregularly enlarging and contracting, and rarely continuous in a straight line. The holes moreover are often separated by only a thin partition, or are confluent.

2ndly. Because they are wanting on the upper surface of the projecting ledges of limestone, whilst on the sides and lower surfaces of the ledges they are excavated to considerable depths.

The above reasons, Dr. Buckland says, against the excavations having been made by any marine lithophagous animal, are favourable to the hypothesis which refers the production of them to snails. These animals, he observes, could find shelter only on the margin and lower surface of the projecting rock, and the irregular form of the confluent cavities correspond with that of the clusters of snails in their ordinary latitat and hybernation; and if to these reasons be added the fact of finding both living and dead shells in the excavations, the evidence, the author conceives, is decisive as to the agency of snails in producing the phænomena under consideration.

In conclusion, the author offers some remarks on the means by which these hollows have been corroded having been overlooked, in consequence, he suggests, of their having been probably referred

* See Bulletin Geol. Soc. France, vol. x. p. 434, 1839.

to the action of the weather, or water, or to original irregularities in the composition of the stone.

A paper "On Moss Agates and other Siliceous Bodies," by John Scott Bowerbank, Esq., F.G.S., was then read.

In a paper "On the Origin and Structure of Chalk-flints and Greensand Cherts*," Mr. Bowerbank inferred that the sponges from which he conceives those bodies originated, differed from recent keratose sponges only in having possessed numerous siliceous spicula. Since that paper was read, the author, however, has found in true keratose sponges from Australia†, as well as in the sponges of commerce from the Mediterranean and the West Indies‡, siliceous spicula in great abundance. All discrepancies, therefore, between the extinct and modern types of a portion of the animals under consideration, he says, is now removed. In these prefatory remarks, Mr. Bowerbank likewise states that there is at present only one known species of recent sponge (*S. fistularis*) the fibre of which is truly tubular.

The author then proceeds to detail the evidences of the existence in moss agates from Oberstein and other parts of Germany, as well as from Sicily, and in green jaspers from India, of the remains of sponges, in the following order: 1st, the proofs of the fibrous structure; 2nd, of the preservation of gemmules; and 3rd, those of the existence of vascular structure. The specimens were examined as opake objects, with direct light concentrated by a convex lens. The number of agates amounted to nearly 200, and that of green jaspers to about 70.

1. *Fibrous structure.*—Though polished agates afforded Mr. Bowerbank, in almost every specimen, strong evidence of spongeous origin, yet the structure and arrangement of the fibres were seldom perfectly preserved throughout, presenting every intermediate state from complete decomposition to the most distinct spongeous tissue. The siliceous matrix of these remains exhibited a clear and frequently crystalline aspect, but the prevailing tint of the enclosed organic matter was bright red, brown, or ochreous yellow; occasionally, however, the fibre was milk-white or bright green. The colouring matter was generally confined within the bounds of the animal tissue, leaving its surface smooth and uninterrupted; sometimes it occurred only in the interior of the tubular fibre, the sides being semipellucid or milk-white; whilst in other cases not only the fibre was completely charged with colouring matter, but the surface was also slightly encrusted with it. In an agate believed to be from Sicily, the greater part consisted of a confused mass composed of innumerable bright red fibres with no perceptible remains of surrounding structure, but near the margin of the specimen the tubuli were as perfectly preserved as in a recent sponge, presenting a semi-pellucid and horny-looking substance enveloping red fibres. In those instances in which the red pigment did not appear to have entered

* See Geol. Trans., 2nd Series, vol. vi. Part 1. 1841. Proceedings, vol. iii. p. 278, 1840.

† Annals of Nat. Hist., April 1841.

‡ Microscopic Journal, vol. i. No. 1, p. 8, 1841.

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bank has little doubt that the vesicles are the fossilized gemmules of the sponges which gave the form to the siliceous masses in which they are imbedded. An agate supposed to have come from Oberstein, presented characters which, Mr. Bowerbank is of opinion, indicated gemmules in an immature state, or in different stages of development, fixed to the fibre of the sponge; and in another specimen, believed to have been received from the same locality, gemmules in different conditions were sparingly scattered amid the tissue.

If this idea of the development of the gemmules *in situ* be correct, it will account, the author thinks, for the frequent occurrence of small detached patches of minute sponge-fibre in well-developed and large-sized tissue. Several other specimens, considered by Mr. Bowerbank to contain gemmules in different stages of development or decomposition, are described in the paper, particularly an agate from Antigua in the possession of Mr. R. Brown; and one from Oberstein, which contained vast numbers of small, pellucid, yellow globules, bearing a strong resemblance to the minute granules which occur in the gelatinous or fleshy sheath surrounding the fibres of the sponge of commerce, and which are probably incipient germs. In accounting for the preservation of the gemmules in a fossil state, Mr. Bowerbank refers to the covering of the ova of birds, fishes and reptiles; and he says, it is natural to expect that the gemmules of the sponge should be similarly protected, and therefore preserved after the decay of the sponge from which they derived their origin.

3. *Vascular structure.*—In a species of recent Turkey sponge, and in some others from Australia*, Mr. Bowerbank detected in the horny sheath which invested the solid fibre, minute anastomosing vessels; but he has not observed a similar vascular covering on the external surface of the two specimens of *Spongia fistularis* which he has examined. The co-existence, however, of this sheath with a tubular fibre, he states, he has discovered in specimens of Indian green jasper. On examining with a power of 60 linear a thin polished slice, he found that some well-preserved tubes, of greater size than the rest, had, on their external surface, a coating of a darker colour than the other parts of the fibre, and were evidently analogous to the vascular sheath of the keratose sponges of commerce. On employing a power of 500 linear, the presence of a reticulated vascular structure was exhibited as distinctly as in the recent sponge, particularly where a portion of the originally horny or fleshy part of the sheath had undergone a slight degree of decomposition. This structure Mr. Bowerbank has also detected in two fragments of flint-pebbles.

The characters exhibited by this external coating are not the only evidences of vascular structure which the author found during his examination of the organic remains inclosed in moss agates and Indian green jaspers, for he discovered in the centre of the tube which exhibited the sheath, a dark thread penetrating the cavity for a considerable distance, and when examined with a power of 500 linear, it assumed the appearance of a spiral tubular thread, frequently

* Microscopic Journal, vol. i. No. 1, p. 10.

obscured by irregular patches of a substance which the author conceives may have been glutinous animal matter. In another specimen of green jasper the spiral course of this curious tissue was much less obscure, and when examined with a power of 800 linear its tubular nature was evident. The same tissue also lined the cavity of almost every fibre of the sponge which was stated to exhibit a structure composed of foliaceous plates, like the skeletons of the leaves of some endogenous plants. In an agate, probably from Oberstein, Mr. Bowerbank says, he detected other evidences of tissue of an exceedingly remarkable character. The fibre, which was very large, had been apparently surrounded by a villose coat, and wherever, by polishing, a longitudinal section had been exposed, one or two minute vessels of uniform diameter and simple structure were visible in the centre of the fibre, and ranging in the direction of its axis. At irregular distances within these vessels the author discovered pellucid round globules, the diameter of which varied from the 1000th to the 2380th of an inch, the diameter of the vessels ranging from the 1000th to the 2000th of an inch. In other parts of the interior of the fibre were opake or semi-pellucid spheres, and in different portions of the agate were considerable numbers of larger, opake, round bodies, the whole of which Mr. Bowerbank considers to be gemmules in various states of development; and he thinks it is extremely probable that the vessels containing the globules were true ovarian ducts. In support of this inference Mr. Bowerbank describes another agate, in which there were no appearances of well-defined anastomosing fibres, but which exhibited numerous long and simple thread-like fibres apparently much decomposed, as their substance consisted sometimes of a congeries of minute separate particles, and sometimes of straight or curved lines composed of minute black bodies. In other cases these strings of incipient gemmules were contained within the boundaries of the tubes, and then presented rarely more than a row of single gemmules; but occasionally the diameter of the vessels appeared to have been much enlarged, and the gemmules were indiscriminately dispersed within its cavity. In some instances also they exceeded in diameter the vessel or its remains, as if they had outgrown and burst their natural boundary, or the walls of the latter had contracted. From the close resemblance in the structure and contents of these vessels to those contained in the large sponge-fibre first described, Mr. Bowerbank has little doubt, whatever may have been their original nature, that they are the same kind of tissue, under somewhat different conditions.

In all the agates and jaspers which have been microscopically investigated by the author, the spaces not occupied by remains of spongeous texture were filled with silex or chalcedony arranged in bands which conformed more or less to the outline of the enclosed fossil. Where, however, the matrix consisted of radiating crystals, the decayed animal remains frequently appeared to have been impelled forward, in the same manner as the decomposed cellular portions of fossil wood have often yielded to the crystallizing process of the associated mineral matter.

Egyptian jaspers, Mocha stones, &c.—The author has examined also numerous specimens of polished Egyptian jaspers, which, when viewed as opake objects, by direct light and with a power of 150 linear, were found to consist of finely comminuted light buff or brown irregular granules, cemented by semi-transparent silex, very much resembling the state in which it exists in chalk-flints and greensand cherts, and to the variations in its colouring matter the banded appearance of the jaspers is due. Imbedded, but very unequally in the layers composing the jaspers, Mr. Bowerbank discovered hundreds of beautiful foraminifera closely resembling those found in chalk-flints, and often difficult to distinguish from the species found in the Grignon sand of the calcaire grossier.

The Mocha stones which the author has examined, presented no indications of organic structure, the moss-like delineations and other appearances, resembling beautiful, thin, reticulated tissues, being due to dendritical or metallic infiltrations.

In the larger pebbles of a mass of Herefordshire pudding-stone, Mr. Bowerbank discovered the characteristic spongeous structure of chalk-flints.

In conclusion, the author dwells upon the difficulties attending the study of the bodies which he has examined and described, in consequence of the little attention which has been paid, with few exceptions, to the structure of recent sponges; and he states that the aspect of the latter, when viewed by the unassisted eye, is so different from that which it presents when seen under a high microscopic power, that those who have not been accustomed to study recent sponges with that aid would never recognise a similar structure in the fossils described by him. He also shows that the prevalence of keratose sponges over those belonging to the genus *Halichondria* is what might naturally be expected, as the spicula which form the skeleton of the latter would be less likely to be preserved in their original position than the horny fibres of the former.

Lastly, the author alludes to the great share which sponges have had in the production of the solid strata of the earth's crust.

ZOOLOGICAL SOCIETY.

March 9, 1841.—James Whishaw, Esq., in the Chair.

A paper by Dr. Richardson, on some new or little known fishes from the Australian seas, was read. The following is an abstract of this paper.

1. CHEILODACTYLUS GIBBOSUS, *formâ Cheilodactyli zonati, (h. e. capite brevi, ore parvulo, dentibus brevibus setaceis; dorso gibbo, spinâ quartâ longissimâ;) radiis pinnæ dorsalis articulatis radios spinosos numero plus duplo excedentibus.*

RADII. P. 8·VI; D. 17·36; V. 1·5; A. 3·8; C.

This species differs from the ordinary *Cheilodactyli*, and agrees with the Japanese species discovered by the naturalists who accompanied Admiral Krusenstern, in the body being very high in the pectoral region, and tapering away in a lengthened manner posteriorly;

This is a Port Arthur freshwater species, for which the author expresses himself indebted to Mr. Lemprière. It differs from the common freshwater eels of Europe in the more posterior origin of the dorsal, as well as in the more anterior position of the vent. The pectorals are lanceolate, the vertical fins are but moderately high, and the gape extends to the posterior margin of the orbit.

4. Narcine Tasmaniensis, *dorso dipterygio, corpore latè obovato; valvulâ nasali obtusè trilobatâ integerrimâ; pinnâ ventrali disco pectorali approximatâ.*

The author having but recently had an opportunity of consulting Henle's Monograph of the genus *Narcine*, takes this opportunity of supplying a specific character of the Van Diemen's Land species, which was formerly described to the Society (Zool. Proceed. for March 1840, p. 29), but which could not be distinctively characterized from his want of knowledge of the other species.

A paper by W. J. Broderip, Esq., in which the author proceeds with his descriptions of Mr. Cuming's shells, was next read.

Helix cryptica. *Hel. testâ tumidâ, subumbilicatâ, subglobosâ, anfractibus* 3 *subcorrugatis* (*ultimo longè maximo, obscurè fasciato*), *lineis incrementi creberrimè obliquè substriatis, purpureo-brunneâ, epidermide sordidè brunneâ; aperturâ subelongato-auriculiformi, intus subargenteo-cærulescente, subiridescente; labii limbo rubro-brunneo, haud patulo, reflexo.*

Long. $1\frac{6}{8}$; lat. $2\frac{1}{2}$ poll.

Hab. ad Catbalonga Insulæ Samar sub foliis desiccatis.

Mr. Cuming found this *Helix* hidden under the decayed leaves of trees. The inside of the mouth has that silvery iridescence which may be observed in the tendon of a muscle in some of the mammiferous animals, and through it may be seen the purple-brown colour of the shell, which thus puts on a subcærulescent appearance.

Helix latitans? *Hel. testâ subtumidâ, subcomplanatâ, purpureo-rubrâ, anfractibus* 3 *lineis incrementi creberrimè striatis* (*ultimo longissimè maximo*), *epidermide sordidè albente; aperturâ maximâ e brunneo subalbido-iridescente, labio patulo, reflexo, rubente, albido internè limbato.*

Long. $1\frac{5}{8}$; lat. $2\frac{5}{8}$ poll.

Hab. ad Gindulman Insulæ Bohol sub foliis desiccatis.

At first sight, this *Helix*, which was also found by Mr. Cuming under decayed leaves, looks a good deal like *H. cryptica*; but on a nearer inspection not only will a difference in form almost indescribable be observed, but also in the texture of the shell, which is without corrugations. The mouth too is much wider and broader, and the reflected lip much more patulous. The silvery iridescence of the mouth extends but a short distance within the aperture, but the polish is continued far in. Still it may only be a variety of *H. cryptica*.

Helix cretata. *Hel. testâ subglobosâ, tumidâ, anfractibus* 3 (*ul-*

timo longè maximo, fasciïs et lineis nigricantibus cincto), lineis incrementi creberrimè obliquè striatis et lineis elevatis cinctis, brunneo-nigricante, epidermide cretaceâ; aperturâ argenteo-subcæruleâ, labii limbo obscurè rubente.

Hab. ad Tannauan Insulæ Leyte foliis arborum hærens.

Mr. Cuming has shown me a young shell which he brought from the mountains of Tanhay in the Isle of Negros, where it was taken on the leaves of trees. I thought at first that it might be the young of *Helix Harfordii*, but the sculpture of the shell and the quality of the epidermis correspond so closely with those of the adult shell just described, that though there is some difficulty arising from the capture of the two shells in different islands, I am inclined to be of opinion that it is probably the young of *Helix cretata*.

Helix Pan. *Hel. testâ globosâ, subelevatâ, umbilicatâ, zonatâ, anfractibus* 4 (*ultimo maximo*) *lineis incrementi minutissimè obliquè striatis; columellâ albidâ, aperturâ subrotundâ, cæruleo-albente, labii limbo angusto, subreflexo.*

Long. $1\frac{5}{8}$; lat. $1\frac{7}{8}$, variat ad infinitum.

Var. *a*. Albens brunneo et nigro pulcherrimè fasciata.

Of the whitish class of variety (*a*) there are variations without end, according as the bands are more or less present or absent. In some the whitish epidermis is only relieved by a brown sutural line and a deep submedial band on the body-whorl, which is more or less interrupted and ribanded with white and light brown towards the base.

Var. *b*. Brunnea albido et nigricante concinnè fasciata.

The same may be said of this section, which varies as much as var. *a*. This imperfect description was drawn from six of each class; but at least treble the number of each would be requisite to give a correct idea of the infinite variations of this beautiful species.

March 23.—William Yarrell, Esq., Vice-President, in the Chair.

A collection of birds from Newfoundland, presented by E. Moore, Esq., was exhibited: it consists of specimens, in different states of plumage, of the Willow Ptarmigan (*Tetrao Saliceti*), a specimen of the Pin-tailed Duck (*Dafila caudacuta*), the American Teal (*Querquedula Americana*), and the Black-backed Gull (*Larus marinus*). The collection also contains a fœtal Esquimaux preserved in spirit.

A paper by G. B. Sowerby, Esq., was read, in which the author proceeds with his descriptions of the new species of shells collected by H. Cuming, Esq., in the Philippine Islands. The following species were described and exhibited:—

Helix matruelis. *Hel. testâ depressiusculo-subglobosâ, tenuiusculâ, lævi, castaneâ, epidermide opacâ, pallescente, hydrophanâ indutâ; spirâ subdepressâ, anfractibus quatuor subrotundatis, ultimo maximo, ventricoso; suturâ distinctâ; aperturâ subtrapezoidali, extùs rotundatâ, intùs sinum propè columellam efformante,*

labio externo reflexo rotundato, fusco ; columellâ latiusculâ, declivi, anticè obliquè subtruncatâ.

Long. 1·1 ; lat. 1·6 poll.

Hab. supra folia arborum propè Cagayan, Provinciæ Misamis, Insulæ Mindanao, Philippinarum.

Obs. *Variat interdùm spirâ minus depressâ.*

Of this species there are two varieties in form and several in colouring. The variety with a rather more than usually elevated spire very closely resembles some of the varieties of *Helix Roissyana* ; still it may be distinguished from that species by the much greater declivity of the columella, and its broader and less rounded outer lip. In the general arrangement of the colouring all the varieties are somewhat similar, particularly in the dark chestnut colour of the apex, which is continuous down the anterior part of the following volutions ; the upper part of the second and third volutions are lighter ; the columella is dark brown, and there is always a very light band surrounding it, which when covered with its epidermis is light yellow-brown, but when deprived of it is white ; this is surrounded by a very dark brown band. The following are the varieties in colour, viz.

a. Shell with a dark brown band at the periphery and another antesutural dark brown band ; epidermis with a very pale band at the circumference.

b. Shell coloured precisely like *a*. : epidermis with a very dark band at the circumference.

c. Shell with the spire more elevated ; last volutions very dark brown, with a white antesutural and another white band at the circumference.

Helix setiger. *Hel. testâ suborbiculari, tenui, brunneâ, spirâ levatiusculâ, anfractibus senis, rotundatis, angustioribus ; aperturâ semilunari, labio externo, tenuissimo ; epidermide setigerâ, setis regulariter coordinatis.*

Long. 1· ; lat. 1·2 poll.

Hab. in ligno putrido propè St. Jaun, Provinciæ Cagayan, Insulæ Luçon.

Shell dark brown, with a yellowish band in front of the periphery, and a broad band of the same surrounding the columella, which is small and white and deeply placed.

Helix velutina. *Hel. testâ suborbiculari, subdepressâ, tenui, pallidè brunneâ, epidermide velutino indutâ, anticè lævi, nitidâ ; spirâ depressâ, anfractibus quinque, rotundatis ; aperturâ semilunari, posticè rotundato-subtruncatâ ; labio externo tenui ; columellâ parvâ, profundâ.*

Long. 0·7 ; lat. 1·2 poll.

Hab. in arboribus putridis ad Insulam Guimaras, Philippinarum.

Close-set short hairs, covering the whole of the upper part of the shell and part of the lower, give it a velvety appearance and softness. Two varieties of this species have occurred, one of smaller

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HELIX (CAROCOLLA) SEMIGRANOSA. *Hel. testâ suborbiculari conico-subdepressâ, supernè granulosâ, subtùs lævi, nitidâ; spirâ conico-subdepressâ, anfractibus senis, rotundatis, ad marginem carinatis; labio externo tenui, acuto, propè columellam crassiusculo; umbilico minimo.*

Hab. ad Insulam Luban dictam, Philippinarum.

The margin of the last volution immediately in front of the keel is slightly crenulated, and of a dark brown colour: the remainder of the shell is of an uniform yellow-brown colour.

ROYAL IRISH ACADEMY.

Feb. 22, 1841.—Mr. Charles T. Webber presented to the Academy an ancient stone, on which is carved a rude bass-relief, supposed to be the representation of a dog killing a wolf. Mr. Webber accompanied the present with a communication to the effect that the stone was taken from the Castle of Ardnaglass, in the barony of Tireragh and county of Sligo, and was said to commemorate the destruction of the last wolf in Ireland. The current tradition in the place from whence it came was, that, some years after it was supposed that the race of wolves was extinct, the flocks in the county of Leitrim were attacked by a wild animal which turned out to be a wolf; that thereupon the chieftains of Leitrim applied to O'Dowd, the chieftain of Tireragh (who possessed a celebrated dog of the breed of the ancient Irish wolf-dog), to come and hunt the wolf; which application being complied with by O'Dowd, there ensued a chase, which forms the subject of an ancient Irish legend, detailing the various districts through which it was pursued, until at length the wolf was overtaken and killed in a small wood of pine-trees, at the foot of one of the mountains in Tireragh. The quarter of land on which the wolf was killed, is to this day called *Carrow na Madhoo*, which means *the dogs' quarter*. In commemoration of the event, O'Dowd had the representation of it carved on the stone, and placed in the wall of his baronial residence. A wood engraving of the bass-relief is given in the Proceedings of the Academy, No. 28.

March 16.—In connexion with the subject of Mr. Webber's remarks at the last meeting, Sir W. Betham communicated the following document, giving an account of an order made by King James I. for the destruction of wolves in Ireland.

Patent Roll, 12 Jac. I. d. R. 17. "The King being given to understand the great loss and hindrance which arose in Ireland by the multitude of wolves, in all parts of the kingdom, did by letters from Newmarket, 26th November 1614, direct a grant to be made by patent to Henrie Tuttesham, who by petition had made offer to repair into Ireland, and there use his best skill and endeavour to destroy the said wolves, providing at his own charge men, dogs, traps, and engines, and requiring no other allowance, save only four nobles sterling, for the head of every wolf, young or old, out of every county, and to be authorized to keep four men and twelve couple of hounds in every county, for seven years next after the date of these letters." 12 Jac. s. L. R. 27.

IMPERIAL ACADEMY OF ST. PETERSBURGH, 1841.

In the botanical section, M. Trinius delivered a revision and a classification of the genera and species of the family of the *Agrostideæ* and MM. Fischer and Meyer, two notes, the first containing the description of a plant from Mexico, which forms the type of a new genus of the family of the *Orchideæ*, under the name of *Seraphyta multiflora*; and the second, of the *Uwarowia chrysanthemifolia* of M. Bunge, with a drawing of this plant. M. Meyer also read a monographic memoir on the *Alyssum minutum*, and the analogous species, followed by a view of the species which form the genus *Psilonema*, as well as the first part of a long treatise on the natural family of the *Polygonaceæ*, under the title of An attempt at a natural arrangement of the genera of this family. He has in fact finished a work begun by the late M. Bongard, the object of which is the description of the plants gathered, in 1838, in the neighbourhood of the Saisang-Nor, and on the banks of the Irtish. This collection, containing 331 species, was made by a pupil of M. Gebler, named Politoff, at Barndoul, in an excursion during the summer months of the above-mentioned year, at the expense of the Academy. However abundant this collection may be thought, considering the little time and expense which it cost, it is still far from furnishing us with a complete picture of the remarkable flora of Songarie; it nevertheless presents some of its isolated and characteristic features, to which M. Meyer directs the attention of botanists in his preface. He has annexed to his memoir drawings of eighteen new species contained in this collection, and has expressed a desire of seeing his work not only inserted in the Collected Acts of the Academy, but of its being printed separately *in octavo* by the title of M. Ledebour's Second Supplement to the Flora of the Altaï, the first having been made by M. Bunge from the materials which he had collected during his journey in 1832, which was also made at the expense of the Academy. The Academy complied with this desire. M. Ruprecht, who, as we mentioned above, has furnished a description of the Algæ collected by Mertens in his circumnavigation, has, together with M. Baer, undertaken the arrangement and the determination of the Thalassiophytes which this academician brought back from his expeditions in the north. M. Bunge, a corresponding member, has sent us a note on the genus *Siphonostegia*, established by Mr. Bentham the English botanist, and a memoir on a new species of the genus *Pedicularis*. M. Trautvetter has sent to the Academy the description of a new species belonging to his genus *Faldermannia*, and to which he gives the specific name of *parviflora*; and also, in two notes, his remarks on two species of (*Nenuphar*) water-lily to which he has given the name of *Lotus circinatus* and *Lotus Candollei*, and on the genera which have the greatest analogy with *Trifolium*. Lastly, we are indebted to M. Schrenk for an interesting sketch of the vegetation of the island of Hochland, in the Gulf of Finland.—*Recueil des Actes, &c.*, p. 32.

MISCELLANEOUS.

FAUNA OF DORSETSHIRE.

To the Editors of the Annals and Magazine of Natural History.

I SEND you an account of the occurrence of two or three rare birds which do not seem to be noticed in Dr. Pulteney's 'Nat. Hist. of Dorsetshire,' viz. *Scolopax Sabini*, shot by George Morant, Esq., about the middle of November last at Muston, near Dorchester, and preserved by Mr. Wheatham of Abbotsbury, who prepared also *Falco peregrinus* for me, which was taken alive here by a labourer two winters ago just after it had killed a woodpigeon and was going to devour it. *Strix nyctea* was shot in a wood at Langton, near Blandford, two or three years ago, belonging to J. J. Farquharson, in whose possession I saw the specimen (a most beautiful and dark spotted [♂ ?] one). The *Ardea nigra* (Black Stork) was also shot a year or two ago near Wareham, and is now in the possession of the Earl of Malmesbury. Mr. Austice of Bridgewater lately mentioned in the paper that *his* specimen (sent to Col. Montagu) was unique; but I think Mr. Edward Quekett, of the Langport Museum, told me another had been shot a few years ago between that town and Bridgewater, which he endeavoured to obtain, but it found its way to Taunton in rather a mutilated state. Thus we have four instances of its being found in Britain; and should any doubt arise, a reference to the persons named above would settle the matter. I have seen the solitary snipe myself in Elsington Wood (the property of the Earl of Orford). I saw the gray wagtail yesterday; it has some yellow above the tail, *not* a yellow breast (I am not much of an ornithologist, but I am pretty sure I am right), and it is not unfrequent here in winter and spring, and three sorts I saw formerly in plenty in ploughed fields near Cambridge in spring, whilst being ploughed. The Egyptian goose was shot last winter at West Stafford, near Dorchester, and is now amongst a collection of aquatic birds belonging to (my cousin) John Floyer, Esq. *Merops apiaster* (Bee-eater), shot many years ago at Chidiock near Bridport, is in the Museum there, belonging to the late Dr. Roberts, who suspected that the bird had escaped from some cage.

From the *Dorset County Chronicle*, Jan. 1st, 1835, is the following:—"*Phoca vitulina* was taken off Portland, Dec. 29, 1834, in a cod-net; weight, 80 lbs.; 3 feet 6 inches from snout to tail; body, 26 inches in circumference;" now in the museum of Mr. Bridge, Surgeon, Weymouth. We have had lately about here rabbits of a black slate colour and of a yellowish cast; and in Yorkshire I saw a white one, at large, but suspect some tame rabbit had escaped and caused the mixture. I also saw some years ago a stuffed *gray* hare in the possession of Mr. Goatley of Newbury, Berks. An eagle was shot in Sherborne Park some years ago, and is in the possession of the Earl of Digby.

Circus cinerascens (Ash-coloured Harrier), shot near Charmouth by C. Bartlett, Esq., on the authority of Dr. B. R. Morris; also a Hoopoe near Charmouth, spring of 1835, by Lord Bridport's

Some years ago one was shot by Mr. Hammond of St. Alban's Court, near Wingham, in Kent. The present specimen was shot by a boy employed in keeping crows in a field at Dandelion, near Margate, on the 21st of last December, and sold for fourpence to a dealer.

LONGEVITY OF GEESE.

To the Editors of the Annals and Magazine of Natural History.

Gentlemen,—Most willingly do I concede to Mr. Hassall priority in his observations on the phosphorescence of zoophytes, &c.,* and I regret that I was ignorant of them till I received a kind and polite note from himself. I have little reason however to regret that I sent my paper to you, as it has been the means of obtaining for me the acquaintance of Mr. Hassall, whose experiments have been made on a richer field and a more extensive scale, and who writes in the *con amore* style of a true naturalist.

Before I lay down my pen, may I use the liberty of asking you, as I am not deeply read in Anserine annals, whether you can tell me how many years a goose may live, if insured against all deadly attacks at Christmas and New-Year's-day from gourmand and gastronome? You may perhaps archly reply, that you could give a good guess, if you knew the age of some of your veteran correspondents. I shall not tell you mine; but I may state that I am not yet so old as a goose whose premature death was recorded about seven years ago in my manuscript *memorabilia*. I was then told by the Rev. Mr. Gibb, that when he was tutor in the family of Mr. Campbell, of Auchlian, in Argyleshire, a new cook, by mistake, killed a goose which had reached the patriarchal age of threescore and four years. This was matter of great sorrow to the family, for the goose was precisely the same age as the *Laird*; and willingly would they have cherished it all the days of its natural life. With these feelings of regard, it would have been like cannibalism to feast on their old feathered friend. Mr. Gibb and two of his pupils were at Glasgow College when the catastrophe took place, and they sent the slaughtered goose to them, that in their ignorance they might regale themselves without prejudice. The goose was welcomed and roasted, and served up; but sharpset as these young Highland chieftains were, poor goosie set them at defiance, for its flesh was as tough as leather. Yours, &c., D. Landsborough.

Manse of Stevenston, Ayrshire, 13th January 1842.

M. PETIT ON THE QUESTIONABLE AUTHENTICITY OF NAMES GIVEN TO UNDESCRIBED GENERA AND SPECIES.

We have submitted to our readers in one of the late numbers of the 'Revue Zoologique,' some observations tending to show the error into which Dr. Grateloup had, in our opinion, been led, in considering as definitely established specific names given by him, *without description*, to some new shells which he did not actually make known till subsequently, and after Mr. Sowerby.

* We would refer our correspondents to Ehrenberg's treatise on the phosphorescence of the sea in the Memoirs of the Berlin Academy.—Ed.

Since our article appeared, we have received several letters, proving the adhesion of various persons to these principles, the general adoption of which seems to them to be quite indispensable for putting an end to this confusion; which, as one of our [English] correspondents writes, "*is constantly increasing in the nomenclature of species.*"

The Academy of Sciences has also just sanctioned the opinion which we have expressed on this subject, on the following occasion.

At the very time when we were opposing the course pursued by Dr. Grateloup, the medical officers belonging to the sloops Astrolabe and Zelée communicated to the Institute some short descriptions of birds, insects, and mollusks, &c., collected by them during their expedition, thinking in this manner to entitle their labours to take their date. This was proceeding exactly as Dr. Grateloup did, if the descriptions communicated were not inserted textually in the proceedings of the sittings of the Academy of Sciences. Such insertion has not been ordered, nor anything further than a mere acknowledgement of the sending the document, together with a bare list of specific names; this mode of giving publicity has then been rejected by the Academy; but it has done still more: a naturalist living in Paris desired to inspect the descriptions thus deposited in the archives of the Institute; for this purpose he addressed a request to the Secretary, who did not think it right to entertain it. The subject is thus mentioned in the *Compte Rendu* of the sitting of the 27th of September 1841, p. 666.

"M. Allibut asks permission to inspect the notices sent by MM. Jaquinot, Hombron and le Guillon, concerning observations in natural history made during the voyage of the Astrolabe and the Zelée.

"M. Allibut must apply to the authors to obtain an opportunity of consulting their writings, or wait until these writings *have been made public by being printed.*"

It is thus, in fact, decided by the Academy that the communications made by MM. Guillon, Jaquinot, and Hombron cannot constitute a *publication*, and that their labours must remain unpublished, in manuscript, until they shall *have been made public by being printed.*

Moreover, one of these medical officers, Dr. le Guillon, fully understood how insignificant was the fact of the deposit which he had made with the Institute, a deposit sanctioned by courtesy merely; for he hastened to get a considerable number of the descriptions which he had sent to the Academy inserted in the 'Revue de la Société Cuviérienne,' of which he is a member; and by this real publication has established an authentic date for his labours: the English do so in their "*proceedings*;" so also did M. d'Orbigny upon his American voyage. It is the course that MM. Jaquinot and Hombron will also probably adopt; the means of publication will not be wanting at Paris; and if it were necessary, the editor of the last voyage of M. Dumont Durville would not refuse to devote a hundred francs to the publication of a synopsis of whatever they have brought which is new.

These two gentlemen will also feel the necessity of not separating themselves from their laborious colleague M. le Guillon; they will not wish to leave him all the burden and all the honour of the work; still less will they be able to treat, as having no existence, whatever has been described before them, *and made public by being printed.* There would be but one voice in opposition to this manner of treating science, and without being aware of it, they would come to a lamentable result, that of for ever throwing discredit upon publications for which the state makes enormous sacrifices.—S. Petit. *Revue Zoologique*, p. 329, No. x. 1841.

[We know nothing of the merits of this particular case, but insert the above as the subject to which it relates is of general interest.—Ed.]

NESTS OF THE HIRUNDO RIPARIA.

"M. Eugene Robert, having had an opportunity of observing the *nests* which the sand-martens excavate in the gravelly banks along the river Volga, noticed that the upper surfaces exhibited a yellowish white plastering of animal matter. This matter, in which he expected to find some analogy to that of which the nest of the *Hirundo esculenta* is composed, appeared to him formed of the spawn of fish, perhaps of the sturgeon, which is common in that river.

"It is impossible," says M. Robert, "not to observe in this arrangement an admirable foresight in the bird, to prevent the falling down of the gravel from destroying its dwelling."—*Comptes Rendus* Nov. 1841.

Some Notices of the Late Professor Don, and of his Father, Mr. George Don, formerly Curator of the Edinburgh Botanic Garden*.

As Professor Don was, in the strictest sense of the terms, a hereditary botanist, naturalist, and man of general information, it may not be amiss, before giving an exceedingly brief outline of the principal events of his life, to say something still more brief of his father. We have no occasion to dilate upon the character of either; they are safe in the memories of large circles of friends; and wherever either had an opportunity of making an impression, the remembrance of it is delightful.

Mr. George Don was a native of Kincardineshire, from which, however, his parents removed in his infancy. While yet a very little boy he revisited the place of his nativity; and the clergyman of the parish, having called on the family with whom Don was residing, found the nascent student of nature busily engaged forming into a natural system of his own, all the wild flowers which he had been able to cull in the neighbourhood; upon observing which, the clergyman remarked, that a boy, who voluntarily entered upon such a course at the very dawning of life, would ultimately become one of the brightest and most successful naturalists of his time.

* Extracted from an article in the Florist's Journal, No. xxiv.

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afforded a most curious and entertaining, as well as a most useful memoir.

Mr. Don was married, and had a family of fifteen children, of whom four sons still remain, who are eminent as botanists, as cultivators, or as both.

Professor David Don was born in his father's cottage at Doo Hillock, in the year 1800; and may be said to have been a botanist and cultivator from his very infancy, having acquired a thorough knowledge of these subjects under his father, who made the best of all possible teachers; and along with these studies, and afterwards, he made himself acquainted with Latin, and acquired some knowledge of Greek and Hebrew, as well as those modern languages which could be most serviceable to him in his pursuits.

Mr. D. Don continued in his father's nursery until he made himself, while yet merely a lad, a botanist of no mean acquirements,—we will not say pretensions, for few men, of anything like equal capacity, have been so unpretending as Professor Don. Upon leaving Forfar he went to Edinburgh, in order to enjoy a wider range both of study and of occupation; and while there had charge of the conservatories and stoves in the grounds of Messrs. Dickson, brothers, nurserymen at Broughton, in the close vicinity of that city, who had at that time one of the best collections in Scotland.

After remaining there for some time, Mr. Don removed to London, where his brother George then was, and engaged in the Physic Gardens at Chelsea. Then, or soon after, the late Mr. Lambert, one of the great encouragers of botanical science, was in want of a librarian; and Mr. Don's practical experience, general knowledge, and suavity of manner, recommended him as amply suited for the situation; he accordingly went to reside in the town mansion of Mr. Lambert, to the mutual satisfaction of both parties, and the gratification of Mr. Lambert's scientific friends and the visitors of his ample collection. This situation, and more especially the manner in which the duties of it were discharged, brought Mr. Don into general acquaintance with the higher classes of the botanical world; and soon after the death of Sir Joseph Banks, the illustrious Mr. Robert Brown having resigned his office of Librarian to the Linnæan Society and Curator of its Museum, Mr. Don was chosen as a worthy successor to that first botanist of the age.

In this new position, Mr. Don was found to be a most valuable acquisition to the Society; and his accurate knowledge and amiable manners endeared him to all, while his numerous contributions to science extended his name widely over the botanical world.

About the year 1836, he was appointed Professor of Botany in King's College; which situation he held jointly with the Librarianship of the Linnæan Society.

He was seized with his last illness, in a serious form, in the end of April, or the beginning of May. It may be regarded as a general breaking up of the system, which assumed a topical character, and defied the skill of the most eminent men. Though latterly his

disease became a very painful one, he bore it with singular fortitude, until delivered both from the evil and the good of this world, on the 8th of December 1841. On the 15th of the same month he was borne to his resting-place in the cemetery at Kensal Green; his remains being followed to that mansion of repose by Mr. Brown, Sir William J. Hooker, Mr. Bentham, Mr. Bennet, Mr. Anderson, Mr. Smith, and various other botanists, who, no doubt, felt the blank which had been made in their circle. Of his character we need add nothing to what has been already embodied in this brief notice.

[We would add, as our own record of his personal character, that he was unpretending, disinterested, openhearted, and sincere. His native kindness, cordiality and hilarity as a companion will long be affectionately remembered by those who knew him.—Ed.]

METEOROLOGICAL OBSERVATIONS FOR DEC. 1841.

Chiswick.—Dec. 1. Overcast. 2. Cloudy: rain. 3. Fine: rain: clear at night. 4. Clear: heavy rain: densely clouded. 5. Cloudy: clear and fine: cloudy. 6. Overcast: heavy rain: clear. 7. Clear: overcast at night. 8. Rain: cloudy. 9. Very fine: rain. 10. Overcast: rain: clear. 11. Slightly overcast: clear: rain at night. 12. Rain: stormy. 13. Rain: clear at night. 14. Cloudy and cold. 15. Densely overcast. 16. Very fine. 17. Clear and frosty. 18. Frosty haze. 19. Sharp frost: slight snow. 20. Frosty: fine. 21. Clear. 22. Slight frost: drizzly. 23. Hazy: drizzly. 24. Overcast: rain. 25. Rain: clear. 26. Overcast: clear: cloudy at night. 27. Hazy. 28. Foggy: cloudy and fine. 29. Dense fog. 30. Hazy. 31. Very fine: rain at night.

Boston.—Dec. 1. Fine: rain yesterday P.M. 2. Fine. 3. Rain: rain early A.M. 4. Stormy: rain early A.M.: rain A.M. and P.M. 5. Stormy. 6. Rain: rain early A.M. 7. Fine. 8. Cloudy: rain early A.M. 9. Fine: rain P.M. 10. Cloudy: rain A.M. 11. Fine. 12. Cloudy: rain early A.M.: rain A.M. 13. Cloudy. 14. Stormy. 15. Cloudy. 16. Fine: rain early A.M. 17—19. Fine. 20. Misty. 21, 22. Fine. 23. Cloudy. 24. Fine. 25. Fine: rain P.M. 26—28. Fine. 29. Rain: rain early A.M. 30, 31. Fine.

Applegarth Manse, Dumfries-shire.—Dec. 1. Slight showers. 2. Rain A.M. 3. Wet and stormy. 4. Fine A.M.: rain P.M. 5. Fine. 6, 7. Rain morning and evening. 8. Rain morning and evening: Aurora. 9. Frost A.M.: rain P.M. 10—12. Heavy showers. 13. One slight shower. 14. Frost A.M.: Aurora. 15. Heavy rain. 16. Rain and squalls. 17. Clear and frost. 18. Clear and frost: cloudy P.M. 19. Slight fall of snow: frost. 20. Thick fog: frost. 21. Frost. 22. Frost: fine. 23. Fog and thaw: rain. 24. Rain. 25. Frost A.M.: rain P.M. 26. Frost, fair and clear. 27. Frost A.M.: thaw and rain P.M. 28. Fine. 29. Dull and moist: rain P.M. 30. Thick fog; rain P.M. 31. Fog and rain.

Sun shone out 21 days. Rain fell 21 days. Frost 10 days. Snow 1 day. Fog 4 days. Aurora 2 days.

Wind north $\frac{1}{2}$ day. North-north-east $\frac{1}{2}$ day. North-east 1 day. East 2 days. South-east $1\frac{1}{2}$ day. South-south-west 4 days. South-west $11\frac{1}{2}$ days. West-south-west $1\frac{1}{2}$ day. North-west $5\frac{1}{2}$ days. North-north-west 3 days.

Calm 9 days. Moderate 9 days. Strong breeze 6 days. Boisterous 6 days. Stormy 1 day.

Mean temperature of the month	38°·9
Mean temperature of Dec. 1840	36 ·0
Mean temperature of spring-water	41 ·6

Meteorological Observations made at the Apartments of the Royal Society, LONDON, *by the Assistant Secretary*, Mr. Roberton; *by* Mr. Thompson, *at the Garden of the Horticultural Society at* CHISWICK, *near London*; *by* Mr. Veall, *at* BOSTON; *by* Mr. Dunbar, *at Applegarth Manse*, DUMFRIES-SHIRE, *and at Sandwick Manse*, ORKNEY.

Days of Month.	Barometer.								Thermometer.										Wind.					Rain.					Dew-point.
1841. Dec.	London: Roy. Soc. 9 a.m.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumfries-shire. 9 a.m.	Dumfries-shire. 9 p.m.	Orkney, Sandwick. 9½ a.m.	Orkney, Sandwick. 8½ p.m.	London: R.S. Fahr. 9 a.m.	London: R.S. Self-reg. Mx.	London: R.S. Self-reg. Mn.	Chiswick. Max.	Chiswick. Min.	Boston. 8½ a.m.	Dumf.-shire. Max.	Dumf.-shire. Min.	Orkney, Sandwick. 9½ a.m.	Orkney, Sandwick. 8½ p.m.	London: R.S. 9 a.m.	Chiswick. 1 p.m.	Boston.	Dumfries-shire.	Orkney, Sandwick.	London: R.S. 9 a.m.	Chiswick.	Boston.	Dumfries-shire.	Orkney, Sandwick.	Lond. R.S. 9 a.m.
1.	29·396	29·536	29·301	28·97	29·06	29·14	29·10	29·33	48·7	55·8	47·6	54	43	43·5	47	42½	43	38	se.	se.	calm	e.	calm	·055	·08	·26	.....	·50	48
2.	29·486	29·437	29·207	29·02	29·18	29·17	29·40	29·42	49·3	52·4	47·3	53	46	44	48	38	43	44	s.	s.	calm	ne.	e.	·033	·15	.....	.....	.....	47
3.	28·954	29·246	28·948	28·62	28·78	28·78	29·38	29·25	51·2	53·3	49·0	54	43	48	49	41½	45	45	e.	sw.	calm	se.	e.	·039	·17	·05	.....	·10	48
4.	29·272	29·922	29·297	28·72	28·85	29·19	29·21	29·48	48·0	53·4	45·4	49	40	46	49½	42	46	45	s.	sw.	w.	sw.	e.	·172	·13	·10	.....	·43	45
5.	29·960	30·038	29·938	29·39	29·74	29·77	29·85	29·83	44·0	50·6	43·4	50	37	48	47½	40½	42	45	w.	w.	w.	sw.	se.	·161	·14	·21	.....	.....	40
6.	29·776	29·761	29·582	29·29	29·34	29·43	29·25	29·13	50·2	51·4	43·5	52	35	48	49½	41	46	46½	s.	sw.	sw.	wsw.	ses.	·091	·30	·21	.....	·35	45
7.	29·916	29·868	29·793	29·42	29·55	29·40	29·40	29·21	43·0	53·0	40·6	50	47	42	50	39	46	46	s.	w.	sw.	sw.	w by s.	·222	·15	·25	1·20	·30	43
8.	29·488	29·478	29·391	29·00	29·14	29·40	29·03	29·51	50·7	51·8	43·2	54	33	50	51	42½	45	36	s.	w.	calm	sw.	w by n	·119	·01	·12	.....	·23	47
9.	29·916	29·865	29·708	29·44	29·70	29·10	29·64	29·11	41·3	54·4	40·8	44	38	35·5	47	30	35	37	w.	w.	calm	sw.	s.	.....	·15	.....	.....	·05	40
10.	29·386	29·659	29·252	28·91	29·01	29·36	28·91	29·21	50·7	52·2	41·6	55	36	47	43½	40	40	39	s.	sw.	calm	nw.	nw.	·116	·07	·08	.....	·51	46
11.	29·916	29·913	29·879	29·40	29·56	29·54	29·38	29·38	40·8	54·8	40·0	47	37	40	44	35	42	40	w.	w.	w.	ssw.	w.	·083	·09	·11	.....	·07	40
12.	29·660	29·660	29·515	29·15	29·15	29·08	29·25	29·10	47·7	49·3	41·0	52	47	46	50	40½	38½	40½	s.	sw.	calm	ssw.	e.	·077	·17	·04	.....	·24	43
13.	29·366	29·350	29·238	28·79	28·9_	29·94	28·80	29·02	51·0	52·3	48·4	52	40	50	50	41	39	39	s.	sw.	calm	ssw.	calm	·213	·08	·03	.....	·12	46
14.	29·540	30·033	29·490	29·06	29·50	29·68	29·42	29·50	42·2	53·2	42·2	42	27	38	41½	33	35	37	w.	n.	n.	sw.	w.	·061	.....	.....	.....	·17	40
15.	29·908	29·907	29·510	29·42	29·19	29·12	28·91	28·86	42·8	43·7	35·2	50	37	40	48	35½	42	39	s.	s.	se.	sw.	sw.	.....	·10	.....	1·38	·17	39
16.	29·400	29·419	29·266	28·96	28·90	29·02	28·88	29·17	42·3	50·3	41·6	49	30	37·5	42	36	38	34½	s.	w.	calm	ssw.	n.	·063	.....	·06	.....	·26	42
17.	29·494	29·609	29·461	29·06	29·33	29·40	29·27	29·33	35·3	45·7	35·4	39	17	35	39½	27½	34	37½	w.	w.	calm	nnw.	nw.	.....	.....	.....	.....	·45	38
18.	29·586	29·585	29·402	29·26	29·39	29·30	29·33	29·36	31·3	38·8	31·2	35	16	29	35	22	35	31	s.	ne.	calm	nnw.	calm	.....	.....	.....	.....	·15	34
19.	29·252	29·270	29·188	29·05	29·24	29·16	29·50	29·40	31·4	35·7	29·9	37	27	24	34	22½	31	37	n.	ne.	calm	nw.	e.	.....	.....	.....	.....	.....	28
20.	29·226	29·444	29·218	30·00	29·15	29·33	29·37	29·45	32·7	35·5	31·6	39	20	28·5	32	22	39	37½	n.	ne.	calm	nnw.	e.	.....	.....	.....	.....	·44	30
21.	29·626	29·676	29·599	29·32	29·42	29·50	29·40	29·43	32·3	36·2	32·8	35	26	28	38	22½	31	35	nw.	w.	calm	nw.	nw.	.....	.....	.....	0·43	.....	32
22.	29·790	29·851	29·780	29·42	29·59	29·61	29·65	29·64	32·8	37·0	32·6	37	33	27	33	24	33	32	w.	w.	calm	e.	calm	.....	·02	.....	.....	·14	33
23.	29·860	29·854	29·793	29·46	29·44	29·50	29·40	29·42	39·7	40·8	33·3	46	27	36	40½	27	35	42	s.	sw.	calm	se.	se.	·014	·06	.....	.....	.....	38
24.	30·050	30·016	29·902	29·64	29·56	29·47	29·35	29·10	39·3	47·4	36·9	50	42	37	47	32½	37	41	s.	sw.	calm	sw.	se.	·060	·12	.....	.....	·13	40
25.	29·768	29·769	29·657	28·30	29·40	29·40	29·12	29·30	44·3	50·4	39·6	49	22	40	41	36	41	42	s.	sw.	calm	sw.	w.	·183	·06	.....	.....	·16	42
26.	29·794	29·944	29·755	29·46	29·65	29·83	29·65	29·90	35·8	46·0	33·4	39	24	32	41	30½	41	37½	n.	nw.	calm	n.	nw.	·044	·01	·03	.....	·06	35
27.	30·132	30·121	30·084	29·77	29·90	29·80	29·71	29·70	31·7	40·2	31·4	36	25	29	41½	26½	41	42	sw.	w.	calm	nw.	sw.	.....	·02	.....	.....	·14	33
28.	30·088	30·063	30·054	29·72	29·92	29·95	29·94	30·00	38·8	40·0	31·5	44	37	35	43½	37	40	40	w.	nw.	calm	nw.	nw.	·025	·02	.....	0·40	·12	35
29.	30·106	30·078	30·035	29·78	29·95	29·92	29·94	30·03	43·4	45·2	39·3	45	39	38	45	39	44	42	w.	nw.	calm	sw.	sw.	.....	·05	·08	.....	.....	39
30.	30·126	30·166	29·927	29·77	29·90	29·91	30·06	30·02	38·8	46·8	39·0	42	31	36·5	46	39½	40½	37½	ne.	se.	calm	sw.	s.	·038	.....	·04	.....	·14	38
31.	30·262	30·211	30·187	29·89	29·93	29·92	29·92	30·01	35·0	43·2	35·0	40	33	37	45	41	41	43½	e.	se.	s.	sw.	s.	.....	.....	.....	.....	.....	35
Mean.	29·694	29·766	29·592	29·27	29·140	29·422	29·400	29·438	41·5	47·1	38·8	45·80	33·38	38·5	43·8	34·4	39·64	39·64						Sum. 1·869	3·15	1·67	3·41	5·43	Mean. 39

tooth in the left valve elongated and attenuated towards the umbo. In the right valve there is a flattened fold parallel to the ligament, and divided obliquely near the umbo by a faint groove; from the anterior extremity of this fold a depression extends beneath the lunule in front of the anterior lateral tooth, and in the left valve there is a corresponding elevation. Umbones closely approximating; muscular impressions deep; ligament external, situated in a deep, marginal, posterior dorsal sinus.

This remarkable genus of bivalve shells differs essentially from any other described, as will be seen by reference to the generic character above.

The difference between this and other genera, particularly *Unio*, in which genus several species have hitherto been placed, consists in the following characters:—In *Pachyodon* the cardinal tooth is often obsolete; the anterior lateral tooth is thick, simple, without striæ, situated in the right valve, having for its insertion a corresponding hollow in the left valve; the posterior lateral tooth is placed in the left valve, the sulcus for its reception being in the right. There are two cicatrices of muscular adhesion very deep and strongly marked, with a small round impression above the anterior one in the left valve.

The impression of adhesion of the mantle is entire, having no siphonal sinus.

Shell thick and heavy, without any trace of erosion at the umbo, so common to freshwater bivalves; apparently without nacre; the lines of growth very prominent, forming strongly marked transverse lines.

1. *Pachyodon Listeri*, Plate IX. fig. 1, 2.

Shell thick, heavy; transverse lines of growth from $\frac{1}{10}$th to $\frac{1}{8}$th of an inch apart, as distant near the umbo as towards the base; height from basal margin to the apex of the umbo, 1 inch $\frac{6}{10}$ths; length from the anterior to the posterior margin, 2·0; thickness 0·7.

Lias, Frethern, Gloucestershire, and Battledown, near Cheltenham.

Unio Listeri, Sowerby, Min. Conch., tab. 154. fig. 1, 3, 4.

————, Goldfuss, p. 181. pl. 132. fig. 1.

Donax? Parkinson, Org. Rem., vol. iii. pl. 13. fig. 7.

Museum of Bristol Institution.

2. *Pachyodon hybridus*, Plate IX. fig. 3, 4.

Shell cuneiform, thick; lines of growth distant and strongly marked; umbones closely approximating; lunule deep; height 1·2, length 1·8, thickness 0·7.

Lias, Langar, Nottinghamshire; near Cheltenham, Gloucestershire.

Unio hybrida, Sowerby, Min. Conch., tab. 154. fig. 2.

Museum of Bristol Institution, Samuel Worsley, Esq.

I think it probable that this species may, upon examination of numerous specimens, prove to be merely a variety of *P. Listeri.*

3. *Pachyodon imbricatus*, n. s., Plate IX. fig. 5, 6.

Shell subtriangular; lines of growth thin-edged, imbricated and numerous; lunule cordate; height 1·1, length 1·5, thickness 0·7.

Lias, banks of the Severn, Gloucestershire, and Bishport, Somersetshire.

Museum of Bristol Institution.

4. *Pachyodon crassissimus*, Plate IX. fig. 7.

Shell subtriangular; umbo incurved towards the anterior margin *, lines of growth forming deep transverse sulci; height 2·6, length 2·8, thickness 1·6.

Inferior oolite, Dundry Hill, Somersetshire.

Unio crassissimus, Sowerby, Min. Conch., tab. 153.

Museum of Bristol Institution, George Cumberland, Esq.

This species I have little doubt is the *Unio crassissimus* of Sowerby, although I do not understand his figure as regards the teeth; the shell is remarkably thick, being 1·6 from the outside extremes of one valve to the other, while the space for the animal is only 0·6.

I have seen another specimen from Wick, near Bath, three inches in height and nearly four in length; both in the collection of George Cumberland, Esq.

5. *Pachyodon crassiusculus*, Plate IX. fig. 8.

Shell ovate, symmetrical; lines of growth equidistant; anterior extremity $\frac{1}{5}$th of the length; height 1·8, length 2·5, thickness 1·1.

Lias, Langar, Nottinghamshire; near Cheltenham; Blue Anchor, Somersetshire; Robin Hood's Bay, Yorkshire.

Unio crassiusculus, Sowerby, Min. Conch., tab. 185.

Pullastra, Phillips, Geol. of Yorkshire, pl. 13. fig. 16.

Museum of Bristol Institution, Wm. Bean, Esq., Scarborough.

It is evident from the figure in the 'Mineral Conchology,' that the *Unio crassiusculus* belongs to this genus, three or four specimens having come into my possession. I have no doubt of its being a distinct and well-characterized species; it is the most symmetrical of the genus.

I very strongly suspect that the locality given in the 'Mineral Conchology' must be a mistake, originating from the close resemblance in colour which the fossils of the ferruginous marlstones have to the fossils of the crag formation.

* This portion of the shell is frequently described as the posterior in the 'Mineral Conchology,' and *vice versâ*.

6. *Pachyodon abductus*, Plate X. fig. 9, 10.

Shell triangular; umbones produced anteriorly; lines of growth nearly smooth; lunule cordate; height 1·3, length 1·7, thickness 0·7.

Inferior oolite, Dundry Hill, Somersetshire.

Lias, near Cheltenham.

Unio abductus, Phillips, Geol. of Yorkshire, tab. 11. fig. 42.

Museum of Bristol Institution.

7. *Pachyodon cuneatus*, n. s., Plate X. fig. 11, 12.

Shell cuneiform; anterior portion but slightly produced beyond the umbo; lunule deep and heart-shaped; height 0·7, length 1·2, thickness 0·4.

Lias, Frethern, Gloucestershire.

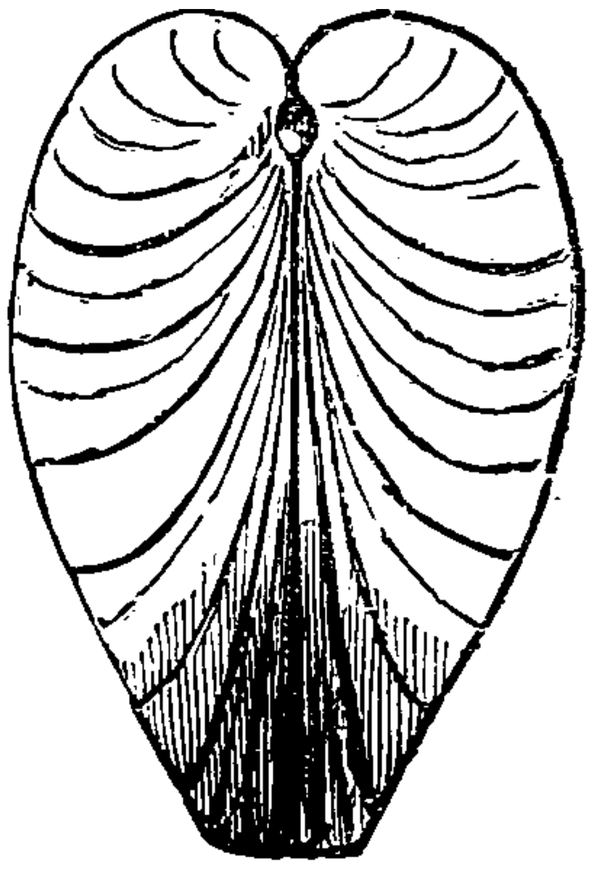
Museum of Bristol Institution.

8. *Pachyodon lanceolata*, n. s.

Shell lanceolate; anterior portion $\frac{1}{6}$th of the length, posterior portion acutely produced; hinge-line straight; lunule small; base curved; height 1·4, length 3·4, thickness 0·9.

Robin Hood's Bay, Yorkshire.

Mus. W. Bean, Esq., Scarborough.



This singular species has been kindly sent me for examination by Mr. Bean of Scarborough, who has for some time distinguished it by the specific name of *lanceolata*.

It approaches most closely to *P. attenuatus*, but differs in being more acute posteriorly, by the straightness of the hinge-line, as also by its greater thickness upon the basal margin. I regret that this species did not come to hand in time to allow of its being included in the Plates.

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LVII.—*The Birds of Ireland.* By Wm. Thompson, Esq., Vice-Pres. Nat. Hist. Society of Belfast.

[Continued from p. 430.]

No. 10.—*Corvidæ (continued); Picidæ; Certhiadæ.*

The Rook, *Corvus frugilegus*, Linn., is as common throughout the cultivated and wooded parts of Ireland as in any other country*. It is generally looked upon by the farmer as an arch enemy, of which he has ocular demonstration,—"the evil that it does" being very apparent in the headless stalks of grain, while its virtues do not in a direct manner come under his cognizance. I have always been disposed to regard the rook as a bird intended by its Creator to check the unwonted increase of the insects most destructive to the vegetation of the field, and keep them within due bounds: both England and the continent furnish us with instances of the almost total destruction of crops in particular districts, consequent on its extirpation.

The good done by this bird is generally admitted by our authors who have written within the last sixty years, greatly to exceed the evil it commits. The only exception to this which I have met with is Sir Wm. Jardine, who speaks of the good as "at least compensating for their destruction or injury to the produce of the fields." It may be possible that in particular localities the "Dr." and "Cr." account will about balance. A gentleman whose extensive farm is situated in the valley of the Lagan, and little more than a mile distant from three extensive rookeries (his place forming, as it were, the centre of the circle), once remarked to me, that he would rather than ten pounds a year that rooks never alighted on his fields. His charges against them comprise about the sum total of the evil propensities of the species. They are as follow:—"When the blade of wheat just shows itself above ground, and the pickle of grain is by frost or otherwise rendered accessible, these birds at daybreak pick it off; when grain is lodged they utterly destroy it, and do serious damage to it when in stooks, not only by eating it, but by carrying away heads of the grain, which are found scattered about the adjacent fields. The potatoe crop too they injure, by picking up the planted 'sets' in spring whenever accessible, as likewise in autumn the young potatoes; but only where the crop is thin and poor, as from such bare spots they can have a look-out against approaching enemies: where the foliage is luxuriant they never alight. They sometimes too have attacked the cherries in the garden †."

* At the more genial period of the year, flocks of rooks occasionally visit the mountain pastures about Belfast.

† Mr. Jesse, who in his 'Gleanings of Natural History' treats most agreeably of rooks generally, and particularly of the *Royal* rookeries, remarks, that these birds are "sad depredators on my cherry-trees, attacking them early in the morning and carrying off great quantities." He is nevertheless satisfied that the good done by the species greatly counterbalances the evil.

The only good here attributed to them is in "picking the grubs off lay ground, when broken up and harrowed." That where very numerous they do much of the harm here alleged is undoubted; but to prove that they do much more good than is imagined, I requested to be allowed to examine any slaughtered birds, that by exhibiting the food they contained, my friend might be convinced of the evil of his ways in destroying them; but though promised they were never sent. The propriety of having boys to guard the lately-sown wheat under the circumstances mentioned, where the depredations are perhaps the most serious, was suggested, but the very early hour was said to be an insuperable obstacle. They could however be watched* and frightened away by boys at this time, and when the grain is lodged, at a trifling expense, and then very little harm indeed would be done by them. One of the inimitable tail-pieces to Bewick's Birds (ed. 1832, vol. i. p. 93) points to the inutility of one kind of scarecrow, where a rook is represented peering curiously, but without the least fear, at the wretched effigy of humanity erected to frighten the species from its vicinity. Every person may have observed similar instances. The most notable that has come under my own observation, was where, in a newly-planted potatoe-field, a host of these birds were feeding, while among them hung four of their brethren gibbeted, and looking so fresh, that they had apparently been killed only two or three days before†.

By Wm. Sinclaire, Esq., of Milltown, near Belfast, I am informed, that towards the end of autumn, when the harvest has been gathered in, numbers of rooks have, for the last dozen years or more, come every morning, for about a fortnight, to the pine-trees (*Pinus sylvestris*) in that district, for the sake of the cones, which they pluck from the branches and carry away. When the cones cannot be detached in the ordinary manner, they seize them in their bills, and launch off from the branch into the air, that the weight of their bodies may detach them. This is their common procedure with unyielding cones, and has been witnessed with much interest from the windows of my friend's house, within a few yards of which are some pines, in which this ingenious feat is regularly practised. The rook being an especial favourite with me on account of the benefit it does mankind, I was much gratified to learn this proof of its intelligence, which raises it to an equality with the gray crow (as evinced by its rising into the air with shell-fish and dropping them on the rocks to break them), and proves it to be not unworthy, on the score of intellect, of being placed in the same family group with the raven. What they do with the cones has not been ascertained. It would seem to me, that unless the scales of the cone be so widely open that

* In his 'Familiar History of Birds,' the Bishop of Norwich fairly weighs the good and harm done by rooks, and is convinced that the former greatly preponderates. He suggests this watching, as Sir Wm. Jardine, likewise, has subsequently done.

† A friend who kept three eagles procured rooks enough on which to feed them in summer, as these birds came to regale themselves at the troughs containing pig's-meat, of which potatoes formed the principal part.

the seed is ready to drop out, they could hardly reach it, and even then a portion only would be accessible; the scales themselves could not, I conceive, be detached, unless they were partially decomposed; unfortunately, the proceedings of the birds, subsequent to their carrying off the cones, have not been watched*.

Great meetings of rooks, before the breeding season commences, have been alluded to by authors, some of whom consider that the object is to settle preliminaries respecting that important period—of the correctness of this idea I have little doubt. These assemblages are sometimes long continued. During four weeks in the year 1837—from January 21st to February 17th—whenever I happened to ride between two and three o'clock in the direction of two rookeries, I always saw, at a place intermediate between them, and about a mile distant from each, extraordinary numbers, amounting certainly to several thousands; more than I conceive the two rookeries could furnish—a third rookery, about a mile and a half distant, must, I imagine, have likewise contributed its numbers. Although they closely covered fields of all kinds (pasture, meadow-land and ploughed ground), they were not congregated for the purpose of feeding, not more perhaps than one in a hundred being ever so engaged. Again they would be all on wing at such a height as to look no larger than swallows, and keeping within as limited a space in the air as they had occupied on the earth.

As remarked by Mr. Macgillivray, rooks "seem to calculate upon the protection which they usually receive in the neighbourhood of their breeding-places." Here it is highly interesting to observe them become fellow-labourers with man when the plough is at work, closely following its track to consume the destructive insect larvæ which are turned up; thus performing an important office that the lords of creation could not accomplish for themselves. At such times too, as if conscious of the good in which they are engaged, they admit of a near approach, and their finely polished plumage has a beautiful effect as it glances like burnished metal in the sun. Their time of roosting varies a little, according to the afternoon being bright or gloomy. On the 10th of August 1837, I remarked a great number busily employed in feeding at some distance from the rookery so late as seven o'clock in the evening: the day throughout had been dull and dark.

I was informed by Richard Langtry, Esq., in the spring of 1831,

* Mr. Blackwall, in his 'Researches in Zoology' (p. 156), remarks, that "rooks in the autumn frequently bury acorns in the earth, probably with the intention of having recourse to them when their wants are more urgent." It is added, that they sometimes forget where they have concealed them. Mr. Jesse too states, that these birds "are known to bury acorns, and I believe walnuts also, as I have observed them taking ripe walnuts from a tree, and returning to it before they could have had time to break them and eat the contents. Indeed, when we consider how hard the shell of a walnut is, it is not easy to guess how the rook contrives to break them. May they not, by first burying them, soften the shells, and afterwards return to feed upon them?" (Gleanings in Nat. Hist., 1st series.)

ed on the beach for manure. About two miles inland from Ballantrae, in Ayrshire, a few hundreds of these birds, in the autumn of 1839, regularly roosted on the ground upon a rising knoll in a pasture-field. I first saw them there at eight o'clock P.M. on the 20th of August; and afterwards, on returning late from grouse-shooting in distant moors, they were always to be seen. This roosting-place was in the midst of a cultivated district, in which there was no wood of sufficient age to be patronized by the rook. At the commencement of a snow-storm in England, and after the ground became well covered, I was once amused at seeing a rook rolling in the snow, apparently enjoying itself as much as a Newfoundland dog could have done *. In summer I have met with the rook in Holland, France and Switzerland, and in some parts of the first-named country observed that it was as common as in its chief haunts in the British Islands. At the Hotel Bellevue, which is situated close to the king's park at the Hague, I for the first time experienced the evils of a rookery, the cawing from a closely adjacent one being so incessant from daybreak as to drive all sleep from me, unaccustomed as I was to such music;—this was at the end of May, when the calls of the young are almost constantly uttered.

The rook has attracted the attention of authors possessing a celebrity of a very different kind. In the 'Bracebridge Hall' of Washington Irving, an admirable chapter is devoted to it. Goldsmith gives a very interesting account of its nestling in the Temple Gardens, London, as observed by himself. A most graphic description of its manner of life about Selborne is furnished by White. Sir Wm. Jardine introduces it in a picturesque manner as an adjunct to the scenery of the park; and Mr. Macgillivray, as if conceiving that the subject had already been quite exhausted, imparts a new feature to the history of the bird, by visiting a rookery at night, and relating the proceedings at that period.

The Jackdaw, *Corvus Monedula*, Linn., is found throughout the island, especially where the labour of man is evinced by buildings, the plantation of trees, and the cultivation of the ground. But it is much more interesting to meet with this bird in its more wild and natural abode in the bold and precipitous cliffs which it frequents, whether inland or marine.

The basaltic precipices of the north-east of Ireland are much resorted to by these birds, and I believe at all seasons—in the month of October, in different years, I have observed them at the approach of evening to gather in as great numbers as in summer, to roost in the rocks at the Cavehill, near Belfast. In the wild peninsula of the Horn (co. Donegal) they breed in the marine cliffs, and according to the late T. F. Neligan, Esq., of Tralee, they nestle in caverns in very small islands about three miles distant from the coast of Kerry. On the 29th of May, 1836, I saw many jackdaws at the sandy pre-

* Waterton in his 'Essays on Natural History' mentions a tame raven acting similarly.

cipitous cliffs rising above the beach of Lough Neagh, at Massareene deer-park, where they breed in holes, all of which were stated by the gamekeeper to be the deserted burrows of rabbits.

Church towers* and steeples, chimnies†, and occasionally trees, are their ordinary nestling-places. They are generally described as late breeding birds; but a most accurate observer furnishes me with notes to the effect that on the 2nd of March he had seen them carrying building materials to a chimney in Belfast; and to other chimnies in the same town he on the 20th of that month, and on the 7th of April, saw them carrying food, as he conceived, for their young. The first foray of certain country jackdaws, in the early morning, is to the town, where they are very punctual in making their appearance: on the 11th of June I once noted the precise time of their appearance to be 45 minutes past 3 o'clock. Here they are quite innocuous; but in the country, it must be confessed, they occasionally levy contributions. Montagu has remarked that they are "fond of cherries," to the truth of which more than one of my friends' gardens about Belfast, had they not "poor dumb mouths," could bear testimony. Of all birds they are the most destructive to this fruit. A friend on one occasion coming upon a number regaling in one of his cherry-trees, fired at them, without reflecting on the damage he must necessarily do to the tree, and five fell dead to the ground; here they and other species, particularly blackbirds (*Turdus Merula*), for some years entirely consumed the crop of cherries on a number of fine and tall standard trees which could not conveniently be netted, and in consequence of their depredations the trees were all cut down. The cherry-trees in the garden of another friend, resident in the neighbourhood of Belfast, were sacrificed for a similar reason. In a district well known to me, jackdaws generally associate with rooks, and hence participate both in the good and evil done by these birds to the farm; though, as mentioned in treating of the rook, the former greatly preponderates. In a wild and uncultivated district on the northern coast of the island, I have in summer remarked flocks of these birds feeding on the sea-shore between tide-marks, and among *fucus*-covered stones.

The sites chosen by the jackdaw for perching are frequently amusing; thus I have observed five of them, in flying to a vane, alight with the most correct regularity on the letters N. E. W. S., while the other surmounted the ball, and thus would they remain stationed for some time, looking as if they were "part and parcel" of the weathercock. On the head of Nelson, as he stands erect in all his majesty on the top of the pillar which bears his name in

* In the tower of a country church near Belfast, jackdaws had in the course of time accumulated such quantities of sticks, that cart-loads of them had to be removed before some repairs on the building could be commenced.

† The burning of Shanes Castle (the mansion of Earl O'Neil, situated on the borders of Lough Neagh), which happened about twenty years ago, was said to have been caused by the dry sticks forming the nests of jackdaws in one of the chimnies having caught fire. [The last fire at York Minster has been attributed to the same cause.—Ed.]

Sackville Street, Dublin, I have seen the jackdaw alight, and impart an air of the ludicrous to the hero of Trafalgar. But under similar circumstances, this bird would not scruple to perch even

"On the bald first Cæsar's head*."

Three jackdaws, entirely white, were reared in a chimney in Belfast a few years ago, and about the same time two of a similar colour were brought up in a demesne in the neighbourhood; here they were observed by a friend associating, both in feeding and on wing, with their sable brethren, who acknowledged them as kindred. On account of their colour, they were unfortunately persecuted to the death, when they proved to be perfect albinoes, the bill and legs, as well as the plumage, being white; their hoary moustaches gave them a most venerable appearance, though in reality they were birds of the year.

On the 29th June 1835, I saw many jackdaws about the fissures of the lofty chalk-cliffs rising above the river Derwent, near Matlock in Derbyshire, where it was presumed they nestled, and the next evening heard their call there so late as ten o'clock, which tended to confirm the conjecture. In the Morea and the Archipelago, late in the spring and in the summer of 1841, I observed jackdaws equally numerous, and in localities similar to those at home, such as about the ruins of the old castle at Patras, the high western cliffs of the island of Sphacteria (the scene of Byron's Corsair), and on a rocky islet, lying to the north-east of the entrance to Port Nousa, in the island of Paros.

The Magpie, *Corvus Pica*, Linn., has long been common throughout the island, but, according to several authors, was unknown down to a certain period. Smith, in his 'History of the county of Cork,' published in 1749, remarks, that it "was not known in Ireland seventy years ago, but is now very common;" and Rutty, in his 'Natural History of Dublin,' observes, that "it is a foreigner, naturalized here since the latter end of King James the Second's reign, and is said to have been driven hither by a strong wind." (!) Dean Swift thus alludes to it in his 'Journal to Stella':—"Pray observe the inhabitants about Wexford; they are old English; see what they have particular in their manners, name and language. Magpies have been always there, and nowhere else

* The following note is contributed by my friend Mr. R. Patterson of Belfast:—"I remember some years ago my uncle, John Fowler, Esq., of the bank of Ireland, had a pet jackdaw, which answered to the name of Jack, and was regularly in the habit of performing a feat, which might baffle many a person who talks about 'the centre of gravity.' When Mr. Fowler after dinner had mixed his 'tumbler' of punch, and called 'Jack,' the bird instantly came, and perched on the edge of the glass, where he poised himself so nicely that it was never upset. I believe that, on such occasions, he used to get from his master a bit of white sugar, which he ate while thus resting on the tumbler."

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magpie is not only very clamorous, but pecks the branch on which it rests, violently tearing the bark off in its rage." On the 9th of May, I once saw a gray crow attack the nest of a magpie, when the latter, "single-handed," boldly repulsed and drove it off to some little distance. The crow nevertheless returned to the nest several times, but was always beaten off without effecting its evil purpose. Bold as the magpie is in defence of its own, I have more than once seen it beaten away by a pair of missel-thrushes (*Turdus viscivorus*) from the vicinity of their nest.

It has been often observed, that if one of a pair of magpies having a nest be shot, another mate is soon found, the period, according to Mr. Selby, "sometimes scarcely exceeding a day;" but a gentleman of my acquaintance assures me, that on his shooting one of a pair of these birds in the forenoon, the survivor had found another partner before evening. Perhaps the most remarkable instance of widowed magpies becoming provided with new partners is that recorded by the celebrated Dr. Jenner in the Philosophical Transactions for 1824 (p. 21). These birds are often so far gregarious as to frequent particular groves near their feeding-ground for roosting, in considerable numbers, and to which they resort in straggling flocks: I have thus reckoned twenty-six on wing together, when the distance between the first and last resembled that in an ill-matched pack of hounds during the chace. November 20, 1838, was a dull, dark, true November day throughout, and so early as half-past two o'clock P.M., I saw a number of these birds that had evidently retired to roost for the night; so many as about twenty of them, which on being alarmed by me flew from a fine old willow on the banks of the Lagan, looked very beautiful as they rose together.

Magpies are very generally persecuted with us on account of their evil propensities. One friend complains that his garden has suffered much from their depredations on cherries and other fruit; another that the eggs of game, &c. are greatly destroyed by them;—their propensity for eggs is taken advantage of for their destruction, and they become victims to the trap baited with those of our domestic fowl. Grain, too, they certainly consume, but their numbers are not anywhere so great as to do much injury in this respect. That they do a great deal of good, I have had abundant and positive evidence from an examination of the contents of their stomachs (supplied me by bird-preservers) at various times, but particularly in winter, when almost every one contained insects (chiefly *Coleoptera*), or the remains of mice and slugs—of the last, the internal shell (*Limacellus*, Brard.) only remained—mixed with these occasionally appeared oats and other grain. In winter, the magpie, as well as others of the *Corvidæ*, is of great service to the public, by resorting in numbers to such meadows as are manured with the offensive refuse of the slaughter-house, and feeding on the titbits*! By George Mathews,

* Since writing my account of the magpie, I find that this and several other particulars dwelt upon are much better treated of by Mr. Waterton in his 'Essays on Natural History.' His description of the bird throughout is excellent.

Esq., I have been informed that a trustworthy warrener at Springvale, county of Down (the seat of his grandfather Major Mathews), assured him, that he once saw a magpie fly some distance out to sea with a stoat or weasel fastened to it, and that he and some other men launched a boat, and followed to see the issue; when they found the magpie lying dead upon the water. The quadruped had disappeared, and they conjectured had been drowned; but Mr. Mathews thinks that it may rather have made its way ashore, as he has often seen these animals swim admirably. Montagu, in the 'Supplement to his Ornithological Dictionary,' mentions his having been witness to a weasel killing a carrion crow, the latter being in the first instance the aggressor.

Magpies are so bold, as apparently, through mere wantonness, to persecute birds that would seem to be more than a match for them: the beautiful kestrel or windhover they occasionally annoy. Towards the peregrine falcon they dare hardly show any impertinence, but the curiosity which I once saw exhibited by a pair of them towards a bird of this species was highly amusing. A trained falcon belonging to my relative Richard Langtry, Esq., on being given its liberty, after taking a few circuits through the air, alighted in a small tree, where first one, and then another magpie likewise alighted, without exhibiting the least fear, but with the intention only, to all appearance, of examining it more closely. They gradually approached the hawk until almost touching it; one indeed seemed to strike it, and immediately after they both flew to a tree close by, and commenced an incessant chattering, which was continued for some time, and which a spectator could not have believed to be anything short of a discussion upon the merits of the stranger bird. When in the tree with the hawk, they maintained a respectful silence. At the same place, a tame magpie and a sheep of a peculiar variety, whose fleece hung nearly to the ground, were great friends, and generally associated together. The favourite perch of the bird was on the sheep's back, and this animal became innocently a receiver of stolen goods, as the magpie concealed its pilferings in the thick wool of its back. It sometimes hopped after the sheep, picking at its heels; and, whether through mischief, or manifesting a natural carnivorous propensity, was very partial to pecking at the bare heels of beggars who came about the house, excessively to their annoyance. Here, also, two magpies were proficients in talking. One, without any teaching, learnt all the phrases of a parrot kept in a neighbouring cage*, and the other was taught several words and short sentences, by their being repeated to it by its master; perhaps

* It would seem that, in a wild state also, either this species or a nearly allied one will imitate the notes of other birds. Mr. Nuttall, who, from a knowledge of the bird both in Europe and America, considers the common magpie of the two continents identical, remarks—"I one day observed a small flock, and among the fraternity heard one chattering familiarly in the varied tone of the cat-bird, as he sat on a bough by the water, where birds might become his prey."—Audubon's Ornithological Biography, vol. iv. p. 409.

the most comical of these was "pretty-poll," as passing strangers, on hearing the well-known words, turned round to look at the supposed parrot, and saw only impudent "mag" instead. But anything more on this subject would be only taking a leaf out of the history of a pet magpie communicated by my friend Mr. Stevelly, Professor of Natural Philosophy in Belfast College. He remarks—

"When a boy I succeeded in rearing a magpie from a very young bird; he became much attached to me, and long before he could fly would follow me about with a curious kind of sideling hop, and even at this time of life began to show great archness, running after the peasant children, who, in the south of Ireland, go for the most part without shoes and stockings, and pecking at their bare heels; and then instantly looking up to see if punishment were meditated, of which, if he saw the least symptom, he would escape with wonderful celerity. He became so adroit at length at this amusement, that the children who came near the house were much afraid of him; when his beak became stronger, he also attacked dogs in the same manner, but always with much and very droll caution. He flew well and strongly before I attempted to confine him in the slightest degree, and roamed at large round my father's place; but when I wished him to come home in the evening, one or two loud calls of his name 'Jack' were sure to bring him from some neighbouring high tree on which he had perched, to my shoulder, which was a very favourite resting-place; when there, it was a favourite practice of his gently to run his beak between my lips or into my ear, with that peculiar motion which pigeons are observed to use when they caress each other; the tickling sensation which this process caused when my ear was in question made me always submit with difficulty, and I was frequently obliged to withdraw my head suddenly with a shudder; at this he always seemed highly delighted, and used to chatter with a guttural sound not unlike Irish words.

"The country people in the south of Ireland have a manner of calling each other from a distance by bending their fore-finger, putting it into their mouth, and producing a very loud and shrill whistle. This whistle 'Jack' became very expert at imitating, and it was a favourite amusement of his to sit on a very hot day on the top of the house, and if he chanced to espy any person at a distance, as, for example, the market-boy riding into town, a whistle from Jack, repeated if necessary, was sure to bring him back, however great his hurry, under the impression that some important commission had been forgotten, or that his presence was required at the house or farm-yard; the length of the avenue, and a gentle slope in it at about a quarter of a mile distance from the house, rendered this trick very easy to be practised, and he seemed to take great delight in it when successful, and many a hearty curse he received from the wearied subject of his practical joke as soon as he had discovered the individual who had so importunately called him back.

"He was particularly fond of any shining article, such as spoons and trinkets; these he frequently stole, and we came upon his treasure-house in a laughable way. There was an old gentleman, a

specting which a breath of suspicion as to him had never been entertained. This day's successful foray led to his losing his entire store, no doubt in the midst of his triumphal rejoicing.

"His thieving propensities seemed to gather strength from this period; but I have little doubt many articles which were lost were set down to his account without sufficient evidence that he was the thief. A valuable brooch which belonged to a lady who was on a visit with my mother was at length lost, and every finger pointed to 'Jack' as the thief; this charge acquired probability from the fact that he had on the previous day overturned and destroyed a very valuable writing-desk in her room while examining too anxiously some of the silver ornaments of its bottles; an order was forthwith issued by my father that a cage must be made for him, and the absolute liberty he had heretofore enjoyed somewhat curtailed. I submitted the more cheerfully to this order as his flights from home were now becoming obviously longer, and on one or two occasions he had not returned all night; and although at these times he made his appearance next morning hungry and cold and with a very rueful aspect, yet I was beginning to fear that he would at length acquire the habits necessary for shifting for himself, and stay away altogether. Accordingly he was caged; at first he furiously attacked the wooden bars of the cage and broke some of them, but in places so scattered, that in no one place did he succeed in making a breach large enough for his exit. He pined very much at the confinement, and the beauty of his plumage was much deteriorated, so that I at length began to let him fly about: his delight on these occasions was excessive and often laughably expressed; but his distress when again seized on to be returned to his cage was at least equally strongly expressed. He used to screech long and loudly, and resist with beak and talon; hence he soon began when liberated to fly straight off and remain away for several hours. In one of these rambles, a woman returning from Cork was astonished to see him stand so tamely on the public road beside a small pond at which he occasionally drank; she came near him and held out a herring towards him, which he very thankfully began to eat, when she secured him, cut one of his wings, and on reaching her home put him among some poultry, who beat him most unmercifully. It was four or five days before I was able to discover his prison, the woman living three or four miles off; and when I did, and had paid a few shillings for his ransom, he came home in most piteous plight; his spirit was quite broken, his plumage much injured and dingy, and except for the well-known 'Jack' and one or two other words, chiefly Irish, which he pronounced, I should have doubted or disbelieved his identity. I however pulled the feathers of his wings (which were mere stumps on one side), and by care he was beginning to recover his vivacity; when, attempting to drink at a barrel, in which, when he could fly, he was in the habit of splashing, he fell in, and was drowned before his danger was discovered. I never felt so bereaved as upon the death of poor 'Jack.'"

At the performance of the Maid and the Magpie in Belfast Thea-

tre, on one occasion in my young days, a schoolfellow about fourteen years of age, who had not before been at any dramatic representation, was present. On seeing that the woman was about to be executed for the theft committed by the bird, he from the pit gallantly roared out at the top of his voice that she was innocent, for he had seen the magpie steal the spoons.—I well remember the laugh of the school being turned against him on the following morning.

This species rarely exhibits variety in its plumage: a white one frequented a demesne near Belfast for two or three years; and a friend once saw three pure white ones, which were brought from the neighbourhood to town for sale;—they had probably been reared in the same nest.

In the month of May last, I met with the magpie about Smyrna: over the greater part of the European continent it is common.

In their respective works on British Birds, Sir Wm. Jardine admirably points out the favourite haunts of the magpie; and Mr. Macgillivray gives a very characteristic description of its manners in a wild state.

The Jay, *Garrulus glandarius*, Flem., can now be claimed as an indigenous bird by about the southern half of Ireland only.

Smith, in his 'History of the county of Waterford' (1745), says, "the jay is pretty common in our woods," and in his 'History of Cork' enumerates it among the birds of that county. Mr. R. Ball considers it to be now rare in that quarter: in the summer of 1837 he saw young birds which were taken from a nest near Youghal. Mr. G. J. Allman informed me in 1839, that the jay had of late, owing to its being protected, become common in Lord Bandon's park, in the last-named county. Mr. R. Davis, jun., of Clonmel, replied as follows to some queries in Feb. 1837:—"The jay must be indigenous: the oldest inhabitants remember them to be much more plentiful than they now are: they still breed in woods near us, but were formerly to be seen close to the town." About Portarlington (Queens-county) they are particularly numerous, and to go out there specially for jay-shooting is not an uncommon practice. About Portumna they are said to be met with, but not frequently. In Rutty's 'Natural History of Dublin,' the jay appears as one of the birds of that county, and as such it is known at present to Mr. R. Ball.

I am not aware of the existence of this bird either now, or for a long time past, in the north of the island, although there are many districts apparently well suited to its abode, and every year becoming more so from the increasing age of full-grown timber. Dubourdieu, in his 'Survey of the county of Antrim,' remarks—"The jay was much more frequent before the woods at Portmore were cut; it is still [1812] however to be met with about Shanes Castle, and other woods at the borders of the lake [Neagh]." I have been unable to verify its being there at so late a period. It must not be taken for granted that the bird called jay in the north of Ireland is the *Garrulus glandarius*, as that name is frequently bestowed on the

missel-thrush (*Turdus viscivorus**). The latest positive evidence known to me of the occurrence of the true jay in the quarter alluded to, is afforded by a venerable friend, who about sixty years ago received three young ones from a nest in Portmore park, on the borders of Lough Neagh, once rich in fine woods of oak, but which long since have fallen before the axe. In the Irish Statutes, 17th of George II., chap. 10, a reward is offered for the head of the jay, together with that of the magpie and others of the *Corvidæ*. Mr. Yarrell seems to imagine that it is to the numbers killed in consequence of this reward being offered, that the species generally became less numerous with us; but as the jay can, like the *Corvidæ*, for which a reward was at the same time offered, take very good care of itself, I should attribute its decrease to other and more natural causes. With reference to the distribution of this bird in Ireland, it is desirable to ascertain its distribution in Scotland. Sir Wm. Jardine observes, that "as we proceed northward it becomes much more local, though by no means rare, where it is found frequenting generally the older wood around private seats, and in parks, and some of the forests in the middle highlands. It is common both in Perth- and Argyleshire, but we are not sure that it extends to the forests of the far north†."

I have never met with this beautiful bird in a wild state in Ireland, but have had the gratification of seeing it in Scotland among the natural wood about the northern extremity of Loch Lomond, as well as about Coniston Water in Lancashire; and on the continent, in Switzerland and Italy—in the latter country, on the richly wooded banks of the Nera, not far from its confluence with the Tiber, and 14° to the south of the first-named locality‡.

Greater Spotted Woodpecker, *Picus major*, Linn.—All that can be positively stated of woodpeckers as Irish birds, is, that the *P. major* has in a very few instances been met with.

Templeton records a specimen obtained in the county of Londonderry in August 1802, having been sent to Dr. M'Donnell of Belfast§; and a second having been met with since. An example

* This bird is correctly remarked by Dubourdieu to be "now frequent," so that the true jay is evidently the bird alluded to.

† Brit. Birds, vol. ii. p. 253.

‡ The nutcracker, *Nucifraga Caryocatactes*, Briss., cannot be announced with any certainty as having ever been met with in Ireland. Among the notes of Mr. Templeton is one to the effect that a bird of this species "had been shot at Silvermines, county of Tipperary, by Mr. J. Lewis." In the preparation of Mr. Templeton's 'Catalogue of the Vertebrate Animals of Ireland' (published in the 'Magazine of Natural History,' vol. i. New Series) by his son, the nutcracker was omitted in consequence of the latter gentleman being unaware of any further particulars.

§ Among Mr. Templeton's drawings is a beautiful coloured representation of this bird. I have only met with this species in its native haunts, in the richly wooded valley of Sarnen, Switzerland.

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In the woods of the counties Down, Antrim, and Fermanagh*, this bird has occurred to me. Mr. J. V. Stewart notices it as found in the north of the county of Donegal; Mr. R. Ball, as met with about Dublin and Youghal; to the Rev. Thomas Knox it is known as common in some parts of Westmeath, and about Killaloe; by Mr. R. Davis, jun., it is reported to be not uncommon in Tipperary; and that the species is common in Kerry, I was informed by the late Mr. T. F. Neligan. Such of these birds as have come under my observation, though apparently aware of my presence, never exhibited any shyness, but admitted of a near approach, when it was extremely interesting to observe the regular, quick, and business-like manner in which they searched for their food. Now one would appear moving in a straight line up the trunks of the largest pines, from near the base until it would almost reach the summit; then it would be seen ascending the next tree to which it flew, by spirally winding round it, the effect being much heightened by its breast, in contrast with the dark-coloured bark, appearing of a silvery whiteness. Mr. R. Ball has "known the creeper to be captured by boys getting to the opposite side of a tree at the base of which it commenced feeding, and making a random stroke with a cap or hat, at the place they supposed it had reached in its upward movement." This species is generally stated by authors to live entirely on insects; but the stomachs of the only two I have examined, contained each, in addition to such food, a few seeds of the common pine (*Pinus sylvestris*): the specimens were shot in the month of January. Wilson, in his 'American Ornithology,' mentions his having found the seeds of the pine-tree (of course a different species from *P. sylvestris*) in the stomachs of individuals killed in the United States, and likewise "fragments of a fungus that vegetates on old wood." Mr. Macgillivray gives a very full and graphic description of the creeper, 'Brit. Birds,' vol. iii.

[To be continued.]

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

Dec. 16, 1841, and Jan. 6, 1842.—A paper was read, entitled, "On Fibre," by Martin Barry, M.D., F.R.SS. Lond. and Edin.

The author observes, that, in the mature blood-corpuscle, there is often seen a flat filament, already formed within the corpuscle. In Mammalia, including Man, this filament is frequently annular; sometimes the ring is divided at a certain part, and sometimes one extremity overlaps the other. This is still more the case in Birds, Amphibia, and Fishes, in which the filament is of such length as to con-

* Here I have seen it close to the house at Florence Court; and a friend living near Belfast has observed this bird creeping up the yard-wall attached to his dwelling-house. There is in reality nothing remarkable in such cases: they are mentioned, as some persons imagine that the creeper never leaves the depth of woods.

stitute a coil. This filament is formed of the discs contained within the blood-corpuscle. In Mammals, the discs entering into its formation are so few as to form a single ring; and hence the biconcave form of the corpuscle in this class, and the frequent annular form of the filament it produces. In the other Vertebrata, the discs contained within the blood-corpuscle are too numerous for a single ring; and they consequently form a coil. At the outer part of this coil, the filament, already stated to be flat, often presents its edge; whence there arises a greater thickness of the corpuscle, and an appearance of being cut off abruptly at this part; while in the centre there is generally found the unappropriated portion of a nucleus; and hence the central eminence, surrounded by a depression, in those corpuscles which, from the above-mentioned cause, have the edge thickened. The nucleus of the blood-corpuscle in some instances resembles a ball of twine; being actually composed, at its outer part, of a coiled filament. In such of the invertebrata as the author has examined, the blood-corpuscle is likewise seen passing into a coil.

The filament, thus formed within the blood-corpuscle, has a remarkable structure; for it is not only flat, but deeply grooved on both surfaces, and consequently thinner in the middle than at the edges, which are rounded; so that the filament, when seen edgewise, appears at first sight to consist of segments. The line separating the apparent segments from one another is, however, not directly transverse, but oblique.

Portions of the clot in blood sometimes consist of filaments having a structure identical with that of the filament formed within the blood-corpuscle. The ring formed in the blood-corpuscle of Man, and the coil formed in that of Birds and Reptiles, have been seen by the author unwinding themselves into the straight and often parallel filaments of the clot; changes which may be also seen occurring in blood placed under the microscope before its coagulation; and similar coils may be perceived scattered over the field of view, the coils here also appearing to be altered blood-corpuscles, in the act of unwinding themselves; filaments, having the same structure as the foregoing, are to be met with apparently in every tissue of the body. The author enumerates a great variety of organs in which he has observed the same kind of filaments.

Among vegetable structures, he subjected to microscopic examination the root, stem, leaf-stalk, and leaf, besides the several parts of the flower: and in no instance of phanerogamous plants, where a fibrous tissue exists, did he fail to find filaments of the same kind. On subsequently examining portions indiscriminately taken from ferns, mosses, fungi, lichens, and several of the marine algæ, he met with an equally general distribution of the same kind of filaments. The flat filament seen by the author in all these structures, of both animals and plants, he states to be that usually denominated a *fibre*. Its appearance is precisely such as that of the filament formed within the corpuscle of the blood. It is known, he remarks, that discoid corpuscles circulate in plants; and it remains to be seen whether or not filaments are formed also in these.

By gradually tracing the fibre or filament above-mentioned into similar objects of larger size, the author endeavours to show that it is not possible to draw a line of separation between the minutest filament, and an object being to all appearance composed of two spirals running in opposite directions, and interlacing at certain regular intervals; an arrangement which produces in the entire object a flattened form, and gives it a grooved appearance. It is, in fact, the structure which, for want of a better term, he has called a *flat filament*. The edge of this filament presents what, at first sight, seem like segments, but which, in reality, are the consecutive curves of a spiral thread. A transverse section of such an object is rudely represented by the figure 8. This is also precisely the appearance presented by the minutest filament, generally termed *Fibre*: and the author particularly refers to the oblique direction of the line separating the apparent segments in the smaller filament, in connexion with the oblique direction of the spaces between the curves of the spiral threads in the larger one.

The spiral form, which has heretofore seemed wanting, or nearly so, in animal tissues, is then shown to be as general in animals as in plants. Nervous tissue, muscle, minute blood-vessels, and the crystalline lens, afford instances in proof of this. And if the author's view of identity in structure between the larger and the smaller filaments be correct, it follows that spirals are much more general in plants themselves than has been hitherto supposed; spirals would thus appear, in fact, to be as universal as a fibrous structure.

The tendency to the spiral form manifests itself very early. Of this the most important instance is afforded by the corpuscle of the blood, as above described. The author has also obtained an interesting proof of it in cartilage from the ear of a rabbit; where the nucleus, lying loose in its cell, resembled a ball of twine, being composed at its outer part of a coiled filament, which it was giving off to weave the cell-wall;—this cell-wall being no other than the last-formed portion of what is termed the intercellular substance—the essential part of cartilage. These nuclei in cartilage, as well as those in other tissues, there is ground for believing to be descended, by fissiparous generation, from the nuclei of blood-corpuscles.

The author then describes the mode of origin of the flat filament or fibre, and its reproduction in various animal and vegetable tissues, which he enumerates. He conceives that each filament is a compound body which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned.

He then traces the formation of muscle out of cells, which, according to his observations, are derived from corpuscles of the blood, to the state where there exists what is denominated the *fibril*. In this process, there are to be observed the formation of a second order of tubes within the original tube; a peculiarly regular arrangement of discs within these second tubes; the formation, first of rings and then of spirals, out of discs so arranged; the interlacing of the spirals; and the origin, in the space circumscribed by these, of spirals having

connexion with some facts recorded by the author in a former memoir; namely, that many structures, including blood-vessels, have their origin in rows of cells derived from corpuscles of the blood. The human spermatozoon presented a disc with a pellucid depression, each of the two sides of the peripheral portion of which was extended into a thread; these two threads forming by being twisted the part usually designated as the tail. The occurrence of two tails, observed by Wagner, is accounted for by the author by the untwisting of these threads.

The author has noticed very curious resemblances in mould, arising from the decay of organic matter, to early stages in the formation of the most elaborate animal tissues, more particularly nerve and muscle. Flax has afforded satisfactory evidence of identity, not only in structure, but in the mode of reproduction, between animal and vegetable fibre.

Valentin had previously stated that in plants all secondary deposits take place in spiral lines. In the internal structure of animals, spirals have heretofore seemed to be wanting, or very nearly so. Should the facts recorded in this memoir, however, be established by the researches of other investigators, the author thinks the question in future may perhaps be, where is the "secondary deposit" in animal structure, which is not connected with the spiral form? The spiral in animals, as he conceives he has shown, is in strictness not a secondary formation, but the most primary of all; and the question now is, whether it is not precisely so in plants.

In a postscript the author observes, that there are states of voluntary muscle in which the longitudinal filaments ("fibrillæ") have no concern in the production of the transverse striæ; these striæ being occasioned by the windings of spirals, within which very minute bundles of longitudinal filaments are contained and have their origin. The spirals are interlaced. When mature, they are flat and grooved filaments, having the compound structure above described. With the shortening of the longitudinal filaments ("fibrillæ") in muscular contraction, the surrounding spirals, and of course the striæ, become elongated and narrow; while in relaxation these changes are reversed.*

GEOLOGICAL SOCIETY.

April 7, 1841.—"A note by Mr. Murchison on a Section and a List of Fossils from the State of New York," by James Hall, Esq., was read.

Mr. Murchison says, that in consequence of the researches of Mr. Featherstonaugh, Mr. Conrad, Mr. Hall, Mr. Vanuxem, Mr. R. C. Taylor, and other geologists, large tracts in the British colonies in North America and in the United States have been for some time known to be composed of formations containing Silurian, old red sandstone and carboniferous fossils. Mr. Hall's section, presenting a tabular view of the succession of formations, commences with the

[* We learn that the author has satisfactorily demonstrated to Professor Owen and others, since the reading of the above paper, the facts described in it.—Edit.]

red sandstone of Blossburgh in Pennsylvania, proved to be the representative of the old red sandstone or Devonian system of Great Britain, in consequence of its inclosing remains of *Holoptychius* and *Coccosteus*. This deposit is succeeded in descending order by others, referable, on account of their testaceous remains, to the lower part of the same system, and these are again underlaid by limestones and shales, especially at Lockport and Rochester, charged with *Ptilodictya lanceolata* and other Silurian corals and fossils. The lowest deposit alluded to by Mr. Hall is the Medina sandstone. The following sectional list, in descending order, is copied from his communication :—

Red sandstone.
Sandstone and shale, abundance of fossil shells.
Shale, with thin layers of sandstone ; Fucoides, abundance ; few shells.
Green and black shale, several hundred feet thick.
Black shale.
Moscow shale.
Encrinal limestone.
Ludlowville shale.
Thin mass, with Bellerophons.
Shale.
Thin limestone, with fossils.
Marcellus shale.
Limestone, with hornstone.
Onondaga limestone.
Onondaga saliferous group, containing gypsum and salt-springs.
Lockport limestone.
Rochester shale.
Limestone.
Green shale, with fossils.
Pentamerus limestone.
Green shale and iron ore.
Red and grey sandstone, Medina sandstone*.

With respect to the Onondaga saliferous group, Mr. Murchison points out its extremely low geological position, resting upon a calcareous stratum, which has been proved by its organic remains to be the equivalent of the Wenlock limestone ; and he states that it is of higher antiquity than the oldest salt-bearing beds of Russia. Mr. Murchison also alludes to the great value of Mr. Hall's communication in proving the wide application of the palæozoic succession established in Great Britain.

June 2.—"On the Faluns of the Loire, and a comparison of their Fossils with those of the newer Tertiary Strata in the Cotentin, and on the relative age of the Faluns and Crag of Suffolk," by Charles Lyell, Esq., V.P.G.S.

In a paper "On the Crag of Norfolk and Suffolk," read in 1839†,

* For detailed accounts of the New York Devonian and Silurian Systems and their Organic Remains, see the Geological Reports of the State for 1838, 1839, 1840.

† Proceedings, vol. iii. p. 171. 1839.

Mr. Lyell stated, that when M. Desnoyers assigned in 1825 a contemporaneous origin to the Crag and the Faluns of Touraine, he dissented from the conclusion; first, because the per-centage of recent species then assigned to the crag, including the Norwich beds, was greater than that ascribed by M. Deshayes to the shells of Touraine; 2ndly, because almost all the fossils in each locality were of distinct species, though only 300 miles apart; and 3rdly, because the fauna of the Suffolk crag had a northern, and that of Touraine an almost tropical aspect, notwithstanding the geographical proximity of the two districts. In 1839, however, when he compared, with the assistance of Mr. G. Sowerby, a large collection of Touraine shells, and ascertained that the recent species amounted to 26 per cent., a nearly similar result to the one at which he had previously arrived respecting the red and coralline crag, he was induced to adopt M. Desnoyers' views. As some doubts nevertheless remained in his mind respecting the localities and true geological position of certain shells assigned to the Faluns, and as he was desirous of determining the range southwards of the organic remains of the English crag, as well as northwards of those of the Faluns, and ascertaining whether the fossils of the most northern of the Falun deposits approached nearest in character to the shells and corals of the English crag, Mr. Lyell examined in the summer of 1840, first, certain of the newer tertiary deposits in La Manche, particularly those near Valognes, and between Carentan and Coutances; then the tertiary strata in the neighbourhood of Dinan and Rennes; and afterwards those along the course of the Loire from Nantes to Tours and Blois, extending his researches northwards of that river as far as Savigné, and southwards to Bossée and Pontlevoy. The following notices contain summaries of the observations made at each locality.

Crag.

Tertiary strata near Valognes.—The first geologist who explored the Cotentin was M. De Gerville. M. Desnoyers, in his memoir on that part of Normandy (published in 1825), shows that the newest secondary rock near Valognes is Baculite limestone*, and that it is overlaid by patches of tertiary strata, of the age of the Paris basin; but he does not allude to any deposit of more recent date. By the advice of M. De Gerville, Mr. Lyell visited a marl-pit at the farm of Cadet, near Ranville la Place, eight miles south-west of Valognes, and he found it to abound with Suffolk crag shells. He obtained twenty-nine species of Testacea, fifteen of which Mr. Searles Wood has identified distinctly with crag species, and seven doubtfully, the most abundant shell being *Lucina radula*. In M. De Gerville's collection from this locality, Mr. Lyell saw a specimen of the Falun variety of the *Voluta Lamberti*, or of what he considers to be a distinct species of Voluta. It is stated to have been found under an oyster-bed, and beneath the stratum containing the above shells.

* Mr. Lyell examined this limestone, and recognised its resemblance to the uppermost chalk at Faxoe in Seeland. See 'Proceedings,' vol. ii. p. 191, and 'Geol. Trans.,' 2nd Series, vol. v. p. 248, for an account of the Faxoe deposit.

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assumes a concretionary or travertine structure: at Le Quiou it is micaceous, and splits into flags; and at the village of Pas de Hac some pinnacles of soft, white, calcareous aggregate present in the lower part fine examples of cross-stratification. At St. Juvat the variety of building-stone called *La jauge*, and composed of comminuted organic remains, resembles the deposit near Saintenỳ, but the occurrence of casts of cones and large Cypræ convinced Mr. Lyell that it must be assigned to the Faluns. It is overlaid by a bed of clay of variable thickness, having been very irregularly denudated; and it is penetrated by cylindrical hollows, similar to the sand-pipes in the English chalk. From these localities Mr. Lyell obtained twenty-six species of shells, one Cirriped, five species of Echinodermata, five of corals, and seven of fishes, besides the remains of Cetacea and Mammalia before mentioned. The shells are for the most part identical with species found in the Faluns of Touraine; the whole of the corals are well-known Touraine fossils; and the fishes, according to M. Agassiz, have been all found in the molasse of Switzerland, with the exception of one species, *Carcharias megalodon*. In the solid limestones of the localities above enumerated, many of the shells, which in several places in Touraine are beautifully preserved, occur only as casts

Rennes.—The country between Dinan and Rennes consists of ancient rocks. M. Desnoyers states, in the memoir before alluded to, that tertiary beds of the age of the Paris basin and of the Faluns occur near Rennes, but Mr. Lyell is not aware of any published account of the fossils. In the ancient quarries of St. Gregoire, to which he was conducted by M. Pontallier, he found corals and casts of shells of Touraine species; also a large Spatangus, a claw of a crab, and teeth of sharks, imbedded in soft and hard limestones similar to those near Dinan. At La Chaussairie, five miles south of Rennes, occurs a perfectly distinct limestone, containing Milliolites and casts of marine shells, resembling those of the Paris basin; and associated with it are green and blue marls, enclosing freshwater Testacea. The deposit is of small extent, and rests upon transition strata; but Mr. Lyell suspects that it is in places overlaid by the ruins of the true Faluns, and that from these were derived the remains of a Lamantin and a tooth of *Carcharias megalodon*, found in the debris of a shaft sunk at La Chaussairie.

Nantes.—The district between Rennes and Nantes consists of transition and granitic rocks, but there are many detached patches of Miocene strata around Nantes. At Les Cleons is a soft coralline limestone, containing pebbles of quartz and spangles of mica, the fundamental rock of the country being mica-schist. Mr. Lyell obtained from the limestone six species of corals and five of Testacea, the whole of which, capable of determination, belong to Touraine fossils. In the museum at Nantes he saw specimens which indicate the existence of Falun strata at Le Loroux, Vieilleville and Limousinière, places within thirty miles of Nantes; also other organic remains which prove that Eocene strata occur at Cambon.

Angers.—Mr. Lyell was prevented from examining the pits north

of this place, but he was presented by M. Millet with an extensive suite of shells and corals, collected by that gentleman. Of fifty-seven species of Testacea, all but thirteen occur in the Faluns near Tours, Savigné and Pontlevoy; but the fact of there being thirteen peculiar to the Angers district induces Mr. Lyell to suspect that the fossils depart more than those of other localities from the common type. The collection contains also only nine species which can be positively identified with known recent shells, and one which is doubtful, giving about seventeen per cent. of existing species, a much smaller proportion than was obtained by the author in other localities.

Doué.—At this town are extensive quarries of a calcareous building-stone, composed of comminuted shells and corals, and exposed to the depth of forty feet. The beds are horizontal, but exhibit highly inclined cross-stratification. From the marl-beds at La Grézille, and the calcareous sand and limestone of Renaudan and Illet, villages situated six or seven miles north of Doué, Mr. Lyell procured twenty-four species of corals, four of Echinodermata and three of fishes; also a few species of shells, the most conspicuous being the large *Pecten solarium*. In the great abundance of corals and Echinoderms, and the small number of Mollusks, Mr. Lyell states that this deposit presents a perfect analogy to the white or coralline crag of Suffolk; but that its fauna is as distinct, with respect to species, from the fauna of the coralline crag, as the other localities of the Faluns of the Loire generally.

Savigné.—Between Doué and Savigné the country consists partly of the Eocene freshwater formation, which extends thence almost continuously to Paris, and partly of *Craie tufeau*. Near Savigné the Falun is composed of limestone, containing most of the Doué fossils. The result of Mr. Lyell's labours in this neighbourhood gave the following amount of organic remains, obtained chiefly from a pit which he had made near the point where the road from Savigné to Channay divides from that leading to Courcelles. The total number of species of corals which have been determined amounts to eighteen, of Echinodermata to two, of Testacea to seventy-six, and of fishes to four. Mr. Lyell also obtained an upper molar of a deer, and a molar of the *Chæropotamus Cuvieri*. Of the shells, only ten species were not found by the author at other Falun localities near the Loire; and twenty-three species, or about thirty per cent., have been identified with recent shells. Among the fishes is *Lamna contortidens*, a species which occurs in the Suffolk crag. The tooth ascertained by Mr. Owen to belong to the *C. Cuvieri*, affords, Mr. Lyell states, another instance of a mammifer common to Eocene and Miocene periods.

District south of Tours.—The immediate neighbourhood of Tours consists of cretaceous valleys, with intervening platforms of Eocene freshwater strata. The Faluns occur from twelve to sixteen miles to the south, at Louans, Manthilan and Bossée. At Louans the deposit is exposed in pits from four to five yards deep, and consists of white and yellow marl, formed, to a great extent, of comminuted shells and corals. From this bed Mr. Lyell obtained 180 species of

shells, many very small, and generally overlooked by collectors; the corals hitherto determined amount to only six species. Of the Testacea he procured all the species, except thirty-three, at other localities; and the recent species have been ascertained to be about forty-nine, or in the proportion of twenty-six per cent. At Bossée he obtained 129 species of Testacea, forty of which, or thirty-two per cent., have been identified with living shells; and of the entire number Mr. Lyell found all except thirteen in some of the other Faluns. Six species of corals, and remains of Lamna and Myliobates, have been also ascertained to occur at Bossée; and a posterior molar tooth which Mr. Lyell procured there, Mr. Owen has proved to belong to the Dichobunes, a genus of Pachyderms, found likewise in the Eocene strata of France and the Isle of Wight.

Pontlevoy.—At this town, thirty miles south-east of Tours, a patch of white Falun marl rests on the Eocene freshwater formation. In the pits east of the town Mr. Lyell procured perfectly preserved shells; and fragments of the Eocene freshwater limestone are found in the Falun bored by Petricolæ, and full of their shells. The marl is usually covered by three feet of red clay, sand and mould. Mr. Lyell found here the first specimens of the shell, generally considered to be the *Voluta Lamberti* of the English crag, but which he believes to differ from it. During his researches at Pontlevoy he procured 163 species of shells, forty-five of which, or twenty-five per cent., have been identified with existing Testacea; and on comparing the whole number with a collection of 180 from Louans, 106 were found to be common to the two localities. Only thirty-four of the Pontlevoy shells were not procured by Mr. Lyell, at some other Falun locality. Not more than six species of corals have yet been ascertained to occur in this district. The other localities near Pontlevoy examined by Mr. Lyell are Sambin and Contres. At the former the white Falun, containing hard flags, is covered by a great deposit of red, ferruginous, stratified gravel, with grains of quartz and flint derived from the Eocene freshwater formation; and it bears a striking resemblance to the gravel-beds which overlie the red crag in Suffolk. Immediately east of Sambin, as well as between Contres and Soing, Mr. Lyell found specimens of the *Ostrea virginica* associated with fragments of other Testacea, which identified the deposits from which they were obtained with those of Touraine. These detached Faluns imply, he says, that a large part of France, now drained by the Loire and its tributaries, was submerged during the Miocene period, although it is only at a few isolated points that the evidence can be detected of the long time this submergence must have lasted, and of the distinctness of the fauna which then lived, both from that now existing, and still more from that of the antecedent Eocene epoch.

General Remarks.—Previously to his tour, Mr. Lyell considered that the collections which he had seen from the Loire might be divided into two groups, the larger resembling a Mediterranean or even a more northern fauna, and the smaller a tropical one; and that some of the shells composing the latter came from inferior beds of the de-

others. The fact, that four-fifths of coralline crag Testacea are extinct, implies high antiquity; as well as the sixteen species of Echinoderms found in the crag being unknown as recent species. The author therefore refers both the crag and Faluns to the Miocene epoch, notwithstanding the specific discordance of their fossils, and he is of opinion that this disagreement may be diminished when the two faunas are better known. The difference between the Testacea of the British coasts and of the Mediterranean is pointed out; and if the greater distance of these seas from each other than of the eastern shores of England from the Faluns should be urged as an objection to the inference that the crag and Faluns belong to one epoch, Mr. Lyell calls attention to the difference in the Testacea on the opposite sides of the isthmuses of Suez and Panama, though these tracts are very inconsiderable, both in height and breadth. That land existed in the immediate neighbourhood of the Faluns, Mr. Lyell says, is proved, from the occurrence of the remains of terrestrial Mammalia, and of land and freshwater shells, though they are of rare occurrence, compared with the marine reliquiæ; and if it formed a barrier between the district occupied by the crag and that by the Faluns, the more northern character of the crag fauna might be due to the sea in which it lived opening to the north; and in support of this opinion he alludes to the rapid transition in the southern hemisphere from a district possessing a mild and equable climate, in which tropical forms of Testacea exist with others common to high latitudes, to one of extreme cold. Lastly, Mr. Lyell says, whatever speculations may be indulged, it is clear that the fossils of the crag and Faluns are almost entirely different from those of the London clay and Paris basin; that at least one-fifth of the fossil shells, both in the crag and Faluns, are identical with recent species; that fifteen per cent. of the shells and corals of the Faluns are specifically identical with those of the Suffolk crag; and that the supposed difference of climate indicated to the Testacea and Polyparia is by no means so great as some observers have supposed. Mr. Lyell nevertheless does not attach such importance to the per-centage of recent shells in the present state of knowledge of all the recent species, as to deduce from this source alone a positive inference regarding the precise agreement in age of the Faluns and the crag, merely stating that both deposits are referable to the Miocene epoch; and as the red and coralline divisions of the Suffolk crag were not formed at the same time, so he conceives there may have been shades of difference in the relative age of the Faluns and the crag.

June 16. "Description of a Newer Pliocene Deposit at Stevenston, and of Post-Tertiary Deposits at Stevenston and Largs, in the County of Ayr," by the Rev. David Landsborough, and communicated by James Smith, Esq., F.G.S.

The Newer Pliocene Deposit.—This stratum was discovered in 1839 in opening two coal-pits in the parish of Stevenston. After penetrating from thirty to thirty-five feet of sand, a bed of blue clay, nine feet thick, was passed through, and found to contain marine fossils of the newer Pliocene epoch. All the species have been obtained in other deposits of the same age in the basin of the Clyde, except two,

—*Astarte borealis*, which occurs in a fossil state in the crag and living in the Arctic seas, and *Astarte propinqua*, a new shell. Mr. Landsborough gives a list of the twenty-seven species collected by him, nineteen of which are common in the adjoining seas, six are known to exist in the Arctic seas, and two, *Natica glaucinoides*, a crag fossil, and *Astarte propinqua*, are believed to be extinct.

Post-Tertiary Deposits.—The author prefixes to his account of these beds a notice of the older formations in that part of Ayrshire. The prevailing rock is red sandstone, which, at almost every point on the coast, has been worn, by the former action of the sea, into cliffs, which indicate a change of level of about forty feet. The terrace at the base of the cliff, Mr. Landsborough states, may be considered a marine raised beach, and the shells contained in it are, with two exceptions, one of which is doubtful, of existing species.

At Ardrossan, a deposit twenty feet above the level of the sea, and at Kelly, the soil which covers the base of the inland cliff to the height of thirty feet, are full of common marine shells. Similar beds are stated to occur in the islands of Arran, Cumbra, and Inch Marnock. In the parish of Stevenston, immediately under the vegetable soil, is a bed of shingle, in which forty-seven species of shells common on the adjacent shores have been found. It rests upon shale perforated in many places by the *Pholas crispata*, of which the shell, in a very friable state, is generally found within the cavity.

At Largs the shore rises to the height of twenty feet above high water. Under a bed of loam, from five to ten feet above the sea-level, is a sandy stratum one foot thick, from which Mr. Landsborough has obtained specimens of *Millepora polymorpha*, and seventy species of marine shells, the whole of which are well-known inhabitants of the British seas, except two species of Rissoa, one of which had been previously found only in the crag, and the other is referred with doubts to the *Rissoa Harveyii* of Mr. Forbes.

Respecting the age of this deposit, Mr. Landsborough states, that 160 species having been found in it by Mr. Smith and other geologists, it would be rash to infer from the above two exceptions, "that there is a difference in the faunas of the existing period of sea-level and of that which preceded it;" but he thinks it is not improbable that some change may have taken place during the very long period in which the inland cliff was formed by the slow wasting of the sea; and he adds, the position of the bed at Largs, being ten feet under the surface, indicates a considerable antiquity, although its age must be much newer than that of the Pliocene strata, in which there is a decided proportion of extinct Testacea.

Lists of the shells found by the author at each locality accompany the paper.

"Notes by Mr. Maclauchlan, F.G.S., to accompany some Fossils collected by himself and Mr. Still, F.G.S., during their employment on the Ordnance Survey in Pembrokeshire."

Taking for a base-line the northern boundary of the Llandeilo flags laid down by Mr. Murchison, the author proceeds to describe a section extending from near Llanhuadain on the south, to Dinas

Head on the north. At Potter's Slade, a little north-west of Llanhuadain, a conglomerate dips to the northward, and is traceable westward to Ford, and eastward towards Llangan, where a sandstone conglomerate occurs containing Trilobites and shells. Proceeding on the line of section, the conglomerate is succeeded first by sandstone and sandstone shales, and then at Clarbeston by limestone with carboniferous shales, dipping northward, and containing Graptolites and casts of shells. Similar carbonaceous shales exist on the west of Clarbeston, at St. Catharine's Bridge, near Camrose; also at Rudbaxton, and on the east at Long Ford, near Llandysilio. They have in some localities been unsuccessfully worked for coal. Graptolites have likewise been found in calcareous shales at Robleston, about a mile north-west of Camrose. At Llys-y-fran, north of Clarbeston, the carbonaceous shales are succeeded by roofing-slates, which at Mynydd Castell-bythe (Castell-y-furoch, Ord. Map) and Morfel alternate with trap. On the summit of Mynydd Pontfaen, sandstone with coarse slates occurs, and between the summit and Pontfaen, trap again alternates with slates. The summit of Mynydd Llanllawer consists of coarse-grained, rudely columnar greenstone, flanked on the northern declivity of the mountain by coarse sandstone of trappean aspect. This rock is overlaid by roofing-slates, which extend nearly to Dinas Head, where a hard conglomerate sandstone, containing crinoidal remains, is exhibited. All these strata are represented in a section as dipping towards the north.

In Aberreiddy Bay, about twelve and a half miles to the southwest of Dinas, slaty beds with a northwardly dip, and apparently prolongations of the schists on the line of section, contain the *Graptolithus Murchisonii* and *G. foliaceus* of the Llandeilo flags, also numerous casts of an Euomphalus, resembling the *E. perturbatus* of that formation, and a species of Lingula. Although these slates differ in lithological characters from the Llandeilo flags, yet Mr. Maclauchlan is of opinion that this difference may have been produced by the masses of trap which are associated with the slates.

The conglomerate sandstone of Dinas Head, which occurs also in Newport Bay and at Trewyddel, near Cardigan, is stated to resemble one of the conglomerates of the Caradoc sandstone described by Mr. Murchison; and the crinoidal stems which it contains, to agree with analogous remains found by Mr. Murchison in the Caradoc sandstone at Little London, May Hill *.

In addition to the phænomena which occur in the immediate vicinity of the section, Mr. Maclauchlan alludes to indications of anticlinal lines near Narberth and at Camrose, in Southern Pembrokeshire; also at Solfach, south-east of St. David's, and at Porthllisky, to the south-west of that city. At the latter village the dip changes to the westward, and continuing to alter, assumes in Whitesand Bay a northwardly direction. This dip also prevails at St. Laurence, thirteen miles east of St. David's Head; at Leweston, three miles south of St. Laurence, and at Long Ford, about two and a half miles south of Llandysilio. Trappean ash also is stated to occur near green-

* Silur. Syst., pl. xx. fig. 19.

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the supposition of the proportion of the femur which has been preserved be right, this bone, Mr. Owen says, differs from that of the Iguanodon, not only in the want of a medullary cavity, but also in the absence of the compressed second trochanterian process which projects from the outer side of the middle of the shaft, and which forms one of the several curious analogical relations between the Iguanodon and Rhinoceros. The bone also expands more gradually than in the femur of the Iguanodon, and the posterior part of the condyles must have been wider apart in consequence of the posterior inter-condyloid longitudinal excavation being longer and wider. Various other minor points of difference are noticed by the author.

Tibia and Fibula.—The portion of a tibia which has been preserved is compressed near its head, and the side next to the fibula is slightly concave. The longest transverse diameter is eight inches nine lines, and the two other transverse diameters at right angles to the preceding give respectively three inches three lines and two inches six lines. The bone soon assumes a thicker form, its circumference at about one-third from its proximal end being sixteen inches six lines. The cancelli occupying the central portion of the bone are arranged in a succession of layers around a point nearest the narrower end of the transverse section. Lower down the tibia again becomes compressed, and towards the distal end the transverse section exhibits a plate bent towards the fibula, and its narrowest transverse diameter is two and a half inches.

The portion of the fibula is eleven and a half inches long. In the middle it is flat on one side, slightly concave on another, and convex on the two remaining sides. It presents the same cancellous structure as the tibia, but the concentric arrangement of the layers of cells is more exact. Towards the opposite end of the bone the concave side becomes first flat and is then produced into a convex wall, terminating one end of a transverse section of a compressed and bent thick plate of bone.

Metatarsals.—These bones, Mr. Owen says, exhibit the characteristic irregularity of length of the crocodilian metatarsals. Of two imbedded in the rock, and considered by the author to be the innermost and second, the former or smaller measured one foot in length, and the latter two feet, having a diameter of eight inches at its greater and of four inches five lines at its narrowest or middle part, and of six inches at its other extremity, which was imperfect. The whole of the bone within the compact outer crust consisted of cells varying from a half to two-thirds of a line in diameter. Portions of four other detached metatarsals are described.

Ilia, Ischia, Pubis, and Coracoid Bone.—These bones, the author states, also conform to the crocodilian type. The remains of the ilia are flat and nearly straight, and they gradually but slightly widen towards one end. Of one ilium, a portion, twenty-five inches long and ten inches across at the broadest end, is preserved, and of the other a fragment twenty inches in length.

The mesial extremities of the pubis and ischium are preserved in the same block of stone. The pubis, Mr. Owen states, differs from

the crocodilian type in its greater breadth. The portion exposed in this block is principally convex, but it becomes concave towards the opposite or median margin. At its broadest part it is thirteen inches across, and its length is seventeen inches. This expanded extremity is rounded, and the diameter of the corresponding expanded extremity of the ischium, which is obliquely truncated, is nine inches. In another block of stone the expanded extremity of the opposite pubis is preserved, and measures fourteen inches across and twenty-two inches in length.

The bone, considered by Mr. Owen to be a coracoid, is two feet in length and seventeen inches in its greatest breadth, and it varies in thickness from three to five inches. The breadth of this bone indicates, the author states, the great development of the muscles destined for the movement of the fore-leg, whence he infers that the anterior extremities were more powerfully and habitually used in progressive motion than in the Crocodiles, and that they were consequently provided with a webbed modification of the hand.

Mr. Owen then enters upon the question of the identity or affinities of the Hythe remains with any of the known marine genera of the saurian order, the texture of the long bones being conclusive against their having belonged to the terrestrial genera, the Iguanodon and Megalosaurus.

The length, thickness, and indications of condyles in the femur, and the length, thickness, and angular form of the metatarsal bones, place, he says, the Plesiosaurus and the Ichthyosaurus out of the pale of comparison; as well as the Mosasaurus, the locomotive extremities of which are considered to have been flattened paddles.

The superior expanse of the pubis and the broad coracoid (?), with the form of the femur and the gigantic proportions of the bones, forbid a reference to any subgenera, recent or extinct, of the crocodilian reptiles; and he shows that it is distinct from the Poikilopleuron of M. Deslongchamp by the long bones of that Saurian having medullary cavities.

Saurian Teeth from the Lower Greensand.—These teeth, described by Mr. Owen in his 'Odontography' under the name of Polyptychodon, are characterized by the crown presenting numerous closely set longitudinal ridges, which are continued, of nearly equal length, to near the apex of the crown. In their size and simple conical form the teeth of the Polyptychodon resemble those of the great sauroid fish, *Hypsodon*, Ag., but may be distinguished by the solid compact structure of the dentine, which is resolved by decomposition into successive cones; and also by the ridges on the exterior of the crown of the Hypsodon's teeth being alternately long and short, and terminating abruptly at different distances from the base, the interspaces between the longer ridges widening as they approach the apex. The tooth of the Polyptychodon is slightly and regularly curved, and invested with a layer of enamel of a clear, amber-brown colour, and of which the ridges are composed, the surface of the outermost layer of dentine being smooth. A tooth from the lower greensand near Maidstone has a crown three inches long, and one inch four lines

across the base. It consists of a body of compact dentine composed of successive lamelliform cones, and has a short and wide conical cavity at the base.

From the teeth supposed to have belonged to the Poikilopleuron, the specimens above described differ in the ridges on the crown being greater in number and more closely set, as well as in the form of the teeth being nearly circular instead of elliptical; from the teeth of the Pliosaurus they differ also in being round and not three-sided, and in having longitudinal ridges over the whole surface of the crown; and from the teeth of the Mosasaurus they differ in being ridged and not smooth.

In conclusion, Mr. Owen states, that as the Hythe Saurian is distinct from all other described Saurians, and as these teeth belonged to a great Saurian also undescribed, and further, as the Maidstone tooth was found in the same formation as the Hythe fossil, so it may be convenient to consider all these remains for the present to have belonged to the genus Polyptychodon, originally proposed for the animal which was provided with the teeth.

ZOOLOGICAL SOCIETY.

April 13, 1841.—William Yarrell, Esq., Vice-President, in the Chair.

The following paper, on some new genera of Birds, by Hugh E. Strickland, Esq., was read.

"It is not without some unwillingness that I venture to point out some new generic groups of birds, because I am of opinion that the process of naming and defining new genera has been in many cases carried too far already. The class of birds probably does not contain more than 6000 species, and these have already been distributed into upwards of 1000 genera, and I think therefore there can be no doubt that systematic ornithologists are now fast approaching the point beyond which it will not be expedient to carry the subdivision of the older groups into new genera. For we must not lose sight of the fact, that expediency or practical convenience *does* form an element in the construction even of a natural system. In such a system the *materials* which constitute any group must be naturally allied, and they must be placed in such *order* as will best show their natural affinities, and yet the number of nominal genera into which such a group is to be divided may be a question of mere expediency. For the *species*, which are the only *real* ingredients in a family or subfamily, often pass from one form of structure to another without any hiatus, so that it becomes a mere matter of opinion whether the so-called genera into which they are to be classed shall be many or few. Nature draws no line by which the rank or extent of genera can be determined. As a general rule, varieties of *form* are considered to constitute genera, and varieties of colour, species; but this criterion is far from infallible, for we very rarely find two species, however closely allied, possessing precisely the same form and proportions; so that if every difference of structure be held to be generic, we shall end in having as many genera as

Fam. Muscicapidæ.

Subfam. Fluvicolinæ.

Genus Copurus*, n. g.

< *Platyrhynchus*, Spix, < *Muscipeta*, Cuv.

Diff. Char.—*The two medial rectrices greatly prolonged.*

Rostrum triangulare (desuper spectanti) paulo longius quàm latum, modicè depressum. Culmen rotundatus, ad basin lentè, versus apicem citiùs decurvans. Nares ovatæ, patulæ. Tomia maxillaria modicè emarginata. Commissura leniter decurvata, gonys leniter ascendens. Vibrissæ rictales mediocres.

Alæ longiusculæ, remige primâ breviore, 2â, 3â, 4â, fere æqualibus.

Cauda mediocris, quadrata, nisi quòd maris rectrices duæ intermediæ graciles spathuliformes reliquas magis duplo excedunt.

Tarsi mediocres, acrotarsiis paratarsiisque scutellatis. Digitus externus interno longior, ad basin paulò cum intermedio coadunatus. Ungues longiusculi, satis curvati, acuti, graciles.

Habitat in Americâ Meridionali.

Species unica, *C. filicaudus* (Spix), Av. Braz. v. 2. pl. 14. (*Muscicapa leucocilla*, Hahn.)

Obs. This bird bears much resemblance to *Pipra* in the colours of its plumage and in the elongate rectrices, as Mr. Swainson has remarked (Classif. Birds, v. ii. p. 90). The depressed beak, however, rounded culmen, shorter tarsus, and slender claws, sufficiently prove its true place to be among the Flycatchers, near *Alectrurus*.

Fam. Pipridæ?

Subfam. Pardalotinæ?

Genus Prionochilus†, n. g.

< *Pardalotus*, Temm.

Diff. Char.—*Margins of the beak minutely serrated.*

Rostrum longiusculum, subcompressum, mandibulis subæqualibus; culmine subcarinato, juxta basin recto, deinde usque ad apicem gradatim decurvato; commissurâ modice decurvatâ; gonyde sursum curvatâ. Maxilla haud emarginata, sed tomia mandibulæ utriusque per medietatem externam minutissimè serrata. Nares oblongæ, membranâ suprà tectæ.

Alæ mediocres, remige 1â spuriâ, 3â, 4â, et 5â subæqualibus.

Cauda brevis, rectricibus æqualibus.

Pedes subbreves, gressorii, acrotarsiis subscutellatis, paratarsiis integris. Digitus externus interiore longior, ad medium per longitudinis dimidium coadunatus.

Habitant in Malasiâ.

Species: 1. *P. percussus* (Temm.), Pl. Col. 394. f. 2. 2. *P. thoracicus* (Temm.), Pl. Col. 600. f. 1, 2. 3. *P. maculatus* (Temm.), Pl. Col. 600. f. 3.

Obs. The nearest affinity of this group is *Calyptomena*, Raff., to which it approaches in the structure of the beak and feet much more

* Κώπη, an oar; οὐρά, the tail.

† Πρίων, a saw; χεῖλος, a lip.

nearly than to *Pardalotus*. The serrations of the *tomia* appear not to have been hitherto noticed.

Fam. Laniadæ?

Subfam. ——————?

Genus Æthiops*, n. g.

Diff. Char.—*Beak subconical, slightly emarginate, dilated at the base.*

Rostrum subconicum, subelongatum. Maxilla ad basin paulo dilatata, juxta apicem compressa, leviter emarginata, apice paulo deorsum curvato, tomiis inflexis. Culmen subcarinatus, gradatim à basi ad apicem decurvatus. Nares ovatæ. Commissura leviter decurvata, gonys ascendens.

Alæ mediocres, rotundatæ, remige 1â spuriâ, 3â, 4â, et 5â subæqualibus.

Cauda breviuscula, rotundata.

Tarsi breves, acrotarsiis scutellatis, paratarsiis integris. Digiti mediocres, medius tarsum æquans, postico longior; externus internum paulo superans. Ungues breviusculi, modicè curvati, ad latera sulcati.

Habitat in Africâ occidentali. Species unica.

Æthiops canicapillus. *Æth. vertice, cervice, dorsoque canescente-cinereis, verticis lateribus, uropygioque canescente-albidis. Fronte, genis, gulâ, partibusque inferioribus omnibus nigerrimis. Alæ nigræ, tectricibus minoribus omnibus, majoribusque dorso proximis maculâ subapicali rotundatâ albâ. Cauda unicolor nigra, tectricibus superioribus nigrescente-plumbeis. Rostrum pedesque nigri.*

Long. tot. 5 poll. *Rostrum* ad rictum $7\frac{1}{2}$ lin., ad frontem 6 lin., latum $3\frac{1}{2}$ lin., altum 3 lin. *Ala* 2 poll. 8 lin. Rectrices medii 1 poll. 11 lin., externi 1 poll. 7 lin. *Tarsus* 8 lin. Digitus intermedius cum ungue 8 lin., externus 6 lin., internus $5\frac{1}{2}$ lin., posticus 6 lin.

Hab. in insulâ Fernando Po. Mus. meo.

Obs. This singular generic form is very difficult to classify. The beak is somewhat similar in form to that of a Tanager, but its other characters and the African habitat forbid such a collocation. The beak also exhibits some resemblance to that of *Artamus*, but the shortness of the wings makes a marked contrast to that genus.

Fam. Fringillidæ.

Subfam. Tanagrinæ.

Genus Stephanophorus†, n. g.

< *Tanagra*, Tem., < *Pyrrhula*, Vieill.

Diff. Char.—*Beak very short, tumid, of equal height and length.*

Rostrum breve, subconicum, mandibulis subæqualibus, intumidis; culmine gradatim deorsum, gonyde sursum incurvatis; commissurâ subrectâ, leviter deorsum curvatâ; maxillâ juxta apicem obsoletissimè emarginatâ. Nares subrotundæ.

Alæ mediocres, rotundatæ, remigibus 3â, 4â (hâc longissimâ) et 5tâ ferè æqualibus.

* Αἰθίοψ, a negro, in reference to the colour and habitat.

† Στέφανος, a crown; φέρω, to bear.

Cauda mediocris, rectricibus subæqualibus.
Pedes mediocres, acrotarsiis scutellatis, paratarsiis integris. Digitus externus interiorem paulo excedens. Ungues mediocres, leviter curvati.
Ptilosis cærulescens, nitore sericeo. Vertex colore igneo insignis.
Habitat in Americâ meridionali.
Species unica, *S. cæruleus* (Vieill.), (*T. diadema*, Temm.), Pl. Col. 243.

Obs. The beak is more tumid and the under mandible more developed in this well-marked type than in any other of the *Tanagrinæ*, and it has hence been referred to the genus *Pyrrhula*. The marginal notch, however, together with the blue and silky plumage, and the geographical distribution, sufficiently prove the true place of this bird to be among the Tanagers, and in the vicinity of *Tanagra*, Lin. (restr.), and *Calospiza*, Gray (*Aglaia*, Sw.).

Fam. Picidæ.

Subfam. Celeinæ.

The genus *Brachylophus*, as defined by Mr. Swainson, includes three very distinct groups: first, the Green Woodpeckers, which had previously been named *Gecinus* by Boié; secondly, the crimson-winged species, *miniatus*, *puniceus*, and *mentalis*, to which I propose to restrict Swainson's name *Brachylophus*; and thirdly, the short-thumbed Woodpeckers, which are here characterized.

Genus Brachypternus*, n. g.

< *Picus*, Linn., < *Brachylophus*, Sw.
Diff. Char.—*Hind toe and claw very short, almost obsolete.*
Rostrum longitudine caput æquans, apice obtusè securiformi, culmine paulatim decurvato, acie laterali nullâ, commissurâ rectissimâ, gonyde paulo ascendente.
Alæ mediocres, remige 1â subspuriâ, 4â, 5â (hâc omnium longissimâ) et 6â subæqualibus.
Cauda mediocris.
Tarsus mediocris. Digitus intermedius ac versatilis tarsum æquiparantes, posticus cum ungue brevissimus, propemodum obsoletus.
Ptilosis: dorsum alæque aurantia aut rubra, facies et partes inferiores albido nigroque variegatæ.
Habitant in Indiâ, Malasiâ.
Species: 1. *B. aurantius* (Linn.), (*P. bengalensis*, Gm.; *P. nuchalis*, Wagl.; *B. hemipodius*, Sw.). 2. *B. goensis* (Gm.), (*P. peralaimus*, Wagl.). 3. *B. philippinarum* (Lath.), (*B. palalacca*, Wagl.). 4. *B. hæmatribon* (Wagl.). 5. *B. erythronotus* (Vieill.), (*P. neglectus* Wagl.).

Fam. Charadriadæ.

Subfam. Charadrianæ.

The group of Plovers affords an instance in addition to those furnished by the genera *Ceyx*, *Alcyone*, *Jacamaralcyon*, *Tiga*, *Tridactylia*,

* Βραχὺς, short; πτέρνα, a heel.

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Pedes elongati, graciles, tridactyli, acrotarsiis scutellatis.

Habitant in Africâ, Asiâ, Australiâ.

Species: 1. *S. pileatus* (Gm.), Pl. Enl. 834. 2. *S. tricolor* (Vieill.), (*Charadrius pectoralis*, Wagl.). 3. *S. bilobus* (Gm.), Pl. Enl. 880.

Genus Lobivanellus*, n. g.

< *Pàrra*, Gm., < *Tringa*, Lath., < *Charadrius*, Wagl., < *Vanellus*, Cuv.

Diff. Char.—*Four-toed, lores wattled.*

Rostrum ut in Charadriis.

Membrana loris affixa, nuda, erecta, in anticum protensa.

Alæ elongatæ, caudam vix superantes, remigibus tribus primariis subæqualibus. Spina pollicaris valida, acuta. Cauda modicæ longitudinis, rectricibus æqualibus.

Pedes elongati, graciles, tetradactyli, acrotarsiis scutellatis.

Habitant in Africâ, Asiâ, Australiâ (Americâ?).

Species: 1. *L. goensis* (Gm.), Pl. Enl. 807. 2. *L. gallinaceus* (Wagl.), Jard. Ill. Orn. ser. 1. pl. 84. 3. *L. ludovicianus* (Gm.), Pl. Enl. 835. 4. *L. senegalus* (Linn.), Pl. Enl. 362. 5. *L. albicapillus* (Vieill.), Sw. W. Af. v. ii. pl. 27. 6. *L. tricolor* (Horsf.), (*Ch. macropterus*, Wagl.). 7. *L. dominica* (Gm.), (*Ch. brissonii*, Wagl.). 8. *L. albiceps* (Gould), Proc. Zool. Soc. pt. ii. p. 45. 9. *L. cucullatus* (Temm.), Pl. Col. 505.

The Secretary called the attention of the members to a new species of Monkey, allied to the green *Cercopitheci*, living at the Society's Menagerie.

The Monkeys allied to *Cercopithecus sabæus*, observes Mr. Ogilby, are now so numerous, that they may be considered to form a subgenus of themselves, at least for all the practical purposes of descriptive zoology. Four species have been already distinguished by M. Frederic Cuvier, *C. sabæus*, *faunus*, *griseus*, and *pygarythrus*. Colonel Sykes has described a fifth, *C. albogularis*, though it is certainly less closely allied to the others than they are among themselves; and there is now a fifth living in the Gardens. This species is most nearly related to *C. sabæus* and *pygarythrus*, between which it is intermediate in many of its characters. It may be described as follows:—

Cercopithecus tantalus. *Cerc. suprà saturatè flavo-viridis, in artus cinerescens, subtus stramineus; facie subnigrâ, circa oculos lividâ; auriculis palmisque fuscis; caudâ fuscâ; apice caudæ, mystacibus et perinæo flavis; tæniâ frontali albâ.*

Head, back and sides a mixture of yellowish brown and green, of the same intense shade as that which prevails on the upper parts of the allied species, *C. sabæus* and *pygarythrus*; outer surface of the limbs of a clearer ashy grey colour; whiskers, throat, breast, belly, and inside of the limbs yellowish white; tail brown at the root, light grey at the tip; backs of the hands and feet light grey; face covered with very short hairs, black on the nose and cheeks, livid flesh-colour

* *Lobus*, a caruncle; *vanellus*, a Lapwing.

round the eyes, and light brown on the lips; eyebrows black, surmounted by a broad white fillet which passes across the forehead; nose very prominent and narrow between the eyes, but flatter and broader towards the extremity; ears and palms of the hands brown; scrotum surrounded by yellowish hairs; size and form of *C. sabæus*, but with a rounder head and shorter face.

The specimen here described was procured at Liverpool, but its previous origin is unknown.

A paper, in which Mr. Broderip proceeds with his descriptions of Mr. Cuming's shells, was next read.

Helix Reevii. *Hel. testâ ovato-subpyramidali, anfractibus 5 ventricosis, lineis incrementi creberrimè obliquè striatis, ultimo maximo, cæteris duplò longiori, apice subplano, umbilico vix apparente, columellæ robustæ basi subsinuatâ, labii limbo reflexo, aperturâ cæruleo-albâ.*

Long. 3; lat. $2\frac{3}{8}$ poll.

Var. *a. Rubro-brunnea, epidermide ex albo brunnescente obtecta, fasciis latis nigricantibus insignis.*

Var. *b. Lineis fasciisque nigricantibus numerosis cincta.*

Hab. ad Luchban in Tayabas insulæ Luzon.

Legit H. Cuming in sylvis.

Var. *c. Tota rubro-brunnea anfractu basali nigrescente.*

Hab. ad Tayabas insulæ Luzon.

Legit H. Cuming in sylvis.

This fine *Helix*, named, at the request of Mr. Cuming, after Mr. Reeve, an assiduous collector, was found by the former at the localities above mentioned, adhering to the leaves of trees. The ground-colour is reddish brown, deepening on the body-whorl to rich, dark plum-colour, approaching to black. A brownish white *epidermis* covers the two first varieties, with the exception of certain interstices, through which the ground-colour is exposed in the form of lines and bands. Thus in var. *a.* three small cinctures of brown lines appear towards the upper part, and a broad brown band at the lower part of the fourth whorl. At the upper part of the body-whorl are two hair-like dark lines, and the middle and lower part of it is belted with four bold, broad, nearly black bands. In var. *b.* the body-whorl is belted and filleted with more numerous lines and bands, but none of the latter are so broad as they are in var. *a.* In all the varieties the *peritreme* and reflected lip are of a rich plum-colour, and the inside of the aperture is bluish white. The pattern resides in the *epidermis*, and, when the shell is plunged into water, disappears.

Bulinus Onyx. *Bul. testâ subpupiformi, umbilicatâ, lineis incrementi obliquis creberrimè substriatâ, anfractibus 7, ultimo maximo; anfractibus 4 primis sordidè albis, quinto et sexto castaneis, ultimo supernè castaneo, basi albo, labii reflexi margine lato et columellâ nigricantibus, aperturâ albâ.*

Long. $2\frac{1}{2}$; lat. $1\frac{1}{8}$ poll.

Hab. ad Calanang insulæ Luzon.

Legit H. Cuming in sylvis.

The above description is taken from a shell deprived of its *epidermis*, and I have only seen one with the *epidermis* on, and that one is not in good condition. The *epidermis* is dirty white. On the anterior part of the fourth whorl a band of longitudinal brown dashes, occurring at regular intervals, extends far upon the whorl from near the suture. A similar band skirts the anterior part of the body-whorl, which is belted with two whitish bands, the uppermost rather below the middle, and is greenish at the base. Upon plunging the shell into water the upper *epidermis* disappears, and exposes the ground-colour; but the greenish *epidermis* remains unchanged. The aperture of the shell almost looks as if it had been curtailed artificially, so suddenly does it terminate.

Bulinus Alberti. *Bul. testâ pyramidali, anfractibus sex, lineis incrementi obliquis creberrimè striatâ, anfractu ultimo cæteros vix æquante, apice acuto, rubro-brunneo, basi viridi; columellâ subsinuatâ et labii reflexi margine nigricantibus; aperturâ albâ.*

Long. $2\frac{6}{8}$; lat. $1\frac{6}{8}$ poll.

Var. *a. Strigis angulatis albidis et nigricantibus concinnè marmorata; anfractu basali fasciis* 2 *subalbidis cincto.*

Hab. ad montem Isarog insulæ Luzon.

Legit H. Cuming in sylvis.

Var. *b. Obscurior; anfractu quinto albido supernè unifasciato, anfractu basali albido trifasciato.*

Hab. ad Calanang insulæ Luzon.

Legit H. Cuming in sylvis.

This species, the most elegant of all the *Bulini* which I have yet seen, is named in honour of His Royal Highness Prince Albert. The form and rich but elegant colouring of the shell combine to make it very beautiful. The pattern, as in the two last species, resides in the *epidermis*, and, when the shell is plunged into water, disappears; but the green at the base remains unchanged, as in the last species.

Mr. Cuming found var. *a.* on the leaves of trees in the woods at the foot of Mount Isarog, in the province of South Camarines, at the south-east end of Luzon. It was very rare, for Mr. Cuming, after a search of many days, could only procure six specimens.

Var. *b.* was found in dense woods, also on the leaves of trees, in the province of the Laguna, at Calanang, in that island.—W. J. B.

April 27.—William Horton Lloyd, Esq., in the Chair.

The exhibition was resumed of the new species of Shells collected by H. Cuming, Esq. in the Philippine Islands, and the following description of new species, by W. J. Broderip, Esq., was read.

Helix (Carocolla) Reginæ. *Car. testâ hyalinâ, prasinâ, lineis incrementi obliquè striatâ, lineolis transversis creberrimè decussatâ suberectâ, anticè compressâ; anfractibus* 3, *ultimo latissimo, acuto, suturam versus concinnè cælato; aperturâ infrà angulatâ; labii margine subexpanso, acuto.*

Long. $\frac{4}{8}$; lat. $1\frac{1}{8}$ poll.

Hab. ad Sibongam Insulæ Zebu foliis arborum hærens, rarissima.

Legit H. Cuming in sylvis.

there the similitude ends. The termination of the aperture is below the line of the body-whorl. The shell consequently rests more on its base: it is much more opaque than *Car. Reginæ*, and has no angle at the aperture, the inside of which has the iridescence of mother of pearl. The sharp edge of the body-whorl is light yellow.

Var. *a. Planior albido- et luteo-virescens; anfractu basali maculis albidis obscuris guttato; basi flavescente; labii limbo ex albido flavescente.*

Hab. ad insulam Bureas, foliis arborum parvorum hærens.

Legit H. Cuming in sylvis.

In this variety, which is much flatter, the sharp edge of the body-whorl is whitish.

Helix (Carocolla) Listeri. *Car. testâ complanatâ, umbilicatâ; anfractibus* 4, *lineis incrementi creberrimè striatis, ultimo maximo acuto; albido-fuscâ maculis brunneis guttatâ, et brunneo uni-fasciatâ; peritremate deorsùm flexo auriculari, albido; labii unidentati margine acuto, anticè lanceolato.*

Long. $\frac{5}{8}$; lat. $1\frac{7}{8}$ poll.

Hab. ad Albay insulæ Luzon, truncis arborum hærens.

Legit H. Cuming in sylvis.

Mr. Cuming had named this species *Car. Gallina*; but as it is designated as *Car. Listeri* on the boards of the British Museum, and as Lister appears to have been the first who figured it, but apparently from an imperfect shell, the latter name is retained.

In colour and in the direction of the form and shape of the aperture it bears much resemblance to *Helix auriculata*, figured by Mr. Swainson (Zoological Illustrations, 1st series) from a specimen formerly in the cabinet of Mr. C. Dubois, afterwards in mine, and now in the British Museum; but in *H. auriculata* the whorls are comparatively rounded, and the body-whorl is quite round instead of having a sharp edge. *H. auriculata* is besides, in many individuals, dimpled with small depressions. These differences may be sufficient in the present state of our knowledge to constitute specific distinction; but whether they are in reality strong enough to form such a separation, may well be doubted. My present impression is, that *H. auriculata* and *H. Listeri* are identical; but I shall return to this subject when I have examined the whole of the cognate series in Mr. Cuming's collection.

Helix (Carocolla) Parmula. *Car. testâ valdè complanatâ, umbilicatâ; anfractibus* 4, *lineis incrementi striatis, ultimo maximo, acuto; fuscâ, lineâ brunneâ suturam juxta albam fasciatâ, margine anfractûs ultimi acuto, albo; peritremate deorsùm flexo auriculari; labii anticè sublanceolati subalbidi margine subreflexo.*

Long. $\frac{3}{8}$; lat. $\frac{1}{2}$ poll.

Hab. ad Argao insulæ Zebu, arborum excelsorum truncis hærens.

Legit H. Cuming in sylvis.

This is a delicate though not showy species.

Var. *a. Elevatior, obscurè albens fasciâ suturali et centrali fuscis ornata.*

Hab. ad insulam Negros, truncis arborum hærens.
Legit H. Cuming in sylvis.

Helix (Carocolla) Siquijorensis. *Car. testâ subcomplanatâ anfractibus* 4, *lineis incrementi creberrimè striatâ; ultimo maximo, acuto; labii subreflexi limbo superiore haud deorsùm depresso; fuscâ, epidermide cinerascente coopertâ.*

Long. $\frac{5}{8}$; lat. $1\frac{6}{8}$ poll.

Hab. ad radices arborum et arbusculorum in insulâ Siquijor.

Legit H. Cuming in sylvis.

The ash-coloured *epidermis* which covers this species, upon immersion in water, disappears, to reappear when it is dry. When it is wet the dark brown ground-colour is exposed. The shell varies to a lighter whitish-brown hue. The sutural line is darker than the general colour, and the lower surface of the expanded edge of the lip is dark brown and shining in each variety. The termination of the upper edge of the lip is on the same line with the edge of the body-whorl.

Helix (Carocolla) Thersites. *Car. testâ subcomplanatâ, gibbâ, tenuissimâ, hyalinâ, diaphanâ; anfractibus* 4, *lineis incrementi creberrimè striatis, ultimo anticè acuto, posticè subitò rotundato, gibbo; aperturâ magnâ; labii anticè reflexi limbo subreflexo, flavescente; anfractibus suturam versus et medio castaneo-fasciatis; nucleo castaneo.*

Long. $\frac{1}{2}$; $1\frac{3}{8}$ poll.

Hab. ad Calopan in insulâ Mindoro, foliis arborum hærens.

Legit H. Cuming in sylvis.

The deformed appearance of this species arises from the flattened and sharp edge of the body-whorl suddenly becoming rounded at about half way. The colouring is pretty, the chestnut bands showing to advantage on the transparent amber-colour of the shell. The young shell has no gibbosity.

Var. *a. Subdiaphana, fasciâ latissimâ nigro-castaneâ ornata.*

Hab. cum præcedente.

This variety is more opake, and the broad, blackish, chestnut band extends from the suture half-way down the whorls. The base of the shell is broadly bifasciated with the same dark colours, the narrowest band being nearest to the outside edge. The termination of the lip in this species is on the same line with the body-whorl.—W. J. B.

The next paper read was by G. B. Sowerby, Esq. This also consists of descriptions of Mr. Cuming's new species of shells.

Helix modesta. *Hel. testâ acuminato-subovali, tenui, albicante, fasciis spiralibus badiis modestè ornatâ; spirâ acuminatiusculâ, apice obtuso; anfractibus* $4\frac{1}{2}$ *subrotundatis, lævibus, lineis incrementi tenerrimè insculptis, ultimo maximo, ventricoso; suturâ distinctâ; aperturæ margine externo rotundato, interno supernè anfractu penultimo modificato; columellari recto, angulum efformante; peristomate paululùm reflexo, badio; columellâ rectâ, albâ, subincrassatâ.*

Long. 1·1 ; lat. 0·8 poll.

Hab. supra folia arborum, propè Catanauan provinciæ Tayabas insulæ Luzon, Philippinarum.

An extremely rare species, rather remarkable among its gay associates of the Philippine Islands for its unpretending modesty of colouring, as well as for its neat contour.

HELIX PYRAMIDALIS. *Hel. testâ oblongo-pyramidali, brunneâ, crassiusculâ; apice obtuso, saturatiore; fasciâ suturali nigro-brunneâ nonnunquam ornatâ; spirâ acuminatâ; anfractibus 5½, leviter rotundatis, lævibus, lineis incrementi tenerrimè insculptis, ultimo majori, rotundato; aperturæ margine externo rotundato, interno supernè anfractu penultimo modificato; columellari recto, angulum efformante; peristomate reflexo, subincrassato, brunneo; columellâ rectâ, crassiusculâ, albâ.*

Long. 1·5 ; lat. 0.8 poll.

Hab. supra folia arborum, ad insulam Cuyo, Philippinarum.

This species most nearly resembles our *Helix incompta*, but may be easily distinguished by its proportions, the number of volutions, and its longer, more pyramidal spire.

HELIX ACUMINATA. *Hel. testâ acuminato-pyramidali, brunneâ, nigrâ, crassiusculâ; apice obtusiusculo, pallidiore, spirâ acuminato; anfractibus 5, planulatis, lævibus, nitidis, lineis incrementi tenerrimè insculptis, ultimo majori, medianè subangulato; aperturâ anticè subeffusâ; peristomate externo subincrassato, reflexo, brunnescente-nigro; columellâ albâ, subincrassatâ, subdeclivi.*

Long. 1·3 ; lat. 0·8 poll.

Hab. supra folia arborum ad insulam Cuyo, Philippinarum.

Two specimens only of this species have been found ; it somewhat resembles the last, but may be known from that by its more acuminated shorter spire, and by the sides of the volutions being nearly straight, and not rounded. Remains of an opake hydrophanous *epidermis* are to be seen on both the specimens.

HELIX OBLONGA. *Hel. testâ oblongâ, subcylindricâ, tenui, brunneâ, obscurâ, subrugosâ; anfractibus senis, latis, ventricosis, ultimo majori; suturâ distinctâ; aperturâ subovali, posticè anfractu ultimo modificato; peristomate amplo, subincrassato, reflexo; columellâ albâ, subincrassatâ, rectiusculâ; umbilico mediocri.*

Long. 1·5 ; lat. 0·75 poll.

Hab. supra folia arborum, ad insulam Luban, Philippinarum.

Somewhat like *H. Oomorpha*, but distinguished easily by its proportions, by the number of its volutions, and by the nature of its *peritreme*.

HELIX FRAGILIS. *Hel. testâ subglobosâ, tenuissimâ, lævi, viridescente; anfractibus tribus, raptim crescentibus, ultimo maximo, lineis interruptis fasciisque duabus anticis albis; aperturâ magnâ; peristomate tenui, subreflexo; columellâ tenui, rectiusculâ.*

Long. 1· ; lat. 1·15 poll.

Hab. supra folia arborum, prope Tanauan ad insulam Leyte, Philippinarum.

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exceptions afforded by the genera *Canis*, *Lycaon*, *Hyæna*, *Lutra*, and *Phoca*. The corpuscles of the common species of the two latter, and of the Dog, are the largest I have yet found in the order. The most minute corpuscles of the *Feræ* were also found in the family *Carnivora*. In the *Viverridæ* and *Felidæ* the corpuscles appear to be very small, as compared with those of the *Phocidæ* and *Canidæ*; and in the genera *Paradoxurus* and *Herpestes* the corpuscles are, for the most part, remarkably so, especially in the *Paradoxurus Bondar**, in which animal they only slightly exceed those of the Goat in size, as noticed in the 'Proceedings of the Society,' Nov. 24, 1840. Among the Cats there is a great resemblance of the corpuscles, which are only just appreciably larger in the Lion, Tiger, Chetah, and Leopard, than in the domestic Cat, so that it would require a nice observation to detect any difference. In the Serval and Norway Lynx, the corpuscles, obtained after death from the heart, appeared to be fully as large as those of any other species of the genus; the corpuscles of the Ocelot and Persian Lynx presenting the smallest size. But as the blood was obtained from the two last species during life, the observations were not quite satisfactory for comparison, as the corpuscles soon undergo changes after death†, and are very liable to certain alterations quickly after being abstracted even from the living animal‡. In the Dog they were uniformly found to be slightly larger than in the Fox and some other congenerous species; and in the Striped and Spotted Hyænas the corpuscles closely resemble those of the genus *Canis*, and are therefore distinctly larger than in the *Viverridæ* and *Felidæ*, with both of which the Hyæna has been associated. The corpuscles of the *Bassaris* approximate pretty nearly to those of the *Ursidæ*.

"On the whole then, although there is considerable diversity in the magnitude of the red particles of the order, there is generally a well-marked relation between these and the different families. Thus the blood-corpuscles of the *Plantigrada* may be immediately distinguished from those of the *Viverridæ*. Adopting Mr. Waterhouse's subdivisions of the *Carnivora*, they would stand as follows, if set down in the order of the size of their blood-discs:—Seals, Dogs, Bears, Weasels, Cats, Viverras. The difference in size is generally quite distinct between the corpuscles of the first two and last two tribes, the discs of the Weasels forming the connecting link, and closely approximating to those of the Cats. The corpuscles of the Otter, however, are much larger than any I have yet seen of the rest of the *Mustelidæ*, and in fact agree very nearly in size with the corpuscles of the Seals and Dogs.

"It has been stated, that in the *Carnivora* the corpuscles are intermediate in size to those of the omnivorous species and of the strictly vegetable feeders—smaller in the *Carnivora*, for example, than in

* In the Menagerie of the Zoological Society this animal is called *Paradoxurus Typus*, but I have been assured that it is the *P. Bondar* of authors; it is the same species as that designated *P. Typus* in the Phil. Mag. for Jan. 1840, p. 28.

† See Lond. and Edin. Phil. Mag. for March 1840, p. 195.

‡ *Ibid*, Nov. 1840, p. 325.

Kangaroo."

An abstract of the measurements of the blood-corpuscles of the order *Feræ* is subjoined.

Measurements of the Blood-corpuscles of the order Feræ.

The measurements are all expressed in fractions of an English inch, and, for the sake of brevity, the average-sized corpuscles only are mentioned, as deduced from numerous observations in each species.

Insectivora.	
Talpa Europæa, *Linn.* . . .	1·4747
Sorex tetragonurus, *Herm.*	1·4571
Erinaceus Europæus, *Linn.*	1·4085
Plantigrada.	
Meles vulgaris, *Desm.* . . .	1·3940
Ursus maritimus, *Linn.* . .	1·3870
—— Arctos, *Linn.*	1·3732
—— Americanus, *Pallas.*	1·3693
—— ferox, *Lewis & Cl.* . .	1·3530
—— labiatus, *DeBlainv.*	1·3728
Procyon lotor, *Cuv.*	1·3950
Nasua fusca, *Desm.*	1·3789
—— rufa, *Desm.*	1·3878
Basaris astuta, *Licht.* . .	1·4033
Carnivora.	
Paradoxurus binotatus . .	1·4660
—— leucomystax, *Gray*	1·4236
—— Bondar.	1·5693
Canis familiaris, *Linn.* . .	1·3542
—— Dingo, *Blum.*	1·3397
—— Vulpes, *Linn.*	1·4117
—— fulvus, *Desm.*	1·3920
—— argentatus, *Desm.* .	1·3888
—— lagopus, *Linn.*	1·3888
Canis aureus, *Linn.*	1·3860
—— mesomelas, *Schreb.*	1·3645
—— Lupus, *Linn.*	1·3625
Lycaon tricolor, *Brookes.*	1·3801
Hyæna vulgaris, *Desm.* .	1·3735
—— crocuta, *Linn.*	1·3820
Herpestes griseus, *Desm.*	1·4662
—— Javanicus?	1·4790
—— Smithii, *Gray*	1·4466
Viverra Civetta, *Linn.* . .	1·4274
—— tigrina, *Schreb.* . . .	1·5365
Felis Leo, *Linn.*	1·4322
—— concolor, *Linn.* . .	1·4465
—— Tigris, *Linn.*	1·4206
—— Leopardus, *Linn.* . .	1·4319
—— jubata, *Linn.*	1·4220
—— pardalis, *Linn.*	1·4616
—— domestica, *Brisson.*	1·4404
—— Caracal, *Gmelin* . .	1·4684
—— cervaria, *Temm.* . .	1·4220
—— Serval, *Linn.*	1·4129
Galictis vittata, *Bell.* . . .	1·4175
Mustela Zorilla, *Desm.* . .	1·4270
—— furo, *Linn.*	1·4134
Lutra vulgaris, *Erxl.* . .	1·3502
Phoca vitulina, *Linn.* . .	1·3281

The next paper read was from W. J. Broderip, Esq., in which the author resumes his descriptions of Mr. Cuming's shells.

Helix (Carocolla) Virgo. *Car. testâ subcomplanato-globosâ, nitidâ, subdiaphanâ, lineis incrementi obliquis creberrimè striatâ, suturis et anfractûs basalis angulo subelevatis subcrenatis, vix umbilicatâ; aperturâ auriculato-angulatâ; labii limbo subreflexo.*

Var. *a. Alba, labii limbo purpureo-brunneo.* Long. $\frac{5}{8}$; lat. $1\frac{4}{8}$ poll.

Var. *b. Tota alba.*

Hab. ad insulam Zebu, foliis arborum hærens.

Legit H. Cuming.

The entirely white variety of this delicate shell (which has the appearance of being framed of the purest wax overlaid with a glassy transparent enamel) is rather smaller than var. *a*. The animal in both varieties is of a light bluish green, so that when it is withdrawn into the transparent shell it produces a strong resemblance to *Carocolla Reginæ*; and indeed, when Mr. Cuming first saw them, he for a moment thought that he had found large specimens of that lovely shell; but when the animal was taken out, the delusion vanished.

Helix (Carocolla) dealbata. *Car. testâ sordidè albâ, subflavescente, subdiaphanâ, subglobosâ, lineis incrementi obliquis creberrimè substriatâ, vix subumbilicatâ; aperturâ auriculatâ, magnâ; labii limbo vix substriato.* Long. $\frac{10}{12}$; lat. $1\frac{4}{8}$ poll.

Hab. in insulâ Siquijor, foliis arbusculorum hærens.

Legit H. Cuming.

The dim and sordid white of this species is enriched when the greyish white animal is withdrawn into the shell.

Helix (Carocolla) Puella. *Car. testâ globosâ, diaphanâ, lineis incrementi obliquis creberrimè substriatâ; aperturâ auriculato-rotundatâ; labii limbo subreflexo.*

Hab. in insulâ Camiguing, foliis arbusculorum adhærens.

Var. *a. Alba, anfractu basali lineâ brunneâ subcentrali cincta.*

Var. *b. Tota alba.*

Legit H. Cuming.

The colour of the animal is dark greyish white.

Helix (Carocolla) Rota. *Car. testâ complanatâ, rotundatâ, subdiaphanâ, umbilicatâ, supernè lineis elevatis, acutis, infrà lineis elevatis haud acutis, concentricis, regularibus corrugatâ, flavescente; anfractibus supernè medio bilineatis, anfractûs basalis infrà unilineati angulo acuto, dentato, unilineato; lineis castaneis; aperturâ auriculatâ; peritrematis unidentati limbo subexpanso albo.*

Long. $\frac{3}{8}$; lat. 1 poll.

Hab. in insulâ Siquijor, arborum truncis hærens.

Legit H. Cuming.

The animal of this elegantly worked *Carocolla* is yellowish, somewhat like the ground-colour of the shell, which is exquisitely sculptured after the manner of engine-turned trinkets. Above, the elevated concentric lines are sharp, and the shell on that side has somewhat the appearance of a flattened *Scalaria*: beneath, the elevated

a conformation cannot be trusted as a specific character. The animal is a dark purplish brown.—W. J. B.

Mr. Yarrell exhibited a British example of the *Motacilla alba* of Linnæus, which had been shot at Kingsbury. Two pairs of this species of Wagtail were seen by Mr. Bond near the reservoir in the early part of the present month, and, although they were very shy, that gentleman, who furnished Mr. Yarrell with the specimen exhibited, succeeded in shooting three of them, two males and one female.

M. Leonard read a paper on the intelligence of animals, which he illustrated by means of two pointer dogs which he had trained for the purpose.

To show that these animals possessed the power of comparison, he placed different objects upon the ground, such as a glove, a roll of paper, a small box, &c., and having kept similar objects himself, he showed them one after another to either of the dogs, and desired the animal to fetch that which was like it from the ground. The dogs performed this task correctly, and all others which they were desired.

Cards, with numbers from 1 to 9 painted upon them, were placed upon the ground, and the dogs fetched any particular number they were bidden: a number brought, M. Leonard ordered the dog to take back again and exchange for another number, and at the same time to deposit it in the place of that number. The dogs also selected a card of a particular colour, when desired, from among many of different colours. Pieces of bread were placed on the ground, and in placing them, their master called them by the names of different numbers in an irregular manner, and afterwards ordered the dogs to fetch the piece of bread he had called a certain number. These and various other experiments (some with pieces of meat) were all performed correctly, and tended to show the great intelligence of the animals and the control which their master had obtained over them.

The dogs were named Phylax and Braque, and either dog, upon his name being called, performed the task he was ordered; but one of them appeared to be more quick than the other.

June 8.—William Yarrell, Esq., Vice-President, in the Chair.

Read a paper by G. B. Sowerby, Jun., Esq., entitled "Descriptions of eight new species of the genus *Ranella*," in the collection of Mr. Cuming.

1. Ranella vexillum, Conch. Illustr., f. 3. *R. testâ ovali, ventricosâ, subacuminatâ, pallidè brunneâ, transversè striatâ, fasciis rufescentibus elevatis noduliferis cinctâ; varicibus irregularibus, decumbentibus, latis; aperturâ magnâ albâ, intùs griseo fasciatâ, posticè vix canaliferâ, anticè in canalem brevem rectum, latum terminante; labio interno sublævi decumbente, dentibus lævibus paululùm incrassato; labio externo subexpanso, leviter undulato, dentibus ferè obsoletis intùs incrassato.*

Long. 3·40; lat. 2 poll.

Hab. ad (Chiloe) Conception.

Mr. Cuming collected specimens at rocky places from three to six fathoms deep. The outer lip is more expanded, and the knotted brown bands are narrower and more numerous than in *R. argus*.

2. Ranella cruentata, Conch. Illustr., f. 5, 5*. *R. testâ subquadratâ, rugulosâ albâ vel pallidè fulvâ, rubro-maculatâ, inter varices ad angulum anfractuum tuberculis magnis tribus, in medio tribus minoribus; varicibus elevatis, utrinque foveolatis; aperturâ paululùm angustatâ, extremitatibus validissimè canaliferis; labio interno decumbente, dentibus acutis instructo, maculis sanguineis 5 ad 6 in medio picto; labio externo complanato, subdigitato, intus dentibus validis instructo.*

Long. 1·50; lat. 1·20 poll.

Hab. ad insulam Ticao, Philippinarum. H. Cuming legit.

Found on coral reefs. This species is remarkable for the well-defined spots of blood-red colour by which that part of the inner lip which rests upon the body-whorl is ornamented. A darker variety occurs, in which the spots are of a strong brown colour.

3. Ranella nana, Conch. Illustr., f. 6. *R. testâ elongato-ovali, lævi, inter varices nebuloso-purpureâ, in medio anfractu fasciâ albâ cinctâ, ad angulum anfractuum tuberculis acutis quatuor, anteriùs tuberculis parvis; varicibus prominentibus, anticè laqueatis, posticè canalem exhibentibus; aperturâ ovali, ad extremitates validissimè canaliferâ; labio interno granoso; labio externo valdè denticulato.*

Long. 1·80; lat. 1·05 poll.

Hab. ad insulam Panama, Philippinarum. H. Cuming legit.

Found in coarse sand at seven fathoms.

4. Ranella albo-fasciata, Conch. Illustr., f. 14. *R. testâ ovali, subcompressâ, granulosâ, fusco-purpureâ, fasciâ albâ in medio anfractu cinctâ, lineis moniliformibus numerosis et ad angulum* 6 *ad 7 tuberculis cinctâ; varicibus granuloso-tuberculiferis; aperturâ ovali, ad extremitates validissimè canaliferâ; labio interno granoso; labio externo valdè denticulato.*

Long. 1·80; lat. 1·20 poll.

Hab. ad insulam Panama, Philippinarum.

Much broader and more completely granulated than the former, which is nearly all over smooth. In this respect our shell resembles *R. granulata*, Lam., but it is neither so oval nor so compressed, the varices are more strongly marked, and the posterior canal is more perfect.

Found in coarse sand at 10 fathoms.

5. Ranella rhodostoma, Conch. Illustr., f. 10. *R. testâ subquadratâ, rugulosâ, granulatâ, pallidè fulvâ, rufo-punctatâ et maculatâ, inter varices tuberculis prominentibus* tribus *ad angulum,* tribus *in medio anfractu; aperturâ roseo-purpureâ, paululùm angustatâ, ad extremitates valdè canaliferâ; labio interno granuloso propè canales* transversè *dentato, labio externo sub-expanso, undulato, intùs dentato; varicibus granoso-tuberculatis, validis, utrinque foveolatis.*

Long. 1·15 ; lat. ·85 poll.

Hab. ad insulam Masbate, Philippinarum.

Found on coral reefs by Mr. Cuming. It is a pretty little species with a delicately purple aperture.

6. Ranella subgranosa, Conch. Illustr., f. 18. *R. testâ ovali subangulatâ, purpureo-fuscâ, brunneo-fasciatâ et maculatâ, transversè lineis elevatis, moniliformibus alternantibus striatâ ; ad angulum anfractuum tuberculis acutis ; varicibus elevatis, utrinque subfoveolatis, granoso-tuberculatis ; aperturâ ovali, albâ, intùs pallidè purpureâ ; canali postico lato, antico subrecurvo, lato ; labio interno tenui, posticè dentato anticè extanti ; labio externo crenulato validissimè dentato, ad canalem posticum aculeato, anticè subexpanso.*

Long. 2·85 ; lat. 1·70 poll.

Hab. ad sinus Manillæ. H. Cuming legit.

This species very nearly resembles *R. elegans*, Beck, Chemn. 1270, Conch. Illustr., f. 17, of which it may perhaps be only a local variety. Our shell is of a more oval shape and is more evenly granulated in every part. Found in sandy mud at ten fathoms.

7. Ranella neglecta, Conch. Illustr., f. 22. *R. testâ subquadratâ, brevi, lineis granulatis transversè striatâ, pallidè fulvâ, fusco-maculatâ ; inter varices ad angulum posticum tuberculis tribus magnis, in medio tribus ad quatuor parvis, prope caudam uno, et aliquando serie moniliformi tuberculorum parvorum ; varicibus crassis liratìm granulosis posticè foveolatis ; aperturâ ovali albâ ; canali postico brevi, recto ; canali antico brevi, subrecto ; labio interno decumbente, granulato, prope canalem posticum acutè denticulato ; labio externo, minutè denticulato, propè canales solùm reflexo.*

Long. 1·60 ; lat. 1·15.

Hab. ad insulam Ceylon.

This shell, which is now common, differs from *R. crumena* in the following respects : it is shorter, the tubercles are more obtuse, the canals are shorter and straighter, the outer lip is scarcely reflected, and the inner lip is not raised at the caudal extremity.

8. Ranella rugosa, Conch. Illustr., f. 7. *R. testâ ventricosâ, granulosâ, angulatâ, pallidè fulvâ, fusco-maculatâ ; inter varices ad angulum posticum tuberculis tribus obtusis, granulosis, inter granula fusco interrupto-lineatis, in medio lineâ duplicatâ moniliformi ; caudam versùs lineis quinque alternantibus moniliformibus ; varicibus crassis, granoso-tuberculatis, utrinque validissimè foveolatis ; canali antico tortuoso, magno ; aperturâ rotundato-ovali albâ, canali postico sub-elongato ; labio interno tortuoso, propè extremitates validè extanti ; labio externo reflexo, extùs laqueato, intùs quinquefariam bi-denticulato, denticulis foveolato.*

Long. 2·30 ; lat. 1·50.

Hab.

This species has not the thickness, flatness, nor the elongated, curved, posterior canal of *R. bufonia*, nor are the tubercles so large.

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are remarkably small. The ferns in Shetland are less numerous than those in Iceland or Faroe, while those of the Long Island exceed the Faroe species by four, and are exactly equal to the number found in Iceland,—the Faroe and Iceland lists being the smallest recorded in Mr. Watson's valuable paper on the Distribution of Ferns, recently published in the Transactions of this Society (vol. i. p. 89).

The more mountainous character of the Long Island will probably account for the much larger proportion (1 to 22) which its ferns bear to the flowering plants, than that which appears to exist in Shetland; for although considerable allowances be made for the imperfect state of the Long Island list, on account of the short time employed in its preparation, yet it does not seem probable that the number of its flowering plants will be so far increased as to raise their relative proportion as high as that shown to exist in Shetland, since this would require an addition of 151 species, even if the number of ferns remained stationary.

The communication concludes as follows:—"We must be allowed to impress upon the Society, that this tour is not of the less interest for not having produced any plants new to the British Flora, since we consider the determination of the flora of any district, peculiar either in its structure or situation, to be of importance, as elucidating the effect of soil or climate upon the distribution of plants.

"We would also take this opportunity of expressing our sense of the obligations under which we lie to the gentlemen of Skye and the Long Island, who in a truly kind and liberal manner exercised their hospitality towards our party, and greatly contributed to the pleasure, indeed we may say to the success, of the excursion."

2. On the Anatomy and Physiology of the seed of *Phaseolus vulgaris*, or French Bean, by Dr. Spencer Thomson, Burton-on-Trent.

In this paper, which was accompanied by illustrative drawings, the author, after giving an elaborate dissection of the seed, stated a variety of circumstances relative to its mode or course of germination, and traced the analogy between that process and the growth of the fœtus in the animal kingdom. He also noticed M. DeCandolle's views on the subject, and pointed out the results which seemed to arise from them.

3. On the discovery of three species of Fungi new to the British Flora, viz. *Tuber ferrugineum*, *Æcidium Thesii*, Leefe, and *Uredo Symphyti*, D. C., by the Rev. J. E. Leefe.

With regard to the first of these fungi, Mr. Leefe says,—"The specimens are in general of a rich red bronze colour. Their smell is peculiarly strong and penetrating, so that on receiving a letter enclosing specimens, Mr. Berkeley can, before opening it, determine positively what it contains."

4. Notice of the discovery of *Cerastium triviale* β. *holosteoides*, Fries, near Kinfauns Castle, Perthshire; and of *Rubus arcticus*, near the head of Glen Tilt, Perthshire, by Mr. J. Robertson, Kinfauns Garden.

Considerable interest was manifested respecting the occurrence of the latter species in the British Flora, and some discussion took place

with regard to its identity; but the specimen exhibited was so imperfect as to leave doubts whether the discovery ought yet to be fully relied on, especially as our botanists have more than once been disappointed in this respect.

BIBLIOGRAPHICAL NOTICES.

A History of Infusoria, living and fossil, arranged according to 'Die Infusionsthierchen' of C. G. Ehrenberg; containing coloured engravings illustrative of all the Genera, and Descriptions of all the Species in that work, with several new ones. By Andrew Pritchard, author of 'Microscopic Illustrations, &c.' 8vo. 1841. Whittaker and Co.

Mr. Pritchard informs us in his Preface, that "the translation of 'Die Infusionsthierchen' was made for him by Dr. Willshire, who also compared his manuscript of Part II. with that work," and on whose authority he relies for stating that the materials taken therefrom are correctly given. "Since Dr. E.'s volume appeared," he adds, "some discoveries in Fossil Infusoria have been made; these, and the Spermatozoa of plants, unknown in this country, I have introduced. Information derived from other sources is duly acknowledged."

The work is illustrated by twelve large and well-filled plates*, containing more than 500 finely executed and coloured figures, which must greatly recommend it to the student as well as render it attractive to the general reader. Of the drawings, the author informs us, "Those for plate xii. were kindly furnished me by that venerable and distinguished botanist, Dr. Unger of Gratz, and the late eminent microscopic observer, Mr. F. Bauer. Every original drawing has the artist's name mentioned in the description of it, and the others, with few alterations, are from 'Die Infusionsthierchen.' The labour and time occupied in selecting, reducing, arranging and condensing these was far greater than most persons would imagine, and the cost of this undertaking has far exceeded my anticipation; but should it meet with patronage sufficient to repay the outlay, and my health permit, it is my intention to bring out, on another branch of microscopic science, a work of equal extent to the present, materials for which I have been for some time collecting."

The 'Natural History of Animalcules' being out of print, Mr. Pritchard offers the present volume as a preferable substitute for a new edition of that work, in which to introduce the later discoveries. "Dr. Ehrenberg's magnificent and elaborate work, entitled 'Die Infusionsthierchen,' having since appeared, and offering a better classification than Müller's, it has been adopted here. I have only to regret," he adds, "that its distinguished author, or some more competent naturalist than myself, has not presented us with an epitome of it."

"In the description of the families, genera and species, I have not adhered to 'Die Infusionsthierchen,' but only condensed such

* Of which the one attached to our present Number will, except as to colour, serve as a specimen.

portions as appeared desirable, interweaving them with other matter; hence it would be unjust to its author to consider this manual an abstract of it. That work being intended to establish a new classification, and as a book of reference, a large portion of its ample 600 folio pages is occupied in giving the synonyms, in references, and in discussions; these I have omitted, but every species described in that work will be found here, together with many others since discovered. A new system of classification is seldom acceded to wholly at first: that by Dr. Ehrenberg has met with its share of opponents. The principal arguments respecting it will be found herein; so that the student, having both sides of the question before him, will be able to arrive at a fair conclusion."

The work is divided into two Parts. In the First, the general history of infusorial animalcules is treated of, in 34 sections; and Part II. consists of their classification and description, viz. 188 genera, and 732 species. Ehrenberg's late work on the Infusoria of the Chalk Formations* is briefly alluded to in an Appendix, bringing the number of species up to 786.

We are much pleased to find in Mr. Pritchard's volume a very seasonable assistant and acceptable source of information to those who feel an interest in the contributions which the microscope is daily making to the knowledge of nature.

Supplementary remarks on Mr. G. R. Gray's '*Genera of Birds*.'

Since the publication of my former notice of Mr. Gray's work in the 'Ann. and Mag. of Nat. Hist.' for January last, a few additional observations have occurred to me. Being desirous of rendering this excellent work as extensively useful as possible, by pointing out those minor details which seem to require correction, I do not scruple to add the following criticisms by way of supplement to my former review.

Page 12 of the 'Genera of Birds.' Dr. Horsfield's genus *Eurylaimus* should be written *Eurylæmus*.

P. 72. It is satisfactory to find that the several authors who claim the honour of giving a specific name to the type of *Geococcyx*, may cease from the contention. This bird was first described by Fernandez 191 years ago under the name of *Hoitlallotl* (see Ray, Syn. Av., p. 158), and was recorded by Latham and Gmelin under the name of *Phasianus mexicanus*. It will therefore now stand as *Geococcccyx mexicanus* (Gm.).

P. 80. The European species of *Bonasa* should be called *B. betulina* (Scop.) instead of *B. sylvestris* (Brehm.).

P. 83. *Cursorius europæus*, Lath., ought, in point of priority, to be called *C. gallicus* (Gm.).

* Of this record of Prof. Ehrenberg's latest discoveries, with his statement of the important geological inferences to be deduced from them, a translation will immediately appear in the forthcoming Part of the 'Scientific Memoirs.'

the substance of the optic, olfactory, and auditory nerves, as well as that of the brain and spinal chord, Dr. Barry employed for the most part such as had been preserved in spirit; and, besides using extremely minute portions, he very often avoided adding any covering whatever, the weight of thin mica itself being sufficient to rupture or to flatten this delicate substance, and thus entirely prevent its structure from being seen. In the parts last mentioned, he finds red discs, which pass first into rings, and then into spirals. In fasciculi from the spinal chord, and surrounded by spiral filaments, he met with a "band-like axis," which perhaps corresponds to that of Remak in the nerves: but if so, Dr. Barry's observations go farther even than Remak's. The "axis" described by this observer was found by him to be susceptible of division into filaments. So also is the one described by Dr. Barry. But the latter adds, that each filament is a compound object, which enlarges, and, from analogy, may contain the elements of future structures, formed by division and subdivision, to which no limits can be assigned. The spermatozoa, mentioned in the abstract, were from the epididymis of a person who had died suddenly. The depression noticed in their discoid extremity—corresponding apparently to the "sugient orifice" of some authors—is probably analogous to the source of new substance in other discs. In these examinations, Dr. Barry has generally added to the objects dilute spirit (sp. gr. about 0·940), containing about $\frac{1}{200}$th of corrosive sublimate. Spirals from the leaf-stalk of the strawberry, after the addition of this reagent, were seen to have divided into parallel filaments having the same structure as those above described. Flax presented a quadruple coil of such filaments. In early states of voluntary muscle also, there were seen double and quadruple coils, evidently produced by the same means—division. Dr. Barry compares the appearance of the vegetable "dotted duct," in its several stages, with that of objects found in mould, in the cornea, in the crystalline lens, and in voluntary muscle; all of which are produced by associations of minute spiral threads. The distribution of the remarkable filaments above described is so universal, that they are found in silk, in the incipient feather, in hair, in the feather-like objects from the wing of the butterfly and gnat, and in the spider's web.

Dr. Barry informs us that he has had the opportunity of showing to several physiologists the principal appearances described in his memoir on fibre. And Professor Owen permits him to state, that he has exhibited to him spirals in voluntary muscle,—muscular "fibrillæ" having a flat, grooved, and compound form,—the filamentous structure of the "white substance in nervous fibre,"—the vegetable spiral becoming double by division,—a coiled filament within red blood-discs,—and the incipient unwinding of the coil in coagulating blood.

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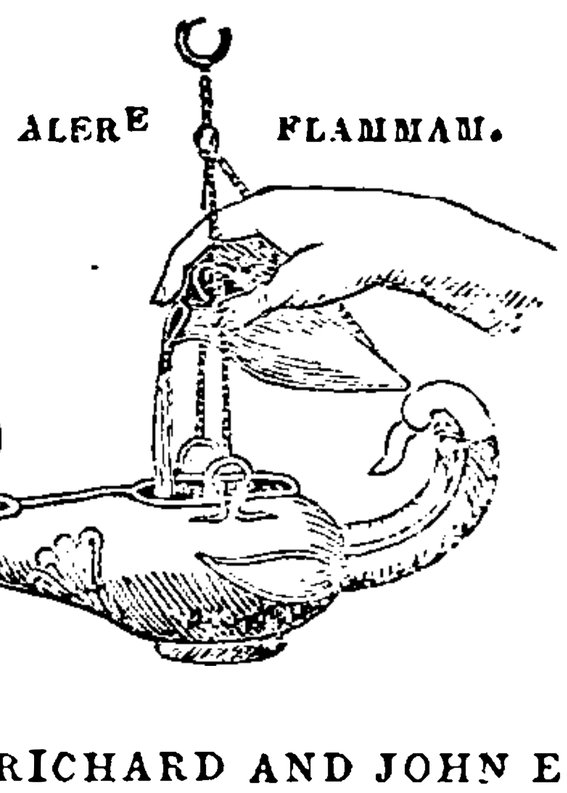

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