

A new diploid species of *Hieracium* sect. *Pannosa* (Asteraceae) from Bulgaria

VLADIMIR VLADIMIROV^{1*} and ZBIGNIEW SZELĄG^{2†}

¹*Institute of Botany, Bulgarian Academy of Sciences, Acad. Georgi Bonchev St., bl. 23, 1113 Sofia, Bulgaria*

²*Institute of Botany, Polish Academy of Sciences, 46, Lubicz St., PL-31–512 Kraków, Poland*

Received December 2004; accepted for publication July 2005

Hieracium petrovae Vladimirov & Szelaĝ **sp. nov.**, a new diploid ($2n = 18$) species in *H.* sect. *Pannosa* Zahn, is described and illustrated from the Rhodope Mountains, South Bulgaria, and compared with related taxa. It grows in relict habitats in crevices of limestone rock together with many Balkan endemics. *H. petrovae* is morphologically similar to taxa from the *H. pannosum*, *H. pilosissimum* and *H. heldreichii* groups (collective species *sensu* Zahn) to some of which it is a presumed ancestral species. © 2006 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2006, 150, 261–265.

ADDITIONAL KEYWORDS: Asteraceae – Balkan Peninsula – chromosome number – taxonomy.

INTRODUCTION

During a floristic survey in July 1999 in the Buynovo and Trigrad gorges, Central Rhodope Mountains in southern Bulgaria, we found an interesting species of *Hieracium* L. from *H.* sect. *Pannosa* Zahn. The plants grew in crevices of limestone rock by the road and were distinctive in their habit and relatively narrow flower heads. The species was re-collected in September 2001 in flowering and fruiting states in the same gorges. A survey of the collections in Bulgarian herbaria revealed that some specimens had been collected previously from several localities in the Central Rhodope Mountains but misidentified as various infraspecific taxa of *H. pannosum* Boiss.

MATERIAL AND METHODS

Morphological characters were noted from herbarium material of personal collections and from the herbarium of the Institute of Botany, Bulgarian Academy of Sciences (SOM). Several individuals were collected and cultivated under glass in the Institute of Botany in Sofia for further study and to obtain chromosome counts.

*Corresponding author. E-mail: vdvlad@bio.bas.bg, †E-mail: azszelag@wp.pl

The chromosome number in three wild-collected plants grown under glass in Sofia was counted at mitotic phase. Root tips were pretreated with colchicine solution (0.01%) for c. 90 min, then fixed in acetic alcohol (1:3) for at least 2 h at room temperature, hydrolysed in 1M HCl for 15 min at 60 °C, stained in Gomori's haematoxylin (Melander & Wingstrand, 1953) for 30 min, also at 60 °C, and finally squashed in 45% acetic acid. Voucher specimens are deposited in SOM. The taxonomy of all species mentioned in ecological notes (except for *Hieracium*) follows Kozuharov (1992).

RESULTS

HIERACIUM PETROVAE VLADIMIROV & SZELĄG, **SP. NOV.** (FIGS 1–3).

Diagnosis: Species nova e sectione *Pannosa*, ab *Hieracio pannoso* s.s. capitulis minoribus cylindrico-subglobois, involucris minus pilosis, foliis oblongo-lanceolatis sinuato-dentatis minus pilosis (dense et longe pilosis, sed non villosolanceolatis) differt; ab *H. friwaldii* caule plerumque ramoso et inflorescentia multicephala, capitulis minoribus, foliis angustioribus et minus pilosis differt; ab *H. heldreichii* s.l. et *H. pilosissimo* s.l. caule et foliis densius plumoso-pilosis,

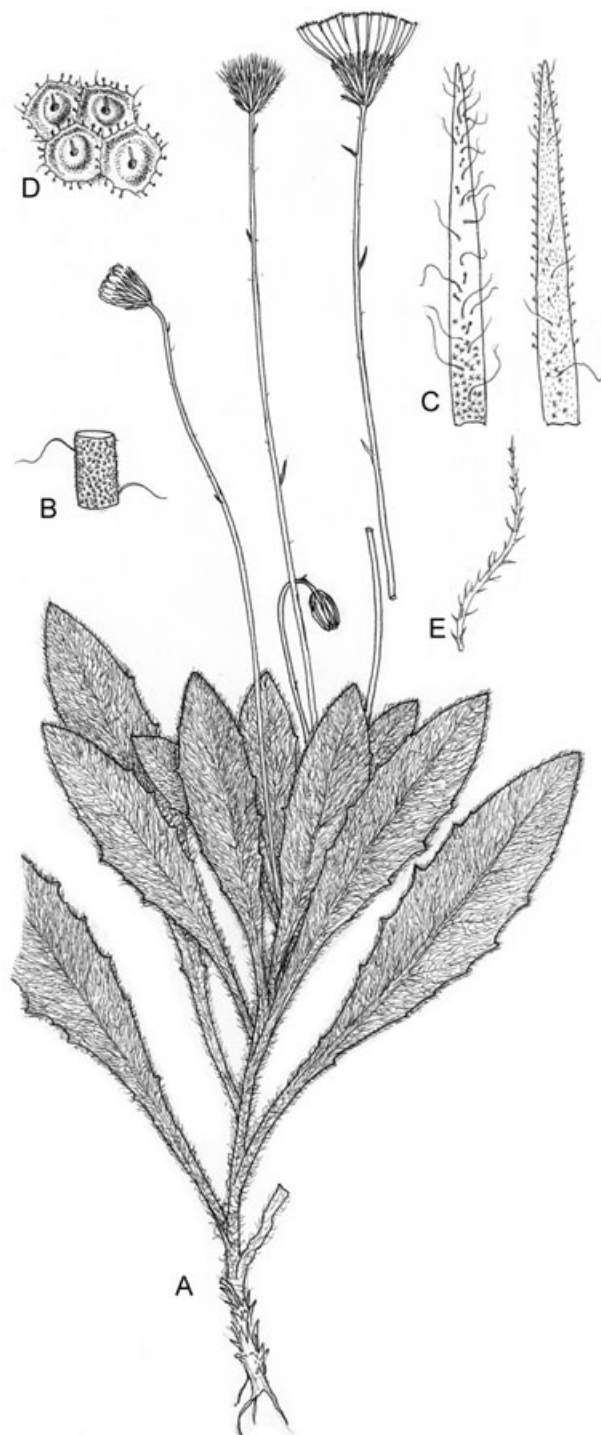


Figure 1. *Hieracium petrovae* sp. nov. A, whole plant. B, indumentum of peduncle. C, indumentum of involucre bracts. D, receptacular pits. E, plumose hair on the leaves.

ramis monocephalis (praeterea 1-2 capitulis abortivis) differt.

Holotype: V. Vladimirov s.n. (SOM 159952), Bulgaria, Central Rhodope Mts, Trigrad gorge, crevices of limestone rock near the entrance of Dyavolskoto garlo [Devil's throat] cave, c. 1100 m a.s.l., 41°36'N, 24°22'E, 14.ix.2001.

Isotypes: BM, K, KRAM, SO, SOA, SOM, WU.

Paratypes: Bulgaria: Central Rhodope Mts, Buynovo gorge, crevices of limestone rock and screes along the road c. 0.5 km downwards from the entrance of the Yagodinska cave, c. 1000 m alt., 41°37'N, 24°19'E, 14.ix.2001, V. Vladimirov s.n. (SO, SOA, SOM); Inter Chvojna et Bela Crkva, 1907, I. Urumov s.n. (SOM 89373!, 89374!, 89376!); Choudnite Mostove, limestone rocks 1470 m, 41°49'N, 24°35'E, 18.vii.2004, Z. Szelaġ s.n. (KRAM); Zabrdno, limestone rocks 1220 m a.s.l., 41°48'N, 24°36'E, 18.vii.2004, Z. Szelaġ s.n. (KRAM).

Etymology: Named after Dr Ana Petrova, one of the most active and experienced explorers of the Bulgarian flora.

Description: Perennial hypophylopodous or pseudophylopodous herb. STEMS 20–40(60) cm tall, villous with dense, up to 7–8 mm long, plumose hairs, in the upper parts also with sparse to dense stellate hairs, branched, with 1–3(7) mono- to 2(3)-cephalous (often 1–2 capitula aborted) branches. LEAVES villose to lanate on both surfaces with dense, 1.2–4 mm long, flexuous, plumose hairs on the central vein beneath and up to 5–6 mm long hairs at the margins, sometimes also with a few microglands, 0.3–0.6 mm long. Cauline leaves 5–15, confined to the lower half of the stem or forming a false rosette at or usually above the base of the stem. Lower leaves 4–20 × 1.2–4(6) cm, oblanceolate, broadest in the upper third, usually obtuse, rarely subacute; lamina entire, denticulate or dentate with 6–14 teeth on each side or more or less sinuate, gradually narrowing to an indistinct, winged petiole. Middle and upper cauline leaves rapidly diminishing in size, oblanceolate, obovate-lanceolate to broadly obovate, denticulate to dentate, with short indistinct petiole or sessile, semiamplexicaul. SYNFLORESCENCE with (1)2–8(19) capitula; branches elongate, 15–20(30) cm long, with 2–4 bracts. Acladium (the terminal branch of the synflorescence) 14–25(27) cm. Peduncles slightly thickened below the capitula, covered with moderate to dense, sessile and stalked stellate hairs, and sparse to moderate, flexuous, plumose hairs. CAPITULA broadly cylindrical to cylindrical-subglobose, 10–14(16) × 6–8(10) mm. Involucre bracts



Figure 2. *Hieracium petrovae* sp. nov. Variation spectrum of cauline leaves.



Figure 3. *Hieracium petrovae* sp. nov. Variation in density of involucre indumentum.

linear-lanceolate, acute, 10–14(15) × 0.9–1.2 mm; the outer dark green with pale margins, covered with dense stellate hairs, sparse to dense, flexuous, subplumose hairs, 1–3.5 mm long, and moderate to dense (in the upper part) microglands, 0.05–0.2 mm long; the inner papillose, covered with dense stellate and microglandular hairs, without or with a few flexuous subplumose hairs. Ligules yellow, glabrous at apex. Stigmas yellow. Achenes 3.8–4.8 × 0.6–0.8 mm, stramineous. Pappus of 6–7 mm long hairs. Margins of

receptacular pits with 0.1–0.16 mm glandular hairs, sometimes also with 0.3–0.45 mm simple eglandular hairs.

Chromosome number: Three plants from the type collection were investigated karyologically. They are diploid ($2n = 18$).

Phenology: Flowering: July–October; Fruiting: August–November.

Habitat and distribution: *Hieracium petrovae* is a calciphilous chasmophyte growing in rock crevices and screes. It occurs usually in sunny, dry places in the larger limestone areas of the Central Rhodope Mts. – Trigrad and Buynovo gorges, along the Buynovska river between Devin and Grohotno, Choudnite mostove rocks ('Wonderful Bridges' rocks), Zabrdo village and Byala cherkva (Fig. 4). These limestone areas are floristically very rich, harbouring a number of relict and endemic species. In the Trigrad gorge, *Arenaria rhodopaea* Delip., *Asplenium trichomanes* L., *Haberlea rhodopensis* Friv., *Hieracium kittanae* Vladimirov, *Saxifraga stribrnyi* (Velen.) Podp., *Saxifraga sempervivum* C. Koch, *Secale montanum* Guss. ssp. *rhodopaeum* (Delip.) Kožuharov, *Sedum album* L., *Syringa vulgaris* L., *Trachelium rumelianum* Hampe were present in close proximity to *H. petrovae*.

Affinities: *Hieracium petrovae* is a diploid species, closely related to a number of presumably descendent taxa in the *H. pannosum*, *H. pilosissimum* and *H. heldreichii* collective species (cf. Zahn, 1921–23).

Hieracium pannosum s.s. differs from *H. petrovae* in having denser indumentum on the leaves and involucre, almost entire, broader leaves, and larger, ±globose capitula, 16–20 mm across. Karyological investigations also indicated that *H. pannosum* s.s. from the Balkan Peninsula is triploid (Schuhwerk & Lippert, 1998) or tetraploid (Vladimirov & Szelaĝ, 2001a).

Taxa from *H. heldreichii* s.l. and *H. pilosissimum* s.l. differ from *H. petrovae* in having a less dense indumentum of (sub)plumose hairs on the stem and leaves. Moreover, their inflorescence branches bear 1–3 well-developed capitula, whereas in *H. petrovae* the monocephalous branches prevail or the second and the third heads are usually aborted.



Figure 4. Distribution of *Hieracium petrovae* sp. nov.

Morphologically, *H. petrovae* is similar to *H. friwaldii* Rchb. fil. described from Crete (Reichenbach, 1860), but differs in the smaller flower heads, multicephalous synflorescence, narrower and sparsely hairy leaves. Buttler (1991) assumed that *H. friwaldii* can be conspecific with *H. pannosum*. Unfortunately, we were unable to find any specimen of the original Frivaldsky's collection in a number of European herbaria, including the herbaria of the Hungarian Natural History Museums in Budapest (BP) and Natural History Museum in Vienna (W) that host the greater part of the original Frivaldsky's herbarium. Nevertheless, we had at our disposal an excellent colour illustration of *H. friwaldii* published in the protologue by Reichenbach (1860).

Zahn (1921–23) proposed a new taxonomic treatment of *H. friwaldii*: *H. pannosum* ssp. *frivaldszkyi* Zahn with much wider circumscription and distribution area from Herzegovina and Bulgaria to Crete. A close phytogeographical relationship between the mountains of Crete and Herzegovina, and the Rhodope Mts are very unlikely when the 'narrow species concept' is applied in *Hieracium* s.s. In our opinion *H. pannosum* ssp. *frivaldszkyi* represents a heterogeneous complex and deserves further analysis. We propose the name *H. petrovae* for only the diploid taxon within *H. pannosum* s.l., that is confined to the limestone areas in the Rhodope Mts and possibly in neighbouring mountains, especially in Greece.

DISCUSSION

The genus *Hieracium* s.l. is one of the largest in the Asteraceae comprising some 1500 species in Europe alone (Sell & West, 1976). It is among the most taxonomically complex genera of vascular plants owing to the occurrence of hybridization, polyploidy and apomixis. The Balkan Peninsula is a territory in Europe rich and diverse in *Hieracia*. Many morphologically distinct and isolated species can be found there, including sexually reproducing diploids, e.g. *H. kittanae* (Vladimirov, 2003), *H. pavichii* Heuff. (Vladimirov, 2000; Mráz & Szelaĝ, 2004), *H. pseudopilosella* Ten. (Vladimirov & Szelaĝ, 2001b), *H. sparsum* Friv. (Vladimirov & Szelaĝ, 2001a), *H. transylvanicum* Heuff., *H. umbellatum* L. (Vladimirov, 2000) and *H. waldsteinii* Tausch (Schuhwerk & Lippert, 1998).

Hieracium sect. *Pannosa* occupies a special position among the Balkan *Hieracia* with the presence of some remarkable hairy-leaved taxa. Besides the Balkan Peninsula, some representatives of *H. sect. Pannosa* occur in Asia Minor, as well as on several East Mediterranean islands (Zahn, 1921–23; Sell & West, 1975, 1976; Buttler, 1991). Zahn, (1921–23) designated three so-called *species principales* in *H. sect. Pannosa*,

equivalent to the *species groups* in *Flora Europaea* (Sell & West, 1976). These are: *H. gymnocephalum* Griseb. ex Pant., *H. waldsteinii* Tausch and *H. pannosum* Boiss. The first two taxa are Balkan endemics restricted to mountain ranges in the western part of the peninsula, whereas *H. pannosum* has a broader distribution; apart from the Balkans it grows also in Asia Minor. In Bulgaria, only one collective species of the section occurs, i.e. *H. pannosum*. It is confined to limestone substrate, at 1000–2800 m a.s.l. In *H. pannosum* s.l. triploids and tetraploids have so far been detected (Christoff & Popoff, 1933; Papanicolaou, 1984; Schuhwerk & Lippert, 1998; Vladimirov & Szelaĝ, 2001a). Present studies reveal for the first time the occurrence of the diploid ploidy level in the *H. pannosum* group.

Discovering sexual species within this otherwise apomictic genus is of particular interest because this may contribute to better understanding of the morphological and genetic variation, as well as relationships between the taxa in the *H. pannosum* group. Extensive hybridization with representatives of many other sections must have taken place in the past which resulted in the establishment of numerous taxa with intermediate morphological characters (Zahn, 1921–23). Also, recent hybridization cannot be excluded because of the presence of diploid sexual species *H. waldsteinii* (Schuhwerk & Lippert, 1998) and the present species, i.e. *H. petrovae* from *H. sect. Pannosa* as well as sexual species from some other sections (Vladimirov, 2003) whose representatives grow in close proximity.

These facts seem to speak in favour of the treatment of Zahn's infraspecific taxa, which represent real entities in nature, as species, i.e. adoption of a narrower species concept similar to the one presented in *Flora Europaea* (Sell & West, 1976).

ACKNOWLEDGEMENTS

We are grateful to Dr Krzysztof Pawłowski (Kraków) for correcting the Latin description, to Dr Kit Tan (Copenhagen) for improving the English and to Mr Dimitar Vlaev for drawing the species. We would like to thank Dr Tim Rich (Cardiff) for his critical review and helpful suggestions. Financial support to V. Vladimirov from IAPT Young Scientist Award for the morphological studies of the taxa and the EC IHP Programme for access to the Natural History Museum, London, and to Z. Szelaĝ by the State Committee for

Scientific Research (KBN grant no. 2 P04G 042 28) are gratefully acknowledged.

REFERENCES

- Buttler KP. 1991.** *Hieracium* L. In: Strid A, Tan K, eds. *Mountain flora of Greece 2*. Edinburgh: Edinburgh University Press, 595–642.
- Christoff M, Popoff A. 1933.** Cytologische Studien über die Gattung *Hieracium*. *Planta* **20**: 440–447.
- Kozuharov S, ed. 1992.** *Opredelitel Na Visshite Rastenia V Balgaria [A key to the vascular plants in Bulgaria]*. Sofia: Nauka i Izkustvo (in Bulgarian).
- Melander Y, Wingstrand KG. 1953.** Gomori's haematoxylin as a chromosome stain. *Stain Technology* **28**: 217.
- Mráz P, Szelaĝ Z. 2004.** Chromosome numbers and reproductive systems in selected species of the genera *Hieracium* L. & *Pilosella* Hill (Asteraceae) from Romania. *Annales Botanici Fennici* **41**: 405–414.
- Papanicolaou K. 1984.** Chromosome number reports LXXXII. *Taxon* **33**: 126–134.
- Reichenbach HG, fil. 1860.** *Hieracium frivaldii*. In: Reichenbach L, Reichenbach HG fil, eds. *Icones Florae Germanicae et Helveticae*. Lipsiae: Sumptibus Ambrosii Abel. 19: 112, tabeau 169.
- Schuhwerk F, Lippert W. 1998.** Chromosomenzahlen von *Hieracium* L. (Compositae, Lactuceae) Teil 2. *Sendtnera* **5**: 269–286.
- Sell PD, West C. 1975.** *Hieracium* L. In: Davis PH, Matthews VA, Kupicha FK, Parris BS, eds. *Flora of Turkey and the East Aegean Islands 5*. Edinburgh: Edinburgh University Press, 696–746.
- Sell PD, West C. 1976.** *Hieracium* L. In: Tutin TG, Heywood VH, Burges NA, Moore DM, Valentine DH, Walters SM, Webb DA, eds. *Flora Europaea 4*. Cambridge: Cambridge University Press, 358–410.
- Vladimirov V. 2000.** Diploid species of the genus *Hieracium* s.l. in Bulgaria. *Abhandlungen und Berichte des Naturkundemuseums Görlitz* **72**(suppl.): 16.
- Vladimirov V. 2003.** A new diploid *Hieracium* (Asteraceae: Lactuceae) from Bulgaria. *Botanical Journal of the Linnean Society* **143**: 213–218.
- Vladimirov V, Szelaĝ Z. 2001a.** Reports (1271–1277). In: Kamari G, Blanché C, Garbari F, eds. *Mediterranean chromosome number reports 11. Flora Mediterranea* **11**: 478–483.
- Vladimirov V, Szelaĝ Z. 2001b.** Chromosome numbers in selected species of *Hieracium* subgenus *Pilosella* (Asteraceae) from Bulgaria. *Polish Botanical Journal* **46**: 269–273.
- Zahn KH. 1921–23.** Compositae – *Hieracium*. In: Engler A, ed. *Das Pflanzenreich Regni Vegeabilis Conspectus. IV*. Leipzig: Wilhelm Engelmann, 280