

# LABORATORY PRIMATE NEWSLETTER

Vol. 44, No. 3

July 2005



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**Published Quarterly by the Schrier Research Laboratory**

**Psychology Department, Brown University**

**Providence, Rhode Island**

**ISSN 0023-6861**

## POLICY STATEMENT

The *Laboratory Primate Newsletter* provides a central source of information about nonhuman primates and related matters to scientists who use these animals in their research and those whose work supports such research. The *Newsletter* (1) provides information on care and breeding of nonhuman primates for laboratory research, (2) disseminates general information and news about the world of primate research (such as announcements of meetings, research projects, sources of information, nomenclature changes), (3) helps meet the special research needs of individual investigators by publishing requests for research material or for information related to specific research problems, and (4) serves the cause of conservation of nonhuman primates by publishing information on that topic. As a rule, research articles or summaries accepted for the *Newsletter* have some practical implications or provide general information likely to be of interest to investigators in a variety of areas of primate research. However, special consideration will be given to articles containing data on primates not conveniently publishable elsewhere. General descriptions of current research projects on primates will also be welcome.

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for \$5.00 each. We are no longer printing paper issues, except those we will send to subscribers who have paid in advance. We will not accept future subscriptions, unless subscribers are willing to pay \$60/year within the U.S.; \$80/year outside the U.S. (Please make checks payable to Brown University.) Readers with access to electronic mail may receive the nongraphic contents of each issue by sending the message **subscribe LPN-L your-own-name** to **listserv@listserv.brown.edu** (Send the message **subscribe LPN-PEF** to receive PDF files by e-mail; or the message **subscribe LPN-WARN** to receive a notice when a new issue is put on the Website.) Current and back issues of the *Newsletter* are available on the World Wide Web at <http://www.brown.edu/primate>. Persons who have absolutely no access to the Web, or to the electronic mailing, may ask to have paper copies sent to them.

The publication lag is typically no longer than the three months between issues and can be as short as a few weeks. The deadline for inclusion of a note or article in any given issue of the *Newsletter* has in practice been somewhat flexible, but is technically the tenth of December, March, June, or September, depending on which issue is scheduled to appear next. Reprints will not be supplied under any circumstances, but authors may reproduce their own articles in any quantity.

**PREPARATION OF ARTICLES FOR THE NEWSLETTER.** – Articles, notes, and announcements may be submitted by mail, e-mail, or computer disk, but a printed copy of manuscripts of any length or complexity should *also* be sent by regular mail. Articles in the References section should be referred to in the text by author(s) and date of publication, e.g., Smith (1960) or (Smith & Jones, 1962). Names of journals should be spelled out completely in the References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *Newsletter*, the scientific names used will be those in *Mammal Species of The World: A Taxonomic and Geographic Reference*, 2nd Ed. D. E. Wilson & D. M. Reeder (Eds.). Washington, DC: Smithsonian Institution Press, 1993. For an introduction to and review of primate nomenclature see the chapter by Maryeva Terry in A. M. Schrier (Ed.), *Behavioral Primatology: Advances in Research and Theory* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

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### ACKNOWLEDGMENTS

The *Newsletter* is supported by U. S. Public Health Service Grant RR-00419 from the Comparative Medicine Program, National Center for Research Resources, N.I.H.

Cover illustration of *Hylobates lar* by Anne Richardson,  
in memory of Beanie.

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# Does Training Chimpanzees to Present for Injection Lead to Reduced Stress?

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## Introduction

Using positive reinforcement to train primates to cooperate during routine health procedures is thought to be preferential to forced compliance, such as the use of restraints (Prentice et al., 1986). Involuntary anesthesia injections (i.e., darting) may result in stress to the animal, leading to blood samples that are not physiologically representative of the individual's normal hormone levels during non-stress periods (Reinhardt et al., 1995). A recent study indicated that training chimpanzees to present for anesthesia injection results in lower levels of some physiological stress responses, in particular significantly lower white blood cell counts and glucose levels (Lambeth et al., 2004). However, simple comparison of individuals who are darted for a health examination versus those that allow anesthesia injection may ignore other factors leading to stress during the procedure. Individuals that will not present for injection upon verbal command, but will present when shown the dart gun, may experience stress levels at or above those of darted individuals.

The purpose of this study was to compare serum cortisol and other physiological stress responses (white blood cell counts and blood glucose levels) in a sample of captive chimpanzees (*Pan troglodytes*) that experienced difficult versus easy anesthesia injections. We predicted that injected chimpanzees would have significantly lower levels of stress-related serum values than darted chimpanzees, as found by Lambeth and colleagues (2004). We also predicted that easily immobilized chimpanzees would have significantly lower levels of stress-related serum values than more uncooperative individuals. Finally, we predicted that trained individuals would have significantly lower levels of stress-related serum values than untrained individuals.

## Methods

Subjects were 17 captive chimpanzees living at the Primate Foundation of Arizona, aged 10.6 to 34.5 years at

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Thank you to all PFA care and research staff and volunteers, especially Rachel Borman. Thank you to all Kronos Science Laboratories staff. This study was supported, in part, by the University of Texas, M.D. Anderson Cancer Research Center, subcontract U42 RR 15090-05, within the National Institutes of Health Biomedical Research Program; and, in part, by Kronos Science Laboratories, Inc., Phoenix, Arizona. PFA is accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC-I). Data collection protocol was reviewed and approved by the PFA Institutional Animal Care and Use Committee (IACUC).

the time of the study. The sample included 8 males and 9 females. Eleven of the subjects were trained, using positive reinforcement techniques, over 21 months (Videan et al., 2005). Individuals were trained to present an arm or leg to the cage mesh for anesthetic injection, using the verbal cues "arm" and "leg". Training procedures were transferred from the trainer to either the colony manager or the assistant colony manager, after behaviors were under stimulus control, in 5 of the trained subjects.

Data from one semiannual health examination, including a blood test, were collected for each individual. Data recorded included whether the individual presented for anesthesia injection or required darting, and the difficulty of the anesthetization (level of cooperation). Difficult-to-anesthetize chimpanzees ("uncooperative") were defined as those who avoided the needle and/or dart and required multiple injection and/or darting attempts. Blood chemistry values associated with physiological stress, including white blood cell (WBC) counts, glucose levels, and cortisol, were compared between darted and injected, trained and untrained, and cooperative and uncooperative animals using one-tailed Mann-Whitney U-tests. Blood chemistry values were compared between trained-transferred, trained-untransferred, and untrained individuals using a Kruskal-Wallis analysis of variance. Significance for all tests was set at the 0.05 level.

## Results

There were no significant differences in levels of cortisol ( $U=22$ ,  $p>0.10$ ), WBC ( $U=29$ ,  $p>0.10$ ), or blood glucose ( $U=22$ ,  $p>0.10$ ) between injected and darted chimpanzees (Table 1). However, significantly lower levels of both cortisol ( $U=6.5$ ,  $p<0.010$ ) and blood glucose ( $U=13$ ,  $p<0.025$ ) were found in individuals whose anesthetizations were ranked as easy or cooperative (Table 1). When all trained individuals were pooled, trained subjects exhibited significantly lower levels of cortisol than untrained ( $U=7$ ,  $p<0.010$ , Table 1). Finally, trained and transferred subjects exhibited significantly lower levels of cortisol than both the trained-untransferred and untrained chimpanzees ( $H=7.86$ ,  $p<0.25$ , Table 1).

## Discussion

Blood chemistry values indicate that presenting for injection does not necessarily lead to lower stress levels in a chimpanzee than darting. However, the training process appears to decrease the stress associated with the anesthesia event. The trained-transferred chimpanzees had the lowest levels of cortisol, despite two of these individuals requiring darting during their anesthetization. Results of

Group	Cortisol (ug/dl)	WBC Counts (th/mm <sup>3</sup> )	Glucose (mg/dl)
Darted (n=10)	24.11 +/- 6.00	9.46 +/- 5.82	97.70 +/- 13.33
Injected (n=7)	21.24 +/- 5.38	7.33 +/- 1.90	90.43 +/- 7.37
Uncooperative (n=8)	<b>26.24 +/- 4.98</b>	9.70 +/- 6.08	<b>100.00 +/- 11.96</b>
Cooperative (n=9)	<b>19.20 +/- 4.18</b>	7.33 +/- 1.94	<b>88.75 +/- 8.14</b>
Trained-Transferred (n=5)	<b>17.66 +/- 4.91</b>	11.06 +/- 8.01	96.60 +/- 19.92
Trained-Untransferred (n=6)	<b>22.75 +/- 4.62</b>	6.68 +/- 1.14	94.33 +/- 8.02
All trained (n=11)	<b>20.44 +/- 5.23</b>	8.67 +/- 5.62	95.36 +/- 13.87
Untrained (n=6)	<b>27.50 +/- 3.57</b>	8.42 +/- 2.46	93.50 +/- 6.44

Table 1: Mean (+/- standard deviation) cortisol levels (ug/dl), white blood cell (WBC) counts (th/mm<sup>3</sup>), and blood glucose (mg/dl) levels for darted versus injected (not darted), uncooperative versus cooperative, and trained versus untrained chimpanzees. Significant differences are in **bold**.

training itself also indicate that chimpanzees who are transferred from the trainer to the colony managers retain their training at significantly higher rates than non-transferred chimpanzees (Videan et al., 2005). It could be that the trained-transferred animals are becoming generally more comfortable with (i.e. habituated to) novel

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## Information Requested or Available

### World Animal Net Directory

World Animal Net Directory, which lists more than 15,000 animal protection organizations in 165 countries, is now available in both English and French. The 550-page book can be purchased for US\$29.95 / Euros 24.2 / sterling 16.4 (plus US\$5 / Euros 4.1 / sterling 2.7 shipping & handling) at <www.worldanimal.net>; or contact <info@worldanimal.net>.

### More Interesting Websites

- Animal Concepts' enrichment and training seminars: <www.animalconcepts.org>
- Animal resources for children: <yahooligans.yahoo.com/science\_and\_nature/living\_things/animals>
- AZA's Nutrition Advisory Group's "Nutrition Chapters from Published Husbandry Manuals":

circumstances presented by multiple individuals than the untransferred animals.

Finally, it is clear that the level of cooperation must be considered an important factor in determining the amount of stress experienced during anesthetization. Those chimpanzees whose anesthetizations were considered "easy" experienced significantly lower levels of stress, independently of whether they eventually presented for injection or required darting. Simply classifying anesthetizations as "injected" versus "darted" does not capture the level of stress experienced by the chimpanzee. Further research should examine other variables (e.g., temperature, colony noise level, identity of staff present, etc.) to more completely assess the factors causing stress during anesthetization in chimpanzees.

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<nagonline.net/husbandry\_manual\_chapters.htm>

- Cross River State, Nigeria: <www.crossriverstate.com>
- "Cybercinus", the Australasian Society of Zoo Keeping's electronic newsletter: <www.aszk.org.au/cybercinus.htm>
- International Primate Protection League: <www.ippl.org>
- News items from the International Primate Protection League: <www.ippl.org/ippl-news.html>
- Pan African Sanctuaries Alliance (PASA): <www.panafricanprimates.org>
- Scientists Center for Animal Welfare: <www.scaw.com>
- Trends in U.S. primate importation, 1995-2004: <www.aesop-project.org/Primate\_Trade/Primate\_Trade\_Imports.htm>

# A Preliminary Test of the Van Schaik Model of Male Coalitions for Costa Rican Mantled Howler Monkeys (*Alouatta palliata*)

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## Introduction

In mantled howler monkey (*Alouatta palliata*) societies, conflicts arise because interindividual interests differ (Jones, 2000). Darwin (1871; also see Dixson, 1998; Jones & Agoramorthy, 2003) proposed that, among males, “male-male competition” (intrasexual selection) would determine access to and monopolization of females. Although most competitive interactions among male mantled howlers are dyadic, coordinated attacks by two males against a third have been observed (Jones, 1978, 1980, 1985, 2000). In this communication, I present a reinterpretation of these coalitions as a preliminary test of a recent model of male-male within-group coalitional aggression (the van Schaik model: van Schaik et al., 2004).

Van Schaik and his colleagues (2004) proposed that coalition value “is the sum of the payoffs of the partners in their original ranks” (p. 101). Although not explicitly stated by these authors, “payoffs” will be condition-dependent since individual optima are expected to change from situation to situation (e.g., according to the “value” of the resource or the quality of the target male). It is also important to note that the symmetry in value among coalition partners need not be equivalent, and that the likelihood of coalition formation among males may be inversely related to rank distance between them, all other things being equal. Van Schaik et al. (2004) propose five “basic coalition types”: (1) rank-changing coalitions targeting individuals ranking above all coalition partners; (2) rank-changing coalitions in which higher-rankers support lower-rankers to rise to a rank below themselves; (3) non-rank-changing coalitions, expected to occur whenever high-ranking males have low-ranking close relatives; (4) non-rank-changing coalitions by high-rankers against lower-ranking targets; and, (5) non-rank-changing coalitions in which all partners rank below their target and which flatten the payoff distribution. The present analysis suggests that, consistent with the van Schaik model, adult male mantled howler monkeys exhibit a variant of configuration #2 in addition to configurations #1 or #5. The possible implications of these findings for social evolution in mantled howlers is discussed.

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The research reported in this brief communication was supported by the Ford Foundation. I thank Carel P. van Schaik for comments on the present results.

## Methods

The study was conducted in 1976 and 1977 at Hacienda La Pacífica, Cañas, Guanacaste, Costa Rica (10°18’ N, 85°07’ W). Results are based upon randomized focal (Altmann, 1974) and ad lib. observations. Modal social organization of mantled howlers is multimale-multifemale, yielding a polygynandrous mating system (Jones, 1978, 1980, 2000). Two marked groups, of known ages, were studied in two habitats of seasonal, tropical dry forest environment, riparian and deciduous (Frankie et al., 2004). Coalitions among males were observed only in the riparian habitat group (Group 5, 402 h observation: Y male, highest ranking; G male, second-ranking; R male, lowest-ranking; and, LT male, a young male entering the hierarchy in 1977). See Jones (1978, 1980, 2000, 2005, Chapter 6) for details of procedures and changes in male rank relations.

## Results

Twenty-four coalitions were observed in Group 5, 12 between adult females and seven among adult males (Jones, 1980, pp. 396-397; Jones, 2000, pp. 10-12). Coalitions among adults, then, were within-sex events (intrasexual competition). Two of the male coalitions were exhibited between Y and LT against G, and five coalitions between G and R against Y.

## Discussion

Interpretation of the coalitions between G and R against Y is relatively straightforward. This configuration represents either case #1 or case #5 of the van Schaik model. An interpretation consistent with case #1 is required to assume that the goal or *motivation* of coalitions between G and R is a rank change, presumably to eject Y from the group and elevate G and R in the hierarchy or to depose Y from his position as highest-ranking male. An interpretation based upon case #5 suggests that coalitions between G and R are non-rank-changing, leveling coalitions. Van Schaik et al. (2004) indicate that rank-changing coalitions are expected where contest competition is strong, as has been reported for male mantled howlers in riparian habitat (Jones, 1978, 1980, 2000, 2005), supporting an interpretation based upon case #1. Nonetheless, both configurations #1 and #5 may occur since the exhibition of coalitions between G and R may be condition dependent. Sequence analysis is required to determine whether contexts and functions differ from coalition to coalition between these males.

Coalitions between Y and the young male, LT, appear to represent a variant of case #2 of the van Schaik model.

These rank-changing coalitions are described by van Schaik et al. (2004) as coalitions in which higher rankers support lower rankers to rise to a rank below themselves and are expected to occur among relatives. G was ultimately expelled from Group 5 as a result of the coalition between Y and LT, who may have been Y's son (Jones, 1980; C.P. van Schaik, personal communication, 2005). This mechanism of group ascension differs from that described by Clarke et al. (1994) who characterize a young male's ascent to top rank as a process similar to that described for females (Jones, 1980). Both processes may occur in either sex of mantled howlers and may result from differing local (patch) conditions (e.g., differing mate or food quantity and/or quality).

Although a key feature of the coalitions between Y and LT appear to deviate from the van Schaik model (i.e., that rank-changing coalitions target individuals ranking above all coalition partners), further analysis resolves the apparent inconsistency. The adult male and female dominance hierarchies of mantled howlers are "age-reversed" (Jones, 1978, 1980) whereby young animals are highest-ranked, middle-aged individuals are medium-ranked, and old individuals are lowest-ranked. Consistent with the analysis of Beekman et al. (2003), coalitions between G and R may have imbalanced power relations in Group 5 from Y to G and R, making it beneficial for Y to form a coalition with LT to expel G and to settle for a reduction in dominance rank to second-ranked male below the young LT. This interpretation characterizes the "age-reversed" dominance hierarchy as evolutionarily stable and suggests one mechanism (coalitions between high-ranked and younger males entering a hierarchy) whereby stability might be maintained. This intuition requires theoretical (mathematical) modeling to reveal the logic of these intrasexual conflicts as well as empirical research to determine the ranges and thresholds of ecological regime and/or coefficients of relatedness ( $r$ ) upon which hierarchical relations among males of this species depend.

It is important to note that coalitions among males, and probably among females, may be viewed not only as indicators of reproductive competition but also as mutual policing and suppression of competition within groups (Frank, 2003). The coalitions between G and R against Y as well as the coalition between Y and LT against G may be viewed as attempts by group members to manage the (condition-dependent) power and, thus, the social (reproductive) influence of other group members (Beekman et al., 2003; Jones, 2000). Additional research on the mechanisms of policing in mantled howlers may reveal important principles concerning the costs and benefits of social influence among primates and other social mammals, especially multimale-multifemale societies (e.g., humans). These studies will also contribute to our knowledge about reproductive skew since mutual policing may enforce "reproductive fairness" (Frank, 2003), at least

over short terms. Finally, since coalitionary aggression is a form of punishment, future research should investigate "post-punishment responses" by the victim, responses (e.g., counter-coalitions) that may impose high costs upon the initial coalition partners ("spite": see Jones, 2002).

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## Awards Granted

### 2004 Conservation Award to Rwandan, Kenyan

Two wildlife champions, Michel Masozera, Rwanda country director for the Wildlife Conservation Society (WCS), and Ali Kaka, executive director of Kenya's East African Wild Life Society, are this year's winners of the National Geographic Society/Bufett Award for Leadership in African Conservation. Established through a gift from the Howard G. Buffett Foundation, the award recognizes outstanding work and lifetime contributions that further the understanding and practice of conservation in Africa.

Masozera, Rwanda country director for WCS since 2002, has worked tirelessly to document and preserve Rwanda's rich biodiversity in the face of daunting socio-economic challenges. Since 1997 he has led WCS's Nyungwe Forest Conservation Project. Nyungwe Forest, home to 13 primate species, faces intense pressure because it is surrounded by some of the highest human population densities in Africa. To protect the forest from agricultural encroachment, hunting, logging, and gold mining, Masozera has implemented a multi-disciplined conservation program that has become a national model for protecting other threatened forests in Rwanda.

Based in Nairobi, Ali Kaka has been executive director of East African Wild Life Society (EAWLS) since 2001. EAWLS protects endangered and threatened species and habitats in East Africa and is at the forefront of community-based conservation initiatives. In the late 1990s, EAWLS, impeded by management problems, was in danger of collapse. Under Kaka's leadership, the Society has reestablished its credibility and is a lead player in

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## Calls for Award Nominations: New Prizes for Work on Alternative Methods

Two new prizes for research that advances alternative methods (the Three Rs of replacement, reduction, or refinement of animal use) are being offered this year. The Dieter Lutticken Award, sponsored by Intervet International, the animal health arm of drug-maker Akzo Nobel, recognizes outstanding contributions in the testing, development, and production of veterinary medicines. Intervet states that the scope of the 20,000-Euro award "covers *in vitro* models used in research and development which replace animal testing for licensing purposes, as well as studies avoiding the use of animals." The application deadline is September 30, 2005.

advocating for crucial policy change to enhance conservation practice in the region.

Recipients of the National Geographic Society/Bufett Award are chosen from nominations submitted to the National Geographic's Conservation Trust. After the nominations are screened by a peer-review process, a selection of names is forwarded to the Howard G. Buffett Foundation, which recommends the final winner. Next year a similar award will introduced for conservationists in South America. – *From National Geographic News, December 9, 2004*

### Marc Bekoff Receives Community Service Award

Marc Bekoff has been awarded the Bank One Colorado Corporation's Faculty Community Service Award. This award recognizes his various, extensive efforts to draw attention to the plight of animals, and to inspire people to treat all animals more humanely. Marc is a local director of Jane Goodall's outreach program, Roots and Shoots, which takes programs into the public schools. Animal awareness and rights have also been major themes of Marc's extensive writing, including the books *The Ten Trusts* (with Jane Goodall), *Minding Animals*, and *The Smile of a Dolphin*.

The Award is given annually to a full-time faculty member at one of the campuses of the University of Colorado who has rendered exceptional educational, humanitarian, civic, or other service in his or her community, external to the faculty member's primary university responsibilities and for no additional remuneration. – *Announced by the University of Colorado, May 16*

The Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART), the Australian Museum, and the Sherman Foundation have announced a new \$10,000 prize designed to encourage research into alternatives to the use of animals or animal products for scientific or teaching purposes. The Voiceless Eureka Prize for Research will go to an Australian scientist(s) for work carried out in Australia in the past five years that has reduced, or has the potential to reduce, the use of animals in laboratory-based research, education and testing. Entries closed on May 13 this year. – *From the HSUS's e-mail publication, Animal Research News & Analysis*

## Nonhuman Primate Feeding Schedules: A Discussion

Bonnie Beresford, Director of Animal Care Services at Queen's University, Kingston, Ontario [e-mail: [beresfor@post.queensu.ca](mailto:beresfor@post.queensu.ca)], wrote to CompMed: "A question on primates: ours are fed twice daily at about 8:30 a.m. and 3:00 p.m. – chow and fruit at both feedings. One primate protocol calls for the primates (cynomolgus) to be handled by the investigators before the morning feed, and the investigators are then supposed to feed the primates by 10:00 a.m. Frequently they do not arrive on time and the primates are not given their first feeding until later – 11:30 or noon. They are fed again by animal care staff at 3:00. Is this schedule problematic? The researchers claim that some institutions feed primates only once a day, so they are not concerned. I will appreciate any information on acceptable primate feeding schedules."

### Summary of Replies

- "At our facility, we feed biscuits in the morning and fruit in the afternoon. If the animals have a procedure that is to be done, we usually schedule it first thing in the morning, or whenever the PI or tech gets to the primate area (I have had problems with lateness as well). When the procedure is finished, I wait until they are awake and then feed them about ½ of their normal biscuit intake to reduce any risk of nausea or vomiting. Depending on how late they recover fully, I will decide if they get fruit in addition to biscuits (usually ½ the normal amount). I will also give ½ the fruit ration. Sometimes they recover so late that they only get the biscuits. I try to make the feeding times as far apart as possible to reduce chances of bloat as well as vomiting. I think that you should make exceptions to the feeding schedule for those animals that have had a procedure done; that way you could prevent any illness or injury and not be worried about over-feeding them. I have fed biscuits once a day for a long time and have had no problems, but the fruit is given in the afternoon. I understand the rationale for feeding twice a day, though. My main concern would be overfeeding at recovery, so having biscuits once a day on the day of a procedure may be the safest for the monkey as well. I have had monkeys that have had procedures done in the morning, been fed when awake, and still have biscuits left over in the afternoon! The feeding schedule may just have to be adjusted on a case-by-case basis. I hope that this helps." (Kate Bullock BS, RVT, RLAT).
- "The researchers are not concerned about this because it's not THEIR feeding schedule being ignored... I've always treated the animals as if reincarnation is possible, and the animal(s) might be my grandmother. Trust me, she would have wanted to eat more than once a day." (Sherilyn Hall)
- "If the schedule is very irregular the animals are prone to bloat, which can be fatal if not corrected. This not especially common in adult cynomolgus, but can be a problem in juveniles or in other NHP species." (Anonymous)
- "We have macaques (rhesus and cynomolgus) that are given 16 biscuits once daily (about 8:30 a.m.). Only about half of our cages have homemade puzzle feeders (open-top plexiglass feeders bolted to the front of the cage). For those with J-feeders, we throw the chow on top of the cage. We have a very small colony, and it almost always turns out that anyone without a puzzle feeder has access to a cage ceiling, either in his home cage or a play cage. So no matter what kind of feeder our guys have, foraging is necessary to obtain the biscuits. I find that there is much less hoarding and fewer biscuits are wasted when they have to work for their food." (Anonymous)
- "About feeding later than usual: If one animal is fasted for a surgery or procedure, we don't feed the others in the room until that monkey is down. They may complain, because they know when to expect breakfast, but since we only feed once a day we don't have a problem with meals being too close together. Fresh fruit or vegetables are given in the afternoon (about 3 p.m.)." (Rebecca Goertz, RLAT, Research Technician III, SUNY, State College of Optometry)
- "For what it's worth, we are a commercial facility, housing anywhere from 300-1200 primates. We have always had a policy of feeding twice a day. First feeding consists of all monkey chow, and second feeding consists of a lesser amount of chow mixed with some fruit, treats, etc. However, while the above is common practice, I also don't feel that in most cases, especially with cynomolgus, there is a severe risk to the animals with only one feeding but no doubt I personally prefer two." (Anonymous)
- "NHP biscuits in the morning and fruit in the afternoon." (Anonymous)
- "We feed chow once a day in the p.m., fruit in the a.m. Does the protocol require food deprivation? If so, then the delay is not a problem. If they are simply not showing up on time..." (T. deLangley)
- "I'll be interested in hearing what feedback you get on this. I have a similar problem with some investigators. The reasoning behind twice daily (b.i.d.) feeding is that it helps prevent bloat. I haven't seen bloat in these animals, but it is one of those 'tucked away in the back of my mind' worries. I have a colony of >1,000 rhesus and we pretty much keep food in front of them at all times. Haven't seen bloat in them, either. I did see it during my residency at another facility – usually in individually housed cynomolgus. I don't remember whether we determined any predisposing factors." (Anonymous)



- “While at XX and YY, I’d have my staff feed twice daily as long as we had adequate staff to do so (I let it slide during a couple of snow emergencies when less than 30% of staff was able to get to work). The only real reason I’ve found to feed primates twice daily is to avoid having them use the food they didn’t eat immediately as decorations for the cage and, if possible, the rest of the room.” (Anonymous)

- “Once-daily feedings can lead to medical problems in primates. Specifically, primates that are fed only once daily can be rather hungry and anxious when they finally do get their food and eat it quickly. This can lead to bloat and/or obstruction, which can be fatal (I have treated these type of cases in the past in rhesus and cynomolgus and was able to convince the investigator that it was not sound to feed in this manner).

“Physiologically, it is also abnormal for cynomolgus to eat once a day. In the wild, they are foraging for five to eleven hours and “grazing” continuously. We know from humans that feeding the daily calories in one feeding vs. feeding over the course of the day promotes obesity, even if the total number of calories is the same for both groups. It would not seem to be optimal for long-term maintenance of these animals (also issues of psychological stress).” (Anonymous)

- “Your biggest problem with once a day feeding is the chance of gastric bloat, but – with all due respect – that has been very rare with cynomolgus in all the places that I have worked. If your surgeries involve intra-abdominal

manipulations than I would be worried about the other end, as I have had cecal dilatation as a sequela to surgery. Gastric bloat is much more common in rhesus. I have worked in facilities that have historically fed once per day with cynomolgus and they didn’t have problems (four years). I had always done b.i.d. prior and since as that is commonly the practice. I think that it at least makes the care staff check the animals twice a day!” (Elyse A. Orchard, Veterinarian and Associate Director, Chimp Haven)

- “I am sure that there are also institutions where ruminants are also fed just once a day and they survive. Twice a day feeding provides for one more incident of human contact and potential for socialization; is less wasteful in terms of food (many will toss food to the cage bottom and not want it after it’s been in the ‘trash bin’); is better for their nutritive well-being (ask your investigators to limit their own intake to once a day); if they are in a common colony room with other animals that do get fed twice daily, they are stressed about being left out; and finally – though I do not recall a research paper on this topic – the potential for bloat seems to be greater with a ‘once a day’ engorgement than with twice daily feedings. – My two cents worth.” (Les Rolf, Jr., Ph.D., D.V.M., Staff Veterinarian, University of Pennsylvania/ULAR)

- “We feed squirrel monkeys once daily after all behavioral testing is complete; feeding can serve as a secondary *Zeitgeber* (an environmental agent or event that provides the cue for setting or resetting a biological clock) – hence, potential confound. We split rhesus feeding b.i.d., as risk for overeating bloat is too high in them.” (Anonymous)

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## Research and Educational Opportunities: Residency/Graduate Training

The NIH Intramural Research Program has resident/graduate training positions beginning with the August, 2005, academic year. The residency program is jointly sponsored by the NIH Office of Intramural Research (OIR) and the Uniformed Services University of the Health Sciences (USU). The program consists of a two-year graduate program of instruction in Comparative Medicine, culminating in a Master of Comparative Medicine degree from USU, and a concurrent residency experience in laboratory animal medicine (LAM) offered in NIH research facilities.

During the residency, the resident obtains supervised practical experience and completes research leading to a published first-author paper. The USU program in Comparative Medicine includes didactic instruction in LAM,

meeting the standards of an ACLAM-approved residency program.

This program has a dual application process; therefore prospective residents must complete application packets from both the Graduate Partnerships Program (at <gpp.nih.gov>) and the Office of Graduate Education, USU (at <cim.usuhs.mil/geo/application.htm>). A competitive selection will be made by the NIH Residency Faculty Committee, based on prior academic performance, letters of reference, goals for graduate study, and career plans in laboratory animal medicine. Residents will be supported for stipend, medical insurance, and tuition for the two-year period of the program (depending on satisfactory progress). For more information contact Dr. Marlene N. Cole, Director, NIH-USU LAM Resources Program [e-mail: [colem@od.nih.gov](mailto:colem@od.nih.gov)].

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# Silky Sifaka (*Propithecus candidus*) Conservation Education in Northeastern Madagascar

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## Introduction

The president and senior staff of Conservation International recently pointed out that “In terms of primate conservation, there is no doubt that Madagascar is the world’s single highest conservation priority” (Mittermeier et al., 2003, p. 1538). With five primate families found only on this island nation, Madagascar’s degree of primate endemism is more extreme than that of any other nation. This fact is reflected in the estimated 257 million years of unique primate evolutionary history on this island, and demonstrates extreme phylogenetic diversity unparalleled by any other place on earth (Sechrest et al., 2002). Moreover, more than 67% (43/64) of extant lemur taxa face a significant risk of extinction over the next several decades. In terms of total number and percentage, there are more threatened primates in Madagascar than in any other country (Mittermeier et al., 2003). Finally, the phrase “risk of extinction” carries a chilling reality in Madagascar, unlike other nations, where 17 or more primate species (in 9 or more genera!) actually have gone extinct within the last 2000 years. Such extinctions are generally attributed to the first arrival of humans to the island about 2000 years ago (Godfrey & Jungers, 2003).



The silky sifaka (*Propithecus candidus*, above) is a critically endangered indrid lemur living within the fragile borders of just two protected areas (Marojejy National

Park: <[www.marojejy.com](http://www.marojejy.com)> and Anjanaharibe-Sud Special Reserve) in the small mountains of northeastern Madagascar. With only an estimated 100 to 1000 individuals remaining in the wild (there are none in captivity), silky sifakas are one of the three rarest lemurs in all of Madagascar and are one of the Top 25 most endangered primates in the world, out of over 600 total primate taxa (Mittermeier et al., 2002). Silky sifaka conservation is threatened by human hunting (Safford & Duckworth, 1989; World Wildlife Fund staff at Andapa, Madagascar, personal communication, 2001, 2003; K. Keiser, personal communication, 2001), hunting by the fossa, a mammalian carnivore (personal observation, 2001; Wright, 1998), and habitat loss from almost annual cyclone damage (Wright, 1999) and slash and burn agriculture (Goodman, 2000).

## Human Hunting of Lemurs



Figure 2: Slaughtered lemurs.

Historically, as for other lemurs, the greatest conservation threat to the silky sifaka has been cultivation of hill rice through slash-and-burn agriculture or “tavy” (Mittermeier et al., 1994). Although human hunting of primates in Madagascar is generally less widespread than in Africa or Asia (Cowlshaw & Dunbar, 2000), nevertheless in some parts of Madagascar, such as Marojejy National Park, steady lemur poaching is evident. Tattersall (1982) suggested hunting must be occurring, given that the most accessible parts of Marojejy seemed “largely bereft of larger mammals and birds”. Duckworth et al. (1995) found numerous lemur traps and “villagers said that lemur hunting is their main reason for penetrating the reserve” (p.556). More recently, Goodman (2000) identified many human trails utilized by local people during lemur hunting, to gain access to hidden agriculture, and to harvest forest plants for medicinal and construction purposes. In

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2000, a silky sifaka was killed by a poacher, but confiscated by local authorities (see photo). Similarly, during the 14.5 months of my research from 2001 to 2003, several episodes of lemur poaching within “protected areas” were evident. Estimated lemurs killed per hunt ranged from several to 70, with each being sold for 25,000 FMG (US\$4) on average.

Unfortunately, there is no *fady* or taboo against hunting of the silky sifaka as there is against hunting of Indri, the largest extant lemur. Nor is there a shortage of meat in this cattle and rice culture situated within the wealthy vanilla-growing region of Madagascar. After questioning numerous local villagers and authorities as to the reason for lemur hunting, it became clear that upper middle class families enjoyed the taste of wild lemur as a delicacy or “picnic food”. Several individuals remarked that the meat tastes so good, one does not even need *sakai* or Malagasy hot sauce. Several individuals testified that the upper middle class hire local impoverished men and provide them with guns and bullets for the lemur hunt. It also became clear that many people living near these protected areas do not understand how rare and special these lemurs are. I therefore began a conservation education program in collaboration with local authorities, the Peace Corps, and Cornell University, with the support of the Conservation Committee of the American Society of Primatologists.

Although conservation education programs near or within protected areas in developing nations are relatively recent (Jacobson & Padua, 1995), such efforts are an increasingly routine goal of wildlife researchers. Although very few doubt the importance of such endeavors, some question whether quantitative evidence exists as to their effectiveness (e.g. Cowlshaw & Dunbar, 2000). There have been some well-documented successes. Blanchard (1995), for example, demonstrates dramatic population size increases (doubling in some cases) in Canadian seabirds following an intensive decade of local environmental education. Significant changes towards pro-conservation attitudes and increases in animal recognition by local peoples have been documented in mountain gorillas (Weber, 1995) and golden-lion tamarins (Dietz & Nagagata, 1995) following educational programs.

### **Conservation Education: Appeal to Hearts and Minds**

A two-pronged strategy towards conservation education about the silky sifaka was adopted. The first component might be considered the “cognitive” component while the second can be labeled the “emotional” component.

The goal of the first component was to increase awareness and knowledge in local villagers and children about the uniqueness of, and existing threats toward, silky sifakas. This goal was pursued through:

- 1) twelve slide presentations at primary and secondary schools adjacent to the remaining habitat of the silky sifaka;
- 2) distribution of large, color laminated silky sifaka photos with informational text on the reverse side;
- 3) distribution of world maps to each school;
- 4) distribution of large colored laminated lemur field guides in three languages to each school and to the authorities supervising the protected areas;
- 5) mounting and distribution of large informational signs with photos and text in three languages at the main ecotourist camp site and in nearby cities;
- 6) training of local villagers as ecotourist guides; and
- 7) radio interviews.

All of the presentations and interviews were conducted in the local dialect of the Malagasy language with the assistance of local teacher Rabary Desire and Peace Corps volunteer Paul Atkinson. These presentations took place from November to January, 2004. Since that time Paul Atkinson and Rabary Desire have continued to deliver similar presentations at more schools with funds donated by myself and equipment supported by the Conservation Committee of the American Society of Primatologists.

The goal of the second “emotional” component was to associate conservation of the silky sifaka with positive emotional experiences. In other words, we hoped to appeal to their hearts as well as their minds. Traynor (1995) points out that “increased knowledge about the environment does not automatically result in behavior that is environmentally responsible. Affective and social factors must also be addressed since people’s behavior depends not only on their skills and knowledge but also on their feelings, motivation, and commitment” (p.17-18).

Towards this end, a wildlife art contest was conducted with local children following a several-hour discussion of biodiversity, endemism, and ecotourism. Throughout this time there was an interactive discussion of current local environmental threats. All interested children were provided with colored pencils and paper. It was our hope that this artwork could ultimately be sold to ecotourists visiting the park since there are presently no local crafts for sale at the park entrance. Children that showed the most interest or effort in their artwork and/or during the interactive discussion were invited in groups (average size, 14 kids) for free 3-day trips into Marojejy National Park to observe and learn about the silky sifakas.

Four groups, totaling 55 children, were brought into the park. These trips took place between June and August, 2004. All of these children live adjacent to the park but had never been within the park boundaries. They were all extremely excited and very happy to make the trip. While hiking to camp we played a species identification game, where all known plant and animal species were called out as they were encountered. We took turns tell-

ing the group about our favorite animal or plant and why we liked it so much. While in camp, we read a conservation story book about a Malagasy hunter who is slowly convinced by his ancestors and the creatures of the forest, who speak to him in his dreams, to respect nature as that is the wish of the ancestors. Then all the children acted it out as a skit. We discussed the behavior and conservation threats to silky sifakas. Then we asked the children to make up songs about what they learned and we all sang those songs. At dawn we tracked and observed the group of silky sifakas that were the subject of my research.

Silky sifakas are absolutely stunning, gorgeous animals with creamy white pelage that has inspired their nickname, “Angels of the Forest”. Virtually all observers, particularly the children, appeared awe-stricken, lost in wonder and joy at their first live sighting of this special lemur. All children returned home with silky sifaka flags and other conservation-related mementos.

#### **Lessons Learned: Village School Presentations**

The participation of local teachers greatly facilitated the effectiveness of the school presentations. We actively recruited their assistance, which not only made the teacher feel more involved with what we were doing but also ensured a far more orderly classroom. A slide projector designed for use in developing countries worked very well. It has few moveable parts, projects only one slide at a time, and is powered by a rechargeable battery that can be charged using either solar panels or traditional wall outlets. A teacher recommended we use a battery-powered megaphone to maintain the attention of large groups of children. This was valuable advice. Not only did use of the megaphone permit more people to hear what was being said, it also instantly quieted down the crowd. Although in some cases we spoke to groups as large as 200, in the end we felt that more learning took place in groups of 75 or less. Whenever possible, we divided classes to reduce the group size. Questions were encouraged at all times. We asked the children for their help in saving the silky sifaka. We asked them for advice and ideas. Nearly every student who asked a question or responded to one received an informational photo. The participation of local teachers helped the children to overcome politeness and fear and ask a question.

All presentations were given in the local dialect of the Malagasy language, unless the teacher requested we speak in French. During the presentations, we changed speakers several times to maintain student attention and interest. Typically I began with basic slides about silky sifaka location, rarity, and behavioral biology. After 15 minutes or so, Rabary Desire, a gifted speaker, local environmentalist, and teacher would step in and ask more personal questions of the students, such as “Have you ever seen this animal? Why should we protect this animal? What do you think the threats are to this animal?” Desire would

then go on and speak about the next batch of slides covering threats to these animals. Finally after 30 minutes, just as the students were losing interest, Nestor, our most vibrant speaker, would take the stage.

Nestor is a forest guide who tracked and followed wild silky sifakas with me for 14.5 months. He was originally a local farmer and can speak to the students more as an average local man. He spoke emotionally and passionately from the heart about how he used to be a hunter, and now after learning so much about these animals, all he wants to do is protect them and learn about them. Nestor described what an average day is like in the forest. He shared several funny tales of his work tracking the silky sifakas, such as the time one of my field research assistants was afflicted with a leech sucking on her eyeball, and the time I developed an abscess from a poisonous insect bite that became larger than a white man’s fist. He acted it out so well as he spoke. He returned to silky sifaka behavior and acted out an adult female cuffing a male, and showed how the silky sifakas played with one another and showed clear sleeping partner preferences. The students absolutely loved it, and wanted to hear more. Towards the end, he became very serious and described how the silky sifakas appeared in his dreams and that is why he respects them so much and how he tracked them with such ease. The students too become very quiet with serious looks on their faces. Dreams are taken very seriously in Malagasy culture; some believe that is how ancestors communicate with the living. The teacher nodded that the time was up and invariably we were followed by huge groups of children as we left. They had so many questions. We stayed for a long time afterwards and sat with them and talked and laughed. When we finally left, they begged us to return and we could only say “We hope so, but you are the ones who can make the difference.”

#### **Lessons Learned: Ecotours with Local Children**

The Malagasy conservation literature we had with us frequently provided some activities of interest to the students. When discussing this literature we did not read in a formal, rigid manner – rather we kept things open and tuned to the students’ interests. If they started acting parts out, we proposed a skit. If they started singing, we all made up songs and shared them with the group. Despite this flexibility, we had a specific curriculum that we wanted the students to learn. At the end of each night in the forest we would review exactly what we had learned about the silky sifaka and conservation threats. We were pleasantly surprised how eager the children were to learn these facts once they had seen the animal in the wild.

However not all of our games and literature were a success. In particular, a conservation-oriented Malagasy language crossword puzzle was generally not understood or of interest to the students. It was like nothing they had ever seen before and perhaps too formally academic.

Finally, deciding which students would be permitted to attend these forest trips was extremely challenging. The initial art contest and question-and-answer session proved effective in identifying many interested students; however there were still far too many students than we were able to bring. We finally asked local teachers to choose the best or most deserving students among those remaining.

### Conclusions

Overall, we found all teachers and students to be very interested in the silky sifaka and genuinely concerned about its plight. As is often the case (Weber, personal communication), people were most curious about the behavior of these lemurs. The donated informational photos, field guides, and maps were in great demand. We felt it was important to provide local people with conservation mementos they could take home, keep for a long time, and show to their friends. In all cases, it proved crucial to visit the schools in advance and schedule presentations with the permission and assistance of school officials. It was not difficult to make radio announcements of upcoming presentations or set up radio interviews. Again, we found that the radio stations were eager to interview us and provide information to their audiences. After this experience, it seems clear that local conservation education can have a great positive impact on the conservation of the silky sifaka.

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# Agonism and Affiliation: Adult Male Sexual Strategies Across One Mating Period in Three Groups of Long-Tailed Macaques (*Macaca fascicularis*)

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## Introduction

In primate groups whose members adhere to a clear social dominance hierarchy, high-ranking animals should have increased access to contested resources (Fedigan, 1983). Due to physiological differences between the sexes, theoretically, females and males place importance on different resources (Trivers, 1972). Female primates have a high energetic investment in prenatal and post-conception care, requiring access to a stable, high quality food supply, in order to provide vital nourishment for themselves and their offspring. In contrast, males are limited by access to females. In most cercopitheciines, males have a minimal investment in their offspring and do not engage in parental caretaking behaviors. However, adult males may engage in defense against predators, group defense, or infant defense, which can be a potentially costly investment (Kappeler, 2000). Priority-of-access models (Fedigan, 1983) suggest that females of high rank should obtain increased access to nutritious food supplies, and high-ranking males should achieve increased reproductive success via increased mating opportunities.

In primate groups with overt male-male competition, high-ranking males usually win contests for access to feeding sites and fertilizations. However, high-ranking males may not be able to monopolize mating and reproductive success. This inability affords low-ranking males, subadult males, and extra-group males to employ strategies to obtain fertilizations outside of dominance contests. These strategies include sneak copulations and/or consortships (Sprague, 1992), queue jumping (Alberts et al., 2003), persistent following and/or shadowing of receptive females, sexual coercion (Smuts & Smuts, 1993), and using infants to gain favor with females (Itani, 1959; Deag & Crook, 1971; Strum, 1987; Ogawa, 1995a).

Smuts & Smuts (1993) proposed the “Sexual Coercion Hypothesis”, predicting that male aggression toward females or the threat of male aggression toward females may be a male tactic to increase the chances that the tar-

geted female(s) will mate with the aggressive male, and not with other males (which might bring more aggression) during peak fertility. In contrast to an aggressive strategy, macaques may utilize infants to gain favor with adult females. Barbary and Tibetan macaques develop close bonds with infants and use infants in triadic interactions with other males (Deag & Crook, 1971; Ogawa, 1995a). Male-infant interactions were initially interpreted as a form of parental investment. However, across the Order Primates, several species engage in male-infant interactions and researchers have posited several hypotheses to explain this behavior. These include protecting the infant from infanticidal males (van Schaik et al., 2000), agonistic buffering (Deag & Crook, 1971), passports into groups (Itani, 1959), and kin selection.

Long-tailed macaques (*Macaca fascicularis*) live in large, permanent bisexual social groups with female philopatry and male dispersal (van Noordwijk & van Schaik, 2001). Alpha and beta *M. fascicularis* males generally have increased mating success and subsequently sire more offspring (de Ruiter et al., 1994). However high-ranking males cannot completely monopolize fertilizations, and this inability allows low-ranking males, subadult males, and extra-group males to obtain fertilizations by utilizing alternative strategies. Regardless of the strategy a male uses, the impact of female mate choice cannot be understated (Small, 1989). In long-tailed macaque groups, sexually active adult females may mate with all adult males in the group (van Noordwijk, 1985). Thus, high-ranking long-tailed macaque males can employ two strategies: copulating mostly with a high-ranking female, or copulating with many females (van Noordwijk, 1985).

The goal of this study was to determine whether adult males increase their reproductive success (measured by mating success) by utilizing an aggression-based behavioral strategy (e.g. sexual coercion), an affiliative-based behavioral strategy (e.g. affiliative interactions with infants), or both strategies.

## Methods

Data were collected on three groups of long-tailed macaques (*Macaca fascicularis*) inhabiting the Padangtegal Temple forest site in Bali, Indonesia. The 139 macaques at this site have a total home range of ~24 hectares. See Fuentes and Gamerl (2005) for site description.

We used continuous focal animal follows and ad libitum notes to record the behavior of ten adult males

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We are indebted to the late Dr. K. G. Suaryana, Dr. I. D. K. Harya Putra, Pak Wayan Salemet, Dr. Aida Rompis, and the Governor of Bali. We would like to thank the following organizations for support: LIPI (Indonesian Institute for the Sciences), Universitas Udayana-Pusat Kajian Primata, and the Padangtegal Wenara Wana Management Committee and Staff.

(Altmann, 1974). The duration of each focal follow was 30 minutes. We collected 42 follows for 9 of the 10 adult males (21 hours per male). The remaining adult male, M7, died during the sixth week of the study; previously we had collected 38 focal follows (19 hours) on this individual. In total, we collected of 208 hours of data on all males (see *Table 1*). Each male was followed at various times of the day throughout the study. Individuals were identified by facial and body scars or irregularities and from pictures of each adult animal from previous field studies at the site. Research since 1998 at the site has produced a photographic catalogue and video library of every adult male and most of the adult females. Prior to the study we collected preliminary data, developed an ethogram, and conducted inter-observer follows (Cohen's *Kappa* Calculation). The frequency and duration of each male's behavior was analyzed on the SPSS 11.5 statistical package. We used a one-way ANOVA with a Bonferroni post hoc test to determine significant differences between the frequency and duration of aggression or affiliation directed toward adult females and/or infants, and the frequency of copulations at the population level. Due to small sample sizes, we used a Chi-Square Goodness-of-fit test with a Bonferroni post hoc test to determine significant differences among these variables between individuals in same group. We used a Spearman's *rho* test to determine if the frequencies of copulations were correlated with aggressive or affiliative behaviors initiated toward females and/or infants. We report only the significant values hereafter.

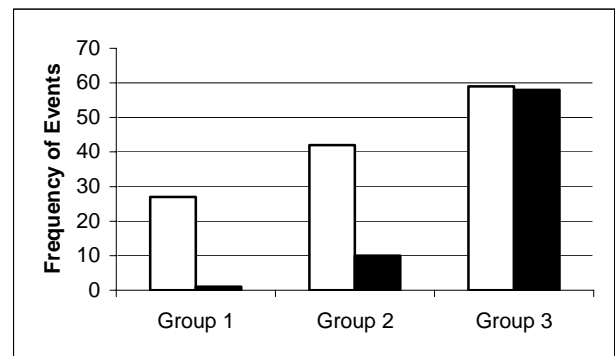
## Results

**Inclusive Analyses/Within-Group Comparisons For Each Group:** Between the two adult males in Group 1, we found significant differences in the duration of aggression initiated toward females ( $X^2=14.1$ ,  $p<0.001$ ) and infants ( $X^2=18.54$ ,  $p<0.001$ ), the frequency ( $X^2=15.01$ ,  $p<0.001$ ) and duration ( $X^2=2972.7$ ,  $p<0.001$ ) of affiliative behavior initiated toward females, and the frequency ( $X^2=14.4$ ,  $p<0.001$ ) of affiliative behavior with females and infants. For Group 2 significant differences emerged between the four males in the frequency of copulations ( $X^2=68.7$ ,  $p<0.001$ ), frequency of aggression initiated toward females ( $X^2=48.5$ ,  $p<0.001$ ), duration of aggression initiated toward females ( $X^2=488.9$ ,  $p<0.001$ ), duration of affiliative infant interactions ( $X^2=420.8$ ,  $p<0.001$ ), total frequency of initiated aggression ( $X^2=52.4$ ,  $p<0.001$ ), and the total frequency of affiliative interactions ( $X^2=57.6$ ,  $p<0.001$ ). The three adult males in Group 3 exhibited significant differences in the frequency of affiliative interactions with infants ( $X^2=49.7$ ,  $p<0.001$ ), duration of aggression initiated toward females ( $X^2=17.7$ ,  $p<0.001$ ), duration of affiliative infant interactions ( $X^2=5344.2$ ,  $p<0.001$ ), and total affiliative interactions ( $X^2=17.7$ ,  $p<0.001$ ).

**Between-Group Comparisons and All Adult Males in This Population:** We found no significant differences in frequency and duration of these behaviors between groups. The frequency of copulations was not correlated with the frequency or duration of aggression or affiliative behavior initiated toward adult females or infants.

## Discussion

**Do females prefer aggressive males?** Each adult male initiated aggression towards adult females, and in Group 2 and Group 3, the individual males differed in the duration of aggression they directed towards females. However, this variation in aggression across the males did not result in concomitant differences in copulatory frequencies. Copulation frequencies may not reflect rates of fertilization and our data could not clearly determine if this aggression coerced females to mate with an aggressive male at specific times. In each group the frequency of initiated aggression toward females surpassed the frequency of affiliative infant interactions (see *Figure 1*). On three occasions, the alpha male from Group 1 (M1), copulated immediately after attacking adult females. In these isolated events, intent on the part of the adult female is unknown and it is therefore impossible to determine if the female preferred the aggressive male due to behavioral cues or was acting out of fear of aggression and attempting to minimize potential injury. Group 1 had two adult males, one of whom was very old and died (M7) during the research period. It may be that the high-ranking male in Group 1 was able to sexually coerce females, because the females in this group could not enlist the help of the old, sick male. In Group 2, the alpha male (M17), was observed directing the most aggression toward adult females and had the highest copulation count. These results suggest that in Group 1 and Group 2, sexual coercion techniques afford high-ranking males higher mating success. Interestingly, in Group 3, the third ranking adult male (M9) obtained the highest copulatory frequency for



*Figure 1:* Frequency of aggression and affiliation with adult females. White bar = aggression; black bar = affiliation.

that group (and the third highest for the population) and frequently directed aggression at adult females. While

every male in this population initiated aggression toward females, this aggression did not correlate with copulations.

**Male-Infant Interactions:** Male-infant interactions did not have a statistically significant relationship with the frequencies of copulations. However, 84% of the male-infant interactions occurred in Group 3. In comparison to Group 1 and Group 2 males, the duration of adult male-infant interactions in Group 3 was 11.7 times higher (Figure 2). Interestingly, during the study period, Group 3 exhibited frequent and high intensity fighting among the adult males and the dominance relations in this group were extremely unstable. The two highest-ranking males (M5 and M11) formed an alliance against a third adult male (M9), and directed high rates of aggression toward him. We observed M5 and M11 holding, carrying, and grooming infants at much higher rates than the other remaining 8 adult males in the population (18 and 35 occurrences respectively, compared to an average of 1.4 for the remaining males).

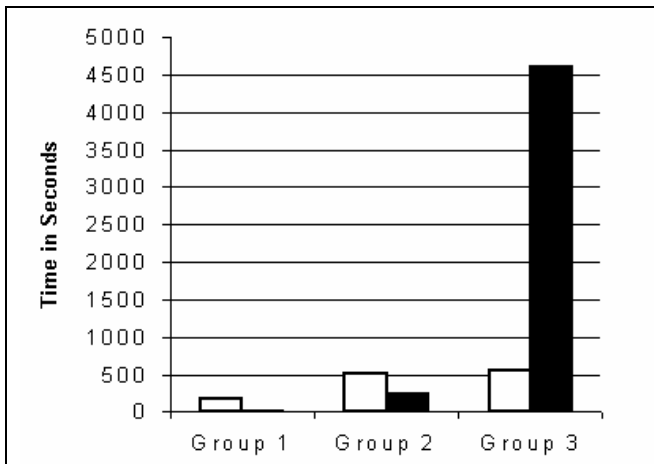


Figure 2: Duration of aggression and affiliation with infants. White bar = aggression; black bar = affiliation.

The adult males in Group 3 may be using infants to achieve access or support from adult females (passports and bridging) and also using infants to reduce levels of aggression from others (agonistic buffering) (Itani, 1959; Deag & Crook, 1971; Ogawa, 1995b). We recognize that low-ranking and subordinate males use infants as “agonistic buffers” to reduce aggression from dominant males. However in Group 3, the reverse was observed. Prior to the study period, M9 had reached full maturity, was in prime physical condition, and was larger than the high-ranking males. M9 occasionally displaced and chased the alpha and beta males if those males were alone. In this unusual situation, the higher-ranking males may have used infants to gain the association of females against the subordinate, but larger and aggressive young adult male.

Long-tailed macaques have demonstrated an ability to identify mother-infant pairs (Dasser, 1988). This ability, perhaps, allows adult males to use infants to their advantage by creating and maintaining relationships with others for the purpose of negotiating conflicts. Although our results do not fully support the “bridging” hypotheses, the highest-ranking males (M5 and M11) in Group 3 devoted little time in aggressive interactions and subsequently engaged in very high levels of male-infant interactions (frequencies and durations). Males in this group may be actively using infants to establish or reinforce bonds with females.

## Conclusion

The alpha position was linked to the highest frequency of copulations in Groups 1 and 2. In free-ranging Sumatran long-tailed macaques, van Noordwijk & van Schaik (2001) note that males’ lifetime reproductive success is largely determined by acquiring and maintaining dominance. Paternity tests demonstrated that alpha and beta males sire the highest number of offspring in long-tailed macaques (de Ruiter et al., 1994). However, these results may derive from female choice and/or a high-ranking male’s timing of copulation, as opposed to absolute copulatory frequencies (i.e. mating success). High-ranking males in Group 3 did not achieve increased copulatory success. The third ranking male, M9, obtained the highest frequency of copulations in this group. M9’s copulatory success may be attributed to queue jumping (Alberts et al., 2003), female choice (Small, 1989), or the high-ranking males’ inability to monopolize access to females.

The results of our data collection did not fully support (i.e. statistically support) either of the two hypotheses, sexual coercion or the use of infants to increase access to females in order to gain copulatory success. Males at this site were observed engaging in affiliative behaviors with adult females and infants, and also behaved aggressively towards adult females. Rather than suggesting that coercive or affiliative strategies are not being practiced, our results may simply reflect the males’ ability to use the most appropriate behavioral strategy at a specific time. If the results of this study are viewed as a “snapshot” in each male’s life history, we may have observed one or multiple behavioral strategies, which were not mutually exclusive and were useful for this mating season and appropriate for the social atmosphere of each group.

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## Travelers' Health Notes: International Assn for Medical Assistance to Travelers

The International Association for Medical Assistance to Travelers (IAMAT), a volunteer group, compiles an annual list of doctors around the world who meet the organization's criteria, who speak English or another second language, and who agree to charge a specific fee. The 2005 Directory lists the current schedule of fees as US\$80 for an office visit, US\$100 for a house (or hotel) call, and US\$120 for night, Sunday, and local holiday calls. These fees do not include consultants, laboratory procedures, hospitalization, or other expenses. The current listing of doctors and centers includes 95 countries.

IAMAT also publishes and provides to its members pamphlets on immunization, schistosomiasis, and malaria,

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as well as "World Climate Charts" and a "Traveller Clinical Record" form. IAMAT has a scholarship program for physicians from developing countries to attend travel medicine training courses in North America.

For information, contact IAMAT, 40 Regal Rd, Guelph, Ontario, N1K 1B5, Canada [519-836-0102]; 1623 Military Rd, #279, Niagara Falls, NY 14304-1745, U.S.A. [716-754-4883]; 206 Papanui Rd, Christchurch 5, New Zealand; or 57 Voirets, 1212 Grand-Lancy-Geneva, Switzerland [e-mail: [info@iamat.org](mailto:info@iamat.org)]; or see [www.iamat.org](http://www.iamat.org).

## Primates de las Américas...La Página

Estimados lectores, este número contiene información sobre dos congresos primatológicos, así como información de revistas primatológicas latinoamericanas que esperamos sean de utilidad. Saludos, Tania Urquiza-Haas <turqheza@yahoo.com> y Bernardo Urbani <burbani@uiuc.edu>.

### I Congreso de Asociación Colombiana de Primatología

Este congreso se llevará a cabo en la ciudad de Santafé de Bogotá, Colombia. Las fechas confirmadas son del 2 al 4 de noviembre de 2005. Los tópicos principales incluyen: Conservación y manejo *in situ* y *ex situ*, biología y ecología además de medicina. Para más información escriba a <ACP\_investigacion@yahoo.com> o visite <www.geocities.com/primatologica/#>.

### VI Congreso de Asociación Primatológica Española

Esta reunión será entre 27 y 30 de septiembre de 2005, en la Facultad de Psicología de la Universidad Complutense de Madrid, España. Entre los temas del congreso se encuentran uso de herramientas, etología infantil y diferencias y similitudes entre humanos y simios. Para mayor información contacte al Dr. Fernando Colmenares o la Dra. María Victoria Hernández-Lloreda por los correos electrónicos <colmenares@psi.ucm.es> y <ape@psi.ucm.es>. También puede visitar <www.ucm.es/info/ape05>.

### Boletín Primatológico Latinoamericano en la red

Algunos artículos del clásico *Boletín Primatológico Latinoamericano* se encuentran en línea y formato PDF en la página de la Estación Biológica de Corrientes, Argentina <ar.geocities.com/yacarehu/revista.htm>. Entre ellos se encuentran:

- Borda, J. T., Pérez Escalá, S., Nuñez Vastos, V., & Sánchez Negrette, M. (1993). Incidencia de enfermedades renales en *Cebus apella* (Primates, Cebidae). 4[1], 1-4.
- Bravo, S. P., Kowalewski, M. M., & Zunino G. E. (1995). Dispersión y germinación de semillas de *Ficus monckii* por el mono aullador negro (*Alouatta caraya*). 5[1], 25-27.
- DeLuycker, A. (1995). Deforestation, selective cutting, and habitat fragmentation: The impact on a black howler monkey (*Alouatta caraya*) population in northern Argentina. 5[1], 17-24.
- Gil, G., & Heinonen, S. (1993). Presencia del mono caí (*Cebus apella*) en la provincia de Formosa, Argentina. 4[1], 15-17.
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### Boletín: Primatología Colombiana

El primer número de la revista digital trimestral de la Asociación Colombiana de Primatología está ya en Internet bajo la dirección editorial de Mauricio García Arcila, María Ortiz y Néstor Varela. Dicha publicación se puede bajar en la página de la asociación <www.geocities.com/primatologica/#> o recibir suscribiéndose al <primatologica-subscribe@gruposyahoo.com>. El primer número (2004, Vol. 1, Nro. 1) contiene los siguientes artículos:

- García-Arcila, M. (2004) La rehabilitación de primates en Colombia. Recopilación de la discusión participativa realizada durante el foro "La Rehabilitación de Primates en Colombia" organizado por la ACP en el año 2004.
- Hernández-Baccay, V., & Castillo-Ayala, C. (2004). Cambios en el uso del espacio por una manada de *Callicebus torquatus lugens* (Bajo Apaporis, Vaupés). Aspectos más relevantes del estudio realizado en mico tocón (*Callicebus torquatus lugens*).
- Varela, N. (2004). Reseña sobre el mono ardilla (*Saimiri sciureus*). Información básica y de carácter divulgativo sobre la biología y ecología de los monos ardilla.

Igualmente, ya se puede acceder al **Boletín de la Red Colombiana de Primatología** editado en forma digital por Alba Lucía Morales-Jiménez, en esta dirección: <www.humboldt.org.co/chmcolombia/servicios/jsp/redes/primates/boletin1.htm>.

## Southeast Asian Primatological Association Established

After a series of deliberations beginning in Torino, Italy, then in Bangkok, Thailand, and finally in Jakarta, Indonesia, the Southeast Asian Primatological Association (SEAPA) was formally launched on April 4, 2005, during the first Southeast Asian Congress of Primatology, held at the Ragunan Zoo's Schmutzer Primate Center in Jakarta, April 3-7. The Congress was concurrently organized with the Congress of the Indonesian Primatology Association (APAPI) and jointly hosted by SEAPA and APAPI. Over a hundred Indonesian primatologists and invited representatives from the other ASEAN member countries attended the congresses.

SEAPA, whose mission is "*To promote and enhance the scientific knowledge and the conservation of primates in the ASEAN Member Countries (AMCs), particularly in their natural habitats,*" has four main goals:

1. To promote interest in, and enhance the quality of, scientific investigations and conservation efforts on primates in the AMCs, particularly among the AMC nationals.
2. To develop and enhance the capacity of AMC nationals in conducting in-situ scientific research and conservation activities on primates in the AMCs.
3. To serve as the focal point for networking among primatologists and other parties interested in promoting the goals of SEAPA.
4. To provide a better representation of primatologists from AMCs, or of their collective opinions, to international primatological meetings.

The elected officers for the 2005-2007 term are:

- **President:** Dr. Jatna Supriatna (Indonesia) [e-mail: [jsupriatna@conservation.org](mailto:jsupriatna@conservation.org)]
- **Secretary General:** Dr. Ramesh Boonratana (Malaysia) [e-mail: [rbz@loxinfo.co.th](mailto:rbz@loxinfo.co.th)]
- **Vice President for Research and Conservation:** Dr. Le Xuan Canh (Vietnam) [e-mail: [lxcanh@ncst.ac.vn](mailto:lxcanh@ncst.ac.vn)]
- **Vice President for Networking and Capacity Development:** Dr. Perry Ong (Philippines) [e-mail: [perryong@csi.com.ph](mailto:perryong@csi.com.ph)]
- **Treasurer:** Dr. Ligaya Ita Tumbelaka (Indonesia) [e-mail: [gayang@cbn.net.id](mailto:gayang@cbn.net.id)].

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## Electronic Freedom of Information Act: Availability of Annual Reports

APHIS Animal Care has announced that as of Tuesday, May 10, annual reports submitted by registered research facilities will be available on the APHIS Website, <[www.aphis.usda.gov/ac/redacted\\_inspection/WebList.htm](http://www.aphis.usda.gov/ac/redacted_inspection/WebList.htm)>. The full contents of the reports will be available, although all confidential information will be

The SEAPA advisors for the 2005-2007 term are Prof. Warren Y. Brockelman and Prof. Birute Galdikas; and the AMC focal persons are Dr. Badrul Munir Mohammed Zain [e-mail: [abgbadd@pkrisc.cc.ukm.my](mailto:abgbadd@pkrisc.cc.ukm.my)] for Malaysia, Dr. Nantiya Aggimarangsee [e-mail: [scboi006chiangmai.ac.th](mailto:scboi006chiangmai.ac.th)] for Thailand, and Mr. Vu Ngoc Thanh [e-mail: [vnthanh@netnam.vn](mailto:vnthanh@netnam.vn)] for Vietnam. A full list of advisors and focal persons will be announced in the coming months.

Membership in SEAPA is open to any individual engaged in the pursuit of scientific knowledge and the conservation of primates in the AMCs, or interested in supporting the goals of SEAPA. There are two categories of memberships:

- **Full Membership** – Any individual who possesses a recognized qualification in a related scientific field, or has made a significant contribution to primatology, or has a demonstrated serious interest in primates. All full members are eligible to vote, but only full members who are AMC nationals are eligible to hold office. Postgraduates may apply for a full membership, but are required to pay the full membership dues of US\$20 per annum, from July 1<sup>st</sup> of the current year to June 30<sup>th</sup> of the following year.
- **Student Membership** – Open to all undergraduates and postgraduates who are interested in primatology. Student members can participate in all activities of SEAPA, and are required to pay the student membership dues of US\$10 per annum. However, student members are not eligible to hold office or to vote.

Members may make one or more complimentary full or student membership payments to SEAPA for AMC national(s) who is/are financially unable to pay the dues. AMC nationals who cannot pay the full or student membership dues may request sponsorship through SEAPA. All requests will be reviewed by the officers, and eligible individuals will be admitted to SEAPA as sponsorship funds become available. Membership inquiries may be directed to the Treasurer, Dr. Ligaya Ita Tumbelaka [e-mail above].

redacted. NABR encourages its members to **check the site regularly** for reports on their institutions. NABR also strongly encourages all member organizations to **request a copy** of their report so that each institution knows exactly what the general public will be seeing.

## Meeting Announcements

The **Laboratory Animal Welfare Training Exchange**, which aims to promote an information exchange among laboratory animal welfare trainers on training programs, systems, materials, and services for the purpose of promoting the highest standards of laboratory animal care and use, will hold its **2005 Conference** August 17-19, in San Diego, California. Charles River Foundation is sponsoring a Poster Session, giving away cash prizes (\$1,000 total) for the best posters. For information and registration materials, see <[www.lawte.org](http://www.lawte.org)>.

**ESLAV** (European Society of Laboratory Animal Veterinarians) and **SECAL** (Spanish Society for Laboratory Animal Science) are organizing a **Joint Meeting** entitled "**Welfare in Facilities**". This will be the 6th and 8th Scientific Meetings, respectively, of these organizations and will be held in Elche, Alicante, Spain, on October 5-7, 2005. More information can be found on <[www.secaleslavmeeting.org](http://www.secaleslavmeeting.org)>.

The German Primate Center (DPZ) will host an international conference in Göttingen, **Fifth Göttinger Freilandtage**, December 13-16, 2005, focusing on primate diversity, taxonomy, and conservation. Invited speakers will summarize and evaluate recent empirical and theoretical work dealing with conservation genetics,

extinction biology, primate biogeography, speciation and taxonomy, conservation strategies, and comparative patterns in other taxa (birds and humans).

Confirmed invited speakers are George Amato, Michael Bruford, John Fleagle, Colin Groves, Shawn Lehman, Russell Mittermeier, John Oates, Carlos Peres, Trevor Price, Anthony Rylands, Mark Stoneking, Jatna Supriatna, Carel van Schaik, Anne Yoder, and Robert Zink. You are invited to submit abstracts for relevant oral (15 min) and poster contributions. The conference is also open to guests without presentations. Deadline for registration and submission of abstracts is September 30, 2005. Additional details are available from Peter Kappeler [e-mail: [pkappel@gwdg.de](mailto:pkappel@gwdg.de)] and at:

<[www.dpz.gwdg.de/sociobiology/GFT2005/index.htm](http://www.dpz.gwdg.de/sociobiology/GFT2005/index.htm)>.

The **2006 AVMA National Meeting** will be held in Honolulu, Hawaii, July 15-19. Sessions scheduled for the meeting include "Current Topics in Laboratory Animal Medicine". Contact Peggy J. Danneman, Jackson Laboratory, Dept of Lab. Animal Health Services, 600 Main St, Bar Harbor, ME 04609 [207-288-6269; fax: 207-288-6276; e-mail: [pjd@jax.org](mailto:pjd@jax.org)].

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## Workshop Announcements

### 2006 International Gorilla Workshop

The 2006 International Gorilla Workshop will be held June 23-26, 2006, at the Paignton Zoo, Devon, England. Gorilla workers from all disciplines are invited to register. The deadline for submission of abstracts and for early registration is December 31, 2005. Further information and registration details are available at <[www.paigntonzoo.org.uk](http://www.paigntonzoo.org.uk)>. Scroll down and click on the gorilla on the left side of the page.

### Meeting the Information Requirements of the AWA

The Animal Welfare Information Center (AWIC) of the U.S. Department of Agriculture has developed a one-and-a-half-day workshop for individuals who are responsible for providing information to meet the requirements of the Animal Welfare Act.

USDA's animal welfare regulations require that investigators provide Institutional Animal Care and Use Committees (IACUC) with documentation demonstrating that alternatives to procedures that may cause more than momentary pain or distress to the animals have been considered and that previous experiments are not unnecessarily duplicated. A thorough literature search meets this federal mandate. An alternative is any procedure which results in the reduction in the numbers of animals used, re-

finement of techniques to minimize pain or distress, or replacement of animals.

The objectives of the workshop are to provide: • an overview of the Animal Welfare Act and the information requirements of the Act including Policy 12 (a representative from USDA's Animal Care Headquarters will provide an update on regulatory activities and be available to answer questions); • a review of the alternatives concept; • a comprehensive introduction to AWIC, database resources such as Medline, EmBase, Biosis, CAB, AGRICOLA, and Web resources such as Altweb, DTIC, Scirus, NorINA and others; • instruction in developing search strategies to retrieve useful scientific and veterinary information; and • on-line database searching experience.

This workshop is targeted for principal investigators, members of IACUCs, information providers, administrators of animal use programs, and veterinarians. All participants will receive a resource manual. There is no charge for the workshop.

The next workshop will be held in Beltsville, Maryland, on October 26-27, 2005, and will be limited to 20 persons. To register, contact AWIC [301-504-6212; fax: 301-504-7125; e-mail: [awic@nal.usda.gov](mailto:awic@nal.usda.gov)] or see <[www.nal.usda.gov/awic/awicworkshops](http://www.nal.usda.gov/awic/awicworkshops)>.

## IACUC 101 and Beyond

A new "IACUC 101" page is available at the NIH Office of Extramural Affairs Website: <http://grants.nih.gov/grants/olaw/iacuc101s.htm>. The IACUC 101 series of training programs is designed to provide IACUC members, administrators, veterinarians, animal care staff, researchers, regulatory personnel, and compliance officers with information on the role and responsibilities of IACUCs. The page provides information on hosting a 101, the 2005 schedule of OLAW-

sponsored 101s, and descriptions of each program in the series.

The following is the remaining 2005 schedule. Questions should be directed to Mary Lou James [e-mail: [mljames@mo.net](mailto:mljames@mo.net)].

- Sept 21-22: IACUC 101 / IACUC 201; Univ. of South Dakota Med. School, Sioux Falls, South Dakota.
- Oct 6: IACUC 101; Univ. of Rochester, Rochester, New York.
- Nov 6: IACUC 101; St. Louis, Missouri.

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## Volunteer Opportunities

### Year-Round Volunteer Internships – Florida

"Jungle Friends (JF) Primate Sanctuary is a 501(c)(3) nonprofit corporation that offers permanent sanctuary care for a variety of primates who have fallen into the wrong hands or are simply no longer wanted. Our program is designed to rehabilitate and socialize primates with their own species. The primates in our care are successfully interacting with members of their own kind, many of which were once species-isolated, neglected, or abused. We are dedicated to animal welfare issues and advocacy for primate protection. Our volunteer program offers qualified individuals, students and groups interested in the well-being of primates and the preservation of the environment, an opportunity to care for our jungle friends.

"JF provides permanent sanctuary for 67 primates (capuchin and spider monkeys, and one marmoset – we do not have any other marmosets here, so we are hoping to find another marmoset to keep him company) at this time. Animal care activities include cleaning cages and habitats; preparing diets; feeding; providing enrichment; performing some medical procedures, restraint, and capture; as well as building and repairing habitats; maintaining the grounds; and record keeping. The work is labor intensive; the climate is very hot and humid in the summer and temperatures can drop to 20 in the winter. The hours are long, usually sun-up to sundown, and there can be times when days off are scarce. We do, however, try to give a day off weekly. The work is difficult and can be stressful, but the rewards are great!

"We are looking for very special people. You must be friendly and have good communication skills, work well with others, and have the ability to lead as well as follow. You must be even-tempered and down to earth. If possible, we prefer that you come to JF for a one-week trial period to evaluate your suitability for this position. JF is located on 12 acres approximately 15 miles from Gainesville; your own transportation is recommended, although not absolutely required. For insurance and health reasons, we are unable to consider applicants who smoke.

"Room and food are provided. The food is donated by a local market and a health food distributor and consists

of mainly fruits, vegetables, tofu/meatless products, bread, cereal, food bars, and snack foods. Six-week to one-year programs are available. If you are interested, contact Kari Bagnall, Jungle Friends Primate Sanctuary, 13915 N State Rd 121, Gainesville, FL 32653 [386-418-0808; e-mail: [Kari@junglefriends.org](mailto:Kari@junglefriends.org)]."

### Primate Behavior Field Assistant – Ecuador

A field assistant is needed to aid in data collection for dissertation research on the behavior and health of white-fronted capuchin monkeys (*Cebus albifrons*). The chosen applicant will gain valuable field experience in a wide array of behavioral field methods, including • primate habituation, • primate group follows, • focal and scan behavioral sampling, • plant collection and preservation, • primate biological sampling and preservation, and • use of radiotelemetry to track primate groups.

The study site is at the Tiputini Biodiversity Station, Yasuni National Park, Ecuador. Yasuni is considered to be one of the most biodiverse areas in the world for both fauna and flora. Further information about this wonderful site is available at [tiputini.usfq.edu.ec](mailto:tiputini.usfq.edu.ec).

Applicants need to be physically fit because the study site has rough, muddy terrain and thick vegetation. Prior field experience in a foreign country, a knowledge of Spanish, and a background in biology, anthropology, or a related field are all beneficial, but not essential. However, a love of the outdoors, lots of patience, a good sense of humor, and a strong work ethic (assistants will typically work 6 a.m. to 6 p.m., six days a week) are essential.

At this time, no funding is available and the assistant will need to pay for travel expenses (airfare, traveler's insurance, etc.) and daily room/board (\$25/day).

The position begins in June, 2005, and will run until July, 2006. Openings are available throughout this time, with a minimum commitment of 3 months (6 months or more preferred).

Contact Shelly Field, Dept. of Anthropology, Ohio State Univ., 148 Fremont St, Battle Creek, MI 49017 [e-mail address: [michellyfield@hotmail.com](mailto:michellyfield@hotmail.com)].

## Grants Available: Simian Vaccine Evaluation Units

The National Institute of Allergy and Infectious Diseases (NIAID), NIH, has a requirement to establish three to four Simian Vaccine Evaluation Units (SVEUs) for evaluation of simian immunodeficiency virus (SIV) and HIV vaccine approaches in support of preclinical AIDS vaccine research and development. For this project, the Division of AIDS, NIAID, is seeking organizations with the technical expertise and facilities needed to house 100-300 nonhuman primates in BSL2 and BSL2/3 containment facilities and to conduct preclinical evaluations of the immunogenicity and efficacy of SIV and HIV candidate vaccines in the nonhuman primates. Studies are conducted at the initiation of the NIAID, and vaccines to be evaluated are selected by NIAID. The Contractor will provide the nonhuman primates and the scientific and technical expertise necessary to conduct preliminary studies on new vaccines, conduct larger-scale studies on vaccines that have already demonstrated promise, evaluate the immunogenicity and safety of candidate HIV vaccines in anticipation of Phase II human clinical trials, and conduct comparative studies on vaccines and/or adjuvants from multiple sources. The SVEUs may also conduct studies with passively administered vaccines.

The SVEUs are expected to provide nonhuman primates for the studies, immunize animals with candidate vaccines, conduct initial assessments of immune responses, challenge the nonhuman primates with infectious virus, and determine whether or not the animals become

infected. The SVEUs also conduct in vivo titrations of virus challenge stocks and may conduct microbicide studies to evaluate the ability of topically administered microbicides and other antiviral substances to block infection of nonhuman primates with virus administered vaginally or by other mucosal routes. The proposed contracts will continue the work of the current SVEUs. It is anticipated that three to four (3-4) completion type contracts will be awarded as a result of this solicitation. This project will take approximately seven years to complete. It is anticipated that three to four cost reimbursement, completion type contracts will be awarded, each with a period of seven years, beginning approximately May 8, 2006. RFP NIH-NIAID-DAIDS-06-15, with a closing date tentatively set for August 8, 2005, may be accessed through the NIAID Contract Management Program (CMP) Home Page at <[www.niaid.nih.gov/contract](http://www.niaid.nih.gov/contract)> – and will also be posted on FedBizOps: <[www.fedbizopps.gov](http://www.fedbizopps.gov)>. Any responsible Offeror may submit a proposal that will be considered by the Government. This advertisement does not commit the Government to award a contract. No collect call will be accepted.

For questions or further information, contact Michelle Scala, Contracting Officer, Division of AIDS, NIAID, Rm 4142, MSC-7620, 6700-B Rockledge Dr., Bethesda, MD 20892-7620 [301-451-3693; fax: 301-402-0972; e-mail: [mscala@niaid.nih.gov](mailto:mscala@niaid.nih.gov)].

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## Resources Wanted and Available

### New Environmental Enrichment Site

“The Wisconsin PRC Library is in the beginning stages of putting together an environmental enrichment site that will contain, among other things, directions and ideas for enrichment toys, treats, etc. We will be soliciting input as we develop the site. Meanwhile, be thinking about it.”

### PASA Veterinary Healthcare Manual in French

The Pan African Sanctuaries Alliance (PASA) *Veterinary Healthcare Manual*, a comprehensive guide to captive primate care, is now available in French. The 223-page manual includes charts, photographs, and explicit directions on everything from quarantine procedures to treatment of respiratory, neurological, and skin diseases; and features sections on animal escapes, confiscations, and hand-raising primates, among other topics. PASA veterinarian Eric Dubuis and a team of editors spent the last 11 months translating the manual; copies (in Eng-

lish or French) can be obtained in printed form or on CD by contacting PASA [e-mail: [PASAapes@aol.com](mailto:PASAapes@aol.com)].

### New Report on Most Endangered Primates

On April 7, 2005, the Primate Specialist Group of IUCN–The World Conservation Union’s Species Survival Commission and the International Primatological Society, in collaboration with Conservation International, released a report, “Primates in Peril: The World’s 25 Most Endangered Primates—2004-2006”, which reveals that 25 percent—or one in four—of the 625 primate species and subspecies are at risk of extinction. The report, compiled by more than 50 experts from 16 countries, cites deforestation, commercial bushmeat hunting, and the illegal animal trade as the primary threats, and warns that failure to respond will bring the first primate extinctions in more than a century.

A press release, including the list of endangered primates, is available at <[www.conservation.org/xp/news/press\\_releases/2005/040705.xml](http://www.conservation.org/xp/news/press_releases/2005/040705.xml)>.

## Positions Available

### Facility Manager – Vanderbilt Medical Center

Vanderbilt University Medical Center, an AAALAC-accredited program, has an immediate opening for Facility Manager at an Animal Facility. This position requires a bachelor's degree and a minimum of 60 months of relevant experience. AALAS certification is preferred; strong organizational and excellent record-keeping skills are a must; some familiarity with computer software programs such as Word, Excel, and e-mail, is a plus.

This facility contains primates and rodents. Candidates are expected to have significant background experience with animal welfare and husbandry and be dedicated to animal welfare. The successful candidate will supervise day-to-day operations of the facility and will coordinate and facilitate personnel interactions and training. This position needs a candidate with strong supervisory skills, problem-solving skills, independence and maturity of judgment, decision-making skills, and ability to maintain a good team working environment. Given the multiple demands of this position, versatility, flexibility, and strong leadership skills are needed.

Salary is dependent upon education and experience. Background screens will be performed and education will be verified prior to employment. Please be prepared to provide required information and/or documentation. Interested applicants should apply online:

[secure.recruitingcenter.net/CLIENTS/VANDERBILT/publicjobs/CanGetJob.cfm?job\\_id=40165&req=TI40165](http://secure.recruitingcenter.net/CLIENTS/VANDERBILT/publicjobs/CanGetJob.cfm?job_id=40165&req=TI40165).

Questions can be directed to Tiffany Ingram, Human Resources [615-322-0053; fax: 615-343-6388; e-mail: [tiffany.ingram@vanderbilt.edu](mailto:tiffany.ingram@vanderbilt.edu)]; or Karen Jackson, Div. of Animal Care, AA-6206 Medical Center North, Nashville, TN 37232-2130 [615- 936-0092; fax: 615-322-7544; e-mail: [karen.jackson@vanderbilt.edu](mailto:karen.jackson@vanderbilt.edu)].

### Clinical Veterinarian – Yerkes

The Yerkes National Primate Research Center (YNPRC) of Emory University in Atlanta, Georgia, has an immediate faculty opening for a clinical veterinarian with a strong background and interest in lab animal medicine. The successful candidate will join a team of veterinarians and veterinary technicians in the Division of Animal Resources, which is responsible for the care and well-being of a large population of nonhuman primates and rodents. YNPRC is a major biomedical research institution that is rapidly expanding, with its main facilities at Emory and a 117-acre field station at Lawrenceville.

YNPRC veterinary staff provides preventive and clinical veterinary care for the colony as well as research support to resident and collaborating scientists. The successful candidate will contribute to a wide range of IA-CUC, environmental enrichment, and training activities,

and will participate in the planning, design and/or renovation of existing and new animal research facilities. S/he will contribute to the supervision of veterinary technicians and to Emory's ACLAM residency training program.

The ideal candidate will have a DVM/VMD degree from an AVMA-accredited institution, be licensed to practice veterinary medicine in the United States, and have training or experience in laboratory animal medicine. S/he will also have excellent interpersonal and team-building skills and strong written/oral communication skills. ACLAM board certification is highly desirable, as are knowledge and hands-on experience in surgical and medical procedures commonly performed in biomedical animal research. Collaborative involvement with investigators is strongly encouraged and prior experience in an academic environment is a plus. An excellent remuneration package will be offered to the right individual. Contact Dr. Jim Else, Associate Director for Research Resources, Yerkes NPRC, Emory University, 954 Gatewood Rd NE, Atlanta, GA 30329 [e-mail: [jelse@rmy.emory.edu](mailto:jelse@rmy.emory.edu)], regarding SAR job vacancy #200392. Emory University is an EEO/AA employer.

### Veterinarian – Alice, Texas

Covance, one of the world's largest and most comprehensive drug development services companies, is seeking a veterinarian to provide general veterinary support for site programs; oversee operations of pharmacokinetics and breeding colony areas; develop and perform pertinent SOP's; serve as study director; ensure animal welfare and regulatory compliance; and represent surgical activities to Covance Research Product clients.

A DVM or VMD degree, licensure in Texas, strong surgical skills, and pharmacokinetics experience are required, along with a demonstrated interest in program development and a client service orientation. Apply online at [www.covance.com/careers](http://www.covance.com/careers); or e-mail resume to Kacey Vosberg [e-mail: [kacey.vosberg@covance.com](mailto:kacey.vosberg@covance.com)].

### Animal Health or Vet Tech – Metro Boston Area

A national nonprofit organization is seeking experienced veterinary or animal health technicians for full-time care and husbandry positions working with New World primates. Responsibilities include feeding, cleaning, administering medications, placement training and other care as needed. Weekday and weekend shifts are required, as is reliable transportation. This is not a research job, but involves life-long care.

Qualifications required: AS/BS preferred in veterinary technology, animal science, biology or a related field; one year of primate experience or, in lieu of a degree, at least five years of experience with primates; CVT, AHT, or LAT certification preferred. Placement training experi-

ence not required; the organization will train. Professionalism and a good work ethic are essential. Salary is commensurate with experience; full employer-paid medical and optional employee-paid dental are available. Please e-mail cover letter, resume, and references to <vettechresumes@yahoo.com>.

#### **Manager, Technical Operations – Bethesda**

SAIC-Frederick, Inc., is seeking a manager of technical operations who will be responsible for managing a large animal facility. This position requires: • a bachelor's degree from an accredited college/university with course work related to biomedical research or equivalent experience; • three years of progressively responsible technical or technically related administrative experience involving contract or program administration in an animal facility; • strong management skills and experience including effective communication skills that enable the individual to interact with all levels of management including government personnel; • ability to perform a wide range of administrative functions including work scheduling, staff supervision, procurement, space allocation, and budgetary control; • excellent organizational skills and attention to details; • the ability to multi-task; • and previous experience with nonhuman primates, dogs and other large animals, and rodents.

SAIC-Frederick, Inc., is dedicated to supporting our employees in their professional and personal achievements. We offer an excellent salary and benefits program and the opportunity to be an employee-owner in one of the world's largest and most innovative employee-owned companies. To be part of an operation that is rapidly driving the future of cancer and AIDS research, please apply at <www.saic.com> or <saic.ncifcrf.gov>, referencing job code number KMB111811.

#### **Veterinarian – California NPRC**

The California National Primate Research Center (CNPRC) is seeking a highly motivated, enthusiastic veterinarian to join its primate medicine team. Position responsibilities include daily clinical care, project support, and teaching in a fast-paced biomedical research facility.

The CNPRC houses approximately 5000 non-human primates of three different species and supports a diverse variety of research programs. Salary and appointment level will be commensurate with experience.

Requirements are a DVM/VMD from an AVMA-accredited college of veterinary medicine and a current license in the United States, as well as excellent communication skills, a service-oriented attitude, and a desire to work in a challenging environment.

For more information, contact either Laurie Brignolo [e-mail: [llbrignolo@primate.ucdavis.edu](mailto:llbrignolo@primate.ucdavis.edu)] or Kari Christe, [e-mail: [klchriste@primate.ucdavis.edu](mailto:klchriste@primate.ucdavis.edu)]; or see <[jobs.hr.ucdavis.edu/jm/ViewVacancy?id=2825](http://jobs.hr.ucdavis.edu/jm/ViewVacancy?id=2825)>. You may apply online at <[www.hr.ucdavis.edu/Emp/Careers/Application\\_Process](http://www.hr.ucdavis.edu/Emp/Careers/Application_Process)>, or write to UC Davis Human Resources Administration Bldg., Orchard Park, Davis, CA 95616. Applications must be received before 5:00 p.m. on August 12 for consideration.

#### **Lab Animal Clinical Veterinarian – North Carolina**

Wake Forest University's Animal Resources Program is seeking a clinical veterinarian to provide medical care to animals, including primates, rodents, and a variety of other species used in teaching and in a research-intensive setting. The candidate will join a team of veterinary faculty and staff responsible for the provision of animal care that ensures compliance with regulatory and accreditation requirements. Additional responsibilities will include supervision of 3-4 animal health technicians, consultation with research faculty and staff on issues pertaining to animal care and use, training of personnel, and participation in IACUC activities.

Qualifications include a degree in veterinary medicine from an AVMA-accredited school, state licensure to practice veterinary medicine in the United States, and one year of veterinary practice experience, as well as excellent communication skills (written and oral) and a service-oriented attitude. Other desirable qualifications are training and/or experience in laboratory animal medicine, surgical experience, and supervisory skills. Apply at <[www.hrfin.wfubmc.edu:8001/hepro/wfuhsjobs.htm](http://www.hrfin.wfubmc.edu:8001/hepro/wfuhsjobs.htm)>. Wake Forest University is an AA/EOE.

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## **Announcements from Publications**

#### ***BMC Veterinary Research***

Biomed Central announces a new electronic journal, *BMC Veterinary Research*, which publishes original research articles in all aspects of veterinary science and medicine, including the epidemiology, diagnosis, prevention, and treatment of medical conditions of domestic, companion, farm, and wild animals, as well as the biomedical processes that underlie their health. *BMC Veteri-*

*nary Research* (ISSN 1746-6148) is indexed by PubMed. See <[www.biomedcentral.com/bmcvetres](http://www.biomedcentral.com/bmcvetres)>.

#### ***Veterinary Virology***

Chapters on Parvoviridae, Circoviridae, Poxviridae, and Herpesviridae have been added to the book, *A Concise Review of Veterinary Virology*, written by G. Carter, D. Wise, and E. Flores. These chapters are available at <[www.ivis.org/new.asp](http://www.ivis.org/new.asp)>.



## News Briefs

### **Anne Yoder Named Duke Primate Center Director**

A Yale University biologist whose scientific career was first inspired by a student tour of the Duke University Primate Center has been named the Center's new director. Anne Yoder, a Yale associate professor of ecology and evolutionary biology, will join the Duke faculty Aug. 1, 2005 and assume the directorship on Jan. 1, 2006.

Yoder succeeds William Hylander, a professor of biological anthropology and anatomy who since 2001 has served as director of the world's only research and education center devoted to prosimians. The Duke center has the world's largest collection of endangered primates. – *From a Duke press release, March 16, 2005*

### **Study Will Debate Monkey Future in U.K.**

A major study will examine what limits should be put on the continued use of nonhuman primates in U.K. experiments. The review is being undertaken by four of Britain's leading medical and scientific organizations: the Academy of Medical Sciences, the Royal Society, the Medical Research Council and the Wellcome Trust. It follows the fractious arguments between the research community and the animal welfare lobby over the need for new testing centers in the country.

Some 3,000 primates – mostly marmoset and macaque monkeys – are used in British labs each year. Three-quarters of them are employed in toxicology tests – checking to see if new drug compounds are likely to be harmful if carried forward into human trials.

Members of the working group, which will be chaired by Sir David Weatherall, will be drawn from outside the nonhuman primate research community. The group will include a broad range of scientific expertise, in addition to ethical and lay representation. Sir David said: "We hope to establish areas where alternatives, such as genetically modified mice or computer modeling, might be an appropriate option." – *Story from BBC NEWS, March 23, 2005*

### **Three Francois Langurs Die at Lincoln Park Zoo**

The president of Lincoln Park Zoo, Chicago, offered to quit his post after three Francois langur monkeys died at the zoo in one week, but his resignation was refused, according to a statement issued by the zoo. The zoo's Board of Directors will wait for results of an independent audit before deciding how to respond to the latest animal deaths, zoo Chairman Jay Proops said in the statement.

"I do not feel it is in the best interest of the institution to even consider (Kevin Bell's) resignation until the audit is complete and the board can make clear judgments based on fact, rather than speculation," Proops said. Animal rights activists have been calling for Bell's resig-

nation since the May 1 death of Wankie, the third of the North Side institution's elephants to die since October.

The zoo today said that about 4 p.m. on May 10, keepers discovered a 7-year-old female langur dead in its exhibit in the Helen Brach Primate House. Another langur, a 12-year-old male, was found dead in the exhibit the next morning. The third langur died in the zoo hospital May 12. University of Illinois pathologists were called in to perform necropsies. It may take several weeks for results to be returned. In the interim, the langur exhibit will remain empty of animals.

The zoo said in its statement it would await necropsy results before stating a cause of death for the monkeys, but acknowledged "strong suspicions among zoo experts that the deaths are connected to a change of exhibit." Proops said the zoo's board has asked the American Zoo and Aquarium Association to immediately convene an independent panel to review the zoo's animal care and management practices. The review will begin this month and could take several weeks to complete, he said. Its report will go directly to the zoo's board. – *May 12, 2005, Chicago Tribune*

### **Last of the Bonobos Arrive at Great Ape Trust**

Three more bonobos have arrived at the Great Ape Trust of Iowa, in Des Moines. They arrived at the research center today, completing the transfer of the colony from the Language Research Center at Georgia State University in Atlanta. They are Kanzi, a 25-year-old male, along with his 35-year-old adopted mother, Matata, and P-Suke, a 26-year-old male. Kanzi is one of the world's most studied great apes. Five other bonobos arrived earlier this spring. Two orangutans were the center's first residents.

The center will be the largest great ape center in North America and one of the first in the world to have all four types of great apes – bonobos, chimpanzees, gorillas, and orangutans. – *Posted to Primate-Net, May 15*

### **Animal Rights Museum in Madison**

The Primate Freedom Project and the Madison, Wisconsin-based Alliance for Animals have announced that they are close to closing a deal to buy a set of sheds between UW-Madison's National Primate Research Center and primate psychology lab. The sheds currently belong to Budget Bicycles, which uses them to store inventory, UW-Madison officials said. The animal rights groups plan to open a museum detailing primate suffering in research; see <[www.PrimateResearch.com](http://www.PrimateResearch.com)>. – *Chicago Sun-Times, June 6*

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## Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

### Books

- *No One Loved Gorillas More: Dian Fossey: Letters From the Mist*. C. De La Bedoyere; photographs by B. Campbell; foreword by J. Goodall. Vancouver: Raincoast Books, 2005. 192 pp. [Price: \$39.95]
- *The Ape in the Tree: An Intellectual and Natural History of Proconsul*. A. Walker & P. Shipman. Cambridge, MA: Belknap Press, 2005. [Price \$26.95]
- *Behavioral Flexibility in Primates: Causes and Consequences*. C. B. Jones. New York: Springer Press, 2005. [Price: \$149]
- *Man the Hunted: Primates, Predators, and Human Evolution*. D. Hart & R. W. Sussman. Philadelphia: Westview Press, 2005. [Price: \$29.95]
- *Systematic Review of Japanese Macaques*, *Macaca fuscata (Gray, 1870)*. J. Fooden & M. Aimi. *Fieldiana: Zoology New Series*, No. 104. Chicago: Field Museum of Natural History, 200 pp. (Price: \$55; Order from <store.fieldmuseum.org>).  
Includes 53 tables, 25 figures (one in color), and 10 appendices.
- *The Human Fossil Record, Volume 4: Craniodental Morphology of Early Hominids (Genera Australopithecus, Paranthropus, Orrorin) and Overview*. J. H. Schwartz & I. Tattersall. [Price: \$195.00] Hoboken, NJ: John Wiley & Sons, Inc.

### Magazines and Newsletters

- *The Conservation Behaviorist*, 2005, 3[1], <www.animalbehavior.org/ABS/Conservation>.
- *Folia Primatologica*, 2005, 76[3].  
Colour discrimination in the black-tufted-ear marmoset (*Callithrix penicillata*): Ecological implications, by D. M. A. Pessoa, J. F. Cunha, C. Tomaz, & V. F. Pessoa; Primate population densities in three nutrient-poor Amazonian Terra Firme forests of South-Eastern Colombia, by E. Palacios & C. A. Peres; New fossil Platyrrhine from Argentina, by M. F. Tejedor; A comparative study of adult facial morphology and its ontogeny in the fossil macaque *Macaca majori* from Capo Figari, Sardinia, Italy, by L. Rook & P. O'Higgins; Extra-unit sexual behaviour among wild Sichuan snub-nosed monkeys (*Rhinopithecus roxellana*) in the Qinling Mountains of China, by D. Zhao, B. Li, Y. Li, & K. Wada; Occurrence of infanticide among wild proboscis monkeys (*Nasalis larvatus*) in Sabah, Northern Borneo, by G. Agoramorthy & M. J. Hsu; and

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We would like to acknowledge *Primate-Science* as a source for information about new books.

Use and manufacture of tools to extract food by captive *Gorilla gorilla gorilla*: Experimental approach, by E. Pouydebat, C. Berge, P. Gorce, & Y. Coppens.

- *Gorilla Gazette*, April, 2005, 18[1]. (Contact J. Dewar, P.O. Box 210, Morganton, GA 30560 [e-mail: [jdewar@gorilla-haven.org](mailto:jdewar@gorilla-haven.org)])

Includes many interesting articles, as well as a CD-ROM of the Proceedings of the 2004 Gorilla Workshop.

- *IPPL News*, April, 2005, 32[1]. [International Primate Protection League, P.O. Box 766, Summerville, SC 29484; e-mail: [info@ippl.org](mailto:info@ippl.org)]
- *Journal of Medical Primatology*, 2005, 34[2].

A review of spontaneous neoplasia in baboons (*Papio* spp.), by R. E. Cianciolo & G. B. Hubbard; Characterization of an immortalized oviduct cell line from the cynomolgus monkey (*Macaca fascicularis*), by H. Okada, Y. Hirose, P. Manonmani, A. Uda, M. Ito, & T. Sankai; Ovarian follicular development stimulated by leuporelin acetate plus human menopausal gonadotropin in chimpanzees, by N. Yoshimoto, K. Shimoda, Y. Mori, R. Honda, H. Okamura, Y. Ide, T. Nakashima, N. Nakagata, R. Torii, Y. Yoshikawa, & I. Hayasaka; Comparison of the effects of Percoll and PureSperm® on the common marmoset (*Callithrix jacchus*) semen, by L. Hernández-López, N. Umland, R. Mondragón-Ceballos, & P. L. Nayudu; Treatment of myocardial dysfunction and pulmonary oedema in an infant chimpanzee, by E. Robel-Tillig, K. Eulenberger, M. Knüpfer, J. Junhold, C. Vogtmann, & W. Kiess; Hematological and serum biochemical values in cynomolgus monkeys anesthetized with ketamine hydrochloride, by C.-Y. Kim, H.-S. Lee, S.-C. Han, J.-D. Heo, M.-S. Kwon, C.-S. Ha, & S.-S. Han; and Molecular cloning and *in vitro* evaluation of an infectious simian-human immunodeficiency virus containing *env* of a primary Chinese HIV-1 subtype C isolate, by Y. Y. Wu, K. X. Hong, A.-L. Chenine, J. B. Whitney, Q. M. Chen, Y. Q. Geng, R. M. Ruprecht, & Y. M. Shao.

- *Journal of Medical Primatology*, 2005, 34[3].

SIV-specific T lymphocyte responses in PBMC and lymphoid tissues of SIV-infected pigtailed macaques during suppressive combination antiretroviral therapy, by L. M. Carruth, M. C. Zink, P. M. Tarwater, M. D. Miller, M. Li, L. A. Queen, J. L. Mankowski, A. Shen, R. F. Siliciano, & J. E. Clements; Expression levels of genes for ATP-binding cassette transporters and sterol 27-hydroxylase in liver and intestine of baboons with high and low cholesterol responses to dietary lipids, by R. S. Kushwaha, A. Rosillo, & H. C. McGill; Assessment of nutritional status in rhesus monkeys: Comparison of dual-energy X-ray absorptiometry and stable isotope dilution, by S. Blanc, R. Colman, J. Kemnitz, R. Weindruch, S. Baum, J. Ram-

sey, & D. Schoeller; Cataracts in a laboratory colony of African green monkeys (*Chlorocebus aethiops*), by R. Plesker, U. Hetzel, & W. Schmidt; Hematologic and lymphocyte immunophenotypic reference values for normal rhesus monkey (*Macaca mulatta*) umbilical cord blood: Gravidity may play a role in study design, by L. B. Rogers, M. B. Kaack, M. C. Henson, T. Rasmussen, E. Henson, R. S. Veazey, D. J. Krogstad, & B. B. Davison; Risks associated with environmental enrichment: Intestinal obstruction caused by foraging substrate, by J. V. Seier, M. A. Dhan-say, & A. Davids; and Comparison between sex and age class on some physiological, thermal, and hematological indices of the cerrado's marmoset (*Callithrix penicillata*), by V. Boere, E. C. Pinheiro, I. de Oliveira e Silva, G. R. Paludo, G. Canale, T. Pianta, A. Welker, & R. C. Rocha-de-Moura.

• *Neotropical Primates: A Journal and Newsletter of the IUCN/SSC Primate Specialist Group*, 2004, 12[1].

Plantas útiles en la alimentación de primates en la Cuenca del Río Samiria, Amazonia Peruana, by R. Aquino & R. E. Bodmer; Habitat use by the white-footed tamarin, *Saguinus leucopus*: A comparison between a forest-dwelling group and an urban group in Mariquita, Colombia, by K. Poveda & P. Sánchez-Palomino; New records of Martins' bare-face tamarin, *Saguinus martinsi* (Primates: Callitrichidae), by L. de Carvalho Oliveira, S. Miscow Mendel, J. de Sousa e Silva, Jr., & G. Wilson Fernandes; Behavioural changes in response to an injured group member in a group of wild moustached tamarins (*Saguinus mystax*), by E. R. Tirado Herrera & E. W. Heymann; Diurnal birth of a wild red titi monkey, *Callicebus cupreus*, at the Estación Biológica Quebrada Blanco, by W. I. Terrones Ruiz, D. M. Vela Diaz, C. Flores Amasifuén, & E. W. Heymann; Occurrence and diet of the black bearded saki (*Chiropotes satanas satanas*) in the fragmented landscape of western Maranhão, Brazil, by M. Port-Carvalho & S. F. Ferrari; Infección por larvas de *Alouattomyia baeri* (Diptera: Cuterebridae) en monos aulladores, *Alouatta palliata* (Primates: Cebidae) de la Costa Caribe de Costa Rica, by O. Calderón-Arguedas, A. Troyo, M. E. Solano, R. Sánchez, M. Chinchilla, & G. A. Gutiérrez-Espeleta; and Flora bacterial oral y su perfil de sensibilidad a antibióticos en monos de Costa Rica (*Alouatta palliata* y *Ateles geoffroyi*), by M. del Mar Gamboa-Coronado, E. Rodríguez-Cavallini, G. Rojas-Contreras, R. Sánchez-Porras, & G. Gutiérrez-Espeleta.

• *PrimeApes*, Spring 2005, 9[1]. [Center for Great Apes, P.O. Box 488, Wauchula, FL 33873]

Includes a report on hurricane damage last year.

#### Special Journal Issues

• Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2005. National Association of State Public Health Veterinarians, Inc. (NASPHV).

*Morbidity and Mortality Weekly Report*, 2005, 54[RR04], [www.cdc.gov/mmwr/mmwr\\_rr.html](http://www.cdc.gov/mmwr/mmwr_rr.html).

Includes an appendix, "Disinfectants and their properties", and a Continuing Education Activity.

• In memory of Professor Patricia S. Goldman-Rakic. *Cognitive, Affective, & Behavioral Neuroscience*, 2005, 4[4].

Contents include "Domain specificity in the primate prefrontal cortex", by L. M. Romanski; "Making your next move: Dorsolateral prefrontal cortex and planning a sequence of actions in freely moving monkeys", by J.-W. Ryou & F. A. W. Wilson; and "The primate working memory networks", by C. Constantinidis & E. Procyk.

• Nested societies. Convergent adaptations of baboons and snub-nosed monkeys? Grüter, C. C., & Zinner, D. *Primate Report*, 2004, 70.

• Systematics and the origin of species. *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102[Suppl. 1]. Contents include: Systematics and the origin of species: An introduction, by J. Hey, W. M. Fitch, & F. J. Ayala; A multidimensional approach for detecting species patterns in Malagasy vertebrates, by A. D. Yoder, L. E. Olson, C. Hanley, K. L. Heckman, R. Rasoloarison, A. L. Russell, J. Ranivo, V. Soarimalala, K. P. Karanth, A. P. Raselimanana, & S. M. Goodman; and Systematics and the future of biology, by E. O. Wilson.

• Spotlight on Brazil. *Conservation Biology*, 2005, 19[3].

#### Anatomy and Physiology

• Optical imaging of visually evoked responses in the middle temporal area after deactivation of primary visual cortex in adult primates. Collins, C. E., Xu, X., Khaytin, I., Kaskan, P. M., Casagrande, V. A., & Kaas, J. H. (J. H. K., Dept of Psychology, Vanderbilt Univ., 301 Wilson Hall, 111 21st Avenue South, Nashville, TN 37203 [e-mail: [jon.h.kaas@Vanderbilt.edu](mailto:jon.h.kaas@Vanderbilt.edu)]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102, 5594-5599.

The middle temporal area (MT) is a visual area in primates with direct and indirect inputs from the primary visual cortex (V1), a role in visual motion perception, and a suggested role in "blindsight". When V1 is deactivated, some studies report continued activation of MT neurons, which has been attributed to an indirect pathway to MT from the superior colliculus. Here muscimol was used to deactivate V1 while optically imaging visually evoked activity in MT in two primates, owl monkeys and galagos, where MT is exposed on the brain surface. The partial loss of V1 inputs abolished all or nearly all evoked activity in the retinotopically matched part of MT. Low levels of activation that persisted in portions of MT that were unstimulated or retinotopically congruent with the blocked portion of V1 appeared to reflect the spread of activity from stimulated to unstimulated parts of MT. Thus, a significant pathway based on the superior colliculus was not demonstrated.

- Regional specialization in pyramidal cell structure in the visual cortex of the galago: An intracellular injection study of striate and extrastriate areas with comparative notes on New World and Old World monkeys. Elston, G. N., Elston, A., Kaas, J. H., & Casagrande, V. (Vision, Touch and Hearing Res. Centre, School of Biomed. Sci., Univ. of Queensland, Queensland, 4072 Australia [e-mail: G.Elston@vthrc.uq.edu.au]). *Brain, Behavior and Evolution*, 2005, 66, 10-21.

“Recent studies have revealed marked differences in the basal dendritic structure of layer III pyramidal cells in the cerebral cortex of adult simian primates. In particular, there is a consistent trend for pyramidal cells of increasing complexity with anterior progression through occipitotemporal cortical visual areas. These differences in pyramidal cell structure, and their systematic nature, are believed to be important for specialized aspects of visual processing within, and between, cortical areas. However, it remains unknown whether this regional specialization in the pyramidal cell phenotype is unique to simians, is unique to primates in general or is widespread amongst mammalian species. In the present study we investigated pyramidal cell structure in the prosimian galago (*Otolemur garnetti*). We found, as in simians, that the basal dendritic arbors of pyramidal cells differed between cortical areas. More specifically, pyramidal cells became progressively more spinous through the primary (V1), second (V2), dorso-lateral (DL) and inferotemporal (IT) visual areas. Moreover, pyramidal neurons in V1 of the galago are remarkably similar to those in other primate species, in spite of large differences in the sizes of this area. In contrast, pyramidal cells in inferotemporal cortex are quite variable among primate species. These data suggest that regional specialization in pyramidal cell phenotype was a likely feature of cortex in a common ancestor of simian and prosimian primates, but the degree of specialization varies between species.”

#### Animal Models

- Representations of faces and body parts in macaque temporal cortex: A functional MRI study. Pinsk, M. A., DeSimone, K., Moore, T., Gross, C. G., & Kastner, S. (Dept of Psychology, Princeton University, Green Hall, Princeton, NJ 08544 [e-mail: mpinsk@princeton.edu]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102, 6996-7001.

“Human neuroimaging studies suggest that areas in temporal cortex respond preferentially to certain biologically relevant stimulus categories such as faces and bodies. Single-cell studies in monkeys have reported cells in inferior temporal cortex that respond selectively to faces, hands, and bodies but provide little evidence of large clusters of category-specific cells that would form ‘areas’. We probed the category selectivity of macaque temporal cortex for representations of monkey faces and monkey body parts relative to man-made objects using functional MRI in

animals trained to fixate. Two face-selective areas were activated bilaterally in the posterior and anterior superior temporal sulcus exhibiting different degrees of category selectivity. The posterior face area was more extensively activated in the right hemisphere than in the left hemisphere. Immediately adjacent to the face areas, regions were activated bilaterally responding preferentially to body parts. Our findings suggest a category-selective organization for faces and body parts in macaque temporal cortex.”

- Lack of long-term cortical reorganization after macaque retinal lesions. Smirnakis, S. M., Brewer, A. A., Schmid, M. C., Tolia, A. S., Schüz, A., Augath, M., Inhoffen, W., Wandell, B. A., & Logothetis, N. K. (Dept of Neurology, Mass. General Hospital, 55 Fruit St, Boston, MA 02114 [e-mail: smsmirnakis@partners.org]). *Nature*, 2005, 435, 300-307.

“Several aspects of cortical organization are thought to remain plastic into adulthood, allowing cortical sensorimotor maps to be modified continuously by experience. This dynamic nature of cortical circuitry is important for learning, as well as for repair after injury to the nervous system. Electrophysiology studies suggest that adult macaque primary visual cortex (V1) undergoes large-scale reorganization within a few months after retinal lesioning, but this issue has not been conclusively settled. Here we applied the technique of functional magnetic resonance imaging (fMRI) to detect changes in the cortical topography of macaque area V1 after binocular retinal lesions. fMRI allows non-invasive, in vivo, long-term monitoring of cortical activity with a wide field of view, sampling signals from multiple neurons per unit cortical area. We show that, in contrast with previous studies, adult macaque V1 does not approach normal responsivity during 7.5 months of follow-up after retinal lesions, and its topography does not change. Electrophysiology experiments corroborated the fMRI results. This indicates that adult macaque V1 has limited potential for reorganization in the months following retinal injury.”

- Age-related diffuse chronic telogen effluvium-type alopecia in female squirrel monkeys (*Saimiri boliviensis boliviensis*). Horenstein, V., Williams, L., Brady, A., Abee, C., Horenstein, M. G. (M. G. H., Dermatology Group, 60 Pompton Ave, Verona, NJ 07044). *Comparative Medicine*, 2005, 55, 169-174.

“We investigated the diffuse alopecia affecting some female squirrel monkeys housed in a breeding facility. We randomly selected 100 female and 10 male animals and performed a complete physical exam and a hair assessment on all animals (blood tests, trichograms, hair density); skin biopsies in representative cases; and a dominance behavioral assessment of 50 animals. Hair coat was normal in 35 female monkeys and all 10 male animals. Of the 65 females with diffuse alopecia, 17 had mild, 22 moderate, and 26 severe hair loss. The alopecia group had a mean age of  $9.6 \pm 0.6$  years, whereas that of the normal group was  $4.7 \pm$

0.6 years ( $P < 0.05$ ). The parity in the alopecia group was  $4.2 \pm 0.6$  but  $2.0 \pm 0.6$  ( $P < 0.05$ ) in the normal group. There were no statistically significant differences in body weight, hemoglobin, blood urea nitrogen, serum glucose, liver aspartate aminotransaminase, or free thyroxine. The trichogram demonstrated  $20.8\% \pm 1.6\%$  (mean  $\pm$  standard error) of telogen hairs in the alopecia group compared with  $9.5\% \pm 2.8\%$  of the control group ( $P < 0.05$ ). The hair density in the alopecia group was  $52.8 \pm 4.1/\text{cm}^2$  and  $79.6 \pm 14.3/\text{cm}^2$  in the control group. Skin biopsies in affected monkeys demonstrated increased telogen follicles, with no fibrosis or inflammation. There were no statistically significant differences in the dominance behavioral analysis. The findings are consistent with chronic telogen effluvium (CTE). A number of organic, behavioral, and dominance-related stress causes of CTE were excluded. CTE appears to be predominantly age-related in this population. CTE in female squirrel monkeys may serve as an animal model for human diffuse alopecia.”

### Animal Welfare

- Mirrors as environmental enrichment for African green monkeys. Harris, H. G., & Edwards, A. J. (Animal Resources Prog., Wake Forest Univ. Health Sci., Medical Center Blvd., Winston-Salem, NC 27157-0001 [e-mail: [harris@wfubmc.edu](mailto:harris@wfubmc.edu)]). *American Journal of Primatology*, 2004, 63, 459-467.

“Stainless steel circular mirrors were employed in an enrichment plan for 105 singly housed male African green monkeys. We observed 25 randomly selected males to measure mirror use and to assess the mirrors’ effectiveness as an enrichment item. We conducted additional mirror-use surveys on all 105 males using fingerprint accumulation as an indicator (rated on a scale of 0 to 4). Use was defined as either being in contact with the mirror (contact use (CU)) or looking directly into the mirror without contact (non-contact use (NC)). Mirror-use data were collected 10 months after the initial introduction of the mirrors and again at 16 months. The two time points were compared by paired t-tests. No significant difference in use was found between the two data collection points. On average, the monkeys used the mirrors 5.2% of the total time intervals recorded (approximately 3 min/hr). Results from the five fingerprint-accumulation surveys showed that 102 of 105 males (97%) had CU with their mirrors over the survey points. Based on the sustained use of the mirrors over a 6-month period, we concluded that the mirrors were an effective enrichment tool that the vast majority of our monkeys routinely used. Habituation did not appear to occur even a year after the mirrors were introduced.”

- The effects of fluoxetine and buspirone on self-injurious and stereotypic behavior in adult male rhesus macaques. Fontenot, M. B., Padgett, E. E., 3rd, Dupuy, A. M., Lynch, C. R., De Petrillo, P. B., & Higley, J. D. (Univ of Louisi-

ana Research Center, 4401 W. Admiral Doyle Dr., New Iberia, LA 70560). *Comparative Medicine*, 2005, 55, 67-74.

The effects of two serotonergic agents – fluoxetine, a serotonin (5-HT) reuptake inhibitor, and buspirone, a 5-HT<sub>1a</sub> agonist – on rates of self-injurious and stereotypic behavior were examined in 15 adult male *Macaca mulatta*. All animals received a placebo for 2 weeks followed by either buspirone or fluoxetine for 12 weeks. Behavior was monitored using a focal sampling technique throughout the study and for 2 weeks post-study. Cerebrospinal fluid (CSF) samples and body weights were obtained pre-study, at the ends of placebo and treatment phases, and post-study. Fluoxetine and buspirone were significantly effective in reducing rates of self-biting during treatment weeks 1 to 8 and self-directed stereotypic behavior during weeks 5 to 12 and post-treatment. No significant effect of either treatment on hair-plucking, stereotypic pacing, saluting, or head tossing was identified. The duration of neutral behavior increased, and rates of scratching and yawning decreased in the buspirone-treated condition. In the fluoxetine-treated condition, rates of yawning, scratching, and self-directed grooming were higher overall compared with those of buspirone-treated animals, and rates of scratching increased significantly ( $P < 0.05$ ) in weeks 9 to 12; these findings suggest that animals in the fluoxetine-treated condition experienced higher levels of anxiety throughout the study. In both treatment conditions, concentrations of CSF 5-HIAA (5-HT metabolite) were significantly lower ( $P < 0.05$ ) than placebo concentrations. Fluoxetine and buspirone may be efficacious for treatment of self-injurious and self-directed stereotypic behavior in macaques. Further studies are required to determine the optimal dosages and treatment length.

### Behavior

- Spatial memory and monitoring of hidden items through spatial displacements by chimpanzees (*Pan troglodytes*). Beran, M. J., Meran, M. M., & Menzel, C. R. (Language Research Center, Georgia State Univ., 3401 Panthersville Rd, Decatur, GA 30034 [e-mail: [mjberan@yahoo.com](mailto:mjberan@yahoo.com)]). *Journal of Comparative Psychology*, 2005, 119, 14-22.

This study examined chimpanzee short-term memory for food location in near space. In Experiments 1 and 2, either one or two items (chocolate pieces) were hidden in an array of three or five containers that either remained stationary or were rotated 180° or 360°. When the array remained stationary, the chimpanzees remembered both item locations. When arrays were rotated, however, chimpanzees found only one item. In Experiment 3, two items were hidden in an array of seven cups. Both items were found at levels significantly better than chance. Ninety percent of errors were made after the first item was found, and errors reflected memory failure rather than a failure of inhibitory control.

- Can squirrel monkeys (*Saimiri sciureus*) plan for the future? Studies of temporal myopia in food choice. McKenzie, T., Cherman, T., Bird, L. R., Naqshbandi, M., & Roberts, W. A. (W. A. R., Dept of Psychology, Univ. of Western Ontario, London, ON, N6A 5C2 Canada [e-mail: roberts@uwo.ca]). *Learning & Behavior*, 2004, 32, 377-390.

In seven experiments, two squirrel monkeys were given choices between arrays of food that varied in the quantity offered. In Experiments 1-5, the monkeys were offered choices between quantities of the same food that varied in a 2:1 ratio. The squirrel monkeys failed to show the temporal myopia effect or a decrease in preference for the larger quantity as the absolute number of food items offered increased. Even when given choices of 8 versus 16 peanuts and 10 versus 20 peanuts, both monkeys significantly preferred the larger quantity. An examination of the monkeys' rates of consumption indicated that 20 peanuts were consumed over a 1- to 2-h period, with eating bouts separated by periods of nonconsumption. In Experiments 6A, 6B, and 7, food was either pilfered or replenished 15 min after an initial choice, so that choice of the smaller quantity led to more total food in the long run. These manipulations caused both monkeys to reduce choice of the larger quantity, relative to baseline choice. The results suggest that squirrel monkeys anticipated the future consequences of their choices.

- Learning to inhibit prepotent responses: Successful performance by rhesus macaques, *Macaca mulatta*, on the reversed-contingency task. Murray, E. A., Kralik, J. D., & Wise, S. P. (Lab. of Neuropsychology, NIMH, Bethesda, MD 20892 [e-mail: eam@ln.nimh.nih.gov]). *Animal Behaviour*, 2005, 69, 991-998.

"To reinvestigate whether macaque monkeys could learn the reversed-contingency task, we trained six rhesus monkeys on the problem. On each trial, the monkeys chose between one and four pieces of the same food item. If a monkey selected four pieces of food, it received one instead; choice of one piece of food led to the receipt of four. All of the monkeys initially tended to select the larger quantity of food, but eventually learned to choose the smaller amount. The results confirmed a previous report that macaque monkeys quickly reached a performance level of roughly 50% 'correct', defined as choosing the smaller amount of food, and some individuals continued to perform at that level for a protracted period of testing. Contrary to that report, however, the present findings show that macaque monkeys can master the reversed-contingency task."

- Inhibitory control and response selection in problem solving: How cotton-top tamarins (*Saguinus oedipus*) overcome a bias for selecting the larger quantity of food. Kralik, J. D. (Lab. of Systems Neurosci., NIMH, Bethesda, MD 20892 [e-mail: jeraldkralik@mail.nih.gov]). *Journal of Comparative Psychology*, 2005, 119, 78-89.

When presented with a choice between 1 and 3 pieces of food in a type of reversed-contingency task, four cotton-top tamarins consistently chose the 3 pieces of food and received nothing, even though the choice of 1 piece would have yielded 3. However, in a task in which the tamarins received the 1 piece of food when they chose it, all subjects learned to select 1 over 3. Thus, the tamarins' prior failure on the reversed contingency task did not result entirely from an inherent inability to suppress the prepotent response of reaching to the larger of two quantities of food. After the experience of selecting the smaller quantity and receiving it, all of the tamarins solved the version of the reversed contingency task that they failed initially. These results suggest that the tamarins' initial failure may have reflected a difficulty with selecting an alternative response option.

### Care

- Catching animals who have escaped from their primary enclosure: A discussion by the Laboratory Animal Refinement & Enrichment Forum. Smith, M., Barley, J., Down, N., Francis, R., Feurtado, M., Kerwin, A., Patterson-Kane, E., Sherwin, C., & Reinhardt, V. *Animal Technology and Welfare*, 2005, 4, 41-44, <[www.awionline.org/Lab\\_animals/biblio/atw4.html](http://www.awionline.org/Lab_animals/biblio/atw4.html)>.

### Conservation

- Hainan black-crested gibbon is headed for extinction. Zhou, J., Wei, F., Li, M., Zhang, J., Wang, D., & Pan, R. (F. W., Institute of Zoology, the Chinese Academy of Sciences, 25 Beishihuan Xilu, Haidian, Beijing, 100080, China (PRC) [e-mail: weifw@ioz.ac.cn]). *International Journal of Primatology*, 2005, 26, 453-465.

"Although Hainan black-crested gibbons have been on the list of the most endangered primate species in the world for many years, their environment is still deteriorating, especially on Hainan Island. Our findings indicate that the species is unlikely to survive the next decades unless efficient conservation policies and strategies are put in place immediately. Census data show that populations of the species used to occur across the whole island, but in 2003 only 13 individuals could be found, confined to a small region, the Bawangling Natural Reserve (19° 02' – 19° 08' N and 109° 02' – 109° 13' E), in the western part of the island, covering only 14–16 km<sup>2</sup>. In other words, ca. 99% of the habitat has vanished in the past 300 years. Such dramatic change has pushed the species to the edge of extinction: only 2 groups and 2 solitary adult males remained in 2003. Two adult females, 2 juveniles and one infant comprise Group A, in Dong'er, the core area of the western part of the reserve; and 1 adult male, 2 adult females, 1 juvenile and 1 infant formed another group (B), confined to another core area (Nanchahe) in the northern part of the reserve. The dramatic decline in the gibbon population has occurred due to vegetation reduction, ecological deterioration and extensive human impact. The forest cover was

reduced from 95.5% 2000 years ago to just 4% in 1999; and the human population in 2003 was 330% larger than in 1950.”

- The Cooking Ape: An Interview with Richard Wrangham. Townsend, E. *Gastronomica*, 2003, 3[2], <[www.gastronomica.org/gastro/pages/sample3.2.html](http://www.gastronomica.org/gastro/pages/sample3.2.html)>.

### Development and Aging

- Functional maturation of the macaque’s lateral geniculate nucleus. Movshon, J. A., Kiorpes, L., Hawken, M. J., & Cavanaugh, J. R. (Center for Neural Science, New York Univ., 4 Washington Pl., Rm 809, New York, NY 10003 [e-mail: [movshon@nyu.edu](mailto:movshon@nyu.edu)]). *Journal of Neuroscience*, 2005, 25, 2712-2722.

“Vision in infant primates is poor, but it is not known which structures in the eye or brain set the main limits to its development. We studied the visual response properties of 348 neurons recorded in the lateral geniculate nucleus (LGN) of macaque monkeys aged 1 week to adult. We measured spatial and temporal frequency tuning curves and contrast responses with drifting achromatic sinusoidal gratings. Even in animals as young as 1 week, the main visual response properties of neurons in the magnocellular (M) and parvocellular (P) divisions of the LGN were qualitatively normal, including the spatial organization of receptive fields and the characteristic response properties that differentiate M- and P-cells. At 1 and 4 weeks, spatial and temporal resolution were less than one-half of adult values, whereas contrast gain and peak response rates for optimal stimuli were about two-thirds of adult values. Adult levels were reached by 24 weeks. Analysis of correlations between S-potentials representing retinal inputs and LGN cells suggested that the LGN follows retinal input as faithfully in infants as in adults, implicating retinal development as the main driving force in LGN development. Comparisons with previously published psychophysical data and ideal observer models suggest that the relatively modest changes in LGN responses during maturation impose no significant limits on visual performance. In contrast to previous studies, we conclude that these limits are set by neural development in the visual cortex, not in or peripheral to the LGN.”

- Schultz’s unruly rule: Dental developmental sequences and schedules in small-bodied, folivorous lemurs. Godfrey, L. R., Samonds, K. E., Wright, P. C., & King, S. J. (Dept of Anthropology, 240 Hicks Way, Univ. of Massachusetts, Amherst, MA 01003 [e-mail: [lgodfrey@anthro.umass.edu](mailto:lgodfrey@anthro.umass.edu)]). *Folia Primatologica*, 2005, 76, 77-99.

“Schultz’s rule (as reconstructed by Smith) states that there is a relationship between the pattern (or relative order) of eruption of molar versus secondary (replacement) teeth and the overall pace (or absolute timing) of growth and maturation. Species with ‘fast’ life histories (rapid

dental development, rapid growth, early sexual maturation, short life spans) are said to exhibit relatively early eruption of the molars and late eruption of the secondary replacement teeth (premolars, canines, incisors), whereas species with ‘slow’ life histories are said to exhibit relatively late eruption of the molars and early eruption of the secondary dentition. In a recent review, B. H. Smith noted that primates with tooth combs might violate this rule because tooth combs tend to erupt early, regardless of the pace of life history. We show that exceptions to Schultz’s rule among lemurs are not limited to the relative timing of eruption of the tooth comb. Rather, among lemurs, some species with extremely accelerated dental development exhibit a pattern of eruption of molars and of secondary teeth in direct opposition to the expectations of Schultz’s rule. We focus particularly on the pattern (order) and pace (absolute timing) of dental development and eruption in *Avahi* and *Lepilemur* – two relatively small, nocturnal folivores with rapid dental development. These taxa differ markedly in their eruption sequences (the premolars erupt after M2 and M3 in *Lepilemur* but not *Avahi*). We offer an explanation for the failure of Schultz’s rule to predict these differences. Schultz’s rule presumes that eruption timing is dependent on the size of the jaw and that, therefore, molar crown formation and eruption will be delayed in species with slow-growing jaws. We show that a variety of processes (including developmental imbrication) allows the crowns of permanent teeth to form and to erupt into jaws that might appear to be too small to accommodate them.”

### Disease

- Malignant NK/T-Cell lymphoma associated with simian Epstein-Barr virus infection in a Japanese macaque (*Macaca fuscata*). Suzuki, J., Goto, S., Kato, A., Hashimoto, C., Miwa, N., Takao, S., Ishida, T., Fukuoka, A., Nakayama, H., Doi, K., & Isowa, K. (Center for Human Evolution Modeling Res., PRI, Kyoto Univ., Inuyama, Aichi 484-8506, Japan). *Experimental Animals*, 2005, 54, 101-105.

A case of spontaneous malignant lymphoma in a Japanese macaque was pathologically, etiologically and virologically studied. Nasal cavity was involved in the neoplastic lesions in addition to lymphoid and visceral tissues. Histopathological analyses revealed the presence of neoplastic cells classified into histiocytic Hodgkin-like cells and Reed-Sternberg-like cells. Histiocytic Hodgkin-like cells were CD16+ and CD20+, and the CD16+ cells were also positive for simian Epstein-Barr virus (sEBV)-encoded early RNA transcripts. RS-like cells were negative for CD3, CD16 and CD20. Antibodies to early antigen of sEBV were detected, while antibodies to simian T-cell leukemia virus-1 were negative. The case may correspond to EBV-associated nasal type NK/T-cell lymphoma in humans rather than Hodgkin lymphoma.

- Intestinal parasites and bacteria of mountain gorillas (*Gorilla beringei beringei*) in Bwindi Impenetrable National

Park, Uganda. Kalema-Zikusoka, G., Rothman, J. M., & Fox, M. T. (Conservation Through Public Health, Plot 39 Babiiha Avenue, P.O. Box 10950, Kampala, Uganda [e-mail: [gladys@ctph.org](mailto:gladys@ctph.org)]). *Primates*, 2005, 46, 59-63.

A survey in 1994 examined intestinal helminths and bacterial flora of Bwindi's mountain gorillas. Parasites and bacteria were identified to genus in the feces of two groups of tourist-habituated and one group of non-tourist-habituated mountain gorillas. There were eggs of an anoplocephalid cestode, as well as nematode eggs representative of the genera *Trichuris*, *Ascaris*, *Oesophagostomum*, *Strongyloides*, and *Trichostrongylus*. This is the first report of *Ascaris lumbricoides*-like eggs in mountain gorillas. Fecal samples ( $n=76$ ) from all groups contained helminth eggs, with strongyle eggs and anoplocephalid eggs the most common. *Salmonella* and *Campylobacter* were found in both gorilla groups. Regular long-term non-invasive fecal monitoring of the populations of mountain gorillas is essential for the prevention and identification of potential health threats by intestinal parasites and bacteria in this highly endangered subspecies.

- Structure of an unliganded simian immunodeficiency virus gp120 core. Chen, B., Vogan, E. M., Gong, H., Skehel, J. J., Wiley, D. C., & Harrison, S. C. (S. C. H., Children's Hospital Laboratory of Molecular Medicine, Harvard Medical School, Boston, MA 02115 [e-mail: [harrison@crystal.harvard.edu](mailto:harrison@crystal.harvard.edu)]). *Nature*, 2005, 433, 834-841.

"Envelope glycoproteins of human and simian immunodeficiency virus (HIV and SIV) undergo a series of conformational changes when they interact with receptor (CD4) and co-receptor on the surface of a potential host cell, leading ultimately to fusion of viral and cellular membranes. Structures of fragments of gp120 and gp41 from the envelope protein are known, in conformations corresponding to their post-attachment and postfusion states, respectively. We report the crystal structure, at 4 Å resolution, of a fully glycosylated SIV gp120 core, in a conformation representing its prefusion state, before interaction with CD4. Parts of the protein have a markedly different organization than they do in the CD4-bound state. Comparison of the unliganded and CD4-bound structures leads to a model for events that accompany receptor engagement of an envelope glycoprotein trimer. The two conformations of gp120 also present distinct antigenic surfaces. We identify the binding site for a compound that inhibits viral entry."

- Ancient co-speciation of simian foamy viruses and primates. Switzer, W. M., Salemi, M., Shanmugam, V., Gao, F., Cong, M., Kuiken, C., Bhullar, V., Beer, B. E., Vallet, D., Gautier-Hion, A., Tooze, Z., Villinger, F., Holmes, E. C., & Heneine, W. (HIV & Retrovirology Branch, Div. of HIV/AIDS Prevention, CDC, 1600 Clifton Rd, MS G-19, Atlanta, GA 30333 [e-mail: [bis3@cdc.gov](mailto:bis3@cdc.gov)]). *Nature*, 2005, 434, 376-380.

Although parasite-host co-speciation is a long-held hypothesis, convincing evidence for long-term co-speciation remains elusive, largely because of small numbers of hosts and parasites studied and uncertainty over rates of evolutionary change. Co-speciation is especially rare in RNA viruses, in which cross-species transfer is the dominant mode of evolution. Simian foamy viruses (SFVs) are ubiquitous, non-pathogenic retroviruses that infect all primates. Here the co-speciation hypothesis in SFVs and their primate hosts is tested by comparing the phylogenies of SFV polymerase and mitochondrial cytochrome oxidase subunit II from African and Asian monkeys and apes. The phylogenetic trees were remarkably congruent in both branching order and divergence times, strongly supporting co-speciation. Molecular clock calibrations revealed an extremely low rate of SFV evolution,  $1.7 \times 10^{-8}$  substitutions per site per year, making it the slowest-evolving RNA virus documented so far. These results indicate that SFVs might have co-speciated with Old World primates for at least 30 million years, making them the oldest known vertebrate RNA viruses.

- Successful treatment of idiopathic dilated cardiomyopathy in an adult chimpanzee (*Pan troglodytes*). Sleeper, M. M., Doane, C. J., Langner, P. H., Curtis, S., Avila, K., & Lee, D. R. (Section of Clinical Studies, Ryan Vet. Hospital, Univ. of Pennsylvania, 3900 Delancey St, Philadelphia, PA 19104). *Comparative Medicine*, 2005, 55, 80-84.

Various congenital and acquired forms of heart disease have been reported in captive lowland gorillas, and heart disease is a major cause of morbidity and mortality in geriatric humans. However, the prevalence of heart disease is unknown in nonhuman great ape species. Indeed, little is known about heart disease in chimpanzees, although the species has been used in research for decades. This report details the clinical presentation and diagnostics (thoracic radiography, electrocardiography, and echocardiography) utilized to diagnose idiopathic dilated cardiomyopathy in a 27-year-old male chimpanzee. Treatment decisions – indicated by follow-up diagnostics including repeat electrocardiography, echocardiography, and clinical laboratory data – over the 22-month period during which he continues to be treated are described. In addition, electrocardiographic and echocardiographic findings obtained from 20 clinically normal adult (11 female and 9 male) chimpanzees are presented for comparison.

- Seroprevalence of simian immunodeficiency virus in wild and captive born Sykes' monkeys (*Cercopithecus mitis*) in Kenya. Ellis, B. R., Munene, E., Elliott, D., Robinson, J., Otsyula, M. G., & Michael, S. F. (S. F. M., Dept of Tropical Med., Tulane Univ., New Orleans, LA 70112 [e-mail: [bellis1@tulane.edu](mailto:bellis1@tulane.edu)]). *Retrovirology*, 2004, 1, 34.

"The Sykes' monkey and related forms make up an abundant, widespread, and morphologically diverse species complex in eastern Africa that naturally harbors a distinct simian immunodeficiency virus (SIVsyk). We carried out



a retrospective serological survey of SIV infection from both wild and captive Sykes' monkeys from Kenya. We compared two commercially available, cross-reactive ELISA tests using HIV antigens with a novel SIVsyk antigen-specific Western blot assay and analyzed the data by origin, subspecies, age and sex. The SIVsyk antigen-specific Western blot assay detected more serum samples as positive than either of the cross-reactive ELISA assays. Using this assay, we found that seroprevalence is higher than previously reported, but extremely variable in wild populations (from 0.0 to 90.9%). Females were infected more often than males in both wild and captive populations. Seropositive infants were common. However, no seropositive juveniles were identified.”

- Oral papillomas and papilliform lesions in rhesus macaques (*Macaca mulatta*). Patterson, M. M., Rogers, A. B., Mansfield, K. G., & Schrenzel, M. D. (Div. of Comp. Med., MIT, 77 Massachusetts Ave, Cambridge, MA 02139). *Comparative Medicine*, 2005, 55, 75-79.

Oral papillomas in two male rhesus macaques that were diagnosed morphologically as filiform and squamous types are described. Two additional macaques had oral papilliform lesions consistent histologically with papillary hyperplasia. Immunohistochemistry, along with electron microscopy and PCR assays, failed to demonstrate evidence of papillomavirus in any of the tumors; however, such results are often lacking when suspect oral lesions in humans and other species are assessed. Other potential causes of the papillary masses include chronic irritation and perhaps a genetic susceptibility. Benign tumors of the oral epithelium in macaques have not been reported previously; they appear to be rare and of variable clinical significance.

- KIT-positive gastrointestinal stromal tumor in a 22-year-old male chimpanzee (*Pan troglodites*). Saturday, G. A., Lasota, J., Frost, D., Brasky, K. B., Hubbard, G., & Miittinen, M. (Dept of Vet. Pathol., AFIP, 14th & Alaska Ave, NW, Bldg 54, Rm G117, Washington, DC 20306-6000 [e-mail: [saturdayg@afip.osd.mil](mailto:saturdayg@afip.osd.mil)]). *Veterinary Pathology*, 2005, 42, 362-365.

Gastrointestinal stromal tumors (GIST), KIT-positive and KIT signaling driven or platelet-derived growth factor receptor  $\alpha$  (PDGFRA) signaling driven mesenchymal tumors, are poorly known in nonhuman primates. Availability of KIT- and PDGFRA-inhibitor drug imatinib mesylate has greatly raised the interest for these tumors. At necropsy of a 22-year-old male chimpanzee, a round, firm 2-cm intramural tumor was incidentally found in the mid-body of the stomach and diagnosed as a GIST. Histologically, the mass was composed of spindle to polygonal epithelioid cells arranged in short to intermediate-length, interlacing streams, bundles, and nodular whorls often separated by hyalinized eosinophilic matrix. The mitotic rate was a maximum 1/50 high-power field. Immunohistochemically, the tumor cells were diffusely positive for KIT and CD34, focally positive for  $\alpha$ -smooth muscle actin, and negative for

muscle specific actin, desmin, S-100 protein, synaptophysin, and glial fibrillary acidic protein. Because the majority of human GISTs have gain-of-function KIT or PDGFRA mutations, genomic sequences of KIT exons 9, 11, 13, and 17 and PDGFRA exons 12 and 18 from this chimpanzee GIST were polymerase chain reaction amplified and sequenced. However, no mutation was identified in the analyzed “mutational hot spots”. This study is the first extensive histomorphologic, immunohistochemical, and molecular genetic analysis of a chimpanzee GIST. More cases of nonhuman primate GISTs should be analyzed to discover the clinicopathologic spectrum of GISTs in these species.

- Combined-type osteosarcoma in a rhesus macaque. Beam, S. L. (Dept of Biomed. Sci., College of Vet. Med., Cornell Univ., Ithaca, NY 14853). *Veterinary Pathology*, 2005, 42, 374-377.

“A femoral mass from a 15-year-old rhesus macaque was evaluated. Grossly, the mass consisted of a large, osteolytic focus in the distal femur, a gelatinous core of neoplastic tissue in the medullary cavity, and an invasive mass-obliterating musculature of the thigh. On histopathologic evaluation, three neoplastic mesenchymal cell populations, osteoblasts, fibroblasts, and primitive mesenchymal cells were identified. The mass was diagnosed as a combined type osteosarcoma. To our knowledge, this is the first osteosarcoma with this subclassification in a rhesus.”

- Intestinal stromal tumors in a simian immunodeficiency virus-infected, simian retrovirus-2 negative rhesus macaque (*Macaca mulatta*). Bielefeldt-Ohmann, H., Barouch, D. H., Bakke, A. M., Bruce, A. G., Durning, M., Grant, R., Letvin, N. L., Ryan, J. T., Schmidt, A., Thouless, M. E., & Rose, T. M. (Washington NPRC, Univ. of Washington, Box 357331, Seattle, WA 98195 [e-mail: [helle@bart.rprc.washington.edu](mailto:helle@bart.rprc.washington.edu)]). *Veterinary Pathology*, 2005, 42, 391-396.

Multifocal submucosal stromal tumors were diagnosed in a 5.5-year-old rhesus macaque experimentally infected with simian immunodeficiency virus, strain SIVsmE660, and CD4<sup>+</sup> T cell depleted. The animal was negative for simian retroviruses, SRV-1, -2, and -5. Polymerase chain reaction analysis of DNA from tumor and spleen tissue revealed abundant, preferential presence of retroperitoneal fibromatosis herpesvirus, the macaque homologue of the Kaposi sarcoma-associated herpesvirus (human herpesvirus-8), in the tumors. This was corroborated by demonstration of viral latent nuclear antigen-1 in the nuclei of a majority of the spindle tumor cells. Low levels of an additional macaque herpesvirus, rhesus rhadinovirus, were also detected in the spleen and tumor tissues. The spindle cells labeled positively for vimentin and CD117 but were negative for CD31, CD68, desmin, and smooth muscle cell actin. Collectively, these findings suggest a relation to but not absolute identity with simian mesenchy-

moproliferative disorders (MPD) or typical gastrointestinal stromal tumors (GISTs).

- Cardiomyopathy in captive owl monkeys (*Aotus nancymae*). Rishniw, M., Schiavetta, A., Johnson, T., & Erb, H. (Dept of Biomed. Sci., College of Vet. Med., Cornell Univ., Ithaca, NY 14853). *Comparative Medicine*, 2005, 55, 162-168.

“Dilated cardiomyopathy (DCM) was identified histopathologically in a colony of owl monkeys over a 15-year period. We characterized the incidence of cardiac disease echocardiographically in the colony over a 14-month period. Of 77 monkeys, 21 had systolic myocardial failure, and postmortem examination confirmed the antemortem diagnosis of DCM in eight animals. Monkeys with a questionable diagnosis at the first examination demonstrated progression of disease with time. Left ventricular end-systolic cross-sectional area and left ventricular fractional area change were the indices that most reliably discriminated between normal and diseased animals. Serum cardiac troponin I concentrations were below detectable limits in normal and diseased monkeys. The apparent high prevalence of disease in this colony precluded establishment of reference intervals for *Aotus nancymae*. Our study provides the first comprehensive echocardiographic evaluation of owl monkeys with cardiomyopathy.”

- Successful cyclosporine treatment for atopic dermatitis in a rhesus macaque (*Macaca mulatta*). Ovadia, S., Wilson, S. R., & Alexander, S. (Nat. Inst. of Biotech. of the Negev, Ben-Gurion Univ. of the Negev, Beer-Sheva, Israel 8554105). *Comparative Medicine*, 2005, 55, 192-196.

A juvenile (1 year old) female rhesus macaque developed a chronic active skin condition characterized by pruritus, erythema, alopecia, scaling, exfoliation, and lichenification. Lesions were limited to the ventrum, specifically rostral mandible and neck, axilla and inguinal regions, distal extremities, and interdigital regions. Differential diagnoses included infection, dietary deficiency, metabolic abnormality, endocrinopathy, and immunological injury. Diagnostic tests included complete hemogram, serum chemistry, skin scrapes for ectoparasite detection, hair plucks for dermatophyte culture, and a serum-based hypersensitivity panel. All results were within normal limits. Dermal biopsies revealed lesions consistent with active allergic dermatitis, and a diagnosis of atopic dermatitis was made. Oral cyclosporine (5 mg/kg daily) rapidly eliminated clinical evidence of dermatitis. Histologically, lesions resolved after 12 months of treatment. Atopic dermatitis is an inflammatory skin condition for which there are neither pathognomonic clinical or diagnostic features nor a single successful therapy. Basic criteria such as pruritus, lichenification, a chronic course, and history of allergies strongly support the diagnosis. One successful therapeutic agent is a macrolide calcineurin inhibitor, cyclosporine. It represents a safer class of immunomodulatory drugs than corticosteroids and provides targeted alteration of lympho-

cyte function. This case apparently represents the first reported successful treatment of atopic dermatitis in a non-human primate utilizing cyclosporine.

- A national survey of laboratory animal workers concerning occupational risks for zoonotic diseases. Weigler, B., Di Giacomo, R., & Alexander, S. (Dept of Comp. Med., School of Med., Univ. of Washington, Seattle, WA 98109-1024). *Comparative Medicine*, 2005, 55, 183-191.

In this cross-sectional survey of laboratory animal workers in the United States, 23 of 1367 persons reported 28 cases of infection with zoonotic agents from research animals at their workplace during the past five years, with 6 persons indicating that their infections were medically confirmed. Based on these data, the annualized incidence rate for work-related transmission of zoonotic agents from laboratory animals was 45 cases per 10,000 worker-years at risk (95% confidence interval, 30 to 65 cases), approximating the rate for nonfatal occupational illnesses in the agricultural production/livestock industry and for those employed in the health services during 2002. Logistic regression analysis found various characteristics of persons and their employers that were significantly associated with the likelihood of having been medically evaluated for exposure to a zoonotic agent from laboratory animals. Most (95.595% +/- 1.1%) persons working with laboratory animals or their tissues indicated that they knew whom to talk to at their institution for medical evaluation and care should they be concerned about the possibility of an occupationally acquired zoonotic disease in future. However, occupational illnesses and exposures among laboratory animal workers were underreported, as 10 of the 28 (36%) alleged zoonotic disease cases were not communicated to the employee's supervisor. Lack of concern about the potential significance to their health and the perception of punitive consequences to the employee were some of the reasons cited for underreporting, an issue which must be vigorously addressed in the interests of continuing progress toward zoonotic disease prevention in this field.

- Emergence of unique primate T-lymphotropic viruses among central African bushmeat hunters. Wolfe, N. D., Heniène, W., Carr, J. K., Garcia, A. D., Shanmugam, V., Tamoufe, U., Torimiro, J. N., Prosser, A. T., LeBreton, M., Mpoudi-Ngole, E., McCutchan, F. E., Birx, D. L., Folks, T. M., Burke, D. S., & Switzer, W. M. (W. M. S., Lab. Branch, Div. of HIV/AIDS Prevention, CDC, Atlanta, GA 30333 [e-mail: [bis3@cdc.gov](mailto:bis3@cdc.gov)]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102, 7994-7999.

“The human T-lymphotropic viruses (HTLVs) types 1 and 2 originated independently and are related to distinct lineages of simian T-lymphotropic viruses (STLV-1 and STLV-2, respectively). These facts, along with the finding that HTLV-1 diversity appears to have resulted from multiple cross-species transmissions of STLV-1, suggest that contact between humans and infected nonhuman primates (NHPs) may result in HTLV emergence. We investigated

the diversity of HTLV among central Africans reporting contact with NHP blood and body fluids through hunting, butchering, and keeping primate pets. We show that this population is infected with a wide variety of HTLVs, including two previously unknown retroviruses: HTLV-4 is a member of a phylogenetic lineage that is distinct from all known HTLVs and STLVs; HTLV-3 falls within the phylogenetic diversity of STLV-3, a group not previously seen in humans. We also document human infection with multiple STLV-1-like viruses. These results demonstrate greater HTLV diversity than previously recognized and suggest that NHP exposure contributes to HTLV emergence. Our discovery of unique and divergent HTLVs has implications for HTLV diagnosis, blood screening, and potential disease development in infected persons. The findings also indicate that cross-species transmission is not the rate-limiting step in pandemic retrovirus emergence and suggest that it may be possible to predict and prevent disease emergence by surveillance of populations exposed to animal reservoirs and interventions to decrease risk factors, such as primate hunting.”

#### Evolution, Genetics, and Taxonomy

- Incisor-molar relationships in chimpanzees and other hominoids: Implications for diet and phylogeny. Pickford, M. (Dépt Histoire de la Terre, UMR 5143, CNRS, 8, rue Buffon, Paris, 75005, France [e-mail: [pickford@mnhn.fr](mailto:pickford@mnhn.fr)]). *Primates*, 2005, 46, 21-32.

This paper examines the incisor-lower molar proportions in extinct and living hominoids and develops a new hypothesis about the evolution of the dentition of chimpanzees and links it to their diet. It also examines the incisor-molar proportions of hominids and African apes in order to throw light on the phylogenetic relationships between them. It is shown that chimpanzees are highly derived in this respect and that several recent ideas concerning the chimp-like appearance of the last common ancestor of hominids and African apes are likely to be incorrect.

- Genomic data support the hominoid slowdown and an Early Oligocene estimate for the hominoid–cercopithecoid divergence. Steiper, M. E., Young, N. M., & Sukarna, T. Y. (Dept of Anthropology, Hunter College of CUNY, 695 Park Avenue, New York, NY 10021 [e-mail: [msteiper@hunter.cuny.edu](mailto:msteiper@hunter.cuny.edu)]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, 101, 17021-17026.

Several lines of indirect evidence suggest that hominoids (apes and humans) and cercopithecoids (Old World monkeys) diverged around 23-25 Mya. Importantly, although this range of dates has been used as both an initial assumption and as a confirmation of results in many molecular-clock analyses, it has not been critically assessed on its own merits. In this article the robusticity of the 23- to 25-Mya estimate is tested with ~150,000 base pairs of orthologous DNA sequence data from two cercopithecoids and two hominoids by using quartet analysis. This method is an improvement over other estimates of the hominoid–

cercopithecoid divergence because it incorporates two calibration points, one each within cercopithecoids and hominoids, and tests for a statistically appropriate model of molecular evolution. Most comparisons reject rate constancy in favor of a model incorporating two rates of evolution, supporting the “hominoid slowdown” hypothesis. By using this model of molecular evolution, the hominoid–cercopithecoid divergence is estimated to range from 29.2 to 34.5 Mya, significantly older than most previous analyses. Hominoid–cercopithecoid divergence dates of 23-25 Mya fall outside of the confidence intervals estimated, suggesting that as much as one-third of ape evolution has not been paleontologically sampled. Identifying stem cercopithecoids or hominoids from this period will be difficult because derived features that define crown catarrhines need not be present in early members of these lineages. More sites that sample primate habitats from the Oligocene of Africa are needed to better understand early ape and Old World monkey evolution.

- Ancient DNA from giant extinct lemurs confirms single origin of Malagasy primates. Karanth, K. P., Delefosse, T., Rakotosamimanana, B., Parsons, T. J., & Yoder, A. D. (A. D. Y., Dept of Ecology and Evolutionary Biology, Yale Univ., P.O. Box 208105, New Haven, CT 06520 [e-mail: [anne.yoder@yale.edu](mailto:anne.yoder@yale.edu)]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102, 5090-5095.

“The living Malagasy lemurs constitute a spectacular radiation of >50 species that are believed to have evolved from a common ancestor that colonized Madagascar in the early Tertiary period. Yet, at least 15 additional Malagasy primate species, some of which were relative giants, succumbed to extinction within the past 2,000 years. Their existence in Madagascar is recorded predominantly in its Holocene subfossil record. To rigorously test the hypothesis that all endemic Malagasy primates constitute a monophyletic group and to determine the evolutionary relationships among living and extinct taxa, an ancient DNA analysis of subfossil species was conducted. A total of nine subfossil individuals from the extinct genera *Palaeopropithecus* and *Megaladapis* yielded amplifiable DNA. Phylogenetic analysis of cytochrome *b* sequences derived from these subfossils corroborates the monophyly of endemic Malagasy primates. The results support the close relationship of sloth lemurs to living indriids, as has been hypothesized on morphological grounds. In contrast, *Megaladapis* does not show a sister-group relationship with the living genus *Lepilemur*. Thus, the classification of the latter in the family Megaladapidae is misleading. By correlating the geographic location of subfossil specimens with relative amplification success, we reconfirm the global trend of increased success rates of ancient DNA recovery from non-tropical localities.”

- New material of the earliest hominid from the Upper Miocene of Chad. Brunet, M., Guy, F., Pilbeam, D., Lieberman, D. E., Likius, A., MacKaye, H. T., Ponce de León,

M. S., Zollikofer, C. P. E., & Vignaud, P. (Lab. de Géobiologie, Biochronologie, et Paléontologie Humaine, CNRS UMR 6046, Fac. des Sciences, Univ. de Poitiers, 40 Ave du Recteur Pineau, 86022 Poitiers Cedex, France [e-mail: [michel.brunet@univ-poitiers.fr](mailto:michel.brunet@univ-poitiers.fr)]). *Nature*, 2005, 434, 752-755.

“Discoveries in Chad by the Mission Paléanthropologique Franco-Tchadienne have substantially changed our understanding of early human evolution in Africa. In particular, the TM 266 locality in the Toros-Menalla fossiliferous area yielded a nearly complete cranium (TM 266-01-60-1), a mandible, and several isolated teeth assigned to *Sahelanthropus tchadensis* and biochronologically dated to the late Miocene epoch (about 7 million years ago). Despite the relative completeness of the TM 266 cranium, there has been some controversy about its morphology and its status in the hominid clade. Here we describe new dental and mandibular specimens from three Toros-Menalla (Chad) fossiliferous localities (TM 247, TM 266 and TM 292) of the same age. This new material, including a lower canine consistent with a non-honing C/P<sub>3</sub> complex, post-canine teeth with primitive root morphology and intermediate radial enamel thickness, is attributed to *S. tchadensis*. It expands the hypodigm of the species and provides additional anatomical characters that confirm the morphological differences between *S. tchadensis* and African apes. *S. tchadensis* presents several key derived features consistent with its position in the hominid clade close to the last common ancestor of chimpanzees and humans.”

- Virtual cranial reconstruction of *Sahelanthropus tchadensis*. Zollikofer, C. P. E., Ponce de León, M. S., Lieberman, D. E., Guy, F., Pilbeam, D., Likius, A., MacKaye, H. T., Vignaud, P., & Brunet, M. (M. B., Address same as above). *Nature*, 2005, 434, 755-759.

“Previous research in Chad at the Toros-Menalla 266 fossiliferous locality (about 7 million years old) uncovered a nearly complete cranium (TM 266-01-60-1), three mandibular fragments and several isolated teeth attributed to *Sahelanthropus tchadensis*. Of this material, the cranium is especially important for testing hypotheses about the systematics and behavioral characteristics of this species, but is partly distorted from fracturing, displacement and plastic deformation. Here we present a detailed virtual reconstruction of the TM 266 cranium that corrects these distortions. The reconstruction confirms that *S. tchadensis* is a hominid and is not more closely related to the African great apes. Analysis of the basicranium further indicates that *S. tchadensis* might have been an upright biped, suggesting that bipedalism was present in the earliest known hominids, and probably arose soon after the divergence of the chimpanzee and human lineages.”

- Phylogeography of Barbary macaques (*Macaca sylvanus*) and the origin of the Gibraltar colony. Modolo, L., Salzburner, W., & Martin, R. D. (Anthropologisches Inst, Univ. Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland [e-

mail: [modulo@aim.unizh.ch](mailto:modulo@aim.unizh.ch)]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, 102, 7392-7397.

The Barbary macaque is the earliest offshoot of the genus *Macaca* and the only extant African representative, all other species being Asiatic. Once distributed throughout North Africa, *M. sylvanus* is now restricted to isolated forest fragments in Algeria and Morocco. The species is threatened: the maximum total wild population size is estimated at 10,000 individuals. Relationships among surviving wild subpopulations in Algeria (96 samples) and Morocco (116 samples) were examined by using 468-bp sequences from hypervariable region I of the mitochondrial DNA control region. Twenty-four different haplotypes were identified, differing by 1-26 mutational steps (0.2-5.6%) and 1 insertion. With one exception (attributable to secondary introduction in coastal Morocco), Algerian and Moroccan haplotypes are clearly distinct. However, whereas Moroccan subpopulations show little divergence in hypervariable region I sequences and little correspondence with geographical distribution, there is a deep division between two main subpopulations in Algeria and one marked secondary division, with haplotypes generally matching geographical distribution. Accepting an origin of the genus *Macaca* of 5.5 million years ago, the Moroccan population and the two main Algerian subpopulations diverged  $\approx$ 1.6 million years ago. Distinction between Moroccan and Algerian haplotypes permitted analysis of the origin of the Gibraltar colony of Barbary macaques (68 samples; 30% of the population). It is generally held that the present Gibraltar population descended from a dozen individuals imported during World War II. However, the Gibraltar sample was found to include Algerian and Moroccan haplotypes separated by at least 16 mutational steps, revealing a dual origin of the founding females.

- The highland mangabey *Lophocebus kipunji*: A new species of African monkey. Jones, T., Ehardt, C. L., Butynski, T. M., Davenport, T. R. B., Mpunga, N. E., Machaga, S. J., & De Luca, D. W. (Udzungwa Mountains National Park, Box 99, Mang'ula, Tanzania [e-mail: [tembomkubwa@gmail.com](mailto:tembomkubwa@gmail.com)]). *Science*, 2005, 308, 1161-1164.

“A distinct species of mangabey was independently found at two sites 370 kilometers apart in southern Tanzania (Mount Rungwe and Livingstone in the Southern Highlands and Ndundulu in the Udzungwa Mountains). This new species is described here and given the name ‘highland mangabey’ *Lophocebus kipunji* sp. nov. We place this monkey in *Lophocebus*, because it possesses noncontrasting black eyelids and is arboreal. *L. kipunji* is distinguished from other mangabeys by the color of its pelage; long, upright crest; off-white tail and ventrum; and loud call. This find has implications for primate evolution, African biogeography, and forest conservation.”

#### Field Studies

- Optimal group size and seasonal stress in ring-tailed lemurs (*Lemur catta*). Pride, R. E. (Dept of Biology, Col-

lege of New Jersey, Ewing, NJ 08628 [e-mail: [pride@tcnj.edu](mailto:pride@tcnj.edu)]. *Behavioral Ecology*, 2005, 16, 550-560.

“Adaptive explanations for social grouping assume that there are fitness consequences associated with group size, and individuals maintain membership in groups of favorable size to maximize fitness. Here I examine fecal cortisol concentrations as a hormonal measure of stress to assess the relative well-being of *Lemur catta* in groups of different size and in seasons of normal and low tamarind fruit availability. I test the hypotheses that there is an optimal group size at which cortisol is lowest and that optimal group size changes in food-scarce conditions. I collected 799 fecal samples from 87 individuals in seven free-ranging *L. catta* groups at Berenty Reserve, Madagascar, over a 1-year period (August 1999–July 2000) and determined fecal cortisol concentrations using a radioimmunoassay. Expressing these as residuals from monthly population means to control for temporal fluctuations in cortisol concentration, I calculated mean fecal cortisol levels for each animal in seasons of normal and low tamarind fruit abundance and over the entire year. Overall, females exhibited lowest mean cortisol levels in groups of intermediate size, suggesting that there are benefits to maintaining membership in these groups. Females in groups that were atypically large or small for their habitat type had higher mean cortisol levels than typical groups. Cortisol levels increased in food-scarce conditions for larger groups, suggesting that intergroup competitive advantages do not outweigh intragroup feeding competition at this time. Group size may be optimized for long-term average conditions, and short-term stresses may intermittently alter the costs associated with group size.”

- Predation of an infant titi monkey (*Callicebus moloch*) by a tufted capuchin (*Cebus apella*). Sampaio, D. T., & Ferrari, S. F. (Depto de Psicologia Experimental, Univ. Federal do Pará, 66075-900 Belém-PA, Brazil [e-mail: [fadad@uol.com.br](mailto:fadad@uol.com.br)]). *Folia Primatologica*, 2005, 76, 113-115.

Tufted capuchins are among the most insectivorous of Neotropical primates and take a variety of other prey, including items, such as crabs and oysters, that are not known to be exploited by other platyrrhines. Capuchins are also among the few platyrrhines known to capture mammals, but until now, predation of other primates had not been recorded, despite the fact that capuchins are sympatric with many potential prey species, in particular the small-bodied callitrichids. Here, predation of an infant titi monkey by an adult male capuchin is reported from a site in eastern Brazilian Amazonia. The observation appears to be the first record of predation on the genus *Callicebus*.

### Instruments and Techniques

- Noninvasive monitoring of the health of *Pan troglodytes schweinfurthii* in the Kibale National Park, Uganda. Krief, S., Huffman, M. A., Sévenet, T., Guillot, J., Bories, C.,

Hladik, C. M., & Wrangham, R. W. (Eco-Anthropologie et Ethnobiologie, USM 0104, Muséum National d'Histoire Naturelle, 57 rue Cuvier, Paris Cedex 5, 75231, France [e-mail: [krief@mnhn.fr](mailto:krief@mnhn.fr)]). *International Journal of Primatology*, 2005, 26, 467-490.

“We assessed the health status of chimpanzees of the Kanyawara group in the Kibale National Park in Western Uganda via noninvasive methods. We conducted visual veterinary inspection, and parasitological and urine analysis in association with behavioral observations, causing minimal disturbance or stress to individually recognized chimpanzees. We applied multiple parasitological techniques to 252 stool samples to compare their efficacy in detecting parasitic infection and to increase the power of detecting a wide range of parasites at a more sensitive level. We examined 76 urine samples via a quick detection method to evaluate multiple parameters of urine that indicate organ dysfunction. Results of the different analyses are mutually supportive and provided useful information for monitoring bodily condition and diseases. The multifaceted health evaluation system is a beneficial tool for monitoring long-term and short-term changes in health status due to environmental stress, seasonal dietary change, and disease in wild chimpanzee populations. Use of this method to detect changes in health, when employed together with behavioral observations, may also provide important insights into the potential effects of self-medicative behaviors.”

- A simple method for assessing muscle function in common marmosets. Stevens, D. J., Hornby, R. J., Cook, D. L., Griffiths, G. D., Scott, E. A. M., & Pearce, P. C. (Biomedical Sciences Dept, Dstl Porton Down, Salisbury SP4 0JQ, U.K. [e-mail: [dstevens@dstl.gov.uk](mailto:dstevens@dstl.gov.uk)]). *Laboratory Animals*, 2005, 39, 162-168.

A novel method of assessing muscle function in the common marmoset was developed as part of a multidisciplinary long-term study. The method involved home-cage presentation of a weight-pulling task. Over a 4-5 month period, 38 of 42 animals were successfully trained to displace weights of up to 920 g (mean 612±20 g). Performance, following initial training, was stable and independent of gender or body weight.

- A novel method for activity monitoring in small non-human primates. Mann, T. M., Williams, K. E., Pearce, P. C., & Scott, E. A. M. (Address same as above [e-mail: [tmann@dstl.gov.uk](mailto:tmann@dstl.gov.uk)]). *Laboratory Animals*, 2005, 39, 169-177.

“Patterns of spontaneous activity are valuable reflections of well-being in animals and humans and, because of this, investigations have frequently incorporated some form of activity monitoring into their studies. It is widely believed that activity monitoring, alongside assessments of general behavior, should be included in initial CNS safety pharmacology screening. As the number of marmoset studies having actimetry as their

focus, or as an adjunct, is increasing, we wished to evaluate an alternative approach to those commonly used. The method is based on miniaturized accelerometer technologies, currently used for human activity monitoring.”

- Survey of captive cynomolgus macaque colonies for SRV/D infection using polymerase chain reaction assays. Hara, M., Kikuchi, T., Ono, F., Takano, J., Ageyama, N., Fujimoto, K., Terao, K., Baba, T., & Mukai, R. (R. M., Tsukuba Primate Center for Med. Sci., NIID, 1 Hachimandai, Tsukuba, 305-0843 Japan). *Comparative Medicine*, 2005, 55, 145-149.

“The exogenous simian type D retroviruses (SRV/Ds) are prevalent in macaque monkeys and sometimes cause immunodeficiency with anemia, weight loss, and persistent unresponsive diarrhea. SRV/D isolates are classified as subtypes 1 to 6, and the entire sequences of the gag region of SRV/D-1, -2, and -3 and SRV/D-Tsukuba (SRV/D-T) have been determined. We designed specific primers in the gag region of SRV/D-T, enabling direct detection by polymerase chain reaction (PCR) SRV/D-T proviral DNA sequences in DNA extracted from whole blood. Using this assay and another PCR assay that detects multiple SRV/D subtypes, we performed a survey for SRV/D infection in our specific pathogen-free (SPF) and conventional colonies at Tsukuba Primate Center (TPC). In the SPF colony, no SRV/D signal was detected in any animal. On the other hand, SRV/D-T was detected in 11 of 49 animals (22.5%) in the conventional colony. SRV/D-T was the only SRV/D subtype detected. Consequently, SRV/D-T is the major SRV/D subtype present in cynomolgus monkeys at TPC.”

### Reproduction

- Reproductive parameters and life-history variables in captive golden-bellied mangabeys (*Cercocebus agilis chrysogaster*). Walker, S. E., Strasser, M. E., & Field, L. P. (Dept of Sociology & Anthropology, Southwest Missouri State Univ., Springfield, MO 65804 [e-mail: [suzanne-walker@smsu.edu](mailto:suzanne-walker@smsu.edu)]). *American Journal of Primatology*, 2004, 64, 123-131.

“An understanding of the reproductive physiology of captive primates is vital for their successful management. We report on reproductive parameters and life-history variables collected at the Sacramento Zoo for five female golden-bellied mangabeys over a 7-year period. For each female, we collected data on their sexual skins, menses, gestation, and other pregnancy-related factors, such as postconception bleeding and swelling. We used these data to estimate life-history variables, such as age at onset of

estrus, menses, and conception, as well as the duration of intervals between births, and between parturition and the resumption of cycling. *Cercocebus agilis chrysogaster* is comparable to other *Cercocebus* species in terms of reproductive parameters, although variability is exhibited within and among female subjects. In some cases, it appears that stressful incidents altered cycle length or halted cycling altogether. We suggest the use of husbandry practices that include consistent data collection to enhance regularity in reproductive cycles, and maximize captive breeding success for this rare species.”

- Birth of rhesus macaque (*Macaca mulatta*) infants after in vitro fertilization and gestation in female rhesus or pigtailed (*Macaca nemestrina*) macaques. Kubisch, H. M., Ratterree, M., Williams, V., Johnson, K., Davison, B., Phillippi-Falkenstein, K., & Harrison, R. (Div. of Vet. Med., Tulane NPRC, 18703 Three Rivers Rd, Covington, LA 70433). *Comparative Medicine*, 2005, 55, 129-135.

“A study was conducted to assess the possibility of using pigtailed macaques as recipients for rhesus macaque embryos. A total of 250 oocytes were collected from 11 rhesus monkeys during 12 follicular aspirations. We performed 15 embryo transfers with two embryos each into rhesus recipients, which resulted in eight pregnancies, of which two were lost during the second trimester. Among the remaining six pregnant rhesus macaques, two were carrying twins, resulting in the birth of eight infants. Twelve transfers of rhesus embryos into pigtailed macaques resulted in one pregnancy and the birth of one infant. Fetal growth and development were monitored by monthly ultrasound examinations, during which biparietal measurements were taken and compared with those derived from 22 pregnant control monkeys. In vitro fertilization-derived singletons tended to develop faster than did twins and naturally conceived control singletons during the initial months of pregnancy and weighed more at birth than did twins. There were pronounced morphologic changes in the placenta of the rhesus that developed in the female pigtailed macaque. These included an irregular shape, elevated placenta-to-birth-weight ratio, and an abnormal length and diameter of the umbilical cord. Histologic analyses of the rhesus-pigtailed placenta showed evidence of maternal-placental floor infarction and thrombosis of the spiral artery with resulting infarction of the villi. These results demonstrate that pigtailed macaques can carry rhesus fetuses to term, but further studies are necessary to determine the cause of the decreased pregnancy rates and observed placental abnormalities.”

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