LABORATORY PRIMATE NEWSLETTER

Vol. 46, No. 2 April 2007

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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 $10.00 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 $80/year within the U.S.; $100/year outside the U.S. (Please make checks payable to the Psychology Department, 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-PDF** 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. Latin names of primates 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 Brown University

Cover photograph of a Bonobo (*Pan paniscus*) family at the Jacksonville, Florida, Zoo, by Marian Brickner

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Activity Profiles and Hormone Metabolites in a Captive Group of Eight Cotton-Top Tamarins, *Saguinus oedipus*

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Introduction

Cotton-top tamarin (*Saguinus oedipus*) social groups are organized around a dominant mating pair, their offspring, and subordinate males and females (Digby, 2006). Previous research demonstrates that hormone levels of subordinates of many primate species are affected by hierarchical relationships. Studies of callitrichids show that subordinate females often ovulate irregularly or not at all when a dominant female is present in the troop (Garber, 1997). However, male reproductive suppression is thought to be caused more by inbreeding prevention than the stress of the dominance hierarchy (French et al., 1989; Baker et al., 1999; Ginther et al., 2001). It is also possible that physiological sexual inhibition of subordinates may not be stress-related but is socially enforced through olfactory cues (Epple & Katz, 1984; Savage et al., 1988; Barrett et al., 1990; Abbott et al., 1993, 1998). Another possible explanation is the decrease in luteinizing hormone (LH) released from the anterior pituitary in females (in *Callithrix jacchus*; Digby et al., 2006), but no evidence exists for reduced LH in males.

Reproductive inhibition in females might also be based on a pattern of infant survival and cooperative caretaking; suppression could prevent the birth, to lower ranking females, of offspring that have little chance of surviving (Snowdon, 1996; Wasser & Barash, 1983). Though there are known instances of multiple pregnancies within a tamarin group, there are no known cases of multiple births in *Saguinus oedipus* (personal communication, Snowdon, 2006). For tamarins, it remains unclear whether hormonal differences can be related to potential reproductive suppression and whether this suppression is based primarily upon hierarchal rank or avoidance of inbreeding.

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This research was made possible in part by support from the Undergraduate Research Opportunity Program, Institute for Scholarship in the Liberal Arts, College of Arts and Letters, University of Notre Dame; and through the University of Notre Dame Honors Program. We wish to thank the tamarin keepers and all the current staff of the Potawatomi Zoo, South Bend, Indiana, as well as the former Director, Greg Bockheim, and the former veterinarian, Julia Napier. We are indebted to the Saint Louis Zoo Endocrinology Lab and Dr. Joan Bauman for the fecal analyses. We also thank Dr. C. Snowdon for his extensive comments and review of earlier versions of this manuscript.

The strong control that dominant mating pairs hold over subordinate monkeys may create stress in a way that produces a physiological change in sexual development and ovulation (Sapolsky, 1998). However, previous studies of cotton-top tamarins report that cortisol levels in the subordinate tamarins were lower than in the dominant tamarins (Ziegler et al., 1995) and that cortisol levels are dependent on the levels of support and relative relationships within the group rather than simple position within the hierarchy (Abbott et al., 2003).

In order to contribute to the broader understanding of behavior, relationships, and hormones in cotton-top tamarins, we conducted a six-week assessment of a single captive group of eight individuals, including four adults.

Methods

Sample Population: Our subjects were the four adult tamarins in a group of eight individuals at the Potawatomi Zoo of South Bend, Indiana. Orlando and Mary Anne, the reproductive adults, were 12 and 11 years old, respectively, at the time of data collection. The offspring of Orlando and Mary Anne included Frank, a non-breeding adult male, Bonnie, a non-breeding adult female (4 and 6 years of age), and four younger individuals (two pairs of twins aged 1 and 2 years, respectively). The test subjects lived inside an approximately 8 x 2.5 x 3 m enclosure behind glass and interacted minimally with the keepers during feeding, cleaning, and enrichment.

Data Collection: Data collection ran from June 13 to July 22, 2005, during which time no females were pregnant or nursing. Observations were carried out in two four-hour observation periods between the hours of 07:00 and 17:00, five days a week for six weeks. Focal animal behavioral observations were carried out in ten-minute segments, averaging 14-16 observations per period. Each adult was observed according to a preset observation sequence chart, leading to approximately 40 min. of observation time per adult tamarin per day. Noldus Pocket Observer software on HP iPAC handheld computers was used to collect all-occurrence data using ten-minute focal animal follows. Samples of the feces of the four adult cotton-top tamarins were collected by Potawatomi Zoo staff and analyzed for fluctuating hormone levels (specifically testosterone and cortisol metabolites; see Ziegler et al., 2006). These fecal samples were obtained whenever the opportunity arose (when defecation was observed by a data collector, so it was certain from whom the sample came). The fecal analyses were conducted at the Saint Louis Zoo Endocrinology Lab under the supervision of

Dr. Joan Bauman. Validation for the fecal assessment of testosterone (fecal androgens) and cortisol (fecal corticoids) from our samples was also conducted by the same lab, with mean recovery very close to 100%.

Fecal Sample Analysis: *Solubilization of Fecal Hormones:* Approximately 0.5 g of the fecal material for each collected sample was shaken overnight in 5 ml modified phosphate-saline buffer containing 50% methanol, 0.1% BSA, and 5% Tween 20, a modification of the method of Shiedler et al. (1993). Solids were removed by centrifuging and the supernatants stored at -70° C until assay.

Assays: Hormone levels were determined by radioimmunoassay. Antibody-coated tubes and 125-I steroids were obtained from Diagnostic Systems Laboratory (DSL, Webster, Texas). Reference standards (Sigma-Aldrich, St. Louis, Missouri) were diluted in phosphate-buffered saline (PBS), pH 7.0. Assays were performed according to manufacturer's protocols, except that the matrices were equalized by adding PBS to the fecal samples, and fecal extraction buffer (containing 50% methanol) to the standards. Concentrations were determined as ng/ml, and then divided by the dry weight of feces extracted to give the results as ng/g feces. All samples were assayed in duplicate. The assay was repeated for any sample in which the duplicates differed by 15% or greater.

In the testosterone assay (DSL 4100) intra-assay variability of the duplicates was 5.9% +/- 3.9% (mean +/- SD). Quality controls containing low, medium and high levels had inter-assay variability of 10.9%, 9.4% and 7.8% respectively. Cortisol intra-assay variation for duplicates was 8.3% and 5.1%. Inter-assay coefficients of variation for low and high QC pools were 11.3% and 5.1 % respectively. Serial dilutions of fecal extracts for parallelism gave O/E values of 103.7 ± 3.9% of the expected values for the progesterone assay, and 97.0 % ± 11.2% for the cortisol assay.

Behavioral Data Analysis: Analysis of the behavioral data was conducted in the Noldus Observer Pro and SPSS software packages. Data analysis of the observations consisted of isolating specific behavioral patterns within the four adult tamarins and assessing significant differences with χ^2 statistical tests and Hinde indices. (This index is the percentage of approaches by one member divided by the percentage of withdrawals by the other member; Palombit, 1999.) For social behaviors we also recorded and analyzed the adults' interactions with the two pairs of twins, but the twins were never focal subjects of observation. Each pair of twins was counted as one individual for the purposes of these analyses. When multiple χ^2 tests were used (examining aggression and grooming), a Bonferroni correction was applied.

Results

The approximately 32 observations per day, five days a week, for six weeks produced a total of 875 observation sessions. These averaged a total of 36.5 hours of observation time per tamarin throughout the 6 weeks of data collection. Thirty-two fecal samples were analyzed (Orlando-6, Mary Anne-6, Bonnie-11, Frank-9). Fecal sample collection was evenly distributed over the course of the study.

Behavioral and Hormonal Data: The behavioral repertoires of the adult tamarins differed significantly. While the activity profiles were similar in the behaviors exhibited, patterns of behavior and interactions with specific individuals differed between tamarins. Among the four adults, a majority of activities (46-55% of all interactions) were affiliative while agonistic behavior was rare (1-2%).

Hinde index graphs of social contribution (Palombit, 1999) were produced, using approaches and departures between dyads to analyze the relative contribution by individuals to association patterns. If the positive and negative absolute values are consistent with each other, then each member of the dyad is investing equally in approaches and departures. *Figure 1* illustrates Mary Anne's status within the group; others often approach her, while she often departs from them.

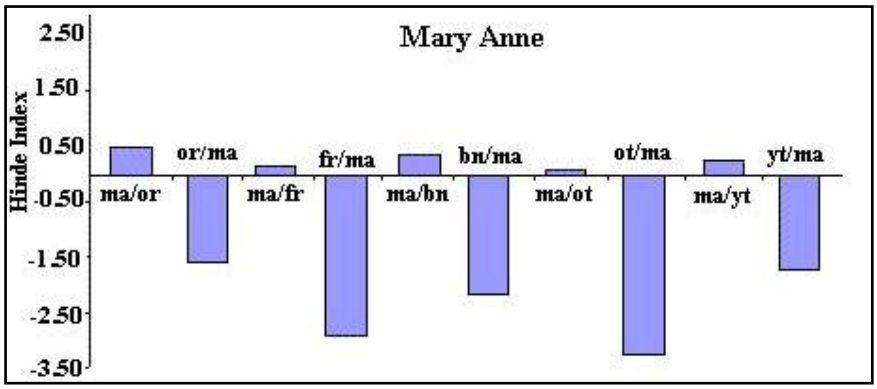

Figure 1: A Hinde index graph for Mary Anne. (ma= Mary Anne, or= Orlando, bn= Bonnie, fr=Frank, ot= older twins, yt= younger twins)

There were significant differences in the behaviors and hormonal levels of the individual adult tamarins (*Tables 1* and *2*).

Discussion

Our adult cotton-top tamarins exhibited a wide variety of activity patterns. Significant differences were observed among the four adults based on five main activities: self-grooming, social grooming, scent-marking, huddling, and aggressive behavior.

Mary Anne participated in the most self-grooming and most frequent huddling (*Table 1*). Our data suggest that

Mary Anne's position as the reproductive female and mother of the younger tamarins makes her a much sought-after companion. As a result she does not appear to invest as much as others in initiating interactions (*Figure 1*).

Throughout the data collection, Bonnie scent-marked significantly more than the other tamarins. She would follow Mary Anne closely and scent-mark right behind her or physically on top of her in addition to being her most frequent grooming partner (166 instances in comparison to 94 with Orlando and 30 with Frank). Increased scent-marking parallels elevated estrogens during the follicular phase of the ovarian cycle; thus Bonnie's behavior may be an indication that she is overcoming reproductive inhibition (Ziegler et al., 2004; personal communication, Snowdon, 2006). She often engaged in aggressive actions with Mary Anne (45 observed instances compared to 14 with Orlando and 9 with Frank). This sort of aggressive behavior between parents and offspring is not unusual when non-breeders attempt to attain breeding status (Snowdon & Pickhard, 1999). Aggression within the group is often linked with regulating within-group relationships, as well as restricting within-group mating (Anzenberger, 1993; Lazaro-Perea et al., 2000; Baker et al., 2002). Bonnie often disrupted interactions between Mary Anne and Orlando and consistently approached and attempted to huddle with Orlando.

Focal Animal	Self Groom	Scent Mark	Social Groom	Aggression	Huddle
Orlando	90	38	758	37	479
Mary Anne	235	63	354	68	641
Frank	140	58	425	81	347
Bonnie	155	778	423	135	724
Older Twins	-	-	162	25	217
Younger Twins	-	-	279	61	498

Table 1: A compilation of the significant differences in the activity of individuals (total instances of behaviors given); $P < 0.001$.

Individual	Testosterone (ng/g) (P< 0.001)	Cortisol (ng/g) (P<0.05)	Testosterone/Cortisol Ratio
Mary Anne	419.68	306.2	1.371
Bonnie	84.46	262.42	0.322
Frank	155.61	257.85	0.603
Orlando	179.92	230.76	0.780

Table 2: Average testosterone and cortisol levels (ng/g) over the collection period.

Bonnie had more instances of affiliative behavior with Orlando (842 instances), the dominant male (and her father), than any other tamarin in the family including Mary Anne (637 instances). In previous studies of free-ranging callichitrids, individuals who remained within their natal group were usually breeding by the age of four if a non-natal male was present (Baker et al., 2002). It is possible that Bonnie, at six years of age, is in a socially frustrating position, being past the average age of beginning breeders without the presence of a non-related male.

Frank, as the subordinate male, invested the most time in interactions with others, especially grooming and huddling. It is probable that through his affiliative behavior he is attempting to ameliorate potential conflict with the reproductive pair. He also spent a fair amount of time playing with his younger siblings. It is possible that even as the subordinate male, in one of the lowest positions in the group, he was able to assert dominance over his younger siblings (Dixson, 1998), whom he was observed mounting on numerous occasions. Non-breeding males within their natal group often direct sexual activity towards group males rather than group females (Ginther et al., 2001).

The hormonal data obtained parallel the behavioral observations. Previous studies in a wide array of mammalian species show that testosterone and cortisol levels are antagonistic to each other (Sapolsky, 1998, 2004). It is assumed that those animals that are receiving attention and stimulation should be higher in the dominance hierarchy and should have higher fecal androgen than fecal corticoid levels. Mary Anne, the dominant female, has significantly higher levels of both metabolites than the other adults. Behavioral observations also show her very often in contact with, interacting with, and being approached by, the other members of the group, supporting our interpretation of her high levels of stimulation. Bonnie, as the most aggressive individual and the main scent-marker in the group, exhibits opposite fecal metabolite trends from Mary Anne. Bonnie had higher fecal corticoid than fecal androgen levels, suggesting physiological indications of stress (*Table 2*). Her extensive scent-marking may be an indicator of her emergence from sexual repression. It is surprising that Orlando shows slightly higher fecal corticoid than androgen levels (*Table 2*). However, the values are similar, suggesting that the levels are roughly comparable.

A final confounding point is that the dominant female in the group has significantly higher levels of fecal androgens than either of the adult males in the group. Historically, testosterone is primarily assessed in males; however, these data suggests that, when possible, females should also be included in testosterone testing.

Conclusions

Contrary to previous studies, the two subordinate adults in this group did not have lower cortisol levels than the dominant male, and only slightly lower levels than the dominant female. All individuals had substantially lower

testosterone levels than the dominant female and only she had a T:C ratio above 1. This high T:C ratio correlates with both her dominant social status and her role as a preferred partner. The lower T:C ratios of the subordinates are associated with their nonreproductive status and activity patterns which, we propose, reflect their social relationships with group members, not simply their rank (as suggested by Abbott et al., 2003). It is possible that these ratios will change as the two sets of twins mature into adults.

Due to the limited duration of this study we cannot offer insight into the relationship between rank and reproductive suppression; however the behavior and hormonal profiles of the subordinate individuals do appear to reflect social and physiological stress, which may influence reproductive status. Our study emphasizes the usefulness of examining the C:T ratio – in females as well as males – rather than only testosterone or only cortisol levels, in examining the relationships between social behavior and hormones.

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Workshop Announcements

Charles Louis Davis, D.V.M. Foundation Workshops

A Workshop and Symposium on Laboratory Animal Diseases will be held in Chicago, Illinois, April 18-21, 2007, sponsored by the Charles Louis Davis, D.V.M. Foundation for the International Advancement of Education in Veterinary and Comparative Pathology.

Another Charles Louis Davis, D.V.M. Foundation Laboratory Animal Medicine Workshop will be held May 19-20, 2007, at the College of Veterinary Medicine, North Carolina State University, Raleigh, North Carolina. Information about these and other Foundation seminars and workshops may be found at <www.cldavis.org/courses/upcoming.html>.

Callitrichid Husbandry and Management Workshop

The 6th annual Callitrichid Behavioral Husbandry and Management Workshop, hosted by the Roger Williams Park Zoo, Providence, Rhode Island, will be held May 12-13, 2007. This is a free workshop for those working with tamarins and marmosets and will include formal presentations, posters, invited speakers, and open discussion, covering a variety of topics such as husbandry, training, enrichment, and conservation. For information see <www.rwpzoo.org/calendar/callitrichid.cfm> or e-mail <*Jhennessy@rwpzoo.org*>.

PASA Management Workshop

The Pan African Sanctuary Alliance (PASA) 2007 Management Workshop, which will be held June 21-24 in Kigali, Rwanda, will focus on issues such as law enforcement, ecotourism, and disease control. PASA was formed in 2000 to promote unity and cooperation among the primate sanctuaries of Africa, and its members represent 17 sanctuaries in 12 African countries. The PASA Management Workshop has been an annual event since 2000. PASA also stages annual workshops for sanctuary veterinarians and educators, in addition to providing crisis relief, funding, equipment, medical supplies, and international policy support to its members. For more information, please contact PASA at <PASAapes@aol.com>.

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Travelers' Health Notes: Rift Valley Fever Outbreak – Kenya

In mid-December, 2006, several unexplained fatalities associated with fever and generalized bleeding were reported to the Kenya Ministry of Health (KMOH) from Garissa District in North Eastern Province. By December 20, a total of 11 deaths had been reported. Of serum samples collected from the first 19 patients, Rift Valley fever (RVF) virus RNA or immunoglobulin M antibodies against RVF virus were found in samples from 10 patients; all serum specimens were negative for yellow fever, Ebola, Crimean-Congo hemorrhagic fever, and dengue viruses. The outbreak was confirmed by isolation of RVF virus from six of the specimens. Humans can be infected with RVF virus from bites of mosquitoes or other arthropod vectors that have fed on animals infected with RVF virus, or through contact with viremic animals, particularly livestock. Reports of livestock deaths and unexplained animal abortions in North Eastern Province provided further evidence of an RVF outbreak. On December 20, an investigation was launched by KMOH, the Kenya Field Epidemiology and Laboratory Training Program, the Kenya Medical Research Institute, the Walter Reed Project of the U.S. Army Medical Research Unit, CDC-Kenya's Global Disease Detection Center, and other partners, including the World Health Organization and Médecins Sans Frontières.

A report, describing the findings from that initial investigation and the control measures taken in response to the RVF outbreak, which spread to multiple additional provinces and districts, resulting in 404 cases with 118 deaths as of January 25, 2007, is available at <www.cdc.gov/mmwr/preview/mmwrhtml/mm5604a3.htm?s_cid=mm5604a3_e>.

A Schema for Multimodal Communication Applied to Male Mantled Howler Monkeys (*Alouatta palliata*)

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Introduction

Communication may be defined as the influence of one organism's signals upon another, permitting reciprocal coordination and control within and between groups (Bradbury & Vehrencamp, 1998). Brad-bury & Vehrencamp (pp. 4-5) define a signal as a stimulus released by a sender that elicits a response in a receiver and that is beneficial to both. Multimodal (multisensory, multichannel) signals, that is, signals emitted using more than one sensory channel, are assumed by most researchers to increase the reliability of information sent to receivers and/or to increase the ease of signal reception (Rowe, 1999). They may also generate novelty effects (novel stimuli inducing changes in response – Rowe & Guilford, 1999) and enhance adaptive psychological processes (Rowe, 2002), including the facilitation of learning and memory (Guo & Guo, 2005). Primate researchers have long recognized the importance of multimodal communication (e.g., Carpenter, 1965), but the theoretical and empirical investigation of this topic by primatologists is in its early stages (Partan & Marler, 2005; but see Gardner et al., 1989; Partan, 2002; Jordan et al., 2005).

Howler monkeys (*Alouatta* spp.) exhibit a rich vocal repertoire (e.g., Baldwin & Baldwin, 1976; Jones & Van Cantfort, 2007; Kitchen, 2004; Kitchen et al., 2004), demonstrating their highly communal, gregarious nature. Vocalizations among males in howler groups are important components of their cooperative and competitive relations (Kitchen, 2004; Kitchen et al., 2004) and are employed to settle inter-individual conflicts of interest (e.g., access to fertilizable females: Kitchen, 2004; Jones & Van Cantfort, 2007). Bioacoustic features of the sound characters of howler vocalizations have been investigated (e.g., Baldwin & Baldwin, 1976; Whitehead, 1995; Jones, 1998), including their functions, in particular, the functions of loud calls emitted by males (e.g., Whitehead, 1987, 1989; Kitchen 2004).

Thanks to the Werner Hagnauer family who permitted the first author to conduct field research on their ranch, Hacienda La Pacífica, from 1973 until 1980. Dawn Kitchen and Peter Marler provided constructive criticism on a previous version of this report, Sarah Partan gave generous feedback on *Table 1*, and an anonymous reviewer provided helpful comments that significantly improved our manuscript. The research reported here was funded by the Ford Foundation.

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Our methodological framework is based upon Partan & Marler's (2005) model. These authors considered the costs and benefits of multimodal communication, proposing a schema for its classification intended for general use that is well suited to both qualitative and quantitative analyses. In the present report, we reanalyze data collected in the mid-1970s (see Jones & Van Cantfort, 2007) on the mantled howler monkey (*Alouatta palliata*), using Partan & Marler's (2005) classification system to organize the results for the study animals. The present brief communication is intended to show that Partan & Marler's (2005) classification system, intended for general use, provides a robust model for the study of multimodal communication in howlers; and that it may be helpful, as well, for the analysis of complex signaling in other primate taxa.

Methods

Study Site and Animals: Data were collected in 1976 and 1977 by one of us (CBJ) at Hacienda La Pacífica, Cañas, Guanacaste, Costa Rica, a cattle ranch located within the Holdridge zone of tropical dry forest environment (Frankie et al., 2004). Mantled howlers are moderately large (maximum size ~7 kg) arboreal atelids distributed as three subspecies from northern South America to southern Mexico (Groves, 2001). The phenotypic plasticity and broad repertoire of stereotyped and ritualized signals and displays of howler monkeys, including vocalizations, has been documented (see Jones, 2006b and references therein). An overview of the genus *Alouatta*, including *A. palliata*, can be found elsewhere (Groves, 2001). Invasive procedures (capturing and marking: Scott et al., 1976) were employed to permit individual identification and measurement of characters (e.g., morphometrics, estimating age by tooth wear) of animals and to locate the deciduous habitat group through radio-telemetry (Jones, 2006b). The present report utilizes data for two marked groups of *A. palliata* occurring in riparian (3 adult males, 15 adult females, 402 h observation) and deciduous (2 adult males, 8 adult females, 114 h observation) habitats, respectively (Jones, 2006a).

Data Collection and Analyses: Results are based upon continuously recorded focal and *ad lib.* observations of male mantled howler monkeys observed in random order (Altmann, 1974). Focal animals were observed daily in random order from ~0600 to ~1200 and ~1400 to- ~1800, yielding a minute-by-minute record of events (see Jones, 2006a). Although more than one vocalization often occurred simultaneously within a 60-sec interval, the data were not sufficiently resolved to record these within-

interval occurrences. Thus, each vocalization implies at least one vocal event per minute. All multimodal responses were recorded and analyzed 60 min before and 60 min after each copulation observed for each male in the riparian and deciduous habitat groups. The total number of focal h that males were observed in each group (rounded to the nearest h) was: 370 h, riparian habitat group and 69 h, deciduous habitat group. Signals determined to be "multimodal" were those "multichannel" signals occurring concurrently in time and space. Field experiments are required to test the validity of this assumption (see Discussion).

Results

Table 1 displays the classification system of Partan & Marler (2005) as applied to descriptive examples from the present data set for male *A. palliata* in sexual contexts. Similar to Partan (2002), most analyses are limited to audiovisual signals (vocalizations in combination with stereotyped body postures). Our results appear to support the idea that males are responding to complete multimodal signals and show that signal components exhibit both redundancy (multimodal signals in which signal components elicit the same response) and non-redundancy (multimodal signals in which signal components elicit different responses). Examples extracted from field observations (see Methods) are identified for each of Partan & Marler's (2005) categories. In addition, *Table 1* strongly suggests that unimodal signals (e.g., guttural barks, body postures: Jones & Van Cantfort, 2007) may be combined and recombined to form complex multimodal signals. Related to this finding, examples of "Enhancement" indicate that complex signals used by mantled howlers may involve "functionally referential communication" and "context-dependent syntax" (see Arnold & Zuberbühler, 2006).

Discussion

The present report supports the schema of Partan & Marler (2005), since the descriptive examples in *Table 1* conform to the classification system advanced by these authors. Future research in the laboratory and field will be required to confirm the existence and distribution of Partan & Marler's (2005) signal categories for mantled howlers. As noted in the Introduction and Methods of this report, the plasticity of vocal communication in howler monkeys has long been acknowledged in the technical literature. However, with the exception of "loud calls" emitted by howler males, the functions of *Alouatta* signals are poorly understood. Additional research on this genus is required to document not only the perspective of signalers but also that of receivers, whose responses have imposed selective pressures upon signal design (Rowe, 1999).

Recent methodological innovations for the experimental investigation of animal communication (Partan, 2002; Hoy, 2005) can be adapted to the study of primates in the field permitting researchers to differentiate (1) unimodal from multimodal signals; (2) components of multimodal signals; (3) interactions among unimodal and multimodal signals; and, (4) interactions between components of multimodal signals (Hebets & Papaj, 2005). In addition, other innovative field techniques such as data collection by multiple recorders are required to measure polyadic relations among marked animals. Finally, the present dataset is not well resolved for the full range of multimodal communication likely to be documented for mantled howlers, in particular, female responses and signaling by immatures. It is hoped that this preliminary report will stimulate additional research on the evolution and development of complex communication in the highly social genus, *Alouatta*.

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Component *a*; Response to *a*	Component *b*; Response to *b*	Response to Multi-modal Signal *ab*	Example	Proposed Signal Category
Redundancy (components elicit the same response)				
Vocal: low guttural bark (LGB); moderate likelihood of sender displacing receiver (Baldwin and Baldwin, 1976; Jones & Van Cantfort, 2007)	Visual: genital display; moderate likelihood of sender displacing receiver (Jones, 2002a)	Moderate likelihood of sender displacing receiver	On 22 June 1976, S, dominant ♂ of the deciduous habitat group, emitted 2 LGBs combined with a genital display to Z, subordinate ♂ of the group. This audiovisual signal failed to displace Z from YPS ♀ with whom Z copulated at 4:23 p.m.	**Equivalence** (redundant components result in same response as each component alone)
Vocal: high gutteral bark (HGB: sometimes displaces subordinate receiver) (Jones & Van Cantfort, 2007)	Visual: front-present (FP) posture (sometimes displaces subordinate receiver) (Jones & Van Cantfort, 2007)	Usually displaces subordinate receiver	On 18 February 1977, G, second-ranked ♂ of the riparian habitat group, emitted 4 HGBs in FP posture to R, subordinate ♂ of the group. G subsequently copulated with UM ♀ at 9:47 a.m. It is interesting to note that, in response to G, R emitted 1 HGB, a lower intensity vocalization than that emitted by G.	**Enhancement** (redundant components result in enhancement of response)
Nonredundancy (components elicit different responses)				
Rear present (RP) posture emitted by receptive female to adult male generally elicits following by male (Jones, 1985)	Genital display by female to adult male generally elicits following by male (Jones, 2002a)	Rear present posture combined with genital display (olfactory-visual multimodal signal) emitted by adult ♀ to adult ♂ generally elicits following by ♂	On 21 March 1976, G, middle ranking ♂ of the riparian habitat group, licks vulva of UM ♀ before copulation at 11:35 a.m. Gustatory inspection by ♂ generally elicits following by ♂.	**Independence** (components still elicit both responses when combined)
Vocal: paedomorphic vocalization (vocalizations or other signals characteristic of immatures but emitted by adults); sender usually displaces receiver (Jones, 1980, 1985; Jones & Van Cantfort, 2007)	Visual: chase; sender (the chaser) sometimes displaces receiver (Jones & Van Cantfort, 2007)	Sender displaces receiver 100% of the time (Jones, 1985)	On 1 February 1976, R, subordinate ♂ of the riparian habitat group, emitted paedomorphic vocalization to and chased Y, dominant ♂ of the riparian group before copulating with UM ♀ at 12:29 a.m.	**Dominance** (one component—paedomorphic vocalization--dominates the other)
Visual: FP posture; sometimes displaces receiver (Jones & Van Cantfort, 2007)	Vocal: HGB; receiver usually responds with vocalization (Baldwin and Baldwin, 1976; Jones & Van Cantfort, 2007)	Sender usually displaces receiver	Outcome usually depends upon rate of HGB emission; thus, on 3 March 1976, R, subordinate ♂ of the riparian habitat group, emitted 1 HGB before and 4 HGBs after a copulation at 3:51 p.m. by dominant ♂ Y with GS ♀. Rate of vocalization appears to modulate effectiveness of FP posture since Y retreated after copulation, preventing possible multiple mating attempts.	**Modulation** (one non-redundant component modulates the effect of another)
Olfactory: urination; usually no response from receiver (Jones, 2002b)	Visual: FP posture; sometimes displaces receiver (Jones & Van Cantfort, 2007)	Urine-wash display (Jones & Van Cantfort, 2007); sender usually displaces receiver	On 3 March 1976, Y, dominant ♂ of the riparian habitat group, exhibits 1 urine-wash display to the subordinate R ♂ before and after Y copulated with GS ♀ at 3:51 p.m.	**Emergence** (two non-redundant components produce a new response)

Table 1: Examples of multimodal signals, their components (*a* and *b*), responses to *a*, *b*, and *ab*, examples, proposed signal category, and definitions (after Partan & Marler, 2005). All examples are extracted from the present author's raw data for males of the riparian and deciduous groups in sexual contexts (see Methods; Jones, 1985; Jones & Van Cantfort, 2007).

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A Tribute to Boris Lapin

Professor Boris A. Lapin, the Director of the Institute of Medical Primatology of the Russian Academy of Medical Sciences, has turned 85. A tribute, by Professor Alexander Voevodin, his former student, has been published in the *Journal of Medical Primatology,* volume *36*[1]. The *Laboratory Primate Newsletter* joins Professor Voevodin and the *Journal of Medical Primatology* in celebrating Professor Lapin's birthday, life, and career.

* * *

The Infrastructure Project, EUPRIM-Net

The European Primate Network, EUPRIM-Net, is a project supported by the European Union (E.U.) that connects eight European primate centers from six countries: Great Britain, France, Italy, Sweden, the Netherlands, and Germany. The project links the centers into a network and facilitates a mutual use of existing know-how and resources. EUPRIM-Net provides the conditions for excellent animal welfare and a framework in which research, as well as primate husbandry and breeding, is optimized. The different tasks of the project are divided into three categories: *Network Activities*, *Access Activities* and *Research Activities*. With the different projects within these activities, EUPRIM-Net makes an active contribution to the 3R concept: Refinement, Reduction, and Replacement.

The first project period, supported with 4.77 million Euros from the E.U., started in April, 2006, and spans four years. It was initiated by the Director of the German Primate Center (DPZ), Prof. Stefan Treue, who is now coordinating the project. Besides the tasks and goals described below, the project expects to affiliate with additional suitable European institutes working with primates to expand the network and to sustain its infrastructures.

Network Activities focus on the training and education of the technical and scientific personnel of the eight partner institutes, as well as persons of other institutions interested in the biology and husbandry of primates. In a set of workshops and courses by invited international experts, knowledge about the morphology, physiology and behavior of primates, as well as about ecological aspects of primatology, is conveyed to the scientific community.

Another network activity is concerned with positive reinforcement training of primates. The existing knowledge of the eight partners is gathered and bundled into several workshops in order to subsequently disseminate it in courses for the technical and scientific personnel at the primate centers involved. In this way, the positive reinforcement technique will be propagated as a standard for the daily routine in handling primates.

Optimization and standardization in primate husbandry is the theme of another workshop series. Here, special attention is paid to health monitoring of primates, especially to finding and establishing standardized research methods for monitoring infections by different viruses, bacteria, and parasites.

Within the scope of *Access Activities,* a database provides European researchers with easy access to a range of biological materials of different nonhuman primate species on the EUPRIM-Net Website at <www.euprim-net.eu>. The collection includes fixed and frozen tissue, serum and blood samples, as well as a large pool of gene (DNA, RNA, cDNA) and gamete samples. In this way, the distribution of material samples for research purposes can be coordinated efficiently.

Within the different *Research Activities*, the eight European institutes will contribute their expertise in biological and biomedical research on primates. Joint research projects will provide a basis for the optimization and standardization of primate husbandry and breeding on the highest level, as well as disease diagnostics and treatment.

All of the network's activities contribute to the 3R-concept – Refinement, Reduction and Replacement:

- **Refinement** in animal welfare is achieved by improving and standardizing methods and techniques used in primate research across Europe, as well as by activities focusing on the viral and microbial states and the genetic profiles of the primates.
- **Reduction** of the number of animals needed for a given scientific project can be met through an improved characterization and selection of animals.
- The central database on the project Website, which gives an overview of availability and provides access to material banks, permits **Replacement** of some live animals by stored data and specimens.

More information about EUPRIM-Net and its different activities can be found at <www.euprim-net.eu>; or contact Prof. Stefan Treue (Project Coordinator) or Dr. Ines Lein (Project Management) at EUPRIM-Net, German Primate Center (DPZ), Kellnerweg 4, D-37077 Göttingen, Germany [e-mail: *euprim@dpz.eu*].

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Grants Available: ASP General Research Small Grants

The American Society of Primatologists invites proposals for general research projects, with preference given to training initiatives, start-up funds, supplementary funding for students, and innovations in animal care and research technology. Award amounts range from $500 to $1500, and will be for a period of one year. See <www.asp.org/grants/SmallGrants/ASPSmallGrant2007.html>. The deadline for applications is April 30, 2007.

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Research and Educational Opportunities

LAMA Certified Manager Preparatory Course

LAMA (Laboratory Animal Management Association) is sponsoring a two-day Certified Manager (CM) Preparatory Course at the Westin Rio Mar Beach Resort in Puerto Rico on June 18-19, 2007, for individuals considering taking the CMAR (Certified Manager Animal Resources) Certification Program and for individuals interested in improving their planning and organizing management skills. Wanda King, MS from Johns Hopkins University, will be the Course Instructor.

The course registration fee is $475 for LAMA Members and $575 for non-LAMA Members. Class size is limited to 25 students. To register for the course and for hotel information, please visit the LAMA Website <www.lama-online.org>. The LAMA Website also contains information on the LAMA/ATA Annual Meeting being held at the same hotel from June 20-21, and information on LAMA Membership. (ATA is the Allied Trade Association – i.e., vendors.) For more information on the CMAR Program, please visit the AALAS Website: <www.aalas.org/certification/cmar.asp>.

Animal Care Internships – Utica, New York

The Utica Zoo is offering Animal Care Internships for the 2007 summer season. The internship lasts for 10 weeks (400 hours). Interns will work directly with the animal care staff and assist in all aspects of their daily activities. These duties include basic cleaning and feeding, record keeping, enrichment, diet preparation, and exhibit maintenance and construction, as well as assisting during veterinary procedures. Interns will be assigned to specific areas within the zoo. Those areas are designated as Asian Realm, North Trek, Tropical Core, and Commissary/Veterinary. The internship is very physical and demanding. Interns must be able to lift 50 pounds, as well as be prepared to work in various weather and environmental conditions. Applicants must be enrolled in, or have graduated from, a college-level zoology, biology, pre-veterinary, wildlife, or related program. The internship is unpaid, although housing is provided. Transportation is the responsibility of the intern. Proof of a negative TB test, along with a recent tetanus vaccination, is required. Send a cover letter and resume (and/or questions) to Mike Bates, Curator, Utica Zoo, 99 Steele Hill Rd, Utica, NY 13501 [fax: 315-738-0475; e-mail: *mike.bates@uticazoo.org*], before April 5, 2007. The cover letter should cover your areas of interest, goals, and what you can offer the zoo by being an intern. To learn more about the zoo, browse <www.uticazoo.org>.

Animal Training Seminar – Munich, Germany

A seminar on "Animal Training and Behavior Through Positive Reinforcement – Further Challenging and Advanced Issues" will be held December 7-9, 2007, in Munich, Germany, sponsored by ClickerTraining. For more information, see <www.clickerreiter.de/KenRamirez1.htm>.

Evolutionary Primatology Lectures – New York City

The New York Consortium in Evolutionary Primatology invites you to attend the following lectures in The New York Regional Primatology Colloquium. Dinner with the speaker is open to all each evening and will normally follow the talks. Please contact Shara Bailey [e-mail: *sbailey@nyu.edu*] if you have any questions or to request dinner information.

On Thursday, April 19, at 6:30 p.m. (awaiting confirmation), Prof. Vittorio Pesce-Delfino and Dr. Eligio Vacca, of the University of Bari, Italy, will speak in the Kriser Room at NYU (25 Waverly Place) on "Recent research on the Middle Pleistocene Altamura hominin site".

On Thursday, May 17, at 7 p.m., Eugene Scott, of the National Center for Science Education, will speak at the Kaufmann Theater, American Museum of Natural History, on "What do creationists believe about human evolution?" Please confirm attendance for this lecture in advance with <*Eric.Delson@Lehman.Cuny.Edu*>, even if you have a Museum I.D.

MSc in Animal Behavior

"The University of Exeter, in the United Kingdom, invites applications to the MSc in Animal Behaviour in the School of Psychology for the 2007/8 academic year. The MSc program in Animal Behaviour is a unique course in the United Kingdom, allowing both psychology and biology students to investigate questions in the area of animal behaviour. We also welcome applications from graduates of related disciplines such as veterinary science. Our Animal Behaviour Group, headed by Professor John Endler, is rapidly expanding, and students will have opportunities to work closely with members of a dynamic research group. This is a full 12-month course comprising taught and practical courses and a 3-month research placement. The teaching and learning methods are a mix of lectures, seminars, practicals and field courses. Overall there is a strong practical and demonstration element to the program, utilizing innovative teaching practices. The program is designed to provide students with a strong background in a broad cross section of research methods used by animal behaviourists and behavioural ecologists and a strong grounding in relevant theory. Students will have the opportunity to learn how to formulate and test relevant research questions, as well as learning to critically evaluate the research carried out by others in the field. The program enables students to get an insight into the varied means of doing animal behaviour research in a

wide array of locations; there are modules devoted to behaviour in the wild, as well as in zoos and laboratories, and also the opportunity for research placements addressing hypotheses using wild, farm, zoo, or companion animals. For more information please visit <psynet.ex.ac.uk:8200/pg/mast/animal>.

"Information about available scholarships is available at <psynet.ex.ac.uk:8200/pg/prog/scholarships.htm>.

"If you have any questions about the course, please contact Fiona Neligan, Postgraduate Secretary [e-mail: *F.C.Neligan@ex.ac.uk*]."

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Call for Award Nominations

4th Annual Lab Products Animal Technician Award

Lab Products, Inc., announces its 4th Animal Technician Awards Program. This program is intended to reward deserving animal care technicians with the opportunity to attend their first National American Association for Laboratory Animal Science (AALAS) Meeting. One award recipient will be selected from each of the eight AALAS Districts and Canada. The award will be limited to animal care personnel with at least one year of laboratory animal care experience who have never attended a National AALAS Meeting. Nominees must be working supervisors, animal care workers, or animal health technicians (i.e., managers, assistant directors, etc. are not eligible).

The recipients of the Lab Products Animal Technician Award will each receive an award recognition plaque; airfare, hotel room, and registration for the National AALAS Meeting; one year's membership in National AALAS; and $250 to cover incidentals while attending the AALAS Meeting.

Nominations, which must be received by June 15, are to be submitted by letter, detailing the technician's work history, accomplishments, and community involvement, and describing how this travel award will benefit the technician and his/her facility. AALAS/CALAS Branch membership, and involvement in branch AALAS/CALAS activities, will be considered in the award selection. Supporting letters are encouraged and will be considered, but are not required. Send nominations to: Lab Products, Inc., P.O. Box 639, Seaford, DE 19973 [800-526-0469; fax: 302-628-4309]: Attn: Awards Selection Committee.

After attending the National AALAS Meeting, the award recipients must present a paper at their next annual Branch or District AALAS/CALAS meeting on how the AALAS Meeting affected them. Award recipients must also agree to attend the Lab Products, Inc., Tuesday night social during the National AALAS Meeting for a formal award presentation, and to be judges for the selection of the next year's award recipients.

2007 Russell and Burch Award

The Humane Society of the United States (HSUS) presents the Russell and Burch Award to scientists who have made outstanding contributions toward the advancement of alternative methods in the areas of biomedical research, testing, or higher education. Alternative methods are those that can *replace* or *reduce* the use of animals in specific procedures, or *refine* procedures so that animals experience less pain or suffering. The award, which carries a $5,000 prize, is named in honor of William M. Russell and Rex L. Burch, the scientists who formulated the Three Rs approach of replacement, reduction, and refinement. The Russell and Burch Award is a means of recognizing the important role that individual scientists can and do play in limiting the use and suffering of animals in laboratories.

Candidates for the award are judged on the scientific merit of their contributions to the alternatives field, as well as their impact and professional commitment to this field. Applicants should have a history of laboratory work that is above reproach on humane grounds.

Send nominations by March 31, 2007, to: Russell and Burch Award, Animal Research Issues Section, The HSUS, 2100 L street, NW, Washington, DC 20037 [301-548-7747; fax: 301-258-7760; e-mail: *ari@hsus.org*]. Persons nominating themselves should submit a cover letter explaining their suitability for the award (see preceding paragraph), a CV, and representative published articles. Persons nominating others should submit a letter explaining the nominee's suitability for the award, and arrange to have supporting documents forwarded.

The HSUS bestows the Russell and Burch Award at the World Congresses on Alternatives and Animal Use in the Life Sciences. The next World Congress will be held August 21-25, 2007, in Tokyo, Japan (see <www.ech.co.jp/wc6/index.html>.

* * *

Awards Granted: King of Bhutan Wins Getty Award

The World Wildlife Fund has awarded His Majesty, Jimge Singye Wangchuck, King of Bhutan, the 2006 J. Paul Getty Award for Conservation Leadership for his three decades of work to conserve the environment of his Himalayan kingdom. The award's cash prize of $200,000 will be used to establish graduate fellowships for Bhutanese conservationists.

His Majesty the King's leadership resulted in the establishment of government policies and laws that have substantial positive impact on conservation and help ensure environmental sustainability in Bhutan. The Kingdom of Bhutan today possesses some of the most pristine ecosystems in the world because of the King's exceptional leadership and the dedicated efforts of the people of Bhutan toward environmental protection. The King's efforts to preserve Bhutan's natural environment spans several decades resulting in outstanding accomplishments that include a system of protected areas and biological corridors known as the Bhutan Biological Complex. Most notable is his recent constitutional commitment of Bhutan to maintain a minimum of sixty percent of Bhutan's total land area under forest cover.

* * *

NIH Awards Will Support Science Education Programs

The National Center for Research Resources (NCRR), a part of the National Institutes of Health (NIH), today announced it will provide nearly $11.5 million to fund 11 Science Education Partnership Awards (SEPA) across the nation. The SEPA projects are designed to inform the public about health issues, foster science literacy, and encourage students to consider careers in the health sciences.

Through mobile laboratories, portable science kits, planetarium films, and online activities, these SEPA projects will provide hands-on, inquiry-based, instruction on topics such as cardiovascular risk factors, genetic testing, and diabetes treatment and prevention. Participants will study multiple research-related issues, learn about the clinical trials process, and examine their own health and lifestyle choices.

"These programs reach out to students and their families, and target some of the most important issues in medicine today such as ethics, evidence-based medicine, and bioinformatics," said Barbara M. Alving, MD, Acting Director of NCRR. "We also want to show students that they have the opportunity to envision careers in medicine, clinical research, drug discovery, and the basic sciences."

SEPA programs reach out to students in rural and under-served communities by funding K-12 classroom activities, as well as science centers and museum exhibits across the country. The awards support professional development for science teachers; the development and distribution of hands-on science curricula; traveling exhibits; and Websites for students, teachers, and the general public.

In the initial three-year phase, partnerships are formed among biomedical and clinical researchers, educators, community groups, and other interested organizations to create programs that provide a better understanding of scientific research. In a second, two-year phase these SEPA-generated curricula are broadly disseminated.

This round of 11 grants brings the SEPA portfolio to 72 active projects that span the country. These SEPA projects address a wide range of subject matter from basic questions about biology to how clinical research is conducted. For a full description of projects, see <www.ncrr.nih.gov/ncrrprog/clindir/SEPAdirectoryFY2006-2.asp>; for more information about SEPA, see <www.ncrrsepa.org>; and for application details, see <www.ncrr.nih.gov/clinical/cr_sepa.asp>. *– NIH Press Release, January 4, 2007*

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Resources Wanted and Available

Serum from Geriatric Male Baboons

Dr. James Mubiru, of the Southwest Foundation for Biomedical Research in San Antonio, Texas, is working to develop a prostate specific antigen (PSA) assay for baboons. This assay will then be used to screen male baboons for prostatic diseases. He needs serum from male baboons which are more than 25 years old. If you have such animals, and are willing and able to take serum samples, please contact Dr. Mubiru [e-mail: *jmubiru@sfbr.org*].

Guidance for Protection Against Animal Activists

A new Frequently Asked Question (FAQ) is now posted on the Office of Laboratory Animal Welfare (OLAW) Website at <grants.nih.gov/grants/olaw/faqs.htm#instresp_8>. This FAQ provides guidance on the roles of the institutional official and the IACUC in developing plans to diminish the likelihood that their institution or its employees will become targets of animal activists. Institutions are encouraged to review OLAW FAQs and make use of this resource. As necessary, OLAW will update the site with new FAQs.

Dietary Management Software for Zoos and Wildlife

Zootrition® is a comprehensive database that provides zoo and wildlife managers with a tool to compare nutritional content of specific food items and calculate overall nutritional composition of diets. Potential nutritional deficiencies and toxicities can be identified and additional information specific to local regions can be added by users. Zootrition® was developed by the Saint Louis Zoo with support from the World Association of Zoos and Aquariums (WAZA). For details on the Zootrition software, contact Ellen S. Dierenfeld [314-781-0900, ext. 205; e-mail: *zootrition@stlzoo.org*], or see <www.stlzoo.org/animals/animalfoodnutritioncenter/zootrition.htm>.

Digital Atlases of Brains

Digital atlases of the brains of *Homo sapiens, Macaca mulatta, M. fascicularis, Chlorocebus aethiops*, and *Callicebus moloch* have been created and posted online by researchers at the UC Davis Center for Neuroscience, at <brainmaps.org/index.php?p=datasets-species#primate>.

Nonhuman Primate Model for Aging Studies

The National Institute on Aging (NIA) provides several nonhuman primate (NHP) resources for investigators in the field of aging research. In addition to supporting colonies of aged rhesus monkeys at four National Primate Research Centers, new resources support avenues of research that do not require the actual acquisition of primates. By making these resources available, the NIA hopes to encourage investigators using other model organisms such as the rat and mouse to test their research findings in the primate model.

The NIA Aged Non-Human Primate Tissue Bank provides a repository of tissue from aged NHPs for use in research. Some tissue from middle-aged and young NHPs will also be available soon. The tissues are donated by NIA-supported NHP colonies and other NHP colonies such as the National Primate Research Centers. The goal of the NIA NHP Tissue Bank is to archive tissue that might otherwise be discarded, and provide that tissue to investigators undertaking research on normal aging and age-related diseases. Information on the health status of the donor animals is available, but the NIA does not guarantee any aspect of the health status. Tissues are available as fresh-frozen specimens, slides containing sections of formalin-fixed tissue, and frozen specimens embedded with tissue freeze medium. Further information is available at<www.nia.nih.gov/ResearchInformation/ScientificResources/NHPTissueBankHandbook.htm>. For information on availability of tissue, contact Tracy Cope [e-mail: *copet@nia.nih.gov*].

The NIA Primate Aging Database (PAD) was developed to collect data on normal aging in a wide range of NHP species. Blood chemistry measurements and body weight data have been collected for healthy NHPs across the lifespan, from primate colonies across the country. PAD currently has approximately 500,000 data points, predominantly from rhesus macaques. The data can be used by the research community to identify changes in biological parameters with age, to validate NHP models for aspects of human aging, and to perform comparative analyses. It is also a valuable resource for veterinary staff caring for aged NHPs, and for identifying normal ranges of measurements at different ages. PAD is housed on a secure Internet server that requires password-protected access: <ipad.primate.wisc.edu>. It is available to investigators and veterinarians in academic and commercial laboratories with interests in aging research.

The Obesity, Diabetes and Aging Animal Resource at the University of South Florida supports a colony of aged, obese, and diabetic rhesus monkeys for collaborative studies, as well as a biospecimen bank. Contact Dr. Barbara Hansen [e-mail: *bchansen@aol.com*] for information on the colony.

For further information on NIA resources, visit the Scientific Resources page, <www.nia.nih.gov/ResearchInformation/ScientificResources>, or contact Dr. Nancy Nadon [301-402-7744; e-mail:

nadonn@nia.nih.gov]. – *From NIH* Notice *NOT-AG-07-004*

JWatcher-Video and JWatcher-Palm

Dan Blumstein's Lab at UCLA and the Animal Behaviour Lab at Macquarie University, Sydney, announce the distribution of JWatcher-Video and JWatcher-Palm.

"JWatcher is a powerful tool for the quantitative analysis of behavior. It can be used to address any theoretical problem that requires a complex sequence of actions to be scored by a human observer. JWatcher is written in Java and is hence not dependent on a particular operating system. It will run on almost any microcomputer capable of providing a Java Virtual Machine and has been tested on both Windows and Macintosh systems. The legacy version (version 0.9) works on older systems (Macintosh OS-9 and Windows-98), while the Version 1.0 works well on Macintosh OS-X and Windows XP systems.

"JWatcher Video works best on Windows XP systems and has reduced functionality running in Macintosh OS-X. JWatcher-Palm can be used to acquire data on a Palm OS-equipped device and analyze it later on your main computer.

"The software and extensive user's guides are available free at <www.jwatcher.ucla.edu>. A book, *Quantifying Behavior the JWatcher Way*, will be the complete manual, along with supplementary educational material. Unfortunately, we currently do not have the resources to provide complimentary user support. We provide paid user support as well as experimental design and analysis consulting to help you solve your behavioral data analysis problems. See the JWatcher Website <www.jwatcher.ucla.edu> for details." – *Daniel T. Blumstein, Dept of Ecology & Evolutionary Biology, 621 Charles E. Young Dr. South, University of California, Los Angeles, CA 90095-1606 [310-267-4746; fax: 310-206-3987; e-mail:* marmots@ucla.edu*]*

Advice to Would-Be Monkey Owners

"Are You Sure You Want a Monkey?" by Erin Crowley and Kevin Ivester, is available at <www.offthewallemporium.com/primates/primate_brochureprint.html>. This essay asks ten difficult questions for people who are contemplating getting a monkey for a pet. It is recommended to anyone who thinks a pet monkey would be "adorable" or "fun".

NIH Policy Notice

A new Notice, entitled "Guidance Addressing the NIH Policy on Allowable Costs for Grant Activities Involving Animals When Terms and Conditions are Not Upheld", has been published in the *NIH Guide for Grants and Contracts* as Notice Number NOT-OD-07-044 <grants.nih.gov/grants/guide/notice-files/NOT-OD-07-044.html>. Questions about this Notice should be directed to: Office of Policy for Extramural Research Administration, NIH [301-435-0938; e-mail: *grantspolicy@od.nih.gov*]. Questions about Assurances or IACUC approval of animal activities should be directed to: OLAW, Div. of Assurances, NIH [301-496-7163; e-mail: *olawdoa@mail.nih.gov*].

International Primatological Society Guidelines

The second edition of the "IPS International Guidelines for the Acquisition, Care and Breeding of Nonhuman Primates" has been completed. A link to these guidelines is on the publications page of the IPS Website at: <www.internationalprimatologicalsociety.org/publications.cfm>.

* * *

Information Requested or Available

New IPS Website!

The International Primatological Society now has its own domain, so all its information can be found at its new, easy-to-remember, Website: <www.internationalprimatologicalsociety.org>.

Wild Gibbon Blog

Susan Cheyne [e-mail: *susancheyne76@yahoo.com*] has announced that she has set up a blog about the gibbons of the Sebangau National Park, Indonesia, at <www.indonesiangibbons.blogspot.com>. She writes: "I hope the blog will allow researchers and the public alike to read about a life in an on-going, long-term primate research project. Information is provided about all the study animals in a 'diary' format as well as monthly updates from the Kalaweit Gibbon Rehabilitation Project <www.kalaweit.org>. The aim is to bring the research to a wider audience, to make it more accessible to the public and to raise awareness."

More Interesting Websites

- CDC's *Biosafety in Microbiological and Biomedical Laboratories* (BMBL), 5th Edition: <www.cdc.gov/od/ohs/biosfty/bmbl5/bmbl5toc.htm>
- Cotton-top tamarin Species Survival Plan Web page: <www.csew.com/cottontop/SSP/Enghome.htm>
- Israeli Primate Sanctuary Foundation: <en.ipsf.org.il>
- Wakuluzu: Friends of the Colobus Trust: <www.colobustrust.org>

Meeting Announcements

The European Association of Zoos and Aquaria (EAZA), Poznan Zoological Garden, and the University of Adam Mickiewicz at Poznan would like to invite you to participate in the **EAZA Research Conference 2007**, hosted by Poznan Zoo and Poznan University. The conference will be held on May 24-25 in Poznan (Poland), and is aimed at zoo and university staff and students. The conference language will be English. Presentations will focus on research done in or by zoos, rescue centers, or scientific collections. Oral presentations and posters will be accepted. Topics may focus on research supporting animal husbandry, conservation, ecology, behavior, genetics, or physiology. Information is available through the EAZA Calendar on <www.eaza.net>; or contact "ZOO Conference", Ogród Zoologiczny w Poznaniu, Ul. Browarna 25, 61-063 Poznan, Poland [+48 61 870 95 02; Fax: +48 61 877 35 33; e-mail: *conference@op.pl* or *zoo.cwiertnia@interia.pl* or *pcwiertnia@zoopoznan.neostrada.pl*]; or see <conference.wizytowka.pl>.

The **FELASA-ICLAS Joint Meeting 2007**, hosted by the Associazione Italiana per le Scienze degli Animali da Laboratorio, will take place on June 11-14 at Villa Erba, Cernobbio, Italy. For information, see <www.felasa-iclas2007.com/information.asp>.

The **Society for Tropical Veterinary Medicine** and its Scientific Board invite you to its 9th Biennial Conference in Merida, Mexico, June 17-22, 2007. The main scientific theme will be: "Animal Biodiversity and Emerging Diseases – Prediction and Prevention". This five-day conference will cover scientific topics from cellular pathogenesis to global pandemics in order to promote discussion and update researchers, academics, governmental and NGO representatives, technicians, veterinarians, and other professionals from the industry sector interested in tropical veterinary medicine. This conference will be developed in collaboration with the Mexican Society for Veterinary Parasitology and the United Nation's Food and Agriculture Organization's Working Group on Parasite Resistance, to create max-imum interaction between the participants. A commercial exhibition will provide information on the latest technological developments in the fields of diagnostics and disease control. As provided during previous STVM conferences, participants presenting a talk or a poster will be able to publish their findings in the Annals of the New York Academy of Sciences. For more information, see <www.ivis.org/newsletter/archives/feb07/feb0907trop.htm>.

Animal Rights 2007 National Conference will be held July 19-23 in Los Angeles, California. The organizer, the Farm Animal Reform Movement, says that some 90 presenters from 60 groups, 120 sessions, 100 exhibits, and 800 participants are expected to attend. For information, see <www.arconference.org>.

The **44th Annual Meeting of the Animal Behavior Society** will be held July 21-25, 2007, in Burlington, Vermont. For information, see <www.animalbehavior.org/ABS/Program>.

This year's **Taking Action for Animals** conference will take place July 28-30 at the Ronald Reagan Building and International Trade Center in Washington, DC. See <www.takingactionforanimals.com>.

The **2nd Congress of the European Federation for Primatology** will be held September 3-7, 2007, at Charles University in Prague, Czech Republic, sponsored by the Czech Group of Primatologists at the Faculty of Education in Prague. For information, see <www.unipv.it/webbio/efp/efp_prague2007.pdf>.

The **XXI International Bioacoustic Congress** will take place in Pavia, Italy, on September 15-18, 2007. There will be a symposium entitled "Vocal Communication in Mammals". This symposium will focus on research involving vocal production, social interactions, and sexual communication, among species or individuals. The symposium will last 3 to 4 hours with 20-minute slots for talks (15 min. for talk and 5 min. for questions). If you are willing to participate in this symposium, please send your abstract to one of the organizers: Isabelle Charrier [e-mail: *isabelle.charrier@u-psud.fr*] or David Reby [e-mail: *reby@sussex.ac.uk*]. General information concerning the conference can be found at <www.horta.uac.pt/intradop/index.php?option=com_content&task=view&id=224>.

Disney's Animal Kingdom and the Brevard Zoo will co-host the **2008 Gorilla Workshop** January 23-27, 2008. The Workshop is a biannual conference begun 16 years ago to highlight the unique and specialized experiences of gorilla keepers in hopes of changing the husbandry culture, thereby improving the lives of captive gorillas. Previous workshops were held in Columbus (1990), Milwaukee (1992), Pittsburgh (1997), Calgary (2004) and Paignton (2006). Keynote speakers in 2008 will include Mbeli Bai field researcher Thomas Breuer and Pan African Sanctuary Alliance executive director Doug Cress. For more information, contact Beth Armstrong [e-mail: *elynn57@aol.com*] or Rebecca Phillips [e-mail: *Rebecca.S.Phillips@disney.com*].

Announcements from Publications

BMC Systems Biology Publishes First Articles

BioMed Central is pleased to announce the launch of *BMC Systems Biology*, the first open access journal focused solely on the entire emerging subject of systems biology. A peer-reviewed online journal, *BMC Systems Biology* has just published its first articles at <www.biomedcentral.com/bmcsystbiol>. *BMC Systems Biology* publishes research articles describing systems-level analysis of biological events, whether experimental or theoretical, at the level of molecules, cells or organisms. Visit the Website to view the first articles published and sign up to receive e-mail alerts when new content is published in the journal.

New Editor, New Features in *Evolution & Development*

A new editor will be added to the animal biology-dominated panel of the journal *Evolution & Development*. Vivian Irish, of Yale University, will start as an editor in January to create a greater niche for the publication of plant "evo-devo" in the journal. The journal recognizes that research on plant evo-devo is a major growing component of this discipline, and welcomes submissions of papers on this subject. Authors of plant evo-devo manuscripts should contact Vivian directly at <*vivian.irish@yale.edu*> to discuss the suitability of potential papers or to submit manuscripts to *Evolution & Development* through her office.

A new section, "News and Comments", will present brief summary reports and comments on important evo-devo papers across the literature, from molecular developmental biology to paleontology. The editor who will handle this section will be Wallace Arthur. This section will include, mostly, very brief reports (500–1000 words), which will be channelled into fast-track publication, with a goal of the receipt-to-publication period being as short as two months. News and Comments manuscripts will not be formally refereed, but rather will be accepted by editorial decision (in relation to which, the handling editor will consult with the other editors as appropriate).

Finally, there will be a new category of short (1000–3000 words) invited reviews on critical issues such as the opportunities and approaches available in new non-model organisms, new problems, new technical breakthroughs, and perhaps new paradigms. These review articles will be primarily by invitation, but suggestions for submissions by interested authors will be welcomed. – *from* Evolution & Development, *2007, 9[1]*

A Fresh Perspective on Science and Politics

Nature has announced, in its January 18 issue, a new column intended to give readers of *Nature* a fuller insight into how and why different topics take their place in America's research and development agenda. Until the end of last year, the column's author, David Goldston, served as chief of staff for the House Committee on Science, helping to set the legislative agenda for science and technology before Congress.

Goldston's column, "Party of One", "will provide a seasoned insider's take on the interaction between science and politics. From stem cells and energy policy to climate change and space exploration, it will provide a unique perspective on why things work, or don't work, in Washington, DC. And stripped of the congressional staffer's customary anonymity, Goldston will be able to offer his own candid opinions on what's really up, on Capitol Hill. As a result, we are confident that our readers in the United States and around the world will gain a valuable insight into some of the forces that help shape science today."

Seeking MSS and Refinements for *ILAR e-Journal*

If you have laboratory refinements or a manuscript that relates to science-based, high quality, humane care of animals, novel animal or other biological models for the study of disease, or any other topic pertinent to the mission of the Institute for Animal Laboratory Research (ILAR), you may submit it for publication in the new *ILAR e-Journal.* While the theme-based quarterly print issues of *ILAR Journal* will not change, the *ILAR e-Journal* will address the need for more published information on these topics without the spatial and graphical limitations of the print edition. All submitted materials will be peer reviewed. All published articles will be fully indexed online and will have the same visibility as *ILAR Journal* print articles. Interested authors should follow the *ILAR Journal* Instructions to Authors <dels.nas.edu/ilar_n/ilarjournal/instructions_to_authors.shtml>, e-mail their respective manuscripts to <*ILAR@nas.edu*>, and include "Prospective MS" on the Subject line of the e-mail.

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News Briefs

Monkey Handlers Can't Give Blood in Canada

People who work with monkeys can no longer give blood in Canada, because of fears they may spread a virus similar to HIV. Canadian Blood Services quietly started screening people in December, asking them in a questionnaire: "Have you, in your past or present job, taken care of or handled monkeys or their body fluids?"

The agency did not announce the ban – in its words an "indefinite deferral" – but a spokeswoman confirmed Friday that it is in effect "as a precautionary measure." She said Blood Services took the action on instruction from blood-system regulator Health Canada. The concern is that some handlers of primates such as monkeys, chimpanzees and baboons have become infected with simian foamy virus, or SFV.

"Simian foamy virus is considered a retrovirus," Doris Kaufmann said from Blood Services' Calgary office. "Retroviruses that are known to affect humans do include HIV and others that we do routinely test for." There's no known case of someone becoming sick from SFV, but some researchers worry there may be a long incubation period. One concern is that, as a retrovirus, SFV can transfer its genetic material to the cells it infects – complicating efforts to eradicate it.

Kaufmann said studies show that two to three per cent of people who regularly work with primates have the virus. "That would include zookeepers, perhaps laboratory workers." It is thought that the virus is transmitted through bites and scratches. About 70 to 90 per cent of primates born in captivity have the antibody that indicates the presence of SFV, Kaufmann said.

She said Blood Services estimates that fewer than 1,000 donors across Canada will be turned away because of their jobs with primates. That's too few to justify the cost of adding a testing procedure, she said. – *from the* Edmonton Journal, *December 23, 2006*

Bonobo Dies, Twelve Ill at Ohio Zoo

A severe respiratory infection has sickened a group of bonobos at the Columbus (Ohio) Zoo and Aquarium, killing one of them, officials said Thursday. The bonobos began showing signs of infection – coughing and nasal discharge – two weeks ago. A necropsy on a 15-year-old male who died Sunday revealed severe pneumonia in his lungs, said Gerald Borin, the zoo's Executive Director. Twelve remaining bonobos are being treated with antibiotics and appear to be getting better, he said.

It's unclear how the animals became infected. Zoo officials are expecting lab results in a few days that could help identify the cause.

The bonobos are kept in a glass-enclosed display during the winter and only have contact with zoo staff, who wear respiratory masks and follow a strict hand-washing protocol during flu season, Borin said. – *Associated Press, December 31, 2006*

OHSU Releases Primate Center Records

According to the *Willamette Week* (Portland), Oregon Health and Science University (OHSU) reached a settlement on October 17, 2006, with In Defense of Animals (IDA), in which OHSU agreed to provide documentation of animal care over seven years at the Primate Center in Beaverton, as well as pay $82,000 in lawyer fees incurred by IDA. The animal rights group received 113,000 pages of documents in 30 boxes from the Oregon National Primate Research Center (ONPRC) on December 12. IDA alleged mistreatment of animals at the Primate Center in 2000, but the Center was later given a clean bill of health by the USDA. According to *Willamette Week*, the ONPRC fought to retain its right to redact the documents before releasing them to IDA, removing the names of employees as well as companies that contract with ONPRC and specific drugs used in studies. The story appears at <www.wweek.com/editorial/3305/8322>. – *From the* NABR (National Association for Biomedical Research**)** Update, *December 14*

Seven Young Gorillas Rescued from Poachers

Seven gorillas, of the Volcano National Park, which had been taken hostage by poachers in Goma, Democratic Republic of Congo (DRC), were rescued last year.

Simon Childs, a gorilla care manager attached to Karisoke Research Center, in Musanze District, Rwanda, said that a total of seven young gorillas were rescued from poachers in Goma and in Rubavu District in Western Province (Rwanda) areas bordering the park and are undergoing "orientation" in Kinigi before they can be reintegrated into wild life. He said the gorillas, ages 1-6, had been captured between November, 2003, and May, 2006. Childs was presenting the Center's achievements for last year at a meeting organized by Karisoke and held at Fatima Guest house on January 10.

"We managed to rescue a total of seven infant gorillas which were being held by poachers; we have since kept them in separate conditions under orientation to have them get used to wild life," he said, and added, "Because they were captured at varying ages and kept under different conditions in captivity, it is hard to reintegrate them immediately with others."

When asked which measures were in place to minimize cases of animal poaching, Childs stressed the need

to sensitize residents around the park about the importance of conserving animal species in the country. He said it was unfortunate that residents at times look at white people as prospective buyers of the animals.

Dr Katie Fawcett, the Director of Karisoke Research Center, attributed poaching in DRC to insecurity. She however warned of illegal animal trade in Rwanda, appealing to security officials for vigilance to reduce scores of poachers in the country. "Conservation laws in Rwanda are a bit strong and only need vigilance to minimize a few loopholes, but in DRC because of insecurity it is hard to stop poaching."

A park guard told this reporter that poachers capture infant gorillas hoping to sell them at high prices when they get prospective buyers but said that game wardens are normally tipped by their secret informers; then, with the help of the police, they arrest the culprits. – *by James Tasamba,* The New Times *(Kigali), January 12, 2007*

Congo Rebels Kill and Eat Two Mountain Gorillas

Rebels in eastern Democratic Republic of Congo have killed and eaten two silverback mountain gorillas, conservationists said today, sparking fears that more of the endangered animals may have been slaughtered in the lawless region.

Only about 700 mountain gorillas remain in the world, 380 of them spread across a range of volcanic mountains that straddle the borders of the DRC, Rwanda and Uganda in Central Africa.

One dismembered gorilla corpse was found yesterday in a pit latrine in the Virunga National Park, a few hundred yards from a park patrol post at Bikenge that was recently abandoned because of rebel attacks, according to the London-based Africa Conservation Fund. Another silverback was slaughtered in the same area on January 5, said the group, which based its report on the word of conservationists in the field.

The conservation group blamed rebels loyal to a local warlord, Laurent Nkunda, for the killings, saying the animals were slaughtered for food. Nkunda is a renegade army soldier who commands thousands of fighters in the vast country's lawless east. They have assaulted major cities and clashed sporadically with government forces. – *From the* Irish Examiner, *January 17, posted to Primate Net*

Rebels Agree to Stop Gorilla Killings

Rangers who fled their patrol posts in the Virunga National Park in the Democratic Republic of Congo, when they became the target of rebel forces, will start returning to their posts. For conservationists this is a considerable triumph, as the rangers will be able to resume what they were originally employed to do – look after the welfare of the endangered mountain gorillas in the park.

International outrage over the recent killing of two silverback gorillas in the park by the rebels played a major part in ensuring the return of the park's rangers, and hopefully the future safety of the gorillas. Robert Muir of the Frankfurt Zoological Society, who is based in the Congo, said an agreement had finally been reached with Laurent Nkunda's rebels to allow the rangers safe passage back to the park.

In the ongoing war between rangers and rebel forces in the park, 97 rangers have been killed in the past 10 years. As a result 15 of them fled to Uganda in December. Later they returned home to live like refugees in Rumangabo, a village in their own country. Now a UN peacekeeping force is due to escort them back to their posts on Tuesday. – *Myrtle Ryan in the South Africa* Tribune*, January 28, 2007*

Dr. Patricia Brown Named OLAW Director

Dr. Norka Ruiz Bravo has announced Dr. Patricia Brown's appointment as the new Director of the Office for Laboratory Animal Welfare (OLAW) in the Office of Extramural Research, National Institutes of Health (NIH). Dr. Brown received her BSc degree in Animal Science (1974) from Pennsylvania State University and her veterinary degree (1978) from the University of Pennsylvania. She served in the U.S. Air Force for eight years, and while on active duty earned a MSc in Laboratory Animal Medicine from the M. S. Hershey Medical Center, Pennsylvania State University. She joined the U.S. Public Health Service in 1986 and has served in a variety of positions at the NIH, within the Veterinary Resources Branch, the National Cancer Institute, and the Office of Animal Care and Use. She has served as Acting Director, OLAW since July 2006. Dr. Brown is a diplomate of the American College of Laboratory Animal Medicine (ACLAM), has served on the Board of Directors of ACLAM, is a past president of the American Society of Laboratory Animal Practitioners (ASLAP), and has served on the Board of Trustees of the Association for Assessment and Accreditation of Laboratory Animal Care International representing ASLAP. – *PHS Animal Welfare Policy Announcement, January 24*

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Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

Books

• *A Conservation Action Plan for the Tonkin Snub-Nosed Monkey in Vietnam*. X. C. Le & R. Boonratana. Hanoi/New York: Institute of Ecology and Biological Resources/Primate Conservation Inc., 2006, <www.aseanprimates.org/images/data/tsm_action_plan.pdf>.

• *The Emotional Lives of Animals: A Leading Scientist Explores Animal Joy, Sorrow, and Empathy – and Why They Matter*. M. Bekoff. Novato, CA: New World Library, 2007. [Price: $23.95]

Audiovisual Material

• *Zoonoses*. Faunacap Series, *The Capture, Handling, and Restraint of Animals*, *Volume 9.* (Animals on Film, 23 Franklin Rd, Wanneroo, Western Australia 6065 [e-mail: *jocowie@optusnet.com*]; or see <www.animalsonfilm.com>.) [Price: $AU237.00, including postage to any country]

Brochures

• *Animal Research Ethics*. Sleep Research Society, <www.sleepresearchsociety.org/PDFs/CAREBrochure.pdf>.

Contents include "The process of animal research", "Alternatives: Sleep researchers study people whenever possible", "Regulation of animal research", "Care of research animals", and "Sources of animals for research".

• *Communications Handbook: A guide to help research institutions develop communication plans for animal research*. Research Defence Society, 2007. [For a copy, contact <*Corinah@rds-net.org.uk*>]

• 60 Years of Public Health Science at CDC. *Morbidity and Mortality Weekly Report*, Dec. 22, 2006, *55*[Supplement 02], <www.cdc.gov/mmwr/PDF/wk/mm55su02.pdf>.

Magazines and Newsletters

• *Animal Research News & Analysis Newsletter*, November, 2006. [The Humane Society of the United States, 2100 L St, NW, Washington, DC 20037; <www.hsus.org/animals_in_research/general_information_on_animal_research/subscribe_to_the_animal_research_news_analysis_newsletter>].

• *Animal Research News & Analysis Newsletter*, December, 2006. [Address same as above].

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

• *BOS Newsletter*, December, 2006, <www.savetheorangutan.co.uk/newsletter/december_06.pdf>. Borneo Orangutan Survival Foundation UK.

• *Conservation Behaviorist*, December, 2006, *4*[2], <www.animalbehavior.org/Committees/Conservation/ConservationBehaviorist>.

• *European Zoo Nutrition Centre Newsletter*, No. 1412, July, 2006, <www.eznc.org>.

• *Folia Primatologica*, 2007, *78*[1].

Contents: Glenohumeral mobility in primates, by L. K. Chan; Scapular position in primates, by L. K. Chan; Stone banging by wild capuchin monkeys: An unusual auditory display, by A. C. A. Moura; Spatial variations in *Eulemur fulvus rufus* and *Lepilemur mustelinus* densities in Madagascar, by S. M. Lehman; One-male harems and female social dynamics in Guinea baboons, by D. Maestripieri, J. Mayhew, C. L. Carlson, C. L. Hoffman, & J. M. Radtke; and an Erratum.

• *Folia Primatologica*, 2007, *78*[2].

Contents: Genetic variability in four *Alouatta* species measured by means of nine DNA microsatellite markers: Genetic structure and recent bottlenecks, by M. Ruiz-Garcia, P. Escobar-Armel, D. Alvarez, M. Mudry, M. Ascunce, G. Gutierrez-Espeleta, & J. M. Shostell; Adult male replacement in socially monogamous equatorial saki monkeys *(Pithecia aequatorialis),* by A. Di Fiore, E. Fernandez-Duque, & D. Hurst; Ontogeny and phylogeny of the pelvis in *Gorilla, Pongo, Pan, Australopithecus* and *Homo*, by F. L. Williams & R. Orban; and Facial displays in young tufted capuchin monkeys *(Cebus apella):* Appearance, meaning, context and target, by A. De Marco & E. Visalberghi.

• *International Journal of Primatology*, 2006, *27*[6].

Contents: Plants consumed by *Eulemur fulvus* in Comoros Islands (Mayotte) and potential effects on intestinal parasites, by A. Nègre, L. Tarnaud, J. F. Roblot, J. C. Gantier, & J. Guillot; Gastrointestinal parasites in crop raiding and wild foraging *Papio anubis* in Nigeria, by A. H. Weyher, C. Ross, & S. Semple; Dietary and energetic responses of *Pongo abelii* to fruit availability fluctuations, by S. A. Wich, S. S. Utami-Atmoko, T. Mitra Setia, S. Djoyosudharmo, & M. L. Geurts; Edge effects on the density of *Cheirogaleus major*, by S. M. Lehman, A. Rajaonson, & S. Day; Probable community transfer of parous adult female chimpanzees in the Budongo Forest, Uganda, by M. Emery Thompson, N. E. Newton-Fisher, & V. Reynolds; Archaeological analysis does not support intentionality in the production of brushed ends on chimpanzee termiting tools, by J. L. Heaton & T. R. Pickering; Seasonal changes in

male associative behavior and subgrouping of *Alouatta palliata* on an island, by P. A. D. Dias & E. Rodríguez Luna; and Left nipple preferences in infant *Pan paniscus* and *P. troglodytes*, by W. D. Hopkins & M. De Lathouwers.

• *IPPL News,* December, 2006, *33*[3]. [International Primate Protection League, P.O. Box 766, Summerville, SC 29484; e-mail: *info@ippl.org*]

• *NCRR Reporter*, Fall 2006, *30*[4], <www.ncrr.nih.gov/newspub/Fall06rpt/Fall06mss.asp>.

• *NCRR Reporter*, Winter 2007, *31*[1], <www.ncrr.nih.gov/newspub/Winter07rpt/Winter07mss.asp>.

Contents include: "Exploring the Potential of HIV Microbicides".

• *NIH Extramural Nexus,* January, 2007, <grants.nih.gov/grants/partners/0107Nexus.htm>.

Contents include "NIH 2007 fiscal operations plan announced", "Addressing terror and violence related to animal research", "Get ready for changes in peer review", "New Web tool to be launched for finding funding information", and information about electronic submission of grant applications.

• *Journal of Medical Primatology*, 2007, *36*[1], <www.blackwell-synergy.com/toc/jmp/36/1>.

Contents: A tribute to Boris Lapin, by A. Voevodin; Therapeutic immunization with Modified Vaccinia Virus Ankara (MVA) vaccines in SIV-infected rhesus monkeys undergoing antiretroviral therapy, by K. Uberla, B. Rosenwirth, P. ten Haaft, J. Heeney, G. Sutter, & V. Erfle; Prevention of zona hardening in non-human primate oocytes cultured in protein-free medium, by C. A. VandeVoort, P. Hung, & R. D. Schramm; Lack of effect of antenatal glucocorticoid therapy in the fetal baboon on cerebral cortical glucose transporter proteins, by I. Antonow-Schlorke, M. Ebert, C. Li, A. Gschanes, O. W. Witte, T. McDonald, P. W. Nathanielsz, & M. Schwab; Blockage of urine by intravesical ejaculate in cynomolgus monkeys, by R. K. Chandolia, C. M. Luetjens, J. Wistuba, A. Semjonow, G. Puhse, & E. Nieschlag; Polymerase chain reaction detection of *Clostridium perfringens* in feces from captive and wild chimpanzees, *Pan troglodytes*, by S. Fujita & T. Kageyama; Effects of three mydriatic drug regimens on pupil size in rhesus (*Macaca mulatta*) and African green monkeys (*Chlorocebus aethiops*), by N. L. Merrill & R. Burge; Left ventricular volume and function in cynomolgus monkeys using real-time three-dimensional echocardiography, by H. Tsusaki, H. Yonamine, A. Tamai, M. Shimomoto, K. Kuwano, H. Iwao, R. Nagata, & G. Kito; Sparganosis in wild-caught baboons (*Papio cynocephalus anubis*), by M. Nobrega-Lee, G. Hubbard, P. LoVerde, C. Carvalho-Queiroz, D. B. Conn, K. Rohde, E. J. Dick, P. Nathanielsz, D. Martin, T. Siler-Khodr, & N. Schlabritz-Loutsevitch; and a Corrigendum.

• *Primates: The Newsletter of the Mona Foundation*, December 2006, No. 13, <www.mona-uk.org/assets/Newsletter Iss 13.pdf>.

Reports

• *The Animal Welfare Act: Background and Selected Legislation*. Congressional Research Service, <www.ncseonline.org/NLE/CRs/abstract.cfm?NLEid=1724>.

Special Journal Issues

• Animal Research. *Nature*, 2006, *44*[7121], <www.nature.com/news/specials/animalresearch>.

The issue includes eight stories on primate research, mouse research, public opinion and scientists' opinions, as well as an editorial and the opportunity to share your comments.

• Contemporary Topics for Animal Care Committees. *ILAR Journal,* 2007, *48*[1], <www.ilarjournal.com>.

• Education and Training for Laboratory Animal Care and Use Programs. *ILAR Journal,* 2007, *48*[2], <www.ilarjournal.com>.

Anatomy and Physiology

• Female hierarchy instability, male immigration and infanticide increase glucocorticoid levels in female chacma baboons. Engh, A. L., Beehner, J. C., Bergman, T. J., Whitten, P. L., Hoffmeier, R. R., Seyfarth, R. M., & Cheney, D. L. [Dept of Biology, Univ. of Pennsylvania, Philadelphia, PA [e-mail: *engh@sas.upenn.edu*]. *Animal Behaviour*, 2006, *71*, 1227-1237.

"Female baboons (*Papio hamadryas* spp.) must contend with myriad potential stressors daily. In a previous study on female chacma baboons, *Papio hamadryas ursinus*, living in the Okavango Delta of Botswana, increases in glucocorticoid (GC) concentrations were associated with female reproductive stage, male immigration and the threat of infanticide. Here, we extend this previous analysis to a larger data set with several additional potential stressors, including actual infanticide and instability in the female dominance hierarchy. A general linear mixed model showed that reproductive state, male immigration, infanticide, female rank instability and predation all had significant effects on GC levels. Lactating females' GC levels increased in response to the arrival of immigrant males and increased even further when infanticide occurred. In contrast, cycling and pregnant females' GC levels did not change. Females also showed elevated GCs in response to instability within their own dominance hierarchy, especially if their own ranks were at risk. Females' stress responses were frequent, but specific to events that threat-

ened their own lives, the lives of their offspring, or their dominance ranks."

• Geniculocortical relay of blue-off signals in the primate visual system. Szmajda, B. A., Buzás, P., FitzGibbon, T., & Martin, P. R. (P. R. M., Dept of Optometry & Vision Sciences, Univ. of Melbourne, Corner Keppel and Cardigan Sts, Carlton VIC 3053, Australia [e-mail: *prmartin@unimelb.edu.au*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2006, *103*, 19512-19517.

"A fundamental dichotomy in the subcortical visual system exists between on- and off-type neurons, which respectively signal increases and decreases of light intensity in the visual environment. In primates, signals for red-green color vision are carried by both on- and off-type neurons in the parvocellular division of the subcortical pathway. It is thought that on-type signals for blue-yellow color vision are carried by cells in a distinct, diffusely projecting (koniocellular) pathway, but the pathway taken by blue-off signals is not known. Here, we measured blue-off responses in the subcortical visual pathway of marmoset monkeys. We found that the cells exhibiting blue-off responses are largely segregated to the koniocellular pathway. The blue-off cells show relatively large receptive fields, sluggish responses to maintained contrast, little sign of an inhibitory receptive-field surround mechanism, and negligible functional input from an intrinsic (melanopsin-based) phototransductive mechanism. These properties are consistent with input from koniocellular or 'W-like' ganglion cells in the retina and suggest that blue-off cells, as previously shown for blue-on cells, could contribute to cortical mechanisms for visual perception via the koniocellular pathway."

• Categorization of behavioural sequences in the prefrontal cortex. Shima, K., Isoda, M., Mushiake, H., & Tanji, J. (J. T., Brain Science Research Ctr, Tamagawa Univ. Res. Inst., Tamagawa-Gakuen, Machida, Tokyo, 194-8610, Japan [e-mail: *tanji@lab.tamagawa.ac.jp*]). *Nature*, 2007, *445*, 315-318.

"Although it has long been thought that the prefrontal cortex of primates is involved in the integrative regulation of behaviors, the neural architecture underlying specific aspects of cognitive behavioral planning has yet to be clarified. If subjects are required to remember a large number of complex motor sequences and plan to execute each of them individually, categorization of the sequences according to the specific temporal structure inherent in each subset of sequences serves to facilitate higher-order planning based on memory. Here we show, using these requirements, that cells in the lateral prefrontal cortex selectively exhibit activity for a specific category of behavioral sequences, and that categories of behaviors, embodied by different types of movement sequences, are represented in prefrontal cells during the process of planning. This cellular activity implies the generation of neural representations capable of storing structured event complexes at an abstract level, exemplifying the development of macro-structured action knowledge in the lateral prefrontal cortex."

• Effects of colour vision phenotype on insect capture by a free-ranging population of white-faced capuchins, *Cebus capucinus*. Melin, A. D., Fedigan, L. M., Hiramatsu, C., Sendall, C. L., & Kawamura, S. (Dept of Anthropology, Univ. of Calgary, 2500 University Dr., N.W., Calgary, AB, T2N 1N4, Canada [e-mail: *amelin@ucalgary.ca*]). *Animal Behaviour*, 2007, *73*, 205-214.

"Unlike most eutherian mammals, which have dichromatic (two-color) vision, most platyrrhine primate species have polymorphic color vision. This unique characteristic is enabled via multiple alleles for a mid- to long-wavelength-sensitive (M/LWS), single-locus opsin gene on the X chromosome. In combination with the autosomal opsin common to most vertebrates, this arrangement provides heterozygous females with trichromatic (three-color) vision, whereas homozygous females and males are dichromats. Trichromatic vision enables visual differentiation among longer-wavelength colors, such as red, orange, yellow and green. Currently, many researchers attribute the evolution and maintenance of polymorphic color vision to trichromat (¼ heterozygote) advantage. However, dichromacy may be more suited for achromatic tasks, such as penetrating color camouflage, especially under low-light conditions. We evaluated whether dichromatic capuchin monkeys (*Cebus capucinus*) were more efficient than trichromatic monkeys at capturing camouflaged and non-camouflaged insects. Through fecal DNA analysis, we determined the genotypes of the M/LWS opsins for 34 capuchins in two groups inhabiting Santa Rosa National Park, Costa Rica. Dichromatic monkeys were more efficient at detecting camouflaged, surface-dwelling insects, especially under conditions of low ambient light. However, unexpectedly, trichromats were more efficient in extracting embedded, noncamouflaged insects from substrates. To our knowledge, this is the first study to document a foraging advantage to dichromatic monkeys in the wild. Our findings show that there is a lack of heterozygote advantage in foraging for surface-dwelling insects and therefore indicate that this mechanism may not be the sole driving force maintaining polymorphic color vision in this population."

• Scaling of inhibitory interneurons in areas V1 and V2 of anthropoid primates as revealed by calcium-binding protein immunohistochemistry. Sherwood, C. C., Raghanti, M. A., Stimpson, C. D., Bonar, C. J., de Sousa, A. A., Preuss, T. M., & Hof, P. R. (Dept of Anthropology, George Washington Univ., 2110 G Street, NW, Washington, DC 20052 [e-mail: *Sherwood@gwu.edu*]. *Brain, Behavior and Evolution*, 2007, *69*, 176-195.

"Inhibitory GABAergic interneurons are important for shaping patterns of activity in neocortical networks. We examined the distributions of inhibitory interneuron sub-

types in layer II/III of areas V1 and V2 in 18 genera of anthropoid primates including New World monkeys, Old World monkeys, and hominoids (apes and humans). Interneuron subtypes were identified by immunohistochemical staining for calbindin, calretinin, and parvalbumin and densities were quantified using the optical disector method. In both V1 and V2, calbindin-immunoreactive neuron density decreased disproportionately with decreasing total neuronal density. Thus, V1 and V2 of hominoids were occupied by a smaller percentage of calbindin-immunoreactive interneurons compared to monkeys who have greater overall neuronal densities. At the transition from V1 to V2 across all individuals, we found a tendency for increased percentages of calbindin-immunoreactive multipolar cells and calretinin-immunoreactive interneurons. In addition, parvalbumin-immunoreactive cell soma volumes increased from V1 to V2. These findings suggest that modifications of specific aspects of inhibition might be critical to establishing the receptive field properties that distinguish visual areas. Furthermore, these results show that phylogenetic variation exists in the microcircuitry of visual cortex that could have general implications for sensory processing."

• Cellular scaling rules for primate brains. Herculano-Houzel, S., Collins, C. E., Wong, P., & Kaas, J. H. (J. H. K., Vanderbilt Univ., 111 21st Ave South, Nashville, TN 37203 [e-mail: *jon.h.kaas@vanderbilt.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *104*, 3562-3567.

"Primates are usually found to have richer behavioral repertoires and better cognitive abilities than rodents of similar brain size. This finding raises the possibility that primate brains differ from rodent brains in their cellular composition. Here we examine the cellular scaling rules for primate brains and show that brain size increases approximately isometrically as a function of cell numbers, such that an 11 times larger brain is built with 10 times more neurons and ≈12 times more nonneuronal cells of relatively constant average size. This isometric function is in contrast to rodent brains, which increase faster in size than in numbers of neurons. As a consequence of the linear cellular scaling rules, primate brains have a larger number of neurons than rodent brains of similar size, presumably endowing them with greater computational power and cognitive abilities."

• Variation in brain size and ecology in *Pongo.* Taylor, A. B., & van Schaik, C. P. (Dept of Biological Anthropology & Anatomy, Duke Univ., Box 3907, Durham, NC 27710 [e-mail: *andrea.taylor@duke.edu*]). *Journal of Human Evolution,* 2006, *52*, 59-71.

"Numerous hypotheses have been advanced to explain relative increases in brain size in primates and other mammals. However, notably less attention has been directed towards addressing the biological limits to increasing brain size. Here we explore variation in brain size in orangutans. We evaluated both raw and size-adjusted cranial capacity (CC) in adult *Pongo pygmaeus pygmaeus* (n = 147), *P. p. wurmbii* (n = 24), *P. p. morio* (n = 14), and *P. abelii* (n = 36). Results demonstrate significant variation in CC among orangutan taxa. Population differences in raw CC are significant for females (p = 0.014) but not males. Post-hoc pairwise comparisons among females further reveal that raw CC is significantly smaller in *P. p. morio* compared to both *P. abelii* and *P. p. pygmaeus*. When evaluated for proportionality, geometric equivalence in CC is not maintained in orangutans, as *P. p. morio* has a significantly smaller CC when compared to one or more other orangutan groups. Even after statistically partitioning size and size-correlated shape, *P. p. morio* has a significantly smaller CC compared to most other orangutan groups. These observed differences in relative brain size are consistent with known variation in resource quality and life history amongst orangutan populations. Specifically, *P. p. morio* is characterized by the least productive habitat, the lowest energy intake during extended lean periods, and the shortest interbirth intervals. Our results, therefore, provide conditional support for the hypothesis that decreased brain size is related to prolonged episodes of food scarcity, and suggest a correlation between brain size, diet quality, and life history at the lowest macroevolutionary level. The association of a relatively small brain and poor diet quality in *Pongo* further suggests that ecological factors may plausibly account for such a reduction in brain size as observed in the recently recovered *Homo floresiensis* from Indonesia."

• Do threatened hosts have fewer parasites? A comparative study in primates. Altizer, S., Nunn, C. L., & Lindenfors, P. (Institute of Ecology, Univ. of Georgia, Athens, GA 30602 [e-mail: *saltizer@uga.edu*]). *Journal of Animal Ecology,* 2007, *76*, 304-314.

"Parasites and infectious diseases have become a major concern in conservation biology, in part because they can trigger or accelerate species or population declines. Focusing on primates as a well-studied host clade, we tested whether the species richness and prevalence of parasites differed between threatened and non-threatened host species. We collated data on 386 species of parasites (including viruses, bacteria, protozoa, helminths, and arthropods) reported to infect wild populations of 36 threatened and 81 non-threatened primate species. Analyses controlled for uneven sampling effort and host phylogeny. Results showed that total parasite species richness was lower among threatened primates, supporting the prediction that small, isolated host populations harbor fewer parasite species. This trend was consistent across three major parasite groups found in primates (helminths, protozoa, and viruses). Counter to our predictions, patterns of parasite species richness were independent of parasite transmission mode and the degree of host specificity. We also examined the prevalence of selected parasite genera among primate sister taxa that differed in their ranked threat catego-

ries, but found no significant differences in prevalence between threatened and non-threatened hosts. This study is the first to demonstrate differences in parasite richness relative to host threat status. Results indicate that human activities and host characteristics that increase the extinction risk of wild animal species may lead simultaneously to the loss of parasites. Lower average parasite richness in threatened host taxa also points to the need for a better understanding of the cascading effects of host biodiversity loss for affiliated parasite species."

Animal Models

• Spatial relational learning persists following neonatal hippocampal lesions in macaque monkeys. Lavenex, P., Lavenex, P. B., & Amaral, D. G. (Dept of Medicine, Unit of Physiology, Univ. of Fribourg, Chemin du Musée 5, CH-1700 Fribourg, Switzerland [e-mail: *Pierre.lavenex@unifr.ch*]). *Nature Medicine*, 2006, *10*, 234-239.

"The hippocampus is important for the acquisition of spatial representations of the environment and consequently in contextual memory. This suggests that the neural substrates underlying spatial cognition might be essential for remembering specific life episodes. Indeed, hippocampal lesions prevent spatial relational learning in adult rodents and monkeys, and result in profound amnesia in adult humans. In contrast, we show here that monkeys with neonatal hippocampal lesions learned new spatial relational information. Our experiments suggest that early hippocampal damage leads to functional brain reorganization that enables spatial information to be acquired through the use of brain regions that normally do not subserve this function."

Animal Welfare

• Survey of environmental enhancement programs for laboratory primates. Baker, K. C., Weed, J. L., Crockett, C. M., & Bloomsmith, M. A. (Tulane NPRC, 18703 Three Rivers Rd, Covington, LA 70433 [e-mail: *kbaker1@tulane.edu*]). *American Journal of Primatology*, 2007, *69*, 377-394.

"Animal welfare regulations in the United States require that nonhuman primate environmental enhancement plans be made in accordance with currently accepted professional standards; however, little information is available for quantifying common practice. Here we report the results of a 2003 survey that was sent to individuals overseeing enrichment programs at a variety of primate research institutions. The surveys requested information on program administration and management, implementation standards, procedures, and constraints pertaining to major categories of environmental enrichment, as well as intervention plans for animals exhibiting behavioral pathologies. Data were obtained on the management of 35,863 primates in 22 facilities. Behavioral scientists performed program oversight at the majority of facilities. Most programs reported recent changes, most commonly due to external site visits, and least commonly resulting from internal review. Most facilities' institutional animal care and use committees (IACUCs) included individuals with behavioral expertise, and about two-thirds reported that enrichment issues could influence research protocol design. While most primates were reported to be housed socially (73%), social housing for indoor-housed primates appears to have changed little over the past 10 years. Research protocol issues and social incompatibility were commonly cited constraints. Implementation of feeding, manipulanda, and structural enrichment was relatively unconstrained, and contributions to these aspects of behavioral management generally included individuals in a wide variety of positions within a facility. In contrast, enrichment devices were used on a less widespread basis within facilities, and positive reinforcement programs that involved dedicated trainers were rare. We suggest that altering the role of the IACUC would be a productive avenue for increasing the implementation of social housing, and that an emphasis on prevention rather than intervention against behavioral pathology is warranted. The data from this survey may be useful for anticipating future program evaluations, establishing more effective internal evaluations, and assessing program progress and resource allocation."

Behavior

• The syntax and meaning of wild gibbon songs. Clarke, E., Reichard, U. H., & Zuberbühler, K. (K. Z., School of Psych., Univ. of St Andrews, St Andrews, Scotland [e-mail: *kz3@st-and.ac.uk*]). *PLoS ONE*, 2006, *1*[1], e-73, <dx.doi.org/10.1371/journal.pone.0000073>.

"Spoken language is a result of the human capacity to assemble simple vocal units into more complex utterances, the basic carriers of semantic information. Not much is known about the evolutionary origins of this behavior. The vocal abilities of nonhuman primates are relatively unimpressive in comparison, with gibbon songs being a rare exception. These apes assemble a repertoire of call notes into elaborate songs, which function to repel conspecific intruders, advertise pair bonds, and attract mates. We conducted a series of field experiments with white-handed gibbons at Khao Yai National Park, Thailand, which showed that this ape species uses songs also to protect themselves against predation. We compared the acoustic structure of predator-induced songs with regular songs that were given as part of their daily routine. Predator-induced songs were identical to normal songs in the call note repertoire, but we found consistent differences in how the notes were assembled into songs. The responses of out-of-sight receivers demonstrated that these syntactic differences were meaningful to conspecifics. Our study provides the first evidence of referential signalling in a free-ranging ape species, based on a communication system that utilizes combinatorial rules."

• Evidence for a spatial memory of fruiting states of rainforest trees in wild mangabeys. Janmaat, K. R. L., Byrne, R. W., & Zuberbühler, K. (K. Z., address same as above). *Animal Behaviour*, 2006, *72*, 797-807.

"We investigated the ranging behaviour of two groups of wild mangabey monkeys (sooty mangabeys, *Cercocebus atys atys*, and grey-cheeked mangabeys, *Lophocebus albigena johnstoni*) relative to a number of preselected target trees within their home range. We observed the groups' visiting patterns and speed when they approached within a critical distance of a target tree as a function of the tree's fruiting state. For both groups, the likelihood of coming into sight or actually entering these trees was significantly higher if fruit was available. Target trees with fruit were also approached significantly faster than were trees without fruits. These behavioural differences were unlikely to be the result of auditory, visual or olfactory cues available over long distances, suggesting that monkeys relied on spatial memory to relocate fruit trees and distinguish between trees that had and had not carried fruit in the immediate past. Results further indicated that the monkeys clearly distinguished between different types of fruit-bearing target trees. We suggest that the monkeys used memory of previous feeding experience to assess each tree's differences and were able to anticipate changes in fruit quality. We found no evidence that individuals belonging to a particular age or sex class led the group towards trees with fruit more often than did others."

• Food-associated calls in chimpanzees: Responses to food types or food preferences? Slocombe, K. E., & Zuberbühler, K. (School of Psychology, University of St Andrews, St Andrews, Fife KY16 9JP, U.K. [e-mail: *kz3@st-andrews.ac.uk*]). *Animal Behaviour*, 2006, *72*, 989-999.

"Chimpanzees produce specific vocalizations, called 'rough grunts', when they find food. These calls vary depending on the type of food. We investigated whether these calls vary according to the type of food alone or the chimps' preference for that type of food. We recorded calls from chimps relating to nine different types of food, ranked as high, medium, or low preference. The chimps consistently produced distinct calls for each of the three different preference classes. Furthermore, even within the high preference foods (bread, banana and mango), certain items could be associated with particular types of call, suggesting that chimpanzees can label individual types of food. However, although our results were repeatable with other captive chimpanzees, we were unable to confirm these findings with data from the wild. This suggests that the emergence of vocal 'names' for food items by chimpanzees that we found is a byproduct of the special circumstances found in captivity."

• Grooming and agonistic support: A meta-analysis of primate reciprocal altruism. Schino, G. (Ist. di Scienze e Tecnologie della Cognizione del Consiglio Nazionale delle Ricerche, Rome, Italy [e-mail: *gschino@casaccia.enea.it*]). *Behavioral Ecology*, 2006, *18,* 115-120.

"Grooming and agonistic support are two common primate behaviors that have been hypothesized to constitute examples of reciprocal altruism. In particular, because primates often direct their grooming up the dominance hierarchy, it has been suggested that they may exchange grooming for agonistic support. Empirical tests of this hypothesis have resulted in highly inconsistent findings. I synthesized the published literature on the relation between grooming and agonistic support in primates using modern meta-analytical techniques. A meta-analysis of 36 studies carried out on 14 different species showed that a significant positive relation exists between grooming and agonistic support (weighted average $r = 0.154$, corrected for publication bias). These findings suggest that grooming and agonistic support may have evolved as part of a system of low-cost reciprocal altruism. They also highlight the potential of meta-analysis in tackling the study of behavioral phenomena characterized by low overall frequency and small effect sizes."

• Road crossing in chimpanzees: A risky business. Hockings, K. J., Anderson, J. R., & Matsuzawa, T. (Dept of Psychology, Univ. of Stirling, Stirling FK9 4LA, Scotland, U.K. [e-mail: *k.j.hockings@stir.ac.uk*]). *Current Biology*, 2006, *16*, 668-670.

"During group movements, monkeys may cooperate to reduce the risk of predatory attacks through adaptive spatial patterning. For example, adult males move toward the front of the group when traveling towards potentially unsafe areas such as waterholes, and bring up the rear when retreating. Comparable data on progression orders in moving groups of great apes are lacking. We hypothesized that chimpanzees evaluate risk when crossing roads, and draw on a phylogenetically-old principle of protective socio-spatial organization to produce flexible, adaptive, and cooperative responses to risk. Progression orders were studied in the small community of chimpanzees (*Pan troglodytes verus*) at Bossou, Guinea, as they crossed two roads, one large and busy with traffic, the other smaller and frequented mostly by pedestrians. We found evidence that the degree of risk, estimated in terms of the width of roads and the amount and type of traffic they carried, influenced the waiting time before crossing the roads and the order in which the chimpanzees crossed."

• Cottontop tamarin, *Saguinus oedipus*, alarm calls contain sufficient information for recognition of individual identity. Sproul, C., Palleroni, A., & Hauser, M. D. (A. P., Dept of Psych., Harvard Univ., Cambridge, MA 02138 [e-mail: *aliparti@wjh.harvard.edu*]). *Animal Behaviour*, 2006, *72*, 1379-1385.

"Most work on individual recognition has focused on signals used in the context of social contact or mate attraction. Here we present the results of a playback experiment designed to test whether cues of individual identity are

encoded in alarm calls given by cottontop tamarins during encounters with a trained and flying goshawk, *Accipiter gentilis*. Based on a habituation–discrimination paradigm previously used with this species to show individual recognition of their long calls, subjects showed the ability to distinguish individuals by their alarm calls alone. Once subjects habituated to multiple exemplars of one individual's alarm call, their response was renewed to the alarm calls of another individual but not to a new set of alarm calls from the same individual. We discuss the implications of these results for current theories of signal processing."

• Anticipation of future events in squirrel monkeys (*Saimiri sciureus*) and rats (*Rattus norvegicus*): Tests of the Bischof-Kohler hypothesis. 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*]). *Journal of Comparative Psychology*, 2006, *120*, 345-357.

The Bischof-Kohler hypothesis holds that nonhuman animals cannot anticipate a future event and take appropriate action when that event involves satisfaction of a need not currently experienced. Tests of the Bischof-Kohler hypothesis were performed with squirrel monkeys and rats. In experimental trials with both species, a nonthirsty animal had its water bottle removed and then chose between a smaller and larger quantity of food. Consumption of the food induced thirst. Choice of the smaller quantity led to the return of the water bottle sooner than choice of the larger quantity. Monkeys reversed their baseline preference for the larger quantity of food when the experimental contingencies were introduced, but rats continued to prefer the larger amount. Although the rat findings support the Bischof-Kohler hypothesis, the monkey findings challenge it.

• Male chimpanzees prefer mating with old females. Muller, M. N., Thompson, M. E., & Wrangham, R. W. (Dept of Anthropology, Boston Univ., 232 Bay State Rd, Boston, MA 02215 [e-mail: *mnmuller@bu.edu*]). *Current Biology*, 2006, *16*, 2234-2238.

"Cross-cultural studies indicate that women's sexual attractiveness generally peaks before motherhood and declines with age. Cues of female youth are thought to be attractive because humans maintain long-term pair bonds, making reproductive value (i.e., future reproductive potential) particularly important to males. Menopause is believed to exaggerate this preference for youth by limiting women's future fertility. This theory predicts that in species lacking long-term pair bonds and menopause, males should not exhibit a preference for young mates. We tested this prediction by studying male preferences in our closest living relative, the chimpanzee (*Pan troglodytes*). We show that despite their promiscuous mating system, chimpanzee males, like humans, prefer some females over others. However, in contrast to humans, chimpanzee males prefer older, not younger, females. These data robustly discriminate patterns of male mate choice between humans and chimpanzees. Given that the human lineage evolved from a chimpanzee-like ancestor, they indicate that male preference for youth is a derived human feature, likely adapted from a tendency to form unusually long term mating bonds."

• Context modulates signal meaning in primate communication. Flack, J. C., & de Waal, F. (Santa Fe Institute, Santa Fe, NM 87501 [e-mail: *jflack@santafe.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *104*, 1581-1586.

"A central issue in the evolution of social complexity and the evolution of communication concerns the capacity to communicate about increasingly abstract objects and concepts. Many animals can communicate about immediate behavior, but to date, none have been reported to communicate about behavior during future interactions. In this study, we show that a special, unidirectional, cost-free dominance-related signal used by monkeys (pigtailed macaques: *Macaca nemestrina*) means submission (immediate behavior) or subordination (pattern of behavior) depending on the context of usage. We hypothesize that to decrease receiver uncertainty that the signal object is subordination, senders shift contextual usage from the conflict context, where the signal evolved, to a peaceful one, in which submission is unwarranted. We predict and find that deceasing receiver uncertainty through peaceful signal exchange facilitates the development of higher quality social relationships: individuals exchanging the peaceful variant groom and reconcile more frequently and fight less frequently than individuals exchanging signals only in the conflict context or no signals. We rule out alternative hypotheses, including an underlying reciprocity rule, temperament, and proximity effects. Our results suggest that primates can communicate about behavioral patterns when these concern relationship rules. The invention of signals decreasing uncertainty about relationship state is likely to have been critical for the evolution of social complexity and to the emergence of robust power structures that feed down to influence rapidly changing individual behavior."

• Exploring immature-to-mother social distances in Mexican mantled howler monkeys at Los Tuxtlas, Mexico. Arroyo-Rodríguez, V., Serio-Silva, J. C., Álamo-García, J., & Ordano, M. (V. A.-R., Div. de Posgrado, Inst. de Ecología A.C., Km 2.5 Antigua Carretera Coatepec No. 351, Congr. el Haya, Xalapa, 91070, Veracruz, Mexico [e-mail: *victorarroyo_rodriguez@hotmail.com*]). *American Journal of Primatology*, 2007, *69*, 173-181.

"We analyzed immature-to-mother social distance (juveniles and non-nursing infants) in two Mexican mantled howler monkey (*Alouatta palliata*) troops inhabiting a tropical rainforest fragment (40 ha) at Los Tuxtlas, Veracruz, Mexico. During July and August of 2000 and 2001 we applied an instantaneous sampling method (317 hr) to

record the behaviors of the immatures and their mothers, as well as distances (ordinal scale) between immatures and their mothers (IMD), and between immatures and non-mother individuals (INMD). Immatures were generally less than 5 m away from any individual of the troop. Social distance was influenced by the different behaviors of both mothers and immatures, with the shortest distances occurring during rest (IMD <5 m in 94% of all instantaneous samples) and the longest during exploration (21%≥ 10 m) and play (26%≥10 m). When IMD increased, we found a higher percentage of records <5 m to other individuals, particularly with the probable father. When the variation in distance to the mother and to other individuals in the troop was considered, the immature animals' distance to other troop members depended on the immatures' age and type of behavior. Overall, these results suggest that in this low-activity species the development of the immature is associated with a complex set of relationships with other troop members."

• Scents and sensibility: Information content of olfactory signals in the ringtailed lemur, *Lemur catta*. Scordato, E., & Drea, C. M. (C. M. D., Dept of Biol. Anthropology & Anatomy, 08 Bio. Sci. Bldg, Box 90383, Duke Univ., Durham, NC 27708-0383 [e-mail: *cdrea@duke.edu*]). *Animal Behaviour*, 2007, *73*, 301-314.

"The function of olfactory signalling in social species is less well understood than in asocial species. Consequently, we examined olfactory communication in the ringtailed lemur, a socially complex primate that retains a functional vomeronasal organ, has well-developed scent glands and shows a suite of scent marking behavior. To assess the information content of different types of scent gland secretions, we decoupled olfactory cues from the visual and behavioral modalities with which scent marking is normally associated. We presented male and female subjects (signal receivers) with a series of choice tests between odors derived from conspecific donors (signal senders) varying by sex, age, social status, and reproductive condition. We additionally examined the influence of the receivers' reproductive state and familiarity with the signaller. The reproductive condition, social status, and familiarity of senders and receivers affected signal transmission; specifically, male receivers attended most to the odors of conspecifics in breeding condition and to the odors of familiar, dominant animals. By contrast, females varied their responses according to both their own reproductive state and that of the sender. Based on male and female patterns of countermarking, we suggest that scent marking serves a function in intergroup spacing and intrasexual competition for both sexes, as might be expected in a female-dominant species. By contrast, minimal female interest in male odors counters a female mate choice function for scent marking in this species. Nevertheless, scent marks are critical to male-male competition and, therefore, may be subject to sexual selection."

Disease

• Ebola outbreak killed 5000 gorillas. Bermejo, M., Rodríguez-Teijeiro, J. D., Illera, G., Barroso, A., Vilà, C., & Walsh, P. D. (Dept of Animal Biology, Univ. of Barcelona, ES-08028 Barcelona, Spain [e-mail: *magda_bermejo@yahoo.es*]). *Science*, 2006, *314*, 1564.

"Over the past decade, the Zaire strain of Ebola virus (ZEBOV) has repeatedly emerged in Gabon and Congo. Each human outbreak has been accompanied by reports of gorilla and chimpanzee carcasses in neighboring forests, but both the extent of ape mortality and the causal role of ZEBOV have been hotly debated. Here, we present data suggesting that in 2002 and 2003 ZEBOV killed about 5000 gorillas in our study area. The lag between neighboring gorilla groups in mortality onset was close to the ZEBOV disease cycle length, evidence that group-to-group transmission has amplified gorilla die-offs."

• Aberrant innate immune response in lethal infection of macaques with the 1918 influenza virus. Kobasa, D., Jones, S. M., Shinya, K., Kash, J. C., Copps, J., Ebihara, H., Hatta, Y., Kim, J. H., Halfmann, P., Hatta, M., Feldmann, F., Alimonti, J. B., Fernando, L., Li, Y., Katze, M. G., Feldmann, H., & Kawaoka, Y. (Y. K., Dept of Pathobiol. Sci., Univ. of Wisconsin, Madison, WI 53706 [e-mail: *kawaokay@svm.vetmed.wisc.edu*]). *Nature,* 2007, *445,* 319-323.

"The 1918 influenza pandemic was unusually severe, resulting in about 50 million deaths worldwide. The 1918 virus is also highly pathogenic in mice, and studies have identified a multigenic origin of this virulent phenotype in mice. However, these initial characterizations of the 1918 virus did not address the question of its pathogenic potential in primates. Here we demonstrate that the 1918 virus caused a highly pathogenic respiratory infection in a cynomolgus macaque model that culminated in acute respiratory distress and a fatal outcome. Furthermore, infected animals mounted an immune response, characterized by dysregulation of the antiviral response, that was insufficient for protection, indicating that atypical host innate immune responses may contribute to lethality. The ability of influenza viruses to modulate host immune responses, such as that demonstrated for the avian H5N1 influenza viruses, may be a feature shared by the virulent influenza viruses."

• Temple monkeys and health implications of commensalism, Kathmandu, Nepal. Jones-Engel, L., Engel, G. A., Heidrich, J., Chalise, M., Poudel, N., Viscidi, R., Barry, P. A., Allan, J. S., Grant, R., & Kyes, R. [Washington NPRC, HSB I-039, Box 357330, Seattle, WA 98195 [e-mail: *jonesengel@bart.rprc.washington.edu*]). *Emerging Infectious Diseases,* 2006, *12,* 900-906, <www.cdc.gov/ncidod/EID/vol12no06/06-0030.htm>.

"The threat of zoonotic transmission of infectious agents at monkey temples highlights the necessity of inves-

tigating the prevalence of enzootic infectious agents in these primate populations. Biological samples were collected from 39 rhesus macaques at the Swoyambhu Temple and tested by enzyme-linked immunosorbent assay, Western blot, polymerase chain reaction, or combination of these tests for evidence of infection with rhesus cytomegalovirus (RhCMV), *Cercopithecine herpesvirus* 1 (CHV-1), simian virus 40 (SV40), simian retrovirus (SRV), simian T-cell lymphotropic virus (STLV), simian immunodeficiency virus (SIV), and simian foamy virus (SFV). Antibody seroprevalence was 94.9% to RhCMV (37/39), 89.7% to SV40 (35/39), 64.1% to CHV-1 (25/39), and 97.4% to SFV (38/39). Humans who come into contact with macaques at Swoyambhu risk exposure to enzootic primate-borne viruses. We discuss implications for public health and primate management strategies that would reduce contact between humans and primates."

• Characterization of blood-borne transmission of simian foamy virus. Brooks, J. I., Merks, H. W., Fournier, J., Boneva, R. S., & Sandstrom, P. A. (Natl HIV & Retrovirology Labs, Center for Infectious Disease Prevention & Control, Public Health Agency of Canada, Rm 3172, Bldg 6, A.L. 0603A2, 100 Eglantine Driveway, Ottawa, ON, K1A 0K9, Canada [e-mail: *James_Brooks@phacaspc.gc.ca*]). *Transfusion*, 2007, *47*, 162-170.

Simian foamy virus (SFV) is an endemic, nonhuman primate (NHP) retrovirus that is transmitted to individuals who work with or hunt NHPs. The cross-species transmission of simian retroviruses is believed to be the etiology of human immunodeficiency virus and human T-lymphotropic virus infections in humans. Although SFV is not pathogenic in the native host, the shared ancestry with other simian retroviruses has brought into question the potential for acquired pathogenicity after cross-species transmission. This study examines whether SFV also shares the traits of transmissibility through the blood supply. Within a controlled environment, blood from an SFV-infected monkey was transfused into an SFV-uninfected monkey. Evidence of infection, pathogenic effects, immune correlates, and viral shedding were followed for 6 months after transfusion. Molecular evidence of SFV infection manifested 8 weeks after transfusion followed by seroconversion 1 week later. Quantitative analysis demonstrated that the highest level of detectable virus was concomitant with seroconversion followed by establishment of a viral "set-point". Analysis of circulating lymphocytes revealed changes early in infection. Potential routes of transmission of SFV and roles of site-specific immune response are suggested by the late appearance of SFV shedding in the saliva of the transfused animal. The blood supply has historically provided a portal through which novel, occult viruses can become disseminated among humans. The demonstration of transmissibility of SFV through whole-blood transfusion, in an NHP model, contributes to the understanding of potential risks associated with blood donation by SFV-infected humans.

• Patterns of gastrointestinal bacterial exchange between chimpanzees and humans involved in research and tourism in western Uganda. Goldberg, T. L., Gillespie, T. R., Rwego, I. B., Wheeler, E., Estoff,, E. L., & Chapman, C. A. (Univ. of Illinois, Coll. of Vet. Med., Dept of Pathobiol., 2001 S. Lincoln Ave, Urbana, IL 61802 [e-mail: *tlgoldbe@uiuc.edu*]). *Biological Conservation*, 2007, *135*, 511-517.

"Ecological overlap may increase the risks of microbial exchange between humans and wild non-human primates. *Escherichia coli* bacteria were collected from chimpanzees and humans in Kibale National Park, western Uganda, in May and June 2004, in order to examine whether interaction between humans and apes in the wild might affect gastrointestinal bacterial communities in the two species. Chimpanzees harbored bacteria genetically more similar to those of humans employed in chimpanzee-directed research and tourism than to those of humans from a local village. Most humans (81.6%) and 4.4% of chimpanzees harbored at least one isolate resistant to locally available antibiotics. In isolates from both humans and chimpanzees, resistance was higher to five of these antibiotics than to Ceftiofur, an antibiotic not available in the region. These data indicate that humans and apes interacting in the wild can share genetically and phenotypically similar gastrointestinal bacteria, presumably originating from common environmental sources. Strategies to limit transmission of pathogens between humans and primates, whether that transmission is direct or indirect, would benefit both human health and primate conservation."

• *Schistosomiasis mansoni*: Novel chemotherapy using a cysteine protease inhibitor. Abdulla, M.-H., Lim, K.-C., Sajid, M., McKerrow, J. H., & Caffrey, C. R. (C. R. C., Sandler Ctr for Basic Res. in Parasitic Diseases, California Inst. for Quantitative Biomed. Res., UCSF, San Francisco, CA 94158 [e-mail: *caffrey@cgl.ucsf.edu*]). *PLoS Medicine*, 2007, *4*[1], e14, <www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1764436>.

Schistosomiasis is a chronic, debilitating parasitic disease infecting more than 200 million people and is second only to malaria in terms of public health importance. Due to the lack of a vaccine, patient therapy is heavily reliant on chemotherapy with praziquantel as the World Health Organization-recommended drug, but concerns over drug resistance encourage the search for new drug leads. The efficacy of the vinyl sulfone cysteine protease inhibitor K11777 was tested in the murine model of *schistosomiasis mansoni*. Disease parameters measured were worm and egg burdens, and organ pathology including hepato- and splenomegaly, presence of parasite egg-induced granulomas in the liver, and levels of circulating alanine aminotransferase activity as a marker of hepatocellular function. K11777 (25 mg/kg twice daily [BID]), administered

intraperitoneally at the time of parasite migration through the skin and lungs (days 1–14 postinfection [p.i.]), resulted in parasitologic cure (elimination of parasite eggs) in five of seven cases and a resolution of other disease parameters. K11777 (50 mg/kg BID), administered at the commencement of egg-laying by mature parasites (days 30–37 p.i.), reduced worm and egg burdens, and ameliorated organ pathology. Using protease class-specific substrates and active-site labeling, one molecular target of K11777 was identified as the gut-associated cathepsin B1 cysteine protease, although other cysteine protease targets are not excluded. In rodents, dogs, and primates, K11777 is nonmutagenic with satisfactory safety and pharmacokinetic profiles. The significant reduction in parasite burden and pathology by this vinyl sulfone cysteine protease inhibitor validates schistosome cysteine proteases as drug targets and offers the potential of a new direction for chemotherapy of human schistosomiasis.

Evolution, Genetics, and Taxonomy

• The evolution of mammalian gene families. Demuth, J. P., Bie, T. D., Stajich, J. E., Cristianini, N., & Hahn, M. W. (M. W. H., Dept of Biology, Indiana University, Bloomington, IN, 47405 [e-mail: *mwh@indiana.edu*]). *PLoS ONE*, 2006, *1*[1], e85, <dx.doi.org/10.1371/journal.pone.0000085>.

"Gene families are groups of homologous genes that are likely to have highly similar functions. Differences in family size due to lineage-specific gene duplication and gene loss may provide clues to the evolutionary forces that have shaped mammalian genomes. Here we analyze the gene families contained within the whole genomes of human, chimpanzee, mouse, rat, and dog. In total we find that more than half of the 9,990 families present in the mammalian common ancestor have either expanded or contracted along at least one lineage. Additionally, we find that a large number of families are completely lost from one or more mammalian genomes, and a similar number of gene families have arisen subsequent to the mammalian common ancestor. Along the lineage leading to modern humans we infer the gain of 689 genes and the loss of 86 genes since the split from chimpanzees, including changes likely driven by adaptive natural selection. Our results imply that humans and chimpanzees differ by at least 6% (1,418 of 22,000 genes) in their complement of genes, which stands in stark contrast to the oft-cited 1.5% difference between orthologous nucleotide sequences. This genomic 'revolving door' of gene gain and loss represents a large number of genetic differences separating humans from our closest relatives."

• Mona Lisa smile: The morphological enigma of human and great ape evolution. Grehan, J. R. (Buffalo Museum of Science, 1020 Humboldt Pkwy, Buffalo, NY 14211 [e-mail: *jgrehan@sciencebuff.org*]). *The Anatomical Record* (*Part B: The New Anatomist*), 2006, *289B*, 139-157.

The science of human evolution is confronted with the popular chimpanzee theory and the earlier but largely ignored orangutan theory. The quality and scope of published documentation and verification of morphological features suggests there is very little in morphology to support a unique common ancestor for humans and chimpanzees. A close relationship between humans and African apes is currently supported by only eight unproblematic characters. The orangutan relationship is supported by about 28 well supported characters, and it is also corroborated by the presence of orangutan-related features in early hominids. The uniquely shared morphology of humans and orangutans raises doubts about the almost universal belief that DNA sequence similarities necessarily demonstrate a closer evolutionary relationship between humans and chimpanzees. A new evolutionary reconstruction is proposed for the soft tissue anatomy, physiology, and behavioral biology of the first hominids that includes concealed ovulation, male beard and mustache, prolonged mating, extended pair-bonding, "house" construction, mechanical "genius", and artistic expression.

• Functionally important glycosyltransferase gain and loss during catarrhine primate emergence. Koike, C., Uddin, M., Wildman, D. E., Gray, E. A., Trucco, M., Starzl, T. E., & Goodman, M. (M. G., Dept of Anatomy & Cell Biology, Wayne State Univ. Sch. of Med., 540 E. Canfield Ave, Detroit, MI 48201 [e-mail: *mgoodwayne@aol.com*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *104*, 559-564.

"A glycosyltransferase, α1,3galactosyltransferase, catalyzes the terminal step in biosynthesis of Galα1,3Gal$^{\beta}$1–4GlcNAc-R (αGal), an oligosaccharide cell surface epitope. This epitope or antigenically similar epitopes are widely distributed among the different forms of life. Although abundant in most mammals, αGal is not normally found in catarrhine primates (Old World monkeys and apes, including humans), all of which produce anti-αGal antibodies from infancy onward. Natural selection favoring enhanced resistance to αGal-positive pathogens has been the primary reason offered to account for the loss of αGal in catarrhines. Here, we question the primacy of this immune defense hypothesis with results that elucidate the evolutionary history of *GGTA1* gene and pseudogene loci. One such locus, *GGTA1P*, a processed (intronless) pseudogene (PPG), is present in platyrrhines, i.e., New World monkeys, and catarrhines but not in prosimians. PPG arose in an early ancestor of anthropoids (catarrhines and platyrrhines), and *GGTA1* itself became an unprocessed pseudogene in the late catarrhine stem lineage. Strong purifying selection, denoted by low nonsynonymous substitutions per nonsynonymous site/synonymous substitutions per synonymous site values, preserved *GGTA1* in noncatarrhine mammals, indicating that the functional gene product is subjected to considerable physiological constraint. Thus, we propose that a pattern of alternative and/or more

beneficial glycosyltransferase activity had to first evolve in the stem catarrhines before *GGTA1* inactivation could occur. Enhanced defense against αGal-positive pathogens could then have accelerated the replacement of αGal-positive catarrhines by αGal-negative catarrhines. However, we emphasize that positively selected regulatory changes in sugar chain metabolism might well have contributed in a major way to catarrhine origins."

• Paleobiology and comparative morphology of a late Neandertal sample from El Sidrón, Asturias, Spain. Rosas, A., Martínez-Maza, C., Bastir, M., García-Tabernero, A., Lalueza-Fox, C., Huguet, R., Ortiz, J. E., Julià, R., Soler, V., de Torres, T., Martínez, E., Cañaveras, J. C., Sánchez-Moral, S., Cuezva, S., Lario, J., Santamaría, D., de la Rasilla, M., & Fortea, J. (Depto de Paleobiología, Museo Nac. de Ciencias Naturales, Consejo Superior de Investigaciones Cientificas, Calle José Gutierrez Abascal 2, 28006 Madrid, Spain [e-mail: *arosas@mncn.csic.es*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2006, *103*, 19266-19271.

Fossil evidence from the Iberian Peninsula is essential for understanding Neandertal evolution and history. Since 2000, a new sample ≈43,000 years old has been systematically recovered at the El Sidrón cave site (Asturias, Spain). Human remains almost exclusively compose the bone assemblage. All of the skeletal parts are preserved, and there is a moderate occurrence of Middle Paleolithic stone tools. A minimum number of eight individuals are represented, and ancient mtDNA has been extracted from dental and osteological remains. Paleobiology of the El Sidrón archaic humans fits the pattern found in other Neandertal samples: a high incidence of dental hypoplasia and interproximal grooves, yet no traumatic lesions are present. Moreover, unambiguous evidence of human-induced modifications has been found on the human remains. Morphologically, the El Sidrón humans show a large number of Neandertal lineage-derived features even though certain traits place the sample at the limits of Neandertal variation. Integrating the El Sidrón human mandibles into the larger Neandertal sample reveals a north–south geographic patterning, with southern Neandertals showing broader faces with increased lower facial heights. The large El Sidrón sample therefore augments the European evolutionary lineage fossil record and supports ecogeographical variability across Neandertal populations.

• Balancing selection and the evolution of functional polymorphism in Old World monkey TRIM5α. Newman, R. M., Hall, L., Connole, M., Chen, G.-L., Sato, S., Yuste, E., Diehl, W., Hunter, E., Kaur, A., Miller, G. M., & Johnson, W. E. [W. E. J., New England RPRC, One Pine Hill Dr., Box 9102, Southborough, MA 01772-9102 [e-mail: *wjohnson@hms.harvard.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2006, *103*, 19134-19139.

Retroviral restriction factor TRIM5α exhibits a high degree of sequence variation among primate species. It has been proposed that this diversity is the cumulative result of ancient, lineage-specific episodes of positive selection. The contribution of within-species variation to the evolution of TRIM5α is described here. Sampling within two geographically distinct Old World monkey species revealed extensive polymorphism, including individual polymorphisms that predate speciation (shared polymorphism). In some instances, alleles were more closely related to orthologues of other species than to one another. Both silent and nonsynonymous changes clustered in two domains. Functional assays revealed consequences of polymorphism, including differential restriction of a small panel of retroviruses by very similar alleles. Together, these features indicate that the primate TRIM5α locus has evolved under balancing selection. Except for the major histocompatibility complex there are few, if any, examples of long-term balancing selection in primates. These results suggest a complex evolutionary scenario, in which fixation of lineage-specific adaptations is superimposed on a subset of critical polymorphisms that predate speciation events and have been maintained by balancing selection for millions of years.

• New Paleocene skeletons and the relationship of plesiadapiforms to crown-clade primates. Bloch, J. I., Silcox, M. T., Boyer, D. M., & Sargis, E. J. (Florida Museum of Natural History, Univ. of Florida, P.O. Box 117800, Gainesville, FL 32611 [e-mail: *jbloch@flmnh.ufl.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *204*, 1159-1164.

"Plesiadapiforms are central to studies of the origin and evolution of primates and other euarchontan mammals (tree shrews and flying lemurs). We report results from a comprehensive cladistic analysis using cranial, postcranial, and dental evidence including data from recently discovered Paleocene plesiadapiform skeletons (*Ignacius clarkforkensis* sp. nov.; *Dryomomys szalayi*, gen. et sp. nov.), and the most plesiomorphic extant tree shrew, *Ptilocercus lowii*. Our results, based on the fossil record, unambiguously place plesiadapiforms with Euprimates and indicate that the divergence of Primates (*sensu lato*) from other euarchontans likely occurred before or just after the Cretaceous/Tertiary boundary (65 Mya), notably later than logistical model and molecular estimates. Anatomical features associated with specialized pedal grasping (including a nail on the hallux) and a petrosal bulla likely evolved in the common ancestor of Plesiadapoidea and Euprimates (Euprimateformes) by 62 Mya in either Asia or North America. Our results are consistent with those from recent molecular analyses that group Dermoptera with Scandentia. We find no evidence to support the hypothesis that any plesiadapiforms were mitten-gliders or closely related to Dermoptera."

• Brain shape in human microcephalics and *Homo floresiensis.* Falk, D., Hildebolt, C., Smith, K., Morwood, M. J., Sutikna, T., Jatmiko, Saptomo, E. W., Imhof, H., Seidler, H., & Prior, F. (Dept of Anthropology, Florida State Univ., Tallahassee, FL 32306 [e-mail: *dfalk@fsu.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *104,* 2513-2518.

"Because the cranial capacity of LB1 (*Homo floresiensis*) is only 417 cm^3, some workers propose that it represents a microcephalic *Homo sapiens* rather than a new species. This hypothesis is difficult to assess, however, without a clear understanding of how brain shape of microcephalics compares with that of normal humans. We compare three-dimensional computed tomographic reconstructions of the internal braincases (virtual endocasts that reproduce details of external brain morphology, including cranial capacities and shape) from a sample of 9 microcephalic humans and 10 normal humans. Discriminant and canonical analyses are used to identify two variables that classify normal and microcephalic humans with 100% success. The classification functions classify the virtual endocast from LB1 with normal humans rather than microcephalics. On the other hand, our classification functions classify a pathological *H. sapiens* specimen that, like LB1, represents an ≈3-foot-tall adult female and an adult Basuto microcephalic woman that is alleged to have an endocast similar to LB1's with the microcephalic humans. Although microcephaly is genetically and clinically variable, virtual endocasts from our highly heterogeneous sample share similarities in protruding and proportionately large cerebella and relatively narrow, flattened orbital surfaces compared with normal humans. These findings have relevance for hypotheses regarding the genetic substrates of hominin brain evolution and may have medical diagnostic value. Despite LB1's having brain shape features that sort it with normal humans rather than microcephalics, other shape features and its small brain size are consistent with its assignment to a separate species."

• 4,300-year-old chimpanzee sites and the origins of percussive stone technology. Mercader, J., Barton, H., Gillespie, J., Harris, J., Kuhn, S., Tyler, R., & Boesch, C. (Dept of Archaeology, Univ. of Calgary, Calgary, AB, T2N 1N4, Canada [e-mail: *mercader@ucalgary.ca*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2007, *104*, 3043-3048.

Archeological research in the African rainforest reveals unexpected results in the search for the origins of hominoid technology. The ancient Panin sites from Côte d'Ivoire constitute the only evidence of prehistoric ape behavior known to date anywhere in the world. Recent archeological work has yielded behaviorally modified stones, dated by chronometric means to 4,300 years of age, lodging starch residue suggestive of prehistoric dietary practices by ancient chimpanzees. The "Chimpanzee Stone Age" predates the advent of settled farming villages in this part of the African rainforest and suggests that percussive material culture could have been inherited from an common human-chimpanzee clade, rather than invented by hominins, or have arisen by imitation, or resulted from independent technological convergence.

• Comparative analysis of genome tiling array data reveals many novel primate-specific functional RNAs in human. Zhang, Z., Pang, A. W. C., & Gerstein, M. (Dept of Med. Genetics & Microbiol., Univ. of Toronto, Toronto, ON, M5S 3E1, Canada [e-mail: *Zhaolei.Zhang@utoronto.ca*]). *BMC Evolutionary Biology*, 2007, *7*(Suppl. 1)**,** S14, <www.biomedcentral.com/1471-2148/7/S1/S14>.

"Widespread transcription activities in the human genome were recently observed in high-resolution tiling array experiments, which revealed many novel transcripts that are outside of the boundaries of known protein or RNA genes. Termed as 'TARs' (Transcriptionally Active Regions), these novel transcribed regions represent 'dark matter' in the genome, and their origin and functionality need to be explained. Many of these transcripts are thought to code for novel proteins or non-protein-coding RNAs. We have applied an integrated bioinformatics approach to investigate the properties of these TARs, including cross-species conservation, and the ability to form stable secondary structures. The goal of this study is to identify a list of potential candidate sequences that are likely to code for functional non-protein-coding RNAs. We are particularly interested in the discovery of those functional RNA candidates that are primate-specific, i.e. those that do not have homologs in the mouse or dog genomes but in rhesus. Using sequence conservation and the probability of forming stable secondary structures, we have identified ~300 possible candidates for primate-specific noncoding RNAs. We are currently in the process of sequencing the orthologous regions of these candidate sequences in several other primate species. We will then be able to apply a 'phylogenetic shadowing' approach to analyze the functionality of these ncRNA candidates. The existence of potential primate-specific functional transcripts has demonstrated the limitation of previous genome comparison studies, which put too much emphasis on conservation between human and rodents. It also argues for the necessity of sequencing additional primate species to gain a better and more comprehensive understanding of the human genome."

• A mobile element-based evolutionary history of guenons (tribe Cercopithecini). Xing, J., Wang, H., Zhang, Y., Ray, D. A., Tosi, A. J., Disotell, T. R., & Batzer, M. A. (Dept of Biol. Sci., Louisiana State Univ., Baton Rouge, LA 70803 [e-mail: *jxing1@lsu.edu*]). *BMC Biology,* 2007, *5*[5], <www.biomedcentral.com/1741-7007/5/5>.

"Guenons (tribe Cercopithecini) are a species-rich group of primates that have attracted great attention from both primatologists and evolutionary biologists. The complex speciation pattern has made the elucidation of their relationships a challenging task and many questions remain

to be answered. SINEs are a class of non-autonomous mobile elements and are essentially homoplasy-free characters with known ancestral states, making them useful genetic markers for phylogenetic studies. We identified 151 novel Alu insertion loci from eleven species of tribe Cercopithecini and utilized these insertions along with 17 previously reported loci to construct a phylogenetic tree of the tribe Cercopithecini. Our results robustly supported the following relationships: (1) *Allenopithecus* is the basal lineage within the tribe; (2) *Cercopithecus lhoesti* (L'Hoest's monkey) forms a clade with *Chlorocebus aethiops* (African green monkey) and *Erythrocebus patas* (patas monkey), supporting a single arboreal to terrestrial transition within the tribe; (3) as opposed to the common belief that *Miopithecus* is one of the most basal lineages in the tribe, *M. talapoin* forms a clade with arboreal members of *Cercopithecus*, and the terrestrial group (*C. lhoesti, Ch. Aethiops,* and *E. patas*) diverged from this clade after the divergence of *Allenopithecus*; and (4) all of the *Cercopithecus* except *C. lhoesti* form a monophyletic group. A number of incongruent loci were recovered concerning the relationships within the arboreal *Cercopithecus* group. Several factors, including incomplete lineage sorting, concurrent polymorphism and hybridization among species may have contributed to the incongruence."

General

• Animal rights, animal minds, and human mindreading. Mameli, M., & Bortolotti, L. (King's College, Univ. of Cambridge, Cambridge CB2 1ST, U.K. [e-mail: *gmm32@cam.ac.uk*]). *Journal of Medical Ethics*, 2006, *32*, 84-89.

Do non-human animals have rights? The answer to this question depends on whether animals have morally relevant mental properties. "Mind reading" is the human activity of ascribing mental states to other organisms. Current knowledge about the evolution and cognitive structure of mind reading indicates that human ascriptions of mental states to nonhuman animals are very inaccurate. The accuracy of human mind reading can be improved with the help of scientific studies of animal minds. However, the scientific studies do not by themselves solve the problem of how to map psychological similarities (and differences) between humans and animals onto a distinction between morally relevant and morally irrelevant mental properties. The current limitations of human mind reading – whether scientifically aided or not – have practical consequences for the rational justification of claims about which rights (if any) nonhuman animals should be accorded.

Instruments and Techniques

• Anesthetic concentrations in enclosed chambers using an innovative delivery device. Hodgson, D. S. (Dept of Clinical Sciences, College of Vet. Med., Kansas State Univ., Manhattan, KS 66506 [e-mail: *hodgson@vet.ksu.edu*]). *Veterinary Anaesthesia and Analgesia*, 2007, *34*, 99-106.

To quantify factors influencing anesthetic concentration when an innovative anesthetic delivery device (vapor wand) was used with enclosed chambers, two experimental chambers (57.4 and 171 L) were constructed. Anesthetic volumes necessary to reach a target concentration of 3% or 5% isoflurane with complete vaporization were calculated for each chamber. After centering the distal end of the vapor wand and multi-orifice sampler, each chamber was sealed. Air (450 mL) was cycled through the vapor wand in a to-and-fro fashion with an electric, modified air pump at either 20 or 40 cycles minute. Samples taken at 30-second intervals were analyzed for isoflurane concentration. Times to reach 2.8% isoflurane concentration were compared for eight treatment combinations replicated three times. Curves were constructed to display the rate of rise to endpoint concentration. Analysis of variance was applied to the data. Chamber size, pump stroke rate, and target isoflurane concentration all affected time to reach 2.8%, and their three-way interaction was statistically significant ($p < 0.05$). Generally time to 2.8% was less with small chambers, more rapid pumping, and a target concentration of 5%. When a wild or aggressive animal is presented for clinical veterinary care, introduction of a vapor wand into its cage offers a safer, more convenient, and less stressful alternative for anesthesia than transfer to an induction chamber. By quantifying factors affecting the rate of rise of anesthetic concentration with its use in experimental chambers, this study should promote greater safety and predictability when used clinically. This information will be useful when anesthetic induction needs to be hastened or delayed depending on the responses of the patient and the clinical judgment of the anesthetist.

Miscellany

• Biomedical research: The endangered lab chimp. A NewsFocus article by J. Cohen. *Science*, 2007, *315*, 450-452, <www.sciencemag.org/cgi/content/full/315/5811/450>.

A decline in the number of chimpanzees available for biomedical research in the U.S. has sparked a growing debate on the opportunities and costs of studies with our closest relatives. Fifteen years ago, the United States was one of a half-dozen countries that had captive chimpanzees available to biomedical researchers. Today, it stands alone. Every country except perhaps Gabon has abandoned this type of experimentation for a bramble of ethical, financial, scientific, and political reasons. Now the U.S. National Institutes of Health – the main supporter of chimpanzees maintained for biomedical research – finds itself facing an incendiary debate over whether it should phase out such studies or breed more animals for future generations of investigators.

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CONTENTS