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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $5.00 each. We are no longer printing paper issues, except those we will send to subscribers who have paid in advance. We will not accept future subscriptions, unless subscribers are willing to pay $60/year within the U.S.; $80/year outside the U.S. (Please make checks payable to Brown University.) Readers with access to electronic mail may receive the nongraphic contents of each issue by sending the message **subscribe LPN-L your-own-name** to **listserv@listserv.brown.edu** (Send the message **subscribe LPN-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. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *Newsletter*, the scientific names used will be those in *Mammal Species of The World: A Taxonomic and Geographic Reference,* 2nd Ed. D. E. Wilson & D. M. Reeder (Eds.). Washington, DC: Smithsonian Institution Press, 1993. For an introduction to and review of primate nomenclature see the chapter by Maryeva Terry in A. M. Schrier (Ed.), *Behavioral Primatology: Advances in Research and Theory* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

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Cover illustration is a Chinese print, purchased in a "tourist shop". The inscription reads something like "Monkey, Garden, Pleasure"

Time Budgets of *Macaca fascicularis* in a Mangrove Forest, Vietnam

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Saigon Zoo

Introduction

Time is limited for most animals. A day's foraging must provide sufficient resources to avoid starvation, to maintain body condition, and perhaps to grow or to support reproduction (Di Fiore & Rodman, 2001). Individuals of many primate species forage together in groups. Groups with stable membership must have foraging patterns which enable all members to get their nutritional requirements. If this were not the case then individuals that could not get sufficient food would have to leave the group or die (Agetsuma, 1995).

Time budgets have been studied in many primate species (e.g., *Propithecus verreauxi*: Richard, 1978; *Macaca fuscata*: Yotsumoto, 1976; Maruhashi, 1981; Agetsuma & Nakagawa, 1998; *Macaca fascicularis*: Van Schaik et al., 1983; *Macaca mulatta*: Gupta & Sinna, 1992; *Macaca silenus*: Umapathy & Kumar, 2000; *Lagothrix lagotricha*: Di Fiore & Rodman, 2001; *Colobus colobus,* Neal & Forthman, 1996). In some species, time budgets are affected by a variety of demographic and environmental factors: sex, social rank, reproductive condition, and the degree of human disturbance in the region (Whitten, 1983; Muruthi et al., 1991; Di Fiore & Rodman, 2001).

This paper is the first detailed description of the time budgets of crab-eating macaques (*Macaca fascicularis*) in a mangrove forest. The information provided by this study is valuable because few papers have been published on activity patterns of primates living in mangrove forests. This study examines the influences of seasonal and tidal changes of their habitat on their time allocation and the plasticity of the time allocation of the species.

Methods

Species and study area: This study included three of four provisioned groups of crab-eating macaques dwelling in Can Gio Mangrove Park. Provisions are 60-100 g of boiled rice/animal/day, given each morning and late afternoon, plus sweet potatoes (as well as fruits given by tourists), and total about 25% of the animals' total food. Provisioning ensures that the animals stay in the park and do not become agricultural pests. This macaque population is distributed throughout the core area of the park. The four groups used a total of 771 ha during the study period and the density was 62 animals/km^2. Home range overlap among the groups is common. The study groups were named Khe Doi (141-170 members), Khe Dinh (89-145 members), and Lam Vien (26-36 members).

Can Gio Mangrove Park is located in the coastal area of Ho Chi Minh City, southern Vietnam, at an altitude of about 0-1 m. The rainy season extends from May to October and the dry season from November to April.

The tide rises twice a day, once at night and again in the daytime. On the 29th, 30th, 1st (new moon), 2nd, 3rd, 13th, 14th, 15th (full moon), 16th, and 17th of each month of the lunar calendar there are especially high tides (called "spring" tides). At high tide on these days, the forest is almost flooded for three hours (Nam et al., 1994) and the macaques go into the drier parts of the forest to escape the rising waters. For details of the macaques and study area see Nam et al. (1994) and Son (2002, 2003a).

Data collection: The present study followed the observational methods used in several previous studies (Richard, 1978, Fragazy et al., 1992, Neal & Forthman, 1996).

Behavioral data were collected using focal animal sampling (Altmann, 1974). A selected monkey was followed and observed from 06:00 to 18:00. Activities of the monkey were recorded at 30-second intervals as long as the monkey was visible. Thirty seconds were considered the minimum time necessary for recording activities of an individual in the mangrove forest condition. The number of records made at 30-second intervals during which the animal engaged in each activity will be referred to as "time spent" in that activity (Altmann, 1974).

Data were collected over 22 months between January, 2000, and October, 2001. The contact time with 105 focal individuals belonging to the three groups was 105 days, a total of 1260 hours.

The following seven categories describe activities:

1. Resting: sitting, lying, or sleeping on branches.
2. Foraging: searching for food. There are two types of foraging: • Arboreal foraging: looking for plant items or insects, or breaking apart branches to look for wood-boring caterpillars (*Zeuzera* spp.) (Son, 2003b). • Terrestrial foraging: manipulating aquatic substrates actively to search for *Brachyura* (crab suborder) species, *Bankia saulii* (shipworms), or other animals (Son, 2003b).
3. Eating.
4. Moving.
5. Grooming: grooming or being groomed by another.
6. Threatening: making vocal, facial, or gestural threats against others.
7. Fighting.

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Data analysis: Statistical tests were conducted using Microsoft Excel and MINITAB 12 software. A t-test was used to examine the significance of the differences between means. The following methods were used for data analysis:

- The time spent on each category of activity was calculated by summing the total number of recorded observations for each category and expressing it as a percentage of the total number of all recorded observations.
- Daily percentage of time spent on each category of activity was calculated by dividing that time by the total time spent on all activities that day.
- For monthly percentage of time spent on each category of activity, I averaged the time spent on each category of activity over the days of each month.
- Dry (or rainy) season percentage of time spent in each activity was calculated by dividing the total time spent in each category of activity by the total observation time in the dry (or rainy) season periods.
- To compare time budgets between the spring tide days and other days, I converted the solar calendar days into lunar calendar days and averaged the time spent on each category of activities for each period.

	Resting	Moving	Grooming	Eating	Arboreal foraging	Terrestrial foraging	Other activities
Dry season (n=51)	31.66 ± 10.22	17.67 ± 6.21	9.2 ± 6.51	9.85 ± 4.43	9.77 ± 11.44	19.79 ± 8.98	2.02 ± 2.20
Rainy season (n=54)	36.47 ± 11.93*	18.1 ± 7.17	7.18 ± 4.03	10.38 ± 3.63	6.66 ± 6.24	18.33 ± 11.23	2.85 ± 2.35
Spring tide days (n= 28)	36.83 ± 10.73*	15.12 ± 6.21	8.98 ± 4.42	11.2 ± 4.92	6.41 ± 7.77	18.81 ± 8.51	2.61 ± 0.92
Other tidal days (n=77)	31.16 ± 11.36	18.9 ± 6.22 **	8.86 ± 5.78	10.72 ± 3.6	8.81 ± 9.67	19.13 ± 10.77	2.37 ± 0.36

Table 1: Percent of time spent on each activity category relative to seasonal and tidal changes. n = days of observation * $p < 0.05$ ** $p < 0.01$

Results

The diurnal activities of a group began at 6 a.m. at sleeping trees with a short foraging travel to the provisioning site. This major bout of feeding, about one-half to one hour, was followed by moving into the forest where the group searched for wild foods. Between 12:00 h and 13:00 h the group rested. During this time macaques either slept, played, or groomed. Juveniles often swam or played in the water, jumping down into the water from branches 1 to 3 m high. After resting, macaques continued searching for food while moving back towards the provisioning site. Between 15:00 h and 16:00 h they were fed by park staff and then moved to sleeping trees from 17:30-18:00 h. The areas in which macaques foraged varied from day to day.

The following are some general descriptions of their daily activities. When moving, macaques walked on the ground or jumped from stilt roots of one *Rhizophora* (red mangrove) tree to another at a distance of 0.5-2 m. During their search for daily food in the forest, a group often swam across 2-4 canals or rivers. When they moved back towards the feeding site, they took almost the same route as they had taken before. In some cases, all the members of a group stopped to forage at a site for 0.5-1 h. In other cases, they continued moving in search of food.

Time budgets: Throughout the year, most time (34.1%) was spent resting. Other activities were: moving, foraging, and eating (total of 54.8%); grooming (8.4%); and other social activities such as playing, fighting, and threatening (total of 2.3%). The proportion of time they allocated to these categories varied from month to month.

Influence of environmental changes on time budgets: The distribution *area* of the macaques was affected cyclically by the tide. Eight days in each month of the lunar calendar, the forest was flooded for 3 hours in the daytime, and this is the time the groups foraged deeper in the forest, where it was drier. In the analysis, I considered whether the tide affected *time* allocation of the groups. I also examined seasonal changes. The data collected was organized as follows (*Table 1*):

- Time budgets of the spring tide days and other days.
- Time budgets of the dry and rainy seasons.

A comparison between the spring tide days and the remainder revealed that the proportion of resting time in the spring tide days was significantly higher ($p < 0.05$), and the moving time was significantly lower ($p < 0.01$) than on the other days. There were no differences in proportions of time spent moving, grooming and foraging between the two seasons, only in resting ($p < 0.05$).

Comparison of time budgets between the three groups: *Table 2* shows a comparison of time budgets among the three groups, with special reference to arboreal and terrestrial foraging. In the mangrove forest, macaques search for plant items, insects, or wood-boring caterpillars (*Zeuzera* sp.) during arboreal foraging, while they look for macrobenthos (organisms, e.g., insect larvae, shrimps, and other crustaceans, living in or on aquatic substrates and large enough to be seen with the naked eye) during terrestrial foraging. The difference was summarized as follows:

- In Lam Vien group, there were no differences between time spent on arboreal foraging and terrestrial foraging throughout the year, whereas the Khe Dinh

group and Khe Doi group spent three times more time on terrestrial foraging than on arboreal foraging.

- Lam Vien group spent 33.81% of their time foraging (terrestrially and arboreally), while the Khe Dinh and Khe Doi group spent 24.85% and 25.08%, respectively.

Group		Resting	Moving	Grooming	Eating	Arboreal foraging	Terrestrial foraging	Other activities
Lam Vien days = 27	$\overline{X}$ (%)	27.57	21.31	5.54	9.8	17.16	16.65	1.96
	SD	8.859	6.89	3.64	3.9	12.70	10.56	2.40
Khe Doi days = 29	$\overline{X}$ (%)	35.89*	18.34	8.82*	9	4.80	20.28	2.84
	SD	10.54	6.11	5.14	3.4	4.18	11.12	2.50
Khe Dinh days = 49	$\overline{X}$ (%)	36.72**	15.75	9.22*	11	5.22	19.63	2.48
	SD	11.60	6.18	6.05	4.3	5.09	9.34	2.13

Table 2: Average proportion ($\overline{X}$) and standard deviation (Sd) of time spent on each activity category of the three groups of Can Gio macaques. * $P < 0.01$, ** $P < 0.001$.

When monkeys feed on macrobenthos, which are high quality food, they (Khe Doi, Khe Dinh groups) need less foraging time to obtain sufficient food; in consequence the resting and grooming times of these two groups were higher than that of Lam Vien group (*Table 2*).

This study suggests that feeding on macrobenthos influenced mangrove macaques' time allocation.

Discussion

Some authors have proposed that increased group size increases feeding competition, which results in increased traveling (Van Schaik et al, 1983; Gillespie et al., 2001). Gillespie et al. (2001) reported that large groups traveled more and rested less than small groups. However, the present study does not agree with these previous studies. Between 1999 and 2001, the size of Lam Vien group ranged from 26 to 36 members while the sizes of Khe Doi and Khe Dinh groups varied from 89 to 170. However, time spent moving and searching for food in Lam Vien group was higher than those of the larger groups (*Table 2*). Lam Vien group spent 60.65% of time feeding on plants, while Khe Doi and Khe Dinh groups spent 31.6% and 34.16%, respectively (Son, 2003b). When monkeys feed on low quality food, e.g., plants, this could cause the increased feeding time in the smaller group.

The results reported here suggest that the diet composition and feeding behavior of Can Gio crab-eating macaques influenced time allocation of the groups more than group size did, and that feeding on macrobenthos living in aquatic substrates affected time allocation on other activities. This study provides support for Saj et al.'s 1999 result that a reduction in time spent feeding is associated with an increase in time spent resting.

Comparison between time budgets in the dry season and the rainy season revealed that seasonal changes in the forest have almost no influence on the groups' activities, except for an increase of time resting during the rainy season, because the macaques would cease their activities until the rain let up (DiFiore & Rodman, 2001).

The tide influenced group activity. Spring tide decreased time spent moving and increased resting time. The comparison of the daily range in the spring tide days with that of other days indicated that there were no differences in daily travel distances (Son, unpublished data). After flooding from the spring tide subsides, the macaques move more rapidly than usual and search for macrobenthos to gain sufficient food for the day.

Foraging for macrobenthos after the spring tide flood subsided is a characteristic feeding behavior of crab-eating macaques in the mangrove forest, and is quite different from that of inland populations. This adaptive mechanism in behavior may be related to ecological conditions, and macaques may strategically forage intensively for animal foods in periods of high macrobenthos abundance in the area. These results raise the possibility that such an opportunistic behavior has an impact on daily time allocation of the species.

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Travelers' Health Notes: New Definitions for Notices Regarding Diseases Abroad

The Division of Global Migration and Quarantine, Travelers' Health, National Center for Infectious Diseases, is announcing new, scalable definitions for travel notices about disease occurrences abroad. The purpose is to refine the announcements so they are more easily understood by international travelers, U.S. citizens living abroad, health-care providers, and the general public. In addition, defining and describing levels of risk will clarify the need for travelers to take recommended preventive measures. A complete description of the definitions and criteria for issuing and removing travel notices at each of the four levels is available at <www.cdc.gov/travel>.

The new notices are as follows:

• *In the News*. This notice provides information about sporadic cases of disease or an occurrence of disease of public health concern affecting a traveler or travel destination. At this level, the risk for an individual traveler does not differ from the usual risk in that area.

• *Outbreak Notice*. Information is provided regarding a disease outbreak in a limited geographic area or setting. The risk for travelers is defined and limited, and the notice reminds travelers about standard or enhanced travel recommendations such as vaccination.

• *Travel Health Precaution*. Specific information is provided to travelers regarding a disease outbreak of greater scope and over a larger geographic area, aimed at reducing the risk for infection. This precaution also provides guidance to travelers about what to do if they become ill while in the area. At this level, CDC does not recommend against travel to a specific area, but might recommend limiting exposure to a defined setting (e.g., poultry farms or health-care facilities).

• *Travel Health Warning*. A recommendation is issued against nonessential travel to an area because a disease of public health concern is expanding beyond the locales or populations that were affected initially. The purpose of a travel warning is to reduce the volume of traffic to affected areas, limiting the risk for spreading the disease to unaffected areas.

* * *

Sniffing Their Way Around: Observations on Captive Owl Monkeys

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Introduction

Owl monkeys, the only nocturnal New World monkeys, have well-developed visual and olfactory systems that are unique: they have the largest eye orbits and olfactory bulbs in relation to body size of any New World primate (Martin, 1990). Their large eyes and susceptibility to certain diseases have made owl monkeys extremely important in biomedical research (Baer et al., 1994).

The DuMond Conservancy houses a colony of approximately 50 owl monkeys, many of which have been retired from biomedical research, including a small number which are visually impaired due to eye surgery. In spite of their obvious handicap, these visually impaired monkeys have adjusted successfully to a new, relatively complex, captive environment. Nightly health monitoring of an elderly, visually impaired female owl monkey revealed she had very high frequencies of sniffing and scent marking as she navigated her way around her home cage. Based on this observation, we predicted that visually impaired monkeys use olfactory cues to navigate. In this study, we compare the rates of sniffing and scent marking between visually impaired owl monkeys and their sighted cage companions.

Methods

Subjects/Housing: Our subjects consisted of six adult mated pairs of owl monkeys, with each pair made up of one sighted and one visually impaired monkey, as described in *Table 1*. The individuals that were karyotyped were of two species: *Aotus nancymaae* (karyotype I) or *Aotus azare* (karyotype VI). Visual acuity was determined by ophthalmological examinations and behavioral observations when the monkeys were first released into their enclosures. An infant was born to one pair during the study, and a widowed, visually impaired male's (Rhett) sighted daughter was removed and replaced with an unrelated, sighted female and her four-month-old offspring.

The pairs were housed in outdoor cylindrical wire cages measuring either 2.44 m in diameter x 2.44 m in height or 3 m x 3 m. Each cage was furnished with eight evenly spaced PVC poles used for travel, extending across the diameter of the cage; a wooden nest box; a wire shelf; and a Lixit watering device. The cages were spot cleaned daily and the bases hosed once per week. In order to minimize disruption of the olfactory environment of the owl monkeys over the duration of this study, the

Name	Sex	Age	Species	Visual Acuity
Chewbacca	M	13	Not Karyotyped	Sighted
Missy	F	9+	Not Karyotyped	Impaired (may see movements)
Galileo	M	17	*Aotus azarae boliviensis*	Severely Impaired
Georgia	F	12	*A. azarae boliviensis*	Sighted
Stevie	M	7	*A. nancymaae*	Impaired
Lil Kim	F	6+	*A. nancymaae*	Sighted
Carradog	M	11	*A. nancymaae*	Severely Impaired
Rose	F	5	*A. nancymaae*	Sighted
Rhett	M	20+	*A. nancymaae*	Severely Impaired
Electra	F	5	*A. nancymaae*	Sighted
Onassis	M	9	Not Karyotyped	Sighted
Puck	F	8	Not Karyotyped	Impaired

Table 1: Six *Aotus* pairs.

of this study, the poles and cages were cleaned only as needed and observations were not conducted for several days after the poles were cleaned. The cage that housed Galileo and Georgia had an unusually strong odor.

The poles were all configured similarly in each cage; however there was some variation in the locations of the nest boxes, feeding sites, and Lixit. The animals were fed once a day, at dusk, their normal diet consisting of Monkey Diet, Fiber-Plus Monkey Diet, and New World Primate Diet (all from PMI® Nutrition International), and a variety of fruits and vegetables. Pregnant or lactating females received supplements during the day. All the owl monkeys foraged for insects that wandered into the cages.

Data Collection: The observation sessions were conducted two evenings per week for approximately one hour per session. Observations commenced within twenty minutes of nightfall and all subjects were fed approximately 30 minutes before each observation session began. Each individual was observed continuously for 20-minute focal animal observation periods, for a total of five hours of observation per individual. Two observers collected data on the pairs simultaneously. Inter-observer reliability tests were conducted prior to the observation sessions to ensure the accuracy of the data collection, with observer agreement measured at approximately 85%. Flashlights covered with red cellophane were used to aid in the observations. We used schematic representations of the cages to record the frequencies and locations of all occurrences of sniffing, scent marking, and urine washing of

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each member of the pair, and defined each behavior pattern as follows:

- Sniffing – a short activity less than 2 seconds in duration in which the muzzle is brought close to the substrate.
- Scent Marking – rapid side-to-side movements of the circumgenital region against the substrate (Moynihan, 1964).
- Urine Washing – moistening the palms of the hands or soles of the feet with urine (Moynihan, 1964).

Results

All 12 owl monkeys were observed sniffing their travel routes and seven monkeys scent marked these routes. Urine washing was observed in only one pair (Georgia and Galileo) and both participated in the activity.

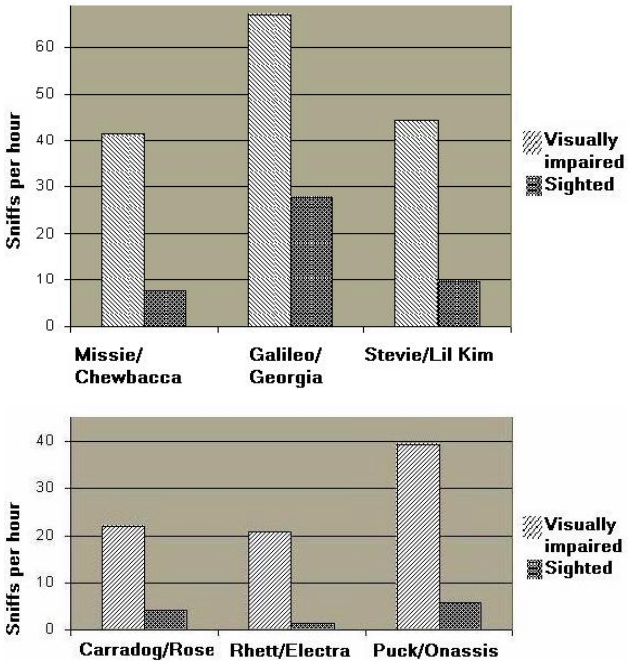

Figure 1: Rates of sniffing along travel routes in six male-female pairs of owl monkeys.

In five pairs, the visually impaired monkeys sniffed more than their sighted mates (sign test, $p>0.05$) and, overall, visually impaired monkeys sniffed more than sighted monkeys (Mann-Whitney *U* test, $p>0.05$), despite one sighted individual (Georgia) having the highest rate of sniffing (see *Figure 1*). In the five pairs in which at least one monkey scent marked, visually impaired monkeys scent marked more than their sighted mates (sign test, $p>0.05$) and, overall, the visually impaired monkeys scent marked more than sighted individuals (Mann-Whitney *U* test, $p>0.05$); see *Figure 2*.

There was a striking correlation in rates of sniffing between the sighted and visually impaired monkey in each mated pair (Spearman Rank Correlation Coefficient, $p>0.01$, $rs=0.971$). Despite the fact that the visually impaired monkeys tended to be older, there was no correlation between age and either scent marking or sniffing and no consistent sex difference was evident.

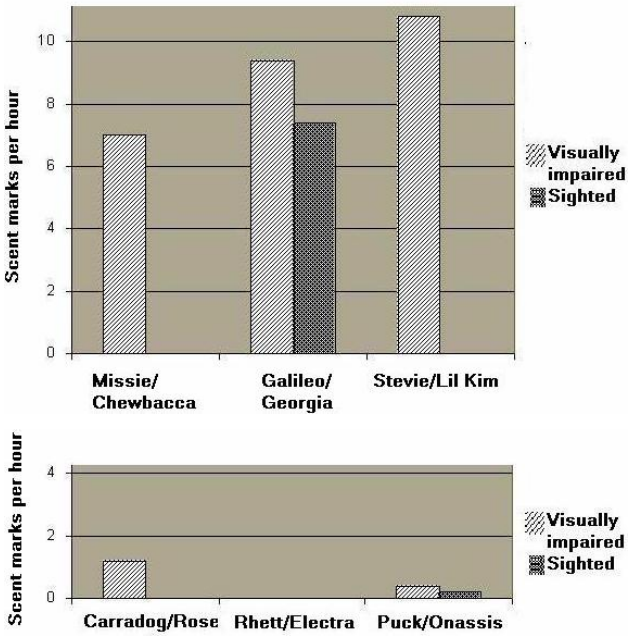

Figure 2: Rates of scent marking along travel routes in six male-female pairs of owl monkeys.

Discussion

The visually impaired owl monkeys were found to sniff and scent mark the poles in their cages more than their sighted mates. In nature and in a semi-free ranging environment, foraging owl monkeys tend to reuse the same paths night after night (Wright, 1985; Bolen & Green, 1997), which suggests that the monkeys may be marking their travel routes by depositing scent marks on trails (Wright, 1989).

One sighted female (Georgia) and her visually impaired companion (Galileo) had extremely high rates of sniffing and scent marking, which was not necessarily surprising as rates of sniffing between mates were correlated. This pair was distinguished from the other five because they were a different species (*Aotus azarae* vs. *A. nancymaae*) and this pair was the only one observed to urine-wash, which undoubtedly contributed to the cage's strong odor.

This study documents that visually impaired owl monkeys can be successfully rehabilitated: our owl monkeys appeared adept at navigating their surroundings through the use of their well-developed olfactory senses. These observations of successful navigation of a familiar environment by visually impaired monkeys are consistent with anecdotal reports of blind primates (McGreal, 1991, pers. obs.).

Unpublished colony records reveal that the visually impaired individuals have been successful breeders and have displayed normal parental behavior. They also foraged for insects successfully.

These findings correspond with what we know about the biology of owl monkeys. Studies have demonstrated heavy reliance of these monkeys on olfactory cues (Bolen & Green, 1997). Furthermore, our visually impaired owl monkeys, like many other handicapped primates, appear to live full, rich lives (Zeller, 2002).

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* * *

Information Requested or Available

Conservation and Behavioral Biology

The Animal Behavior Society Conservation Committee has compiled a list of review and conceptually based publications on the interface of conservation and behavioral biology. The references in the list provide an overview on how conservation efforts have been aided through a better understanding of behavior. See <www.animalbehavior.org/ABS/Conservation/ccrefs.html>.

Jackson Lab Courses and Meetings Website

The Jackson Laboratory, Bar Harbor, Maine, has redesigned their Courses and Meetings Website "to better meet user needs. The site now contains dynamic pages fed from a database, providing instant updates and more current information. We have added search features by keyword and also by subject areas to help you narrow down the list of events to meet your own interests. Over the next few months we will phase in more features. See <www.jax.org/courses/events/current.do>; and you can also find us on the <www.jax.org> home page."

More Interesting Websites

- American College of Laboratory Animal Medicine's Position Statement on Animal Experimentation: <www.aclam.org/PDF/pub_animal_experimentation.pdf>
- Berggorilla & Regenwald Direkthilfe (new URL): <www.berggorilla.de/english/frame.html>
- Guidelines for the Housing and Management of Orang utans (*Pongo pygmaeus* and *Pongo abeli*), by L. Cocks: <www.seaza.org/animal_husbandry/australasian_species_management_orang_utan.htm>
- Link to *Callitrichid Husbandry Manual* (Available in English and Spanish): <www.csew.com/newworldprimate/>
- *Healthy Animals*, animal health-related research news, published by the Agricultural Research Service: <www.ars.usda.gov/is/np/ha/>
- Husbandry and Management of the Proboscis Monkey (*Nasalis larvatus*) in the Singapore Zoological Gardens, by N. de Graff et al.: <www.seaza.org/animal_husbandry/husbandry_and_management_of_the_proboscis_monkey.htm>
- *Journal of Animal Technology*'s 1989-2001 Index: <www.iat.org.uk>
- Lab. Animal Refinement & Enrichment Forum photos: <www.awionline.org/lab_animals/LAREF/LAREFphotos.html>
- Occupational Primate Disease Safety Guidelines for Zoological Institutions: <www.aazv.org/PRIMATESAFETYGUIDELINES.htm>
- Policy on Exhibiting Primates in New South Wales: <www.agric.nsw.gov.au/reader/aw-exhibited/aw-primates.pdf>
- Practical enrichment options for animals kept in research institutions: <www.awionline.org/lab_animals/LAREF/enriop.htm>
- Ranomafana National Park, Madagascar: <info.bio.sunysb.edu/rano.biodiv>

Effective Data Management and Data Sharing in Nonhuman Primate Studies

Darlene A. Smucny
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The "3-Ds" of Data Management and Sharing

Primatologists collaborate by sharing data with local researchers, by exchanging data with other colonies and facilities, and by accessing multi-center databases. Data sharing is likely to increase in the future, particularly with greater interest in studies that require longitudinal data over lifespans or across generations (e.g., aging research and studies of lineage or demographics), and with limited numbers of primates in captivity. In order to facilitate such data sharing, it is imperative that data should be managed effectively, efficiently, and clearly.

Data management and data sharing are made more effective through implementation of some practical guidelines. In addition to computer software and hardware issues, researchers and data managers should concern themselves with the following guidelines for good data practices ("3-Ds"): • *Data standards:* What minimal animal information is available in consistent format for all colonies that are sharing data? • *Data definitions*: How are variables defined? Are these definitions consistent between, and within, colony databases? • *Data validation*: How can we ensure data accuracy? How can we detect errors in data gathering or data entry?

Data Standards: What to Share, and in What Format?

"Data standards" refers to the minimum parameters needed for detailed demographic analyses and for the construction and analysis of extended pedigrees. Dyke (1993) proposed a set of simple standards for primate colony data. Standards relate to single-entry records, as well as multiple-entry data files. The 14 variables for the standard single-entry registry record structure (for each animal), as proposed by Dyke, include: (1) Animal ID, (2) sire ID, (3) dam ID, (4) sex, (5) date of birth (DOB), (6) entry date, (7) acquisition code, (8) exit date, (9) exit code, (10) taxonomic code, (11) institution code, (12) local subgroup code, (13) current location code, (14) end of record character (Dyke, 1993, p. 133). According to Dyke's data standards, variables 1-9 *must* be present for any demographic and/or pedigree analysis, while variables 10-13 are considered optional. Item 14 is important to ensure that all records are the same length, for a uniform data format and more effective data sharing.

Data standards ensure that a minimum amount of information is available for all colonies. Uniform standards across colonies make it easy and cost-effective to assemble information into a consistent format.

Data Definitions: How Are Variables Defined?

It is critical for researchers and data managers to clearly define the variables in their records, and to keep accurate and clear records of the "data definitions", not only for data sharing, but also for within-colony database management. Data managers and data-entry personnel must see to it that data are consistent, and that data definitions are reviewed routinely.

Some basic examples of the importance of data definitions to data sharing and to database management include multiple meanings of variables. To one colony, "entry date" might be defined as the date when an animal entered a colony, if it was not born to that colony. To another colony, "entry date" may be defined both as birth date (into colony) and entry date for an animal coming into colony (i.e., not born there).

As new personnel enter projects, it is imperative to keep data definitions consistent, especially for long-term studies in which changes in student assistants, postdoctoral scientists, and other staff regularly occur.

Precise and consistent "data definitions" are especially needed for any and all studies employing archived records. It is important to know how variables are defined as colonies or studies progress with time, and if these definitions ever have been changed or revised.

Data Validation: How Do We Ensure Data Accuracy?

When reviewing or sharing data, researchers may be faced with data that do not make "biological sense" or

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I wish to thank Suzette Tardif, Donna Layne, Jim Bridges, Linda Freeman-Shade, Bennett Dyke, and Mark Sharp of Southwest Foundation for Biomedical Research/SNPRC for their meaningful discussions and ideas about database management. I also thank Emilia Yamamoto and Anuska Irene Alencar (Universidade Federal do Rio Grande do Norte), Keith Mansfield (New England NPRC), Suzette Tardif (Marmoset Research Center, Oak Ridge; Southwest NPRC), and David Abbott and Nancy Schultz-Darken (Wisconsin NPRC) for access to demographic data from their common marmoset colonies. Mary Beland, of New England NPRC, also provided invaluable assistance in organizing and describing NENPRC colony records. The idea for this poster presentation was inspired by the Colony Records Analysis Workshop (CRAW III), held in San Antonio, Texas, November, 2002. This article appeared as a poster at the 26th Annual Meeting of American Society of Primatologists in Calgary, Alberta, Canada, August, 2003. The common marmoset reproductive database project is supported by NIH grant RR02022.

that seem to contain entry errors. From a data management standpoint, it is best to check or review data regularly for errors. For small colonies, data managers may run summary statistics on database variables regularly. Outliers then can be identified and reviewed for possible errors in data entry. For example, interbirth intervals can be routinely calculated and reviewed, in order to see if such values make "biological sense". Similarly, birth, entry, transfer, and death dates can be routinely reviewed to detect errors in data entry.

Such "biological checks" are done easily with simple programming *(*e.g.*,* script commands, such as those described in Veeraraghavan, 2002) to ensure data accuracy, and to detect possible errors. "Data validation" can identify not only entry errors, but also any special circumstances regarding the animals. For example, a very short interbirth interval could indicate an aborted pregnancy. Such information then may be logged with a special comment or code for future reference.

An Example from Nonhuman Primate Research

Many relevant examples of data sharing and multi-centered databases may be found in current biological and biomedical research. Nonhuman primate databases for laboratory primates include the Tumor Register (German Primate Center) and the Primate Aging Database (Wisconsin National Primate Research Center). A nonhuman primate database currently in development is a reproductive/demographic database with information from five different common marmoset (*Callithrix jacchus*) colonies. *Table I* provides a basic description of this large, multi-colony database, which provides information about basic reproductive life history in captive common marmosets. The database contains a large sample of individuals, particularly dams with known birth dates. The sharing of such data between marmoset colonies allows for larger sample sizes, and increased power for statistical analyses. Using the database, factors important for reproductive demography and reproductive variation in this species may be better examined and explored.

The demographic database provides a larger sample size to examine questions about marmoset reproduction, as well as comparisons between the different colonies (Tardif et al., 2003). Lifespan and breeding information are important for this species, since its use as an animal model in human biomedical research is increasing (Abbott et al., 2003).

The "3-Ds" in the Marmoset Database

The data variables provided by the five marmoset colonies, along with their definitions, are found in *Table II*. All data have been checked for accuracy of birth, entry, transfer, and death dates. Mate changes also have been tracked in the breeding pairs. Entry of the data into the PEDSYS data program (Dyke, 1996) also helped to locate errors in dates and identification codes. As the marmoset demographic data have been updated and prepared for analysis, additional data checks have been routinely undertaken for "biologically relevant" variables such as interbirth interval, litter sizes, and weaned litter sizes.

Institution	Year of 1st recorded birth in colony	Range for known DOB for animals in colony (as of last update to database)	Number of known-aged dams	Number of known-aged sires	Total number of individuals (infants, juveniles and adults) with known DOB
Universidade Federal do Rio Grande do Norte, Natal, Brazil	1992	1990-2000	49	46	406
New England NPRC Southborough, MA	1980	1978-2002	165	135	1989
Marmoset Research Center, Oak Ridge, TN	1978	1975-1992	116	98	984
Southwest NPRC San Antonio, TX	1994	1987-2004	40	40	341
Wisconsin NPRC Madison, WI	1991	1982-2002	119	113	993
TOTAL			489	432	4713

Table I. Description of the common marmoset multi-colony database (modified and updated from Tardif et al., 2003)

Of the "3-Ds", I find that "Data Standards" require additional attention for most primate colonies. Although all colony databases possess the variables of interest, there is no real standardization of archived records across most colonies to allow ease of data sharing.

Conclusions

The success of data sharing and multi-center data projects depends on effective, clear, and open communication between researchers, data managers, and data entry personnel. The data management guidelines suggested here will enhance both prospective and archived data projects. The common marmoset demographic database project is an excellent example of successful implementation of these practices.

VARIABLE	DEFINITION
ID	Animal identification code
BIRTH	Birth date
SIRE	Sire ID
DAM	Dam ID
SEX	Coded as male, female or unknown
EXIT	Death date
SITE	Colony code
ENTRY DATE	Entry date, if entered colony from another site
BIRTH STATUS	Coded as abort, live or stillbirth
TRANSFER DATE	Transfer date, if animal moved out from colony
REPROX DATE	Date of Ovariectomy, Vasectomy or Castration (if applicable)

Table II. List of variables (with brief definition) provided by each colony for common marmoset reproductive and demographic database.

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Meeting Announcements

The 2004 **American College of Veterinary Anesthesiologists'** meeting will be held on October 21-23, 2004, in Phoenix, Arizona. The meeting is being held in conjunction with the International Veterinary Academy of Pain Management and the Academy of Veterinary Technician Anesthetists. The format of the meeting will include a general session and simultaneous dual abstract sessions. The meeting will conclude with refresher course presentations – hour-long presentations on general topics. For further information, see <www.acva.org>.

The **22nd Annual Symposium on Nonhuman Primate Models for AIDS** will be held November 3-6, 2004, hosted by the Southwest National Primate Research Center at the Southwest Foundation for Biomedical Research, San Antonio, Texas. The latest findings in pathogenesis, primate immunology and genomics, virology, vaccines, and therapeutics will be presented. The symposium will encompass five half-day scientific sessions and a poster session. In addition, there will be an invited keynote opening speaker and a banquet speaker, who will address scientific approaches and concerns regarding the global AIDS crisis and related issues of public health. Contact Barbara Gault [e-mail: *bgault@sfbr.org*] for more information.

The **Fourth European Zoo Nutrition Conference** will be held January 21-23, 2005, at the Leipzig Zoo. Besides fundamental aspects of nutrition this conference will focus on the practical implications of zoo animal nutrition. The European Association of Zoos and Aquaria (EAZA) and the EAZA Research Group support this conference. Presentations on the following themes are encouraged: • Primate nutrition, especially papers on fiber utilization in primates and the role of Ultraviolet-B radiation in smaller primates. • Feeding browsers. In the last few years, the knowledge of how to feed browsing animals has improved. We hope to present papers considering the optimal feeding of these species. • Iron storage. According to the literature, hemosiderosis can be found in several animal species. • Behavior enrichment. Foodstuffs are often used for behavioral enrichment. Should the amount used be limited? • Practical feeding.

To submit a paper or for more information, see <www.EZNC.org>; or contact the European Zoo Nutrition Centre, c/o EAZA Executive Office (Walter Jansen, Joeke Nijboer, Andreas Bernhard), P.O. Box 20164, NL-1000 HD, Amsterdam, The Netherlands [+31 (0) 20 5200 750; Fax: +31 (0) 20 5200 752; e-mail: *info@EZNC.org*]. – *from zoo-biology@yahoogroups.com*

The **American Society of Primatologists' 28th Annual Meeting** will be held at the Benson Hotel, Portland, Oregon, August 17-20, 2005, hosted by the Oregon National Primate Research Center. For information, contact Dr. Kris Coleman, Oregon NPRC, 505 NW 185th Ave, Beaverton, OR 97006, [e-mail: *colemank@ohsu.edu*].

Antibiotics for Colobus Monkeys? A Discussion

On April 21, Jan Vermeer <*j.vermeer@la-vallee-des-singes.fr*>, of La Vallée des Singes, Romagne, France, wrote to the Zoo-Biology e-mail group: "I have always been told that it is not good to give colobus monkeys and langurs antibiotics orally (because we would kill the gut-flora and therefore may kill the animal), and that if they need an antibiotic we should give it by injection. I have recently spoken to a vet who says that there is no difference between the ways. Who has experience with this? We have given clamoxyl per injection without visible negative effects. What would happen if we give clamoxyl orally? And what about other antibiotics?"

Tom deMaar <*tdemaar@binderparkzoo.org*>, Director of Animal Health and Research of the Binder Park Zoo, Battle Creek, Michigan, responded: "There are two very good questions here. First: The question of giving antibiotics to any animal that uses bacteria and other microorganisms as part of the digestive process. This really includes any member of the animal kingdom. Any antibiotic can cause a digestive disturbance. Hopefully the benefit of the antibiotic can and will outweigh the possibility of digestive disturbance.

"This issue is more pronounced in animals that ferment plant material: ruminants, equids, colobine monkeys, lagomorphs, etc. They are intimately dependent on the microflora for nutrition. Any antibiotic could disturb the process. There is no evidence that oral versus injectable antibiotic would be different. Both types will diffuse all around the body. Perhaps the oral route may cause a higher concentration in the digestive tract and thus a greater impact on the digestive microflora. However, that must be balanced with the stress and trauma of repeated injection by dart or manual restraint. In zoo and wild animal medicine there are always compromises.

"Second: How do get a colobine monkey to take oral antibiotics? I am struggling to treat a black and white colobus at the moment. I could dart her, but I believe that to be much too stressful. She refuses to take consistently orally either liquid Augmentin or tablet Clavamox in any form. (These are the same medication with different trade names from human and veterinary markets.) Sometimes she may take a single dose in a novel piece of fruit such as plum, pear, or grape but the next time she refuses. I have a large list of things she will not eat. We are beginning to test specially made troches with different flavors such as chocolate, coffee, sassafras, anise, etc. These are made by a local pharmacy and we are hoping to find a flavor that covers the medication and that the patient finds irresistible.

"Does any one have some advice?"

John Pullen <*john.pullen@zsl.org*>, of the London Zoo, wrote on April 22: "I have certainly given antibiotics to colobus and hanuman langurs (and I think Francois's langurs as well, but I would have to check my records) with no ill effects. I do remember stopping a course of antibiotics due to very loose feces on one occasion. I also believe personally that it depends on the species; some are more 'delicate', for want of a better word, than others.

"Saying that, we have always kept in mind the possible effects of knocking out the gut flora, and here are some good points to think about. • Obviously, do they need the antibiotics? Humans are very quick to jump in and use them as a preventive rather than a treatment. • Give smaller amounts more often, particularly first and last thing to spread the dose throughout the day. • Give food as soon as the antibiotics are consumed, to help fill the stomach/gut. • What are the stress levels like, and is there any way to reduce them? • Can the animals be trained (operant conditioning) in any way to make the process easier?

"As for getting them to accept the medicine, a lot depends on how hungry they are. One of my favorites is to squash a piece of banana with the flat side of a knife a few times, add the meds (well crushed if pills), mix in, then put in a bowl with either baby cereal or bread and make a small doughy ball.

"Then the other tricky bit is to get it to the right animal in the group!"

A veterinarian wrote: "Giving oral medication to langurs or colobines, which have compound stomachs which use fermentative processes to aid digestion (similar situation to oral medicines in animals with large cecums, e.g., horses etc.), does have the risk of killing off the desired bacteria, thus reducing digestive processes and causing diarrhea, which in some cases can be quite severe. Saying that, it is something I do occasionally depending on the duration of the problem, etc., and I have not had too many problems, although I have had to stop in the occasional case due to severe diarrhea. It certainly helps to administer a probiotic during the treatment period and for at least ten days following. I should also mention that bacteriostatic antibiotics (e.g. tetracyclines) are better tolerated orally by animals with compound stomachs than bacteriocidal antibiotics (e.g., penicillins)."

And from Australia: "When I was the primary keeper for birds and colobus, we gave our meds (tablet form) in figs. It seems to work well."

Another zookeeper wrote: "We've had good success with pills by cutting off tiny pieces and inserting them into a grape. Hand out plain grape, plain grape, medi-

cated grape, plain grape, etc. Feed fast so they don't have time to think about what might be inside. Also, put meds in immediately prior to handing out so they don't begin to melt and release flavor. This method works with banana chunks too.

"Other successful methods: • Mix into jam (or peanut butter) and spread on bread. • Crush and sprinkle on inside of banana peel then fold-up/roll peel. • Crush and sprinkle into pocket in raw sweet or white potato. • Liquid can be drizzled over leafy greens. • Core large strawberry and insert crushed or tiny pieces of pill mixed w/banana, replace top of strawberry. • Crush and place into holes in a chunk of ZuPreem Primate Diet. • Sometimes a dot of honey over the crushed pills is helpful."

She also quoted a previous response on colobus medication: "I used hibiscus flowers to hide meds in. We just poured crushed meds into the pistil/stamen area of the flower and then handed it to them. This worked really well."

Chris Clark <*cclark@durrell.org*>, of the International Training Centre, Durrell Wildlife Conservation Trust, Les Augres Manor, wrote: "I know we used to give probiotic to our colobus sometimes, especially if they had been medicated but even if we had loose feces or loss of appetite. I think it was a preparation designed for cattle; Leocud was the brand name but I am sure there must be many available. I would suggest taking advice from the group and a vet on this but it may be worth considering."

But a veterinarian said: "I have seen some cattle-aimed probiotics actually cause an increase in severity of diarrhea. I am personally a fan of Avipro (®Vetark); it is easily administered and appears to be effective (or at least has no deleterious effects)."

On April 28 Jan Vermeer wrote again: "We have tried probiotics before, with no adverse effects. Probiotics from Protexin (U.K.) seem to work OK. It helped us to treat *Clostridium difficile* in our woolly monkeys."

Another issue was raised: "I think we have actually skipped over another important issue in giving oral antibiotics to colobus type monkeys. These animals actually have a bacterial fermenting vat as the first portion of their stomach, much like a ruminant. It is very questionable if something like clavamox or amoxicillin makes it past the initial bacterial fermentation. I don't think anyone has investigated this, but it doesn't work in ruminants. Most antibiotics need to be given by injection, bypassing the bacterial fermentation in the rumen, to be effective.

"Recent data has shown enrofloxacin to be effective in ruminants given orally. This has been demonstrated with blood levels. I have made the stretch and tried oral enro- or ciprofloxin in colobus, but still have the serious delivery challenges. My current case has serious dental and gingival disease. We have used local long-acting antibiotic-impregnated cement, but it's not enough. We are planning on temporarily moving her out of her group to facilitate treatment. If that still doesn't work, she may live in a squeeze cage for a bit. Part of it is deciding how critical the antibiotic treatment is. Colobus are just difficult. I think any macaque would be much easier to treat."

A veterinarian replies: "That is certainly something I have wondered about, though I believe tetracyclines also survive fermentation in ruminants. Has penicillin been investigated? All I can say is that in a small number of cases where I have tried it, it 'appears' to have been effective, but then most animals get better despite treatment!"

Associate Editor Morris Povar asks: "Do any of our readers have experience with the topic? If so, can you add any solid data?"

Our Assistant Editor, Elva Mathiesen adds: "I've run across this problem with my pet iguana. Green iguanas (*Iguana iguana)* use fermentation to digest their food. Over the years one of my iguana's eyes has become badly infected several times. When this happened in 2001, he received Baytril (enrofloxacin) by injection; I no longer remember whether he had digestive problems then. In 2002 the eye flared up again, and this time we gave him Baytril orally. After several doses he could no longer digest his food. He would simply excrete completely undigested food – more finely chopped than when it went in, but otherwise unchanged.

"The solution: I let him sniff and lick some of his old fecal material (lizards do this). Within a few days his gut was repopulated and he could digest his food again. Hmmm…could this be a solution for colobus?"

AND, as We were editing this, We got another note from Tom DeMaar: "Of course I have more information from my story. We switched antibiotics to enrofloxacin and also failed to get her to take it. We used both the chewable variety made for dogs and biscuits soaked in an oral liquid designed for poultry. Neither one was consumed by the patient. So I have resorted to treating the group of three animals equally, using biscuits soaked in the poultry solution. I do not agree with treating all three animals, but it seemed that the competition and/or camaraderie was necessary to encourage food consumption. It was the only way. We tried every idea listed here plus many, many, more. I can provide a three-page list of failed ideas, some of which were very creative."

* * *

Primates de las Américas...La Página

Estimados lectores, en esta edición presentamos dos listas que esperamos sean de utilidad. Éstos se refieren a sociedades y estaciones primatológicas en Iberoamérica con páginas de internet. Igualmente, incluimos información sobre el próximo congreso brasileño de primatología. Además, una invitación para un círculo de discusión primatológica en portugués y español, y la reseña del nuevo libro Primates de Colombia*. Cordiales saludos, Tania Urquiza-Haas (*turqheza@yahoo.com*) y Bernardo Urbani (*burbani@uiuc.edu*).*

Una lista de sociedades primatológicas de Iberoamérica con páginas de internet

• Asociación Primatológica Española:
<www.uam.es/otros/ape/>
• Sociedade Brasileira de Primatologia:
<planeta.terra.com.br/educacao/SBPr/>

Una lista de estaciones de campo para el estudio de primates en Iberoamérica con páginas de internet

• Estación Biológica Bocas del Toro, Panamá:
<www.itec-edu.org>
• Estación Biológica de Corrientes (EBCo), Argentina:
<ar.geocities.com/yacarehu/>
• Estación Biológica La Suerte, Costa Rica:
<www.lasuerte.org/lasuerte.htm>
• Estación Biológica Los Tuxtlas, México:
<www.primatesmx.com/inicio.htm>
(Esta página presenta una muy buena sección sobre financiamiento de trabajos de campo, véala aquí: <www.primatesmx.com/apoyos.htm>; sin embargo, esta base de datos proviene de la página de internet de la ONG Simbiota que se sustenta y actualiza en: <wildlife.wisc.edu/simbiota/s-lista.htm>.)
• Estación Biológica Ometepe, Nicaragua:
<www.lasuerte.org/ometepe.htm>
• Estación Biológica Quebrada Blanco, Perú:
<www.dpz.gwdg.de/voe_page/index.htm>
• Estación del Proyecto Primates de Yasuní, Ecuador:
<www.nyu.edu/projects/difiore/Yasuni/>
• Projeto Buigo, Santa Catarina, Brasil:
<www.furb.rct-sc.br/cce/biologia/bugio/bugio8.htm>
• Proyecto Titi, Colombia:
<www.csew.com/proyectotiti/>
• Santuario y Refugio de Primates de Panamá:
<www.primatesofpanama.org/projects/prsp/mission.htm>

XI Congreso Brasileño de Primatología

Localidad: Pontifícia Universidade Católica do Rio Grande do Sul, Porto Alegre, Rio Grande do Sul, Brasil.
Fechas: del 13 al 18 de febrero de 2005
Contacto: Julio César Bicca-Marques [e-mail: *jcbicca@pucrs.br*]
Comentario: Con seguridad será una oportunidad ideal para reunir a la comunidad primatológica brasileña y de toda Latinoamérica.

Conversaciones Entre Primatólogos

Si está interesado en un círculo de discusiones primatológicas tanto en portugués como en español puede contactar al siguiente correo electrónico: <*primatologia@yahoogrupos.com.br*>. Este panel está primordialmente auspiciado por estudiantes de primatología del Brasil, representando una excelente manera de interactuar con la nueva generación de primatólogos de ese país.

Novedad Bibliográfica

• *Primates de Colombia.* T. R. Defler. J. V. Rodríguez-Mahecha (Ed.). S. D. Nash, C. Landazábal-Mendoza, y M. Nieto-Díaz (Illus.). *Serie de Guías Tropical de Campo/Tropical Field Guide Series.* Santafé de Bogotá, Colombia: Conservación Internacional–Colombia, 2003. 543 pp. [Precio: 25.000 pesos colombianos ó 25 dólares estadounidenses más 5 adicionales para envío]

Este excelente libro acaba de salir publicado y sin duda representa un hito en calidad de guías de campo sobre monos neotropicales. Su contenido es conciso y exacto, está magníficamente ilustrado y su presentación y diagramación son de primera calidad. Sin duda alguna es una obra primatológica fundamental no sólo de Colombia sino de Latinoamérica en general. Como dato interesante hay que señalar que el libro está dedicado a la memoria del Dr. José Ignacio "El Mono" Hernández-Camacho, siendo esto un merecido reconocimiento para uno de los investigadores que con mayor pasión se dedicó al estudio de los platirrinos. En este sentido, estamos seguros que esta obra es y será gratamente recibida por primatólogos interesados en el Neotrópico. Para mayor información visite esta página:
<www.unal.edu.co/imani/primates.htm>.

Para adquirirlo diríjase a:

• Thomas R. Defler, Instituto Imani, Universidad Nacional de Colombia, Leticia, Amazonas, Colombia [e-mail: *thomasdefler@hotmail.com*]; o
• Conservation International, 1919 M Street, NW, Suite 600, Washington D.C. 20036, U.S.A. (Introduzca su solicitud en esta página:
<www.conservation.org/xp/CIWEB/about/contact.xml>.) – *Breve reseña por B. Urbani*

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Awards Granted

Patricia Wright Honored by Madagascar

Stony Brook University anthropologist and conservation biologist Patricia Wright has received a medal, the Officier de l'Ordre National de Madagascar, one of the highest honors granted to a civilian by the Madagascar government. Wright was largely responsible for the formation of Madagascar's Ranomafana National Park in 1991, and for last summer's inauguration of the Centre ValBio, a hand-built, international biology research facility on the park's edge. – *Newsday, Inc.*

Australian Animal Welfare Awards

Every year in the state of New South Wales, Australia, two Compassion Awards are made to people for "dedicated compassionate work for animals". To win these awards, a person must have a proven record of "making a difference for animals". This year, Lyn Shanley of Primates for Primates was awarded one of these. During her twenty-two years in animal welfare, Lyn has built up a proven record of changing legislation and attitudes for the benefit of animals. Lyn came into the Animal Rights movement in June, 1982, after obtaining her first cat. She has worked with and for many organizations during that time, including the International Primate Protection League and Primates for Primates, and continues to work for the benefit of animals despite being in poor health herself. – *Announced by Graeme Crook, President, Australasian Primate Society, on February 2*

Animal Welfare Enhancement & Refinement Awards

The Animal Welfare Institute (AWI) and the Johns Hopkins Center for Alternatives to Animal Testing (CAAT) are pleased to announce the winners of the 2004 Animal Welfare Enhancement Awards. The focus of these awards is to improve housing, handling and/or experimental situations for laboratory animals. Thanks to an anonymous donor, thirteen awardees will receive $6,000 each for studies aimed at enhancing laboratory animal welfare. The winning projects will explore such issues as the use of conditioning or training techniques to reduce stress levels, environmental enrichment, effects of group housing, and noninvasive indicators of pain and distress. The only primatologist among the winners, Amy M. Dupuy, of the University of Louisiana at Lafayette, will study "The effects of light intensity on fecal cortisol and stereotypic behavior in adult male *Macaca mulatta*".

For brief summaries of the proposed projects and a description of the selection criteria, please see <caat.jhsph.edu/programs/AWE/awards.htm>.

AWI also offers a Refinement Award, which supports studies aiming at the refinement of housing and handling conditions of monkeys (or dogs) kept in research institutions. This award has funding with a budget of $3,000. This year's award will go to Steve Schapiro of the M. D. Anderson Cancer Center in Bastrop, Texas, to assess *Immunological Variables in Chimpanzee Blood Samples Obtained by Different Techniques.* Steve's well-designed proposal attempts to provide scientific underpinning for the assumption that the welfare of animals is enhanced when they are trained to cooperate rather than resist during common procedures.

Wurtz Recognized for Brain/Eye Research

Robert Wurtz has been selected as one of three recipients of the Dan David Prize for innovative research that crosses traditional boundaries and paradigms. Dr. Wurtz is a researcher on cognitive neuroscience and a scientist at the National Eye Institute (NEI), one of the federal government's National Institutes of Health.

The Dan David Prize covers the past, present, and future time dimensions, representing realms of human achievement. Dr. Wurtz won his award for the future time dimension, the topic of which this year was "Brain Sciences". The future time dimension focuses on breakthroughs that hold great promise for improvement of our world. Dr. Wurtz will share the $1 million award with Dr. William T. Newsome, an NEI grantee at the Stanford University School of Medicine, and Dr. Amiram Grinvald of the Weizmann Institute of Science in Israel. The work of all three was cited "for having revolutionized neurobiology by showing that higher mental processes can be analyzed in the intact behaving primate in terms of individual nerve cells and cellular populations."

Dr. Wurtz introduced methods for the study of brain cells in the visual system of the monkey while the monkey was using its visual system to perform sophisticated visual and behavioral tasks. This approach has become the standard animal model for the study of the human visual system. It has paved the way for the growth of research on neuronal activity in the brain that underlies visual perception and higher brain function. Wurtz's subsequent work has tried to unravel the components in the brain that transform visual input from the eye into visual perception and eye movements. He and his colleagues identified neuronal activity in the brain that contributes to a person's ability to attend to some parts of the visual scene but not to others, and the brain mechanisms that underlie human perception of a stable visual world in spite of eye movements that occur several times per second.

Established by international entrepreneur and automatic photo booth developer Dan David, the Dan David Prize is funded from a $100 million Dan David Foundation endowment and is administered by Israel's Tel Aviv University. Winners donate 10 percent of their prize money to outstanding doctoral students at universities

around the world, which helps to foster the next generation of scholars. The Dan David Prize aims to promote the scientific, technological and humanistic achievements that advance and improve our world. This is the third year the prize has been awarded.

Dr. Wurtz and other prize recipients received their awards at Tel Aviv University on May 16, 2004. For more information about the Dan David Prize and its former winners see <www.dandavidprize.org>. – *NIH News Release, March 5, 2004*

The IPS Conservation Committee Small Grants

Claudio Padua, International Primatological Society Vice President for Conservation, has announced that the IPS Conservation Committee has awarded over $6,300 in Conservation Small Grants. Seven applications were received from primatologists studying in all of the continents in which primates naturally occur, and four awards were made. The following individuals received grants for their excellent projects: • Dilip Chetry (India) for "Non-human primate survey in Nongkhyllem Wildlife Sanctuary, Meghalaya, India"; • Entang Iskandar (Indonesia) for "Population survey of the Javan gibbon (*Hylobates moloch*) at the Gunung Halimun National Park, West Java"; • Pierre Kakule (Congo) for "Environmental education for the conservation of primates at the Tayna Centre for Conservation Biology"; and • Karenina Morales (El Salvador) for "Survey and census of spider monkeys in El Salvador".

"These grants were made possible by generous contributions to the IPS Conservation Fund from many IPS members. We are planning on awarding another set of grants within the next year, so keep your eyes open for the announcement and keep those contributions coming. Grant applications were evaluated by the members of the IPS Conservation Committee, and I would like to thank Tom Struhsaker, Alcides Pissinatti, Anne Savage, Anthony Rylands, Bill Konstant, Russ Mittermeier, David Chivers, John Oates, Ken Glander, and Pat Wright for their work."

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Positions Available

Clinical Veterinarian – Madison, Wisconsin

The University of Wisconsin Medical School – Laboratory Animal Resources has an opening for a Clinical Veterinarian and is seeking a highly motivated, service-oriented candidate for the position. The Medical School is an AAALAC-accredited unit with 80,000 square feet of facilities. Species include all traditional laboratory models including nonhuman primates. There are active programs in ophthalmology, surgery, cardiology, neurophysiology, and other clinical and basic sciences.

Qualified applicants will have a DVM or VMD from an accredited college of veterinary medicine, a license to practice veterinary medicine in any U.S. state, at least two years' experience in laboratory animal medicine, and be ACLAM board-eligible or a diplomate. Salary is commensurate with qualifications and experience. Information about University employment benefits and a Web posting of the position vacancy listing (#46861) can be viewed at <www.ohr.wisc.edu>.

To apply, please submit a letter of interest, CV, and the names of at least three references to: Alison Jarvis, DVM, Associate Director, Laboratory Animal Resources, K4/114 Clinical Science Center, 600 Highland Ave., Madison, WI 53792-1654 [e-mail: *asjarvis@wisc.edu*]. UW-Madison is an equal opportunity/affirmative action employer. We promote excellence through diversity and encourage all qualified individuals to apply.

Campus Veterinarian, NHLBI

The National Heart, Lung and Blood Institute (NHLBI), NIH, is seeking applicants for the position of Campus Veterinarian for NHLBI activities conducted on the NIH campus located in Bethesda, Maryland. This position offers an exciting opportunity for making substantial contributions to the NHLBI's Division of Intramural Research program, which currently utilizes a wide variety of laboratory animals including nonhuman primates (macaques, tamarins, and squirrel monkeys), farm animals (swine and sheep), dogs, rabbits, and rodents in its research program. As a key member of the Laboratory of Animal Medicine and Surgery (LAMS) team, the successful applicant will have responsibilities for planning, directing, coordinating, and evaluating all aspects of animal care and use activities on the NIH campus.

Specific responsibilities include: • supervision of animal care personnel; • providing veterinary clinical care and surgical support services to NHLBI investigators; • providing guidance in the development and implementation of animal use protocols to researchers; • maintaining the animal health surveillance program; • participating in IACUC activities; • participating in on-campus surgical support program; • representing NHLBI in central animal holding facility committees; • assisting in the education and training of animal care personnel; • advising the Chief, LAMS, and other intramural Laboratory and Branch Chiefs and research investigators on animal care, use, and welfare issues; • assuring compliance with all federal and state animal care and use laws and regulations; and • maintaining AAALAC accreditation.

Salary will be commensurate with experience. Officers in the Commissioned Corps of the U.S. Public Health

Service may also apply. Minimum qualifications are a Doctor of Veterinary Medicine or equivalent degree from an AVMA-accredited school of veterinary medicine (board eligibility or certification by ACLAM is desirable), licensure in at least one state, experience in the AAALAC-accreditation process, and five years of progressively responsible experience in an animal research program. Experience with mouse breeding colonies and/or research-oriented surgical experience is also desirable.

The submission deadline is July 1, 2004, or until the position is filled. To apply for this position, submit CV and the names, addresses, and telephone numbers of four professional references to James "Buster" Hawkins, NHLBI, NIH, 14 Service Rd South, Bldg 14E, Room 105A, Bethesda, MD 20892-5570 [e-mail: *hawkinsJ@nih.gov*]. For additional information, contact Dr. Hawkins [301-451-6743]. NIH is an Equal Opportunity Employer.

Chimp Haven – Louisiana

Chimp Haven, Inc., has several positions open. "We are seeking a *Behaviorist* to provide behavioral care and management for a colony of chimpanzees retired from medical research. Responsibilities include reviewing animal records; acquiring information regarding behavior and background of each chimpanzee; maintaining behavioral measures on chimpanzees; assisting with arrival plans, care, and group formation; oversight of ordering enrichment supplies; supervising the enrichment technician; developing written training materials; planning climbing structures, enrichment devices, and other structures for enrichment; conducting behavioral studies; presenting results in peer-reviewed journals and at meetings; and implementing an animal training program. A bachelor's degree from an accredited university and three years' experience with nonhuman primates, zoo animals, or exotic species are required. An advanced degree, chimpanzee experience, and experience with positive reinforcement training and safety and biohazard procedures are preferred.

"We are seeking a *Colony Manager* to provide care and management for a colony of chimpanzees retired from medical research. Responsibilities include, but are not limited to: hiring, training, and supervising animal care staff; developing standard operating procedures; overseeing work schedules, daily duties, and responsibilities of animal caregivers; preparing for the arrival, care, and socialization of chimpanzees; and working with veterinary and behavioral staff to plan and implement medical and behavioral monitoring programs, including positive reinforcement training and enrichment procedures. Responsibilities will also include maintaining employee and animal records, managing the ordering of supplies and equipment, and overseeing maintenance of animal care equipment and the animal facility. A minimum of five years of experience is required, preferably with chimpanzees. A bachelor's degree from an accredited university, and experience with positive reinforcement training and safety and biohazard procedures are preferred.

"We are seeking an *Enrichment Technician* to provide enrichment for a colony of chimpanzees retired from medical research. Responsibilities include, but are not limited to: collecting, reviewing and maintaining behavioral records; monitoring progress of social group formation; ordering supplies; constructing and providing enrichment devices; providing scheduled enrichment to chimpanzees; training chimpanzees for cooperation and enrichment; participating in colony management decisions; and assisting the Behaviorist with data collection, report and publication generation, and behavioral observation studies. A minimum of two years' experience with nonhuman primates or other exotic species, experience implementing environmental enrichment programs, and computer experience are required. A bachelor's degree from an accredited university with two years' experience implementing enrichment programs for chimpanzees, collecting behavioral data, and training with positive reinforcement is preferred.

"We are seeking a *Veterinary Technician* to provide clinical care for a colony of chimpanzees retired from medical research. Responsibilities include, but are not limited to: ordering and stocking veterinary supplies; reviewing and maintaining medical records; monitoring colony health; maintaining equipment; sedation and recovery of chimpanzees; assisting the veterinarian with physical exams, treatments, and surgery; coordinating laboratory tests; training chimpanzees to cooperate with medical procedures; and participating in colony management decisions. A high school diploma or GED is required, but a bachelor's degree, vet tech degree, or an associate's degree is preferred. Five years' experience with nonhuman primates, medical monitoring, sedation, treatments, suturing, surgical assistance, and computer database entry is required. Experience with safety and biohazard procedures is preferred.

"For all positions, please send cover letter, resume, and salary requirement to Chimp Haven, Inc., Attn: Human Resources, 710 Spring St, 2nd Floor, Shreveport, LA 71101 [318-425-0002; fax: 318-425-4250; e-mail: *careers@chimphaven.org*]. Chimp Haven employees receive competitive salaries and benefits, and work in a team atmosphere. Chimp Haven is an equal opportunity employer."

Primate Behavioral Ecology – New Jersey

The Department of Anthropology, Rutgers University, announces a temporary lecturer position in primate behavioral ecology for the 2004-05 academic year (September

2004 to mid-May 2005). The lecturer will teach two courses each semester (undergraduate and graduate level), as well as mentor students. Salary is $27,000. The PhD must be completed by August, 2004. Applicants should submit a CV and statement of teaching interests, and arrange submission of three letters of recommendation before June 30, 2004. These should be e-mailed to Dr. Ryne Palombit <*palombit@africaonline.co.ke*>, and cc'd to Dr. Dorothy Hodgson <*hodgson@rci.rutgers.edu*>. Please note: because Dr. Palombit is currently in the field with a slow Internet connection, e-mails should not exceed 100 kilobytes (including attachments). Inquiries about the position can be e-mailed to Dr. Palombit. Rutgers University is an Equal Opportunity employer.

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Grants Available: Pathogenesis of SARS Lung Disease

The National Heart, Lung, and Blood Institute (NHLBI; <www.nhlbi.nih.gov/index.htm>) invites research applications to rapidly advance understanding of the pathogenesis of severe acute respiratory syndrome (SARS) in the lung using, among other models and techniques, nonhuman primate models of SARS. The Program Announcement invites R01 applications for both high-risk hypothesis-generating research and hypothesis driven projects (if sufficient preliminary data are available), relevant to the pathogenesis of human lung disease caused by the human SARS coronavirus (SARS-CoV).

SARS, manifested by fever, pulmonary infiltrates, and often respiratory failure and death, infected more than 8000 people worldwide during the winter and spring of 2003. Overall, the death rate for SARS is estimated at 9.6%, but at 50% or more for patients over 60 years of age. The World Health Organization and the Centers for Disease Control (CDC) quickly identified a new human coronavirus, SARS-CoV, which appears to have "jumped" species from an animal reservoir to infect humans and cause SARS. At present, the outbreak has subsided, due to rigorous public health measures and probably to the seasonal nature of the coronavirus life cycle. Questions about viral persistence in asymptomatic animal or human hosts or how SARS might emerge next remain unanswered for now. The mechanism is not known. It has been postulated that this might occur as a result of persistence and shedding of virus by asymptomatic human hosts or as a consequence of human contact with animals that are harboring the virus (possibly civet cats in China). A few new cases have been reported from China in December 2003 and January 2004, but fortunately the disease does not appear to have spread. At least some cases appear to have had contact with civet cats.

At this time, very little is known about the pathogenesis of SARS in the lung. Macaques have been infected in preliminary experiments and are reported to have lung lesions similar to those seen in humans. Attempts to establish rodent models of lung disease have not succeeded yet, but infection can be established in rodents, and models of other animal coronavirus diseases make it likely that a model may be established soon, either by direct infection or by modifying the SARS-CoV genome. Recently, ferrets and domestic cats have been infected with SARS-CoV. These animals can spread infection. The ferrets become ill and die, not apparently from pneumonia, but the model is reproducible.

Pulmonary investigators are encouraged to form collaborations to take full advantage of already established animal models of coronavirus infection and newly developed animal resources. Of equal importance, pulmonary investigators are encouraged to use existing genetically altered mouse resources (e.g., the NHLBI Programs of Genomic Applications) and if necessary to develop novel mice, engineered to incorporate or ablate components of immune function, to study the pathogenesis of SARS lung injury. Collaborations with virologists to develop and study chimeric viruses are encouraged. Chimeras might make it possible to use many existing mouse models and reagents that could quickly provide data on mechanisms of lung damage in SARS.

Examples of the type of research topics and approaches that would be solicited under this program announcement include (but are not limited to) the following: • Determine which lung structural cells (e.g., epithelial, endothelial, etc.) and immune and inflammatory cells support human SARS-CoV infection. • Study viral binding, receptors, co-receptors, replication, persistence, effects on host cell gene expression, and apoptosis. • Investigate immunological aspects of SARS-CoV infection, e.g., elaboration of cytokines, antigen presentation, and effects of co-stimulation with other pathogens. • Address the role of immune responses, age-related issues, surfactant proteins, and the effects of co-morbidities (e.g., underlying emphysema, diabetes) using animal models of SARS. • Elucidate pathogenesis by using animal models to study the effects of vaccines, antiviral drugs, and immune modulating agents that might moderate the manifestations of SARS in the lung.

Direct questions about scientific/research issues to Hannah H. Peavy, Div. of Lung Diseases, NHLBI, 6701 Rockledge Drive, Suite 10018, Bethesda, MD 20892-7952 [301-435-0222; fax: 301-480-3557; e-mail: *peavyh@nhlbi.nih.gov*]. Applications submitted in response to this program announcement will be accepted at the standard application deadlines, which are available at <grants.nih.gov/grants/dates.htm>.

Resources Wanted and Available

Fun Website for Kids

Cartoonist Pauline Comanor, who designed the original "Chunky Monkey", has a Website that includes lessons on how to draw monkeys and apes, as well as insects, foliage, and flowers: <www.chunkymonkey.com/index.htm>.

NCRR Releases New Fact Sheets

The National Center for Research Resources, NIH, has issued two new fact sheets that provide overviews of the General Clinical Research Centers and Biomedical Technology (BT) Resource Centers throughout the country. The BT Resource Centers fact sheet describes the more than 40 specialized BT Resource Centers that develop and provide the scientific community with access to state-of-the-art instruments, methodologies, and computational tools that are not broadly available. Staffed by scientists who have expertise in technology and biology, the Centers also create new tools for biomedical research and identify applications for these tools. The fact sheet summarizes the research, service, training, and dissemination components of the Centers and also provides information about gaining access to or establishing new centers.

These and other fact sheets are available on the Publications, Plans, and Reports page of NCRR's Website: <www.ncrr.nih.gov/publications.asp>; they can also be obtained free of charge from the Office of Science Policy and Public Liaison, NCRR/NIH, 6701 Democracy Blvd, Rm 978, Bethesda, MD 20892-4874 [301-435-0888; fax: 301-480-3558; e-mail: *info@ncrr.nih.gov*].

Community Conservation Project Needs Help

Lake Elementeita is a small flamingo-filled lake in Kenya's Rift Valley province with about 5,000 greater and lesser flamingos and many other aquatic avifaunal species living there. It is the only known breeding site for great white pelicans in Kenya, but it is very close to, and overshadowed by, more spectacular Lakes Naivasha and Nakuru (a world heritage site, with about one million flamingoes).

A group of 28 local people have formed "The Lake Elementeita Eco-friendly Development Centre" to encourage birding and nature walks around the area as well as educate the local people, especially school children, on the need to conserve biodiversity in and around the lake, and tackle the problems threatening the lake.

An education center has been built at the site but needs resources to make it fully functional. Once everything is set up, the center is expected to be self-sustaining as it will charge a fee for services rendered to general visitors, but offer free education to visiting school parties.

This is a wish list for donations needed to help make this project succeed:
(a) Conservation education materials including books, posters, magazines, pamphlets, bulletins, etc.
(b) New or used audio-visual equipment, e.g., slide and/or overhead projectors, screens, TV, video.
(c) Camera, binoculars.
(d) Water chemistry testing kits.
(e) One medium-sized diesel generator and one portable generator for outreach programs.
(f) Field guide books for birds, mammals and trees of east & central Africa.
(g) Office equipment such as desks, chairs, cabinets.
(h) Tents, thermarests, sleeping bags, etc.
(i) Donations in cash to purchase any of the above locally.

For further information on the project please contact Peter Micheni, Jersey Wildlife Preservation Trust-Trained Conservation Education Officer, P.O. Box 15125, Nairobi 00509, Kenya [e-mail: *wildeekenya@yahoo.com*]; or Phillip Gitahi, Wildlife Clubs of Kenya, P.O. Box 20184, Nairobi, Kenya [e-mail: *ecomenteita@yahoo.com*]. – *zoo-biology@yahoogroups.com, April 9, 2004*

Primate Field Guide – Indonesia

Keely Severn [e-mail: *keelysevern@yahoo.co.uk*] posted the following notice to the *Alloprimate* e-mail list on April 11, 2004: "As part of the Primate Conservation Master's degree at Oxford Brookes University, I am planning to produce a full color, fold-out, laminated field guide showing behavioral, ecological, and conservation information for the species and subspecies of nocturnal primates of Indonesia. It will primarily aim to help the taxonomic identification of *Tarsius* and *Nycticebus* subspecies using visual identification and vocalization information. I hope to distribute this guide throughout Indonesia as well as send some copies to specific sites around the world. If you would like a copy or know of a sanctuary, research station, conservation organization, educational program, university, or ecotourism group that you feel would be interested, please contact me or pass on my e-mail address.

AALAS Learning Library Primate Biosafety Course

The American Association for Laboratory Animal Science announces a new course on the AALAS Learning Library (ALL) on a biosafety topic: *Health Risks and Safety Procedures for Working with Nonhuman Primates*. This course covers the procedures for an occupational health program, information on zoonoses including B virus, personal protective equipment, sharps, facility signage, standard microbiological and sanitation practices, basic information about animal restraint procedures, and handling exposures to pathogens. This course is the first

on the AALAS Learning Library to offer streaming video clips on specific procedures.

This course was supported by the AALAS Foundation and the Elizabeth R. Griffin Foundation and is a companion to the videotape and DVD *Primates, Personnel, and Protection,* also released this month. Remember that a videotape and/or DVD (one copy each, please) are distributed at no charge or shipping cost to U.S. institutions.

Users having an account with ALL can access the courses in the Animal Care and Use Library at <www.aalaslearninglibrary.org>.

Molecular Diagnostic Testing

Polymerase chain reaction (PCR) assays are changing the way researchers and animal care facilities monitor infectious diseases of nonhuman primates. The sensitivity, specificity, and speed with which pathogens are identified using molecular assays enable research and health monitoring possibilities unavailable using other techniques alone.

In molecular diagnostic testing, nucleic acid (DNA or RNA) is isolated from a specimen (often blood, but other sample types are possible depending on the target pathogen), then amplified using highly specific primers complimentary to target sequences. References and controls are run simultaneously; amplified sequences are then separated and visualized using state-of-the-art protocols and instrumentation.

Zoologix serves primate facilities with PCR-based diagnostic testing for infectious diseases. "*Zoologix* is owned and managed by board-certified scientists and seasoned laboratory managers with extensive experience in molecular biology, biochemistry, zoology, assay design and lab operations. Our objective is to provide to the primatology community fast, sensitive, and specific infectious disease testing. Over 50 different molecular assays are available on the Zoologix menu. For more information, contact Steven Lloyd, Zoologix, Inc., 9811 Owensmouth Ave, Suite 4, Chatsworth CA 91311 [818-717-8880; fax 818-717-8881; e-mail: *slloyd@zoologix.com*], or see <www.zoologix.com>."

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Research and Educational Opportunities

Postdoctoral Research Training – MDs and PhDs

The Department of Psychiatry at the University of Colorado Health Sciences Center, Denver (Martin Reite, MD, Program Director), is offering postdoctoral research training for MDs (child and general psychiatrists, developmental pediatricians) and PhDs in neuroscience, developmental psychobiology and psychopathology. Funded by the National Institute of Mental Health (NIMH), training emphasizes the neuroscience research tools (molecular, behavioral and psychiatric genetics, functional/structural neuroimaging, cognitive and behavioral analyses) needed to understand complex behavioral and psychiatric disorders. Applications will be accepted now for summer/fall 2004 positions (please see <www.dprgpostdoc.org>). Women and minorities are encouraged to apply. EO/AAE.

Origins of Individual Differences in Impulsivity

As part of the above-described postdoctoral training program, Dr. Mark Laudenslager is specifically seeking a PhD-level individual to be involved in research training focused on a National Institute on Alcohol Abuse and Alcoholism-funded project of gene-environment interactions in setting the trajectory of adolescent impulsivity in bonnet macaques. The candidate must have a background in primatology with a focus on behavioral development and neuroscience. This allied research project focuses on the role of the serotonin transporter gene polymorphism and the quality of early maternal care in expression of the behavioral phenotype of impulsivity. The training program as funded by NIMH emphasizes the neuroscience research tools (molecular, behavioral and psychiatric genetics, functional/structural neuroimaging, cognitive and behavioral analyses) needed to understand complex behavioral and psychiatric disorders. Applications will be accepted now for summer/fall 2004 positions. For program information and application procedures, please see <www.dprgpostdoc.org>. The University of Colorado is committed to diversity and equality in education and employment.

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Volunteer Opportunities

Work with Baboons – South Africa

Global Vision International is looking for volunteers to work at a baboon sanctuary bordering Kruger National Park in South Africa. This sanctuary relies entirely on charitable donations and is desperately in need of your help. Volunteers will be involved in a number of different tasks, including overseeing the baby baboon crèche, playing with the youngsters; cleaning enclosures and water troughs; and maintaining records of the animals, their treatment, and progress. Volunteers are also sometimes involved in release of animals into the wild. The daily work is hard – be prepared to get hot, dirty and dusty – but the results are immensely rewarding.

Full training will be given in all aspects of animal care for this project. During your stay you will learn a huge amount about the baboons, as well as about nature in general. Comfortable accommodation in a wonderful location is provided on site for volunteers, with central bathroom facilities, hot water, and electricity. Food will be purchased in the town and prepared by each volunteer on a rotating basis. Volunteers must provide flights and insurance. We require a minimum four-week stay.

For more information please contact Erica Louise, Global Vision International, St Albans, U.K. [00 44 870 608 8898; fax: 00 44 158 283 4002; e-mail: *info@gvi.co.uk*]; or see <www.gvi.co.uk>.

Dian Fossey Gorilla Fund – Rwanda

Global Vision International has linked up with the Dian Fossey Gorilla Fund to offer volunteers the chance to work in Rwanda assisting in the long-term conservation of the endangered mountain gorilla. It is estimated that there are about 355 mountain gorillas left in the world. The future of the gorillas is most dependent on the protection and survival of the forests in which they live, since they depend on this land for food, safety and normal activities, but the forests are often in danger from growing human populations, and from civil war in the region. Volunteers will be assisting through research, conservation action, education, and partnerships. This is a valuable opportunity to gain experience in this field.

Each position requires different qualifications. However, all volunteers must be fluent in English and French (both written and spoken), have a full driving license, and be willing to commit themselves for at least three months. It is preferable for volunteers to have some international travel experience, in particular within Africa.

Living conditions will vary depending on where you are based but will either be in a house or a guesthouse. All accommodations will be basic but comfortable and will have electricity and running water. Please be prepared for intermittent shortages of electricity and water. Contact Erica Louise at the address above, or see the URL above.

Primate Keepers Needed – Spain

The Mona Foundation is the only primate sanctuary in Spain. Its aim is to provide a better life for primates who have been exploited by people. Here the primates are rehabilitated and socialized into family groups. At the moment, the sanctuary is home to nine chimpanzees and three macaques. The main enclosure is more than 5000 m^2, in which the aim is to provide an environment as close as possible to what they would enjoy in the wild.

The Mona Foundation is looking for hard-working, dedicated people who are interested in helping in its mission. Volunteer duties will depend upon the center's requirements, which vary with the time of year. Volunteer responsibilities include: cleaning, feeding, enrichment, and general maintenance such as gardening, painting, and building work. Volunteers also help with administrative duties and in welcoming visitors, for which good presentation skills are needed.

Voluntary primate keepers must be able to commit to a period of six months working at the sanctuary and be present five days and five nights each week. All voluntary posts are subject to a one-month trial period. To apply for a voluntary position at the Mona Foundation write to <*mona1@fundacionmona.org*>. For more information, see <www.fundacionmona.org>. – *From the* ZooNews Digest – *please mention it in your application*

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Workshop Announcement: European Marmoset Research Group 8th Workshop

A workshop on Macaques and Marmosets in Biological and Biomedical Research will be held August 20-21, 2004, at the Swiss Federal Institute of Technology and University of Zurich, Switzerland. Details and registration are available at <www.emrg.org>. You can also contact Christopher Pryce, Behavioural Neurobiology Lab., Swiss Federal Inst. of Technology-Zurich, Schorenstr. 16, CH-8603 Schwerzenbach, Switzerland [+41 (0)1 655 7386; fax: +41 (0)1 655 7203; e-mail: *pryce@behav.biol.ethz.ch*]; or see <www.behav.ethz.ch>.

News Briefs

Gorilla Shot After Escaping at Dallas Zoo

Police shot and killed a gorilla that escaped from its enclosure at the Dallas Zoo on Thursday and injured three people. One adult and two children, ages 10 and 2, suffered minor injuries from the gorilla and were taken to area hospitals, Deputy Police Chief Daniel Garcia said. He said the three were bitten and scratched. The zoo was evacuated after the animal escaped and police were notified. When the gorilla charged two officers, getting within 15 feet of them, they opened fire, Garcia said. "We were forced to put this animal down," he said.

Garcia said police officers' objective was protecting citizens until authorities could figure out what to do with the gorilla. Diana Gonzalez, a zoo patron, said she saw the animal banging on the door of its enclosure, and then it broke. The gorilla then scampered out of the gorilla pit. Dallas zoo director Rich Buickerood said the primate was an inquisitive 13-year-old western lowland gorilla. He said the animal was likely "extremely excited and extremely fearful while it was out."

He said zoo officials are trying to figure out how the escape happened. Last year, a 300-pound gorilla escaped twice in two months from Boston's Franklin Park Zoo. In the second escape, he strolled around the zoo and the surrounding streets for about two hours and attacked a 2-year-old girl and an 18-year-old woman. Both suffered minor injuries. The animal was sedated with tranquilizer darts. The zoo reopened its gorilla exhibit last month without the escapee, named Little Joe, who now spends his time in a holding area away from the public. – *Associated Press, March 19*

Will State Evict Morgan Island Monkeys?

Almost two years ago, the state of South Carolina decided to evict thousands of rhesus monkeys from Morgan Island near Beaufort. But with a tight state budget, that could change. Since 1979, the island has been the only U.S. free-range breeding colony and the biggest producer of the monkeys, which are valued for scientific research. It is home to 3,000 monkeys who breed about 750 baby monkeys a year. Each year, about 150 yearlings are trapped and shipped to research labs.

The island was acquired by the state for $20 million in 2002. The money came from federal grants used for conservation efforts in the area drained by Ashepoo, Combahee, and Edisto rivers. Later that year, the state Department of Natural Resources Board voted not to renew a lease that allowed the monkey breeding. But since that vote, the state budget has tightened and the state is looking for ways to generate more revenue.

Most of the monkeys are owned by the U.S. Food and Drug Administration (FDA), which leases the property for $787,000 a year. The new Department of Natural Resources Board, which formed six months ago, got its first report on the island last week. The board has the prerogative to review the earlier decision, said Mike McShane, the board chairman. "From a cursory standpoint, [the island] seems to have worked well under private ownership for more than 20 years," he said.

Since the Sept. 11 terror attacks, the federal government has also been pushing for more research into vaccines against biological weapons.

Greg Westergaard, whose Alpha Genesis Inc. manages the breeding operation, said there have only been preliminary discussions about moving the monkeys. "I know the animals are critical to research," he said. "No other facility could do that in terms of sheer numbers." Westergaard has a contract to provide monkeys to the FDA through 2006 and said the agency is negotiating to extend its lease on the island. DNR Director John Frampton said the state plans to discuss the matter with the FDA. "There is a need for monkeys in medical research," he said.

Westergaard said moving the monkeys would stress them and kill "a significant percentage" with disease. It could take a year to catch the animals and move them. Westergaard said the company could move them temporarily to enclosures in Yemassee or Hampton County, but he hasn't made any plans yet. "As December 2004 creeps up, you do wonder what the plan is going to be," he said. – *Associated Press, February 18*

UWA to Control Animal-to-Human Infections

The Uganda Wildlife Authority (UWA) has formed a partnership with Conservation Through Public Health to control the spread of diseases around the protected areas, top wildlife officials have said.

Speaking yesterday, Dr. Zikusoka Kalema, who heads the conservation group, said groups of the endangered mountain gorillas in the recent past contracted scabies, a deadly skin disease, from the human population. Kalema said the apes were man's closest relatives and that diseases also sometimes spread from the animals to the local communities. She also said because people and animals can make each other sick, it is important to merge conservation with public health.

"We have teamed up with UWA to provide health care to people living near the national parks," Kalema said. She said their emphasis was on teamwork and that this was the reason why they had entered into partnership

with UWA to protect wildlife and improve the livelihood of communities.

Lillian Nsubuga, the spokesperson of UWA, said change of attitude in the communities was important in sustaining nature. – New Vision*, 27 March, 2004*

Mysterious Brazil Zoo Animal Deaths Rise to 73

Seventy-three Saõ Paulo Zoo animals have died from poisoning this year, and Brazilian police said on Tuesday they were extending their investigation because they still lacked sufficient evidence to charge suspects. But the leading detective on the case, Clovis Ferreira de Araujo, said the culprits could be caught soon. Speaking to journalists, Araujo said police were looking into groups that might have benefited financially from the animals' deaths.

"The action was intended to weaken the internal controls of the park and with this carry out illicit activities that could generate ill-gotten gains," Araujo said without elaborating. He said the toll now stood at 73, up from the previously announced 67. The dead animals included kangaroos, an elephant, dromedaries, porcupines, and primates. Ten people are being interrogated, of whom six may soon be indicted, but "there are still no clues to order the arrest of these suspects," said Araujo. He added that he would likely request the telephone and bank records of the suspects. The suspects continue working at the zoo. "There are still risks for the animals. I cannot rule out the possibility of new deaths," Araujo said. – © *Reuters, April 6, 2004*

Joe Goes Outdoors – Gorilla Haven

Joe, the gorilla who came to Gorilla Haven from the Gladys Porter Zoo in Brownsville, Texas, last March (see <www.brown.edu/Research/Primate/lpn42-3.html#news>), was permitted to go out in the grass this April for the first time in many years. For pictures and the story of his adventure, see <www.gorilla-haven.org/>.

John Maynard Smith, 1920-2004

John Maynard Smith, Emeritus Professor of Biology at the School of Life Sciences, University of Sussex, passed away on April 19, 2004. In 1965, he founded and became Dean of its School of Biological Sciences and served as Professor there until 1985. He built it up into one of the world's great centers for the study of evolution. See <www.evolutionary-ecology.com/JohnMaynardSmith.html>.

ILAR Addresses Transportation of Lab Animals

The Institute for Laboratory Animal Research (ILAR) recently established a Committee on Guidelines for the Humane Transportation of Laboratory Animals. The Committee is charged with addressing current problems with the transportation of lab animals, including: animal welfare concerns, availability of quality transportation services, overlaps or gaps in regulatory oversight, permitting issues, tissue/specimen transportation, regulatory burden reduction, and potential biosecurity concerns. All species of lab animals will be considered. The Committee's work is sponsored by the National Institutes of Health and the National Centers for Infectious Diseases.

Pet Vervet Repatriated to Zambia from Singapore

In May, 2003, acting on information provided by the International Primate Protection League (IPPL) and the Animal Concerns Research and Education Society (ACRES), the Singapore Agri-Food & Veterinary Authority, assisted by ACRES, confiscated a vervet monkey illegally kept as a pet. This monkey had been illegally imported from South Africa.

ACRES has been working to find a new home for this monkey where he can once again associate with other vervets, and today he makes his journey back to the African continent, to the Munda Wanga Sanctuary in Zambia. This is the first repatriation of a confiscated pet primate from Singapore.

"Blue" will be living in a new, large, open-topped, electrified enclosure, with other vervets. ACRES extends its appreciation to the Singapore Zoo, for taking care of "Blue" and helping with the logistics necessary for his return flight to Zambia. Stichting AAP (a Dutch foundation) is the principal sponsor for this repatriation. Additional sponsors include IPPL, Gorilla Haven, and ACRES. *– from a May 4, 2004, press release by ACRES*

Changes at AAALAC International

The Association for Assessment and Accreditation of Laboratory Animal Care International (AAALAC International) is pleased to announce the restructuring and augmentation of its Executive Office. Effective this summer, AAALAC International's Senior Director, Dr. Kathryn A. Bayne, will relocate to Hawaii and assume the duties of Director of Pacific Rim Activities and Associate Director for Accreditation. A search committee is being formed and will be soliciting applications in the next few weeks to fill her current position of Senior Director in AAALAC International's Rockville, Maryland, U.S.A. office.

Along with the recent formation of a European Section of the Council on Accreditation, and the longstanding involvement of Dr. Egil Berge as Assistant Director for European Activities, this restructuring is another step in AAALAC International's continuing efforts to broaden its scope and better serve the international community. If you have questions or comments regarding the restructuring, please e-mail <*accredit@aaalac.org*>, or see <www.aaalac.org>. *– an announcement by John G. Miller, Executive Director*

Eye Operation Performed on Macaque in Kerala Zoo

A team of doctors in Kerala, India, led by Dr. K. Mahadevan, Assistant Professor of Ophthalmology, attached to the Government Eye Hospital, conducted a cataract surgery on the left eye of a 15-year-old male lion-tailed macaque at the city zoo. They fitted an intra-ocular lens after removing the affected lens. The special lens was supplied by a Baroda-based private company. The macaque, now recovering in the zoo hospital, would be under observation for a week or so, the authorities said.

Mr. Jayakumar, a veterinary doctor in the zoo, claimed that this was the first time in the country that a macaque in captivity had undergone a cataract surgery. Last year, a similar operation was carried on a 17-year-old lioness by the same team of doctors, the authorities said. – *From the Kerala News Channel, May 18, 2004*

The Fight to Save the Eastern Lowland Gorilla

The past decade has been devastating for eastern lowland gorillas. Their numbers are down 70 percent. One major reason for the decline is mining. Coltan, a mineral used in manufacturing cell phones, is mined in the eastern Democratic Republic of Congo, where the gorillas live. Gold is also mined in the area. Logging, clear-cutting of forests for farms, and civil strife have added to the gorillas' population decline. And, as resources become more strained, gorillas are being hunted and eaten.

The Congo is home to almost all of the eastern lowland gorillas in the world. In 1994, there were about 17,000 of the apes. Today that number is down to 5,000.

The Dian Fossey Gorilla Fund International is working with local tribal chiefs to set up nature reserves for the apes. It's one way to get the people of the Congo to become more involved with the region's conservation, especially in light of the fact that they struggling just to get food on the table. Clare Richardson, director of the Gorilla Fund, has seen it firsthand.

"It's very difficult to have people in Africa concerned with conservation and the loss of biodiversity and the loss of these massive areas of rain forest when they're desperately trying to make it from one day to the next," she said. The Gorilla Fund is spending close to $3 million to help set up these local reserves. Part of the money will be used to pay the villagers who work there in an effort to spark their economy and better their living conditions. Richardson says it will be impossible to save the eastern lowland gorillas without a commitment from the people who live there. – *From an article by Sharon Collins on CNN Headline News, May 17, 2004*

Gorilla Dies at San Francisco Zoo

A 29-year-old gorilla died at the San Francisco Zoo less than two weeks after undergoing surgery to remove his diseased right lung. Kubi, a 422-pound silverback western lowland gorilla, underwent the unprecedented procedure May 7. Tuesday morning, keepers said, he was not eating solid food and appeared lethargic. He died about 3:30 p.m.

"We were really encouraged by Kubi's recovery and progress," said Dr. Freeland Dunker, the senior veterinarian at the zoo. "Every minute of the last 10 days was a step in the right direction for him – he was eating, he was moving about, he was interacting with the others in his group – but all along we've been very cautious and knew the first 10 days to two weeks would be critical for him."

Preliminary results of the necropsy performed by Zoo veterinary staff Tuesday night indicated bleeding from an opening of a pulmonary vessel that had abscessed.

Life span for a western lowland gorilla in the wild is 35 years; in captivity, up to 50 years. "Kubi was a tremendous spirit and he leaves a legacy as a gentle and sensitive individual, he'll be missed not only by his family but by his Zoo family," Dunker said. "Lessons learned from his life here at the Zoo will be valuable to others for many years to come." – *From the San Francisco* Chronicle, *May18, 2004*

Sierra Leone Sanctuary Receives U.S. Money

The United States has donated $77,000 to Sierra Leone's Tacugama Chimpanzee Sanctuary for habitat restoration aimed at saving seven endangered primate species in the tiny West African state. The donation, part of which came from the U.S. Fish and Wildlife Service, will expand the sanctuary and pay for electric fencing to encircle it, allowing 30 formerly caged chimpanzees to roam free across the 1,500-hectare enclosure. The decade of rebel war that raged in Sierra Leone until 2001 virtually wiped out the primate populations, sending seven species, including the incredibly rare western chimpanzee, to the brink of extinction. – *Agence France-Presse, May 21*

Second Gorilla Born at Denver Zoo

Denver Zoo celebrated its first gorilla baby birth in 30 years a month ago. A second baby was born early May 29. "With less than a dozen gorilla births a year in the United States, it's truly remarkable to have two births in such a short period of time," said Clayton Freiheit, Denver Zoo president. The sex and weight of the baby is not yet known. The mother, 26-year-old JoRayK, has been keeping the infant close to her body and zookeepers will wait to examine the baby. The other baby, a female gorilla born May 2, was named Tulivu. Zoo workers are raising Tulivu because her mother stopped feeding the baby. "All of these animals are part of a species survival plan. They are part of a breeding program," Bowie said. "The fact that they got so active a few weeks apart is purely coincidental. A great coincidence. But purely coincidental." – *Associated Press, June 1, 2004*

Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

Books

• *Kinship and Behavior in Primates.* B. Chapais & C. M. Berman (Eds.). New York: Oxford University Press, 2004. 520 pp. [Price: $89.50]

Contents: *Introduction:* The kinship black box, by B. Chapais & C. M. Berman.

Part I. Who Are Kin? Methodological Advances in Determining Kin Relationships: Determination of genealogical relationships from genetic data: A review of methods and applications, by P. A. Morin & T. L. Goldberg; Noninvasive genotyping and field studies of free-ranging nonhuman primates, by D. S. Woodruff.

Part II. Kin Compositions: Ecological Determinants, Population Genetics, and Demography: Is there no place like home? Ecological bases of female dispersal and philopatry and their consequences for the formation of kin groups, by L. A. Isbell; Dispersal and the population genetics of primate species, by G. A. Hoelzer, J. C. Morales, & D. J. Melnick; The effects of demographic variation on kinship structure and behavior in cercopithecines, by D. A. Hill.

Part III. Diversity of Effects of Kinship on Behavior: Matrilineal kinship and primate behavior, by E. Kapsalis; Patrilineal kinship and primate behavior, by K. B. Strier; Kinship and behavior among nongregarious nocturnal prosimians: What do we really know? by L. T. Nash; Kinship structure and reproductive skew in cooperatively breeding primates, by J. M. Dietz; Kinship structure and its impact on behavior in multilevel societies, by F. Colmenares; The impact of kinship on mating and reproduction, by A. Paul & J. Kuester.

Part IV. Kin Bias: Proximate and Functional Processes: "Recognizing" kin: Mechanisms, media, minds, modules, and muddles, by D. Rendall; Developmental aspects of kin bias in behavior, by C. M. Berman; The recognition of other individuals' kinship relationships, by D. L. Cheney & R. M. Seyfarth; Constraints on kin selection in primate groups, by B. Chapais & P. Belisle.

Part V. The Evolutionary Origins of Human Kinship: Human kinship: A continuation of politics by other means? by L. Rodseth & R. Wrangham; Residence groups among hunter-gatherers: A view of the claims and evidence for patrilocal bands, by H. Perich Alvarez; Mating, parenting, and the evolution of human pair bonds, by K. Hawkes.

Conclusion: Variation in nepotistic regimes and kin recognition: A major area for future research, by B. Chapais & C. M. Berman.

• *Encyclopedia of Animal Behavior* (3 vols.). M. Bekoff (Ed.). Portsmouth, NH: Greenwood Press, December 2004. 1200 pp. [Price: $349.95; Prepublication Price: $314.96]

• *The Evolution of Thought: Evolutionary Origins of Great Ape Intelligence.* A. E. Russon & D. R. Begun (Eds.). West Nyack, NY: Cambridge University Press, 2004. [Price: $110.00]

Contents: Evolutionary reconstructions of great ape intelligence, by A. E. Russon; Enhanced cognitive capacity as a contingent fact of hominid phylogeny, by D. R. Begun.

Part I. Cognition in Living Great Apes: Introduction, by A. E. Russon; The manual skills and cognition that lie behind hominid tool use, by R. W. Byrne; The cognitive complexity of social organization and socialization in wild baboons and chimpanzees: Guided participation, socializing interactions, and event representation, by S. Taylor Parker; Gestural communication in the great apes, by J. Blake; Great ape cognitive systems, by A. E. Russon.

Part II. Modern Great Ape Adaptation: Introduction, by A. E. Russon; What's in a brain? The question of a distinctive brain anatomy in great apes, by C. E. MacLeod; Life histories and the evolution of large brain size in great apes, by C. Ross; Evolution of complex feeding techniques in primates: Is this the origin of great ape intelligence? By G. Yamakoshi; The special demands of great ape locomotion and posture, by K. D. Hunt; Great ape social systems, by C. P. Van Schaik, S. Preuschoft, & D. P. Watts; Diet and foraging of the great apes: Ecological constraints on their social organizations and implications for their divergence, by J. Yamagiwa.

Part III. Fossil Great Ape Adaptations: Introduction, by D. R. Begun; Paleoenvironments and the evolution of adaptability in great apes, by R. Potts; Cranial evidence of the evolution of intelligence in fossil apes, by D. R. Begun & L. Kordos; Life history and cognitive evolution in the apes, by J. Kelley; Fossil hominoid diets, extractive foraging, and the origins of great ape intelligence, by M. Singleton; Paleontology, terrestriality, and the intelligence of great apes, by D. L. Gebo; Body size and intelligence in hominoid evolution, by C. V. Ward, M. Flinn, & D. R. Begun.

Part IV. Integration: Evolutionary origins of great ape intelligence: An integrated view, by A. E. Russon & D. R. Begun.

• *Apes, Monkeys, Children, and the Growth of Mind*. J. C. Gomez. *The Developing Child Series*. Cambridge: Harvard University Press, 2004. [Price: $39.95].

Children's Books

• *The Importance of Being a Mouse.* A. R. Gernhardt (R. Fisher, Illustrator). Washington, DC: Foundation

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

for Biomedical Research, 2004. <www.fbresearch.org/education>.

Catalogs

• An annotated catalog of the African primate genera *Colobus* and *Procolobus* (Cercopithecidae: Colobinae) in the collections of the American Museum of Natural History. R. O'Leary (Div. of Vertebrate Zoology, American Museum of Natural History, New York, NY 10024 [e-mail: *oleary@amnh.org*]). *American Museum Novitates,* 2003, No. 3399.

The Department of Mammalogy of the American Museum of Natural History houses over 300 specimens of African colobus monkeys. The collection consists of *Procolobus badius, P. verus, Colobus angolensis, C. guereza, C. polykomos, C. satanas*, and *C. vellerosus*. Taxonomic notes, pelage descriptions, and range are noted for each species and subspecies. For each specimen, the following data are given: catalog number, date collected or recorded, sex, age, nature of specimen, locality, name of collector, and measurements.

Journal Contents

• *Laboratory Animals*, 2004, *38*[2].

Contents include: Report of the FELASA Working Group on evaluation of quality systems for animal units, by B. Howard, H. van Herck, J. Guillen, B. Bacon, R. Joffe, & M. Ritskes-Hoitinga; and A study of behavioural responses of non-human primates to air transport and re-housing, by P. E. Honess, P. J. Johnson, & S. E. Wolfensohn.

Magazines and Newsletters

• *Boletín de la Asociación Primatológica Española*, 2004, *11*[1] <www.uam.es/ape>. [Depto de Psicobiología, Buzón 150, Fac. de Psicología, Univ. Complutense de Madrid, Campus de Somosaguas, 28223 Madrid, Spain]

Contents include "The Macaque Genus: New Perspectives", by Jacqueline Donohoe, a report on the Calpe Conference entitled "The Barbary Macaque – Comparative and Evolutionary Perspectives" held in Gibraltar in November, 2003; and "Conoce una Población [Meet a Population of Primates]: Gibraltar and its Macaque Population", a detailed report by J. Cortés and Eric Shaw. (Both articles are in English.)

• *Connection,* Winter/Spring, 2004. [AAALAC International, 11300 Rockville Pike, Suite 1211, Rockville, MD 20852-3035]

• *IPPL News,* May, 2004, *31*[1]. [International Primate Protection League, P.O. Box 766, Summerville, SC 29484]

Contents include articles on the Taiping Four gorillas, a hamadryas baboon going from Bahrain to Wales, the death of a Singapore Zoo photo chimp, the colobus monkeys of Kenya, and problems facing the "Rock Apes" of Gibraltar.

• *The Laboratory Primate Voice,* 2004, *1*[1]. (Laboratory Primate Advocacy Group., P.O. Box 230298, Boston, MA 02123-0298).

Contents include "Five things you can do to help end biomedical research on monkeys and chimpanzees."

• *TPP Newsletter*, 2003, *2*[2, Suppl.]. The Theoretical Primatology Project; <www.robertwilliams.org/tpp>.

Features "A Recipe for a Good Graduate Student?" by R. Dunbar.

Proceedings

• *Cooperation in Primates and Humans: Mechanisms & Evolution.* 4. Göttinger Freilandtage, December 9-12, 2003. *Primate Report,* 2003, Special Issue 66-1.

Reports

• *Annual Report, 2002-2003*. (Primate Foundation of Arizona, P.O. Box 20027, Mesa, AZ 85277-0027).

Special Journal Issues

• Primate cognitive ecology. *American Journal of Primatology,* 2004, *62*[3].

Contents: New perspectives in primate cognitive ecology, by P. A. Garber; Brain growth, life history, and cognition in primate and human evolution, by S. R. Leigh; Wild capuchins (*Cebus capucinus*) fail to use tools in an experimental field study, by P. A. Garber & E. Brown; Use of spatial, visual, and olfactory information during foraging in wild nocturnal and diurnal anthropoids: A field experiment comparing *Aotus, Callicebus,* and *Saguinus*, by J. C. Bicca-Marques & P. A. Garber; Significance of color, calories, and climate to the visual ecology of catarrhines, by N. J. Dominy & P. W. Lucas; Paleoenvironmental basis of cognitive evolution in great apes, by R. Potts; and Human cognitive ecology: An instructive framework for comparative primatology, by J. D. Keller.

• Nonhuman primate and other animal models of women's health. *ILAR Journal*, 2004, *45*[2].

Contents: Introduction: Modeling women's health with nonhuman primates and other animal models, by J. R. Kaplan; Ovarian dysfunction, stress, and disease: A primate continuum, by J. R. Kaplan & S. B. Manuck; Nonhuman primates contribute unique understanding to anovulatory infertility in women, by D. H. Abbott, S. C. Foong, D. K. Barnett, & D. A. Dumesic; Animal studies in endometriosis: A review, by L. Story & S. Kennedy; Hormone replacement therapy and cardiovascular disease: Lessons from a monkey model of postmenopausal women, by J. K. Williams & I. Suparto; Stroke in the female: Role of biological sex and estrogen, by S. J. Murphy, L. D. McCullough, & J. M. Smith; Sex hormones, insulin sensitivity, and diabetes mellitus, by C. M. Bruns & J. W. Kemnitz; Hormonal therapies and osteoporosis, by C. P. Jerome; Cognition, mood disorders, and sex hormones, by C. A. Shively & C. L. Bethea; Usefulness of the monkey model

to investigate the role of soy in postmenopausal women's health, by S. E. Appt; and Role of the nonhuman primate for research related to women's health.

• Social learning and imitation. *Learning and Behavior*, 2004, *32*[1].

Contents include: Socially-biased learning in monkeys, by D. M. Fragazy & E. Visalberghi; Approaches to the study of traditional behaviours of free-living animals, by B. G. Galef, Jr.; Social learning about predators, by A. S. Griffin; Social learning strategies, by K. N. Laland; Distinguishing social and asocial learning using diffusion dynamics, by S. M. Reader; Influences of social learning on mate choice decisions, by D. J. White; and How do apes ape? By A. Whiten, V. Horner, C. Litchfield, & S. Marshall-Pescini.

• Cognitive neuroscience. *Current Opinion in Neurobiology,* 2004, *14*[2].

Contents include: The prefrontal cortex and working memory: Physiology and brain imaging, by D. Passingham & K. Sakai; What electrical microstimulation has revealed about the neural basis of cognition, by M. R. Cohen & W. T. Newsome; and Episodic memory in nonhumans: What, and where, is when? By R. R. Hampton & B. L. Schwartz.

• Program and abstracts of the 27th annual meeting of the American Society of Primatologists, June 8-11, 2004. *American Journal of Primatology,* 2004, *62*[Suppl. 1].

• Mammalian genome special. *Nature*, 2004, *429*[6990].

"A snapshot of genome research and medical applications, featuring the first sequenced chimpanzee chromosome and an accompanying web focus, and several additions to our ongoing human genome web focus, with chromosomes 9 and 10, as well as a new analysis of the quality of the human genome sequence."

Anatomy and Physiology

• The scaling of frontal cortex in primates and carnivores. Bush, E. C., & Allman, J. M. (Biology Division, California Institute of Technology, Pasadena, CA 91125 [e-mail: *bush@caltech.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 3962-3966.

"Size has a profound effect on the structure of the brain. Many brain structures scale allometrically, that is, their relative size changes systematically as a function of brain size. Here we use independent contrasts analysis to examine the scaling of frontal cortex in 43 species of mammals including 25 primates and 15 carnivores. We find evidence for significant differences in scaling between primates and carnivores. Primate frontal cortex hyperscales relative to the rest of neocortex and the rest of the brain. The slope of frontal cortex contrasts on rest of cortex contrasts is 1.18 (95% confidence interval, 1.06-1.30) for primates, which is significantly greater than isometric. It is also significantly greater than the carnivore value of 0.94 (95% confidence interval, 0.82-1.07). This finding supports the idea that there are substantial differences in frontal cortex structure and development between the two groups."

• Urinary testosterone metabolite levels in captive bonobos: Relationship with age. Sannen, A., Van Elsacker, L., Eens, M., & Heistermann, M. (Dept of Biology, Lab. of Ethology, Univ. of Antwerp, Universiteitsplein 1, BE.2610 Wilrijk, Belgium [e-mail: *adinda@uia.ua.ac.be]*). *Folia Primatologica*, 2004, *75*, 107-110.

"Despite the importance of testosterone in the biology of hominoids, to date knowledge on this topic in bonobos *(Pan paniscus)* is scarce. To offer basic information on testosterone levels in this species, we explored the unknown relationship of testosterone with age. Typically, testosterone levels change throughout life according to the changing needs of an individual. These variations have been most thoroughly studied in humans."

• Colour discrimination learning in black-handed tamarin (*Saguinus midas niger*). Passoa, D. M. A., Araujo, M. F. P., Tomaz, C., & Pessoa, V. F. (V. F. P., Lab. de Neurociências e Comportamento, CFS, IB, Univ. de Brasília, CEP 70910–900 Brasília, DF, Brazil [e-mail: *vpessoa@unb.br*]). *Primates*, 2003, *44*, 413-418.

Color is one cue that monkeys use for perceptual segregation of targets and to identify food resources. For fruit-eating primates such as *Saguinus*, an accurate color perception would be advantageous to help find ripe fruits at a distance. The color vision abilities of black-handed tamarins were assessed through a discrimination learning paradigm using Munsell color chips as stimuli. Pairs of chips were chosen from an early experiment with protan and deutan humans. The monkeys (three males and one female) were tested with stimuli of the same hue, but different brightness values, in order to make sure that discriminations were based on color rather than brightness cues. The results showed that the female, but not the males, presented an above-chance performance for stimuli resembling hue conditions under which tamarins forage (oranges *vs* greens). Color vision in *S. m. niger* is discussed according to the advantages and disadvantages of dichromatism in daily search for food as well as to aspects regarding polymorphism in New World monkeys.

Animal Models

• Where is the evidence that animal research benefits humans? Pound, P., Ebrahim, S., Sandercock, P., Bracken, M. B., & Roberts, I. (I. R., London School of Hygiene & Tropical Med., London WC1B 3DP, U.K. [e-mail: *Ian.Roberts@lshtm.ac.uk*]). *British Medical Journal*, 2004, *328*, 514-517.

"Clinicians and the public often consider it axiomatic that animal research has contributed to the treatment of human disease, yet little evidence is available to support this view. Few methods exist for evaluating the clinical relevance or importance of basic animal research, and so

its clinical (as distinct from scientific) contribution remains uncertain. Anecdotal evidence or unsupported claims are often used as justification – for example, statements that the need for animal research is 'self evident' or that 'Animal experimentation is a valuable research method which has proved itself over time.' Such statements are an inadequate form of evidence for such a controversial area of research. We argue that systematic reviews of existing and future research are needed."

• Cervical and vaginal epithelial neoplasms in cynomolgus monkeys. Wood, C. E., Borgerink, H., Register, T. C., Scott, L., & Cline, J. M. (Comp. Med. Clinical Research Center, Wake Forest Univ. Health Sciences, Medical Center Boulevard, Winston-Salem, NC 27157-1040 [e-mail: *chwood@wfubmc.edu*]). *Veterinary Pathology*, 2004, *41*, 108-115.

Papillomavirus-associated cervical cancer is the second most common neoplasm in women but has rarely been reported in animals. This report describes cervical and vaginal intraepithelial neoplasms identified in routine histologic specimens obtained from 20 (5.2%) of 385 female cynomolgus macaques (*Macaca fascicularis*) being used in long-term studies. Lesion incidence was similar in both control and hormonally treated animals (4.7% and 5.5%, respectively). Neoplasms included benign vaginal papillomas, mild to severe intraepithelial dysplasias, and two invasive cervical carcinomas. Common morphologic features included koilocytosis, nuclear atypia, and expansion of the basal epithelium. Selective staining of lesions with at least one of three papillomavirus antibodies was observed in all cases (20 of 20). In contrast, immunostaining of lesions was negative for Epstein-Barr–related virus proteins (0 of 20). The unique similarities between the observed lesions and those seen in women suggest that macaques may provide a suitable animal model for study of papillomavirus oncogenesis.

Animal Welfare

• Husbandry refinements for rats, mice, dogs and non-human primates used in telemetry procedures: Seventh report of the BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement, Part B. Hawkins, P., Morton, D. B., Bevan, R., Heath, K., Kirkwood, J., Pearce, P., Scott, L., Whelan, G., & Webb, A. (Research Animals Dept, RSPCA, Wilberforce Way, Southwater, West Sussex RH13 9RS, U.K.). *Laboratory Animals*, 2004, *38*, 1-10.

This article follows on from Part A, published in the last issue of *Laboratory Animals* (*37*[4]). Together they form a report that is intended to help scientists, animal technicians, veterinarians and members of ethics or animal care and use committees to refine all aspects of telemetry procedures, from the project planning stage through to reporting finished research. This part addresses the selection, housing and care of rats, mice, dogs and primates used in telemetry studies. Part A focused on refinements in telemetry procedures from the project planning stage through to reporting finished research. It is strongly recommended that both reports be used together to ensure that suffering is minimized and welfare improved throughout the lives of animals used in telemetry studies. Guidance for ethics or animal care and use committees based on the recommendations in Parts A and B is also available at <www.lal.org.uk/telemetry/>.

• Animal Welfare; Transportation of Animals on Foreign Air Carriers. Department of Agriculture, Animal and Plant Health Inspection Service. *Federal Register,* 2004, *69,* 17899-17901.

On October 10, 2003, the Animal and Plant Health Inspection Service published a determination to regulate, notifying the public of their intention to begin applying the Animal Welfare Act (AWA) regulations and standards for the humane transportation of animals in commerce to all foreign air carriers operating to or from any point within the United States, its territories, possessions, or the District of Columbia to ensure that any animal covered by the AWA, whether coming into, traveling from point to point in, or leaving the United States, its territories, possessions, or the District of Columbia, will be provided the protection of the AWA regulations and standards. This document responds to several issues raised in comments submitted by the public regarding this determination to regulate and confirms the effective date specified in that document.

Behavior

• Dispersed male networks in western gorillas. Bradley, B. J., Doran-Sheehy, D. M., Lukas, D., Boesch, C., & Vigilant, L. (Max Planck Inst. for Evolutionary Anthropology, Deutscher Platz 6, D-04103 Leipzig, Germany [e-mail: *bradley@eva.mpg.de*]). *Current Biology*, 2004, *14*, 510-513.

"Although kin-selection theory has been widely used to explain the tendency of individuals to bias beneficial behaviors towards relatives living within the same social group, less attention has focused on kin-biased interactions between groups. For animal societies in which females emigrate, as is the case for mountain gorillas (*Gorilla beringei beringei*), encounters between males in different groups often involve aggressive displays that can escalate to physical violence and fatal injuries. However, recent findings on the little-studied western gorilla (*G. gorilla*) indicate that interactions between social groups occur more frequently than they do in mountain gorillas and are often, although not always, surprisingly nonaggressive. We investigated the pattern of genetic relationships between individuals of different groups and found evidence suggesting a previously unrecognized "dispersed male network" social structure in western gorillas in which the single males leading social groups were usually related to one or more nearby males. This may provide a basis for extra-group, kin-biased behaviors and may explain the reported

peaceful intergroup interactions. Furthermore, these results suggest that a patrilocal social structure, in which males remain in their natal region and potentially benefit from kin associations, is a feature unifying African apes and humans."

• Microhabitat preference and vertical use of space by patas monkeys (*Erythrocebus patas*) in relation to predation risk and habitat structure. Enstam, K. L., & Isbell, L. A. (Dept of Anthropology/Linguistics, Sonoma State Univ., 1801 East Cotati Ave, Rohnert Park, CA 94928 [e-mail: *karin.enstam@sonoma.edu*]). *Folia Primatologica*, 2004, *75*, 70-84.

"Habitat structure can be important in determining habitat preference of animals because it is often closely linked to factors that affect survival and reproduction, such as food availability and predation risk. Here we examine the ways in which microhabitat structure and predation risk affect the habitat preference of wild patas monkeys. Patas monkeys in Kenya are typically restricted to *Acacia drepanolobium* habitat, but within our study group's home range, there are two distinct microhabitats, one with taller trees ('tall microhabitat') and one with apparently perennially shorter trees ('short microhabitat'). Examination of ranging behavior indicates that the patas monkeys preferred the tall microhabitat. In the tall microhabitat, focal animals climbed into trees that were significantly taller than average, indicating that they preferred tall trees. Female patas monkeys spent more time scanning from tall trees than from short trees and detected predators only from taller than average trees, based on alarm call data. Their use of tall trees may have decreased their predation risk by increasing their ability to detect predators. We found no evidence of increased food availability or reduced predator presence in the tall microhabitat that could contribute to the monkeys' preference for the tall microhabitat."

• Differences in aerial and terrestrial visual scanning in captive black tufted-ear marmosets (*Callithrix penicillata*) exposed to a novel environment. Barros, M., Alencar, C., & Tomaza, C. (C. T., Dept of Physiological Sciences, Inst. of Biology, Univ. of Brasilia 70910-900 Brasilia, DF, Brazil [e-mail: *ctomaz@unb.br*]). *Folia Primatologica*, 2004, *75*, 85-92.

Aerial and terrestrial visual scanning were investigated in captive black tufted-ear marmosets exposed to a novel environment. Naive adult subjects (n = 24) were individually exposed to a figure-eight maze during seven 30-min trials, 48 h apart. Habituation to the maze was observed, as indicated by the significant decrease in locomotion. The frequency of aerial scanning, however, remained elevated throughout the seven trials, while its duration rapidly increased to high levels. Frequency and duration of terrestrial scanning persisted at constant low rates, differing significantly from aerial scanning. Males and females did not differ significantly. The different impact of aerial versus terrestrial predators could have a significant influence on vigilant behavior in this species. Thus, visual scanning is an important and highly organized anti-predation strategy in marmosets.

• Transfer from the natal group is related to presence of immature relatives in orphaned male rhesus macaques (*Macaca mulatta*). Waitt, C., Gerald, M. S., & Berard, J. (Dept of Psychology, Univ. of Stirling, Stirling, FK9 4LA Scotland [e-mail: *cw5@stir.ac.uk*]). *Folia Primatologica*, 2004, *75*, 101-103.

"Rhesus macaques live in multimale/multifemale social groups, characterized by male natal emigration at puberty and repeated transfer throughout adulthood. Transfer from the natal group generally occurs in males at 4 to 6 years of age, although transfer age can vary considerably between individuals. Male natal rank, largely determined by maternal rank, explains some variation in emigration age, but other factors remain unclear. Although orphaning is reported not to influence timing of male transfer in Japanese macaques or rhesus macaques, the role of immature kin has not been examined in these cases. We investigated whether the presence of closely related immature maternal relatives influences natal transfer in orphaned rhesus macaques."

• Three apparent cases of infanticide by males in wild white-faced capuchins (*Cebus capucinus*). Manson, J. H., Gros-Louis, J., & Perry, S. Max Planck Inst. for Evolutionary Anthropology, Deutscher Platz 6, DE.04103 Leipzig, Germany [e-mail: *manson@eva.mpg.de*]). *Folia Primatologica,* 2004, *75,* 104-106.

"Infanticide by male primates is widespread, though debate continues about its adaptive significance. Here we report one observed and two inferred cases of infanticide by adult male white-faced capuchins at Lomas Barbudal Biological Reserve, Costa Rica, a site where observations have been conducted since 1990 on one group (Abby's group), since 1996 on Rambo's group, and sporadically since 2000 on Splinter group, which fissioned from Rambo's group in late 1999. These three cases join two published accounts of infanticide by males of this species at the nearby Santa Rosa site."

• Spatial rotations and transpositions in orangutans (*Pongo pygmaeus*) and chimpanzees (*Pan troglodytes*). Call, J. (Max-Planck-Inst. for Evolutionary Anthropology, Inselstrasse 22, 04103 Leipzig, Germany [e-mail: *call@eva.mpg.de*]). *Primates*, 2003, *6*, 347-357.

This study investigated the ability of three chimpanzees and three orangutans to track the position of a reward after a series of displacements. The reward was placed under one of two opaque containers resting on a platform. Experiment 1 investigated rotational displacements in which the platform was rotated 0°, 180°, or 360°. Experiment 2 investigated transpositional displacements in which the platform remained stationary while the containers either remained stationary, or swapped their positions (in a one-,

two-, or three-step sequence). In both experiments, the initial position of the reward was indicated either by directly showing the reward under the containers, or by placing a landmark, which had been previously associated with the reward, on top of the baited container. Subjects successfully tracked the reward through rotations and transpositions when they had seen it, but their performance substantially deteriorated when the landmark indicated the reward's initial position, even though subjects successfully used the landmark to find the reward in the absence of displacements. This decrease was especially pronounced in rotational displacements. A language-trained orangutan outperformed all the other apes and solved all problems.

• Sex differences in learning in chimpanzees. Lonsdorf, E. V., Eberly, L. E., & Pusey, A. E. (Dept of Ecology, Evolution & Behavior, Univ, of Minnesota, Saint Paul, MN 55108 [e-mail: *elonsdorf@lpzoo.org*]. *Nature*, 2004, *428*, 715-716.

"The wild chimpanzees in Gombe National Park, Tanzania, fish for termites with flexible tools that they make out of vegetation, inserting them into the termite mound and then extracting and eating the termites that cling to the tool. Tools may be used in different ways by different chimpanzee communities according to the local chimpanzee culture. Here we describe the results of a four-year longitudinal field study in which we investigated how this cultural behavior is learned by the community's offspring. We find that there are distinct sex-based differences, akin to those found in human children, in the way in which young chimpanzees develop their termite-fishing skills."

• A pacific culture among wild baboons: Its emergence and transmission. Sapolsky, R. M., & Share, L. J. (Dept of Biological Sciences, Stanford Univ., Stanford, CA 94305 [e-mail: *sapolsky@stanford.edu*]). *PloS Biology*, 2004, *2*[4], <www.plosbiology.org>.

"Reports exist of transmission of culture in nonhuman primates. We examine this in a troop of savanna baboons studied since 1978. During the mid-1980s, half of the males died from tuberculosis; because of circumstances of the outbreak, it was more aggressive males who died, leaving a cohort of atypically unaggressive survivors. A decade later, these behavioral patterns persisted. Males leave their natal troops at adolescence; by the mid-1990s, no males remained who had resided in the troop a decade before. Thus, critically, the troop's unique culture was being adopted by new males joining the troop. We describe (a) features of this culture in the behavior of males, including high rates of grooming and affiliation with females and a "relaxed" dominance hierarchy; (b) physiological measures suggesting less stress among low-ranking males; (c) models explaining transmission of this culture; and (d) data testing these models, centered around treatment of transfer males by resident females."

• Habitual cave use and thermoregulation in chacma baboons (*Papio hamadryas ursinus*). Barett, L., Gaynor, D., Rendall, D., Mitchell, D., & Henzi, S. P. (Dept of Psychology, Univ. of Central Lancashire, Preston PR1 2HE, U.K. [e-mail: *phenzi@uclan.ac.uk*]). *Journal of Human Evolution*, 2004, *46*, 215-222.

"The willingness to utilize caves as shelters is held to have been important to early humans but dependent on pyrotechnology. Despite anecdotal evidence that nonhuman primates will also exploit caves, there has as yet been no detailed account of such exploitation or of the reasons underlying it. Here we provide the first such data, on the frequency and patterning of the use of an underground cave system by baboons – and show that usage is determined, at least in part, by above-ground temperatures."

• Social dynamics of captive western lowland gorillas living in all-male groups. Stoinski, T. S., Kuhar, C. W., Lukas, K. E., & Maple, T. L. (TECHlab, Zoo Atlanta, 800 Cherokee Ave, Atlanta, GA 30315 [e-mail: *tsoinski@zooatlanta.org*]). *Behaviour,* 2004, *141,* 169-195.

Male mammals show considerable variation in their association (e.g. single-male, multi-male, all-male groups) and relationship (e.g. affiliative versus intolerant) patterns. Although a number of primates have been observed to form all-male groups, studies of the social dynamics of these groups are limited. This study examined the social interactions of 25 male western lowland gorillas living in nine captive all-male groups. Over 1,300 hours of data were collected using group scan and all-occurrence sampling methodologies. Groups were cohesive, with males spending approximately one-third of their time within 5 meters of another individual. Although complete linear dominance hierarchies within a group were not observed, dominance relationships between individuals were evident for the majority (66%) of dyads. Social interactions varied as a function of age, with subadults engaging in more affiliative behavior and less non-contact aggression than either blackbacks or silverbacks. Visual/olfactory access to females increased non-contact aggression between males. Such results are similar to those found for all-male groups of mountain gorillas in the wild and demonstrate that all-male groups can be a cohesive social unit in this species. They also raise the questions of why all-male groups have rarely been observed in wild populations and how social, ecological and anthropogenic factors influence male sociality.

Care

• Effects of parametric feeding manipulations on behavioral performance in macaques. Taffe, M. A. (Dept of Neuropharmacology, CVN-7, Scripps Research Inst., 10550 North Torrey Pines Rd, La Jolla, CA 92037 [e-mail: *mtaffe@Scripps.edu*]). *Physiology & Behavior*, 2004, *81*, 59-70.

Early experimental psychologists made broad use of knowledge that is undoubtedly as old as animal domestica-

tion, i.e., that the power of appetitive reinforcement is enhanced by restricting the subjects' access to food. This has led to the nearly universal practice of restricting common laboratory rodent and avian subjects to 85% of free-feeding weight for operant experiments. Appetitive operant procedures in nonhuman primates (NHPs) vary more widely, in part because of the time required for such animals to reach mature weight and greater individual variability in body size compared with inbred laboratory species. In addition, many NHPs will grow obese under true ad-libitum feeding. Therefore, food restriction protocols for monkeys tend to be highly individualized and conducted on the basis of laboratory experience within a given model. The present study was undertaken to determine to what extent short-term, ad-libitum food consumption in rhesus macaques would impair performance on an established neuropsychological testing battery. A second part of the study was to formalize food-restriction parameters to determine what degree of restriction was required to produce consistent behavioral performance. Results show clearly that behavioral performance on a range of tasks is detrimentally affected by short-term, ad-libitum chow feeding, even when the reinforcer is highly preferred or the tasks are well trained. Furthermore, it is shown that maintenance of weekly chow intake in the range of 70–85% of National Research Council recommendations for metabolizable energy is necessary for consistent behavioral responding.

• Introducing a fourth primate species to an established mixed-species exhibit of African monkeys. Wojciechowski, S. (Primate Dept, Brookfield Zoo, 3300 Golf Rd, Brookfield, IL 60513 [e-mail: *shwojcie@BrookfieldZoo.org*]). *Zoo Biology*, 2004, *23*, 95-108.

Five red-capped mangabeys (*Cercocebus torquatus*) were gradually introduced to an established mixed-species exhibit containing six black and white colobus, seven mandrills, and six sooty mangabeys. Interspecific interactions were documented throughout the 3-month introduction period and for an additional 3 months immediately thereafter. In addition, each species' behavior and exhibit use were documented before and after the addition of the fourth species. Minimal interactions were observed between the red-capped mangabeys and the colobus or mandrills, and neither species was significantly affected by this addition. Many affiliative and aggressive interactions and changes in behavior were documented in the sooty mangabeys. However, this study shows that even closely related allopatric species can coexist in a captive environment, and the animals can benefit from this association.

• Causes of mortality in captive cotton-top tamarins (*Saguinus oedipus*). Leong, K. M., Terrell, S. P., & Savage, A. (A. S., Disney's Animal Kingdom, P.O. Box 10,000, Lake Buena Vista, FL 32830 [e-mail: *anne.savage@disney.com]*). *Zoo Biology*, 2004, *23*, 127-137.

"Cotton-top tamarins have been housed in captivity in the United States for over five decades. These animals initially were managed in biomedical and research facilities, and more recently have been kept in zoos as well. Although the causes of mortality in captive cotton-top tamarins have been a topic of investigation for biomedical colonies, they have not been addressed for the North American zoo population. In this retrospective study we review the causes of mortality in the AZA Cotton-top Tamarin Species Survival Plan (SSP)© population during 1997-2001 to assess current husbandry practices and assist in further developing effective husbandry and management programs for this endangered species."

• Development of a system for individual feeding of baboons maintained in an outdoor group social environment. Schlabritz-Loutsevitch, N. E., Howell, K., Rice, K. Glover, E. J., Nevill, C. H., Jenkins, S. L., Cummins, L. B., Frost, P. A., McDonald, T. J., & Nathanielsz, P. W. (P. W. N., NYU School of Med., 550 First Ave, 9E2 NBV, New York, NY 10016 [e-mail: *peter.nathanielsz@msnyuhealth.org*]). *Journal of Medical Primatology*, 2004, *33*, 117-126.

"We developed a system that allows individual feeding of adult baboons, 8–15 years of age, maintained in an outdoor group social environment. The purpose of the system is to allow careful monitoring and control of individual diet. Baboons were housed in two group cages, 16 females and a single male in one and 12 females and a single male in the other. Baboons exited the group cage once daily and passed along a chute and over a scale into individual cages where they received their individual diets. Food intake was monitored during their 2-hour stay in the individual cages. Baboons rapidly learned to use this system. Food intake and weight were stable within 20 days. Food consumed decreased during the period of sexual receptivity. The maintenance of the group social environment allowed observations on the group's dominance structure and the relationship of dominance to food consumption. Speed of food access in the group cage was related to dominance. Dominance was not related to food consumed in individual cages. The system permits study of many variables related to behavior and food intake while still retaining critical social interactions."

• *AAZK Enrichment Notebook* (3rd Ed.). CDROM Version. American Association of Zoo Keepers, Inc., 2004. 455 pp. (Price: AAZK Member $25.00; Non-Member $40.00. Overseas orders: $35 and $50. See <www.aazk.org>.)

This publication includes many facets of animal enrichment and is indexed for easy reference. The sections include an Overview of Enrichment, Enrichment Links, Enrichment Suppliers, Suggested Guidelines, Safety Considerations, Lists of Browse Plants and Toxic Plants, Cookbook Recipes for Enrichment, Enrichment Ideas/Devices (organized by category), Sample Enrichment

Forms (currently used in zoological facilities), and an extensive Enrichment Bibliography.

• Looking after animals kept in research laboratories. Anonymous, *AWI Quarterly*, 2004, *53*[2], 14-14: <www.awionline.org/pubs/Quarterly/04-53-2/532p14.htm>.

Conservation

• Changes in locomotor and foraging skills in captive-born, reintroduced golden lion tamarins (*Leontopithecus rosalia rosalia*). Stoinski, T. S., & Beck, B. B. (Manager of Conservation Partnerships, Zoo Atlanta, 800 Cherokee Ave., Atlanta, GA 30315 [e-mail: *tstoinski@zooatlanta.org*]). *American Journal of Primatology*, 2004, *62*, 1-13.

The behavior of reintroduced, captive-born animals is understudied, limiting the scientific understanding and utility of reintroduction as a conservation tool. This work describes changes in locomotor and foraging behaviors in captive-born golden lion tamarins over the first 18 months after their release into the wild. The subjects included 73 individuals living in and around the Poço das Antas Biological Reserve in Brazil between 1984 and 1996. The differences between animals that survived 6 months after release and those that did not indicate that initial deficiencies in locomotor and foraging abilities are related to survival. Behavioral changes in both juvenile and adult individuals during the first 6 and 18 months after release appear to be primarily related to locomotor abilities; however, the effect of provisioning on foraging abilities is unknown. Juvenile animals showed a larger number of changes relative to adults during the first 6 and 18 months, suggesting that placing tamarins into complex environments early in development may promote the expression of natural behaviors and increase survival opportunities after their release. However, when this is not possible, the best mechanism for reintroducing adult members of this species involves intensive post-release support rather than pre-release training, which confers few behavioral advantages. Recommendations for future reintroductions with this and other species include introducing animals to complex environments early in development, and collecting data systematically.

• Demographic changes over thirty years in a red howler population in Venezuela. Rudran, R., & Fernandez-Duque, E. (Department of Conservation Biology, National Zoological Park, Smithsonian Institution, Washington, DC 20008 [e-mail: *rrudran@crc.si.edu*]). *International Journal of Primatology*, 2003, *24*, 925-947.

"During a 30-year span (1969–1999) the annual growth rate of a Venezuelan red howler (*Alouatta seniculus*) population fluctuated irregularly, but its size increased, remained stable for a short while, and finally declined sharply. The increase took place in three stages, and began as an increase in the size of established groups. The next two stages of population increase were due to the formation of new groups and their subsequent increases in size. These two stages likely occurred because of habitat regeneration, which increased the areas where newly formed groups could establish home ranges. The population decline of 74% was most likely due to disease. However, new groups died out more rapidly than established groups, indicating that food shortages, especially in recently regenerated areas, may also have contributed to the population crash. The food shortages could have been caused by unpredictable periods of drought, which may explain the irregular size fluctuations of the study population. Since many howler species show irregular size fluctuations and sharp declines, their demographic features may reflect adaptations to unpredictable events like droughts and disease epidemics. On this premise we explain the preponderance of unimale groups and female-biased birth sex ratios at low densities and the dispersal of both sexes as adaptations for increasing a population rapidly after a decline. Within the population, mortality of small juvenile females was higher in multimale than in unimale groups, though medium juvenile and older immature females were better represented in multimale than in unimale groups. These results may be explained in terms of group composition and the mating systems in red howlers."

• Can captive-bred *Varecia variegata variegata* adapt to a natural diet on release to the wild? Britt, A., & Iambana, B. R. (Herbarium, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AB, U. K. [e-mail: *a.britt@rbgkew.org.uk*]). *International Journal of Primatology,* 2003, *24,* 987-1005.

"We compared the diets of 3 groups of released captive-bred *Varecia variegata variegata* (RG1, RG2, RG3) in the Betampona Reserve to that recorded for a resident wild group, between 1998 and 2001. We investigated whether the released captive-bred *Varecia*, from differing captive backgrounds, could cope with seasonal changes in climate and consequent food availability, finding sufficient food to meet their nutritional requirements and dietary choices and selection. We collected data on diet, including plant part, family, genus and, if known, species, as well as data on seasonal variation in dietary composition. Dietary overlap is significant at the familial level between RG1/RG3 and the wild group. There is some dietary overlap between RG2 and the wild group, but it is not significant. In general, RG1 and RG3 more closely followed the dietary choices and seasonal changes in diet exhibited by the wild group. We conclude that *Varecia* raised in free-ranging environments are better adapted to meet their nutritional requirements in the wild than those raised in cages are. However, even they struggle to deal with seasonal climatic changes and consequent changes in food availability. We suggest that future reintroduction efforts for primates include attempts to integrate released individuals rapidly into wild groups so that they can learn to cope with a seasonal environment through direct observation of wild conspecifics."

• Long-term impacts of logging on forest diversity in Madagascar. Brown, K. A., & Gurevitch, J. (Dept of Ecology & Evolution, Stony Brook Univ., Stony Brook, NY 11794-5245 [e-mail: *kbrown@life.bio.sunysb.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 6045-6049.

Ecological perturbations can either be necessary for maintaining tropical forest diversity or responsible for its decline, depending on the scale, nature, and frequency of the disturbance. Anthropogenic disturbances such as logging and subsistence agriculture may promote the establishment of nonnative, invasive plant species, potentially affecting forest structure and diversity even long after the perturbation has ceased. We investigated the impacts of logging 50 and 150 years ago on tropical forest vegetation in Madagascar, a "hotspot" of biodiversity. Logging was the overriding factor influencing establishment of nonnative plants. Sites once logged never recovered native species diversity because of the dominance and persistence of invasive species.

Development and Aging

• Relations among birth condition, maternal condition, and postnatal growth in captive common marmoset monkeys (*Callithrix jacchus*). Tardif, S. D., & Bales, K. L. (Southwest NPRC, P.O. Box 760549, San Antonio, TX 78245-0549 [e-mail: *stardif@icarus.sfbr.org*]). *American Journal of Primatology,* 2004, *62*, 83-94.

The present study characterizes the relationships among maternal condition, litter size, birth condition, and growth in body weight for a population of common marmosets. The subjects of the study were marmosets born into a single colony between 1994 and 2001. Three sets of analyses were conducted to answer the following questions: 1) Is there a relationship between litter size, maternal condition, and birth condition? In the study population, maternal body weight, maternal age, litter size, and birth condition were related in a complex fashion. Birth weight and prenatal long-bone growth, as reflected in knee-heel length, were both related to maternal age, with older mothers supporting higher prenatal growth. Age and maternal condition appeared to interact as determinants of long-bone growth, as the combination of older and larger mothers resulted in significantly longer knee-heel lengths in their offspring. 2) Is there a relationship between birth condition or maternal condition and subsequent growth or final adult size? The early growth rate in this population was similar to early growth rates reported for three different marmoset colonies, suggesting that early growth may be relatively inflexible in this species. However, within this population, the variation that did occur in early growth rate was related to birth weight and maternal weight. Later growth and adult weight were related to birth weight and litter size: small twin infants displayed slower later growth rates and were smaller as adults than twins that began life at a higher birth weight, while the birth weight of triplets was not related to adult size. In these marmosets, small infants that were the result of increased litter size differed from small infants whose small birth size resulted from other factors. This reinforces the proposal that the causes of low birth weight will be relevant to the development of the marmoset as a model of prenatal environmental effects.

• Sexual behavior and hormonal estrus cycles in captive aged lowland gorillas (*gorilla gorilla*). Atsalis, S., Margulis, S. W., Bellem, A., & Wielebnowski, N. (Dept of Conservation Biol., Brookfield Zoo, 3300 Golf Rd., Brookfield, IL 60513 [e-mail: *sylviaatsalis@hotmail.com*]). *American Journal of Primatology,* 2004, *62*, 123-132.

"To evaluate whether observed cycles in proceptive behavior in aging lowland gorilla females (age 40+) at Brookfield Zoo were driven by ovarian activity, we compared monthly behavioral data to estradiol and progestogen cycles based on fecal hormone assessments. Progestogen peaks showed regularity and close coincidence with monthly sexual behaviors. Estradiol was more variable. Progestogen peaks varied between 22 ± 5 days for the control female (29 years old), to 24 ± 2.5 and 29 ± 8 for the aged subjects. In the first aged female, which was housed with other females and a silverback, the high degree of cyclicity in sexual behavior, regularity of progestogen cycles, and close concordance between hormonal cycling and sexual behavior strongly compared to patterns found (in this and other studies) in gorilla females < 35 years old. Cyclical progestogen peaks were longer and more variable in the second aged female – perhaps because she lacked the social mediation of other females or a male. For husbandry reasons she is not housed with the gorilla group; her behavioral data were not collected. The value of our longitudinal study is in obtaining reproductive profiles of primate females that are approaching maximum lifespan. This pilot study is part of a larger research project on reproductive senescence that will include other captive females > 35 years old, a population that is rapidly increasing in North American zoos as gorillas continue to age."

• Effect of removal from the family group on feeding behavior by captive *Callithrix jacchus.* Yamamoto, M. E., & de Araújo Lopes, F. (Dept of Physiology, Univ. Fed. do Rio Grande do Norte, Caixa Postal 1511, Natal, RN, 59072-970 Brazil [e-mail: *emilia.yamamoto@uol.com.br*]). *International Journal of Primatology*, 2004, *25*, 489-500.

"Common marmosets are omnivorous primates with a highly diversified diet. There is no study describing if and how the diet is learned. Infants get their first bits of solid food from other monkeys in the group, which suggests that they may need an introduction to food items by older individuals before including them in their diet. We assessed the acceptance of novel and familiar food items by common marmosets, both isolated and in their family groups. We tested adults, subadults and juveniles from 5 captive families while isolated and in their family groups. The test consisted of presenting for 10 min novel and familiar food

items to isolated individuals or to the whole family. We recorded the latency to start eating and the number of food items ingested. When isolated, adults ate more novel and familiar food items than juveniles did. They also started eating sooner than juveniles did. When tested alone, all juveniles, except one, never tasted novel food, and juveniles ingested fewer familiar food items than adults did. When tested in their family groups, juveniles ingested more familiar and novel food than when they were isolated. Our results suggest that: 1. juvenile common marmosets show more food neophobia than adults do, especially when alone; 2. the family group may facilitate the acceptance of novel food items by juveniles; 3. the family group, besides promoting the acceptance of novel food, may also increase its ingestion; and 4. dietary acquisition in *Callithrix jacchus* involves social facilitation."

• Imaging correlates of brain function in monkeys and rats isolates a hippocampal subregion differentially vulnerable to aging. Small, S. A., Chawla, M. K., Buonocore, M., Rapp, P. R., & Barnes, C. A. (Dept of Neurology, Columbia Univ. College of Physicians & Surgeons, New York, NY 10032 [e-mail: *sas68@columbia.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 7181-7186.

"The hippocampal formation contains a distinct population of neurons organized into separate anatomical subregions. Each hippocampal subregion expresses a unique molecular profile accounting for their differential vulnerability to mechanisms of memory dysfunction. Nevertheless, it remains unclear which hippocampal subregion is most sensitive to the effects of advancing age. Here we investigate this question by using separate imaging techniques, each assessing different correlates of neuronal function. First, we used MRI to map cerebral blood volume, an established correlate of basal metabolism, in the hippocampal subregions of young and old rhesus monkeys. Second, we used in situ hybridization to map Arc expression in the hippocampal subregions of young and old rats. Arc is an immediate early gene that is activated in a behavior-dependent manner and is correlated with spike activity. Results show that the dentate gyrus is the hippocampal subregion most sensitive to the effects of advancing age, which together with prior studies establishes a cross-species consensus. This pattern isolates the locus of age-related hippocampal dysfunction and differentiates normal aging from Alzheimer's disease."

Disease

• Naturally acquired simian retrovirus infections in central African hunters. Wolfe, N. D., Switzer, W. M., Carr, J. K., Bhullar, V. B., Shanmugam, V., Tamoufe, U., Prosser, T., Torimiro, J. N., Wright, A., Mpoudi-Ngole, E., McCutchan, F. E., Birx, D. L., Folks, T. M., Burke, D. S., & Heneine, W. (Dept of Epidemiology, Bloomberg School of Public Health, Johns Hopkins Univ., 615 North Wolfe St E7132, Baltimore, MD 21205). *The Lancet*, 2004, *363*, 932-937.

"Hunting and butchering of wild non-human primates infected with simian immunodeficiency virus (SIV) is thought to have sparked the HIV pandemic. Although SIV and other primate retroviruses infect laboratory workers and zoo workers, zoonotic retrovirus transmission has not been documented in natural settings. We investigated zoonotic infection in individuals living in central Africa. We obtained behavioural data, plasma samples, and peripheral blood lymphocytes from individuals living in rural villages in Cameroon. We did serological testing, PCR, and sequence analysis to obtain evidence of retrovirus infection. Zoonotic infections with simian foamy virus (SFV), a retrovirus endemic in most Old World primates, were identified in people living in central African forests who reported direct contact with blood and body fluids of wild non-human primates. Ten (1%) of 1099 individuals had antibodies to SFV. Sequence analysis from these individuals revealed three geographically independent human SFV infections, each of which was acquired from a distinct non-human primate lineage: De Brazza's guenon (*Cercopithecus neglectus*), mandrill (*Mandrillus sphinx*), and gorilla (*Gorilla gorilla*), two of which (De Brazza's guenon and mandrill) are naturally infected with SIV. Our findings show that retroviruses are actively crossing into human populations, and demonstrate that people in central Africa are currently infected with SFV. Contact with non-human primates, such as happens during hunting and butchering, can play a part in the emergence of human retroviruses, and the reduction of primate bushmeat hunting has the potential to decrease the frequency of disease emergence."

• Origin of AIDS: Contaminated polio vaccine theory refuted. Worobey, M., Santiago, M. L., Keele, B. F., Ndjango, J.-B. N., Joy, J. B., Labama, B. L., Dhed'a, B. D., Rambaut, A., Sharp, P. M., Shaw, G. M., & Hahn, B. H. (Dept of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ 85721 [e-mail: *worobey@email.arizona.edu*]). *Nature*, 2004, *428*, 820.

Despite strong evidence to the contrary, speculation continues that the AIDS virus, human immunodeficiency virus type 1 (HIV-1), may have crossed into humans as a result of contamination of the oral polio vaccine (OPV). This "OPV/AIDS theory" claims that chimpanzees from the vicinity of Stanleyville – now Kisangani in the Democratic Republic of Congo – were the source of a simian immunodeficiency virus (SIVcpz) that was transmitted to humans when chimpanzee tissues were allegedly used in the preparation of OPV. Here it is shown that SIVcpz is indeed endemic in wild chimpanzees of this region but that the circulating virus is phylogenetically distinct from all strains of HIV-1, providing direct evidence that these chimpanzees were not the source of the human AIDS pandemic.

• Use of desferoxamine and S-adenosylmethionine to treat hemochromatosis in a red ruffed lemur (*Varecia variegata ruber*). Sanchez, C. R., Murray, S., & Montali, R. J. (Smithsonian Nat. Zool. Park, 3001 Connecticut Ave, NW, Washington, D.C. 20008-2598). *Comparative Medicine*, 2004, *54*, 100-103.

Hemochromatosis was diagnosed in a 14-year-old red ruffed lemur. Therapy included chelation using desferoxamine to remove excess iron and S-adenosylmethionine to improve liver function. After 56 days of treatment, serum chemistry analysis indicated a decrease in iron panel values. When treatment was temporarily discontinued (56 though 65 days), the animal's condition worsened, so therapy was reinstituted. However, the lemur died several months later from hepatocellular carcinoma.

• Hepatic alveolar echinococcosis in cynomolgus monkeys (*Macaca fascicularis*). Bacciarini, L. N., Gottstein, B., Pagan, O., Rehmann, P., & Gröne, A. (Via Dogana 16, 6501 Bellinzona, Switzerland [e-mail: *luca.bacciarini@ti.ch*]). *Veterinary Pathology*, 2004, *41*, 229-234.

Alveolar echinococcosis was diagnosed in 12 cynomolgus monkeys at postmortem examination within a period of 6 years. Besides consistent involvement of the liver, parasitic lesions were also present in mesenteric lymph nodes, pancreas, lung, and kidney. In the liver, various patterns of host's responses to parasitic tissue could be distinguished. Infiltration of macrophages, often multinucleated, around usually intact metacestodes was the main feature of one pattern. A second pattern was characterized by the presence of abundant, normally degenerate granulocytes in addition to macrophages surrounding collapsed laminated structures. Finally and as a third pattern, some cysts were surrounded by marked collagen deposition, which was usually not a significant feature of the other foci. Parasitic cysts with protoscolices were observed in foci with the first and third pattern but not in the second one. The simultaneous occurrence of all three patterns was observed in most animals. Type AA amyloid was identified either in the space of Dissé, macrophages or blood vessel walls in nine animals using immunohistochemistry. Identity of parasitic structures such as metacestodes of *Echinococcus multilocularis* was confirmed immunohistochemically. All animals that could be tested serologically (7/12) had detectable antibodies against the *E. multilocularis*–specific Em2 antigen. Liver lesions of six animals were additionally analyzed by polymerase chain reaction, yielding the amplification of a specific *E. multilocularis* DNA fragment in each case.

Evolution, Genetics, and Taxonomy

• Myosin gene mutation correlates with anatomical changes in the human lineage. Stedman, H. H., Kozyak, B. W., Nelson, A., Thesier, D. M., Su, L. T., Low, D. W., Bridges, C. R., Shrager, J. B., Minugh-Purvis, N., & Mitchell, M. A. (Dept of Surgery, Univ. of Pennsylvania, Philadelphia, PA 19104 [e-mail: *hstedman@mail.med.upenn.edu*]). *Nature*, 2004, *428*, 415-418.

"Powerful masticatory muscles are found in most primates, including chimpanzees and gorillas, and were part of a prominent adaptation of *Australopithecus* and *Paranthropus*, extinct genera of the family Hominidae. In contrast, masticatory muscles are considerably smaller in both modern and fossil members of *Homo*. The evolving hominid masticatory apparatus – traceable to a Late Miocene, chimpanzee-like morphology – shifted towards a pattern of gracilization nearly simultaneously with accelerated encephalization in early *Homo*. Here, we show that the gene encoding the predominant myosin heavy chain (MYH) expressed in these muscles was inactivated by a frameshifting mutation after the lineages leading to humans and chimpanzees diverged. Loss of this protein isoform is associated with marked size reductions in individual muscle fibres and entire masticatory muscles. Using the coding sequence for the myosin rod domains as a molecular clock, we estimate that this mutation appeared approximately 2.4 million years ago, predating the appearance of modern human body size and emigration of *Homo* from Africa. This represents the first proteomic distinction between humans and chimpanzees that can be correlated with a traceable anatomic imprint in the fossil record."

• Morphometrics and hominoid phylogeny: Support for a chimpanzee–human clade and differentiation among great ape subspecies. Lockwood, C. A., Kimbel, W. H., & Lynch, J. M. (Dept of Anthropology, Univ. College London, Gower St, London WC1E 6BT, U.K. [e-mail: *c.lockwood@ucl.ac.uk*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 4356-4360.

"Taxonomic and phylogenetic analyses of great apes and humans have identified two potential areas of conflict between molecular and morphological data: phylogenetic relationships among living species and differentiation of great ape subspecies. Here we address these problems by using morphometric data. Three-dimensional landmark data from the hominoid temporal bone effectively quantify the shape of a complex element of the skull. Phylogenetic analysis using distance-based methods corroborates the molecular consensus on African ape and human phylogeny, strongly supporting a *Pan–Homo* clade. Phenetic differentiation of great ape subspecies is pronounced, as suggested previously by mitochondrial DNA and some morphological studies. These results show that the hominoid temporal bone contains a strong phylogenetic signal and reveal the potential for geometric morphometric analysis to shed light on phylogenetic relationships."

• Assessment of the diversity of African primates. Grubb, P., Butynski, T. M., Oates, J. F., Bearder, S. K., Disotell, T. R., Groves, C. P., & Struhsaker, T. T. (35 Downhills Park Rd, London N17 6PE, U.K. [e-mail: *Pgrubb35@aol.com*]). *International Journal of Primatology*, 2003, *24*, 1301-1357.

"This account of the systematics of African primates is the consensus view of a group of authors who attended the Workshop of the IUCN/SSC Primate Specialist Group held at Orlando, Florida, in February, 2000. We list all species and subspecies that we consider to be valid, together with a selected synonymy for all names that have been controversial in recent years or that have been considered to be valid by other authors in recent publications. For genera, species-groups or species, we tabulate and discuss different published systematic interpretations, with emphasis on more recent publications. We explain why we have adopted our taxonomic treatment and give particular attention to cases where more research is urgently required and in which systematic changes are most likely to be made. For all taxa, from suborder to subspecies, we provide English names."

Instruments and Techniques

• Genotyping from semen of wild Japanese macaques (*Macaca fuscata*). Domingo-Roura, X., Marmi, J., Andrés, O., Yamagiwa, J., & Terradas, J. (Dept de Ciències Experimentals i de la Salut, Univ. Pompeu Fabra, Doctor Aiguader 80, 08003 Barcelona, Spain [e-mail: *xavier.domingo@upf.edu*]). *American Journal of Primatology*, 2004, *62*, 31-42.

"The noninvasive collection of animal cells is crucial for DNA analyses in wild populations that cannot be disturbed by capture. We describe the collection of 68 semen samples following copulation and masturbation events in wild habituated and nonhabituated troops of Japanese macaques on the protected island of Yakushima. We used this DNA to amplify 390 base pairs (bp) of the mitochondrial DNA control region in 16 individuals from eight troops, and found a monomorphic pattern in agreement with the low variability imposed by geographic isolation and female philopatry. We also amplified two microsatellite loci from samples collected after the resident males of a focal troop had copulated with different females. We found several different allele combinations in samples collected after the observed mating of a single male, indicating the presence of contaminant DNA, presumably from males that had previously mated with the same female. This discovery made it impossible to assign a given sample to a specific male except when the samples were recovered after masturbation events. Thus, it was not possible to test for kinship or estimate allele frequencies from the semen samples. The mixing of semen, and the pattern of sample collection observed in morphologically identified individuals support the notion that strong mating and sperm competition exists among resident and nonresident males."

• Scalp EEG for the diagnosis of epilepsy and photosensitivity in the baboon. Szabó, C. Á., Leland, M., Sztonák, L., Restrepo, S., Haines, R., Mahaney, M. A., & Williams, J. T. (Dept of Med./Neurology, Univ. of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX 78284-7883 [e-mail: *caszabo@university-health-sys.com*]). *American Journal of Primatology,* 2004, *62*, 95-106.

Spontaneous seizures have been observed in several baboon species housed at the Southwest National Primate Research Center (SNPRC), including *Papio hamadryas anubis* and *cynocephalus/anubis, hamadryas/anubis*, and *papio/anubis* hybrids. The goal of this study was to establish a noninvasive, reliable electroencephalographic technique to characterize epilepsy phenotypes and assess photosensitivity in these subspecies. Thirty baboons with witnessed seizures, and 15 asymptomatic baboons underwent scalp electroencephalograms (EEGs) with photic stimulation (PS). The sensitivity and specificity of surface EEG for identifying interictal epileptic discharges (IEDs) in baboons with witnessed seizures were examined. The morphology of IEDs, electroclinical features of seizures and responses to PS, reproducibility of EEG findings, and intrarater reliability were also evaluated. Twenty-three seizure baboons (77%) demonstrated IEDs, predominantly with frequencies of 4-6 Hz in 18 baboons and 2-3 Hz in six baboons. Two seizure animals had a mixture of 2-3-Hz and 4-6-Hz IEDs. All animals with 2-3-Hz IEDs were 3 years old or younger. Myoclonic seizures (MS) and generalized tonic-clonic seizures (GTCS) were recorded in 13 baboons (43%). PS activated IEDs in 15 baboons (50%) and seizures in nine baboons. The presence of IEDs or seizures was not associated with a particular gender or species (Fisher exact test, =0.05). Seizures were more common in animals >3 years old, while PS-induced IEDs and seizures were more prevalent in *P.h. anubis/cynocephalus* crosses compared to *P.h. anubis*. In the asymptomatic controls, IEDs were recorded in five baboons (33%), and photoparoxysmal responses were observed in two (13%). Surface EEG is a sensitive and reliable instrument for characterizing the epilepsy encountered in *Papio* species. Electroclinically, the seizure animals had generalized epilepsy with photosensitivity. The variation in IED morphology may be age-related or it may reflect different epileptic phenotypes. Ketamine provoked IEDs and seizures in most seizure animals and only in a few asymptomatic baboons; therefore, it may enhance the sensitivity of surface EEG for detecting a predisposition to epilepsy.

• Saliva sampling to assess cortisol levels in unrestrained common marmosets and the effect of behavioral stress. Cross, N., Pines, M. K., & Rogers, L. J. (L. J. R., Centre for Neuroscience & Animal Behaviour, School of Biological, Biomedical and Molecular Sciences, Univ. of New England, Armidale NSW 2351, Australia [e-mail: *lrogers@pobox.une.edu.au*]). *American Journal of Primatology,* 2004, *62*, 107-114.

We report a method for taking saliva samples from unrestrained, captive marmosets (*Callithrix jacchus*) to assess levels of free cortisol. Saliva samples can be obtained reliably, without any habituation, by encouraging

the marmosets to lick and chew a cotton-wool bud coated in banana. Saliva is thus left on the bud. We also tested sweetened fruit-drink crystals and a number of other substances, but none of these attracted all of the marmosets, and even flavors that were effective once soon lost their attraction. The presence of banana in the samples collected was found to lower the measured concentration of cortisol; however, as shown in samples taken with and without the banana coating on the bud, it did so in a linear and consistent way, and did not vary significantly among subjects. Therefore, a simple conversion factor could be applied to correct for the presence of banana. A first experiment showed that the marmosets exhibited a rise in salivary cortisol levels in response to social isolation. A second experiment showed elevation of cortisol during a period when the marmosets were disturbed by increased human activity and noise levels in the building in which they were housed. Hence, this method of saliva sampling is a convenient, noninvasive means of assessing cortisol levels in marmosets.

• Field methods for capturing and marking Azarai night monkeys. Fernandez-Duque, E., & Rotundo, M. (CRES, San Diego Zoo, P.O. Box 120551, San Diego, CA 92112-0551 [e-mail: *efduque@sandiegozoo.org*]). *International Journal of Primatology*, 2003, *24*, 1113-1120.

"Long-term behavioral studies require the permanent identification of individuals. The need for individual identification is even more crucial for sexually monomorphic species since not even the sexes can be differentiated by the field observer. Owl monkeys (*Aotus* spp.) are sexually monomorphic primates inhabiting the forests of Central and South America. We report here on the methods and drug dosages used to capture, mark, and identify individual owl monkeys (*Aotus azarai azarai*) in Eastern Formosa, Argentina. We successfully captured 70 owl monkeys using blowpipes or a CO^2 rifle, but attempts to capture them with baited traps proved unsuccessful. During the marking and collaring procedures, we gave individuals on average a total of 50 mg of ketamine hydrochloride, including the dose in the dart. To mark them, we freeze-branded portions of their tails and fitted them with radio or bead collars. There was no death or physical life-threatening injury while capturing or marking individuals. The procedures we describe should allow one to safely capture and to mark small arboreal primates when trapping is not possible."

• Endocrine monitoring of wild dominant and subordinate female *Leontopithecus rosalia*. French, J. A., Bales, K. L., Baker, A. J., & Dietz, J. M. (Depts of Psychology and Biology, Univ. of Nebraska, Omaha, NE [e-mail: *jfrench@unomaha.edu*]). *International Journal of Primatology*, 2003, *24*, 1281-1300.

"In captive callitrichid primates, female reproductive function tends to vary with social status. However, little is known about the interplay between these factors in wild groups. We report observations on normative ovarian function in dominant and subordinate female golden lion tamarins living in wild groups. We monitored ovarian status by measuring, via enzyme immunoassay, concentrations of excreted pregnanediol glucuronide (PdG) and estrone conjugates (E1C) in fecal samples collected noninvasively from individuals in social groups in the Poço das Antas Biological Reserve, Rio de Janeiro State, Brazil. Dominant breeding females demonstrated steroid levels similar to those previously reported for wild cotton-top tamarin females, with statistically significant rises during pregnancy. The duration of elevation of fecal steroids in breeding females was ca. 4 mo, which corresponds with estimates of gestation from captive studies. Low steroid concentrations from December to June suggest a seasonally related period of infertility in female golden lion tamarins. Dominant and subordinate females demonstrated several differences in endocrine function. In general, younger females living in intact natal family groups showed no evidence of ovarian cyclicity. We noted endocrine profiles consistent with ovulation and subsequent pregnancy for behaviorally subordinate females living in groups with unrelated males or in which a reversal in female dominance status occurred. Results suggest that in addition to changes in female reproductive endocrinology associated with puberty, the regulation of reproduction in females in wild callitrichid groups can be sensitive to status and relatedness to breeding males."

• Minimally invasive surgery via laparoscopy for intra-abdominal biopsy in obese rhesus macaques (*Macaca mulatta*). Liao, P., Bodkin, N., Cho, E., Alexander, T., & Ortmeyer, H. (N. B., Dept of Physiology, 10 Pine St, MSTF 6-00, School of Med., Univ. of Maryland, Baltimore, MD 21201). *Comparative Medicine*, 2004, *54*, 159-164.

To determine the safety and effectiveness of laparoscopy for repeated intra-abdominal biopsy of liver and omental adipose tissue (AT) in obese rhesus monkeys, nine obese rhesus monkeys were studied by use of 18 laparoscopic procedures (two procedures each, approx. six weeks apart). Time-sensitive liver and omental AT specimens were obtained from monkeys under general anesthesia, using a three-port approach with a roticulating endoscopic stapler/divider and a monopolar electrosurgery for hemostasis. All subjects tolerated the initial and repeat laparoscopic procedures well. Liver specimens weighed (mean ± SEM) 3.8 ± 0.5 g, and omental AT specimens weighed 16.6 ± 0.8 g. Compared with previous studies of conventional laparotomy with liver wedge resection, the monkeys experienced faster postoperative recovery via laparoscopy, with rapid return to normal food intake and activity. Minimal to no adhesions were observed by use of the repeat procedure in all monkeys, with no major complications. This was an excellent minimally invasive surgical method. In contrast to laparotomy with wedge resection,

this approach greatly decreases operative time and stress, provides generous tissue specimens in a time-efficient manner, and facilitates rapid and full recovery.

• Diagnosis of tuberculosis in macaques, using whole-blood in vitro interferon-gamma (PRIMAGAM) testing. Garcia, M. A., Yee, J.-A., Bouley, D. M., Moorhead, R., & Lerche, N. W. (Stanford Univ. School of Med., Dept of Comp. Med., RAF 1, Quad 7, Bldg 330, Stanford, CA 94305-5410). *Comparative Medicine*, 2004, *54,* 86-92.

The diagnostic performance of a new in vitro screening test (PRIMAGAM) was evaluated during an outbreak of tuberculosis in a conditioned colony of rhesus and cynomolgous macaques. The PRIMAGAM test measures the interferon gamma response to purified protein derivatives (PPD) of *Mycobacterium bovis* and *M. avium*. Results based on the last test administered before necropsy indicated that it had good sensitivity (68%) and excellent specificity (97%) compared with disease status determined by pathologic examination. By contrast, the sensitivity and specificity of the tuberculin skin test was 84% and 87%, respectively. Both tests suffered from intermittent positive and negative reactions on repeat testing. Overall, however, there was no significant difference and moderate agreement between the tests. The interferon response to bovine PPD was significantly lower in cynomolgous macaques. Moreover, each test failed to detect tuberculosis in three cynomolgous macaques. The authors recommend parallel use of skin testing and PRIMAGAM testing for maximal overall sensitivity in tuberculosis screening programs, especially for cynomolgous monkeys.

• Effect of glycerol and dimethyl sulfoxide on cryopreservation of rhesus monkey (*Macaca mulatta*) sperm. Si, W., Zheng, P., Li, Y., Dinnyes, A., & Ji, W. (W. J., Inst. of Zoology, Chinese Acad. of Sciences, Jiaochang Donglu 32, Kunming, Yunnan 650223, P. R. C. [e-mail: *wji@mail.kiz.ac.cn*]). *American Journal of Primatology*, 2004, *62,* 301-306.

Glycerol and dimethyl sulfoxide (DMSO) are widely used as penetrating cryoprotectants in the freezing of sperm, and various concentrations are applied in different species and laboratories. The present study aimed to examine the effect of these two cryoprotectants at different concentrations (2%, 5%, 10%, and 15% glycerol or DMSO) on rhesus monkey sperm cryopreservation. The results showed that the highest recovery of post-thaw sperm motility, and plasma membrane and acrosome integrity, was achieved when the sperm was frozen with 5% glycerol. Spermatozoa cryopreserved with 15% DMSO showed the lowest post-thaw sperm motility, and spermatozoa cryopreserved with 15% glycerol and 15% DMSO showed the lowest plasma membrane integrity among the eight groups. The results achieved with 5% glycerol were significantly better for all parameters than those obtained with 5% DMSO. The functional cryosurvival of sperm frozen with 5% glycerol was further assessed by in vitro fertilization (IVF). Overall, 85.7% of the oocytes were successfully fertilized, and 51.4% and 5.7% of the resulting zygotes developed into morulae and blastocysts, respectively. The results indicate that the type and concentration of the penetrating cryoprotectant used can greatly affect the survival of rhesus monkey sperm after it is frozen and thawed. The suitable glycerol level for rhesus monkey sperm freezing is 5%, and DMSO is not suitable for rhesus monkey sperm cryopreservation.

• Development of an inexpensive, low attenuation styrofoam primate chair for use in a PET scanner. Kortekaas, R., Waarde, A., Maguire, R. P., Leenders, K. L., & Elsinga, P. H. (Dept of Neurology, Groningen Univ. Hospital, Groningen, The Netherlands [e-mail: *r.kortekaas@neuro.azg.nl*]). *Journal of Medical Primatology,* 2004, *33*, 78-82.

Pharmacokinetic modelling of radiotracers for positron emission tomography (PET) imaging of neuroreceptors can be performed with time-activity data for brain and blood. We aimed to develop an alternative to withdrawal of arterial blood samples for acquisition of a blood curve. A supportive primate chair was constructed out of styrofoam and fixed to the head portion of the bed of a PET scanner. A lightly anaesthetised rhesus monkey was positioned in the chair in a sitting position and injected with the radiotracer. The styrofoam chair provided sufficient support for the monkey. The presence of the chair in the PET scanner caused negligible attenuation of radiation, allowing simultaneous acquisition of dynamic data from the subject's brain and heart. We conclude that a styrofoam primate chair is an ideal tool to measure blood and brain data from a rhesus monkey with PET. Invasiveness to the animal is reduced, as well as experimenter time.

• Penile vibratory stimulation in the marmoset monkey: A practical alternative to electro-ejaculation, yielding ejaculates of enhanced quality. Schneiders, A., Sonksen, J., & Hodges, J. K. (Dept of Reproductive Biology, German Primate Centre, Goettingen, Germany). *Journal of Medical Primatology,* 2004, *33*, 98-104.

The availability of sufficient amounts of spermatozoa of high quality is one of the main limiting factors in reproductive research and development of reproductive technologies in marmoset monkeys (*Callithrix jacchus*). Penile vibrostimulation (PVS) has been successfully used in semen collection in the squirrel monkey but with poor success rate in the marmoset. We report here on an improved protocol for PVS with a success rate of almost 90%. Ejaculates obtained by PVS were of enhanced quality compared with those obtained by rectal probe electroejaculation (RPE). PVS ejaculates contained on average three- to fourfold higher numbers of total and motile spermatozoa. Assessment of sperm kinematics using computer-assisted sperm analysis indicated that there are also functional differences between spermatozoa collected by PVS and RPE. Marmoset spermatozoa in samples ob-

tained by RPE swim in a more convoluted manner compared with those obtained by PVS.

Reproduction

• Hormonal changes during the mating and conception seasons of wild northern muriquis (*Brachyteles arachnoides hypoxanthus*). Strier, K. B., Lynch, J. W., & Ziegler, T. E. (Dept of Anthropology, Univ. of Wisconsin, 1180 Observatory Dr., Madison, WI 53706 [e-mail: *kbstrier@facstaff.wisc.edu*]). *American Journal of Primatology*, 2003, *61*, 85-99.

"We investigated hormonal and behavioral changes in wild male and female northern muriquis at the Estação Biológica de Caratinga, Minas Gerais, Brazil, during a 6-mo period that encompassed the onset of the 1998-1999 mating and conception seasons. Individual females resumed mating with the resumption of ovarian cycling, which was not synchronized among them or related to their cortisol levels. Females experienced two to seven cycles prior to conceiving, and the first conception occurred 2 mo after the onset of the group's mating season. There were no differences in female cortisol levels across their premating, mating, and conception conditions. Cortisol levels were significantly higher in females than in males prior to the conception season, consistent with the prediction that energy reserves may be associated with breeding readiness in females, but not males, in this species. The sustained elevation in male cortisol occurred after the peak in their sexual activity, which resulted in the first conception of the year. Male cortisol levels were positively correlated between years that were similar in rainfall, but differed in the timing of sexual and reproductive events. The timing of cortisol elevations in males appears to be generally regulated by environmental cues, but is responsive to fine-tuning by social and behavioral cues related to the unpredictable timing of reproductive opportunities within their extended mating season."

• Influence of female copulation calls on male sexual behavior in captive *Macaca fascicularis.* Nikitopoulos, E., Arnhem, E., van Hooff, J. A. R. A. M., & Sterck, E. H. M. (Behavioural Biology, Utrecht University, Utrecht, Netherlands [e-mail: *e.nikitopoulos@bio.uu.nl*]). *International Journal of Primatology,* 2004, *25*, 659-677.

"We investigated the function of copulation calls – vocalizations by females during mating – in captive groups of long-tailed macaques. We tested predictions of the contest-competition, sperm competition, synchronized orgasms, mate again, alpha-male notification and graded-signal hypotheses. We observed 371 copulations of 36 females wherein the presence or absence of a copulation call was clear. Females call equally often with different males and shortly after ejaculation. Copulation calls occurred equally with copulations with and without ejaculation. Calls did not incite disruptions of the mating. Following calls females mated again, more often than expected, with their mating partner. Both pregnant and fertile females uttered copulation calls. Two females conceived and mated mainly with the alpha male then. We conclude that copulation calls do not incite male contest competition for sexual access to females and that it is unlikely that calls synchronize male and female orgasms. Several hypotheses remain plausible, but not all predictions are borne out unequivocably. This alerts us to the possibility that the calls could have multiple beneficial effects; natural selection might strike a compromise among functions. Investigation of the mate again, sperm competition and alpha-male notification hypotheses, and of hypotheses not tested in our study concerning female breeding overlap and female-female agonism, is required."

• Behavioral and endocrine responses in male marmosets to the establishment of multimale breeding groups: Evidence for non-monopolizing facultative polyandry. Schaffner, C. M., & French, J. A. *(*Department of Psychology, Centre for Stress Research, University College Chester, Parkgate Road, Chester, CH1 4BJ, England [e-mail: *c.schaffner@chester.ac.uk*]). *International Journal of Primatology,* 2004, *25*, 709-732.

"Studies of wild callitrichids provide conflicting evidence regarding polyandrous groups. One perspective supports a monopolizing breeding strategy on the part of one male, while the alternative perspective suggests that polyandry does not lead to a breeding monopoly. We tested the hypotheses in male marmosets (*Callithrix kuhlii*) with 5 polyandrous groups composed of related/familiar males as our attempts to establish polyandrous groups of unrelated/familiar males failed. We monitored male social and sexual behavior and urinary testosterone (T) and cortisol (CORT) across the first 80 days of group formation and contrasted them with similar measures in males housed in monogamous groups. We also examined the same measures across the females' ovulatory cycles for polyandrous males. We found little evidence that males in polyandrous groups exercised a mating monopoly over the female and no evidence for overt competition between polyandrous males. We found two behavioral differences: polyandrous males were less often in proximity and copulated more often with the female than monogamous males did. Our findings suggest that the males in newly-formed groups of marmosets do not monopolize breeding and social behavior with the female. This appears to be the case for three reasons. First, males may use sperm competition rather than overt competition. Secondly, it may take longer for relationships to develop between the female and the males in polyandrous groups versus in monogamous groups. Thirdly, the cost of infant care is sufficiently high to demand that group members get along when groups are small and reproductive benefits are shared."

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