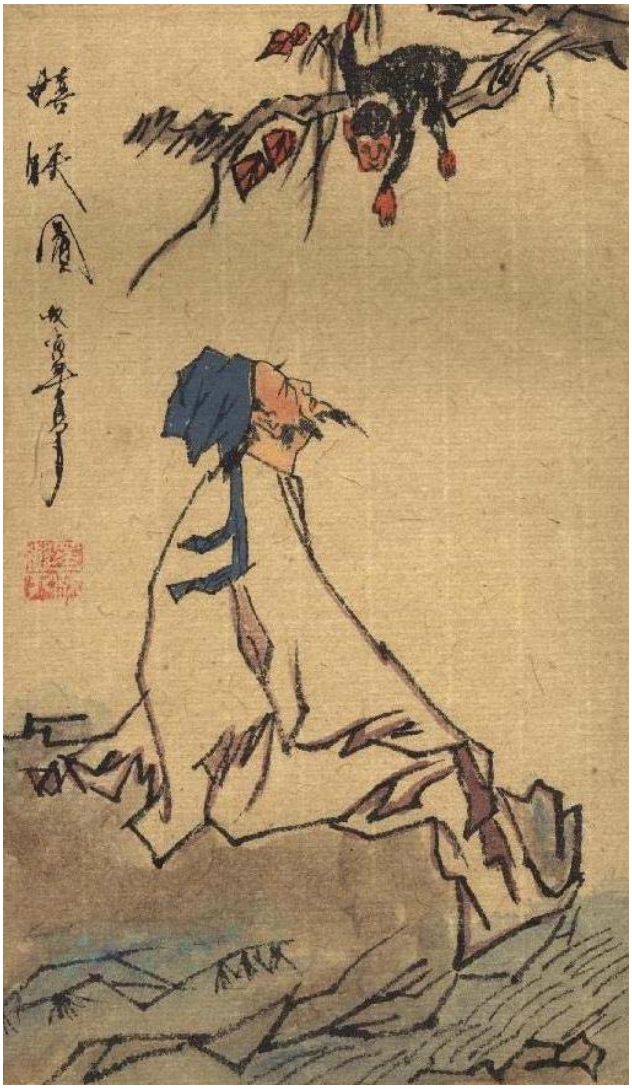
LABORATORY PRIMATE NEWSLETTER

Vol. 43, No. 4 October 2004



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Published Quarterly by the Schrier Research Laboratory
Psychology Department, Brown University
Providence, Rhode Island
ISSN 0023-6861

POLICY STATEMENT

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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $5.00 each. We are no longer printing paper issues, except those we will send to subscribers who have paid in advance. We will not accept future subscriptions, unless subscribers are willing to pay $60/year within the U.S.; $80/year outside the U.S. (Please make checks payable to Brown University.) Readers with access to electronic mail may receive the nongraphic contents of each issue by sending the message **subscribe LPN-L your-own-name** to **listserv@listserv.brown.edu** (Send the message **subscribe LPN-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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ACKNOWLEDGMENTS

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

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

Environment- and Season-Influenced Alopecia in Juvenile Rhesus Macaques

R. Venatesan, P. Nagarajan, M. J. Mahesh Kumar and S. S. Majumdar
Primate Research Center, National Institute of Immunology, New Delhi

Introduction

Both the seasons and stress can play an important role in the hair condition of macaques kept in outside open enclosures. Hypergrooming and self-mutilation due to boredom without enough enrichment may cause alopecia, apart from other factors such as the presence of ectoparasites, bacterial and fungal infections, hormone imbalance, nutritional deficiencies, excess use of detergents, and psychogenic causes. Seasonal alopecia in affenpinschers and other dogs has been reported (Waldman, 1995). Hair loss in subordinant animals due to stress has been reported in nonhuman primates (Burge et al., 1997). Also photoperiod and hormonal activity (pregnancy and lactation for females, breeding for males) have influenced hair loss and growth patterns in rhesus macaques (O'Neill-Wagner, 2002). In this paper we show how changes in environment prevented seasonal alopecia in juvenile rhesus macaques.

Original Conditions

Housing and indoor environment: Our juvenile (ages 10-15 months) rhesus macaques (*Macaca mulatta)* were kept in peer groups of about 15 individuals in an outdoor run for most of the year. During the middle of winter and summer they were kept indoors, where they were maintained under standard environmental conditions in accordance with the guidelines for care and use of animals in scientific research (Indian National Science Academy, New Delhi), in a CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals)-registered animal facility with air-conditioned rooms: temperature 22-25º C, humidity 55-60%, 12:12 photoperiod, and individual stainless steel cages. The animals were fed with commercial pelleted primate feed and soaked gram (*Cicer arietinum*, chick peas) in the morning, bread in the afternoon, and fruits and vegetables in the evening. They had water *ad libitum*.

Outdoor open enclosures: After winter, during March, the animals were transferred to semi-natural outdoor enclosures, 30 x 25 x 10 ft. The enclosures included enclosed rooms (30 x 5 x 5 ft.) for resting, and enrichment devices such as perches, swings, and small rocks. Water was provided *ad libitum* through stainless steel nipples, which are fixed at 2-ft intervals in the water pipe.

During the months of April to June 40% of the juveniles transferred from indoor rooms to outdoor enclosures had hair loss in varying degree. Skin scrapings from all those animals were subjected to parasitogical and fungal examination. In addition hematological and biochemical parameters of those animals were examined to rule out other possible causes of alopecia. The animals were also given a multivitamin suspension daily, because we suspected hair losses might be due to vitamin deficiencies. We transferred some animals with alopecia back to indoor rooms, suspecting that hair losses might be due to high temperatures (39-44º C) in the open enclosures.

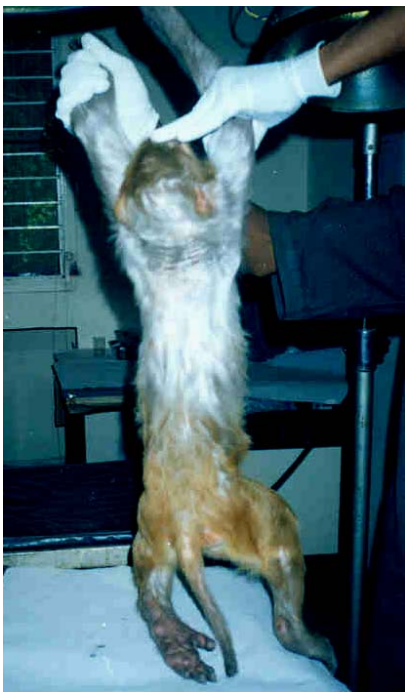

Figure 1: Hair loss spreading from back of neck to whole back in a juvenile rhesus monkey kept in an open enclosure.

First Results

Parasitological and fungal examinations of skin scrapings revealed no arthropods or fungal growths, and cultures showed no growth of organisms. Hematological and biochemical parameters revealed no significant changes, and there was no initiation of hair growth in the animals supplemented with multivitamins.

The juveniles who were transferred to individual indoor rooms recovered from alopecia and hair growth began within a week. Hence we concluded that hair losses

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We are thankful to our Director for providing necessary facilities to carry out the study.

in outside enclosures are due to environmental stress; to ease that stress the outdoor enclosure was modified.

Modifications to the Enclosure

Figure 2: Modified open enclosure.

Figure 2 shows an outside enclosure modified with more trees, additional covering, and sprinklers, all of which reduced the temperature to 33-40º C. In addition, we put electric coolers in the enclosed rooms. The water provided was also cooled. We also gave vitamin C-rich juicy fruits and continued to give supplemental vitamins. Further loss of hair was controlled and there was also progress in hair growth.

Conclusions

Group housing is probably the most appropriate housing for macaques (Bernstein, 1991), but the problems encountered in group housing include bites and scratches, symptoms of dietary deficiency, difficulty in eliminating prevalent infectious agents, and hair loss in varying degrees (Burge et al., 1997); hence it is important to eliminate such problems when animals are kept in the open enclosures. As CPCSEA requires housing laboratory macaques in outdoor enclosures for their psychological well-being, care must be taken to provide an appropriate environment and to reduce stress for those animals. When macaques are kept in outdoor enclosures in

Figure 3: Openings to rooms in lower part of the enclosure.

climates similar to India's during the months of April to June they are more prone to stress due to high temperatures. Changes such as planting trees around the open enclosures, adding coolers and sprinklers, and providing cold water *ad libitum* can reduce this stress, and seems to prevent hair loss during this season. In addition to normal feeding, diet should be supplemented with vitamin C-rich fruits.

To conclude, if macaques are to be kept in outdoor group housing during hot months, a proper environment should be provided to reduce heat stress, which, in turn, prevents hair loss.

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Burge, T., Panoussis, B., & Weber, H. (1997). Primate housing facilities for pharmaceutical research in Switzerland. *Primate Report, 49*, 19-22.

O'Neill-Wagner, P. L. (2002). Seasonal hair growth and molt patterns in the pelage cycle of rhesus monkeys (*Macaca mulatta*). Presented at the National Institute of Health 2002 Research Festival, Bethesda, MD.

Waldman, L. (1995). Seasonal flank alopecia in affenpinschers. *Journal of Small Animal Practice, 36*, 271-273.

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Erratum

In the article "Callitrichid monkey branch preference", by A. S. Chamove and S. Goldsborough (*43*[2], 1-6), the name of Francine Dolins is incorrectly spelled. The correct reference is:

Dolins, F. L., & Chamove, A.S. (1987). Substrate use and locomotory behaviour in captive cotton-top tamarins (*Saguinus oedipus*). *International Journal of Primatology 8*, 548-549.

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Stereotypical Behavior: A LAREF Discussion

The following discussion took place on the Laboratory Animal Refinement & Enrichment Forum [LAREF]. Ernie Davis, NIH Animal Center, Poolsville, Maryland; Natasha Down, York University, Toronto; Joseph Garner, University of California, Davis; Anna Olsson, Institute for Molecular and Cell Biology, Porto, Portugal; Emily Patterson-Kane, University of British Columbia, Vancouver; and Chris Sherwin, University of Bristol, United Kingdom, all posted contributions, which have been edited and expanded by Viktor Reinhardt, moderator of LAREF.

The discussion was initiated by the observation that animals kept in legally minimum-sized, unstructured enclosures very often exhibit stereotypical behaviors. Traditionally these repetitive movement patterns without obvious goals or functions are categorized as "abnormal".

Figure 1: Stereotypical ear-pulling in an individually caged rhesus macaque.

It was argued that a healthy animal kept in a small, barren enclosure has little choice of expressing his/her biologically inherent drive to engage in species-typical behaviors other than pacing back and forth, running in circles, somersaulting, rocking, self-biting, bar-biting, ear-pulling (*Figure 1*), hair-pulling, eye-poking, etc. There is nothing really "abnormal" except the abnormally restrictive and abnormally boring housing condition that induces the stereotyped expression of these activities. The majority of macaques kept in conventional standard cages exhibit stereotypical activities (Erwin & Deni, 1979; Lutz et al., 2003). These behavioral patterns thus become "normative" under the given circumstance (Reinhardt). In caged mice, barbering (fur and whisker trimming) is another example of a stereotypy that has become a normative behavior pattern within the context of inadequate living conditions (Anonymous).

It is the artificial environment in which stereotypies develop that is "abnormal" as it does not allow the animals to satisfy basic behavioral needs (Olsson). The label "abnormal" would be more fitting for the inadequate confinement condition rather than for the subject's unsuccessful attempt to adjust to it. We tend to project abnormality onto animals rather than onto the people who create deficient living quarters for them. It would be fair to first focus on the husbandry conditions, study the environmental factors that lead to the development of abnormal behaviors, and then correct these factors in order to prevent abnormal behaviors in the future (Reinhardt). These unsuccessful attempts of adjusting could also be described as "behavior indicative of an abnormal environment" (Patterson-Kane).

Many stereotypies are signs of frustration, with the subject being chronically thwarted from expressing basic activities such as taking a few free steps in one direction, climbing and perching, retreating to a secluded place, foraging, and interacting with another conspecific (Reinhardt). Scientific evidence suggests that animals who engage in stereotypical behavior show a disorganization of brain function (Kraemer et al., 1997; Garner & Mason, 2002) and alterations in their stress reactivity (Tiefenbacher et al., 2004). These "abnormalities" are likely to introduce uncontrolled variables into research data, thereby jeopardizing the validity of science that is done with the affected subjects. It is ironic that the unstimulating, minimum-sized housing environment that promotes the development of stereotypies is often defended with the assertion that it minimizes the number of extraneous variables that could influence research data (Reinhardt).

A temporary replacement of stereotypical behaviors with species-typical behaviors does occur with environmental enrichment, but the effect is usually only of short duration, because the subject quickly loses interest in the enrichment and is then left again with nothing to do but engage in the habitual, repetitive behavior pattern(s) (Reinhardt).

Viktor Reinhardt is with the Animal Welfare Institute, Washington, DC. Contact him at 6014 Palmer Dr., Weed, CA 96094 [e-mail: *viktorawi@siskiyou.net*].

The question was raised whether any of the 140 LAREF members can share success stories of environmental modifications that cured animals from stereotypical behaviors:

1. Feather-pecking was virtually eliminated in group-housed turkeys by providing the animals with straw, UV light and vertical visual blinds (Sherwin).
2. Hair loss, presumably resulting from hair pulling and hair eating, was successfully treated by transferring an individually caged rhesus macaque to a compatible group-housing arrangement (Down).
3. Seven individually caged rhesus macaques were cured of self-injurious biting by transferring them to compatible pair-housing arrangements (Reinhardt). Since very stressful situations can trigger self-injurious biting even in group-housed animals, transfer to pair-housing probably suppressed rather than eliminated this stereotypy (Davis).

The paucity of success stories supports the findings that neurological alterations are associated with the development of stereotypical behavior patterns which tend to be irreversible (Reinhardt).

Preventing stereotypies by rearing and housing the animals in species-appropriately enriched conditions is probably a better strategy than waiting for the development of these behavioral problems and then investing time and resources in the futile attempt to eradicate them (Garner).

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Workshop Announcements

Meeting Information Requirements of the AWA

The Animal Welfare Information Center (AWIC) of the U.S. Department of Agriculture, National Agricultural Library (NAL), has developed a day-and-a-half workshop for individuals who are responsible for providing information to meet the requirements of the Animal Welfare Act (AWA). This workshop is targeted for principal investigators, members of IACUCs, information providers, administrators of animal use programs, and veterinarians. The objectives of the workshop are to provide: • an overview of the AWA and the information requirements of the act; • a review of the alternatives concept; • a comprehensive introduction to NAL, AWIC and other organizations; • instruction on the use of existing information databases/networks; • on-line database searching experience.

The next workshop will be held at the NAL in Beltsville, Maryland, on October 6-7, 2004. It is limited to 20 persons. For more information, contact AWIC, NAL, 10301 Baltimore Ave., Beltsville, MD 20705-2351 [301-504-6212; fax: 301-504-7125; e-mail: *awic@nal.usda.gov*]; or see <www.nal.usda.gov/awic/awicworkshops/awicworkshops.htm>.

Teaching Research Ethics

Indiana University's twelfth annual Teaching Research Ethics Workshop will convene on the campus at Bloomington, Indiana, May 12-14, 2005. Session topics will include an overview of ethical theory; using animal subjects in research; using human subjects in clinical and nonclinical research; and responsible data management. Many sessions will feature techniques for teaching and assessing the responsible conduct of research. For more information, contact Glenda Murray, Program Associate, Poynter Center, Indiana Univ., 618 East Third St, Bloomington, IN 47405-3602 [812-855-0262; fax: 812-855-3315; e-mail: *glmurray@indiana.edu*]; or see <poynter.indiana.edu>.

* * *

Callitrichid Triplets: A Discussion

On May 15, Alex Mohr <*zookeeperfcz@cox.net*>, Keeper III at Folsom Children's Zoo, Lincoln, Nebraska, posted to the Zoo-Biology e-list: "Our Wied's tufted-eared marmoset (*Callithrix kuhlii*) just had triplets! Is there anything I should be really concerned about? Will she have enough milk? They all appear healthy and Mom has huge breasts. I have dealt with tamarin babies lots of times but nobody ever had more than the usual twins. I have not seen Dad take one yet but he is checking them out."

Jan Vermeer <*j.vermeer@la-vallee-des-singes.fr*>, of La Vallée des Singes, Romagne, France, wrote on May 16: "We had several cases where two or all three babies died when we left triplets with their mother. We therefore remove one of the babies on the first day to give the two others better chances for survival. (If you wait longer, it might be too late.) I know that many zoos had tamarins or marmosets that reared all three, and it would be interesting to know what the survival chances for triplets really are." Three other similar responses were posted.

Vanessa Phelan <*grillasruleis@rogers.com*>, gorilla keeper at the Toronto Zoo, wrote: "We had triplets born to our white-eared common marmosets on several occasions when I worked with them many years back. For some reason, although the male was carrying them well and they were going back to mom to nurse, only two survived each time. We did manage to retrieve one triplet and nursery raised him. He was eventually successfully reintroduced back to other family members."

And another response: "I've worked with both marmosets and tamarins who have given birth to triplets in captivity. After many cases of 'giving mom a chance' we have learned to try and allow the infants to nurse from mother's milk for one day and then automatically pull one. If you wait too long you are most likely going to end up with at least one infant in a weakened condition. That infant could either not survive at all, or be in such a compromised state that the already intense work of hand-rearing becomes even more difficult.

"No matter how good the parents are it never seems that all three triplets are able to get an even and adequate share if left to nurse from their mother. If you can raise the infant on formula until it is mobile, then train it to run to a bottle or eye dropper, it can be reintroduced to the family group while it is still not yet weaned and continue being fed by its keeper. This is socially the best chance the young marmoset will have for a 'normal' future life."

Kirsten Christensen <*KChristensen@cabq.gov*>, Mammal Dept. Supervisor of the Rio Grande Zoo, wrote on May 17: "Just to offer a counterpoint, we had triplets born to our cotton-top female in 2001. We were already preparing for observations because during the pregnancy the father died. The female was housed with her two previous litters of twins (male and female). We monitored them closely, and all three nursed. Initially, mom Zinger carried all three, but eventually the siblings kicked in and helped with rearing the triplets. All three have survived to adulthood. The only caution I would add was that Zinger was a highly experienced, exceptional mother, and that during the early weeks, the triplets did get into battles with each other for position. I hadn't realized what a great job Zinger and the siblings did until your question arrived! Good luck to you."

Dominic Wormell <*eldom@jerseymail.co.uk*>, of the Jersey Zoo, wrote: "We recently had the case of a female pied tamarin who was very reluctant to carry her twins during the day. Consequently the twins became very weak on the first and second days after birth, and we nearly pulled them. We decided to shorten the daytime hours for the group considerably, i.e., lights on at 0800, twilight at 1300 and lights off at 1700. The group was shut in for this. This appears to have worked and the infants are doing well. The reasons for the success are: first, the group are far less active shut in with the shorter day length and thus the infants don't have to expend valuable energy clinging on for dear life as the carrier leaps around; and second, the greater amount of time the mother spends in the nest box, due to the longer hours of darkness, the greater opportunity the infants have to suckle, suckling after the dam has retired to the nest box being the norm.

"I think if triplets were to be left with the mother, this regimen would probably give all three infants the best chance of being mother-reared. I would only suggest this regimen for the first couple of weeks."

Alex wrote again: "Thanks for all the great responses. I was glad to see so much of the information correlate. Our pair of Kuhli's are first-time parents. One of the babies dropped off and we immediately picked it up and began the hand-raising protocol. The infant seemed to perk up after getting warmed and having a feeding, but it was not thriving. The little guy lasted until 4 pm today. He just never really came all the way back. We hope the other two will be okay. At least we know we are ready, thanks to all the dedicated animal personnel out there!"

Later that day, Alex added: "It looks like we are not done yet! We are now hand-rearing a second infant. This one is doing better, so we are hopeful. I have a request...could those of you whom actually did this before send me your formula and the amounts fed? We are curious to see if there is much difference among the different zoos. We are currently using two protocols."

Here are two references that should be relevant:

Ziegler, T. E., Stein, F. J., Sis, R. F., Coleman, M. S., & Green, J. H. (1981). Supplemental feeding of marmoset (*Callithrix jacchus*) triplets. *Laboratory Animal Science, 31*, 194-195.

Patiño, E. M., & Borda, J. T. (1997). The composition of primates' milk and its importance in selecting formulas for hand-rearing. *Laboratory Primate Newsletter, 36*[2], 8-10.

As we were preparing this for publication, we received a final note from Alex: "This is still a sad subject for me as we lost all three babies. I may have killed the last one by feeding it too much and it aspirated. A sad way to learn."

* * *

Do Chimpanzees Like Music? Will They Choose Their Own?

Jo Fritz
Primate Foundation of Arizona

What a blast and great fun animal research can be... especially if you do not have the money to build computer equipment...and then must improvise! Who knows how it may end?

We conducted a "music study" with the chimpanzees at the Primate Foundation of Arizona (Howell, et al, 2003). The next step was to design a computerized system that would allow them to choose their own music.

We contacted computer gurus, we contacted Arizona State University students, we contacted until we were almost dead! There were no results, because we had no money and students don't have the time!

So…we went back to the drawing board. After two full weekends on the Internet and scouring toy stores, we found a small 10'' x 12" toy plastic piano (Little Tykes) with four keys, tiny xylophone-type key strikes, no batteries, no extra music. We attached a handle. We presented it to individual chimpanzees.

The idea was…should they strike a key, Pavarotti (or whatever music was assigned to that key) would instantly come on, using an observer-operated laptop. Because the keys were colored (red, green, blue, yellow), we knew we would also be battling a color preference. The "plan" was that once a pattern was set, we would change the music-color connection. Would they always hit RED (by color choice), or would they search until they found YELLOW and Pavarotti?

Well...it seems like the chimpanzees like to compose their own music! Some with "snatch and grab"..."Mine, Mine, Gimme! Gimme!!" But others are very content to make their own tunes, one key at a time, and several seem to prefer "Jerry Lee Lewis chording"! They totally ignore what music they have "called for", i.e., Pavarotti, Patsy Cline, Indian Flutes, etc., and stay intent upon the music they are making themselves…on a tiny plastic piano with four keys!

Oh, finally – one or two chimpanzees seem to have the same idea as we. Hit the key, listen, hit another key, listen. Perhaps we will get there…maybe!

The important thing is...chimpanzees like music! Stay tuned!

Reference

Howell, S., Schwandt, M., Fritz, J., Roeder, E., & Nelson, C. (2003). A stereo music system as environmental enrichment for captive chimpanzees (*Pan troglodytes*). *Lab Animal, 32*[10], 31-36.

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Volunteer Opportunities: Munda Wanga's Wildlife Park and Sanctuary, Zambia

Three-week volunteer opportunities are available to keen and enthusiastic people looking to gain hands-on experience working at an African wildlife park and sanctuary. Species you could be working with include lions, tigers, wild dogs, various primates, an American black bear, and a baby elephant. Volunteer duties will vary depending on volunteer's interest, previous experience, and the Park and Sanctuary's priorities, which vary with the time of year and what construction/relocation programs are on at the time. For more information contact Lee Stewart [e-mail: *sanctuary@zamnet.zm*], or see <www.mundawanga.com>. Longer volunteer periods are available depending on the volunteer's experience. – *Please mention ZooNews Digest if you apply for this position.*

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Resources Available

Colombian Primate Network

The Colombian Primate Network is attempting to create a virtual space that can be reached by researchers all around the world, in order to share information about Colombian primates, their status, ecology, conservation programs, research projects, methodologies, and publications. This virtual place will connect people who are working in the same areas or species; it will inform the general public and researchers about the findings in Colombian primatology; and, finally, it will be a connection with international agencies, primatological societies, and resources that can be useful to develop better research and conservation programs. For more information, see <www.geocities.com/primatescolombia>.

NIH's Expanded Health Information Website

The National Institutes of Health (NIH) has announced the launch of an expanded health information Website: <www.nih.gov/news/pr/jun2004/od-15.htm>. The Website includes three colorful new feature sections, including "Research In Action", which links users to cutting-edge scientific information on topics such as stem cells and genetics, and provides an opportunity to "meet" scientists ranging from high school students to Nobel laureates. *– from an NIH press release, June 15*

Rhesus cDNA Sequences and Microarrays

The National Center for Research Resources (NCRR) recently funded two projects to derive rhesus macaque complementary DNA (cDNA) sequences and design rhesus-specific microarrays. In the first project, Michael Katze (Washington National Primate Research Center) and Shawn Iadonato (Illumigen Biosciences, Inc.) are preparing rhesus cDNA libraries and sequencing the resulting clones. A general description of the project plus microarray data that can be downloaded are available at <primate.viromics.Washington.edu>. The cDNA sequences in FASTA format are also available.

In the second project, Robert Norgren (University of Nebraska Medical Center) and Eliot Spindel (Oregon NPRC) are designing rhesus-specific microarrays in Affymetrix format, with input from the research community. For a current list of sequences expected to be on the chips, plus information for providing input, see <rhesusgenechip.unomaha.edu>. Sequences determined by both projects also will be deposited in GenBank, which can be accessed through the National Center for Biotechnology Information. – *From the* NCRR Reporter, *Spring, 2004*

Raven Sound Analysis Software

A new version of Raven, an interactive sound recording and analysis program designed specifically for the study of animal sounds, is now available online at <www.birds.cornell.edu/Raven>. Raven runs on Windows and Mac OS computers, and offers real-time spectrograms, the ability to handle arbitrarily large signals, easily exportable measurements, flexibility of signal display, a friendly user interface, and comprehensive documentation. This release, version 1.2, adds over twenty new features including annotations (named arbitrary text notes that you can add to selections, like "Song Type", "Individual ID", etc.), selection spectrum views (average spectrum of a selection), greatly improved image export features, selection labels in views, and drag-and-drop file opening. A free demonstration version of the program, including the Raven Users' Manual and a set of example sound files, is available at the Website, and the fully functional version can also be purchased there.

* * *

Environment for a Sustainable Future

The Centre for Environment Education (CEE), Gujarat, India, a national institution established in 1984, is supported by the Indian Ministry of Environment and Forests. The main aim of CEE is to create environmental awareness among children, youth, decision-makers, and the general community. CEE's primary objective is to improve public awareness and understanding of environmental issues, with a view to promoting conservation of nature and natural resources. To this end, CEE not only creates expertise in the field of environment education, but also develops innovative educational programs and materials, testing them for their validity and effectiveness.

CEE is organizing an International Conference on "Education for a Sustainable Future" (ESF) in Ahmedabad, Gujarat, January 18-20, 2005, as part of the United Nations Decade of Education for Sustainable Development (2005-2014). ESF is planned as a forum for the international community, which will help to: • Share the understanding, current status and needs of "Environment for Sustainable Development" (ESD). • Showcase best practices for ESD from different parts of the world. • Strengthen networking and active participation of all stakeholders for ESD for the next decade. • Develop a strategy and a blueprint of action for the decade, including India's strategy and its role in the decade. • Work towards developing guiding principles, roadmaps and priorities for ESD in the decade. See <www.ceeindia.org>; or contact Meena Nareshwar, Zoo Education and Interpretation Programmes, Centre for Environment Education, Ahmedabad, Gujarat, India [e-mail: *esf@ceeindia.org*].

News Briefs

Clyde Is a Grandfather!

Remember Clyde, the parenting male orangutan (*LPN, 37*[1], 18-19), described in 1998 by Betty Jo McDuffee? The San Diego Zoo said Thursday that it knows the father of Cinta, a 3-month-old orangutan. Zookeepers had been wondering since spotting Cinta's mother, Indah, mating with 9-year-old Satu as well as with Satu's 27-year-old father, Clyde.

Some suspected Clyde was the father because of his riper age. But hair and blood samples pointed to Satu, even though he lacked a beard, long dreadlocks, and large cheeks – traits that female orangutans find attractive, the zoo said.

"Despite appearances, it turns out Satu is indeed man enough to be a daddy, and Clyde is now a grandfather,'' the zoo said in a press release. The San Diego Zoo is now home to three generations of orangutans. It is the first offspring for Indah, the 17-year-old mother. – *June 17, Associated Press report*

Chimfunshi Opens 150-Acre Enclosure

The Chimfunshi Wildlife Orphanage, which has cared for injured and unwanted chimpanzees since 1983, marked another milestone in its development recently when it released 12 chimpanzees into a 150-acre enclosure at the sanctuary in central Zambia. The group was transferred June 12 to a fenced area that includes thick forests, fruit groves and open grassland. The move is considered permanent, but the chimpanzees will still be fed regularly and their health will be monitored by Chimfunshi staff. The facility includes night cages and a food storage building.

This move was overseen by a veterinary team that included Dr. Peter Buss of South Africa. Dr. Sally Shiel of Zambia, Dr. Tink Robey of South Africa, and Chimfunshi's resident veterinarian, Dr. Eric Dubuis. The chimpanzees had been living in a 14-acre enclosure. They were anesthetized and then loaded onto a truck and transported the 12 kilometers to their new home.

For more information, see <www.chimfunshi.org.za>, or contact the Orphanage at P.O. Box 11190, Chingola, Zambia [e-mail: *ChimfunshiUSA@aol.com*]. – *from a June 24 press release*

Sue Howell at Alpha Genesis, Inc.

"Alpha Genesis, Inc. (AGI), is pleased to announce that Dr. Sue Howell has been appointed Director of Research and Development. Dr. Howell brings a wealth of experience to our organization and is a welcome addition to our program. AGI maintains high-quality primate breeding and research facilities at its three South Carolina facilities and is currently accepting proposals for primate breeding and research projects. Please send inquiries via e-mail to <*ask-alphagenesisinc@alphagenesisinc.com*>, or to <*GWprimate@alphagenesisinc.com*>. Further details are available at <www.alphagenesisinc.com>."

Dutch Zoo Chimpanzees Get Second Chance

Two adult male chimpanzees that grew up as virtual brothers and formed deep emotional bonds at Artis Zoo in Amsterdam will remain together permanently after being transferred this week to the Great Ape Project (GAP)–Brazil sanctuary <www.greatapeproject.org>. Rakker and Simon, both 11 years of age, were born in captivity. Rakker was acquired from the Antwerp Zoo in Belgium at 18 months of age as a playmate for Simon, born at the Artis Zoo, but rejected by his mother.

The chimpanzees were raised together for three years before being placed in the main social group of adults at the Artis Zoo. But Simon's mother, who is the alpha female of the group, refused to accept Rakker and attacked him severely, nearly killing him on one occasion. Attempts to keep Rakker from the main group for his own safety left Simon lonely and disconsolate.

The Artis Zoo, which was suffering from overcrowding in its chimpanzee enclosure, looked at options elsewhere in Europe and Asia before contacting GAP–Brazil, which already cares for 26 chimpanzees. Rakker and Simon arrived on June 9 accompanied by keepers from the Artis Zoo, who will help ease the chimpanzees' transition into their new surroundings.

The GAP–Brazil sanctuary is situated on the outskirts of São Paulo and was created to care for injured and unwanted chimpanzees and other primates. Most of the sanctuary's residents have come from South American circuses or zoos.

Gorilla Escaped Enclosure by Leaping Trench, Wall

A gorilla that was shot to death by police after breaking out of its enclosure at the Dallas Zoo in March escaped by leaping over a 12-foot-wide trench and a wall that separates animals from visitors, officials said Tuesday. Jabari, a 340-pound western lowland gorilla, went on a 40-minute rampage March 18, snatching up a toddler with his teeth and injuring three other people.

The gorilla enclosure is constructed so that animals are roughly at visitors' eye level, but they are separated from visitors by a 14-foot wall and the trench. Zoo investigators believe the gorilla probably got a running start and sailed over the trench and the wall, clearing an electrical wire atop the wall that is supposed to give a mild shock.

The zoo investigation found no human errors that might have led to the gorilla's escape, such as doors left open. The zoo is raising the walls to 15 feet. – *Associated Press, June 15*

Gorillas Escape from Enclosure at Ohio Zoo

Seven gorillas escaped from their enclosure at the Columbus Zoo and spent a few hours wandering free in the ape house. The zoo had closed for the day Saturday, July 3, when keepers noticed a gorilla loose in the house outside of the gorilla enclosure. A door had been accidentally left open, allowing the animals to roam areas usually off limits to them. The gorillas weren't able to leave the ape house building, but zoo officials say the group managed to have a wild time scattering supplies. About three hours after the escape, the gorillas were coaxed back into their outdoor habitat. – *© 2004 by The Associated Press*

Virunga National Park Victim of Forest Clearing

Nearly 4,000 acres of prime mountain gorilla habitat have been cleared by illegal settlers in Africa's Virunga National Park, a World Heritage Site. The settlements were uncovered by the Congolese Institute for the Conservation of Nature, which found that, since April, thousands of people from Rwanda and the Democratic Republic of Congo (DRC) have destroyed large tracts of the park to create agricultural and pastoral land.

Located in DRC on the border with Rwanda and Uganda, Virunga National Park is home to more than half the world's 700 remaining mountain gorillas. The park is also home to the world's only golden monkey population. The mountain gorillas generate around $2 million for the region annually from tourism.

According to information received by the World Wildlife Fund (WWF), the Wildlife Conservation Society, and their conservation partners, most of the destruction took place from early May to June. Several thousand people moved in to the area to farm illegally in Virunga, with support from influential local individuals who sold plots of land within the national park. The forest was clearcut and turned into timber or charcoal before crops were planted.

WWF is urging the Congolese and Rwandan governments to take measures to enforce the UN World Heritage Convention that protects this unique site. WWF is also calling on the international community to fund park patrols, the peaceful evacuation of illegal settlers, and the restoration of destroyed areas. – *from a WWF press release, July 5*

Great Ape Trust Nearing Completion

The first primates will soon move into Iowa's first primate research facility in Des Moines. Construction on the building is right on schedule, and officials say they're on track for completion. The building will be one of the premiere learning facilities for primate research in the country, but it won't be open to the public. About two hundred neighbors toured the facility at a private event Tuesday evening.

Next month, two orangutans, Azy and Indah, from the National Zoo in Washington, DC, will be the first apes to arrive at the Great Ape Trust of Iowa. – *WorldNow, July 14*

LSU–Tulane Center for Infectious Disease Research

The Louisiana State University (LSU) School of Veterinary Medicine has received a $9.9 million grant to establish a Center of Biomedical Research Excellence (COBRE). This Center grant from the National Center for Research Resources provides substantial funds into developing faculty for independent funding by the National Institutes of Health (NIH) traditional mechanisms. The grant will last for five years and can be competitively renewed for five or more years. The School's grant will allow it to create a Center for Experimental Infectious Disease Research. "This Center constitutes a strategic alliance between the School of Veterinary Medicine, the LSU College of Basic Sciences, and the Tulane National Primate Research Center," said Dr. Konstantin G. Kousoulas, the administrator of the COBRE program at the LSU School of Veterinary Medicine. Currently, a total of five assistant professors have research projects in the grant, representing the Department of Pathobiological Sciences, School of Veterinary Medicine; the Department of Biological Sciences, College of Basic Sciences; and the Department of Microbiology and Immunology, Tulane National Primate Center (TNPRC). A number of other faculty and staff will participate in research cores in the School and TNPRC.

Participants in the COBRE program will have access to specialized Core Facilities at both TNPRC and the Division of Biotechnology and Molecular Medicine. The COBRE grant provides funding and research capabilities that will give assistant and associate professors the opportunity to establish research programs that will effectively compete for independent funding by NIH. Once a faculty member receives his or her own NIH funding for a particular research program, he or she will be rotated out of COBRE and replaced by other eligible faculty. For more information, see
<biommed.lsu.edu/article.php?story=20040720213400104>.

Gorilla with Inoperable Cancer Euthanized

A 39-year-old gorilla with inoperable cancer was euthanized at the Columbus Zoo and Aquarium, zoo officials said Tuesday. Exploratory surgery last week confirmed the cancer in Sylvia, a western lowland gorilla. She was put to death Monday.

Sylvia was born in the wild and caught when three months old. She spent time at the National Zoo in Washington and the Baltimore Zoo before coming to Columbus. Sylvia never conceived a child, but was a surrogate and adoptive mother to juvenile gorillas at the Columbus Zoo, which in 1956 was the first zoo to have a western lowland gorilla born in captivity. – *Associated Press, August 4*

Monkeys Escape Cages at Research Center

A group of monkeys escaped from their cages at the New Iberia Research Center Monday. Only one of the monkeys escaped the Center's grounds. It was recovered at a nearby business. By Monday evening all of the escaped monkeys were back in their cages.

The Center is a primate facility run by the University of Louisiana at Lafayette. It breeds nonhuman primates and provides pre-clinical safety trials and evaluations of pharmaceuticals and biotechnology products. The rhesus monkeys, used for breeding, did not pose a risk to the public, a university spokesman said. The incident is under investigation. Officials believe the escape was the result of human error. – *Associated Press, August 9*

KWS to Kill More Than 200 Monkeys

Over 200 monkeys that have invaded farms in the famine-hit Ndeiya location of Limuru will be killed at the weekend, the Kenya Wildlife Service (KWS) has said. The primates have become a menace, causing great crop damage and meting out violence on the residents and KWS officials who have tried to remove them from the farms. Limuru District Officer (DO) Isaac Masinde and local KWS officials said they would eliminate the monkeys.

Masinde said their attempts to push the primates back to the forest had failed, leaving them with no alternative but to kill them. The KWS officials are expected to shoot the animals dead. The DO said the monkeys had created fear among the residents of Ndiuni and Githunguchu villages, imposing a curfew on them such that they could not venture out of their compounds from 5 p.m. to 8 a.m.

Masinde said so far 10 monkeys had been shot dead, which seems to have provoked the others to violence. Yesterday, the residents and KWS officials who went to scare the monkeys away got a shock when three well-armed battalions of monkeys stoned them. Though the officials of the wildlife organization were armed with sophisticated weapons, they had to scamper for safety in neighboring homes.

And lately, the monkeys have grown bolder, conducting daylight raids on homesteads and taking away any edible material they find. Masinde said they were waiting for reinforcements from the Ngong KWS headquarters. – *The East African Standard (Nairobi), August 6*

Additions to PASA Advisory Board

The Pan African Sanctuaries Alliance (PASA) has announced two additions to the PASA Advisory Board. Barbara Cartwright, a campaigner for the International Fund for Animal Welfare (IFAW) – Canada, and Dr. Tony Mudakikwa, the senior veterinary officer of the Office of Rwandan Tourism and National Parks (ORPTN), were elected to the PASA Advisory Board at the recent PASA 2004 Management Workshop in Johannesburg, South Africa.

Other members of the PASA Advisory Board include Debby Cox (Jane Goodal Institute–Uganda), Estelle Raballand (Chimpanzee Conservation Center, Guinea), Wayne Boardman (London Zoo, U.K.), Kay Farmer (United Kingdom), Adebowale Ajao (Nigeria), Carol Keys (United States) and Doug Cress (United States).

PASA was formed in 2000 in order to promote cooperation and efficiency among the rapidly growing sanctuaries throughout Africa. The organization stages workshops in Africa each year for the veterinarians, educators and managers of each sanctuary, in addition to providing crisis intervention and coordination, emergency funding, logistics, and promotion of their work. PASA sanctuaries collectively care for over 700 chimpanzees, 75 gorillas, 35 bonobos, and literally thousands of baboons, drills, and monkeys. For more information, please visit <www.panafricanprimates.org> or contact PASA at [*PASAapes@aol.com*]. – PASA *press release, July 14*

Visitors Watch Bonobo Birth at San Diego Zoo

A bonobo was born at the San Diego Zoo on August 15, 2004, to the surprise of many zoo visitors who witnessed the birth. The bonobo (or pygmy chimpanzee) is a critically endangered species and rarely seen in zoos. The San Diego Zoo has a successful breeding program, and this birth marks the third offspring for the mother Lana. – *Yahoo News*

Spanish Town Refuses Permit for Retired Chimps

Dozens of chimpanzees from a Dutch laboratory face a housing crisis after plans for their retirement on the Spanish coast collapsed because of residents' fears they would carry infectious diseases. This illustrates the dilemma of what to do with research chimps as more countries decide it is no longer acceptable to use humankind's closest genetic relative for experiments.

The Dutch government agreed to pay for 39 healthy chimps to move to a proposed state-of-the-art facility near the town of Relleu, Spain. The center, to be built on 100 acres of land, was to feature trees, play structures, and housing with shady areas underneath. But Relleu has refused to grant a permit, fearing the chimps carry diseases. Pleas from the Spanish regional government, and a

visit from expert Jane Goodall, failed to sway town officials.

''We are in trouble, that's for sure,'' said David van Gennep, director of Stichting AAP, the Dutch primate shelter behind the move. The 39 chimps ''could end up spread around the world. But we're not willing to accept having them put them down,'' he said. Caring for chimps is costly, and high-quality zoos are reluctant to accept laboratory chimps because they may have developed psychological problems.

Meanwhile, countries like The Netherlands have banned tests on chimps. The U.S. Congress voted in 2000 to allow primate testing to continue, but with restrictions. *– Associated Press, August 20*

Rare Twins Born to Mountain Gorillas

On May 17, second-time mother Nyabitondore, 12 years old, gave birth to twins, only the third ever recorded, in Volcanoes National Park, Rwanda. Since the middle of last year, gorilla troops have produced 14 other babies, and the birth of the twins has delighted conservation experts.

In 1986, the first recorded pair of twins died after just nine days. Of the second pair, born in 1991, one infant died within a month. The other survived to adulthood, only to be killed by poachers attempting to steal a baby gorilla in 2002. Gorilla troops are ferociously protective of their young and poachers often have to kill mothers and other adults to steal babies.

Volcanoes National Park, Africa's first, was established by Rwanda's Belgian colonial rulers in 1925 after Carl Akeley of the American Museum of Natural History made a plea to protect the gorillas. It lies on the Rwandan side of a mountain range that straddles the borders of Rwanda, Congo and Uganda. Adjacent parks in Congo and Uganda are both known as Virunga National Park. The three parks are home to the world's entire mountain gorilla population. A census conducted late last year found that the number was up 17 percent since the last count 15 years ago. *– from Associated Press and African Wildlife Foundation Web reports*

* * *

Research and Educational Opportunity: Chimpanzee Behavior Internship – AZ

The Primate Foundation of Arizona (PFA) is currently accepting applications for Chimpanzee Behavioral Research Internship Program. The internship is 10 weeks in duration and runs from March 1 to May 15 (Spring Internship) or June 1 to August 15 (Summer Internship). Applications for the Spring are due January 1, 2005. Summer applications are due April 1, 2005. The Behavioral Research Internship provides college students in the behavioral and biological sciences the opportunity for behavioral research experience. It includes three basic components: 1) an introduction to chimpanzee behavior and behavioral observation data collection, 2) chimpanzee psychological wellness program and environmental enrichment training, and 3) research support tasks such as data entry. The introduction to chimpanzee behavioral observation is the primary component of the internship and includes data collection on an assigned or chosen project, entering the data into a spreadsheet program, conducting preliminary analysis, and completion of a background literature review. Students are welcome to incorporate their internships into their college curricula for research credit, independent study, or similar course work. However, PFA remains the supervisor for all internship-related activities. Internship project topics focus on environmental enrichment but other projects may be considered as requested by academic advisors or to meet academic requirements.

Students should have completed at least two years of a four-year program (junior-level standing) in the behavioral or biological sciences. Both undergraduate and graduate students are encouraged to apply. Previous course work and/or experience in primatology/animal behavior is required for all students. The internship is on a volunteer basis and provides no stipend.

For further information, contact Elaine Videan, Research Director, Primate Foundation of Arizona, P. O. Box 20027, Mesa, AZ 85277-0027 [e-mail: *evpfa@qwest.net*].

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A Future for the *LPN*?

The *Laboratory Primate Newsletter* is nearing the end of its last NIH grant period. We have been told that the grant will not be renewed, because "there are enough primate journals". We are trying to find alternative sources of funding, because we believe that we are providing some unique services. When Allan Schrier started the *LPN* in 1962, he wrote: "The primary purpose of the *Newsletter* is an exchange of practical information about nonhuman primates…The *Newsletter* will probably continue as long as people are interested enough to contribute items of interest." "Items of interest" are still appearing in our mail and e-mail boxes. We only hope that we will be able to continue to publish them. Any suggestions will be appreciated.

Meeting Report: Chimpanzees in Biomedical Research

The University of Texas M. D. Anderson Cancer Center and the University of Louisiana at Lafayette New Iberia Research Center hosted a meeting titled "Chimpanzees in Biomedical Research: Status and Strategic Planning" in Bastrop, Texas, May 3-4, 2004. Participants included chimpanzee resource providers, researchers whose science requires access to the resources, regulatory agencies, National Institutes of Health representatives, and individuals associated with sanctuary efforts. The major resource providers represented include:

- Yerkes National Primate Research Center
- Southwest Foundation for Biomedical Research
- University of Texas M. D. Anderson Cancer Center
- Primate Foundation of Arizona
- Alamogordo Primate Facility
- The University of Louisiana at Lafayette New Iberia Research Center

Discussions during the meeting included updating current chimpanzee resources available to the biomedical and behavioral community, demographics, and the scientific needs for chimpanzees as animal models for human disease research. The Institute for Laboratory Animal Research (ILAR) document on recommendations regarding the management of chimpanzees was reviewed, and the Food and Drug Administration representatives detailed the FDA's perspective on the use of chimpanzees as animal models. Professionals from each field detailed the importance of the animal model for neuroscience research, genetics and genomics, and comparative anthropology, as well as some critical infectious disease and safety study requirements.

At the end of the meeting Dr. Chris Abee summarized the presentations and performed a SWOT analysis (strengths, weaknesses, opportunities, and threats). Action items identified included (but were not limited to) the following:

- Periodically evaluate stakeholder priorities.
- Foster awareness of appropriate use in scientific/regulatory and public/political communities.
- Develop a coordinated approach to addressing problems with accessing chimpanzees as animal models for research and chimpanzee resources.
- Nurture relations with the U.S. Congress and with the European Community.
- Update the Institute for Laboratory Animal Research (ILAR) publication titled "Chimpanzees in Research, Strategies for Their Ethical Care, Management, and Use" to reflect global utilization and strategic needs.

Lastly the participants identified the need to create a leadership group to assure the future availability of chimpanzee resources for basic and applied research. The "Chimpanzee Resource Executive Committee" is currently being formed. It will address these and other needs associated with a global resource currently being overseen by a small handful of institutions partially supported by the National Center for Research Resources – NIH.

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OLAW Changes Time Frame for Submission of Assurances and Annual Reports

The Office of Laboratory Animal Welfare (OLAW) has announced changes related to two documents that are required to be submitted by National Institutes of Health (NIH) awardee institutions. On July 13, 2004, a notice informing NIH grantee institutions holding Animal Welfare Assurances under the Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals was posted in the NIH Guide for Grants and Contracts. OLAW will now approve most Assurances for periods of up to four years, and is "strongly encouraging" institutions to use the calendar year for the reporting period of annual reports. According to the notice, "renewal Assurances must be submitted to OLAW by the expiration date of the Assurances. Institutions that currently have an Assurance with a five-year approval period will be requested to submit their renewal 6-12 months prior to the expiration date in order for the renewal to be negotiated and approved within the PHS Policy timeframe." "OLAW will now approve Assurances for periods of up to four years to allow time for review and approval of renewal Assurances."

With regard to annual reports, institutions are being asked to use a calendar year (January 1–December 31) as the reporting period. Those institutions that elect to use a different 12-month reporting period must submit a letter or e-mail to OLAW by January 31, 2005, indicating their preferred reporting period. If institutions do not choose a reporting period other than the calendar year, "OLAW will consider that the institution is defaulting to use the calendar year as its reporting period." For detailed information and guidance on these changes, please see <grants.nih.gov/grants/guide/notice-files/NOT-OD-04-052.html>.

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Positions Available

Animal Facility Supervisor – Georgia

The Medical College of Georgia, Lab Animal Services, is seeking an Animal Facilities Supervisor. Minimum qualifications include an Associate's degree in Lab Animal Science or a related field, and three years' experience in laboratory animal science and medicine; AALAS certification as a Laboratory Animal Technologist or certification eligible within one year of employment; thorough knowledge of the techniques involved in handling, observing, and caring for animals; considerable knowledge of physiology, normal behavior, and physical characteristics of all types of lab animals; knowledge of management principles and practices as applied to laboratory facilities; excellent supervisory and verbal/written communication skills; working knowledge of desktop computer and electronic office equipment; and the ability to lift up to 75 pounds. Preferred qualifications include a bachelor's degree in a related field with at least five years' experience in laboratory animal medicine; at least three years' experience with nonhuman primates (macaques); at least two years' experience managing and/or supervising staff; two years' previous experience as a veterinary technician; or the combined equivalent of related education and experience.

Responsibilities include, but are not limited to, planning and supervising the general husbandry aspects of the animal care and use program for research and education at the Medical College of Georgia; assisting with the perioperative care of all species; providing technical assistance to investigators, laboratory assistants, technicians, and graduate students; maintaining/supervising a regular schedule of maintenance and sanitation of animal housing, equipment, and rooms; supervising technicians in husbandry techniques; implementing a quality assurance program and/or sentinel program; reinforcing training through teaching certification classes; providing maintenance of ancillary care equipment; performing various clinical procedures.

Shifts are days, Mondays-Fridays, but some weekends and holidays are required. The salary is negotiable, based on qualifications. To apply, see <www.mcg.edu/jobs>. For more information, contact Dr. Rodriguez [706-721-8575; e-mail: *nrodriguez@mail.mcg.edu*].

Scientific Administrative Specialist – Texas

The Southwest National Primate Research Center (SNPRC) is looking for an individual who will be responsible for managing and monitoring grants and for assisting other administrative staff with the preparation of public relations documents and materials. Grants management duties (70% effort) will include managing data required for reporting and administrative purposes; assisting scientific investigators in developing budgets; developing internal financial reports; processing travel requests; and serving as a liaison between the SNPRC and its host institution, the Southwest Foundation for Biomedical Research. Public relations duties (30% effort) will include assisting with the continuing development and maintenance of the SNPRC Website; preparation of a public relations brochure; preparation and management of a set of slides and PowerPoint files used by SNPRC investigators; and management of information and data required for public relations activities. This individual will report to Dr. VandeBerg, Director of SNPRC.

A bachelor's degree in accounting, math, finance, business, or a scientific field; two years of experience in accounting, financial record management, or scientific grants; excellent written and oral communication skills; and the ability to work independently are required. Experience with relational database report development and experience with NIH grants and management in a biomedical research environment are preferred. This is a full-time salaried (exempt) position. To apply or for further information contact E. Gwen Bridgeford, Sr. Human Resources Specialist, Southwest Foundation for Biomedical Research, P. O. Box 760549, San Antonio, TX 78245-0549 [210-258-9699; fax: 210-670-3328].

Facility Manager – Virginia

The Division of Comparative Medicine at Eastern Virgina Medical School is seeking a full-time facility manager for its centralized animal care unit. Responsibilities include, but are not limited to: assisting the Director in the overall management of the animal care program; assisting in training of investigators and staff; all aspects of personnel supervision related to the animal care staff; maintaining facility records; managing the rodent and nonhuman primate colonies; and ensuring that animal care procedures are in accordance with United States Department of Agriculture (USDA), Association of the Assessment and Accreditation of Laboratory Animal Care International (AAALAC) standards.

In addition, the successful candidate will oversee the administration of technical services for research investigators, and will monitor the environmental enrichment and rodent health surveillance programs. The facility manager must be familiar with various equipment including ventilated cage systems, cage washers, and autoclaves, and possess excellent verbal and written communication skills. Must be AALAS-certified as a LATG and have a minimum of 4-6 years' supervisory experience.

Please send resume and salary reqirements to: Eastern Virginia Medical School, 358 Mowbray Arc, Suite 1-1, Norfolk, VA 23507. For more details, see <www.evms.edu>. Only those considered will be contacted. AA/EOE/Drug Free Workplace.

Information Requested or Available

New WPRC Library Website

"The Wisconsin Primate Research Center Library and Information Service has a new Library Web page at <library.primate.wisc.edu>. Along with a fresh, up-to-date look, we have reorganized content to better reflect services and resources, and make it easier to navigate. In addition, we have used standards-compliant XHTML and Cascading Style Sheets, and ensured that the site complies with Americans with Disabilities Act requirements.

"Staff and affiliates of the Wisconsin Primate Research Center and other National Primate Research Centers should note the new, easy-to-remember URLs for the document delivery request forms: University of Wisconsin users: <library.primate.wisc.edu/lx>; other NPRC users: <library.primate.wisc.edu/dds>.

"We hope you find the WPRC Library and Information Service Web page useful. Please direct any comments or suggestions to <*library@primate.wisc.edu*>."

Primate-News Service

"The Wisconsin Primate Research Center Library and Information Service is pleased to announce the launch of our new notification service, *Primate-News* (*P-News*)! Anyone with an interest in nonhuman primates is welcome to subscribe to *P-News*, which is designed to deliver Web-based news clippings, information about upcoming television programs, and other items of interest about primates via e-mail. The list is a notification service. Subscribers will not have the ability to post messages. For more information and to subscribe go to <pin.primate.wisc.edu/infoserv/forums/pnews> and complete the brief subscription form. *Note:* All of the content in *P-News* is also posted to *Primate-Science."*

News from the Primate Info Net (PIN)

"Primate Info Net has been redesigned from the ground up. Along with a fresh, up-to-date look, we have reorganized content making it easier to navigate, added new content, and consolidated the World Directory of Primatologists and the International Directory of Primatology under the single title: International Directory of Primatology.

"Note the new URL: <pin.primate.wisc.edu>. Many old links (bookmarks) may not work. We have redirected all old links to the new homepage. You can use the search feature, the site map, or the left-side navigation bar to locate those pages you wish to bookmark. These tools are available on every PIN page.

"The page will change regularly, so visit often to keep up on the latest announcements and additions. Note the rotating exhibit of *Primates in Art and Illustration*. We plan to mount a new image exhibit several times a year highlighting primates as they are depicted in various forms of popular media. We have also included links to current primate-related news articles. We hope you enjoy your visit to the new PIN and welcome feedback on your experience. Send your comments, questions or complements to <*library@primate.wisc.edu*>."

More Interesting Websites

- Malaria educational site, from Royal Perth Hospital, in English, French and Spanish:
<www.rph.wa.gov.au/labs/haem/malaria>
- Morris Animal Foundation's Mountain Gorilla Veterinary Project:
<www.morrisanimalfoundation.org/learn/animals/mgvp/default.asp>
- Otto Environmental, products:
<www.ottoenvironmental.com>
- Primate Rescue Center, Inc.:
<www.primate-rescue.org/>
- *A Reference Source for the Recognition & Alleviation of Pain & Distress in Animals,* from AWIC:
<www.nal.usda.gov/awic/pubs/awic200003.htm>
- Southwest Foundation for Biomedical Research:
<www.sfbr.org>
- Zookeeping Education Programs:
<www.wonderferret.com/zooed/>

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Meeting Announcements

An **International Symposium on Construction and Maintenance in Zoos** will be held at Zoo Zürich, November 21-24, 2004, at Zürichbergstrasse 221, 8044 Zürich, Switzerland. The theme will be "Exhibits in Zoos: Experiences from planning to facility management". See <www.zoo.ch/symposium>.

The **Fourth European Zoo Nutrition Conference** will be held January 21-23, 2005, at the Leipzig Zoo. See <www.EZNC.org>.

See page 7 for another meeting announcement.

The 2005 **Veterinary Midwest Anesthesia and Analgesia Conference** will be held April 21-23, 2005, at the Adams Mark Indianapolis (Indiana) Airport Hotel. This meeting is sanctioned by the American College of Veterinary Anesthesiology and the International Veterinary Academy of Pain Management and will offer 10 credit hours of continuing education. Registration is $50. For more information, contact William Muir, Dept of Veterinary Clinical Science, 601 Tharp St, Ohio State Univ., Columbus, OH 43210.

Awards Granted

Mammalogists Honor Mittermeier

Conservation International (CI) President Russell A. Mittermeier has been awarded the second annual Aldo Leopold Award by the American Society of Mammalogists (ASM). The award was created to honor individuals who have made outstanding and lasting contributions to the conservation of mammals and their habitats. In a written statement, the ASM's president, Dr. Bruce D. Patterson, highlighted Mittermeier's "productivity as a scientist and [his] effective leadership of several conservation organizations, especially CI."

This Award honors the memory of the early 20th Century conservationist Aldo Leopold, a former ASM member considered to be the "father" of wildlife ecology and management. Last year, the inaugural Aldo Leopold Award was presented to Dr. E. O. Wilson of Harvard University, who serves on CI's Board of Directors.

Mittermeier's fieldwork has focused on primates, protected areas and other conservation issues in Brazil, Suriname, Madagascar, and more than 20 other countries. His areas of expertise include biological diversity and its value to humanity, ecosystem conservation, tropical biology and species conservation. In addition to his work at CI, Mittermeier is Chairman of the IUCN-World Conservation Union Species Survival Commission's Primate Specialist Group, Adjunct Professor at the State University of New York at Stony Brook, and President of the Margot Marsh Biodiversity Foundation. Prior to coming to CI, he was with the World Wildlife Fund–U.S. for 11 years, where his last role was as vice president for Science. – *From a July 29 press release from CI*

IPS Captive Care Grants Awarded

Colleen McCann, the International Primatology Society's Vice-President for Captive Care, has announced that the IPS Captive Care Committee has recently awarded $2,000 in Captive Care Small Grants. "Four applications were received and two awards were made. The following individuals received grants for their excellent projects: • Luisa Fernanda Lema Valez: $1,000 for the purchase of an incubator for the care and treatment of confiscated primates at Fundación Ecolombia, Colombia. • Patricia Peignot: $1,000 to provide enhancement to the enclosures for the chimpanzees at the International Center for Medical Research in Gabon.

"Congratulations to Luisa and Patricia for their outstanding proposals and we look forward to hearing updates on their projects and how the work resulting from these awards has improved the lives of the primates in their care. These grants were made from the IPS General Fund. We are planning to award another set of grants within the next year.

"Grant applications were evaluated by the members of the IPS Captive Care Committee and I would like to thank Hannah Buchanan-Smith, Kay Farmer, Helena Fitch-Snyder, Lisa Jones-Engel, Mark Prescott, and Sylvia Taylor for their work."

IPS Education Committee Award Recipients

Anne Savage, International Primatological Society Vice-President for Education, announces: "In honor of Dr. Charles Southwick's longstanding commitment to conservation education, we have developed the Charles Southwick Conservation Education Commitment Award. This award is dedicated to recognizing individuals living in primate habitat countries that have made a significant contribution to formal and informal conservation education in their countries. The amount of the award is $750: $500 is given to the recipient and $250 will be given in the recipient's name to a project of their choosing in their community. The IPS Education Committee is pleased to announce the following recipients of the 2004 Charles Southwick Conservation Education Award: • Dr. Surendra Mal Mohnot, Emeritus Professor and Chairman, Primate Research Center, Jodhpur, India, has a long and distinguished career in teaching, research, and public conservation education in India. He is the founding director of the School of Desert Sciences, a teaching and research center devoted to the conservation of wildlife, environments, and people in the Great Thar Desert of western India. He has trained and mentored more than 40 pre-and post-doctoral students and young investigators; many of these individuals are now working for the conservation of India's natural resources. • Mr. Wilberforce Okeka founded the Kakamega Environmental Education Program (KEEP), a program focused on environmental education for school children living near the Kakamega Forest. The educational goal of the KEEP project is to teach local people about the wonder and beauty of the forest and the importance of conserving the forest. By partnering with local Kenyan organizations, KEEP has also become involved in facilitating lifestyle changes that relieve pressure on the forest, including tree planting, income generation from on-farm cultivation of forest products, and fuel-efficient cooking technology.

"In addition, the Lawrence Jacobsen Education Development Award supports the initiation and long-term support of primate conservation education programs. This education award supports field conservation programs, work with local communities and/or schools, or programs that provide training in conservation education techniques. The Education Committee is pleased to announce the following recipients of the 2004 Lawrence Jacobsen Education Development Award: • Randy Kyes was awarded $500 to support a conservation education program in the elementary schools around Tangkoko-

Batuangus-Duasudara Nature Reserve, North Sulawesi, Indonesia. • Sandra Correa was awarded $500 to support an educational exhibit for *Alouatta seniculus* as part of Fundación Ecolombias program to reintroduce animals rescued from the pet trade to a restored forested area in Colombia. Please join us in congratulating these deserving recipients."

Primate League Founder Wins Conservation Award

Dr. Shirley McGreal, founder of the Summerville, South Carolina-based International Primate Protection League, has been named one of six winners in the 50th Annual ChevronTexaco Conservation Awards. The $10,000 award was presented at ChevronTexaco's corporate headquarters in San Ramon, California. Since its founding in 1954, the ChevronTexaco Conservation Awards have honored more than 1,000 volunteers, professionals and organizations for their practical and creative solutions to environmental challenges.

McGreal founded the International Primate Protection League in 1973. The organization boasts 17,000 members whose mission is to protect gorillas and other primates worldwide. – *from a September 9 press release*

* * *

Award Nominations

2005 Animal Welfare Enhancement Awards

The Animal Welfare Institute (AWI) and the Johns Hopkins Center for Alternatives to Animal Testing (CAAT) have issued a call for proposals for Animal Welfare Enhancement Awards. An anonymous donor has provided funds to award up to twelve applicants with funds for proposals intended to improve the welfare of laboratory animals. The focus of these awards is to refine the housing, handling and/or experimental situations for laboratory animals. This program excludes research studies with great apes.

Studies may, for example, examine:

- how physiological and behavioral stress responses to common husbandry (e.g., capture) and traditional treatment procedures (e.g., gavage, injection, blood collection) can be reduced or eliminated (e.g., by training the subjects to cooperate rather than resist);
- whether animals caged at different tier levels show different physiological and behavioral stress responses when being approached by personnel, and how these responses can be minimized or avoided;
- whether the presence of a compatible companion buffers physiological and behavioral stress responses to experimental situations (e.g., enforced restraint);
- whether animals kept in legally minimum-sized cages benefit from a moderate increase in space that is (a) empty versus (b) structured in species-appropriate ways (e.g., shelter, visual blind, perch, platform, PVC tube).

Any studies to be undertaken must be non-invasive, with the possible exception of obtaining blood for biochemical measurements. If possible, animals should be trained to cooperate during venipuncture. Objective measures might include behavior, coat appearance, body weight, or analysis of feces, urine, or blood as described above.

Each award will be for $6,000. In the case of successful completion of the application, some individuals may be invited to present their papers at a national symposium. Additional funds will be provided for travel to these meetings.

This award is limited to North American applications. The proposal itself should be in the form of a letter clearly stating the objectives of the study and the anticipated outcomes. It should provide sufficient detail so that reviewers can understand what is being proposed, how it will be achieved, and how the data will be evaluated.

These awards are intended for laboratory and animal technicians; senior investigators can sponsor them, however. Each proposal must be approved by the Animal Care and Use Committee, and the proposal itself must be co-signed by the Head of Animal Services at the institution. Applications should be sent to Ruth Brady [e-mail: *rbrady@jhsph.edu*]. Any parts of the application that cannot be sent by e-mail must be sent in multiples of 10 copies each to: Alan M. Goldberg, The Johns Hopkins Center for Alternatives to Animal Testing, 111 Market Place, Suite 840, Baltimore, MD 21202-6709.

The deadline for submission is November 1, 2004. Applications will be reviewed by an international group of reviewers. The AWI and CAAT then will make the final decisions on those proposals to be funded. Successful applicants will be funded by February 28, 2005.

Each successful applicant must send a final report of the completed study to Ruth Brady [e-mail: *rbrady@jhsph.edu*] and Viktor Reinhardt [e-mail: *viktorawi@siskiyou.ne*] by November 1, 2005. These reports will be posted on such Websites as Altweb <altweb.jhsph.edu>, the Animal Welfare Institute <www.awionline.org>, the Animal Welfare Information Center <www.nal.usda.gov/awic>, and other sites, as appropriate. It is hoped that successful applicants also will submit manuscripts of their projects and their outcomes to a professional journal.

For winners of the 2004 Awards, see
<caat.jhsph.edu/programs/AWE/2004/recipients.htm>

Grants Available

Paul B. Beeson Career Development Awards in Aging

The National Institute on Aging (NIA), along with the John A. Hartford Foundation, Atlantic Philanthropies, and the Starr Foundation (the "participating foundations") are collaborating on this initiative to sustain and promote the research careers of clinically trained individuals who are pursuing research careers in aging. The program is named after Dr. Paul B. Beeson, who has profoundly influenced the career paths of many young physicians, including several who now form the core leadership in geriatric medicine.

The aims of the Paul B. Beeson Career Development Awards in Aging (BCDA) program are: • to encourage and assist the development of future leaders in the field of aging by supporting clinically-trained (primarily physician) faculty members early in their careers to gain additional research training and to establish independent programs in aging research; • to deepen the commitment of research institutions to academic research in aging and to translating research outcomes to geriatric medicine by involving mentor and recipient in establishing and advancing the recipient's career in aging research; and • to expand clinically-relevant research on aging (broadly defined to include work in the basic sciences, including animal models of aging where there is apparent clinical relevance; maintenance of health and independence in old age; diseases and disabilities of old age; and issues in the clinical management of, and systems of care for, the elderly). Overall the program will foster the independent research careers of clinically trained investigators whose research will enhance the health and quality of life of Americans, particularly older people.

See <grants.nih.gov/grants/guide/rfa-files/RFA-AG-05-001.html> for details. Direct questions about scientific/research issues to: Robin A. Barr, Office of Extramural Affairs, 7201 Wisconsin Ave, Rm 2C218, MSC 9205, Bethesda, MD 20892-9205 [301-496-9322; fax: 301-402-2945; e-mail: *BarrR@nia.nih.gov*]. Letter of intent receipt date is October 22, 2004; application receipt date is November 22; earliest anticipated start date is June, 2005.

Novel Approaches to Enhance Stem Cell Research

This program announcement encourages the submission of applications for research to enhance animal stem cells as model biological systems. Innovative approaches to isolate, characterize, and identify totipotent and multipotent stem cells from nonhuman biomedical research animal models, as well as to generate reagents and techniques to characterize and separate those stem cells from other cell types, are encouraged.

Embryonic stem cells and other stem cells are valuable biomedical research models for the study of biological and disease processes, and for creation of disease models. In addition, these cells hold promise as model systems for development of therapeutics and for development of replacement tissues through understanding of the processes that control cellular differentiation.

Thus far, embryonic stem cells have been isolated from some biomedically important nonhuman research models. In addition, stem cells with a more restricted potential have been characterized from post-embryonic tissue types. However, research is needed to provide for a full array of totipotent and multipotent stem cells from nonhuman biomedical research animal models, as well as to provide the research tools to identify, characterize, and purify those cells.

This initiative will support the isolation and characterization of embryonic and other multipotent stem cells in a variety of nonhuman animal species. For detailed information, and where to send inquiries, see <grants.nih.gov/grants/guide/pa-files/PA-04-125.html>.

Fyssen Foundation Research Grants

The aim of the Fyssen Foundation is to "encourage all forms of scientific inquiry into cognitive mechanisms, including thought and reasoning, which underlie animal and human behavior; their biological and cultural bases; and phylogenetic and ontogenetic development". The Foundation supports research in ethology, psychology, neurobiology, anthropology, ethnology, human paleontology, and archeology.

The Foundation will award research grants to support postdoctoral researchers, under 35 years of age in the biological sciences and under 40 years of age in the human sciences, who wish to work independently by establishing around them a research team to achieve a collective scientific operation in a laboratory in France, and who will work in keeping with the Foundation's goals. Priority will be given to researchers who will develop their project in a laboratory other than those in which they received their doctorate and are presently working. The grant can range from 15,000 to 30,000 euros without renewal. Financing for equipment above 7500 euros is excluded. One year after the award, the researchers will have to provide a detailed financial report about the use of the grant and a short scientific report in French.

Applications should consist of: • applicant's CV and list of publications; • description of the research project; • description of the budget; • names of people who have been approached about working on the project; • list of other financial requests; • a letter from the inviting laboratory, including the original copy; and • recommendation letters from two senior scientists outside the inviting laboratory, including original copies. Send 15 copies of the proposal to: Secrétariat de la Fondation

proposal to: Secrétariat de la Fondation Fyssen, 194 rue de Rivoli, 75001 Paris, France. Proposals must be received by October 30, 2004.

Primate Conservation, Inc. – Call for Grant Proposals

Primate Conservation, Incorporated (PCI), is a not-for-profit foundation founded to fund field research that supports conservation programs for wild populations of primates. Priority will be given to projects that study, in their natural habitat, the least known and most endangered species. The involvement of citizens from the country in which the primates are found will be a plus. The intent is to provide support for original research that can be used to formulate and implement conservation plans for the species studied.

Primate Conservation, Inc., will grant seed monies or provide matching grants for graduate students, qualified conservationists, and primatologists to study rare and endangered primates and their conservation in their natural habitats. Grants have averaged approximately $2,500, with a maximum grant of $5,000. We do not support conferences, travel to scientific meetings, legal actions, tuitions or salaries at institutions, or overhead costs.

Proposals are evaluated on competitive basis. Applications are screened by outside reviewers and the Board of Directors of PCI. All appropriate projects will be considered, but the regions of current interest are Asia and West Africa. Deadlines for all grant application materials are February 1st and September 20th of each year. Applications and detailed information are available at <www.primate.org/grant_in.htm>. You may send questions to Noel Rowe [e-mail: *nrowe@primate.org*].

Heart/Lung Transplantation Tolerance

The National Institute of Allergy and Infectious Diseases (NIAID) invites applications from single institutions or consortia of institutions to participate in the Non-Human Primate Immune Tolerance Cooperative Study Group (NHPCSG). The NHPCSG is a multi-center, cooperative program for research on nonhuman primate (NHP) models of kidney and islet transplantation, established in 1999 to evaluate preclinical safety and efficacy of existing and newly developed immune tolerance induction regimens and to elucidate the underlying mechanisms of the induction, maintenance, and/or loss of tolerance in these models. The long-range goal of this program is to develop and evaluate tolerance-induction regimens that will result in enhanced long-term graft survival in clinical transplantation of all organs and tissues. The purpose of this Request for Applications (RFA) is to expand the scope of transplantation models studied within the NHPCSG to include NHP models of heart and lung transplantation.

The goals of the NHPCSG include: (1) development of novel donor-specific tolerance induction regimens; (2) assessment of the safety and efficacy of existing and newly developed immune tolerance regimens in preparation for human clinical trials; (3) definition of underlying mechanisms of action of the therapeutic approaches under investigation and the mechanisms of induction, maintenance and/or loss of tolerance; and (4) development and validation of biomarkers for the induction, maintenance and/or loss of immune tolerance. Currently, all studies within the NHPCSG are limited to NHP models of kidney and islet transplantation. A wide range of immune tolerance induction protocols are under evaluation and development.

This RFA solicits grant applications to expand the scope of the current NHPCSG to include immune tolerance induction studies in NHP models of heart and lung transplantation. Currently the NHPCSG is funded exclusively for studies in islet and kidney transplantation. Because the long-range goal of this RFA is to develop and evaluate candidate tolerogenic approaches for transplantation in humans, NIAID expects that there will be reciprocal communication between the NHPCSG and NIH-funded clinical trials programs. In addition, this interaction may result in potential opportunities to develop and participate in initial safety and efficacy pre-clinical studies.

All research projects to be supported under this RFA are limited to NHP heart and/or lung transplantation models. Specifically, this RFA calls for the use of any NHP species for allogeneic studies of heart and/or lung transplantation. While individual research approaches may vary, the research scope of applications is restricted to one or more of the following areas: (1) development of novel donor-specific tolerance induction regimens or refinement of existing regimens; (2) assessment of the safety and/or efficacy of existing or newly developed immune tolerance regimens either alone, in combination with immunosuppressive therapy, and/or in combination with withdrawal of immunosuppressive therapy; (3) studies to define the underlying mechanisms of action of the therapeutic approaches under investigation, including changes in immune response and function, and the mechanisms of induction, maintenance and/or loss of donor-specific tolerance; and (4) studies to develop, evaluate, and validate biomarkers for the induction, maintenance, and/or loss of immune tolerance, and/or for onset of acute or chronic graft rejection.

Direct questions about scientific/research issues to Kristy Kraemer, Div. of Allergy, Immunology and Transplantation, NIAID, Rm 3043, MSC-6601, 6610 Rockledge Dr., Bethesda, MD 20892-6601 [301-496-5598; fax: 301-480-0693; e-mail: *kk187y@nih.gov*]; and see <grants.nih.gov/grants/guide/rfa-files/RFA-AI-04-049.html>. Letter of intent receipt date is November 22, 2004; application receipt date is December 21.

Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

Books

• *Keywords and Concepts in Evolutionary Developmental Biology*. B. K. Hall & W. M. Olson (Eds.). Cambridge: Harvard University Press, 2003. 496 pp. [Price: $59.95]

• *Brain Endocasts: The Paleoneurological Evidence*. R. L. Holloway, D. C. Broadfield, & M. S. Yuan. *The Human Fossil Record, V. 3*. J. H. Schwartz & I. Tattersall (Series Eds). Somerset, NJ: Wiley, 2004. [Price: $195.00]

• *The Complete Capuchin: The Biology of the Genus* Cebus. D. M. Fragaszy, E. Visalberghi, & L. M. Fedigan. New York: Cambridge University Press, 2004. [Price: $100 (hardback); $50 (paperback)]

The taxonomy, distribution, life history, ecology, anatomy, development, perception, cognition, motor skills, and social and sexual behavior of these monkeys are summarized. The book also describes how humans have viewed, used, and studied these monkeys from ancient times to the present.

• *A Photographic Atlas for Physical Anthropology*. P. F. Whitehead, W. K. Sacco, & S. B. Hochgraf. Englewood, CO: Morton Publishing Co., 2005. [Price: $34.95]

• *Shaping Primate Evolution: Form, Function and Behavior.* F. Anapol, R. Z. German, & N. G. Jablonski (Eds.). New York: Cambridge University Press, 2004. [Price: $120.00]

Contents: *Preface:* Shaping primate evolution, by F. Anapol, R. Z. German, & N. G. Jablonski; Charles Oxnard: An appreciation, by M. Cartmill.

Part I: Craniofacial form and variation. The ontogeny of sexual dimorphism: The implications of longitudinal vs. cross-sectional data for studying heterochrony in mammals, by R. Z. German; Advances in the analysis of form and pattern: Facial growth in African colobines, by P. O'Higgins & R. I. Pan; Cranial variation among the Asian colobines, by R. I. Pan & C. P. Groves; Craniometric variation in early *Homo* compared to modern gorillas: A population-thinking approach, by J. M. A. Miller, G. H. Albrecht, & B. R. Gelvin.

Part II: Organ structure, function, and behavior. Fiber architecture, muscle function, and behavior: Gluteal and hamstring muscles of semiterrestrial and arboreal guenons, by F. Anapol, N. Shahnoor, & J. P. Gray; Comparative fiber-type composition and size in the antigravity muscles of primate limbs, by F. K. Jouffroy & M. F. Medina; On the nature of morphology: Selected canonical variates analyses of the hominoid hindtarsus and their interpretation, by R. S. Kidd; Plant mechanics and primate dental adaptations: An overview , by P. W. Lucas; Convergent evolution in brain "shape" and locomotion in primates, by W. De Winter.

Part III: In vivo organismal verification of functional models. Jaw adductor force and symphyseal fusion, by W. L. Hylander, C. J. Vinyard, M. J. Ravosa, C. F. Ross, C. E. Wall, & K. R. Johnson; Hind limb drive, hind limb steering? Functional differences between fore and hind limbs in chimpanzee quadrupedalism, by Y. Li, R. H. Crompton, W. Wang, R. Savage, & M. M. Gunther.

Part IV: Theoretical models in evolutionary morphology. Becoming bipedal: How do theories of bipedalization stand up to anatomical scrutiny? By N. G. Jablonski & G. Chaplin; Modeling human walking as an inverted pendulum of varying length, by J. T. Stern, Jr., B. Demes, & D. C. Kerrigan; Estimating the line of action of posteriorly inclined resultant jaw muscle forces in mammals using a model that minimizes functionally important distances in the skull, by W. S. Greaves.

Part V: Primate diversity and evolution. The evolution of primate ecology: Patterns of geography and phylogeny, by J. G. Fleagle & K. E. Reed; Charles Oxnard and the aye-aye: Morphometrics, cladistics, and two very special primates, by C. P. Groves; From "mathematical dissection of anatomies" to morphometrics: A twenty-first-century appreciation of Charles Oxnard, by F. L. Bookstein & F. J. Rohlf; Design, level, interface, and complexity: Morphometric interpretation revisited, by C. E. Oxnard; Postscript and acknowledgments, by C. E. Oxnard.

• *Sexual Selection in Primates: New and Comparative Perspectives.* P. Kappeler & C. van Schaik (Eds.). New York: Cambridge University Press, 2004. [Price: $70.00]

Contents: *Foreword,* by R. L. Trivers.

Part I: Introduction. Sexual selection in primates: Review and selective preview, by P. M. Kappeler & C. P. van Schaik; What is sexual selection? By T. H. Clutton-Brock; Sex roles, contests for the control of reproduction, and sexual selection, by P. A. Gowaty.

Part II: Sexual Signals: Substrates and Function. Sexual selection and communication, by C. T. Snowdon; Sexual selection and exaggerated sexual swellings of female primates, by D. P. Zinner, C. L. Nunn, C. P. van Schaik, & P. M. Kappeler; Female multiple mating and genetic benefits in humans: Investigations of design, by S. W. Gangestad & R. Thornhill.

Part III: Sexual Selection in Action. Sexual selection, behaviour and sexually transmitted diseases, by C. L. Nunn & S. M. Altizer; Mating conflict in primates: Infanticide, sexual harassment and female sexuality, by C. P. van Schaik, G. R. Pradhan, & M. A. van Noordwijk; Post-

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

copulatory sexual selection in birds and primates, by T. R. Birkhead & P. M. Kappeler.

Part IV: Development and Consequences. Development and sexual selection in primates, by J. M. Setchell & P. C. Lee; Alternative male reproductive strategies: Male bimaturism in orangutans, by S. Atmoko Utami & J. A. R. A. M. van Hooff; Sexual selection and the careers of primate males: Paternity concentration, dominance-acquisition tactics and transfer decisions, by M. A. van Noordwijk & C. P. van Schaik; Sexual selection, measures of sexual selection, and sexual dimorphism in primates, by J. M. Plavcan; Sex ratios in primate groups, by J. B. Silk & G. R. Brown; Natural and sexual selection and the evolution of multi-level societies: Insights from zebras with comparisons to primates, by D. I. Rubenstein & M. Hack.

Bulletins

• *Animal Welfare Information Center Bulletin,* Summer 2004, *12*[1-2].

Contents include Development of an environmental enrichment program utilizing simple strategies, by K. Stewart; and a (U.K.) Home Office Guidance Note: Water and food restriction for scientific purposes.

Journal Contents

• *Primate Conservation: The Journal of the IUCN/SSC Primate Specialist Group,* 2003, No. 19. [Conservation International, 1919 M Street NW, Suite 600, Washington, DC 20036; e-mail: *j.lucena@conservation.org*]

Contents: *Neotropical Section*: New data on the distribution and abundance of *Saimiri oerstedi citrinellus*, by C. Sierra, I. Jiménez, M. Altrichter, M. Fernández, G. Gómez, J. González, C. Hernández, H. Herrera, B. Jiménez, H. López-Arévalo, J. Millán, G. Mora, & E. Tabilo; Conservation priorities for Colombian primates, by T. R. Defler, J. V. Rodríguez-M., & J. Hernández-Camacho; Distribution and conservation status of the primates of Trinidad, by K. A. Phillips & C. L. Abercrombie; Translocation as a metapopulation management tool for the black lion tamarin, *Leontopithecus chrysopygus*, by E. P. Medici, C. B. Valladares-Pádua, A. B. Rylands, C. S. Martins, & M. M. Silva. *Madagascar Section*: A survey of the habitat of *Lemur catta* in southwestern and southern Madagascar, by R. W. Sussman, G. M. Green, I. Porton, O. L. Andrianasolondraibe, & J. Ratsirarson. *Africa Section*: Coprophagy and intestinal parasites: Implications to human-habituated mountain gorillas (*Gorilla gorilla beringei*) of the Virunga Mountains and Bwindi Impenetrable Forest, by T. K. Graczyk & M. R. Cranfield; The Cross River gorilla: The most endangered gorilla subspecies, by E. E. Sarmiento; Primates of Guinea-Bissau, West Africa: Distribution and conservation status, by S. Gippoliti & G. Dell'Omo. *Asia Section*: Distribution and demography of the Nilgiri Langur (*Trachypithecus johnii*) in Silent Valley National Park and adjacent areas, Kerala, India, by G. K. Joseph & K. K. Ramachandran; Status survey and pilot study of the slender loris *(Loris tardigradus)* in Sri Lanka, by K. A.-I. Nekaris & J. Jayewardene; The pig-tailed macaque *Macaca nemestrina* in India – Status and conservation, by A. Choudhury; Assamese macaques (*Macaca assamensis*) in Nepal, by M. K. Chalise.

• *Journal of Medical Primatology,* 2004, *33*[4].

Systemic and mucosal immunity in rhesus macaques immunized with HIV-1 peptide and gp120 conjugated to *Brucella abortus*, by N. Eller, H. Golding, S. Inoue, P. Beining, J. Inman, N. Matthews, D. E. Scott, & B. Golding; Changes in hematology, biochemical values, and restraint ECG of rhesus monkeys (*Macaca mulatta*) following 6-month laboratory acclimation, by M. Hassimoto, T. Harada, & T. Harada; Descriptive urological record of chimpanzees (*Pan troglodytes*) in the wild and limitations associated with using multi-reagent dipstick test strips, by T. Kaur & M. A. Huffman.; White monkey syndrome in infant baboons (*Papio* species), by P. A. Frost, G. B. Hubbard, M. J. Dammann, C. L. Snider, C. M. Moore, V. L. Hodara, L. D. Giavedoni, R. Rohwer, M. C. Mahaney, T. M. Butler, L. B. Cummins, T. J. McDonald, P. W. Nathanielsz, & N. E. Schlabritz-Loutsevitch; Sebaceous gland adenoma in a rhesus monkey (*Macaca mulatta*), by M. J. Mahesh Kumar, P. Nagarajan, R. Venkatesan, S. M. Sakthivelan, & S. S. Majumdar.

Magazines and Newsletters

• *Attentio dossier. Editión especial del boletín DEPANA en Acció,* January, 2003-2004, No. 1 [c/ Sant Salvador no. 97, 08024 Barcelona, Spain]

Contents: Editorial; Proyecto Attentio: An introduction; The case of Alberto: Incompetence and laziness in the management of confiscated wild animals; Comments on the new Animal Protection Law of Catalunya (Law 22/2003 of July 4); Plants for nonhuman primates in captivity; A sanctuary for primates: Monkey World.

• *CC Update,* Summer 2004, *15*[1]. [Community Conservation, Inc., 50542 One Quiet Lane, Gays Mills, WI 54631; <www.communityconservation.org>]

Contents include: Taking co-management to a new level: Peace Corps and community co-management in Belize; From war to conservation in El Salvador; Community conservation in Papua New Guinea; and Census of golden langurs in Koila Moila, Assam.

• *Gorilla Gazette,* April, 2004, *17*[1]. [Contact J. Dewar, P.O. Box 210, Morganton, GA 30560 [e-mail: *jdewar@gorilla-haven.org*]

Includes The use of training to facilitate a gorilla move, by N. Perriello; Enhancing gorilla enclosures through plant selection and use, by C. Worstell; and a section on zoo gorilla diets from six facilities.

• *IPPL News,* August, 2004, *31*[2]. [International Primate Protection League, P.O. Box 766, Summerville, SC 29484; e-mail: *info@ippl.org*]

Contents include: The Safari World orangutan scandal; The kick-boxing orangutans; Gibbon and macaques found in bad conditions at the Cu Chi Tunnels in Vietnam; Baby monkey/fraudulent documents guilty plea by US monkey importer; Singapore: Vervet monkey rescued and sent to African sanctuary; and News from Cercopan about successful mangabey release in Nigeria.

• *Reaching Out,* 2004, *6*[1]. [Primate Rescue Center, Inc., 5087 Danville Rd, Nicholasville, KY 40356; e-mail: *kyprimate@earthlink.org*; <www.primaterescue.org>]

Proceedings

• Abstracts from the 14th Annual Meeting of the Société Francophone de Primatologie, Doué-la-Fontaine, October 23-25, 2002. Guest editor: B. L. Deputte. *Folia Primatologica*, 2004, *75*, 167-182.

Reports

• *Pain & Distress Report*, June 2004. The Humane Society of the United States; <www.hsus.org/ace/11401>.

Special Journal Issues

• Advances in Diabetes Through Animal-Related Research. *ILAR Journal*, 2004, *45*[3]. <www.national-academies.org/ilarjournal>

• Biomechanics. *Folia Primatologica,* 2004, *75*[4].

Contents: Introduction, by R. H. Crompton; Thoughts on bone biomechanics, by C. E. Oxnard; The role of the zygomatic arch in the statics of the skull and its adaptive shape, by U. Witzel, H. Preuschoft, & H. Sick; Functional structure of the skull in Hominoidea, by H. Preuschoft & U. Witzel; Stresses exerted in the hindlimb muscles of common chimpanzees *(Pan troglodytes)* during bipedal locomotion, by S. K. S. Thorpe, R. H. Crompton, & W. J. Wang; The relationship between speed, contact time and peak plantar pressure in terrestrial walking of bonobos, by E. Vereecke, K. D'Août, D. De Clercq, L. Van Elsacker, & P. Aerts; Automatic monitoring of primate locomotor behaviour using accelerometers, by W. I. Sellers & R. H. Crompton.

Supplements

• The Large-scale Biosphere-Atmosphere (LBA) Experiment in Amazonia. *Ecological Appications,* 2004, *14*[4, supplement].

• Program for the 51th Annual Meeting of the Japanese Association for Laboratory Science. *Experimental Animals,* 2004, *53*[3].

• A Taxonomic Review of the Titi Monkeys, *Callicebus* Thomas 1903. *Neotropical Primates,* June 2002, *10.*

Includes the description of two new species, *Callicebus bernhardi* and *Callicebus stephennashi,* from Brazilian Amazonia, by M. G. M. van Roosmalen, T. van Roosmalen, & R. A. Mittermeier.

Anatomy and Physiology

• Hibernation in a tropical primate. Kausmann, K. H., Glos, J., Ganzhorn, J. U., & Heldmaier, G. (Dept of Animal Physiology, Phillips Univ., 35043 Marburg, Germany [e-mail: *dausmann@staff.uni-marburg.de*]). *Nature*, 2004, *429,* 825-826.

The Madagascan fat-tailed dwarf lemur, *Cheirogaleus medius*, hibernates in tree holes for seven months of the year, even though winter temperatures rise to over 30°C. Here it is shown that this tropical primate relies on a flexible thermal response that depends on the properties of its tree hole: if the hole is poorly insulated, body temperature fluctuates widely, passively following the ambient temperature; if well insulated, body temperature stays fairly constant and the animal undergoes regular spells of arousal. The findings indicate that arousals are determined by maximum body temperatures and that hypometabolism in hibernating animals is not necessarily coupled to a low body temperature.

• Footfall patterns, stride length and speed of vertical climbing in spider monkeys (*Ateles fusciceps robustus*) and woolly monkeys (*Lagothrix lagotricha*). Isler, K. (Anthropologisches Institut und Museum, Universität Zürich-Irchel, Winterthurerstrasse 190, CH.8057 Zürich, Switzerland [e-mail: *kisler@aim.unizh.ch*]). *Folia Primatologica*, 2004, *75*, 133-149.

Vertical climbing is central to theories surrounding the locomotor specializations of large primates. This paper presents spatiotemporal gait parameters obtained from video recordings of captive spider monkeys and woolly monkeys in semi-natural enclosures, with the aim of discovering the influence of body weight and differences in general locomotor behavior on vertical climbing kinematics on various substrates. There are few differences between gait parameters of climbing on thin trees, vertical and oblique ropes, while climbing on large-diameter trees differs considerably, reflecting the higher costs of locomotion on the latter. At the same speed, *Ateles* takes longer strides and the support phase takes a smaller percentage of cycle duration than in *Lagothrix*. Footfall patterns are more diverse in *Ateles* and include a higher proportion of ipsilateral limb coupling. Compared to other primates, the gait characteristics of vertical climbing of atelines most closely resemble those of African apes.

• Brain structure variation in great apes, with attention to the mountain gorilla (*Gorilla beringei beringei*). Sherwood, C. C., Cranfield, M. R., Mehlman, P. T., Lilly, A. A., Garbe, J. A. L., Whittier, C. A., Nutter, F. B., Rein, T., R., Bruner, H. J., Holloway, R. L., Tang, C. Y., Naidich, T. P., Delman, B. N., Steklis, H. D., Erwin, J. M., & Hoff, P. R. (Department of Anthropology, Kent State University, 226 Lowry Hall, Kent, OH 44242-0001 [e-mail: *csherwoo@kent.edu*]). *American Journal of Primatology*, 2004, *63*, 149-164.

"Magnetic resonance (MR) images of three mountain gorilla brains were obtained with a 3T scanner, and the volume of major neuroanatomical structures (neocortical gray matter, hippocampus, thalamus, striatum, and cerebellum) was measured. These data were included with our existing database that includes 23 chimpanzees, three western lowland gorillas, and six orangutans. We defined a multidimensional space by calculating the principal components (PCs) from the correlation matrix of brain structure fractions in the well-represented sample of chimpanzees. We then plotted data from all of the taxa in this space to examine phyletic variation in neural organization. Most of the variance in mountain gorillas, as well as other great apes, was contained within the chimpanzee range along the first two PCs, which accounted for 61.73% of the total variance. Thus, the majority of interspecific variation in brain structure observed among these ape taxa was no greater than the within-species variation seen in chimpanzees. The loadings on PCs indicated that the brain structure of great apes differs among taxa mostly in the relative sizes of the striatum, cerebellum, and hippocampus. These findings suggest possible functional differences among taxa in terms of neural adaptations for ecological and locomotor capacities. Importantly, these results fill a critical gap in current knowledge regarding great ape neuroanatomical diversity."

• Personality characteristics and basal cortisol concentrations in adult male rhesus macaques (*Macaca mulatta*). Capitanio, J. P., Mendoza, S. P., & Bentson, K. L. (Dept of Psychology, Univ of California, Davis, CA 95616-8686 [e-mail: *jpcapitanio@ucdavis.edu*]). *Psychoneuroendocrinology,* 2004, *29,* 1300-1308.

"Although data show that psychosocial factors can regulate physiological processes, few data have been collected on normative populations. Studies in humans have suggested that personality characteristics might be related to regulation of the hypothalamic–pituitary–adrenal (HPA) axis. We explored the relationship between personality characteristics and plasma cortisol concentrations in adult male rhesus macaques. Two sets of blood samples were obtained from monkeys using a procedure with which they were very familiar; thus, cortisol concentrations reflected basal values. Analyses indicated high-excitable animals had lower basal cortisol concentrations during the afternoon period, and that low-confidence was associated with lower cortisol in the morning period and lack of a circadian decline in the afternoon period. Sociability and equability were unrelated to cortisol levels. Our data confirm and extend some results found in human studies, and suggest that even in normal populations, personality characteristics are related to measures of HPA function. We propose that comparative studies of personality in nonhuman primates that parallel studies in humans can increase our understanding of mechanisms whereby personality may relate to mental and physical health outcomes."

Animal Models

• Cyclophilin A retrotransposition into TRIM5 explains owl monkey resistance to HIV-1. Sayah, D. M., Sokolskaya, E., Berthoux, L., & Luban, J. (J. L., Dept of Med., Columbia Univ., College of Physicians and Surgeons, 701 West 168th St, HHSC 1502, New York, NY 10032 [e-mail: *jl45@columbia.edu*]). *Nature*, 2004, *430*, 569-573.

"In Old World primates, TRIM5-α confers a potent block to human immunodeficiency virus type 1 (HIV-1) infection that acts after virus entry into cells. Cyclophilin A (CypA) binding to viral capsid protects HIV-1 from a similar activity in human cells. Among New World primates, only owl monkeys exhibit post-entry restriction of HIV-1. Paradoxically, the barrier to HIV-1 in owl monkey cells is released by capsid mutants or drugs that disrupt capsid interaction with CypA. Here we show that knockdown of owl monkey CypA by RNA interference (RNAi) correlates with suppression of anti-HIV-1 activity. However, reintroduction of CypA protein to RNAi-treated cells did not restore antiviral activity. A search for additional RNAi targets unearthed *TRIMCyp*, an RNAi-responsive messenger RNA encoding a TRIM5–CypA fusion protein. *TRIMCyp* accounts for post-entry restriction of HIV-1 in owl monkeys and blocks HIV-1 infection when transferred to otherwise infectable human or rat cells. It seems that TRIMCyp arose after the divergence of New and Old World primates when a LINE-1 retrotransposon catalysed the insertion of a *CypA* complementary DNA into the *TRIM5* locus. This is the first vertebrate example of a chimaeric gene generated by this mechanism of exon shuffling."

• Highly pathogenic SHIVs and SIVs target different CD4+ T cell subsets in rhesus monkeys, explaining their divergent clinical courses. Nishimura, Y., Igarashi, T., Donau, O. K., Buckler-White, A., Buckler, C., Lafont, B. A. P., Goeken, R. M., Goldstein, S., Hirsch, V. M., & Martin, M. A. (M. A. M., Lab. of Molecular Microbiology, National Inst. of Allergy & Infectious Diseases, NIH, Bethesda, MD 20892 [e-mail: *mmartin@niaid.nih.gov*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 12324-12329; freely available online through the PNAS open access option.

In contrast to simian immunodeficiency viruses (SIVs), which induce immunodeficiency over a 1- to 3-year period, highly pathogenic simian-human immunodeficiency viruses (SHIVs) cause a complete, irreversible, and systemic depletion of $CD4^+$ T lymphocytes in rhesus monkeys within weeks of infection. By using small-molecule competitors specific for CCR5 and CXCR4 in *ex vivo* assays, we found that highly pathogenic $SHIV_{DH12R}$ exclusively uses CXCR4 for infection of rhesus peripheral blood mononuclear cells, whereas SIV_{mac239} and SIV_{smE543} use CCR5 for entry into the same cells. During the period of peak virus production in $SHIV_{DH12R}$- or $SHIV_{89.6P}$-infected rhesus monkeys, massive elimination of $CXCR4^+$ naïve

$CD4^+$ T cells occurred. In contrast, circulating $CCR5^+$ memory $CD4^+$ T cells were selectively depleted in rapidly progressing SIV-infected monkeys. At the time of their death, two SIV rapid progressors had experienced a nearly complete loss of the memory $CD4^+$ T cell subset from the blood and mesenteric lymph nodes. Thus, pathogenic SHIVs and SIVs target different subsets of $CD4^+$ T cells *in vivo*, with the pattern of $CD4^+$ T lymphocyte depletion being inextricably linked to chemokine receptor use. In the context of developing an effective prophylactic vaccine, which must potently control virus replication during the primary infection, regimens that suppress SHIVs might not protect monkeys against SIV or humans against HIV-1.

• Use of primates in research: A global overview. Carlsson, H.-E., Schapiro, S. J., Farah, I., & Hau, J. (Div. of Comp. Med., Dept of Neuroscience, BMC Box 572, Uppsala Univ., SE-751 23 Uppsala, Sweden [e-mail: *Hans-Erik.Carlsson@bmc.uu.se*]). *American Journal of Primatology*, 2004, *63*, 225-237.

The use of nonhuman primates and nonhuman primate biological material in research was assessed by reviewing studies published in 2001 in peer-reviewed journals. The number and species of primates used, the origin of the animals, the type of study, the area of research of the investigation, and the location at which the research was performed were tabulated. Additionally, factors related to the animals that may have affected the outcome of the experiments were recorded. A total of 2,937 articles involving 4,411 studies that employed nonhuman primates or nonhuman primate biological material were identified and analyzed. More than 41,000 animals were represented in the studies published in 2001. In the 14% of studies for which re-use could be determined, 69% involved animals that had been used in previous experiments. Published studies most commonly used nonhuman primates or nonhuman primate biological material from the species *Chlorocebus aethiops* (19%), *Macaca mulatta* (18%), *M. fascicularis* (9%), and *Papio* spp. (6%). Of these studies, 54% were classified as in vitro studies, 14% as noninvasive, 30% as chronic, and 1% were considered acute. Nonhuman primates were primarily used in research areas in which they appear to be the most appropriate models for humans. The most common areas of research were microbiology (including HIV/AIDS (26%)), neuroscience (19%), and biochemistry/chemistry (12%). Most (84%) of the primate research published in 2001 was conducted in North America, Europe, and Japan. The animals and conditions under which they were housed and used were rarely described. Although it is estimated that nonhuman primates account for an extremely small fraction of all animals used in research, their special status makes it important to report the many husbandry and environmental factors that influence the research results generated. This analysis has identified that editors rarely require authors to provide comprehensive information concerning the subjects (e.g., their origin), treatment conditions, and experimental procedures utilized in the studies they publish. The present analysis addresses the use of primates for research, including the effects of a shortage of suitable nonhuman primate subjects in many research areas.

Animal Welfare

• Short and long-term effects of a substantial change in cage size on individually housed, adult male rhesus monkeys (*Macaca mulatta*). Kaufman, B. M., Pouliot, A. L., Tiefenbacher, S., & Novak, M. A. (M. A. N., Psych. Dept, Univ. Mass., 439 Tobin Hall, 135 Hicks Way, Amherst, MA 01003 [e-mail: *mnovak@psych.umass.edu*]). *Applied Animal Behaviour Science,* 2004, *88*, 319-330.

An investigation of the effects of a six-fold increase in cage size on the behavior of individually housed male rhesus monkeys. Limitations of previous studies included the magnitude of change in cage size, the length of the observation period, and the potential confounds of relocation. Prior to this study, eight male monkeys were individually housed in pens (6.77 m^3) for varying lengths of time before moving to baboon cages (1.24 m^3) located within their pens. After 2 years in baboon cages, monkeys were returned to their pen environment (6.77 m^3). Monkeys were observed for forty 5-min observation periods representing four phases: short (first 4 months) and long-term (after 23 months) exposure to the baboon cage followed by short (first month) and long-term (after 8 months) exposure to the pen environment. Contrary to expectations, general activity decreased and abnormal behavior remained unchanged when the monkeys were returned to their pens. However, tension-related behavior decreased significantly with exposure to a larger cage. The results of this study suggest that cage size does not have a detectable impact on habitual kinds of abnormal behavior but may significantly affect the level of tension.

• A study of behavioural responses of non-human primates to air transport and re-housing. Honess, P. E., Johnson, P. J., & Wolfensohn, S. E. (Dept of Vet. Services, Univ. of Oxford, OX1 3PT, U.K. [e-mail: *paul.honess@vet.ox.ac.uk*]). *Laboratory Animals*, 2004, *38*, 119-132.

More long-tailed macaques (*Macaca fascicularis*) than any other primate are imported into the U.K. for research, and journey times may be of up to 58 h. While a number of studies have examined the stress associated with transport, these have typically involved laboratory rodents and livestock, and little is known of its effect on nonhuman primates. This paper reports the results of a study of behavioral changes in a group of long-tailed macaques transported by air from standard breeding conditions and then re-housed in standard laboratory primate conditions. The animals were studied prior to their departure, immediately after arrival, and 3 weeks after that. Data were collected on individual time budgets using focal animal sam-

pling and on hierarchy using a feeding trial. The data were analyzed for changes in behavioral repertoires and for social perturbation that would be reflected in hierarchical changes. Changes in behavior occurred which reflected heightened levels of stress in the study group. It was also clear that although there was some adjustment of behavior, after an initial change on arrival at the new establishment, there was no return to levels observed at the breeding facility within the first month. This study demonstrates that, as a whole, the process of international air transport and rehousing in laboratory conditions may result in the compromising of the welfare of the study animals.

Behavior

• Long-distance calls in Neotropical primates. Oliveira, D. A. G., & Ades, C. (R. Anfilofio de Carvalho, 29, 3. and. 20030-060 Rio de Janeiro RJ Brazil [e-mail: *dilmar@usp.br*]). *Anais da Academia Brasileira de Ciências*, 2004, *76*, 393-398.

Long-distance calls are widespread among primates. Several studies concentrate on such calls in just one or in few species, while few studies have treated more general trends within the order. The common features that usually characterize these vocalizations are related to long-distance propagation of sounds. The proposed functions of primate long-distance calls can be divided into extragroup and intragroup ones. Extragroup functions relate to mate defense, mate attraction or resource defense, while intragroup functions involve group coordination or alarm. Among Neotropical primates, several species perform long-distance calls that seem more related to intragroup coordination, markedly in atelines. Callitrichids present long-distance calls that are employed both in intragroup coordination and intergroup contests or spacing. Examples of extragroup-directed long-distance calls are the duets of titi monkeys and the roars and barks of howler monkeys. Considerable complexity and gradation exist in the long-distance call repertoires of some Neotropical primates, and female long-distance calls are probably more important in non-duetting species than usually thought. Future research must focus on larger trends in the evolution of primate long-distance calls, including the phylogeny of calling repertoires and the relationships between form and function in these signals.

• Vocal sequential exchanges and intragroup spacing in the northern muriqui *Brachyteles arachnoides hypoxanthus*. Mendes, F. D. C., & Ades, C. (address same as above [e-mail: *francisco@ucg.br*]). *Anais da Academia Brasileira de Ciências*, 2004, *76*, 399-404.

Sequential exchanges of vocalizations (staccatos and neighs) emitted by northern muriquis were recorded at the Biological Station of Caratinga, Minas Gerais State, Brazil. Staccatos and neighs containing a larger proportion of short elements were preferentially produced during short-range exchanges; neighs, produced by a larger number of participants, were typical of long-range exchanges. Staccatos emitted by animals feeding in a dispersed manner contained a larger proportion of tonal elements than those emitted by muriquis feeding in a cohesive manner. Sequential exchanges seem thus to be constituted by two interrelated subsystems of calls that aid muriquis to coordinate intragroup spacing, despite the poor visibility of the habitat.

• Cognitive imitation in rhesus macaques. Subiaul, F., Cantlon, J. F., Holloway, R. L., & Terrace, H. S. ((Dept of Anthropology, Columbia Univ., New York, NY 10027 [e-mail: *subiaul@aol.com*]). *Science*, 2004, *305,* 407-410.

Experiments on imitation typically evaluate a student's ability to copy some feature of an expert's motor behavior. Here, we describe a type of observational learning in which a student copies a cognitive rule rather than a specific motor action. Two rhesus macaques were trained to respond, in a prescribed order, to different sets of photographs that were displayed on a touch-sensitive monitor. Because the position of the photographs varied randomly from trial to trial, sequences could not be learned by motor imitation. Both monkeys learned new sequences more rapidly after observing an expert execute those sequences than when they had to learn new sequences entirely by trial and error.

• An experimental study of leaf swallowing in captive chimpanzees: Insights into the origin of a self-medicative behavior and the role of social learning. Huffman, M. A., & Hirata, S. (Primate Research Inst., Kyoto Univ., 41-2 Kanrin, Inuyama, Aichi 484-8506, Japan [e-mail: *huffman@pri.kyoto-u.ac.jp*]). *Primates*, 2004, *45*, 113-118.

Chimpanzees in the wild swallow the rough hispid leaves of certain plant species as a means of physically expelling intestinal parasites. A plant with such a leaf texture was introduced in 36 trial sessions to a captive group of 11 healthy adult chimpanzees to investigate the possible origin and acquisition of leaf swallowing behavior. One male (housed separately from the group during testing) and one female, both captive born, spontaneously exhibited the behavior on their first trial without prior opportunity to observe others with this plant. Six other chimpanzees on their first trial displayed a phobic response to these leaves and rejected them entirely, while another two chewed and swallowed the leaves in a normal way. Four individuals eventually exhibited the behavior, after having approached and closely observed the leaf swallowing of the first female to exhibit the behavior in the group. Four of the six individuals that initially avoided the leaves never overcame their phobia toward this plant and were not in proximity to a chimpanzee performing leaf swallowing during test sessions. Individuals born to wild chimpanzee mothers were no more likely to perform the behavior than captive-reared group mates. These results suggest that the acquisition of this behavior is based in part on a propensity to fold and swallow rough, hispid leaves, but that the acquisition and spread of leaf swallowing within a group is likely to be

socially influenced. This study provides support for the hypothesis that leaf swallowing originated in the wild from opportunistic feeding behavior and was later passed down in the form of a self-medicative behavioral tradition.

• Extinction deficits in male rhesus macaques with a history of self-injurious behavior. Lutz, C., Tiefenbacher, S., Meyer, J., & Novak, M. (Harvard Med. School, New England PRC, One Pine Hill Dr., P. O. Box 9102, Southborough, MA 01772-9102 [e-mail: *Corrine_Lutz@hms.harvard.edu*]). *American Journal of Primatology*, 2004, *63*, 41-48.

Self-injurious behavior (SIB) occurs in both human and nonhuman primate populations. Despite the potential for harm, SIB may persist in part because of an inability to inhibit behavior that results in wounding. A lever-pressing task was used to test the prediction that monkeys with SIB would show greater persistence in lever-pressing on extinction trials than monkeys without the disorder. The subjects were 15 individually housed adult male rhesus macaques, 10 of which (the SIB group) had a veterinary record of self-inflicted wounding. All of the monkeys were trained to lever-press for food rewards to a criterion of 400 total responses. The test procedures consisted of five daily 30-min sessions divided into six 5-min intervals. On day 1, the subjects received continuous reinforcement. On days 2-4, testing consisted of alternating reinforced/unreinforced 5-min intervals, beginning with reinforcement. Reinforced intervals were cued with a buzzer. On day 5, the subjects received no reinforcement. The number of lever-presses and behavioral responses were recorded during each session. Saliva samples were collected for cortisol measurement before and after test sessions on days 1, 2, and 5. As predicted, monkeys with SIB lever-pressed more than controls during extinction intervals on days 2-4. There was no difference on day 1 or day 5. The frequency of scratching, yawning, and abnormal behavior increased when reinforcement was intermittent (days 2-4) or absent (day 5). Cortisol levels were highest with continuous reinforcement (day 1), and may reflect differential levels of food intake rather than stress. The presence of extinction deficits suggests that SIB may persist in some monkeys because they lack the ability to regulate the intensity of their biting behavior.

Care

• Factors influencing the formation and maintenance of all-male gorilla groups in captivity. Stoinski, T. S., Lukas, K. E., Kuhar, C. W., & Maple, T. L. (Zoo Atlanta, 800 Cherokee Ave., Atlanta, GA 30315 [e-mail: *tstoinski@zooatlanta.org*]). *Zoo Biology*, 2004, *23*, 189-203.

"The social housing of males is of particular importance for managers of polygynous species in captivity. In this work, we highlight nine areas we believe are important to the successful formation and maintenance of all-male gorilla groups. Although more data are still needed to complete our understanding of these groups, the general picture that emerges is that all-male groups can be a functional social unit for male gorillas, the longevity of which might be improved by careful planning. It appears that the best time to form all-male groups is when the animals are still immature, as males in this age class have been observed to form some of the most stable groups. Efforts should be made to diversify the groups in terms of rearing history, particularly with respect to hand-reared males, and to limit the amount of hand rearing experienced by males. Groups probably should contain no more than three or four adult males. Exhibits should be designed to provide visual barriers, refuges for subordinate animals, the means to separate individuals, and possibly the means to isolate all-male groups from mixed-sex groups. Additionally, because it is likely that some males will have to be removed from all-male groups, zoos need to design facilities that provide state-of-the-art housing for solitary individuals. It is hoped that by identifying bachelor males early in life and establishing cooperative management plans across institutions, zoos will be able to provide beneficial, long-term social situations for all male gorillas in captivity."

• Tuberculosis-like lesions arising from the use of Freund's complete adjuvant in an owl monkey (*Aotus* sp.). Málaga, C. A., Weller, R. E., Broderson, J. R., & Gozalo, A. S. (A. S. G., Div. Lab. Animal Med., Box 951718, UCLA, Los Angeles, CA 90095 [e-mail: *agozalo@mednet.ucla.edu*]). *Journal of Medical Primatology*, 2004, *33*, 109-112.

An apparently normal, non-tuberculin-reacting, splenectomized owl monkey presented tuberculosis-like lesions of the lung at necropsy. Histological and bacteriological examination failed to demonstrate the presence of acid-fast organisms. Retrospective inquiry showed the animal had been inoculated using Freund's complete adjuvant during a malaria vaccine trial. Lesions observed were compatible with lipid embolism of the adjuvant in the lungs.

• Assessment of preference for grid-flooring and sawdust-flooring by captive-bred marmosets in free-standing cages. Hardy, A., Windle, C. P., Baker, H. F., & Ridley, R. M. (H. F. B., Dept of Experimental Psych., School of Clinical Vet. Med., Downing St, Madingley Rd, CB2 3EB, Cambridge, U.K.]. *Applied Animal Behaviour Science*, 2004, *85*, 167-172.

Marmosets (*Callithrix jacchus*) in a captive breeding colony living in metal caging, with wooden shelves and perches, were assessed by video recording for the time spent on the floor of the cage when that floor was a wire grid above a sawdust-filled tray and when it had been changed to a sawdust-filled tray several days previously. Quantitative analysis of these videos indicated that marmosets made more visits to the floor when it comprised a wire grid than when it comprised a sawdust-filled tray. They also tended to spend more time on the floor when the floor was a wire grid. These results suggest that this arboreal species does not necessarily share the need or preference

for contact with a particle-covered solid floor, which might be considered appropriate for a terrestrial species.

Conservation

• A behavioral comparison of captive-born, reintroduced golden lion tamarins and their wild-born offspring. Stoinski, T. S., Beck, B. B., Bloomsmith, M. A., & Maple, T. L. (TECHlab, Zoo Atlanta, 800 Cherokee Ave, Atlanta, GA 30315 [e-mail: *tsoinski@zooatlanta.org*]). *Behaviour*, 2003, *140*, 137-160.

The behavioral development of reintroduced, captive-born animals and their wild-born offspring is understudied, limiting the scientific understanding and, therefore, utility of reintroduction as a conservation tool. Several reintroduction programs have shown that survival rates of captive-born animals are lower than those of their wild-born offspring. However, whether these differences are because of increased behavioral competency of wild-born animals or age-related factors is unknown. This study compared behavior of captive-born golden lion tamarins to that of their age-matched first- and second-generation descendants. Subjects included 134 golden lion tamarins living in and around the Poço das Antas Biological Reserve in Brazil. Overall, captive-born animals were deficient in locomotor and foraging skills as compared with their wild-born offspring, and some of these deficiencies persisted after two years in the wild. Locomotor and foraging differences were also observed between generations of wild-born animals, suggesting that behavioral change continued past the first generation. Recommendations for future reintroductions with this and other species include: (1) increased exposure to complex environments prior to release; (2) intensive post-release support; (3) introduction of naïve animals with experienced conspecifics when possible; (4) comparisons of reintroduced and wild populations when possible; and (5) short-term management plans aimed at the survival of captive-born individuals combined with long-term plans focused on maximizing natural adaptive processes.

• The value of unprotected habitat in conserving the critically endangered Tana River red colobus (*Procolobus rufomitratus*). Mbora, D. N. M., & Meikle, D. B. (Dept of Biological Sciences, Dartmouth College, Hanover, NH 03755 [e-mail: *david.mbora@Dartmouth.edu*]). *Biological Conservation*, 2004, *120*, 91-99.

"We determined the importance of unprotected forest habitat outside the Tana River Primate National Reserve (TRPNR), Kenya, in conserving the critically endangered Tana red colobus. We compared colobus and forest attributes inside and outside the reserve and found no significant difference in colobus density or mean group size, although absolute values for both measures were higher outside the reserve. Forests outside TRPNR had a higher basal area of trees, basal area per tree, and basal area of stumps from human use. We also compared data on group size and composition collected inside and outside TRPNR during the period of reserve establishment (1978), 10 years after establishment (1988) and over 20 years after establishment (2000). Mean group size declined by nearly 50% since the reserve was established across all age classes both inside and outside TRPNR. Since the red colobus population is in decline and forests outside TRPNR are as suitable as those inside as colobus habitat, we recommend adopting a community-based conservation strategy of sustainable forest management and use outside TRPNR to enhance conservation goals."

Development and Aging

• Sequences and timing of dental eruption in semi-free-ranging mandrills (*Mandrillus sphinx*). Setchell, J. M., & Wickings, E. J. (BP 769, Franceville, Gabon [e-mail: *mandrills@yahoo.co.uk*]). *Folia Primatologica*, 2004, *75,* 121-132.

The chronology of tooth emergence is often used to examine the growth and development of individuals and to compare life histories across species. Emergence patterns are also used to age animals and to infer life history influences for extinct species. However, comparative studies of primates are hindered by a lack of dental development data for many species. Here the sequences and timing of tooth emergence are described for a large sample of semi-free-ranging mandrills and compared with other life history variables for this species. The order of tooth eruption and the occurrence of sequence polymorphisms were very similar to those observed for baboons and macaques. Comparison with life history variables showed that mandrills have complete deciduous dentition at weaning; that females possess both adult incisors and first molars when they first reproduce, but still have deciduous canines and premolars; and that both sexes have full adult dentition before they attain their full adult stature and mass.

Diet and Nutrition

• Diet and activity in black howler monkeys (*Alouatta pigra*) in southern Belize: Does degree of frugivory influence activity level? Pavelka, M. S. M., & Knopff, K. H. (Dept of Anthropology, Univ. of Calgary, 2500 University Dr. N.W., Calgary, Alberta, T2N 1N4, Canada [e-mail: *pavelka@ucalgary.ca*]). *Primates*, 2004, *45*, 105-111.

This study reports on the diet and activity budgets of Central American black howler monkeys at Monkey River, Belize. This is a previously unstudied population, close to the southern boundary of the species range, and it provides comparative data on *A. pigra* from a new study site. Both diet and activity are within the ranges reported for other *A. pigra* sites and for mantled howlers (*A. palliata*). No age-sex differences could be discerned in either diet or activity, though monthly variation was apparent. The monkeys switch from consuming leaves 86% of the time in January to March to consuming 67% fruit in April to July. This difference was statistically significant, and provided the opportunity to compare activity levels of the monkeys over

two dietary periods, one characterized primarily by folivory, the other by frugivory. Howlers are often seen as a relatively inactive species, something that is associated with a low quality, folivorous diet. However, *A. pigra* have been described as being as frugivorous as possible and as folivorous as necessary. Yet, despite the opportunistic consumption of large quantities of high-energy foods, *A. pigra* has been observed as conforming to the howler lifestyle, resting as much as 80% of the day. The data in this paper support both of these reports. Black howlers at Monkey River Belize are typically inactive, maintaining high levels of inactivity even during months characterized by frugivory, suggesting that diet is more flexible and varied than is behavior and calling into question the assumption that howler inactivity is due to the digestion of large quantities of leaves.

• On the possible adaptive value of coprophagy in free-ranging chimpanzees. Krief, S., Jamart, A., & Hladik, C.-M. (Eco-anthropologie, 4 av. du Petit Château, 91800 Brunoy, France [e-mail: *krief@icsn.cnrs-gif.fr*]). *Primates,* 2004, *45,* 141-145.

Coprophagy occurred during major periods of feeding on fruits of *Dialium* spp. (Caesalpiniaceae) in a group of orphaned chimpanzees released in Conkouati Douli National Park, Republic of Congo. Since stress, boredom or food scarcity could not explain coprophagy according to our daily behavioral and veterinary control observations, we suggest that *Dialium* seeds were the item of interest in the feces. Two types of *Dialium* seeds were commonly found in the feces after chimpanzees swallowed the mesocarp and whole seeds together. Seeds recovered from feces were either whole and hard or whole/broken and soft. A mechanical and/or chemical effect of the gut passage may enable the chimpanzees to chew and ingest the seeds, thus providing nutritional intake.

• Digesta passage, digestibility and behavior in captive gorillas under two dietary regimens. Remis, M. J., & Dierenfeld, E. S. (Dept of Sociology & Anthropology, Purdue University, West Lafayette, IN 47907-1365 [e-mail: *remism@sri.soc.purdue.edu*]). *Internationational Journal of Primatology,* 2004, *25*, 825-845.

"Gorilla adaptation has been debated in recent years, given the wide variation among diets of gorillas in different habitats. Gorillas are the largest of living primates, have large colons, and should be capable of processing tough foods. Preliminary captive studies have suggested that they may well have long average gut retention times relative to smaller hominoids, which should facilitate digestive efficiency in their wild counterparts. Indeed, wild gorillas consume large amounts of fibrous foods as staples or fall-back foods across their range, in response to habitat-related or seasonal changes in fruit availability. Fluctuations in diet might be matched by changes in digesta passage and digestibility, with possible selective retention of harder-to-digest items. We further studied digestive processes via chemical cobalt and chromium markers to track liquids and solids, as they passed through the guts of gorillas at the San Francisco Zoo (SFZ). In addition, we examined the effects of variation in captive diets on intake, digesta passage, digestion, and behavior. The SFZ gorillas exhibited high digestibility coefficients, and gut passage was long relative to those of smaller-bodied hominoids. The results permit us to understand more fully the relationships of digestive processes to adaptation and dietary flexibility in the wild and to inform the development of dietary recommendations to improve the well-being of captive gorillas."

• Circadian rhythms in diet and habitat use in red ruffed lemurs (*Varecia rubra*) and white-fronted brown lemurs (*Eulemur fulvus albifrons*). Vasey, N. (Dept of Anthropology, Portland State Univ., Portland, OR 97207-0751 [e-mail: *nvasey@pdx.edu*]). *American Journal of Physical Anthropology*, 2004, *124*, 353-363.

Daily variation in niche use among vertebrates is attributed to a variety of factors, including thermoregulatory, reproductive, and nutritional requirements. Lemuriform primates exhibit many behavioral and physiological adaptations related to thermoregulation and sharp seasonal reproduction, yet they have rarely been subjects of a quantitative analysis of circadian (or daily) rhythms in niche use. This study documents daily rhythms in diet and microhabitat use over an annual cycle in two sympatric, frugivorous lemurs. Data on diet, forest site, and forest height were recorded at 5-min time points on focal animals and divided into three time blocks for analysis (06:00-10:00 hr, 10:00-14:00 hr, and 14:00-18:00 hr). Multivariate tests of independence were used to examine daily rhythms in diet and microhabitat use according to sex, season, and reproductive stage. Throughout the day, *V. rubra* is frugivorous and dwells in the upper canopy, with notable departures (especially for females) during the hot seasons, gestation, and lactation. *E. f. albifrons* has heterogeneous daily rhythms of food choice and microhabitat use, particularly across seasons, and both sexes are equally variable. These daily rhythms in diet and microhabitat use appear related to thermoregulatory and nutritional requirements, seasonal food availability and circadian rhythms of plant (and possibly insect) palatability, predator avoidance tactics, and in the case of *Varecia*, to reproduction. Daily rhythms of food choice in *V. rubra* support two previously suggested hypotheses explaining why primates consume more non-fruit items late in the day, whereas those of *E. f. albifrons* are too variable to lend support to these hypotheses.

Disease

• Sustained clinical efficacy of sulfadoxine-pyrimethamine for uncomplicated *falciparum* malaria in Malawi after 10 years as first line treatment: Five year prospective study. Plowe, C. V., Kublin, J. G., Dzinjalamala, F. K., Kamwendo, D. S., Mukadam, R. A. G., Chimpeni, P., Moly-

neux, M. E., & Taylor, T. E. (Malaria Section, Center for Vaccine Development, Univ. of Maryland School of Med., 685 W. Baltimore St, HSF1-480, Baltimore, MD 21044 [e-mail: *cplowe@medicine.umaryland.edu*]). *British Medical Journal*, 2004, *328*, 545-549.

The efficacy of sulfadoxine-pyrimethamine treatment of *falciparum* malaria, after a change from chloroquine as first-line treatment in Malawi in 1993, was measured from 1998 to 2002. Contrary to expectations, sulfadoxine-pyrimethamine has retained good efficacy after 10 years as the first-line antimalarial drug in Malawi. African countries with very low chloroquine efficacy, high sulfadoxine-pyrimethamine efficacy, and no other immediately available alternatives may benefit from interim use of sulfadoxine-pyrimethamine while awaiting implementation of combination antimalarial treatments.

• Anthrax kills wild chimpanzees in a tropical rainforest. Leendertz, F. H., Ellerbrok, H., Boeschi, C., Couacy-Hymann, E., Mätz-Rensing, K., Hakenbeck, R., Bergmann, C., Abaza, P., Junglen, S., Moebius, Y., Vigilant, L., Formenty, P., & Pauli, G. (H. E., Zentrum für biologische Sicherheit, Robert Koch-Institut, Nordufer 20, D-13353 Berlin, Germany [e-mail: *ellerbrokh@rki.de*]). *Nature*, 2004, *430,* 451-452.

"Infectious disease has joined habitat loss and hunting as threats to the survival of the remaining wild populations of great apes. Nevertheless, relatively little is known about the causative agents. We investigated an unusually high number of sudden deaths observed over nine months in three communities of wild chimpanzees (*Pan troglodytes verus*) in the Taï National Park, Ivory Coast. Here we report combined pathological, cytological and molecular investigations that identified *Bacillus anthracis* as the cause of death for at least six individuals. We show that anthrax can be found in wild nonhuman primates living in a tropical rainforest, a habitat not previously known to harbor *B. anthracis*. Anthrax is an acute disease that infects ruminants, but other mammals, including humans, can be infected through contacting or inhaling high doses of spores or by consuming meat from infected animals. Respiratory and gastrointestinal anthrax are characterized by rapid onset, fever, septicemia, and a high fatality rate without early antibiotic treatment. Our results suggest that epidemic diseases represent substantial threats to wild ape populations, and through bushmeat consumption also pose a hazard to human health."

• Cecal volvulus in two African green monkeys (*Cercopithecus athiops sabeus*). Couillard, N., Wallace, J., Young, R., & Kock, N. (School of Med., Med. Center Blvd, Wake Forest Univ., Winston-Salem, NC 27157). *Comparative Medicine*, 2004, *54*, 324-326.

Following short-term signs of weakness, depression, and/or anorexia of less than 24 h, two adult male African green monkeys of St. Kitts origin died from complications of cecal volvulus. Gaseous distention was radiologically apparent in one animal. Necropsy of both monkeys revealed cecal volvulus, one at the ileocecal junction and one involving a segment of the distal portion of the ileum and cecum. Congestion and hemorrhage were evident microscopically in the lamina propria of the affected intestine, with variable necrosis.

• Carcinosarcoma of the maxilla in a squirrel monkey (*Saimiri sciureus*). Moutsopoulos, N. M., Nikitakis, N. G., Powell, D. A., & Reynolds, M. A. (Dept of Periodontics, Univ. of Maryland Dental School, 666 W. Baltimore St., Baltimore, MD 21201). *Comparative Medicine,* 2004, *54,* 333-336.

"We present the first, to our knowledge, described case of carcinosarcoma of the maxilla in a squirrel monkey. Carcinosarcomas are rare tumors of the upper aerodigestive tract, and consist of carcinomatous and sarcomatous tissue. Histologic analysis revealed a neoplasm composed of an adenocarcinomatous component (epithelial element) and a mesenchymal component (sarcomatous element). Metastatic growth was documented in the lung tissue and the submandibular lymph node. The histolopathologic findings, the pattern of metastasis, and the clinical progression closely resembled those of carcinosarcoma involving salivary glands in humans."

• Transmission of STLV in a closed colony of macaques. Parrish, S. W. K., Brown, A. E., Chanbancherd, P., Gettayacamin, M., & Parrish, J. H. (5241 Bartonsville Rd, Frederick, MD 21704 [e-mail: *jsparrish@mindspring.com*]). *American Journal of Primatology*, 2004, *63*, 103-109.

A 3.3% seroprevalence of simian T-lymphotropic virus (STLV) was found in a closed breeding and research colony of rhesus and cynomolgus macaques in Thailand. Epidemiology of STLV within the colony was assessed by means of a retrospective analysis of banked and freshly collected serum samples, and a review of the animals' medical records. Evidence was found that the virus had been imported into the colony by some of the original animals, and was subsequently transmitted both vertically and horizontally. The cell-associated nature of STLV was demonstrated by iatrogenic transmission of the virus following a whole-blood transfusion, but there was no transmission to animals that received only serum from the same infected donor. Transmission by all routes was infrequent, as indicated by the overall seroprevalence of 3.3% (14 of 420 samples) after the colony had been closed for 11 years. Maternal-infant transmission appeared to be <12%.

• Novel antimalarial compounds isolated in a survey of self-medicative behavior of wild chimpanzees in Uganda. Krief, S., Martin, M.-T., Grellier, P., Kasenene, J., & Sevenet, T. (T. S., Inst de Chimie des Substances Naturelles, CNRS, 1 av de la Terrasse, 91198 Gif-sur-Yvette Cedex, France [e-mail: *sevenet@icsn.cnrs-gif.fr*]). *Antimicrobial Agents and Chemotherapy*, 2004, *48*, 3196-3199.

Following a veterinary and behavioral survey of chimpanzees from a natural population in Uganda, leaf samples of *Trichilia rubescens* were collected because of the unusual method of ingestion observed. The methanolic crude extract of *T. rubescens* leaves exhibited significant antimalarial activity *in vitro*. Bioassay-directed fractionation provided two new limonoids, trichirubines A and B. A greater understanding of the role of secondary compounds in the primate diet may be helpful in recovering naturally occurring compounds of medicinal significance for human medicine.

Evolution, Genetics, and Taxonomy

• DNA sequence and comparative analysis of chimpanzee chromosome 22. The International Chimpanzee Chromosome 22 Consortium (Y. Sakaki, RIKEN, Genomic Sci. Ctr, Yokohama 230-0045, Japan [e-mail: *sakaki@gcs.riken.jp*]). *Nature,* 2004, *429,* 382-388.

"Human–chimpanzee comparative genome research is essential for narrowing down genetic changes involved in the acquisition of unique human features, such as highly developed cognitive functions, bipedalism or the use of complex language. Here, we report the high-quality DNA sequence of 33.3 megabases of chimpanzee chromosome 22. By comparing the whole sequence with the human counterpart, chromosome 21, we found that 1.44% of the chromosome consists of single-base substitutions in addition to nearly 68,000 insertions or deletions. These differences are sufficient to generate changes in most of the proteins. Indeed, 83% of the 231 coding sequences, including functionally important genes, show differences at the amino acid sequence level. Furthermore, we demonstrate different expansion of particular subfamilies of retrotransposons between the lineages, suggesting different impacts of retrotranspositions on human and chimpanzee evolution. The genomic changes after speciation and their biological consequences seem more complex than originally hypothesized."

• Selective pressures on the olfactory receptor repertoire since the human-chimpanzee divergence. Gimelbrant, A. A., Skaletsky, H., & Chess, A. (A. C., Dept of Biology, Massachusetts Institute of Technology, 9 Cambridge Center, Cambridge, MA 02142 [e-mail: *chess@wi.mit.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 9019-9022.

"The availability of the sequence of the chimpanzee genome provides an opportunity to examine human genes and their chimpanzee orthologs and to analyze selective pressures that have been shaping the olfactory receptor repertoire since the human-chimpanzee divergence. We determined the ratio of nonsynonymous to synonymous changes for each of 186 orthologous pairs and then examined how the distribution of these ratios compares with the distribution expected under neutral drift. Consistent with the diminishing importance of olfaction for these species, we find no evidence for positive selection and we find evidence of weak purifying selection affecting over half of the repertoire."

• The evolution of culture: From primate social learning to human culture. Castro, L., & Toro, M. A. (M. A. T., Dept. de Mejora Genética Animal, Inst. Nac. de Investigación y Tecnología Agraria y Alimentaria, Carretera de la Coruña Kilómetro 7, 28040 Madrid, Spain [e-mail: *toro@inia.es*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 10235-10240.

"Cultural transmission in our species works most of the time as a cumulative inheritance system allowing members of a group to incorporate behavioral features not only with a positive biological value but sometimes also with a neutral, or even negative, biological value. Most models of dual inheritance theory and gene-culture coevolution suggest that an increase, either qualitative or quantitative, in the efficiency of imitation is the key factor to explain the transformation of primate social learning in a cumulative cultural system of inheritance as happens during hominization. We contend that more efficient imitation is necessary but not enough for this transformation to occur and that the key factor enabling such a transformation is that some hominids developed the capacity to approve or disapprove their offspring's learned behavior. This capacity to approve or disapprove offspring's behavior makes learning both less costly and more accurate, and it transformed the hominid culture into a system of cumulative cultural inheritance similar to that of humans, although the system was still prelinguistic in nature."

• Binocularity and brain evolution in primates. Barton, R. A. (Evolutionary Anthropology Research Group, Dept of Anthropology, Univ. of Durham, 43 Old Elvet, Durham DH1 3HN, U. K. [e-mail: *r.a.barton@durham.ac.uk*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 10113-10115.

Primates are distinguished by frontally directed, highly convergent orbits, which are associated with stereoscopic vision. Although stereoscopic vision requires specialized neural mechanisms, its implications for brain evolution are unknown. Using phylogenetic comparative analysis, it is shown that evolutionary increases among primate taxa in the degree of orbital convergence correlate with expansion of visual brain structures and, as a consequence, with the overall size of the brain. This pattern is found across the whole primate order and is also repeated within each of the two major primate subtaxa. The visual expansion associated with increased binocularity is specific to the parvocellular visual pathway, consistent with recent evidence implicating this pathway in fine-grained stereopsis. The results support the hypothesis that brain size evolution in primates was associated with visual specialization.

• Lineage-specific gene duplication and loss in human and great ape evolution. Fortna, A., Kim, Y., MacLaren, E.,

Marshall, K., Hahn, G., Meltesen, L., Brenton, M., Hink, R., Burgers, S., Hernandez-Boussard, T., Karimpour-Fard, A., Glueck, D., McGavran, L., Berry, R., Pollack, J., & Sikela, J. M. (J. P., Dept of Pathology, Stanford Univ., Stanford, CA 94305 [e-mail: *pollack1@stanford.edu*]). *PloS Biology,* 2004, *2*[7].

"Given that gene duplication is a major driving force of evolutionary change and the key mechanism underlying the emergence of new genes and biological processes, this study sought to use a novel genome-wide approach to identify genes that have undergone lineage-specific duplications or contractions among several hominoid lineages. Interspecies complementary DNA (cDNA) array-based comparative genomic hybridization was used to individually compare copy number variation for 39,711 cDNAs, representing 29,619 human genes, across five hominoid species, including human. We identified 1,005 genes, either as isolated genes or in clusters positionally biased toward rearrangement-prone genomic regions, that produced relative hybridization signals unique to one or more of the hominoid lineages. Measured as a function of the evolutionary age of each lineage, genes showing copy number expansions were most pronounced in human (134) and include a number of genes thought to be involved in the structure and function of the brain. This work represents, to our knowledge, the first genome-wide gene-based survey of gene duplication across hominoid species. The genes identified here likely represent a significant majority of the major gene copy number changes that have occurred over the past 15 million years of human and great ape evolution and are likely to underlie some of the key phenotypic characteristics that distinguish these species."

• Primate jumping genes elucidate strepsirrhine phylogeny. Roos, C., Schmitz, J., & Zischler, H. (Primate Genetics, Gene Bank of Primates, German Primate Center, Kellnerweg 4, 37077 Göttingen, Germany [e-mail: *croos@dpz.gwdg.de*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 10650-10654.

"Transposable elements provide a highly informative marker system for analyzing evolutionary histories. To solve controversially discussed topics in strepsirrhine phylogeny, we characterized 61 loci containing short interspersed elements (SINEs) and determined the SINE presence-absence pattern at orthologous loci in a representative strepsirrhine panel. This SINE monolocus study was complemented by a Southern blot analysis tracing multiple loci of two different strepsirrhine specific SINEs. The results thereof were combined with phylogenetic trees reconstructed on the basis of complete mitochondrial cytochrome *b* sequences from all recognized strepsirrhine genera. Here we present evidence for (*i*) a sister group relationship of Malagasy Chiromyiformes and Lemuriformes, (*ii*) Lorisidae being a monophyletic sister clade to the Galagidae, and (*iii*) common ancestry of African and Asian lorisids. Based on these findings, we conclude that strepsirrhines originated in Africa and that Madagascar and Asia were colonized by respective single immigration events. In agreement with paleocontinental data, the molecular analyses suggest a crossing of the Mozambique channel by rafting between the late Cretaceous and the middle Eocene, whereas Asia was most likely colonized between the early Eocene and the middle Oligocene on a continental route. Furthermore, one SINE integration links the two Lemuriformes families, Lemuridae and Indriidae, indicating a common origin of diurnality or cathemerality and a later reversal to nocturnality by the indriid genus *Avahi*."

• High-resolution vegetation and climate change associated with Pliocene *Australopithecus afarensis*. Bonnefille, R., Potts, R., Chalié, F., Jolly, D., & Peyron, O. (Centre Européen de Recherche et d'Enseignement des Géosciences de l'Environnement, Unité Mixte de Recherche 6635, Centre National de la Recherche Scientifique, B.P. 80, 13545 Aix-en-Provence Cedex 04, France [e-mail: *bonnefille@cerege.fr*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101*, 12125-12129.

Plio-Pleistocene global climate change is believed to have had an important influence on local habitats and early human evolution in Africa. Responses of hominin lineages to climate change have been difficult to test, however, because this procedure requires well-documented evidence for connections between global climate and hominin environment. Through high-resolution pollen data from Hadar, Ethiopia, we show that the hominin *Australopithecus afarensis* accommodated to substantial environmental variability between 3.4 and 2.9 million years ago. A large biome shift, up to 5°C cooling, and a 200- to 300-mm/yr rainfall increase occurred just before 3.3 million years ago, which is consistent with a global marine $\delta^{18}O$ isotopic shift.

Field Studies

• Population and group structure of western lowland gorillas (*Gorilla gorilla gorilla*) at Lokoué, Republic of Congo. Gatti, S., Levréro, F., Ménard, N., & Gautier-Hion, A. (Station Biologique, 35 380 Paimpont, France [e-mail: *sylvain.gatti@univ-rennes1.fr*]). *American Journal of Primatology*, 2004, *63*, 111-123.

During a 17-month study at the Lokoué clearing in Odzala National Park, Republic of Congo, 377 western lowland gorillas were identified. This population included 31 solitary males, 37 breeding groups, and 8 nonbreeding groups. Its age- and sex-class structure was similar to those observed at two other clearings in the same forest block. However, the size of breeding groups varied with site (either clearing or forest sites). At Lokoué, breeding groups (mean size: 8.2 gorillas; range: 3-15) included a single silverback male and, on average, 3.2 adult females. Nonbreeding groups (mean size: 5.5; range: 2-15) were devoid of adult females. Five of the nonbreeding groups were composed predominantly of blackbacks, subadult

males, and juveniles, and thus fit the definition of all-male groups previously observed in mountain gorillas. This study confirms that 1) one-male breeding groups are the norm in western gorillas, and 2) all-male groups occur in this species. Despite frequent changes in members due to migrations of the males, the persistence of these all-male groups indicates that they may play an important role in the life of migrating males. Variations in population structure, and group composition and type among gorilla populations are discussed. However, a further understanding of the evolution of group-living in gorillas requires detailed ecological studies conducted in parallel with studies of the population structure and dynamics of these groups.

Instruments and Techniques

• Wild chimpanzee dentition and its implications for assessing life history in immature hominin fossils. Zihlman, A., Bolter, D., & Boesch, C. (UCSC, Dept of Anthropology, Social Sciences 1, 1156 High St, Santa Cruz, CA 95064 [e-mail: *azihlman@ucsc.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2004, *101,* 10541-10543.

Data from three African field sites on *Pan troglodytes* demonstrate an unambiguous pattern of a slower growth rate in wild vs. captive chimpanzee populations. A revised dental growth chronology for chimpanzees is similar to estimated timing of *Homo erectus* and therefore has implications for interpreting life history in hominins.

• Field testing a global positioning system (GPS) collar on a Japanese monkey: Reliability of automatic GPS positioning in a Japanese forest. Sprague, D. S., Kabaya, H., & Hagihara, K. (Nat. Inst. for Agro-Environmental Sci., 3–1–3 Kannondai, Tsukuba, Ibaraki 305–8604, Japan [e-mail: *sprague@niaes.affrc.go.jp*]). *Primates,* 2004, *45,* 151-154.

A GPS collar recorded the locations of an adult female Japanese macaque over a 9-day period in a habitat with mixed suburban and rural land-uses in Chiba Prefecture, Japan. The GPS device acquired positions even in forested areas. The GPS data located the female mostly in forested areas, although the female had ranged through a habitat with intermingled fields, orchards, quarries, and residential areas. However, the GPS position acquisition rate was low compared to studies carried out on North American mammals. The GPS fixed a position in 20% of positioning attempts. When the collared female was tracked by radiotelemetry, almost all failures of the GPS to fix a position occurred in forest.

• Genotyping aids field study of unhabituated wild chimpanzees. McGrew, W. C., Ensminger, A. L., Marchant, L. F., Peuetz, J. D., & Vigilant, L. (Dept. of Zoology, Miami Univ., Oxford, OH 5056 [e-mail: *mcgrewwc@muohio.edu*]). *American Journal of Primatology,* 2004, *63,* 87-93.

"Prolonged habituation times for wild great apes delay the collection of behavioral and environmental data, sometimes for years. However, genotyping of noninvasively collected feces can provide useful socioecological information in the meantime. We tested this premise on an unhabituated wild population of western chimpanzees (*Pan troglodytes verus*) at Mont Assirik, Senegal. Genotyping yielded information on kinship, group size, party size and composition, sex ratio, and ranging."

• Validation of urinary cortisol as an indicator of hypothalamic-pituitary-adrenal function in the bearded emperor tamarin (*Saguinus imperator subgrisescens*). McCallister, J. M., Smith, T. E., & Elwood, R. W. (School of Biology & Biochemistry, Queens Univ. Belfast, 97 Lisburn Rd, Belfast BT9 7BL, U.K. [e-mail: *j.mccallister@qub.ac.uk*]). *American Journal of Primatology*, 2004, *63*, 17-23.

The use of cortisol levels as a measure of stress is often complicated by the use of invasive techniques that may increase hypothalamic-pituitary-adrenal (HPA) axis activity during sample collection. The goal of this study was to collect samples noninvasively and validate an enzyme-immunoassay (EIA) for the measurement of cortisol in urine to quantify HPA axis activity in the bearded emperor tamarin. Urine samples were collected from trained subjects between 0700 and 0730 hr during a 1-month period, and were pooled for immunological validation. The assay was validated immunologically by demonstrating specificity, accuracy, precision, and sensitivity. For biological validation of the assay, it was shown that levels of urinary cortisol (in samples collected between 0700 and 1700 hr) varied significantly across the day. Cortisol concentration was lowest at 0700 hr, increased to a mid-morning peak (0900 hr), and declined across the remainder of the day in a typical mammalian circadian pattern. This demonstrates that urinary cortisol can be used to quantify HPA activity in *S. i. subgrisescens*.

• Indices of environmental temperatures for primates in open habitats. Hill, R. A., Weingrill, T., Barrett, L., & Henzi, S. P. (Evolutionary Anthropology Research Group, Dept of Anthropology, Univ. of Durham, 43 Old Elvet, Durham, DH1 3HN, U.K. [e-mail: *r.a.hill@durham.ac.uk*]). *Primates*, 2004, *45*, 7-13.

"Studies of thermoregulation in primates are underrepresented in the literature, although there is sufficient evidence to suggest that temperature represents an important ecological constraint. One of the problems in examining thermoregulation in primates, however, is the difficulty in quantifying the thermal environment, since shade temperatures, solar radiation, humidity and wind speed all serve to alter an animal's perceived temperature. Since animals respond to their perceived temperature, we need methods to account for each of these factors, both individually and collectively, if we are to understand the integrated impact of the thermal environment on primates. Here, we present a review of some thermal indices currently available. Black bulb temperatures can account for the effect of solar radiation, with wind chill equivalent temperatures and the heat index providing quantifiable

estimates of the relative impact of wind speed and humidity, respectively. We present three potential indices of the perceived environmental temperature (PET) that account for the combined impact of solar radiation, humidity and wind speed on temperature, and perform a preliminary test of all of the climatic indices against behavioral data from a field study of chacma baboons (*Papio cynocephalus ursinus*) at De Hoop Nature Reserve, South Africa. One measure of the perceived environmental temperature, PET2, is an effective thermal index, since it enters the models for feeding and resting behavior, and also accounts for levels of allogrooming. Solar radiation intensity is an important factor underlying these relationships, although the wind chill equivalent temperature and humidity enter the models for other behaviors. Future studies should thus be mindful of the impact of each of these elements of the thermal environment. A detailed understanding of primate thermoregulation will only come with the development of biophysical models of the thermal characteristics of the species and its environment. Until such developments, however, the indices presented here should permit a more detailed examination of the thermal environment, allowing thermoregulation to be given greater precedence in future studies of primate behavior."

Reproduction

• Endocrine correlates of reproductive status in breeding and nonbreeding wild female moustached tamarins. Löttker, P., Huck, M., Heymann, E. W., & Heistermann, M. (Abt. Soziobiol., German Primate Center, Kellnerweg 4, 37077 Göttingen, Germany [e-mail: *ploettker@dpz.gwdg.de*]). *International Journal of Primatology,* 2004, *25*, 919-937.

"In callitrichid primates, reproduction is usually restricted to a single female per group. Reproductive rate is high and the occurrence of a postpartum estrus can lead to simultaneous lactation and pregnancy. In contrast, nonreproductive females often show ovarian inactivity. However, most studies on callitrichid reproductive physiology have been conducted in captivity, where conditions differ considerably from those in the wild, so that reproductive conditions may be strongly modified. Using fecal estrogen and progestogen measurements to monitor female reproductive status in 2 groups of wild moustached tamarins (*Saguinus mystax*), we examined 1) whether reproductive females in free-ranging groups also show postpartum estrus and 2) whether nonreproductive females demonstrate signs of ovarian activity. In both reproductive females, clear changes in the excretion pattern of progestogen and estrogen metabolites over time in combination with information on parturition dates allowed us to differentiate between pregnancy, a period of postpartum ovarian inactivity lasting for 54 and 64–82 days, and a period of ovarian activity before conception. Nonreproductive females demonstrated temporal fluctuations in hormone concentrations and absolute hormone levels that were similar to ones in the breeding females during the phase of ovarian activity. The results suggest that, in contrast to most captive female tamarins, reproductive females in wild groups of moustached tamarins do not have a postpartum estrus and that nonreproductive females show ovarian activity despite the presence of a breeding female. We therefore conclude that findings from captivity should be only carefully compared to the situation in the wild."

• Onset of plural cooperative breeding in common marmoset families following replacement of the breeding male. Saltzman, W., Pick, R. R., Salper, O. J., Liedl, K. J., & Abbott, D. H. (Dept of Biology, Univ. of California, Riverside, CA 92521 [e-mail: *saltzman@citrus.ucr.edu*]). *Animal Behaviour,* 2004, *58,* 59-73.

"Common marmosets, *Callithrix jacchus*, are usually characterized as singular cooperative breeders, with only a single, dominant female reproducing in each group. Anecdotal reports, however, have described two females breeding concurrently when an unrelated male joins their group. We tested the hypothesis that incorporation of an unrelated adult male into a family systematically leads to the onset of reproductive activity in a daughter and investigated the underlying mechanisms. We collected hormonal and behavioral data from mothers and their eldest daughters before and after the father was removed from the family and either replaced by an unrelated male (N=11) or immediately returned to the family (N=7). Variation between daughters in the occurrence of ovulatory cyclicity was not associated with the presence of an unrelated male but was closely linked to daughters' relationships with their mothers: only anovulatory daughters behaved submissively towards their mothers. Daughters never engaged in sexual behavior with their fathers, but most did so with unrelated males. Similarly, daughters never conceived in intact natal families but did so in eight of 11 families containing an unrelated male. In six of these families, the mother and daughter bred concurrently. Thus, incorporation of an unrelated adult male into a marmoset family may frequently lead to the onset of plural breeding by activating sexual behavior in a daughter; however, daughters ovulate only if they are not behaviorally subordinate to their mothers. Therefore, both inbreeding avoidance and rank-related reproductive suppression may constrain reproduction in marmoset daughters and contribute to maintenance of singular breeding."

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