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

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Cover illustration of an infant rhesus monkey (*Macaca mulatta*),  
by Penny Lapham

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# Obtaining Blood Samples from Awake Rhesus Monkeys (*Macaca mulatta*)

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## Introduction

Rhesus monkeys (*Macaca mulatta*) are believed to be among the most aggressive macaques. However, due to their high level of intelligence, they can easily be trained to cooperate for simple procedures. When compared to bonnet (*M. radiata*) and crab-eating (*M. fascicularis*) macaques, they were "trained readily to perform simple procedures" (Clarke et al., 1988). In the same study, however, "they were more likely to resist restraint and threaten, grab at or attempt to bite investigators."

The animals in our study had developed type II diabetes and had been put on an experimental drug currently in Phase II clinical trials. The drug could be administered daily diluted in fruit juice, which the animals readily took from a syringe every morning. However, to monitor the effects of the drug, we needed to obtain blood samples on a regular schedule, every 2-3 weeks. Thus, we sought a system that would enable us to acquire these blood samples with as little stress to the animals as possible. Furthermore, two of the monkeys developed adverse reactions to ketamine hydrochloride, and, as a result, measures were needed to prevent repeated exposure. Vertein and Reinhardt (1989), Phillip-Falkenstein and Clarke (1992), Walker et al. (1982), and Elvidge et al. (1976) have designed successful protocols to train awake rhesus macaques to cooperate for venipuncture in the home cage. Although an attractive prospect, repeated venipuncture was a difficult option in an awake or even anesthetized animal, because all four animals in our study are geriatric, obese, and have poor circulation.

Wojnicki et al. (1994) discussed the benefits of using vascular access ports (VAPs) when compared to previous methods. The use of VAPs in nonhuman primates has become common in research and studies conducted by drug companies. They have created a non-detrimental and controllable method for a wide range of opportunities including drug self-administration studies, drug infusions, plasma pharmacokinetics of new drugs, chronic blood sampling, and monitoring blood levels. Although there are complications involved with vascular access ports, they can easily be overcome and VAPs are superior to previously used methods (e.g., exterior catheterization).

Kinsora et al. (1997) stated that "...vascular access ports reduced the risk of injury and level of stress the monkey is subject to and allowed greater flexibility in

study design as related to the number of blood samples which can be taken from the monkey." Without the use of VAPs we would not have been able to conduct our study.

In our research facility, the animals are housed in pairs in large enclosures (4' x 5' x 6') containing tree trunks as perches. Thus, accessing the animals for even simple procedures is difficult. In addition, to prevent stress to the other monkeys, the veterinary staff does not allow procedures to be carried out in a monkey's home environment. Therefore, before sampling, the animal must be captured from its home cage and then transferred into a squeeze cage and brought to the procedure room. The animals are not allowed to remain in squeeze cages for extended periods; consequently, commonly used training schedules and protocols for venipuncture could not be implemented. Also, because the blood samples are being taken to monitor glucose and insulin levels, food must be withdrawn from the monkeys for at least twelve hours prior to sampling and can be used as a reward only after the procedures are carried out.

## Vascular Access Ports

Four male rhesus macaques ranging in age from nineteen to twenty-one years old are included in this study. Their body weight ranges from 10 to 16 kg. The monkeys are housed and cared for according to the regulations outlined by the Canadian Council on Animal Care (1993). They are housed in pairs and are fed a diet of fresh fruit, vegetables, commercial monkey chow, and assorted nuts and seeds. Water is available ad libitum. All monkeys in this study were born and raised in captivity and have been used in research throughout their entire lives. Research techniques that are used in our study include mainly imaging techniques such as positron emission tomography and magnetic resonance imaging. The animals in this study have had very little experience in any behavioral testing. The only experience they have had with behavioral training was in the Wisconsin General Testing Apparatus more than ten years ago, which required very little handling of and cooperation from the animals.

As recommended by the Canadian Council on Animal Care (1993) for repeated blood sampling procedures, the four monkeys were surgically implanted with vascular access ports under sterile surgical techniques. Under general anesthesia (isoflurane), a pocket is formed on the outside of the thigh and a titanium port (Model T1200AC-5H, Access Technologies/Norfolk Vet Products, Skokie, IL) is sutured securely to the *rectus femoris* with non-dissolving suture material (000 Ethicon Polypropylene suture material with a SH-1 Taper needle). A 5 French

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catheter is attached to the port forming a loose loop to allow for limb movement. The catheter is threaded to the inside of the thigh using a trocar. The femoral artery is exposed and dissected. Three to four inches of catheter are inserted into the artery and secured to the vessel and adjacent tissues with a non-dissolving suture material (Ethicon silk). The port patency is verified before the closure and again at the end of the surgery and the port is then filled with 2000-3000 units of heparin. Buprenorphine (0.05mg/kg i.m.) is given as an analgesic following the surgery along with an antibiotic injection (Baytril 2.5mg/kg i.m. for 5 days). The animals are kept on observation in the squeeze cages for a few days and then returned to the home cage and partner.

Following the surgical implantation of the VAPs, every 2-3 weeks the monkeys are captured from their home cages and transferred into individual squeeze cages measuring 80 cm x 80 cm x 95 cm. Initially, the monkeys were immobilized with the squeezing mechanism by pulling the back wall towards the front of the cage, and were sedated with an intramuscular injection of ketamine hydrochloride (10mg/kg). A monkey was removed from the cage and laid on his side on a treatment table with the port-implanted leg facing up. The hair covering the site of the port was clipped. The port's location is usually easily identified as a protuberance under the skin. The sampling procedure described below is then applied in either condition, awake or anesthetized. The skin surrounding the port area is sterilized with a surgical scrub preparation. First, the area is cleansed with Betadine® surgical soap (microbicidal sudsing skin cleanser) beginning at the port and working in a circular motion outwards as recommended by the port manufacturer. Next, the area is scrubbed in the same manner first with alcohol, then with a Betadine solution. The Betadine solution is left on the area for a few minutes and, holding the port with one hand, a sterile 22-gauge x 3/4 right-angle huber needle with 18" tubing (Model RA22715 – Access Technologies/Norfolk Vet Products, Skokie, IL) is firmly inserted through the skin into the port's membrane. The content of the port is pushed out by intra-arterial pressure until clean arterial blood is seen coming out of the tubing; the tubing is then tightly clamped to prevent further blood loss. Opening and closing the clamp, four 2-ml blood samples are drawn using a 3-ml syringe every two minutes. The catheter is closed between samples to prevent blood loss and is lightly flushed with saline to prevent clotting. Upon completion of the final blood sample, 2000-3000 units of heparin are infused through the huber needle to ensure patency. Holding the port with one hand, the needle is removed with the other while still infusing the heparin to ensure that the port is completely filled. If anesthetized, the monkey is then returned to his individual squeeze cage where he recovers from the ketamine sedation. He is later fed his regular diet and returned to his home cage the following day. When the procedure is

performed on an awake animal, he is given appetizing treats and fruits and can be put back in his home cage immediately.

The above procedure was initially always performed under sedation, but after several months of repeated ketamine exposure, the animals became resistant with two of them developing side effects. Thus, we attempted the procedure without sedation but following the same general procedure for sterilization of the area and blood sampling, as follows:

### **Sampling Without Sedation**

The monkey has to be gently persuaded to present the leg implanted with the port toward the front of the squeeze cage. This is done by slowly pulling the back wall forward. All of the animals have had experience with squeeze cages and are trained to turn and present one side against the front of the cage. If the monkey presents the wrong side we continue to gently pull the back wall back and forth until the monkey is correctly positioned. Once this is achieved, the back wall is pulled forward, leaving a little room for the monkey to move. Reaching through the bars of the squeeze cage, we sterilize the port area as described above, taking care that the animal's skin does not contact the bars of the cage. Then we firmly grasp the protruding port with the thumb and index finger of one hand and insert the sterile huber needle into the port with the other hand. The open end of the catheter and the clamping mechanism are kept outside the cage and remain held by the person performing the sampling throughout the procedure to avoid contamination. The blood sampling is performed as described above. The monkey receives a favored food reward upon completion of the procedure. The first effort was carried out on Monkey M, the least aggressive monkey of the group. Awake sampling from Monkey S, who is also one of the less aggressive monkeys, was successfully attempted next. He has, however, on several occasions attempted to grab us.

The other two monkeys, Monkey R and Monkey E, are extremely aggressive. There was some reluctance to attempt sampling their blood without sedation. However, because of the success with Monkeys M and S, we decided to try. In his home cage, Monkey R carries out typical threatening gestures including head-bobbing, charging, grabbing, and attempting to bite the technicians, investigator, and animal care staff. Despite this aggressive behavior, and the fact that he exhibits stereotypical stress behaviors (including bouncing up and down in place and pacing in a circular motion) when he is brought into the procedure room in a squeeze cage, he has become the most cooperative of the four monkeys. He now even allows us to scratch and stroke his head and arms as a distraction throughout the procedure. The same procedure is also carried out on Monkey E, also one of the more aggressive monkeys. Although Monkey E demon-

strates signs of fear by grimacing and showing his teeth, he cooperates in the same manner as the others.

On occasion some of the monkeys have moved during the sampling procedure and rubbed the site of the port. At this time, the huber needle is removed and discarded. The area is resterilized as described earlier and a new, sterile huber needle is used.

### Discussion

For the past seven months all four monkeys have continued to cooperate for blood sampling via vascular access ports without ketamine sedation.

To keep VAPs functional for extensive periods, it is extremely important to maintain sterility and to prevent infection from occurring (Wojnicki et al., 1994). For that reason, we had to ensure that the sterilization technique used in the sedated animal could still be achieved in the awake animal. One difficulty we discovered was removing hair from the site. Because of the small area between the bars and the sound of the clippers frightening the animals, we were not able to clip the hair. This has not posed a problem in our study, since the animals need to be anesthetized every six weeks for an intravenous glucose tolerance test, so we clip the hair then. Aside from hair removal, we are able to follow the aseptic technique discussed for the anesthetized animal.

If this method were to be used in a larger group of animals, it would be beneficial to modify the squeeze cage to include an opening in which the port could be fully exposed and easier to access. This would allow the person performing the sampling to have more control over the site and the sterilization technique.

There are several reasons why this method is superior to the previously used procedure using ketamine hydrochloride as a sedative to perform blood sampling. Although stress and ketamine anesthesia do not appear to significantly skew the parameters of interest in our study (fasted glucose and insulin levels), it is important to consider the effects of stress and various anesthetic drugs when designing a research protocol. Being able to perform sampling in awake animals in longitudinal studies may be an important tool to study changes in hormones or neurotransmitters without the added factors of stress and anesthesia. Even though it has already been shown that anesthesia does not affect the actual cellular composition of the blood (Wall et al., 1985), it is likely that it may significantly affect other physiological parameters, and may obscure or mask changes in physiological parameters such as cortisol, ACTH, norepinephrine, or prolactin, which could be important when following the effects of drugs, changes in behavioral conditions, or therapies. Elvidge et al. (1976) clearly demonstrated the influence of handling and sedation on plasma cortisol in rhesus monkeys and showed that "...it is possible by long term regular training to achieve mean cortisol values which are

significantly lower than in untrained or anaesthetized animals." Another advantage of the awake sampling method is its efficiency. The sampling procedure with ketamine sedation took up to 45 minutes per monkey, while it can be completed in an awake animal in 10 to 15 minutes. The monkeys are able to return to their home cages immediately after the completion of the procedure, whereas with ketamine sedation they spent up to several hours recovering in the squeeze cage and were often not returned to their home cages until the following day.

### Follow-Up

Work is being done with these rhesus macaques to eventually take blood samples without using the cage's squeezing mechanism. We are also working on a training method to enable us to give the monkeys daily insulin injections as their diabetes progresses.

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# Morphology of Epidermal Glands Responsible for the Release of Colored Secretions in *Alouatta guariba clamitans*

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## Introduction

Most primates are social animals and possess various means of communication, such as the production of sounds, visual signs, and secretions with characteristic odors (Ralls, 1971). Studies of epidermal secretions in primates have been carried out to better understand scent marking as a means of communication. Communication by means of chemical signals has been intensively studied in primates, with scent marking the most common area of investigation (Rylands, 1990).

Studies of marking as a means of primate communication have described the existence of odoriferous secretions that carry a variety of signals, such as territoriality (Charles-Dominique, 1977; Mertl-Millhollen, 1979, 1986; Bartecki & Heymann, 1990), dominance (Schilling & Perret, 1987), reproductive status (Clark, 1982; Epple et al., 1982; Epple, 1986; Setz & Gaspar, 1996), and social status (Epple et al., 1979, 1982; Epple, 1986; Walraven & Van Elsacker, 1992).

Studies on the release of colored substances through the skin in primates are scarce. Aquino and Encarnación (1993), in a study of population dynamics in *Aotus nancymaae*, reported the presence of an intensely colored secretion, of creamy consistency, that adhered to the animals' skin and was present in both sexes from juveniles through adults. The authors attributed the function of territorial marking to this secretion.

Auricchio (1995) stated that members of the genera *Alouatta* and *Leontopithecus* release a colored secretion, which seems to contain pigments derived from hemoglobin; he concluded that these pigments are responsible for the animals' skin coloration.

Epples and Lorens (1967) described the presence of macroscopic epidermal glands, specialized in releasing

substances that function in odor marking, in various body regions of Neotropical primates. In *Alouatta*, these glands were observed in the regions of the chest and throat.

Studies of captive *Alouatta guariba clamitans*, a subspecies of brown howler monkey, have confirmed the release through the skin of a substance similar in color to the hair of these animals (Z. M. B. Hirano, personal observation). Further investigations of this secretion, as well as the structure responsible for its release, have not yet been reported in the literature.

The present study seeks to describe the morphology of the glands, in the skin of adult *A. g. clamitans* males, that are responsible for releasing this secretion, and to analyze the distribution of these glands throughout the body. [Note: *Alouatta guariba* is also known as *A. fusca*.]

## Methods

Samples from the skin of five adult males (animals with reddish coloration, body weight over 4 kg, and complete permanent dentition) were used in this study. The animals were found dead by the Forestry Police of Santa Catarina State and brought to the Centro de Pesquisas Biológicas de Indaial within six hours of death. Small (maximum 2 cm<sup>2</sup>) pieces of skin, containing epidermis and dermis, were removed from various regions of the animals' bodies as follows: nape of the neck, spine, throat, base of the tail, abdomen, groin, and lower jaw.

Skin samples were immediately immersed in a 10% formalin solution for at least 24 hours. The solution was replaced after 12 hours. After soaking, skin samples were cut under a dissecting microscope, making plane transversal cuts in the epidermis.

After fixing, a routine histological technique for paraffin embedding was used. The sections obtained were stained with hematoxylin and eosin.

Observations were carried out by light microscope to identify the glands present in the skin.

## Results

**Qualitative analysis of the glands:** Three types of glands were observed in the skin of *Alouatta guariba clamitans*: sebaceous, sudoriferous (sweat), and a glandular structure which we named PPG (pigment production gland). Presence of the types varied by region of skin.

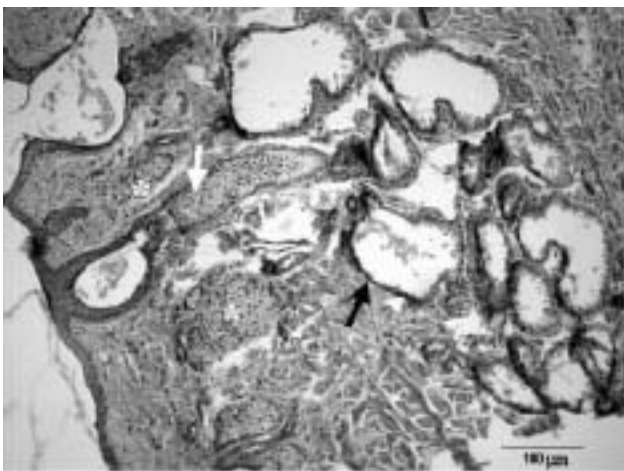
PPG were identified in the regions of the throat, groin, and lower jaw (*Figures 1-3*). In the other regions examined only sebaceous and sweat glands were observed.

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Sebaceous and sweat glands were found in all of the regions that contained PPG, and these had the same morphological characteristics as those found in human skin. The PPG had coiled tubular secretory portions, adjacent to the hair follicle in the dermis, which were formed by two distinct layers of secretory cells within a connective tissue capsule. In the cells of the outermost layer of the secretory portion, secretory granules were noted (*Figure 3*), which produced a secretion similar to the pigment released by the animals. In addition, occasional acidophilic granules were found in the lumen of the glands. These results suggest that the PPG are differentiated sweat glands of the apocrine type, since morphological characteristics are similar between PPG and sweat glands, but there are differences in size, number of the secretory units, arrangement, and form.



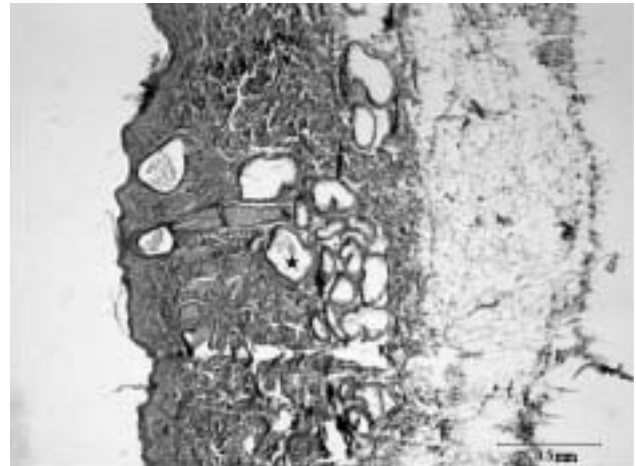
*Figure 1:* Photomicrograph (objective 10X) of the hyoid region (on top of the hyoid bone) in the throat of an adult male, showing secretory portions (black arrow) of the PPG located in the dermis. Sebaceous glands (white asterisks) are associated with a hair follicle (white arrow).

There were a large number of secretory units in the PPG, which presented apical cells in the secretory epithelium. *Figure 1* shows a section from the region close to the hyoid bone in the throat, containing two sebaceous glands and one PPG.

### Discussion

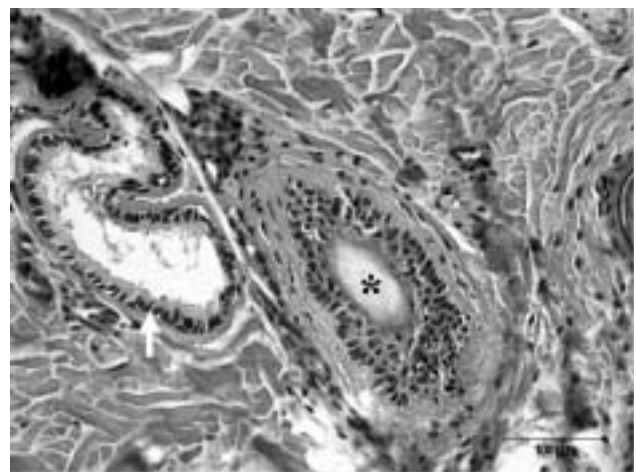
Brumloop *et al.* (1994) investigated the histology of odoriferous glands in the skin of adult females of the genus *Pithecia*, and described the presence of modified sebaceous glands in the gular (throat) region. These glands have also been observed in the same region in adult males of this genus by Hill (1960). This region of the genus *Pithecia* corresponds to the region of the hyoid bone in *Alouatta guariba clamitans*, in which we observed PPG. In both *Pithecia* and *Alouatta*, secretions appear on the skin in this region, depending on environmental conditions and the animals' development. Both genera rub this region against tree trunks, leaves, etc.

The PPG that we found had the characteristics of modified sweat glands, rather than modified sebaceous glands as has been reported for the genus *Pithecia*.



*Figure 2:* Photomicrograph (objective 4X) of the hyoid region of an adult male, indicating the location of the PPG secretory portions in the deep layer of dermis. Histological structure is formed by compound tubuloacinar glands with secretory units that are very dilated (black star).

Epple & Lorens (1967) reported that, for the genus *Alouatta*, there are glands capable of releasing an odoriferous secretion in the regions of the throat (an area in which we found PPG) and chest. We believe that the PPG we describe has a dual function, visual and odor communication, releasing colored and/or odoriferous substances, depending upon the situation (stimulus) and the signal (response) emitted by the adult male animal.



*Figure 3:* Photomicrograph (objective 40X) of the groin region of an adult male showing details of the PPG secretory tubuloacinar portion, associated with a hair follicle in the dermis (black asterisk). The arrow indicates the arranging of the cylindrical cells with muco-acinar tubules, which are predominant in PPG.

Rubbing against a substrate is common in *A. g. clamitans* (Gaspar & Setz, 1997); the presence of PPG in the

regions commonly rubbed corroborates the hypothesis that the secretions of these glands are used for odor and/or visual marking.

*A. g. clamitans* exhibits chromatic sexual dimorphism (Gregorin, 1996). Adult males are reddish, while adult females, juveniles and infants are dark brown. The colored secretion released by the PPG is probably responsible for the hair coloration in these animals (Aurichio, 1995; Z. M. B. Hirano, personal observation) and, thus, for their chromatic dimorphism.

Setz & Gaspar (1996) studied white-faced sakis (*Pithecia pithecia*), a species with an accentuated sexual dimorphism, and reported that in most of these animals the sexual dimorphism consists of the genitalia, variation in body mass, behavioral differences, and the secretion of pheromones. These secretions are produced by subcutaneous glands, primarily in the dominant animals, and may be voluminous.

The discovery of glands specializing in the release of colored epidermal secretions in adult male *A. g. clamitans* may indicate that the PPG are sweat glands, probably modified by the action of sexual hormones during puberty in this species, since prepubertal youngsters do not have the characteristic hair coloration of the adults nor the colored secretion.

The difference between the PPG and sweat glands is that PPG are larger and have more secretory units and apical cells in the secretory epithelium, with an accumulation of secretory granules; the additional presence of these granules in the lumens of the tubules indicate that these glands are of apocrine type.

In most species sex hormones are responsible for the definition of secondary sexual characteristics; they act on the membrane receptors and induce hyperplasia and/or hypertrophy in a few cell types responsible for the observed differences between the sexes in dimorphic species (Emerson, 2000). PPG may increase in size and volume during puberty as a result of the action of the male sexual hormones, defining the secondary characteristics. Furthermore, it is believed that these glands may play an important role in sex differentiation, sexual attraction, and social communication in this primate subspecies.

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## Primates de las Américas...La Página

*Estimados lectores, a partir de esta edición hemos invitado a los investigadores Tania Urquiza-Haas y Bernardo Urbani como editores de esta sección, esperando que próximamente se incorporen como parte de la "segunda generación" editorial de manera oficial. Por ello, nos resta desearles mucha suerte de nuestra parte, quienes nos mantendremos asociados con ellos. La comunicación con ellos deberá realizarse a las direcciones <burbani@uiuc.edu> y <turqheza@yahoo.com>.*

*De antemano se les agradece a Uds. todo el apoyo a este esfuerzo de más de 5 años. Al mismo tiempo, esperamos seguir teniendo su apoyo y colaboración para este foro de difusión de notas en español y portugués para nuestros colegas primatólogos de Latinoamérica o donde nos alcancen a leer. Sinceramente gracias! Juan Carlos Serio-Silva [serioju@prodigy.net.mx] y Elva Mathiesen [Theresa\_Mathiesen@brown.edu].*

### Cursos primatológicos en Argentina

Se presentan dos cursos ofrecidos para el segundo semestre del 2003 por la Estación Biológica Corrientes (EBC, conocido anteriormente como Centro Argentino de Primates) del Museo Argentino de Ciencias Naturales "B. Rivadavia" en la provincia de Corrientes, Argentina. Para mayor información escriba al siguiente correo electrónico: <yacarehu@yahoo.com.ar>; o visite <ar.geocities.com/yacarehu/>.

• **Curso:** Primates Neotropicales; Genética, Ecología y Comportamiento. Dirigido por: Dr. Gabriel Zunino (Consejo Nacional de Investigaciones Científicas y Técnicas [CONICET] – Museo Argentino de Ciencias Naturales [MANC]). Dra. Marta D. Mudry (CONICET –

Universidad de Buenos Aires). M. A. Martín Kowalewski (University of Illinois). Lic. Luciana Oklander (CONICET – MACN). 1) Lugar: Estación Biológica de Corrientes. 2) Fecha: 17 al 24 de Agosto, 2003. 3) Inscripción: US\$60 (180 Argentine Pesos). Incluye alojamiento con pensión completa. 4) Carga horaria: 80 horas. 5) Modalidad: Intensivo teórico-práctico, con los tópicos: a) Exposición de los temas por parte de los docentes, b) Seminarios de discusión por parte de los alumnos de artículos científicos sobre temas seleccionados, c) Trabajos prácticos en el campo aplicando las técnicas expuestas en las clases, d) Diseño y ejecución de proyectos de investigación por parte de los alumnos. 6) Evaluación: Los alumnos diseñan un proyecto, cuando el mismo es aprobado lo ponen en práctica y exponen los resultados obtenidos. Se evalúa la calidad del proyecto, descripción del problema, antecedentes, hipótesis, metodología y resultados. 7) Parte teórica en 5 unidades, a saber, a) Sistemática y evolución: El origen de los primates. Teorías y evidencias. Similitudes y diferencias entre primates del Viejo y Nuevo Mundo. Las especies actuales, diversidad. Distribución geográfica. Ambientes. Mecanismos de especiación. Taxonomía. La citogenética y biología molecular, su aplicación en los estudios de evolución y taxonomía. Variabilidad cromosómica y polimorfismo. b) Primates de la Argentina: Primates de la Argentina generalidades. Mapa de distribución y abundancia. Estudios de campo y cautiverio. Patrones de organización social en: *Alouatta caraya*, *Cebus apella* y *Aotus azarae* – Uso de los primates – Situación actual de la primatología en el país – Estado de protección de las poblaciones –

Amenazas directas e indirectas – Áreas protegidas en el país – Perspectivas. c) Citogenética y biología molecular: Variabilidad cromosómica, ejemplos. Primates del Viejo y Nuevo Mundo. Análisis citogenéticos en primates neotropicales. Variabilidad y evolución cromosómica. Análisis de polimorfismos en: Cebidae y Callithricidae. Primates de Argentina y países limítrofes. Metodologías de interpretación. Descripción de cariotipos y análisis de patrones de restricción. Interrelaciones taxonómicas. Análisis de paternidad mediante marcadores genéticos. d) Ambientes, organización social y ecología: Variabilidad adaptativa. Influencia del ambiente. Formación de grupos. Estructuras jerárquicas. Comportamiento social intra-e intergrupales. Relaciones intra-e interespecíficas. Uso del espacio. Área de acción y territorio. Predicción de la territorialidad. Dieta, adaptaciones morfológicas y de comportamiento. Selectividad del alimento. Estimación de la disponibilidad de recursos en el espacio y el tiempo. Ciclos de actividad. e) Métodos para el estudio de poblaciones de primates: Procedimientos generales de campo. Densidad poblacional. Métodos de censo. Censos por transecta. Método no lineal de frecuencia de encuentros por parcela. Estimación de la precisión. Métodos de observación a corto y largo plazo. Extrapolación de resultados entre diferentes sitios. Métodos de estimación. Métodos usuales de registro de comportamientos. Animal-foco, Instantáneo, Barrido, Uno-cero. Registro de estructura social. Determinación de edad y sexo. Demografía – Organización social. Análisis estadísticos de uso frecuente en el estudio del comportamiento. Matrices de dominancia. Índice de Landau. Índices de dominancia.

• **Curso:** Manejo de colonias de primates neotropicales. Prácticas veterinarias. Parasitología y patología de plátirinos. Dirigido por: Dr. Exequiel Patiño (Universidad Nacional del Nordeste) <exepa@vet.unne.edu.ar>; Dra. Miropé Santa Cruz. 1) Lugar: EBC. 2) Fecha e inscripción: Por confirmar. 3) Modalidad: Por módulos, Taxonomía y distribución de primates en el mundo; importancia del modelo primate en investigaciones biomédicas; la primatología en Latinoamérica y en el mundo; Alojamiento, instalaciones y equipamientos; Nutrición y alimentación; Captura, sujeción, identificación y registro de datos; Biología de la reproducción; Salud, patologías y

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## Resource Available: AALAS Educational Products Errata List

The Educational Resources Committee (ERC) of the American Association for Laboratory Animal Science (AALAS) announces an Errata List for educational products (manuals, workbooks, CDs) on the AALAS Website <www.aalas.org>. To access it, click on *Bookstore*, then under *Information*, choose *Corrections in Educa-*

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tratamientos mas frecuentes; Parasitosis en primates; Zoonosis.

**Niveles de cortisol fecal en *Ateles geoffroyi yucatanensis* en diferentes tipos de hábitat de la península de Yucatán, México.** Ariadna Rangel-Negrín <ari\_rangel2@hotmail.com>, tesis de licenciatura, Facultad de Ciencias, Universidad Nacional Autónoma de México. Director: Juan Carlos Serio-Silva (División Académica de Ciencias Biológicas – Universidad Juárez Autónoma de Tabasco), Co-director: Ricardo Valdéz-Pérez (Centro de Investigación y Estudios Avanzados del Instituto Politécnico Nacional – Zacatenco).

Cada vez es más evidente la reducción del hábitat para los primates silvestres mexicanos. Para el caso de la península de Yucatán es muy común encontrar condiciones contrastantes de conservación de las áreas de selva que ahí ocurren. En esta zona se ubican poblaciones de monos araña (*Ateles geoffroyi yucatanensis*) de los que se conoce muy poco de su biología y mucho menos de cómo las condiciones de fragmentación están afectando sus respuestas conductuales y fisiológicas a este nuevo escenario. Para el presente estudio, durante un ciclo anual, se ubicaron grupos de monos araña que se encuentran en el estado de Quintana Roo bajo diferentes condiciones: a) vida libre; (hábitat conservado y perturbado), y b) cautiverio (mascotas y animales en zoológicos) a fin de comparar los niveles de cortisol presentados en las heces de dichos individuos ( $n = 121$ ), esto a fin de valorar el posible estrés que estos animales pudieran presentar en cada tipo de hábitat. Los análisis de muestras realizados con radioinmunoanálisis, demuestran una reducción de los niveles de cortisol en monos de hábitat conservado contra cualquiera de las otras condiciones ( $p < 0.013$ ). Asimismo, aunque no se encontraron diferencias estadísticas, los datos mostraron un gradiente en el incremento de los niveles de cortisol en sitios perturbados, zoológicos y mascotas, respectivamente. Estos métodos no invasivos son de gran utilidad para identificar de que manera resienten la perturbación del hábitat y como repercute en las respuestas fisiológicas y conductuales de monos silvestres y cautivos. (*Estudio financiado por el Consejo Nacional de Ciencia y Tecnología – Sistema Regional Justo Sierra*).

# Morphology of *Macaca fascicularis* in a Mangrove Forest, Vietnam

Vo Dinh Son  
Saigon Zoo

During the warfare from 1965 to 1970, the Can Gio area was almost fully destroyed by herbicides. The Can Gio mangrove forest restoration project was started in 1978 and now most forest areas have recovered.

UNESCO (2000) has recognized this forest as a Biosphere Reserve. Can Gio Mangrove Park, an area belonging to the Can Gio mangrove forest, has recovered not only plants, but some fauna species, such as salt-water crocodiles (*Crocodilus porosus*), leopard cats (*Felis bengalensis*), Asiatic black bears (*Helarctos thibetanus*), binturong (*Arctitis binturong*), etc., and especially crab-eating macaques (*Macaca fascicularis*).

There are 22 species or well-defined subspecies of primates living in Vietnam (Fooden, 1996) but only one species living in a mangrove forest (Sung, Website).

The object of this study is to obtain preliminary morphological data of partially provisioned crab-eating macaques living in a mangrove forest.

**Crab-eating macaques:** The number of macaques in the Park has been increasing continuously. Detailed censuses at feeding sites showed that, in July of 2000, there were approximately 500 individuals living in four groups.

The Park staff feeds the macaques twice a day, except on weekends and holidays, at feeding sites. Food provided includes sweet potatoes and boiled rice (about 100 g of boiled rice per individual per day). On weekends and holidays thousands of tourists from Ho Chi Minh City visit the “Monkey Park” and provide many kinds of food, such as guavas, mangoes, bananas, peanuts, and corn, at entrances to the forest. From the feeding sites, the macaques move into the mangrove forest to search for natural food, such as leaves, flowers, fruits (mostly *Rhizophora* spp. and *Avicenia* spp.), and invertebrates, which are their main animal food sources.

## Methods

The crab-eating macaques at the Can Gio Mangrove Park were caught and measured from July, 1999, to January, 2000. For details of the study area, see Son (2002).

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The author would like to express his deep thanks to Dr. Shuichi Matsumura and Dr. Yuzuru Hamada, Primate Research Institute, Kyoto University, for comments on an earlier version of the manuscript. The author must also express his sincere gratitude to the following people for their kind help to this research at Can Gio Mangrove Park: Mr. Le Van Sinh, Director, Can Gio Biosphere Reserve; Mr. Le Truong Hai, Director, Can Gio Forest Park; and Mr. Vuong Dinh Bo, Wildlife husbandary team leader, Can Gio Forest Park.

Results were compared with measurements of *M. fascicularis* in Indonesia (Bakar et al., 1981), the Saigon Zoo (Son, 2000), and in laboratories (Honjo & Cho, 1977).

One hundred and nineteen macaques from four groups were temporarily caught by intramuscular administration of Zoletil (tiletamin and zolazepam, Virbac Co.) at feeding sites. Anesthetized macaques were transferred to the Park office – about one kilometer from the feeding sites – to measure and photograph them and take blood samples (see Son, 2002). Ages were estimated by tooth eruption, as described in captive crab-eating macaques by Honjo & Cho (1977). Data were recorded for individual macaques on a data sheet.

Although data were obtained from 119 macaques, statistical comparisons were made using only data from adults (27 males and 36 females). Blood samples were also drawn for hematological examination. After recovering from anesthesia, macaques were released to their original groups.

For body measurement, we used the method introduced in Watanabe et al. (1987) and Hamada et al. (1999). We used a balance for body weight, tape for chest girth, and an anthropometer and spreading and sliding calipers for other dimensions. Significance of the differences between means was statistically examined using Student’s t-test.

## Results and Discussion

**Comparison of sex differences:** The mean body weight of females ( $4.36 \pm .69$  kg) was only 58% of that of males ( $7.47 \pm 1.20$  kg), a significant difference. Females are significantly smaller than males in all other body measurements.

In Bakar et al.’s 1981 study of morphology of *M. fascicularis* in Indonesia, the percentages of female body weight compared to that of males was: 58.9% (Gunung Meru area) 59.5% (Sangeh area) and 73.9% (Bukit Cangang area).

**Comparison of body weights between Can Gio macaques and macaques of other places:** There was no significant difference in body weight between Can Gio males ( $7.47 \pm 1.20$  kg) and Saigon Zoo males ( $8.0 \pm 2.45$  kg;  $p > 0.05$ ). However, Can Gio females ( $4.36 \pm .69$  kg) were significantly lighter than Saigon Zoo females ( $5.88 \pm 1.21$  kg;  $p < 0.001$ ). Can Gio males ( $7.47 \pm 1.20$  kg) are significantly lighter than Sangeh (Indonesia) males ( $8.28 \pm .93$  kg) but there was no significant difference in female body weight between those two places ( $p > 0.05$ ). This may be because the Sangeh macaques received more food than Can Gio macaques.

At the Can Gio feeding sites, males always encroached on and fought the females for food, so sexual dimorphism in weight of Can Gio and Sangeh macaques surpassed that of captive (Saigon zoo and laboratory) bred macaques. Captive bred macaques were fed in cages, so differences in body weights between males and females were not so large.

**Comparison of anterior trunk length:** Both male and female macaques in Can Gio mangrove forest (latitude: 10°2' N) had longer anterior trunks than those of macaques at Sangeh, Indonesia (latitude: 8°30' S;  $p < 0.001$ ). Aimi et al. (1982) selected anterior trunk length for measurement as an indicator of body size. The crab-eating macaque body size increases with increasing latitude, supporting Bergmann's rule, that among birds and mammals, individuals of the same species tend to be larger and heavier when they live in colder climates. (Fooden, 1995; Aimi et al., 1982).

**Comparison of tail length:** The following comparisons were based on the results of Bakar et al.'s 1981 study of (Indonesian) Sangeh crab-eating macaques. As previously reported by Fooden (1995, pp. 38-39), *M. fascicularis* tails are longest near the equator (e.g. Malaysia, Sumatra and Borneo) and shortest at 15° to 17° N, in the Indochinese peninsula. This geographical variation conforms to Allen's rule, that among endotherms, populations of the same species living near the equator tend to have more protruding body parts and longer limbs than do populations farther away from the equator.

The mean tail length of Sangeh (latitude: 8° 30') males ( $59 \pm 1.81$  cm) were significantly longer than those of Saigon (latitude: 10° 47') zoo ( $51.7 \pm 4.03$  cm;  $p < 0.001$ ) and Can Gio (lat: 10° 2') males ( $53.98 \pm 5.66$  cm;  $p < 0.01$ ), while there was no significant difference ( $p > 0.05$ ) between those of Saigon zoo, Can Gio, and Sangeh females.

**Skull size and shape:** Sangeh macaque females' skulls ( $9.60 \pm 0.22$  cm) were larger than those of Can Gio females ( $9.38 \pm 0.75$  cm;  $p < 0.001$ ), but there was no significant difference in skull size between males ( $p > 0.05$ ). The skull index (breadth/length) indicated that skull shape did not differ between the two places.

**External appearance:** External appearances of Can Gio macaques are similar to those that living in Saigon Zoo and some regions in southern Vietnam, but some macaques showed hair variation. Rather than dark brown, they are light brown to gray with reddish black faces (Figure 1).

A blackish hair crest was observed in most animals but mustache and whiskers were not conspicuous (Figure 2). According to Wilson and Wilson (1976), geographic variation is apparent in *M. fascicularis*; faces of some juveniles in coastal regions are darker than those of inland

individuals. [Editor's Note: In my experience, the Vietnam *fascicularis* have a unique "Mohawk-like" hair pattern, which easily distinguishes them from Indonesian, Philippine, or Mauritius macaques. This may be the "hair crest" mentioned. – L. H.]



Figure 1: *Macaca fascicularis* with reddish black face



Figure 2: *Macaca fascicularis*

## Conclusions

Body dimensions give an idea of the living style of any species (Hamada, 1999). The morphological characteristics of macaques in Can Gio mangrove forest can contribute information about their adaptation to partially provisioned life in a mangrove forest habitat.

Mangrove macaque body weight mean was equivalent to laboratory-bred macaques as reported by Honjo et al. (1977). Body size was also not very different from

macaques living in semi-natural (provisioned) conditions in Sangeh, Indonesia.

The results of this study suggest that crab-eating macaques have been adapting to the mangrove habitat. Group sizes and composition confirm this: half of the animals were immature and most females have reproduced annually.

The following ecological factors are considered to have had an impact on these *M. fascicularis*:

- Suitable habitat
- Food diversity includes various plants and animals in the mangrove forest.
- There were neither competitive species nor predators.

Many factors, such as habitat, group size, and genetics, have affected the macaque morphology. However, this *M. fascicularis* population seems to have adapted to life in the mangrove environment.

[Editors' Note: Tables of data are available at the LPN Website: <[www.brown.edu/primate/tab03.html](http://www.brown.edu/primate/tab03.html)>.

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### Editors' Notes

It has always been difficult to order just the right number of issues from the printer, so that We won't run out, but also won't have too many extra copies. We have always erred on the side of not running out; so instead We are running out of *space* to store all those back issues. Sixteen years ago we did send a large number of excess copies to the recycler, but we are once more overloaded.

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29-1	120	33-1	50	34-3	50	36-4	50	38-3	50
30-2	70	33-2	60	35-2	50	37-2	70	38-4	200
30-4	60	33-3	40	35-3	50	37-4	80	40-2	50
32-3	90	34-1	40	36-3	50	38-1	70	42-1	100

## Research and Educational Opportunities

### Continuing Education Courses – Delhi, New York

The following is a list of some of the courses to be offered by the Veterinary Technology Program at the State University of New York, located in Delhi, New York. Course descriptions, additional information, and registration forms, may be found at <[www.vetsci.delhi.edu](http://www.vetsci.delhi.edu)>; or contact Jackie Howard, SUNY, 136 Farnsworth Hall, Delhi, NY 13753 [607-746-4305; e-mail: [howardja@delhi.edu](mailto:howardja@delhi.edu)]. Additional courses will be added as information becomes available, so please check the Website periodically.

- Applied Primatology (0.7 Continuing Education Units [CEU]) will be given on May 30, 2003. The course fee is \$225; the instructor is Ken Pyle, LATG.
- A LATG Exam Review Class (6.0 CEU) will be given June 1-6, 2003. The course fee is \$500; instructors are the SUNY-Delhi Faculty and Staff.
- Chemical Immobilization of Animals (1.6 CEU) will be given for 16 hours, May 20-21, 2003. The instructor is Dr. Keith Amass, of Safe-Capture International.
- Sedation, Immobilization, Handling and Anesthesia of Non-Human Primates (1.6 CEU) will be given for 16 hours May 20-21, 2003. The instructors are Drs. Keith Amass and Carol Emerson.

For further information on, and registration for, the last two classes, contact Safe-Capture International [608-767-3071; fax: 608-767-3072; e-mail: [safecaptur@aol.com](mailto:safecaptur@aol.com)] or see <[www.safecapture.com](http://www.safecapture.com)>.

### Medical and Experimental Mammalian Genetics

Applications are being accepted for The 44th Annual Short Course in Medical and Experimental Mammalian Genetics, at The Jackson Laboratory, Bar Harbor, Maine. This year's course will run from July 13-25, 2003, and will include daily lectures in the mornings and evenings supplemented by afternoon mini-symposia, workshops, tutorials, and demonstrations. There is special emphasis on student-faculty interaction. The faculty is diverse in terms of disciplines and the students in terms of stage of career and fields of concentration. The content of the Short Course focuses on

- an up-to-date presentation of genetics in experimental animals and man,
- the relationship of heredity to disease in experimental animals and man, and
- the importance of molecular genetics in the diagnosis and treatment of inherited disorders.

The development and uses of modern techniques in bioinformatics, mathematical genetics, genome manipulation, mutagenesis, and phenotyping are taught in lectures and in afternoon workshop sessions. As in the past, the Short Course includes an implicit focus on translational biology and clinical applications. Special emphasis in this year's course is on ethics, neurosensory disorders, and genome diversity.

This course is a joint effort of Johns Hopkins University and The Jackson Laboratory. The senior lecturer this year is Leon E. Rosenberg, MD, of Princeton University.

For more information, including application instructions and a preliminary schedule, see <[www.jax.org/courses/documents/shortcourse\\_03.html](http://www.jax.org/courses/documents/shortcourse_03.html)>; or contact Nancy Place, Course Coordinator, The Jackson Laboratory, 600 Main St, Bar Harbor, ME 04609 [207-288-6257; e-mail: [nancyp@jax.org](mailto:nancyp@jax.org)].

### Summer Apprentice Program – Washington State

The Chimpanzee & Human Communication Institute (CHCI) is taking applications for their 10-week Summer Apprentice Program, which will run June 15 to August 22 in 2003. Graduates, undergraduates, and post-graduates from various academic backgrounds (e.g., anthropology, biology, psychology, linguistics, philosophy, etc.) are encouraged to apply.

The research at CHCI involves a group of four chimpanzees who use the signs of American Sign Language (ASL). Three of the four, Washoe, Tatu, and Dar, were part of the cross-fostering research that began with Drs. R. A. and B. T. Gardner. Each chimpanzee was raised in an enriched environment in which his or her human family members used only ASL, much like the environment in which a deaf human child grows up. The fourth chimpanzee, Loulis, was adopted by Washoe in 1978 and learned his signs from other chimpanzees as a focus of research done by the co-directors of CHCI, Dr. Roger and Deborah Fouts. Currently, the chimpanzees reside at the CHCI on the campus of Central Washington University in Ellensburg, in a large state-of-the-art facility. Apprentices are at the Institute daily, cleaning enclosures, preparing meals and enrichment, making observations of the chimpanzees, and participating in one or more research projects. The first week is intensive training in laboratory jobs and chimpanzee behaviors. The philosophy of CHCI is that the needs of the chimpanzees come first. Apprentices are trained in humane care and research techniques. After several weeks each apprentice becomes more autonomous and has responsibilities in the research project.

Applicants must be at least 18 years of age and have completed one year of college/university education prior to the start of the program. A previous course in ASL is encouraged but not required. The program fee is \$1,800 and does not include housing or transportation, but inexpensive housing is available on campus. There is also a \$25 application fee. The application deadline is March 24, 2003. If you are reading this after that date, consider next year's program. For more information, see <[www.cwu.edu/~cwuchci/apprentice.html](http://www.cwu.edu/~cwuchci/apprentice.html)>; or

contact Mary Lee Jensvold, Apprentice Coordinator, CHCI, Central Washington University, 400 E. 8th Ave., Ellensburg, WA 98926-7573 [509-963-2215; fax: 509-963-2234; e-mail: [jensvold@cwu.edu](mailto:jensvold@cwu.edu)].

### **New Master's Program in Primatology – England**

The University of Surrey Roehampton, U.K., is offering a one-year Master of Research (MRes) degree program starting in September, 2003. This program provides a unique opportunity to study primate biology in depth. It will teach original research and place findings into a theoretical context, providing preparation for advanced research (PhD and consultancy work). It will combine theoretical investigation with laboratory and field work on a range of topics. Practical investigations will be carried out in zoos, local habitats, museums and laboratories. After the first semester the emphasis will be on independent research, with all students carrying out an in-depth piece of original research. This will be written up as a dissertation and a paper in a form suitable for publication in a peer-reviewed scientific journal.

Key areas of study will be:

- Ecology and behavior: Methods used in surveying and gathering biological information; methods of recording behavior in the field.
- Diet and foraging: Observing and investigating behavioral and physical dietary adaptations; field and laboratory techniques for gathering data; analyzing nutritional and foraging data from wild and captive primates.
- Life-history evolution: Allometry; reproductive life history variables; comparative analysis of life-history and brain size evolution.
- Reproduction: Laboratory techniques for gathering data and analyzing reproductive hormone data in wild and captive primates; the evolution of mating strategies.
- Zoos and museums as a resource for the study of primates; the ethics of studying captive primates.
- Methods of analyzing physical and behavioral adaptations (e.g. locomotion, sensory systems); phylogenetic reconstructions and interpretations of adaptations.

For further details, contact: School of Life and Sport Sciences, University of Surrey Roehampton, West Hill, London SW15 3SN, England [020 8392 3524; e-mail: [life\\_sciences@roehampton.ac.uk](mailto:life_sciences@roehampton.ac.uk)]; or see [www.roehampton.ac.uk/prospectus/postgraduate.asp?file=Primatology](http://www.roehampton.ac.uk/prospectus/postgraduate.asp?file=Primatology).

### **Biological Anthropology PhD Program – U.S.C.**

Beginning in the fall, 2003, the Biological Anthropology PhD program at the University of Southern California will be merged with a new Biological Sciences graduate program in Integrative and Evolutionary Biology. This program will have a strong focus on human origins and primate behavior, and on the evolution of the human life-span. The core primate behavior/human evolution faculty are currently:

- Craig Stanford (Anthropology; Biological

Sciences): Primate behavior and ecology, human evolution. Great apes and implications for human evolution. Field research opportunities in East Africa and China.

- Christopher Boehm (Anthropology; Biological Sciences): Evolution of human behavior, hunter-gatherers, egalitarian societies. Research opportunities in Jane Goodall Research Center archives.
- Nayuta Yamashita (Anthropology; Cell and Neuroanatomy): Primate behavior and ecology; prosimians; evolution of locomotor morphology and ecology.
- Caleb Finch: (Gerontology; Biological Sciences): Evolution of the human and ape life-span, aging.

• We expect to be hiring more biological anthropology faculty in the coming years.

Outstanding applicants to the program, whose interests include primate behavior and ecology, are especially sought. A limited number of university fellowships have been allotted to the new program for its first year. These will provide an entering PhD student with approximately \$26,000 plus tuition remission. These fellowships will be awarded competitively based on the applicant's credentials (GREs, GPA, etc.). Applicants who are admitted but not offered fellowships will be funded through teaching assistantships.

The application deadline for this fall is past, but for more information about the program for the next year, see [www.usc.edu/dept/LAS/biosci/ieb/ieb.html](http://www.usc.edu/dept/LAS/biosci/ieb/ieb.html); or contact Craig Stanford, Chair, Department of Anthropology, University of Southern California, Los Angeles, CA 90089-0032 [e-mail: [stanford@usc.edu](mailto:stanford@usc.edu)].

### **Research Ethics Fellowship Program**

A two-year, non-degree fellowship is being offered by the Program on Ethical Issues in International Health Research in the Department of Population and International Health at the Harvard School of Public Health. The program will support four fellows and is funded by an International Bioethics Education and Career Development grant from the Fogarty International Center of the National Institutes of Health.

This fellowship is intended for individuals involved in all areas of international health research, including medicine, anthropology, epidemiology, education, journalism, political science, and law; government, foundation, and industry officials with funding responsibilities; and members of institutional and governmental review boards.

For more information, contact Suzanne Welty, Program Manager, Program on Ethical Issues in International Health Research, Dept of Population and International Health, Bldg I – Rm 1104, Harvard School of Public Health, 665 Huntington Ave., Boston, MA 02115 [617-432-3998; fax: 617-566-0365; e-mail: [swelty@hsph.harvard.edu](mailto:swelty@hsph.harvard.edu)]; or see [www.hsph.harvard.edu/bioethics](http://www.hsph.harvard.edu/bioethics). – *Posted to tdr-scientists list*

### Summer Research – Massachusetts

The Division of Comparative Medicine at the Massachusetts Institute of Technology (MIT) has a number of NIH-funded openings for veterinary students who have an interest in pursuing research during the summer. Research Fellows will participate in existing research projects in the laboratories of established investigators at MIT or collaborating institutions such as Harvard and Tufts. Research Fellows will augment their understanding of animal-based research by participating in clinical and laboratory rotations. Fellows will receive a stipend of approximately \$1,500 per month. Applicants must have completed one year of veterinary school. Accepted candidates need to have a TB test prior to their arrival at MIT. MIT is an equal opportunity/affirmative action employer. Women and minorities are encouraged to apply.

Interested candidates should send a cover letter, CV, veterinary school transcripts, and two letters of recommendation to Dr. James G. Fox, 77 Massachusetts Ave, 16-825, Cambridge, MA 02139. For more information, contact Bruce Brown [617-253-1757; e-mail: [bbrown@mit.edu](mailto:bbrown@mit.edu)].

### Training in Comparative Medicine – North Carolina

The Section on Comparative Medicine of Wake Forest University Health Sciences offers **Residency Training** for veterinarians seeking careers in laboratory animal medicine (LAM) and comparative pathology. Positions are available in both disciplines. These positions offer unique opportunities for motivated individuals interested in the care and study of primates, rodents, and a variety of other species in a research-intensive setting. The period of training is flexible; appointment will be for one year with annual renewal up to three years. Training can be used towards eligibility for certification by the American College of Laboratory Animal Medicine (ACLAM) or the American College of Veterinary Pathologists (ACVP). Additional information on both residencies can be found at [www.wfubmc.edu/pathology/training.htm](http://www.wfubmc.edu/pathology/training.htm). Applicants must have a DVM degree from an accredited U.S. institution (or an equivalency exam). Send a statement of career goals and interests, CV, college transcripts, and three letters of reference to: (for LAM) Dr. Jeanne M. Wallace, or (for Pathology) Dr. J. Mark Cline, Dept of Pathology, Section on Comp. Med., Wake Forest Univ. Health Sci., Med. Center Blvd, Winston-Salem, NC 27157-1040.

They are also seeking candidates for **Post-Doctoral Fellowships** in Comparative Medicine. The NIH-sponsored post-doctoral fellowship typically lasts three years. These fellowships are designed to provide research training to veterinarians who are graduates of AVMA-accredited veterinary schools, and may lead to the PhD degree. Training faculty includes 24 faculty, 11 of

whom are veterinarians and seven of whom hold board certification by ACLAM or ACVP. Areas of research include cardiovascular disease, diabetes, cancer biology, and behavioral medicine with an emphasis on research in women's health and nutrition. Stipends range from \$30,000 to \$55,000 per year depending on previous experience. Interested applicants should send a statement of career goals and interests, a CV, college transcripts, and three letters of reference to Dr. Jan Wagner, Dept of Pathology, address above [336-716-1630; fax: 336-716-1515; e-mail: [jwagner@wfubmc.edu](mailto:jwagner@wfubmc.edu)].

The **Summer Student-Training Program** is also NIH-sponsored, with the same faculty and areas of research as the postdoctoral program. Activities include participation in research, clinical treatments, journal clubs, and grand rounds. A minimum of eight weeks is required. Stipend support is approximately \$1,500 per month. Interested applicants should send a letter of intent with names of three references to Dr. Jan Wagner at the address above.

Applicants must be U.S. citizens or permanent residents. We are AA/EOE.

### CLASS and POLA – Maryland

The **7th Current Laboratory Animal Science Seminar (CLASS)** will be held August 3-4, 2003, at the Doubletree Hotel in Rockville, Maryland, sponsored by the Armed Forces Institute of Pathology (AFIP) and the C.L. Davis DVM Foundation. This seminar provides an intensive and comprehensive review of selected topics in laboratory animal medicine and science. It is intended to serve the needs of veterinarians across a broad spectrum: clinical veterinarians, researchers, residents, training program directors, and facility directors. The course includes lectures on animal models, occupational health, regulations, laws and guidelines, statistics, facility design and management, and research methods.

Each participant should leave the course with a new working knowledge of specific changes to the field of laboratory animal medicine. Attendees will acquire new and current information on regulations, animal models, and research programs that will enable them to better oversee the daily operations of laboratory animal facilities. The information provided will assist practicing veterinarians in the field of laboratory animal medicine to prepare for board review and certification.

The **48th Pathology of Laboratory Animals (POLA)** course will be held August 5-8, 2003, at the same location, under the same sponsorship. This course is designed primarily for veterinarians and other allied scientists who are responsible for the recognition and interpretation of lesions in laboratory animals. It is intended to help attendees interpret spontaneous diseases which might affect experimental results, or alter the



health of laboratory animals. Pathology will receive major emphasis in the course, but other features of diseases such as etiology, diagnosis, and control will also be given attention. The course will encompass a wide range of diseases including infectious, neoplastic, iatrogenic, nutritional, and metabolic conditions in a variety of laboratory animal species.

The major objective of this course is to review the pathology and, where appropriate, the etiology, pathogenesis, diagnosis and control of infectious, neoplastic, iatrogenic, nutritional, and metabolic diseases of laboratory animals. At the completion of this course, attendees will be able to better recognize and interpret conditions which may affect experimental results or alter the health of laboratory animals.

For more information contact: Course Coordinator: Mark L. Hovland, Dept of Medical Education, AFIP, Washington, DC 20306-6000 [202-782-2637 or 800-577-3749; fax: 202-782-5020 or 800-441-0094; e-mail: [came@afip.osd.mil](mailto:came@afip.osd.mil)]. Tuition is \$175 for CLASS, \$375 for POLA, and \$450 for both. Register on-line at [www.afip.org/Departments/edu/upcoming.htm](http://www.afip.org/Departments/edu/upcoming.htm).

#### **Enhancing Humane Science – Johns Hopkins**

The Johns Hopkins University's Center for Alternatives to Animal Testing (CAAT), along with the University's Institutional Animal Care and Use Committee, will introduce a course in early 2003 on the enhancement of humane science. This course will be offered to all faculty and graduate students in the life sciences as well as all laboratory technicians who work with animals in laboratories. The course will cover "proper experimental design (including statistics) and the role of pilot studies in minimizing animal use and refining experiments, as well as many refinement issues: humane endpoints, enrichment, post-surgical care, pain management, and the impact of stress on the quality of data." To learn more about CAAT's work, see [caat.jhsph.edu](http://caat.jhsph.edu). – *from CATT's 2003 Progress Report*

#### **Kirschstein National Research Service Postdocs**

To help ensure a diverse pool of highly trained scientists in adequate numbers and in appropriate research areas to carry out the nation's biomedical and behavioral research agenda, the National Institutes of Health (NIH) awards postdoctoral fellowships to promising applicants with the potential to become productive, independent investigators in fields related to the mission of the NIH

constituent institutes and centers. The proposed postdoctoral training must be within the broad scope of biomedical, behavioral, or clinical research and must offer an opportunity to enhance the Fellow's understanding of the health-related sciences and extend his/her potential for a productive research career. Fellowship awardees are required to pursue their research training on a full-time basis, devoting at least 40 hours per week to the training program.

Special consideration is given to physicians and other health professionals who agree to undertake a minimum of two years of biomedical, behavioral or clinical research. For those who have a health professional degree, the proposed training may be used to satisfy a portion of the degree requirements for a master's or doctoral degree, or any other advanced research degree program. Women, minorities, and individuals with disabilities are encouraged to apply.

Before submitting a fellowship application, the applicant must identify a sponsoring institution and an individual who will serve as a sponsor (also called mentor or supervisor) supervising the training and research experience. The applicant's sponsor should be an active investigator in the area of the proposed research who will directly supervise the candidate's research. The sponsor must document the availability of research support and facilities for high-quality research training. Applicants requesting fellowship support for foreign research training must show in the application that the foreign institution and sponsor offer unique opportunities and clear scientific advantages over positions currently available in the United States.

For details about this program, see [grants.nih.gov/grants/guide/pa-files/PA-03-067.html](http://grants.nih.gov/grants/guide/pa-files/PA-03-067.html), or contact Walter T. Schaffer, Research Training Officer; NIH, 6705 Rockledge Dr., Rm 3537, Bethesda, MD 20892-7963 [301-435-2687; fax: 301-480-0146; e-mail: [ws11q@nih.gov](mailto:ws11q@nih.gov)].

#### **Summer Programs in Behavior and Ecology – Panama**

Four Programs in Primate Behavior and Ecology will be conducted at the Primate Refuge and Sanctuary of Panama (PRSP) during the summer of 2003. These vary from nine days to three weeks in length. If students wish to spend a longer time at the PRSP, it is possible to take two or more consecutive programs. Further information is available at [www.primatesofpanama.org/program.htm](http://www.primatesofpanama.org/program.htm).

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## News Briefs

### **NCRR Primate Centers Broaden Focus**

Early in 2002, the nation's eight National Center for Research Resources (NCRR)-supported Regional Primate Research Centers were renamed National Primate Research Centers to reflect their enhanced emphasis on providing nonhuman primates (NHPs) and related resources to biomedical scientists nationwide. NCRR broadened the scope of the centers because of increased demand for NHPs in the study of AIDS, neurobiology, cardiology, and other research areas. The first seven Centers were established in the 1960s; an eighth Center was added to the network in 1999. Today this network, located around the country, maintains more than 24,000 nonhuman primates and provides NHP cells, tissues, organs, and biological fluids to investigators all over the United States and the world. – *From the Fall 2002 NCRR Reporter*

### **NCRR Establishes a Chimpanzee Sanctuary**

NCRR has awarded a contract to Chimp Haven, Inc. – a private, nonprofit organization – to establish and operate a sanctuary for chimpanzees no longer needed for biomedical research. Such a sanctuary was mandated by the Chimpanzee Health Improvement, Maintenance, and Protection Act, passed in December, 2000, to provide lifetime care for federally owned or supported chimpanzees retired from research. Over the term of the 10-year contract, NCRR will provide about \$19 million in total costs, and Chimp Haven will contribute about \$4 million toward direct costs. In addition, NCRR has awarded a \$5 million grant to Chimp Haven to support construction of the new sanctuary near Shreveport, Louisiana.

In Spring, 2004, the sanctuary is expected to initially provide housing in a free-ranging environment for approximately 75 chimpanzees. If more chimpanzees are transferred from research facilities to the sanctuary, Chimp Haven is authorized to either expand its sanctuary facility or serve as a primary contractor to additional qualified sanctuary sites, which will be maintained by subcontractors. – *From the Fall 2002 NCRR Reporter*

### **Iris Bolton Is WiPRC Head Veterinarian**

Iris Bolton, DVM, was named Associate Director for Animal Services at the Wisconsin Primate Research Center (WiPRC) on December 4, 2002. Dr. Bolton was in the U.S. Navy, then attended veterinary school at Purdue University. She completed her residency in primate medicine at the California PRC. She joined the WiPRC staff in 1999 and has served as interim Attending Veterinarian since July, 2002.

“Her experience here and her personal commitment to our program will guarantee a smooth transition into her new role as Associate Director and Attending Veterinar-

ian with expanded responsibilities,” stated Director Joe Kemnitz. – *From Primate-Science December 4, 2002*

### **Jacobsen to Retire, Primatology Mourns**

Larry Jacobsen, the Director of Library and Information Services at the Wisconsin Primate Research Center, announced on January 14 that he will be leaving his position “sometime this spring or summer – depending on when a replacement is found.” Larry has worked at the Center since 1973, and has been responsible for, among many important advances, the Primate Info Net on the Web.

Larry tells us that the Center “is committed to finding someone to carry on and develop the Internet programs that are the basis of our services to the international primatological community. Rest assured that Primate Info Net, PrimateLit, the World Directory of Primatologists, and our other Internet programs will continue to be available.” We are glad to hear that, but it won't be the same without you, Larry!

### **Uganda Has More Chimps Than We Thought**

Uganda contains nearly 1,000 more endangered chimpanzees than the usual estimates of 4,000. The population is 4,950, a report on the first census for chimpanzees conducted by experts has revealed. Dr. Andrew Plumptre of the Wildlife Conservation Society (WCS) presented the report yesterday at a workshop convened to make a conservation plan for chimpanzees. The chimpanzee census, done by the WCS and the Jane Goodall Institute, was the first systematic effort to count chimpanzees in Uganda.

Plumptre said that scientists had guessed that Uganda had between 3,000-4,000, but no one knew the exact number. The team of experts counted the chimpanzees in over 20 forest reserves in western Uganda over four years. – *by Gerald Tenywa, printed in New Vision (Kampala) NEWS, posted to Primate-Science, January 21*

### **Ebola Hemorrhagic Fever – Congo**

**January 20:** A chimpanzee was found dead in the remote Odzala National Park of the Democratic Republic of Congo (DRC) in mid-January, 2003. Less than a year before, contact with a dead ape was blamed for an Ebola outbreak that killed at least 53 people in the area. Specialists have again found Ebola virus in the dead ape. Some 3,000 pygmies and others in the area live by hunting monkeys and apes.

**February 6:** Scientists working with a European-funded regional forest conservation program for central Africa in northern DRC are witnessing what appears to be a massive die-off of lowland gorillas and chimpanzees in the Lossi Gorilla Sanctuary. Spanish primatologists Dr.

Magdalena Bermejo and Mr. Germain Ilera, who have been studying gorillas at Lossi for the past nine years, report that the eight families (139 individuals) they have been monitoring since 1994 have disappeared from their study area of 40 square kilometers in the sanctuary. The first deaths were reported on November 26, 2002; in mid-December, scientists collected samples from four gorilla and two chimpanzee carcasses and confirmed the presence of Ebola virus in all.

**February 7:** A team from the Congolese Ministry of Health, the Centre International de Recherches Medicales de Franceville (CIRMF), and the World Health Organization (WHO) is traveling to Mbomo district, Cuvette Ouest region, to investigate rumors of suspected cases of acute hemorrhagic fever syndrome. Laboratory samples will be collected and tested by CIRMF in Gabon.

**February 11:** Thirty-eight people have died in a suspected outbreak of the Ebola virus in the north of Congo-Brazzaville, near the border with Gabon.

**February 13:** The Ministry of Health of DRC and WHO are treating the deaths as a confirmed Ebola outbreak and taking measures to contain the spread of the virus, which is easily passed by contact with body fluids and between humans and animals. The Ministry says its emergency teams have now succeeded in convincing inhabitants of the area to stay away from church and not to travel. The teams are also trying to stop people in the region from eating wild game such as gorilla, gazelle, and antelope. These are among the animals that have been dying off in the surrounding forest and have already tested positive for Ebola.

The Ebola virus is easily spread just by skin contact with an infected primate or person. This makes the virus particularly difficult to contain, as Congolese funeral rites dictate that the body of a deceased person be washed by the family before burial. The current outbreak is believed to have been caused by villagers eating primates that were already infected with Ebola.

**February 29:** According to data published on February 28 by the Congolese Ministry of Health, at least 81 persons have died as a result of the epidemic of Ebola hemorrhagic fever in the Cuvette Ouest region (northwest Congo), on the border with Gabon. The Ministry of Health information bulletin indicates that the district of Kelle, 430 miles northwest of Brazzaville, where the main focus of the epidemic is located, registered 72 deaths, while the neighboring district of Mbomo, almost 500 miles further north, reported 9 victims since the disease appeared on January 4, 2003. In 1996, a similar epidemic caused the death of hundreds of people in the DRC. Local communities have begun to have a better understanding of this highly contagious disease, and have less fear, thanks in part to the medical and expert teams who have arrived and who are instructing them to not eat dead mon-

keys found in the forest, as well as to change their burial rites.

Between November, 2001, and June, 2002, at least 80 people died during an outbreak of the disease in the cross-border area of northeastern Gabon and northwestern Congo (Mekambo-Ekata-Mbomo-Kelle). During that epidemic, scientists also documented deaths of great apes in the same area, and Ebola virus was confirmed from one carcass. In several cases it was established that handling fresh ape carcasses that they had found in the forest had contaminated humans. – *From notices posted by ProMed-mail*

### **Monkeys in India Cause Trouble**

Worshipped by India's 800 million Hindus as the incarnation of the monkey god "Hanuman", the monkeys of Himachal Pradesh are definitely not man's best friends. The monkey population is taking over, not literally, but it feels like it to increasing numbers of city dwellers and farmers in the state. Farmers are complaining of the growing monkey menace that is destroying millions of dollars' worth of crops. Strict rules govern the treatment of monkeys under the Wildlife Protection Act; animals cannot be killed unless there is a proven threat to life.

The problem is especially acute in India's northern state where 80% of monkeys compete for living space with their human rivals. In the last three years alone, the simian population has grown by 50% and is still rising. For the region's farmers, their feeding habits are costing a fortune: \$16.5 million a year in destroyed produce.

Roop Singh Thakur, the state Forest Minister, said that monkeys are encouraged to leave their natural woody habitats by tourists who feed them along highways bisecting forests. However, the real underlying issue is India's disappearing forests and burgeoning urban centers, which are putting wildlife and humans on a collision course that can only be harmful to both. – *Reuters, posted to Primate-Science December 9, 2002*

### **Mountain Gorillas Killed by Poachers**

More than 10 mountain gorillas, *Gorilla gorilla beringei*, are believed to have been lost after a series of raids this year by poachers in the Virunga Volcanoes (Rwanda and D.R. Congo and Bwindi national parks). The World Wide Fund for Nature has expressed concern over the recent wave of poaching and kidnapping of the endangered mountain gorillas whose population is now 670.

In a press release dated November 27, WWF confirmed that 10 gorillas, representing three percent of the Virunga population, have either been killed or confiscated or gone missing. In the preceding six months, there were four poaching incidents in the three countries where the world's only populations of mountain gorillas are found. – *From New Vision (Kampala), posted to the Web December 17, 2002*

### **CITES Statement on the “Taiping Four”**

The CITES Secretariat’s monitoring of investigations into the export of gorillas from the University of Ibadan Zoological Garden in Nigeria to Taiping Zoo in Malaysia is continuing. The Secretariat is firmly of the opinion that considerable criminality is associated with this incident, particularly with regard to how the animals were acquired and their subsequent export from Nigeria. It also believes that there are reasonable grounds to suspect the complicity of persons in Malaysia in the illicit trade.

A Commission of Inquiry has been established by order of the President of Nigeria. The Secretariat will continue to provide assistance and technical support to Nigeria to help improve its implementation of the Convention.

The Secretariat understands that a decision has recently been taken by the authorities in Malaysia that the gorillas should go to a suitable facility where they can be housed in appropriate conditions and contribute to conservation of this species, and that discussions are underway with a zoo in South Africa to enable this to take place. The Secretariat is of the opinion that the decision to dispose of the animals in this manner complies with the

guidance that the Conference of the Parties has issued on this subject. The Secretariat is aware that an alternative facility in Africa was identified as a possible recipient for the gorillas confiscated in Malaysia and it made the authorities aware of this. It is also aware, however, that this facility is soon to receive gorillas that have recently been seized by the authorities in Nigeria. It presumes that this may have been a fact that Malaysia took into account in reaching a decision regarding the disposal of the animals.

The Secretariat regrets that unscrupulous persons were able to circumvent the provisions of the Convention. It believes, however, that useful learning opportunities have been identified and hopes that something positive will emerge from the incident. It continues to encourage the countries concerned to gather evidence to allow those involved in the illicit trade to be prosecuted.

The Secretary-General of CITES is highly appreciative of the concern and support shown by non-governmental organizations and the general public in relation to this incident. In particular, Willem Wijnstekers wishes to note the information supplied by the International Primate Protection League and the World Association of Zoos and Aquariums. – *From a statement by John M. Sellar of the CITES Secretariat, March 5*

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## **Announcements from Publications**

### **New Open-Access Journals**

A group of scientists is taking the idea of open access to scientific literature into their own hands by starting their own journals. Backed by a \$9-million grant from the Gordon and Betty Moore Foundation, the nonprofit organization Public Library of Science (PLOS) plans to launch two journals in biology and medicine next year that will be accessible on the internet by anyone. Their goal is to make every paper that is published in biology and medicine, and eventually other disciplines, freely available to everyone who wants to use it.

The same group tried to pressure existing subscription journals into embracing open access in 2001 by circulating a petition among scientists who agreed to boycott the journals. The petition garnered more than 30,000 signatures, but was largely unsuccessful because very few scientists honored it and all but a few journals were unmoved.

The first two new journals, to be called *PLOS Biology* and *PLOS Medicine*, will initially charge authors \$1,500 to publish their work. The fee is potentially prohibitive for some research institutions, but PLOS hopes the charge will shrink as the publications gain momentum and that institutions will come to consider such publishing fees part of the cost of research. If the new journals succeed, PLOS plans to start more journals in subdisciplines of

biology and medicine, as well as in other fields such as chemistry and physics.

The Howard Hughes Medical Institute (HHMI) has already endorsed that view by agreeing to pay the charge for the 332 investigators it currently supports. “Since we’re paying people to do their work, we’d like it to be widely distributed,” said a vice president of HHMI. “Part of our mission is science in the public interest, and this is in the public interest.” – *from an article in the December 20, 2002, issue of The Scientist, by Betsy Mason*

### **AJP Announces “Invited Papers”**

The *American Journal of Primatology* has launched a new category of articles, Invited Papers. To date, invitations from the Editor to submit Invited Papers on specific topics have been extended only to individuals who have given Keynote or Featured talks at annual American Society of Primatologists conferences, but the invitations may be extended more broadly in the future, to senior primatologists whose expertise qualifies them to present an important perspective on topics of current interest. Invited Papers need not meet the formal criteria for either a Review Article or Research Article, although they are expected to meet the more general standards of high scholarship, and will go through a review and revision process in which three Associate Editors of *AJP* will provide critical comments to the authors.

## Grants Available

### NIA Pilot Research Grant Program

The National Institute on Aging (NIA) is seeking Small Grant applications in specific areas to: • stimulate and facilitate the entry of promising new investigators into aging research, and • encourage established investigators to enter new targeted, high priority areas in this research field. This Small Grant Program provides support for pilot research that is likely to lead to a subsequent individual research project grant that is focused on aging and/or a significant advancement of aging research.

Research objectives include: • Behavioral, clinical, social, cellular, and molecular studies of cardiovascular and cerebrovascular aging. • Studies for preclinical research in the discovery, design, development and testing of novel compounds aimed at immunological and other approaches to delaying decline in cognitive function, and to preventing, slowing the progression of, or delaying the onset of Alzheimer's disease. • The development of methods for screening and diagnosis, and understanding mechanisms of action, of prions in the production of transmissible spongiform encephalopathies in the aging organism. • Basic molecular, cellular, and physiological studies on age- and disease-related protein modification (e.g., oxidation), protein misfolding and repair (e.g., role of chaperones), protein aggregation, and protein degradation (e.g., proteasomes and lysosomes) in the heart, liver, nervous system and other organ systems. • Studies on the biology of stem cells as a function of aging and disease; genetic and environmental effects on tissue stem cells; stem cell plasticity; development of cell markers and imaging techniques to identify and monitor stem cells in vivo; and transplantation of stem cells to effect tissue repair. • Mechanisms underlying normal age-related declines and age-related disease changes in sensory and motor processing in the central nervous system. • Studies to develop new measures that would better characterize and assess those cognitive processes termed "executive function" in humans and nonhuman primates. Of particular interest would be development of executive function measures that help distinguish between normal and pathological cognitive aging, such as Alzheimer's disease. Imaging studies, or other neuroanatomical or neurobiological studies, that would help bolster this cluster of functions as distinct from other cognitive domains are encouraged. • Studies on age-related changes in the structure, content, or function of cell membranes, the extracellular matrix and cytoskeleton, including regulation of cell signaling cascades, intracellular transport mechanisms, cell motility and morphology, and cell death. • Genetic, physiological, cellular and biochemical mechanisms that underlie age-related changes leading to dysfunction in tissues, systems, or organs. • Studies that

explore whether intermediary metabolism changes with advancing age and/or caloric restriction, and whether there is a relationship between age-related and caloric restriction-related changes in metabolism. Studies on changes in neuroendocrine, neuropeptide or neurochemical pathways as possible mediators of caloric restriction effects. • Basic underlying mechanisms of musculoskeletal aging. • Genetic studies to advance our understanding of behaviors that affect aging (e.g., response to interventions, health behaviors, personality, social functioning and coping, everyday functional competence, cognition) using humans or non-human models.

Research is solicited that examines aging and behavior from diverse levels of genetic analysis and uses evolutionary, population, biodemographic, quantitative or molecular approaches. Innovative approaches are needed to: integrate research directions stemming from social and epidemiological research (e.g., health disparities) with genetic approaches; to develop and apply methodologies to study how genes influence behavior; to investigate gene-environment interplay in developmentally dynamic ways; to integrate quantitative and molecular levels of genetic analysis; and to investigate environmental measures and contexts that modify genetic risk and are of particular relevance for healthy aging.

As an applicant, you will be solely responsible for planning, directing, and executing the proposed project. You may request either \$25,000 or \$50,000 per year in direct costs for up to two years. These awards are not renewable. Before completion of the Small Grant project, you are encouraged to seek continuing support for research through a Research Project Grant.

Direct questions about scientific/research issues to: David B. Finkelstein, Biology of Aging, Suite 2C231 [301-496-6402; fax: 301-402-0010; e-mail: [BAPQuery@nia.nih.gov](mailto:BAPQuery@nia.nih.gov)]; Angie Chon-Lee, Behavioral and Social Research, Suite 5C533 [301-594-5943; fax: 301-402-0051; e-mail: [BSRQuery@nia.nih.gov](mailto:BSRQuery@nia.nih.gov)]; Judy Finkelstein, Neuroscience and Neuropsychology of Aging, Suite 350 [301-496-9350; fax: 301-496-1494; e-mail: [NNAQuery@nia.nih.gov](mailto:NNAQuery@nia.nih.gov)]; or Michael Bone, Geriatrics and Clinical Gerontology, Suite 480 [301-496-6913; fax: 301-402-1784; e-mail: [bonem@nia.nih.gov](mailto:bonem@nia.nih.gov)]. All addresses are NIA, 7201 Wisconsin Ave, MSC 9205, Bethesda, MD 20892-9205. Also see [grants.nih.gov/grants/guide/pa-files/PAR-03-056.html](http://grants.nih.gov/grants/guide/pa-files/PAR-03-056.html). Application receipt dates are July 15, 2003 and November 17, 2003.

### PSGB Conservation Grants

The Primate Society of Great Britain (PSGB) awards small grants in support of primate conservation and edu-

cation. These grants are administered by the Conservation Working Party, which considers applications at its biannual meetings. Proposals are invited for grants to assist

- research of benefit to primate conservation;
- short surveys to identify locations of value to primate conservation;
- projects involving conservation education relevant to primates.

Grants will be awarded to members of PSGB, or to citizens of primate-range states who are sponsored by a member. Only those projects which are judged to have attainable goals that will benefit primate conservation or conservation education will be considered. Group training projects will not be considered for these grants, nor will undergraduate expeditions or commercial/adventure missions.

Awards are made on a competitive basis, and the decision of the Conservation Working Party is final. In some cases applicants may be invited to submit an amended application. Individual awards tend to be in the range of £250 to £500. Closing dates for application are the last day of February and the last day of August, each year. Application must be made on the Application Form, or following the same format, and must be submitted as a signed hard copy. It is requested that an additional electronic copy be sent (by e-mail or on floppy disk), if possible. Applications submitted solely by e-mail or by fax will not normally be accepted. For more information, contact Anna T. C. Feistner, Convenor, PSGB Conservation Working Party, Durrell Wildlife Conservation Trust, Les Augres Manor, Trinity, Jersey JE3 5BP, British Isles [44

(0)1534 860000; fax 44 (0)1534 860001; e-mail: [Anna.Feistner@durrell.org](mailto:Anna.Feistner@durrell.org)]; or see [www.psgb.org](http://www.psgb.org).

### **NIAID Asofsky Scholars in Research Award**

The National Institute of Allergy and Infectious Diseases (NIAID), National Institutes of Health, invites applications from current NIAID grantees (Principal Investigators) to apply for the Richard A. Asofsky Scholars in Research (ASIR) program. Dr. Asofsky served NIH and NIAID with distinction and energy for 37 years, a major part being spent improving research training programs. This announcement has been created to represent and honor his dedication to bring underrepresented minorities into the biomedical sciences. The ASIR Program is to provide supplemental funding to NIAID extramural principal investigators for the purpose of supporting underrepresented minority high school and college students in their research laboratories to expose them to research career opportunities in the areas of allergy, immunology, transplantation, microbiology, and infectious diseases, including AIDS. These NIAID ASIR Awards are to be used to encourage the development of underrepresented minority researchers as outlined in the NIAID Strategic Plan on Health Disparities.

Direct inquiries to: Joyce Hunter Woodford, M.P.P., Room 2130 [301-496-6722; fax: 301-496-8729; e-mail: [jw25v@nih.gov](mailto:jw25v@nih.gov)]; or Diane Adger-Johnson, Room 2261 [301-402-8969; fax: 301-496-8729; e-mail: [da15a@nih.gov](mailto:da15a@nih.gov)]; both at Div. of Extramural Activities, NIAID, 6700B Rockledge Dr., Bethesda, MD 20892-7610.

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## **Information Requested or Available**

### **AWI Launches Animal Reporting Website**

The Washington DC-based activist group Animal Welfare Institute has inaugurated a Website, [labanimalissues.org](http://labanimalissues.org), designed to solicit confidential/anonymous claims about animals in research and education. The Website encourages reports whether dealing with one animal or an entire institution. The AWI vows to follow up with actions that “may include but are not limited to: • inspecting the animal(s) involved • filing a complaint(s) with the appropriate oversight entity • notifying the media and/or Congress.”

### **More Interesting Websites**

- Academic Careers Online:  
[www.AcademicCareers.com](http://www.AcademicCareers.com)
- Animal Capture Equipment, Inc.:  
[www.ace-cap.com](http://www.ace-cap.com)

- Cyber Visions, a comprehensive facility and protocol management database system:

[www.cybervisionsusa.com/](http://www.cybervisionsusa.com/)

- Laboratory Animal Management Association:

[www.lama-online.org](http://www.lama-online.org)

- Limbe Wildlife Centre, a sanctuary:

[www.limbewildlife.org](http://www.limbewildlife.org)

- Microbiology Information Portal:

[www.microbes.info/](http://www.microbes.info/)

- Report of the Task Force on Eco- and Animal Rights Terrorism for the National Association of State Universities and Land-Grant Colleges:

[www.nasulgc.org/AM2002/presentations/Eco\\_Terror\\_Final\\_Rpt.pdf](http://www.nasulgc.org/AM2002/presentations/Eco_Terror_Final_Rpt.pdf)

- Veterinary Anaesthesia & Analgesia, table of contents:

[www.blackwellpublishing.com/toc.asp?ref=1467-2987](http://www.blackwellpublishing.com/toc.asp?ref=1467-2987)

- WARDS: [www.ouranimalwards.org](http://www.ouranimalwards.org)

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## Workshop Announcements

### Teaching Research Ethics

Indiana University's tenth annual Teaching Research Ethics Workshop will convene on the campus at Bloomington, Indiana, May 14-17, 2003. Session topics will include an overview of ethical theory; using human subjects in biomedical and behavioral/social research; and responsible data management. Many sessions will feature techniques for teaching and assessing the responsible conduct of research. For more information, contact Kenneth D. Pimple, Teaching Research Ethics Project Director, Poynter Center, Indiana Univ., 618 East Third St, Bloomington, IN 47405-3602 [812-855-0261; fax: 812-855-3315; e-mail: [pimple@indiana.edu](mailto:pimple@indiana.edu)]; or see [pointer.indiana.edu](http://pointer.indiana.edu).

### Advanced Training for IACUC Members

One-day workshops, co-sponsored by the Office of Laboratory Animal Welfare, NIH (OLAW), and Working for Animals used in Research Drugs and Surgery (WARDS), will be held on June 2 and October 28, 2003. The June workshop will be hosted by the University of Minnesota, in Minneapolis; the October workshop, in Bethesda, Maryland, will be hosted by OLAW and the Office of Animal Care and Use, NIH. The program for both will include presentations on Institutional Animal Care and Use Committee (IACUC) Function and Development; Protocol Review; and Special Advanced Topics. The latter may include "Special requirements for nonhuman primates", "Best practices in captive animal research", and "Field studies: Capture and release of wildlife", among other topics.

Single registration is \$185; \$150 for SCAW Institutional Members. For more information see [www.scaw.com](http://www.scaw.com); or contact SCAW, 7833 Walker Dr., Suite 410, Greenbelt, MD 20770 [301-345-3500; fax: 301-345-3503; e-mail: [info@scaw.com](mailto:info@scaw.com)].

### Evolution of the Primate Skull

An international workshop, "Evolutionary Changes in the Craniofacial Morphology of Primates", will be held September 18-20, 2003, in Greifswald, Germany. Registration cost is 80 Euros until May 15, and 100 Euros thereafter. The deadline for abstract submission is June 15, 2003. For details, contact Dr. Thomas Koppe, Inst. für Anatomie, Ernst Moritz Arndt Univ. Greifswald, Friedrich-Loeffler-Str. 23c, D-17489 Greifswald, Germany [+49-3834-865318; fax: +49-3834-865302; e-mail: [thokoppe@mail.uni-greifswald.de](mailto:thokoppe@mail.uni-greifswald.de)]; or see [www.dur.ac.uk/t.c.rae/CT/Wegner/](http://www.dur.ac.uk/t.c.rae/CT/Wegner/).

### 2003 Animal Welfare Information Center Workshops

The Animal Welfare Information Center (AWIC) of the U.S. Department of Agriculture, National Agricultural Library (NAL), has developed a one-and-a-half day workshop, "Meeting the Information Requirements of the Animal Welfare Act".

The regulations of the act require that investigators provide Institutional Animal Care and Use Committees (IACUCs) with documentation demonstrating that alternatives to procedures that may cause more than momentary pain or distress to the animals have been considered and that activities do not unnecessarily duplicate previous experiments. A thorough literature search regarding alternatives meets this federal mandate. An alternative is any procedure which results in the reduction in the numbers of animals used, refinement of techniques, or replacement of animals.

The objectives of the workshop are to provide: • an overview of the Animal Welfare Act and the information requirements of the act; • a review of the alternatives concept; • a comprehensive introduction to NAL, AWIC and other organizations; • instruction on the use of existing information databases/networks; and • on-line database searching experience.

This workshop is targeted for principal investigators, members of IACUCs, information providers, administrators of animal use programs, and veterinarians. All participants will receive a resource manual. Workshops will be held at the National Agricultural Library on: • June 4-5, 2003, and • October 22-23, 2003. Each workshop is limited to 20 persons.

To register, use the registration form at [www.nal.usda.gov/awic/awicworkshops/regform.htm](http://www.nal.usda.gov/awic/awicworkshops/regform.htm) or contact AWIC at: U.S. Dept. of Agriculture, ARS, NAL, Animal Welfare Information Center, 10301 Baltimore Ave., Beltsville, MD 20705 [301-504-6212; fax: 301-504-7125; e-mail: [awic@nal.usda.gov](mailto:awic@nal.usda.gov)]. See also [www.nal.usda.gov/awic](http://www.nal.usda.gov/awic).

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### 2002 Martha J. Galante Award Announced

The International Primatological Society's Conservation Committee has announced that the winner of the 2002 Martha J. Galante Award is Dr. Jonah Ratsimbazafy, of Madagascar.

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## Positions Available

### Research Scientist – South Carolina

LABS of Virginia, Inc., has a Research Scientist position for a postdoctoral or experienced master's level candidate. The position requires demonstrated scientific leadership, as well as data analysis and publication skills. The primary current project involves long-term behavioral and physiological characterization of a free-ranging population of rhesus macaques. This project is funded through the National Institute on Alcohol Abuse and Alcoholism and presents a significant opportunity for career development. Other resources include large populations of Old and New World primates in captive facilities. The successful candidate will be expected to have a track record of research innovation and publication, experience in bio-behavior and neurotransmitter functioning, and a thorough and broad understanding of primate behavior and development. S/he will work under direct supervision of the Deputy Director and will be expected to develop a well funded research program. Salary will depend upon the candidate's ability to secure research support.

Minimum requirements include a PhD, DVM, or Master's degree in a relevant field with a proven record of research leadership and publication, including publications as senior author. The ability to work independently and to develop innovative research techniques is essential.

Send a detailed cover letter, resume, and all other correspondence by e-mail; up to five representative publications should be sent by mail to Greg Westergaard, LABS of Virginia, Inc., 95 Castle Hall Rd, P.O. Box 557, Yemassee, SC 29945 [e-mail: [GWprimate@netscape.net](mailto:GWprimate@netscape.net)].

### Senior Animal Technician – New Mexico

The Lovelace Respiratory Research Institute seeks a highly motivated individual to work as a senior animal care technician in a primate colony. Experience in handling of nonhuman primates in a group housing setting is required. A bachelor's degree and two years' related experience is desired, but highly qualified individuals with a high school diploma or equivalent and a minimum of four years of directly related experience working in an animal care facility will be considered. AALAS certification at

the Lab Animal Technician level is preferred, but highly qualified individuals certified as Assistant Lab Animal Technicians will be considered. Successful completion of a post-offer pre-employment physical examination/medical history check is required. Positions are located on Kirtland Air Force Base in Albuquerque, New Mexico. We offer a competitive salary and excellent benefits. To apply, mention Job # S303 and send resume to Human Resources Office, Lovelace Respiratory Research Institute, 2425 Ridgecrest Dr. SE, Albuquerque, NM 87108 [fax: 505-348-4976; e-mail: [hmail@LRRRI.org](mailto:hmail@LRRRI.org)]. For other employment opportunities, see [www.LRRRI.org/](http://www.LRRRI.org/). EO/AAE.

### Research Technician – New York City

The Fishberg Research Center for Neurobiology at Mount Sinai School of Medicine has an opening for a full-time behavioral neurobiology research technician. Candidates should be dedicated, hardworking, and willing to learn on the job. The work environment is friendly, familial, and constantly asks workers for their input and ideas. They participate directly in the creation and implementation of behavioral research studies exploring the role of the hippocampus in learning and memory using rhesus monkeys. Other duties include data analysis and wet lab responsibilities. Training will be provided. Prior experience with animal behavioral testing is preferred. BA/BS in psychology, neurobiology, or related discipline is required. Familiarity with computers is a must. Knowledge of CORTEX, STAT View, MAT Lab, and Excel is a plus. The salary is \$29,500. Contact Peter Rapp, Mount Sinai School of Medicine, 1425 Madison Ave., Room 9-20, New York, NY 10029 [fax: 212-849-2510; e-mail: [peter.rapp@mssm.edu](mailto:peter.rapp@mssm.edu)].

### Sanctuary Director – Texas

Alan Berger, of the Texas Snow Monkey Sanctuary, writes that the position of Director there is still open. See the announcement in the last issue, or contact Alan at 1122 S Street, Sacramento, CA 95814 [916-485-1707 ext. 211; fax: 916-447-3070; e-mail: [aberger@api4animals.org](mailto:aberger@api4animals.org)].

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## Meeting Announcements

The **2003 Laboratory Animal Management Association Meeting and Educational Seminar** will be held June 18-20, and the pre-meeting **Management Training Course**, June 15-17, at the Wyndham El San Juan Hotel, San Juan, Puerto Rico. For more information and registration forms, see [www.lama-online.org](http://www.lama-online.org).

The **Annual Meeting of the Society for Conservation Biology** will be held June 28 to July 2, 2003, in

Duluth, Minnesota. Contact Kris Lund, Univ. of Minnesota, Continuing Education, 251 Darland, 1049 University Dr., Duluth, MN 55812-3011 [218-726-7810; fax: 218-726-6336; e-mail: [2003@conservationbiology.org](mailto:2003@conservationbiology.org)]; or see: [www.conservationbiology.org/2003](http://www.conservationbiology.org/2003).

The **9<sup>th</sup> Congress of the European Society for Evolutionary Biology** will be held August 18-24, 2003, in Leeds, England. See [www.eseb.org](http://www.eseb.org).



## Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

### Books

- *Primate Audition: Ethology and Neurobiology*. A. A. Ghazanfar (Ed.). Boca Raton, FL: CRC Press, 2002. [Price: \$139.95]

Contents: Primates as auditory specialists, by A. A. Ghazanfar & L. R. Santos; Causal knowledge in free-ranging Diana monkeys, by K. Zuberbuhler; Auditory temporal integration in primates: A comparative analysis, by K. N. O'Connor & M. L. Sutter; Mechanisms of acoustic perception in the cotton-top tamarin, by C. T. Miller, D. J. Weiss, & M. D. Hauser; Psychophysical and perceptual studies of primate communication calls, by C. G. Le Prell & D. B. Moody; Primate vocal production and its implications for auditory research, by W. T. S. Fitch; Developmental modifications in the vocal behavior of non-human primates, by J. Fischer; Ecological and physiological constraints for primate vocal communication, by C. H. Brown; Neural representation of sound patterns in the auditory cortex of monkeys, by M. Brosch & H. Scheich; Representation of sound location in the primate brain, by K. A. Kelly, R. Metzger, O. A. Mullette-Gillman, U. Werner-Reiss, & J. M. Groh; The comparative anatomy of the primate auditory cortex, by T. A. Hackett; Auditory communication and central auditory mechanisms in the squirrel monkey: Past and present, by J. D. Newman; Cortical mechanisms of sound localization and plasticity in primates, by G. H. Recanzone; Anatomy and physiology of auditory-prefrontal interactions in non-human primates, by L. M. Romanski; and Cortical processing of complex sounds and species-specific vocalizations in the marmoset monkey (*Callithrix jacchus*), by X. Wang, S. C. Kadia, T. Lu, Li Liang, & J. A. Agamaite.

- *Infanticide by Males and Its Implications*. C. P. van Schaik & C. H. Janson (Eds.). 2002. Cambridge: Cambridge University Press, 2002. 584 pp. [Price: £80.00 (hardback), £29.95 (paperback)].

Contents: Foreword, by S. B. Hrdy; Preface, by C. P. van Schaik & C. Janson.

*Part I. Introduction.* The holy wars against infanticide: Which side are you on and why? by V. Sommer; Infanticide by male primates: The sexual selection hypothesis revisited, by C. P. van Schaik; Vulnerability to infanticide by males: Patterns among mammals, by C. P. van Schaik.

*Part II. Infanticide by males: Case studies.* Infanticide in red howlers: Female group size, male composition and a possible link to folivory, by C. M. Crockett & C. H. Janson; Infanticide in Hanuman langurs: Social organization, male migration and weaning age, by C.

Borries & A. Koenig; Male infanticide and defense of infants in Chacma baboons, by R. A. Palombit, D. L. Cheney, J. Fischer, S. Johnson, D. Rendall, R. M. Seyfarth, & J. B. Silk; Infanticide by males and female choice in wild Thomas's langurs, by R. Steenbeek; The evolution of infanticide in rodents: A comparative analysis, by D. T. Blumstein; Infanticide by male birds, by J. P. Viegas.

*Part III. Behavioural consequences of infanticide by males.* Prevention of infanticide: The perspective of infant primates, by A. Treves; Infanticide and the evolution of male-female bonds in animals, by R. A. Palombit; The other side of the coin: Infanticide and the evolution of affiliative male-infant interactions in Old World primates, by A. Paul, S. Preuschoft, & C. P. van Schaik; Female dispersal and infanticide avoidance in primates, by E. H. M. Sterck & A. H. Korstjens; Reproductive patterns in eutherian mammals: Adaptations against infanticide, by M. A. van Noordwijk & C. P. van Schaik; Paternity confusion and the ovarian cycles of female primates, by C. P. van Schaik, J. K. Hodges, & C. L. Nunn; Social evolution in primates: The relative roles of ecology and intersexual conflict, by C. L. Nunn & C. P. van Schaik.

*Part IV. Infanticide by females.* Infanticide by female mammals: Implications for the evolution of social systems, by L. Digby; 'The hate that love generated': Sexually selected neglect of one's own offspring in humans, by E. Voland & P. Stephan.

*Part V. Conclusion.* The behavioral ecology of infanticide, by C. H. Janson & C. P. van Schaik.

- *Primates in Fragments: Ecology and Conservation*. L. K. Marsh (Ed.). Dordrecht: Kluwer Academic Publishers, 2002. 428 pp. [Price: \$135]

This volume is divided into sections based on broad categories of research in primates in fragments. In the genetics and population dynamics section, the authors cover topics in viability, metapopulation, and species that remain in remnant forests. In the behavioral ecology section, authors take a closer look at feeding, ranging and other behaviors that allow primates to remain in or disperse between fragments. In conservation and management, authors bring knowledge of species that remain in fragments, together with plans to implement strategies for their long-term viability. Finally, in the integration and future directions section, the authors synthesize the information in this volume and make recommendations for future and continued work in this field.

### Journal Contents

- *Journal of Medical Primatology*, 2002, 31[3]. Select at <[www.blackwell-synergy.com](http://www.blackwell-synergy.com)>.

Postnatal pre- and postexposure passive immunization strategies: Protection of neonatal macaques against oral

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

simian-human immunodeficiency virus challenge, by R. Hofmann-Lehmann, J. Vlasak, R. A. Rasmussen, S. Jiang, P. L. Li, T. W. Baba, D. C. Montefiori, B. J. Bernacky, T. A. Rizvi, R. Schmidt, L. R. Hill, M. E. Keeling, H. Katinger, G. Stiegler, L. A. Cavacini, M. R. Posner, & R. M. Ruprecht; Serological evidence of alpha herpesvirus infection in sooty mangabeys, by R. D. Henkel, H. M. McClure, P. Krug, D. Katz, & J. K. Hilliard; *Yersinia pseudotuberculosis* infection in breeding monkeys: Detection and analysis of strain diversity by PCR, by T. Kageyama, A. Ogasawara, R. Fukuhara, Y. Narita, N. Miwa, Y. Kamanaka, M. Abe, K. Kumazaki, N. Maeda, J. Suzuki, S. Gotoh, K. Matsubayashi, C. Hashimoto, A. Kato, & N. Matsubayashi; ABO blood groups in the primate species of Cebidae from the Amazon region, by T. C. O. Corvelo, H. Schneider, & M. L. Harada; Spontaneous terminal ileitis resembling Crohn disease in captive tamarins, by A. Gozalo, G. E. Dagle, E. Montoya, & R. E. Weller; and Neonatal behavioral scoring of common marmosets (*Callithrix jacchus*): Relation to physical condition and survival, by S. D. Tardif, D. G. Layne, L. Cancino, & D. A. Smucny.

- *Journal of Medical Primatology*, 2002, 31[4-5].

Longitudinal follow up of SIVmac pathogenesis in rhesus macaques of Chinese origin: Emergence of B cell lymphoma, by B. Ling, R. S. Veazey, C. Penedo, K. Xu, J. D. Lifson, & P. A. Marx; Infection of macaques with a molecular clone, SHIVSF33A2, provides evidence for tissue specific variants, by C. M. Buckner, A. Gettie, R. C. H. Tan, T. Eshetu, M. Ratterree, J. Blanchard, C. Cheng-Mayer, & J. M. Harouse; Species-specific variation in SIV disease progression between Chinese and Indian subspecies of rhesus macaque, by A. M. Trichel, P. A. Rajakumar, & M. Murphey-Corb; Inclusion of Vpr accessory gene in a plasmid vaccine cocktail markedly reduces Nef vaccine effectiveness in vivo resulting in CD4 cell loss and increased viral loads in rhesus macaques, by K. Muthumani, M. Bagarazzi, D. Conway, D. S. Hwang, V. Ayavoo, D. Zhang, K. Manson, J. Kim, J. Boyer, & D. B. Weiner; Changes in dendritic cell migration and activation during SIV infection suggest a role in initial viral spread and eventual immunosuppression, by S. M. Barratt-Boyes, M. I. Zimmer, & L. Harshyne; Characterization of CD4+ T helper cell fine specificity to the envelope glycoproteins of simian immunodeficiency virus, by S. Sarkar, V. Kalia, M. Murphey-Corb, & R. C. Montelaro; Whole inactivated SIV virion vaccines with functional envelope glycoproteins: Safety, immunogenicity, and activity against intrarectal challenge, by J. D. Lifson, M. Piatak, J. L. Rossio, J. Bess, E. Chertova, D. Schneider, R. Kiser, V. Coalter, B. Poore, R. Imming, R. C. Desrosiers, L. E. Henderson, & L. O. Arthur; Protection by SIV VLP DNA prime/protein boost following mucosal SIV challenge is markedly enhanced by IL-12/GM-CSF co-administration, by E. O'Neill, I. Martinez, F. Villinger, M. Rivera, S. Gascot, C.

Colon, T. Arana, M. Sidhu, R. Stout, D. C. Montefiori, M. Martinez, A. A. Ansari, Z. R. Israel, & E. Kraiselburd; Magnetic resonance spectroscopy: An in vivo tool for monitoring cerebral injury in SIV-infected macaques, by J. B. Greco, K. E. Sakaie, S. Aminipour, P. L. Lee, L. L. Chang, J. He, S. Westmoreland, A. A. Lackner, & R. G. Gonzalez; and Preclinical AIDS vaccine research: Survey of SIV, SHIV, and HIV challenge studies in vaccinated nonhuman primates, by J. Warren.

- *Journal of Medical Primatology*, 2002, 31[6].

Effects of intestinal survival surgery on systemic and mucosal immune responses in SIV-infected rhesus macaques, by Y. Y. Edghill-Smith, K. Aldrich, J. Zhao, J. Pinczewski, V. S. Kalyanaraman, M. Johnson, A. Heyliger, R. P. Perrin, R. Woodward, & M. Robert-Guroff; Immune responses in baboons vaccinated with HIV-2 genetic expression libraries, by C. P. Locher, K. F. Sykes, D. J. Blackburn, & S. A. Johnston; Endometrial function in vervet monkeys (*Cercopithecus aethiops*): Morphology,  $\beta 3$  integrin and insulin-like growth factor binding protein-1 expression during the menstrual cycle and pregnancy in the normal and disrupted endometrium, by J. V. Seier, K. Chwalisz, J. Louw, G. van der Horst, M. de Kock, D. du Toit, & J. A. Laubscher; Baseline and stress levels of cortisol in conscious and unrestrained Japanese macaques (*Macaca fuscata*), by J. Suzuki, S. Ohkura, & K. Terao; Spontaneous rat bite fever in nonhuman primates: A review of two cases, by C. R. Valverde, L. J. Lowenstine, C. E. Young, R. P. Tarara, & J. A. Roberts; and Congenitally caused fused labia in the common marmoset (*Callithrix jacchus*), by E. F. Isachenko, P. L. Nayudu, V. V. Isachenko, F. Nawroth, & H. W. Michelmann.

### Magazines and Newsletters

- *CC Update*, Spring/Summer 2002, 13[1]. [Community Conservation Inc., 50542 One Quiet Lane, Gays Mills, WI 54631]

Contents include articles about spider monkeys in El Salvador, howler monkeys in Belize, and a monkey sanctuary in central Ghana.

- *Neotropical Primates: A Journal of the Neotropical Section of the IUCN/SSC Primate Specialist Group*, April, 2002, 10[1]. [Conservation International, 1919 M St, NW, Suite 600, Washington, DC 20036]

Contents include: Western extension of the range of bearded sakis: A possible new taxon of *Chiropotes* sympatric with *Cacajao* in the Pico da Neblina National Park, Brazil, by J. P. Boubli; Survey of three primate species in forest fragments at La Suerte Biological Field Station, Costa Rica, by J. D. Pruetz & H. C. Leason; Primates, lots and forest fragments: Ecological planning and conservation in the Sierra de Santa Marta, Mexico, by G. Silva-López & E. Portilla-Ochoa; Estudio del patrón de actividad general de monos aulladores (*Alouatta palliata*) en el Parque Yumká, Tabasco, México, by D. Muñoz, Y. García del

Valle, B. Franco, A. Estrada, & M. Magaña A.; Dieta do *Callithrix penicillata* (Primates, Callitrichidae) em áreas de cerrado no Distrito Federal, Brasil, by S. Lopes Vilela & D. Santos de Faria; Fecal collection in free-ranging common marmosets, *Callithrix jacchus*, by M. B. Cordeiro de Sousa, M. C. Nascimento Lopes, & A. C. S. R. Albuquerque; Neotropical Ethnoprimateology: An annotated bibliography, by B. Urbani; and Neotropical primate remains in cave deposits: An annotated bibliography, by B. Urbani.

- *Neotropical Primates: A Journal of the Neotropical Section of the IUCN/SSC Primate Specialist Group*, August, 2002, 10[2]. [Address same as above]

Contents include: The true identity and characteristics of *Simia albifrons* Humboldt, 1812: Description of neotype, by T. R. Defler & J. I. Hernández-Camacho; Primates of the Jaú National Park, Amazonas, Brazil, by A. A. Barnett, S. H. Borges, C. V. de Castilho, F. M. Neri, & R. L. Shapley; Cuidado biparental en el mono de noche (*Aotus azarai*) de Formosa, Argentina, by M. Rotundo, E. Fernandez-Duque, & M. Giménez; Behavior of squirrel monkeys (*Saimiri sciureus*): 16 years on an island in French Guiana, by B. de Thoisy, O. Louguet, F. Bayart, & H. Contamin; Estudo preliminar do monitoramento do bugio ruivo, *Alouatta guariba clamitans*, através da contagem de bolos fecais no Parque Estadual de Itapuã, Rio Grande do Sul, Brasil, by G. Buss & H. P. Romanowski; BDGEOPRIM: Database of geo-referenced localities of Neotropical primates, by A. Hirsch, L. G. Dias, L. de Oliveira Martins, R. F. Campos, E. C. Landau, N. Almeida, & T. Resende; Bird predation and prey-transfer in brown capuchin monkeys (*Cebus apella*), by R. Ferreira, B. D. Resende, M. Mannu, E. B. Ottoni, & P. Izar; The black howler monkey (*Alouatta pigra*) and spider monkey (*Ateles geoffroyi*) in the Mayan site of Yaxchilán, Chiapas, Mexico: A preliminary survey, by A. Estrada, L.-A. Lluécke, S. Van Belle, K. French, D. Muñoz, Y. García, L. Castellanos, & A. Mendoza; and A possible example of coercive mating in mantled howling monkeys (*Alouatta palliata*) related to sperm competition, by C. B. Jones.

- *Positively Primates*, 2000, 6[2-3]. [DuMond Conservancy, 14805 S.W. 216 St, Miami, FL 33170]

### Monographs

- *The Monkeys of Suriname* [text in both Dutch and English]. S. Boinski. Suriname: Foundation for Nature Conservation in Suriname, 2002. (This document may be borrowed from the Wisconsin PRC. Contact Joanne Brown [608-263-3512; e-mail: [brown@primate.wisc.edu](mailto:brown@primate.wisc.edu)])

### Special Journal Issues

- The Mosquito Genome: *Anopheles gambiae*. *Science*, 2002, 298[5591].

- Papers Presented at International Congresses of the International Society for Applied Ethology. *Applied Animal Behaviour Science*, 2003, 81[3].

Contents include: Understanding behaviour: The relevance of ethological approaches in laboratory animal science, by I. A. S. Olsson, C. M. Nevison, E. G. Patterson-Kane, C. M. Sherwin, H. A. Van de Weerd, & H. Würbel; Medical paradigms for the study of problem behaviour: A critical review, by D. S. Mills; Animal welfare judging teams: A way to interface welfare science with traditional animal science curricula? by C. R. Heleski, A. J. Zanella, & E. A. Pajor; and Guidelines for the ethical use of animals in applied ethology studies, by C. M. Sherwin, S. B. Christiansen, I. J. Duncan, H. W. Erhard, D. C. Lay, Jr., J. A. Mench, C. E. O'Connor, & J. C. Petherick.

### Studbooks

- *2000 North American Regional Studbook Update* (This document may be borrowed from the Wisconsin PRC. Contact Joanne Brown [608-263-3512; e-mail: [brown@primate.wisc.edu](mailto:brown@primate.wisc.edu)])

### Supplements

- Regulatory Testing and Animal Welfare. *ILAR Journal*, 2002, 43[Supplement], 2002.

Proceedings of an International Symposium organized by the International Council for Laboratory Animal Science and the Canadian Council on Animal Care, held in Quebec City, Canada, June 21-23, 2001.

### Anatomy and Physiology

- Behavioral and cardiophysiological responses of common marmosets (*Callithrix jacchus*) to social and environmental changes. Gerber, P., Schnell, C. R., & Anzenberger, G. (Anthrop. Inst. & Museum, Univ. of Zürich, Winthurerstrasse 190, CH-8057, Zürich, Switzerland [e-mail: [basa@aim.unizh.ch](mailto:basa@aim.unizh.ch)]). *Primates*, 2002, 43, 201-216.

Under captive conditions common marmosets show socially monogamous propensities. Males and females form a social bond as characterized by signs of behavioral arousal during separation of pairmates, high levels of affiliative interactions between pairmates, and agonistic responses towards strange conspecifics. Responses of mated individuals were recorded while the animals were in an unfamiliar environment (1) alone, (2) with the pairmate, or (3) with an opposite-sex stranger. Systolic and diastolic blood pressure, heart rate, and locomotor activity were recorded telemetrically through peritoneally implanted transmitters. Behavioral responses were videotaped. Responses measured while alone were reduced only by the pairmate, not by a stranger. No affiliative behaviors occurred between strange conspecifics, but aggressive and sexual behaviors were observed. During reunion with the pairmate, individuals recovered physiologically.

- Scaling of sexual dimorphism in body mass: A phylogenetic analysis of Rensch's rule in primates. Smith, R. J., & Cheverud, J. M. (Dept of Anthropology, Campus Box 1114, Washington Univ., St. Louis, MO 63130 [e-mail: rjsmith@artsci.wustl.edu]). *International Journal of Primatology*, 2002, 23, 1095-1135.

“We examined the relationship between body mass dimorphism, measured as the natural logarithm (ln) of the male/female ratio, and body mass, defined as ln (female mass), with interspecific allometry, phylogenetically independent contrasts, and phylogenetic autocorrelation in 105 primate species. We repeated the analyses for Strepsirrhini (N = 23), Haplorrhini (N = 82), Platyrrhini (N = 32), and Catarrhini (N = 47). With independent contrasts, there is statistically significant ( $p < .05$ ) positive allometry in Primates in general, Haplorrhini, and Catarrhini, but not in Strepsirrhini or Platyrrhini. The steepest slope (0.134) is for Catarrhini. Results differed when we conducted analyses with traditional interspecific allometry. For example, not only was the Catarrhini slope not statistically significant, but also the magnitude of the slope was shallower than that of all other groups, except Strepsirrhini. The results indicate that phylogenetic effects influence the scaling of sexual size dimorphism, and that the statistical method used has a large impact on the interpretation of this biological relationship. We discuss issues involved in applying these statistical methods in detail.”

- A spatially organized representation of colour in macaque cortical area V2. Youping X., Wang, Y. & Felleman, D. J. (Dept of Ophthalmology, Mt Sinai School of Med., One Gustave L. Levy Pl., New York, NY 10029 [e-mail: youping@camelot.mssm.edu]). *Nature*, 2003, 421, 535-539.

Neurons responding selectively to different colors have been found in various cortical areas in macaque monkeys; however, little is known about whether and how the representation of color is spatially organized in any cortical area. Cortical area V2 contains modules that respond preferentially to chromatic modulation, which are located in thin cytochrome oxidase stripes. Here it is shown that within and beyond these modules, gratings of different colors produce activations that peak at different locations. Optical recording of intrinsic signals revealed that the peak regions of the responses to different colors were spatially organized in the same order as color stimuli are arranged in the DIN (German standard color chart) color system. Nearby regions represented colors of a similar hue. The set of color-specific regions formed 0.07–0.32-mm-wide and approximately 1.3-mm-long bands that varied in shape from linear to nearly circular. This finding suggests that thin stripes in V2 contain functional maps where the color of a stimulus is represented by the location of its response activation peak.

- Functional mapping of the primate auditory system. Poremba, A., Saunders, R. C., Crane, A. M., Cook, M.,

Sikoloff, L., & Mishkin, M. (Dept of Psychology and Neuroscience Program, Univ. of Iowa, Iowa City, IA 52242 (e-mail: amy-poremba@uiowa.edu)). *Science*, 2003, 299, 568-572.

Cerebral auditory areas were delineated in the awake, passively listening, rhesus monkey by comparing the rates of glucose utilization in an intact hemisphere and in an acoustically isolated contralateral hemisphere of the same animal. The auditory system defined in this way occupied large portions of cerebral tissue, an extent probably second only to that of the visual system. Cortically, the activated areas included the entire superior temporal gyrus and large portions of the parietal, prefrontal, and limbic lobes. Several auditory areas overlapped with previously identified visual areas, suggesting that the auditory system, like the visual system, contains separate pathways for processing stimulus quality, location, and motion.

- Circadian rhythm in circulating CD16-positive natural killer (NK) cells in macaque monkeys: Implication of plasma cortisol levels. Terao, K., Suzuki, J., & Ohkura, S. (Tsukuba Primate Ctr, NIID, 1-Hachimandai, Tsukuba, Ibaraki 305-0843, Japan [e-mail: terao@nih.go.jp]). *Primates*, 2002, 43, 329-338.

The daily change in both percentage and absolute number of circulating major lymphocyte subset was determined with young Japanese monkeys and rhesus monkeys. The blood sample was collected at four-hour intervals beginning at 16:00 for 24 hours using a tethering system by which blood samples could be collected without restraint. During the dark period (from 20:00 to 08:00), the number of peripheral lymphocytes increased and that of granulocytes decreased, resulting in no significant change in the number of total peripheral white blood cells. The absolute number of CD4+ T, CD8+ T, and CD20+ B cells showed the significant daily change similar to that in number of peripheral lymphocytes, indicating no proportional change in these subsets. The typical proportional change was observed in CD16+ natural killer (NK) cells and the percentage of CD16+ cells decreased during dark period (from 20:00 to 04:00) and increased in the morning (from 08:00 to 12:00). The NK activity determined by killing K562 target cells showed the same changing pattern as that of percentage in CD16+ NK cells. The changing pattern of both percentage and activity of NK cells was consistent with that of plasma cortisol levels. In addition, the intravenous injection of 300 µg/kg of cortisol induced increase in plasma cortisol levels and decrease in percentage of CD16+ NK cells during the first 60 min after cortisol injection. These results strongly suggest that the levels of peripheral functional CD16+ NK cells might be directly regulated by plasma cortisol level in macaque monkeys.

#### Animal Models

- Therapeutic dendritic-cell vaccine for simian AIDS. Lu, W., Wu, X., Guo, W., & Andrieu, J.-M. (Inst de

Recherche sur les Vaccins et l'Immunothérapie des Cancers et du Sida, Paris, France [e-mail: [louis.wei-lu@biomedicale.univ-paris5.fr](mailto:louis.wei-lu@biomedicale.univ-paris5.fr)]. *Nature Medicine*, 2003, 9, 27-32.

An effective immune response against human immunodeficiency virus or simian immunodeficiency virus (SIV) is critical in achieving control of viral replication. Here, it is shown in SIV-infected rhesus monkeys that an effective and durable SIV-specific cellular and humoral immunity is elicited by vaccination with chemically inactivated SIV-pulsed dendritic cells. After three immunizations made at two-week intervals, the animals exhibited a 50-fold decrease of SIV DNA and a 1,000-fold decrease of SIV RNA in peripheral blood. Such reduced viral load levels were maintained over the remaining 34 weeks of the study. Molecular and cellular analyses of axillary and inguinal node lymphocytes of vaccinated monkeys revealed a correlation between decreased SIV DNA and RNA levels and increased SIV-specific T-cell responses. Neutralizing antibody responses were augmented and remained elevated. Inactivated whole virus-pulsed dendritic cell vaccines are promising means to control diseases caused by immunodeficiency viruses.

- A simian replication-defective adenoviral recombinant vaccine to HIV-1 gag 1. Fitzgerald, J. C., Gao, G.-P., Reyes-Sandoval, A., Pavlakis, G. N., Xiang, Z. Q., Wlazlo, A. P., Giles-Davis, W., Wilson, J. M., & Ertl, H. C. J. [H. C. J. E., Wistar Institute, 36<sup>th</sup> St at Spruce, Philadelphia, PA 19104]. *Journal of Immunology*, 2003, 170, 1416-1422.

In animal models, E1-deleted human adenoviral recombinants of the serotype 5 (AdHu5) have shown high efficacy as vaccine carriers for different Ags including those of HIV-1. Humans are infected by common serotypes of human adenovirus such as AdHu5 early in life and a significant percentage has high levels of neutralizing Abs to these serotypes, which will very likely impair the efficacy of recombinant vaccines based on the homologous virus. To circumvent this problem, a novel replication-defective adenoviral vaccine carrier based on an E1-deleted recombinant of the chimpanzee adenovirus 68 (AdC68) was developed. An AdC68 construct expressing a codon-optimized, truncated form of gag of HIV-1 induces CD8<sup>+</sup> T cells to gag in mice which at the height of the immune response encompass nearly 20% of the entire splenic CD8<sup>+</sup> T cell population. The vaccine-induced immune response provides protection to challenge with a vaccinia gag recombinant virus. Induction of transgene-specific CD8<sup>+</sup> T cells and protection against viral challenge elicited by the AdC68 vaccines is not strongly inhibited in animals preimmune to AdHu5 virus. However, the response elicited by the AdHu5 vaccine is greatly attenuated in AdHu5 preimmune animals.

- Serotonin transporter gene polymorphism, differential early rearing, and behavior in rhesus monkey neonates.

Champoux, M., Bennett, A., Shannon, C., Higley, J. D., Lesch, K. P., & Suomi, S. J. (NICHD, Lab. of Comp. Ethology, NIH Animal Center, P.O. Box 529, Poolesville, MD 20837 [e-mail: [mc110e@nih.gov](mailto:mc110e@nih.gov)]). *Molecular Psychiatry*, 2002, 7, 1058-1063.

A polymorphism in the serotonin (5-HT) transporter gene regulatory region (5-HTTLPR) is associated with measures of 5-HT transporter (5-HTT) expression and 5-HT-mediated behaviors in humans. An analogous length variation of the 5-HTTLPR has been reported in rhesus monkeys (rh5-HTTLPR). A retrospective association study was conducted on 115 rhesus macaque infants either homozygous for the long 5HTTLPR variant (*l/l*) or heterozygous for the short and long form (*l/s*). To assess contributions of genotype and early rearing environment, 36 mother-reared monkeys (*l/l* =26, *l/s* =10) and 79 nursery-reared monkeys (*l/l* =54, *l/s* =25) were assessed on days 7, 14, 21, and 30 of life on a standardized primate neurobehavioral test designed to measure orienting, motor maturity, reflex functioning, and temperament. Both mother-reared and nursery-reared heterozygote animals demonstrated increased affective responding relative to *l/l* homozygotes. Nursery-reared, but not mother-reared, *l/s* infants exhibited lower orientation scores than their *l/l* counterparts. These results demonstrate the contributions of rearing environment and genetic background, and their interaction, in a nonhuman primate model of behavioral development.

- Prevention of virus transmission to macaque monkeys by a vaginally applied monoclonal antibody to HIV-1 gp120. Veazey, R. S., Shattock, R. J., Pope, M., Krijian, C., Jones, J., Hu, O., Ketas, T., Marx, P. A., Klasse, P. J., Burton, D. R., & Moore, J. P. (J. P. M., Dept of Microbiology & Immunology, Weill Med. College of Cornell Univ., New York, NY [e-mail: [jpm2003@med.cornell.edu](mailto:jpm2003@med.cornell.edu)]). *Nature Medicine*, 2003, 9, 343-346.

Vaginal administration of the broadly neutralizing human monoclonal antibody b12 can protect macaques from simian-human immunodeficiency virus (SHIV) infection through the vagina. Only 3 of 12 animals receiving 5 mg b12 vaginally in either saline or a gel and then challenged vaginally (up to 2 h later) with SHIV-162P4 became infected. In contrast, infection occurred in 12 of 13 animals given various control agents under similar conditions. Lower amounts of b12 were less effective, suggesting that protection was dose dependent. These observations support the concept that viral entry inhibitors can help prevent the sexual transmission of HIV-1 to humans.

#### Animal Welfare

- Self-injurious behavior in rhesus monkeys: New insights into its etiology, physiology, and treatment. Novak, M. A. (Dept of Psychology, Tobin Hall, Univ. of Massachusetts, Amherst, MA 01003-7710 [e-mail: [mno-vak@psych.umass.edu](mailto:mno-vak@psych.umass.edu)]). *American Journal of Primatology*

tology, 2003, 59, 3-19.

“Self-injurious behavior (SIB) is a significant human health problem frequently associated with profound intellectual disabilities, genetic diseases, and psychiatric conditions. However, it also occurs in subclinical populations and appears to be on the rise in adolescents and young adults. SIB is also seen in a small percentage of nonhuman primates that injure themselves through biting. We have begun to characterize SIB in rhesus monkeys to identify some of the risk factors associated with this disorder, and to determine the parallels with the human condition. In our study population, 14% of individually housed monkeys (the vast majority of which are males) have a veterinary record for self-inflicted wounding. Wounding is rare, but self-directed biting is common. SIB can be elicited during aggressive altercations and may be associated with husbandry events. Some monkeys appear to be more vulnerable to acquiring SIB. This increased vulnerability is associated with certain social experiences in the first 2 years of life and with exposure to a larger number of moderately stressful events as compared to controls. Monkeys with SIB also have a dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, indicated by a blunted cortisol response to mild stressors. Our findings suggest that SIB may be a coping strategy to reduce arousal. Biting appears to rapidly lower an escalating heart rate. The potentially reinforcing effects of SIB may account for the failure of some treatment regimens. These findings are compared to studies of SIB in humans, and concordances are identified.”

### Behavior

- Conflict and post-conflict behavior in a small group of chimpanzees. Fuentes, A., Malone, N., Sanz, C., Matheson, M., & Vaughan, L. (Dept of Anthropology, Notre Dame Univ., Notre Dame, IN 46556-5639 [e-mail: [anthro@nd.edu](mailto:anthro@nd.edu)]). *Primates*, 2002, 43, 223-235.

In an attempt to expand the database of chimpanzee conflict resolution, conflict and post-conflict behavior were recorded for a small group of socially housed chimpanzees at Central Washington University. Data were collected over six 6-week periods between 1997 and 2000, for a total of 840 hours of observation, resulting in a substantial post-conflict and matched control data set. The data demonstrate this group's tendencies to maintain visual contact and closer proximity after conflicts. Dyadic corrected conciliatory tendencies ranged between 0 and 37.5%; individual corrected conciliatory tendencies ranged between 5.8 and 32%, suggesting that variation in post-conflict behavior may be important to our understanding of chimpanzee conflict negotiation, and may have implications for the design and management of captive enclosures and social groups, respectively.

- Group decision-making in animals. Conradt, L., & Roper, T. J. (School of Biological Sciences, Univer-

sity of Sussex, Brighton BN1 9QG, U.K. [e-mail: [l.conradt@sussex.ac.uk](mailto:l.conradt@sussex.ac.uk)]). *Nature*, 2003, 421, 155-158.

“Groups of animals often need to make communal decisions, for example about which activities to perform, when to perform them, and which direction to travel in; however, little is known about how they do so. Here, we model the fitness consequences of two possible decision-making mechanisms: ‘despotism’ and ‘democracy’. We show that under most conditions, the costs to subordinate group members, and to the group as a whole, are considerably higher for despotic than for democratic decisions. Even when the despot is the most experienced group member, it only pays other members to accept its decision when group size is small and the difference in information is large. Democratic decisions are more beneficial primarily because they tend to produce less extreme decisions, rather than because each individual has an influence on the decision per se. Our model suggests that democracy should be widespread and makes quantitative, testable predictions about group decision-making in non-humans.”

- Response patterns of bonnet macaques following up to 75 weeks of continuous access to social-video and food rewards. Andrews, M. W., & Rosenblum, L. A. (Dept of Psychology, Southern Oregon Univ., 1250 Siskiyou Blvd, Ashland, OR 97520 [e-mail: [andrews@sou.edu](mailto:andrews@sou.edu)]). *American Journal of Primatology*, 2002, 57, 213-218.

Three individually housed bonnet macaque males were given 75 weeks of continuous access to a joystick task with a reward choice of either viewing a live color video of a bonnet group or obtaining a banana-flavored food treat. Data is reported here for weeks 44-75 following a change in the stimulus group displayed in the video. The new stimulus group enhanced responding to the video for two subjects over the entire 32 weeks of the study, although there was some decline across weeks, and the video continued to be an effective reward for the duration of the study for all subjects.

- Patterns and trends in primate pair bonds. Fuentes, A. (Dept. of Anthropology, Notre Dame Univ., Notre Dame, IN 46556-5639 [e-mail: [anthro@nd.edu](mailto:anthro@nd.edu)]). *International Journal of Primatology*, 2002, 23, 953-978.

“Pair-bonding may be a significant feature of the social repertoire of some primate species. However, discerning inter- and intraspecific pair bonds is problematic. I present an overview of the general behavior and ecology of species reported to occur in two-adult, pair-bonded groups. There is no two-adult grouped nonhuman primate species in Africa and only two types in Asia. Behavioral and ecological data suggest that the two-adult group or pair-bonding or both may have evolved separately 4-7 times. I propose that two pair-bond components – social pair bond and sexual pair bond – occur and can be defined and described in a manner that facilitates comparative analysis across primate taxa. The evolution of grouping patterns in many two-adult grouped primates may be best modeled via evolu-

tionary scenarios relying on direct dietary/energetic constraints, predation, and possibly mate-guarding. There is little support for the infanticide prevention and bodyguard hypotheses of female-choice models.”

- Aggression and reconciliation in *Cebus capucinus*. Leca, J.-B., Fornasieri, I., & Petit, O. (O. P., Equipe d’Ethol. et Ecol. Comport. des Primates, Centre d’Ecologie et Physiol. Energétiques, UPR CNRS 9010, Strasbourg, France [e-mail: [odile.petit@neurochem.u-strasbg.fr](mailto:odile.petit@neurochem.u-strasbg.fr)]). *International Journal of Primatology*, 2002, 23, 979-998.

Most data relating to aggressive and conciliatory behaviors are from Old World primates. Agonistic interactions and post-conflict behaviors in a group of 12 white-faced capuchins were recorded. After a conflict, the aggressor was followed as the focal individual during a 10-min postconflict period. Matched-control observations were also conducted on the same individual. Conflicts involving physical contact were significantly bidirectional, and conflicts without physical contact were preferably unidirectional. Reconciliation was not demonstrated at the group level. However, reconciliation occurred in kin and non-kin male/female dyads: their conciliatory tendencies were 48.1% and 21.2%, respectively. White-faced capuchins reconciled mainly during the first minutes after the end of the conflict. In kin and non-kin male/female dyads, selective attraction occurred, and aggressors were more likely to initiate affiliative contacts than aggresses. “Hold-bottom and mount” while emitting loud vocalizations were the most characteristic behaviors of reconciliation. Possible links may exist between aggressive and conciliatory patterns and other social variables.

- Tutoring in wild golden lion tamarins. Rapaport, L. G., & Ruiz-Miranda, C. R. (Dept of Anthropology, Univ. of New Mexico, Albuquerque, NM [e-mail: [lrapt@bellsouth.net](mailto:lrapt@bellsouth.net)]). *International Journal of Primatology*, 2002, 23, 1063-1070.

Among most nonhuman primates, juveniles must acquire most of their solid food independently. Information gleaned from adults results from efforts initiated by the juveniles. Donation of food or foraging information by adults to immatures is rare among apes and virtually unknown among monkeys. This report is of three observations in which wild adult golden lion tamarins appear to have directed their immature offspring to a location where a hidden prey item was located. According to the definition of Caro and Hauser (1992), the tamarins were tutoring their young.

- Vocal production by a language-competent *Pan paniscus*. Tagliabue, J. P., Savage-Rumbaugh, S., & Baker, L. A. (Language Research Center, Georgia State Univ., 3401 Panthersville Rd, Decatur, GA 30034 [e-mail: [jared@gsu.edu](mailto:jared@gsu.edu)]). *International Journal of Primatology*, 2003, 24, 1-17.

“Human spoken language and nonhuman primate vo-

calization systems have traditionally been regarded as qualitatively different from one another with respect to their semanticity and the way in which individuals acquire and utilize these signals. However, recent studies of the vocal behaviors of both captive and free-ranging monkeys and apes suggest that this dichotomy may not be unequivocal. We examined the vocalizations produced by a linguistically-competent adult male bonobo named Kanzi. We analyzed his vocalizations during communicative interactions with humans in order to determine whether they vary systematically according to the semantic context in which they are produced. We determined semantic contexts based upon a vocalization’s co-occurrence with predefined behavioral correlates. Spectrographic and statistical analyses revealed that acoustic structure is similar among the vocalizations that occurred within a specific semantic context and structural differences are evident between the vocalizations produced in different contexts. The results provide evidence that, during communicative interactions with humans, Kanzi modulates his vocal output on both the temporal and spectral levels.”

- Do capuchin monkeys, *Cebus apella*, know what conspecifics do and do not see? Hare, B., Addessi, E., Call, J., Tomasello, M., & Visalberghi, E. (Dept of Anthropology, Harvard Univ., 11 Divinity Ave, Cambridge, MA 02138 [e-mail: [bhare@fas.harvard.edu](mailto:bhare@fas.harvard.edu)]). *Animal Behaviour*, 2003, 65, 131-142.

“Capuchin monkeys were tested in five experiments in which two individuals competed over food. When given a choice between retrieving a piece of food that was visible or hidden from the dominant animal, subordinate animals preferred to retrieve hidden food. This preference is consistent with the hypotheses that either (1) the subordinate knew what the dominant could and could not see or (2) the subordinate was monitoring the behaviour of the dominant and avoiding the piece of food that it approached. To test between these alternatives, we released subordinates with a slight head start forcing them to make their choice (between a piece of food hidden or visible to the dominant) before the dominant entered the area. Unlike chimpanzees, subordinates that were given a head start did not preferentially approach hidden pieces of food first. Therefore, our experiments provide little support for the hypothesis that capuchin monkeys are sensitive to what another individual does or does not see. We compare our results with those obtained with chimpanzees in the same paradigm and discuss the evolution of primate social cognition.”

- Serial expertise of rhesus macaques. Terrace, H. S., Son, L. K., & Brannon, E. M. (Columbia Univ. Psychology Dept, 418 Schermerhorn Hall, New York, NY 10027 [e-mail: [terrace@columbia.edu](mailto:terrace@columbia.edu)]). *Psychological Science*, 2003, 14, 66-73.

The development of serial expertise in four experimentally naive rhesus monkeys that learned, by trial and error, the correct order in which to respond to 3-, 4-, and 7-item

lists of arbitrarily selected photographs is described. The probabilities of guessing the correct sequence on 3-, 4-, and 7-item lists were, respectively, 1/6, 1/24, and 1/5,040. Each monkey became progressively more efficient at determining the correct order in which to respond on new lists. During subsequent testing, the subjects were presented with all possible pairs of the 28 items used to construct the four 7-item lists (excluding pairs of items that occupied the same ordinal position in different lists). Subjects responded to pairs from different lists in the correct order 91% of the time on the first trials on which these pairs were presented. These features of subjects' performance, which cannot be attributed to procedural memory, satisfy two criteria of declarative memory: rapid acquisition of new knowledge and flexible application of existing knowledge to a new problem.

### Care

- Tool use task as environmental enrichment for captive chimpanzees. Celli, M. L., Tomonaga, M., Udono, T., Teramoto, M., & Nagano, K. (Primate Research Institute, Kyoto Univ., Inuyama, Aichi 484-8506, Japan [e-mail: malu@pri.Kyoto-u.ac.jp]). *Applied Animal Behaviour Science*, 2003, 81, 171-182.

Wild chimpanzees spend 50-80% of their time foraging, using tools and other forms of manipulation, while captive chimpanzees cannot. In this study, a device – honey in a bottle to be “fished” with artificial materials – that elicits tool use was presented to six captive chimpanzees housed in pairs. The task successfully reduced inactivity by about 52%, increased foraging opportunity from 0 to around 31%, and elicited tool use and manipulation. Dominants, who had more access to the device, showed significantly more behavioral changes than subordinates. There was no statistical evidence of habituation to the device, though there was evidence of habituation to the materials. The task effectively extended the subjects' behavioral repertoire in the direction of that of wild chimpanzees.

- Factors predicting increased incidence of abnormal behavior in male pigtailed macaques. Bellanca, R. U., & Crockett, C. M. (C. M. C., NPRC, Box 357330, University of Washington, Seattle, WA 98195-7330 [e-mail: crockett@u.washington.edu]). *American Journal of Primatology*, 2002, 58, 57-69.

“To identify factors predicting abnormal behavior in laboratory monkeys, we observed all available singly housed 4- to 11-year-old male pigtailed macaques (*Macaca nemestrina*), the species/age/sex group most likely to be referred to the Washington National Primate Research Center's Psychological Well-Being Program for behavioral assessment. Of the 87 subjects, 29 had been referred to the program; 58 had not. Abnormal behavior was unrelated to the subject's housing location (biocontainment vs. other facility) or invasiveness of research. Nursery-reared sub-

jects displayed more abnormal behavior than mother-reared subjects. Across and within rearing categories, the proportion of the first 48 months of life spent singly housed was positively related to the amount of abnormal behavior at maturity. This effect was stronger for subjects separated from the mother for clinical rather than experimental reasons, and least for mother-reared subjects. Locomotor stereotypy, the most frequent form of abnormal behavior, was positively related to time in single housing but was unrelated to rearing. These results reinforce the importance of tactile social contact during juvenility for the prevention of abnormal behavior in social primates. They also suggest that self-directed abnormal behaviors and locomotor stereotypies have different etiologies.”

### Conservation

- Threatened primates experience high human densities: Adding an index of threat to the IUCN Red List criteria. Harcourt, A. H., & Parks, S. A. (Dept of Anthropology, University of California, One Shields Ave, Davis, CA 95616). *Biological Conservation*, 2003, 109, 137-149.

IUCN Red List conservation status is apparently judged mainly by assessment of species' susceptibility to threat. However, risk must often depend also on the threat itself. Therefore, we investigate the value of adding to IUCN's current criteria a separate index of threat, human density. Human density in the geographic range of Threatened primate species is significantly higher than in the range of Lower Risk species. Thus, Threatened species are both susceptible, and experience more threat. However, the match is far from perfect. Given abundant other evidence of adverse effects of high human density, the mismatch emphasizes the potential benefit of adding an index of threat to the current criteria. A main advantage might be improved assessment, given the amount of up-to-date data on threats compared with the paucity on reactions to threat. The simplest means of incorporation might be to increase the status of species that experience higher than a certain threshold human density.

- Survey of savanna chimpanzees (*Pan troglodytes verus*) in southeastern Sénégal. Pruetz, J. D., Marchant, L. F., Arno, J., & McGrew, W. C. (Dept of Anthropology, 324 Curtiss Hall, Iowa State Univ., Ames, IA 50011. *American Journal of Primatology*, 2002, 58, 35-43.

A survey of the western subspecies of chimpanzee was conducted from February 1 to April 9, 2000. The Assirik area of the Parc National du Niokolo Koba and areas south and east of the park were surveyed. The purpose was to initiate long-term research of chimpanzees in southeastern Sénégal, as a follow-up to the Stirling African Primate Project (SAPP) of the 1970s. Standards set by the SAPP project were replicated, except when technological innovations (e.g., the global positioning system) allowed improvement in data collection procedures.



- Population of the black howler monkey (*Alouatta pigra*) in a fragmented landscape in Palenque, Chiapas, Mexico. Estrada, A., Mendoza, A., Castellanos, L., Pacheco, R., van Belle, S., García, Y., & Muñoz, D. (Apto Postal 176, San Andrés Tuxtla, Veracruz, México [e-mail: [astrada@primatesmx.com](mailto:astrada@primatesmx.com)]). *American Journal of Primatology*, 2002, 58, 45-55.

Data is presented on forest loss and on troop size, age, and sex composition for a population of black howlers existing in the fragmented landscape surrounding a Mayan site. Two aerial photos (1:70,000) of the study area (261 km<sup>2</sup>) taken in 1984 and 2001 were examined to assess forest loss. Between June and December, 2001, and January and March, 2002, 44 forest fragments were surveyed for the presence of howlers. The aerial photos showed that 33% of the forest present in 1984 had disappeared by 2001, and also showed an increased number of forest fragments present in the landscape. A total of 115 howlers were found in 22 of the 44 forest fragments studied, of which 107 were members of 18 troops. The rest were solitary males or small groups of males living in isolated forest fragments. Troop size ranged from 2 to 15 individuals (mean 5.9±3.0). 31% and 15% of individuals in the troops were juveniles and infants, respectively, suggesting continued reproductive activity. Howler troops in the forest fragments were on average smaller (5.9±3.0) than troops in the nearby protected forest of the Mayan site (7.0±2.8). The mean density of howlers in the forest fragments was 119 (±82.9) per km<sup>2</sup>. Establishment of corridors is suggested as a possible means for conservation of the population investigated, and to connect this population with the howler population found in the protected forest of the Mayan site.

- Extinction of snub-nosed monkeys in China during the past 400 years. Li, B., Pan, R., & Oxnard, C. E. (R. P., Dept of Anatomy & Human Biol., Univ. of Western Australia, Perth, Western Australia, Australia [e-mail: [pruliang@anhb.uwa.edu.au](mailto:pruliang@anhb.uwa.edu.au)]). *International Journal of Primatology*, 2002, 23, 1227-1244.

The historical change in distribution of snub-nosed monkeys (*Rhinopithecus*), a genus which includes 3 of the 4 endemic primate species in China, from the Qing Dynasty (1616) to 2001. The monkeys were once widely distributed in south, southwest, and central China, and in two provinces in northwest China. Unfortunately, most of their populations in the plains and in some mountainous regions have vanished. Today, extant groups occur only in isolated mountainous regions with an altitude ≤4,500 m above sea level. The dramatic diminution is closely related to social and natural events which occurred in China during the last 400 years: • the rapidly increasing density of human beings, especially during the twentieth century; • wars, especially in the first half of the 20th century; • deteriorating environments and accelerated deforestation; and • hunting monkeys for food, medicine, and trade.

- Census and distribution of the golden lion tamarin (*Leontopithecus rosalia*). Kierulff, M. C. M., & Rylands, A. B. (Conservation International do Brasil, c/o Inst. de Estudos Sócio-ambientais do Sul da Bahia (IESB), Rua Major Homem Del Rey 147, Cidade Nova, 45650-000 Ilhéus, Bahia, Brazil [e-mail: [c.kierulff@conservation.org.br](mailto:c.kierulff@conservation.org.br)]). *American Journal of Primatology*, 2003, 59, 29-44.

During 1990-1992, a survey of the golden lion tamarin was carried out throughout its known distribution area. Forest remnants were identified by visual interpretation of Landsat-TM satellite images. Localities occupied by *L. rosalia* were first identified by interviews with local people. All forests more than 20 ha in size, and for which two or more interviews suggested the presence of the species, were surveyed using play-back recordings of lion tamarin long calls. The total wild population of *L. rosalia*, including that of the Poço das Antas Biological Reserve, was estimated to be 562 individuals in 109 groups. The lion tamarins were generally found in four major areas of forest (six or more groups per forest, not including Poço das Antas), with a further 12 groups isolated in small forest patches. Currently the species' distribution is restricted to just four municipalities in the state of Rio de Janeiro: Silva Jardim, Cabo Frio, Saquarema, and Araruama. Although they are typically confined to lowland forest of < 300 m altitude, *L. rosalia* was recorded at an altitude of 550 m in one locality. Average group size varied from 3.6 to 5.7 individuals, and densities from 0.39 groups/km<sup>2</sup> to 2.35 groups/km<sup>2</sup> (2.17 individuals/km<sup>2</sup> to 8.53 individuals/km<sup>2</sup>). Six of the isolated groups found during the survey were successfully translocated to a forest of 2,400 ha. There is now also a significant population of reintroduced lion tamarins. Overall, however, the possibilities for further expansion of the wild population are severely limited.

- Pan-African Sanctuary Alliance: Status and range of activities for great ape conservation. Farmer, K. H. (Dept of Psychology, Univ. of Stirling, Stirling FK9 4LA, Scotland, U.K. [e-mail: [k.h.farmer@stir.ac.uk](mailto:k.h.farmer@stir.ac.uk)]). *American Journal of Primatology*, 2002, 58, 117-132.

While wild populations continue to decrease, the number of orphaned primates, sanctuaries, and attempts to reintroduce primates back to the natural environment are increasing. An umbrella organization called the Pan-African Sanctuary Alliance (PASA) was formed in 2000, and recently the IUCN Reintroduction Specialist Group developed a set of specific policy guidelines for primates (2002). Data presented in this report are based upon questionnaire responses by managers from 17 African facilities that have become members of PASA (membership in PASA is defined by attendance at an annual PASA workshop). These PASA facilities house over 500 great apes. (There may be other facilities not represented here simply because their managers did not attend a PASA workshop.) The majority of the apes arrived at the sanctuaries when they were less than 4 years old and half had been confiscated. Over 40%

were found awaiting sale, and 30% had been previously kept as pets. Common ailments upon arrival included internal parasites, behavioral abnormalities, and malnutrition; 20% of the total sanctuary population died prematurely. Most sanctuaries use a combination of enclosures surrounded by electric fencing and cages to accommodate the apes. Sanctuaries actively participate in conservation education, habitat protection, tourism, scientific data collection, local development, and reintroduction. The median total facility operating cost was US\$65,000 per annum. The median facility cost per ape was US\$2,222 per annum. Most funding comes from overseas nongovernmental agencies. Discussion focuses on evaluating the present status of sanctuaries, the problems facing them, and their potential role in African conservation issues.

### Development and Aging

- Developmental changes in responsiveness to parents and unfamiliar adults in a monogamous monkey (*Callicebus moloch*). Mayeaux, D. J., Mason, W. A., & Mendoza, S. P. (Dept of Psychology, Uris Hall, Cornell Univ., Ithaca, NY 14853 [e-mail: [djm36@cornell.edu](mailto:djm36@cornell.edu)]). *American Journal of Primatology*, 2002, 58, 71-89.

Titi monkeys are monogamous New World primates, characteristically found in family-type groups consisting of a mated adult pair and one or two young. The factors maintaining the small size of these groups are not known. Based on observations of free-ranging and captive families, parental aggression toward older offspring seems unlikely to play a significant role. Maturing individuals themselves, however, could undergo behavioral changes that weaken ties to their natal group. These might include waning of affiliative relations with parents, or subtle forms of aversion. Independent of such changes, increasing interest in unfamiliar conspecifics could be a factor. The present study examines these possibilities by assessing changes in social behavior and social preferences from initial ambulatory independence (6 months) through reproductive maturity (24 months) in a combined cross-sectional/longitudinal study of 21 captive titi monkeys living with their parents. Responses to both parents and to an unfamiliar adult heterosexual pair, a single unfamiliar adult male, and a single unfamiliar adult female were observed when subjects were given a choice between parents and strangers presented simultaneously or as the only social incentive. Social stimuli were at opposite ends of a 16.8 m-long test corridor. Subjects could move freely about the corridor for 5 min with each configuration of social stimuli. They stayed closer to parents than to strangers at all ages. Responsiveness to strangers increased with age and suggested growing ambivalence, particularly toward the male stranger. As they approached 24 months of age, male subjects showed a dramatic increase in the frequency and intensity of agonistic behaviors toward male strangers, behaviors that were rarely directed toward female strangers or parents. Waning

of attraction to parents may be less important in dispersal from the natal group than changing reactions to strangers.

### Disease

- Chronological and spatial analysis of the 1996 Ebola Reston virus outbreak in a monkey breeding facility in the Philippines. Miranda, M. E., Yoshikawa, Y., Manalo, D. L., Calaor, A. B., Miranda, N. L., Cho, F., Ikegami, T., & Ksiazek, T. G. (Vet. Research Dept, Research Inst. for Tropical Medicine, Alabang, Muntinlupa City, 1770 Philippines). *Experimental Animals*, 2002, 51, 173-179.

To describe the transmission pattern of natural infection with Ebola Reston (EBO-R) virus in a breeding colony, a chronological and spatial analysis of mortality during the 1996 EBO-R virus outbreak was done. The EBO-R virus infection among monkeys in the facility was widespread. Over a period of three months, 14 of 21 occupied units were contaminated with antigen positive animals. A large number of wild-caught monkeys were involved in this outbreak, suggesting that wild-caught monkeys have a high susceptibility to the infection. In this outbreak, morbidity patterns for individual animal units were very different regardless of the type and size of cages, individual or gang cages. The results suggest that not only the cage size but also poor animal husbandry practices may be risk factors for the spread of EBO-R infection.

- Covalent modifications of the Ebola virus glycoprotein. Jeffers, S. A., Sanders, D. A., & Sanchez, A. (D. A. S, Department of Biological Sciences, 1392 Lilly Hall, Purdue University, West Lafayette, IN 47907 [e-mail: [retrovir@bragg.bio.purdue.edu](mailto:retrovir@bragg.bio.purdue.edu)]). *Journal of Virology*, 2002, 76, 12463-12472.

“The role of covalent modifications of the Ebola virus glycoprotein (GP) and the significance of the sequence identity between filovirus and avian retrovirus GPs were investigated through biochemical and functional analyses of mutant GPs. The expression and processing of mutant GPs with altered N-linked glycosylation, substitutions for conserved cysteine residues, or a deletion in the region of O-linked glycosylation were analyzed, and virus entry capacities were assayed through the use of pseudotyped retroviruses. Cys-53 was the only GP1 (130 kDa) cysteine residue the replacement of which resulted in the efficient secretion of GP1, and it is therefore proposed that it participates in the formation of the only disulfide bond linking GP1 to GP2 (24 kDa). We propose a complete cystine bridge map for the filovirus GPs based upon our analysis of mutant Ebola virus GPs. The effect of replacement of the conserved cysteines in the membrane-spanning region of GP2 was found to depend on the nature of the substitution. Mutations in conserved N-linked glycosylation sites proved generally, with a few exceptions, innocuous. Deletion of the O-linked glycosylation region increased GP processing, incorporation into retrovirus particles, and viral transduction. Our data support a common evolutionary

origin for the GPs of Ebola virus and avian retroviruses and have implications for gene transfer mediated by Ebola virus GP-pseudotyped retroviruses.”

- Partial molecular characterization of two simian immunodeficiency viruses (SIV) from African colobids: SIVwrc from western red colobus (*Piliocolobus badius*) and SIVolc from olive colobus (*Procolobus verus*). Cournaud, V., Formenty, P., Akoua-Koffi, C., Noe, R., Boesch, C., Delaporte, E., & Peeters, M. (M. P., Laboratoire Retrovirus, UR36, IRD, 911 Ave. Agropolis, BP 64501, 34394 Montpellier cedex 5, France. [e-mail: [martine.peeters@mpl.ird.fr](mailto:martine.peeters@mpl.ird.fr)]). *Journal of Virology*, 2003, 77, 744-748.

“In order to study primate lentivirus evolution in the Colobinae subfamily, in which only one simian immunodeficiency virus (SIV) has been described to date, we screened additional species from the three different genera of African colobus monkeys for SIV infection. Blood was obtained from 13 West African colobids, and HIV cross-reactive antibodies were observed in 5 of 10 *Piliocolobus badius*, 1 of 2 *Procolobus verus*, and 0 of 1 *Colobus polykomos* specimens. Phylogenetic analyses of partial *pol* sequences revealed that the new SIVs were more closely related to each other than to the other SIVs and especially did not cluster with the previously described SIVcol from *Colobus guereza*. This study presents evidence that the three genera of African colobus monkeys are naturally infected with an SIV and indicates also that there was no coevolution between virus and hosts at the level of the Colobinae subfamily.”

- Bone and joint disorders in wild Japanese macaques from Nagano Prefecture, Japan. Nakai, M. (Primate Research Institute, Kyoto Univ., Kanrin, Inuyama, Aichi, 484-8506, Japan [e-mail: [nakai@pri.kyoto-u.ac.jp](mailto:nakai@pri.kyoto-u.ac.jp)]). *International Journal of Primatology*, 2003, 24, 179-195.

Bone and joint disorders in wild Japanese macaques (*Macaca fuscata fuscata*) were studied to discern some aspects of their life history from the skeletal material. The specimens comprise 107 nearly complete skeletons of subadults and adults that were killed as crop-raiders between 1997 and 1998 in Nagano Prefecture. The most frequent disorder is angular deformity due to fractures: 80 healed fractures in 31 of 52 males and 71 healed fractures in 26 of 55 females. Secondary osteoarthritis due to fractures is rare. Two males had *osteochondritis dissecans* bilaterally on the posterior surface of the lateral femoral condyles. Degenerative changes are common in the aged individuals. Fractures of the trunk—clavicle, scapula, vertebrae, ribs or hip—are frequent in males, while the majority of fractures in females are in the hands and feet. While most fractures in males appear to have occurred during adulthood, those in females occurred during childhood and senescence. Inter-individual violence should not be regarded as a principal cause for fractures in males and females because there were no bite wounds, except perhaps one case of an

amputated digit. Fractures of the trunk in males were probably caused by impact forces against their shoulders or hips or both, caused by rolling down a steep slope or falling out of trees, perhaps during intertroop transfers.

- Medical survey of the local human population to determine possible health risks to the mountain gorillas of Bwindi Impenetrable Forest National Park, Uganda. Guerrero, W., Sleeman, J. M., Jasper, S. B., Pace, L. B., Ichinose, T. Y., & Reif, J. S. (2600 West 134<sup>th</sup> Circle, Bloomfield, CO [e-mail: [bill-the-vet@excite.com](mailto:bill-the-vet@excite.com)]). *International Journal of Primatology*, 2003, 24, 197-207.

“There has been increasing contact between mountain gorillas (*Gorilla gorilla beringei*) and the human population surrounding Bwindi Impenetrable Forest National Park (BIFNP) in Uganda. Due to the close taxonomic relationship between humans and gorillas there is potential for disease transmission between them. Preventing the introduction or spread of transmissible diseases to the gorillas is essential to protect them. We interviewed 301 villagers living in close proximity to BIFNP with a medical questionnaire in July, 2000. We collected information on demographics, vaccination and health history, and human/gorilla interaction in order to estimate the prevalence of several diseases in the human population and to evaluate the risk of anthrozoönotic transmission from humans to gorillas. We found a high prevalence of disease symptoms such as coughing (72.1%) and fever (56.1%) compatible with acute infectious diseases; over half of the respondents (59.1%) had a specific disease diagnosis within the 6 mo. preceding the study. We compared villagers who had visual contact with gorillas in the 6 mo. preceding the study (53.5%) to villagers who had no visual contact (46.5%). Men were 2.3 times more likely than women to have visual contact with gorillas. In general, the frequency of disease history and symptoms was similar for people with and without contact. The high prevalence of acute infectious diseases in the population surrounding BIFNP and the high rate of contact with gorillas creates the potential for anthrozoönotic disease transmission.”

- Comparative efficacy of a canine distemper-measles and a standard measles vaccine for immunization of rhesus macaques (*Macaca mulatta*). Christie, K. L., McChesney, M. B., Spinner, A., Rosenthal, A. N., Allen, P. C., Valverde, C. R., Roberts, J. A., & Lerche, N. W. (California RPRC, One Shields Ave, Davis, CA 95616-8542). *Comparative Medicine*, 2002, 52, 467-472.

Measles virus (MV), a highly infective paramyxovirus, has caused sporadic epizootics characterized by high morbidity and increased mortality in nonhuman primates. Measles vaccines for human use, although effective, are cost prohibitive for use in primate colonies. We compared the efficacy of one or two doses of Vanguard D-M, a canine distemper-measles (CD-M) vaccine, with a single dose of Attenuvax, a human measles vaccine. Compared with 81% of animals inoculated with Attenuvax, all ani-

mals inoculated with one or two doses of Vanguard developed detectable MV antibodies. One year after immunization, six juveniles from each vaccine group, along with three unvaccinated controls, were challenged with pathogenic MV and were monitored for clinical signs of disease, viremia, viral shedding, and immune response. All uninoculated controls developed clinical disease and viremia, and shed virus in nasopharyngeal secretions. Sub-clinical viremia without viral shedding was identified in two Attenuvax- and two single-dose Vanguard-inoculated animals. Viremia was not detected in any two-dose Vanguard-inoculated animals. Significantly higher neutralization antibody titers were observed in animals receiving Vanguard. Results of this study indicate that Vanguard is at least as efficacious as Attenuvax for protection of rhesus macaques. The considerably lower cost of Vanguard makes vaccination against measles in large breeding colonies economically feasible.

### Evolution, Genetics, and Taxonomy

- Extracting 3D from motion: Differences in human and monkey intraparietal cortex. Vanduffel, W., Fize, D., Peuskens, H., Denys, K., Snaert, S., Todd, J. T., & Orban, G. A. (Lab. voor Neuro- en Psychofysiologie, Katholieke Univ. Leuven, Campus Gasthuisberg, Herestraat 49, Leuven B-3000, Belgium [e-mail: [wim.vanduffel@med.kulcuven.ac.be](mailto:wim.vanduffel@med.kulcuven.ac.be)]). *Science*, 2002, 298, 413-415.

“We compared three-dimensional structure-from-motion (3D-SFM) processing in awake monkeys and humans using functional magnetic resonance imaging. Occipital and midlevel extrastriate visual areas showed similar activation by 3D-SFM stimuli in both species. In contrast, intraparietal areas showed significant 3D-SFM activation in humans but not in monkeys. This suggests that human intraparietal cortex contains visuospatial processing areas that are not present in monkeys.”

- Grasping primate origins. Bloch, J. I., & Boyer, D. M. (Museum of Paleontology, Univ. of Michigan, 1109 Geddes Rd, Ann Arbor, MI 48109-1079 [e-mail: [carpo@umich.edu](mailto:carpo@umich.edu)]). *Science*, 2002, 298, 1606-1610.

“The evolutionary history that led to Eocene-and-later primates of modern aspect (Euprimates) has been uncertain. We describe a skeleton of Paleocene plesiadapiform *Carpolestes simpsoni* that includes most of the skull and many postcranial bones. Phylogenetic analyses indicate that Carpolestidae are closely related to Euprimates. *C. simpsoni* had long fingers and an opposable hallux with a nail. It lacked orbital convergence and an ankle specialized for leaping. We infer that the ancestor of Euprimates was primitively an arboreal grasper adapted for terminal branch feeding rather than a specialized leaper or visually directed predator.”

- Orangutan cultures and the evolution of material culture. Van Schaik, C. P., Ancrenaz, M., Borgen, G., Galdikas, B.,

Knott, C. D., Singleton, I., Suzuki, A., Utami, S. S., & Merrill, M. (Dept of Biological Anthropology & Anatomy, Duke Univ., P. O. Box 90383, Durham, NC 27708 [e-mail: [vschaik@duke.edu](mailto:vschaik@duke.edu)]). *Science*, 2003, 299, 102-105.

“Geographic variation in some aspects of chimpanzee behavior has been interpreted as evidence for culture. Here we document similar geographic variation in orangutan behaviors. Moreover, as expected under a cultural interpretation, we find a correlation between geographic distance and cultural difference, a correlation between the abundance of opportunities for social learning and the size of the local cultural repertoire, and no effect of habitat on the content of culture. Hence, great-ape cultures exist, and may have done so for at least 14 million years.”

- Late Pliocene *Homo* and hominid land use from western Olduvai Gorge, Tanzania. Blumenshine, R. J., Peters, C. R., Masao, F. T., Clarke, R. J., Deino, A. L., Hay, R. L., Swisher, C. C., Stanistreet, I. G., Ashley, G. M., McHenry, L. J., Sikes, N. E., van der Merwe, N. J., Tactikos, J. C., Cushing, A. E., Deocampo, D. M., Njau, J. K., & Ebert, J. I. (Ctr for Human Evolutionary Studies, Dept of Anthropology, 131 George St, Rutgers University, New Brunswick, NJ 08901-1414 [e-mail: [rjb@rci.rutgers.edu](mailto:rjb@rci.rutgers.edu)]). *Science*, 2003, 299, 1217-1221.

Excavation in the previously little-explored western portion of Olduvai Gorge indicates that hominid land use of the eastern paleobasin extended at least episodically to the west. Finds included a dentally complete *Homo* maxilla (OH 65) with lower face, Oldowan stone artifacts, and butchery-marked bones dated to be between 1.84 and 1.79 million years old. The hominid shows strong affinities to the KNM ER 1470 cranium from Kenya (*Homo rudolfensis*), a morphotype previously unrecognized at Olduvai. ER 1470 and OH 65 can be accommodated in the *H. habilis* holotype, casting doubt on *H. rudolfensis* as a biologically valid taxon.

- Mitochondrial COII gene sequences provide new insights into the phylogeny of marmoset species groups (Callitrichidae, Primates). Sena, L., Vallinoto, M., Sampaio, I., Schneider, H., Ferrari, S. F., & Schneider, M. P. C. (Depto de Genética, Univ. Federal do Pará, Caixa Postal 8607 BR-66075-900, Belém, Pará, Brazil [e-mail: [sena@interconnect.com.br](mailto:sena@interconnect.com.br)]). *Folia Primatologica*, 2002, 73, 240-251.

Mitochondrial cytochrome oxidase II (COII) gene sequences (549 base pairs) were used to investigate the taxonomic relationships among 12 marmoset (*Callithrix*, *Cebuella* and *Mico*) taxa. A large number of substitutions were found in the third base codon positions, providing a strong phylogenetic signal in a gene coding a conserved protein. Despite the significant affinity between the two Amazonian genera *Cebuella* and *Mico*, found in recent molecular studies, the analysis presented here did not resolve convincingly the phylogenetic relationships between the three genera. *Mico* nevertheless formed three distinct

clades, reflecting a basic division of species groups based on geographic distribution (east or west of the Rio Tapajós) rather than morphology (presence or absence of auricular hair). This supports the taxonomic distinction of the allopatric *emiliae* forms. In *Callithrix*, *Callithrix aurita* forms a distinct clade, but the remaining morphotypes form a somewhat contradictory cluster, possibly resulting from an extremely rapid radiation.

- Phylogenetic shadowing of primate sequences to find functional regions of the human genome. Boffelli, D., McAuliffe, J., Ovcharenko, D., Lewis, K. D., Ovcharenko, I., Pachter, L., & Rubin, E. M. (E. M. R., U.S. Dept of Energy Joint Genome Inst., Walnut Creek, CA 94598 [e-mail: [emrubin@lbl.gov](mailto:emrubin@lbl.gov)]). *Science*, 2003, 299, 1391-1394.

Nonhuman primates represent the most relevant model organisms to understand the biology of *Homo sapiens*. The recent divergence and associated overall sequence conservation between individual members of this taxon have nonetheless largely precluded the use of primates in comparative sequence studies. Sequence comparisons of an extensive set of Old World and New World monkeys and hominoids were used to identify functional regions in the human genome. Analysis of these data enabled the discovery of primate-specific gene regulatory elements and the demarcation of the exons of multiple genes. Much of the information content of the comprehensive primate sequence comparisons could be captured with a small subset of phylogenetically close primates. These results demonstrate the utility of intraprimate sequence comparisons to discover common mammalian as well as primate-specific functional elements in the human genome, which are unattainable through the evaluation of more evolutionarily distant species.

### Instruments and Techniques

- Personality research with non-human primates: Theoretical formulation and methods. Kosuke, I. (Dept of Integrated Neurosci., Brain Research Inst., Univ. of Niigata, Asahimachi-Dori, 1-757, Niigata 951-8585, Japan [e-mail: [itoh@bri.niigata-u.ac.jp](mailto:itoh@bri.niigata-u.ac.jp)]). *Primates*, 2002, 43, 249-261.

Since the earliest primatology studies, researchers have been aware of animals' consistent individual differences in behavior or personality. Many papers have been published on this subject, but they lacked a common theoretical and methodological background. The present work provides a theoretical framework and methodological suggestions for nonhuman primate personality research.

- Sequential culture medium promotes the in vitro development of *Macaca fascicularis* embryos to blastocysts. Curnow, E. C., Pawitri, D., & Hayes, E. S. (E. S. H., Washington RPRC, U. of Washington, Box 357331, Seattle, WA 98119 [e-mail: [hayes@bart.rprc.washington.edu](mailto:hayes@bart.rprc.washington.edu)]). *American Journal of Primatology*, 2002, 57, 203-212.

In vitro production of blastocyst stage embryos from *Macaca fascicularis* (*Mf*) has not previously been demonstrated without cell support. A large proportion of *Mf* embryos arrest at the morula stage in nonsequential culture medium (NSM), lacking serum supplementation and/or cell support. *Mf* embryos produced by in vitro fertilization were subjected to in vitro culture in either a commercial sequential embryo culture medium (SM) or an NSM. After 7-9 days of in vitro culture, embryo development to the blastocyst stage and embryo degeneration were significantly lower and higher, respectively, in NSM compared to SM.

- Comparison of slow- and rapid-cooling protocols for early-cleavage-stage *Macaca fascicularis* embryos. Curnow, E. C., Kuleshova, L. L., Shaw, J. M., & Hayes, E. S. (E. S. H., address same as above). *American Journal of Primatology*, 2002, 58, 169-174.

Cryostorage of nonhuman primate embryos by time-consuming slow-cooling methods is often limited to early cleavage stages. Effective rapid-cooling methods have been developed for many species and represent valuable tools for laboratory- and field-based studies of nonhuman primate reproductive biology. However, few rapid-cooling protocols have been applied to nonhuman primate embryos in terms of comparing various developmental stages. Here slow cooling vs. two- and three-step rapid cooling of two-, four-, and eight-cell *M. fascicularis* (*Mf*) embryos are compared. Rapid cooling was conducted in open pulled straws (OPS) using cooling solutions containing reduced quantities of ethylene glycol (EG) and supplemented with either of two high-molecular-weight polymers, ficoll and dextran. The survival of the slow-cooled embryos, but not the rapid-cooled embryos, was independent of embryonic stage at cryostorage. Slow cooling was associated with greater cell survival (82%) post thaw compared to warming following rapid cooling (18-29%). Slow cooling resulted in a high proportion of embryo survival (18/20; 90%) and cleavage (15/18; 83%) post thaw. Rapid cooling resulted in significantly reduced percentages of embryo survival (26-32%) and embryo cleavage in culture (29-38%) after warming. Conventional slow cooling was more effective than the rapid-cooling protocols employed in this study for cryopreservation of early-cleavage-stage *Mf* embryos.

- Markovian models for the developmental study of social behavior. Berchtold, A., & Sackett, G. (G. S. Univ. of Washington, Dept of Psychology, Box 357330, Seattle, WA 98195 [e-mail: [jsackett@bart.rprc.washington.edu](mailto:jsackett@bart.rprc.washington.edu)]). *American Journal of Primatology*, 2002, 58, 149-167.

Behavioral development involves changes in the probabilities of both social and nonsocial activities and the sequential pattern of activities over time. A number of methods have been offered for the analysis of these patterns of behavioral sequences. However, there continue to be problematic issues, including the analysis of nonstationary data; accommodation of changes in patterns within an

observation period, or over repeated observations or age; and identification of differences in pattern changes between individuals or groups, and the factors responsible for these differences. In this work, data are analyzed from 15 young monkeys (*Macaca nemestrina*) using classification and Markovian methods, including a new approach to non-stationary data called the double-chain Markov model (DCCM). These methods allow one to identify differences in behavior patterns that differentiate between normal subjects and those presenting developmental anomalies.

- Scale issues in the study of primate foraging: Red colobus of Kibale National Park. Chapman, C. A., Chapman, L. J., & Gillespie, T. R. (Dept of Zoology, Univ. of Florida, Gainesville, FL 32611 [e-mail: *cachapman@zoo.ufl.edu*]). *American Journal of Physical Anthropology*, 2002, 117, 349-363.

“Diet data have been used to address a number of theoretical issues. We often calculate the proportion of time spent eating different foods (e.g., fruits, leaves) to place species into dietary categories and contrast morphological or behavioral traits among categories. Yet we have little understanding of how flexible species can be in terms of the plant parts and species consumed. To address this issue, we analyzed data on the diets of red colobus monkeys (*Procolobus badius*) from Kibale National Park, Uganda, to evaluate temporal and spatial variability in the plant parts and species eaten. After considering observer differences and sampling issues, we evaluated how different a group’s diet could be if samples were taken in different years. We found that the diet of the same groups showed significant, consistent changes over a 4-year period. For example, the time spent feeding on leaves increased from 56% in 1994 to 76% in 1998. The plant parts and species eaten by eight groups inhabiting different types of forest (e.g., pristine, logged, riverine) varied among groups. The largest interdemographic difference was seen in the use of young leaves (38%). Dietary differences were also found between groups with overlapping home ranges (41-49% overlap). Different subspecies of *P. badius* also varied in diet; however, this variation was often not of the magnitude documented within Kibale for the same population. The fact that diet can vary considerably over small spatial and short temporal scales within the same species raises the intriguing question as to what level of interspecific difference is biologically significant for addressing particular questions. We conclude that behavioral flexibility blurs our traditional stereotypic assessment of primates; a study of one group that occupies a specific habitat at one point in time may not adequately represent the species.”

### Nutrition

- Diet composition of chimpanzees inhabiting the montane forest of Kahuzi, Democratic Republic of Congo.

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Basabose, A. K. (c/o Prof. J. Yamagiwa, Lab. of Human Evolution Studies, Dept of Zoology, Kyoto Univ., Sakyo-Ku, Kyoto 606-8502, Japan [e-mail: *augabasabose@yahoo.com*]). *American Journal of Primatology*, 2002, 58, 1-21.

The diet of chimpanzees was investigated by direct observations, feeding remains, and fecal analysis for six years. Among 171 food items identified, 156 were plant materials belonging to 114 species from 57 taxonomic families. Chimpanzees consumed 66 species of fruits (pulp of 62, seeds of 4), with figs most frequently eaten. Diet changed with seasonal and annual variations in both abundance and diversity of fruit species. During the rainy season, when ripe fruit was scarce, chimpanzees relied heavily on piths and leaves. Compared to other chimpanzee habitats, Kahuzi has a low diversity of fruit species and the availability of a few pulp-fruit species may be critical to the survival of Kahuzi chimpanzees.

- Western lowland gorilla diet and resource availability: New evidence, cross-site comparisons, and reflections on indirect sampling methods. Doran, D. M., McNeilage, A., Greer, D., Bocian, C., Mehlman, P., & Shah, N. (Dept of Anthropology, SUNY, Stony Brook, NY 11794 [e-mail: *ddoran@notes.cc.sunysb.edu*]). *American Journal of Primatology*, 2002, 58, 91-116.

A description of resource availability and diet of western lowland gorillas (*Gorilla gorilla gorilla*) from a new study site in the Central African Republic and Republic of Congo based on three years of study. The results, based on 715 fecal samples and 617 days of following feeding trails, were similar to those reported from three other sites, in spite of differences in herb and fruit availability. Staple foods (consumed year-round) included high-quality herbs (*Haumania*), swamp herbs (when present), and a minimal diversity of fruit. A variety of fruits (average of 3.5 species per day and 10 per month) were selectively consumed; gorillas ignored some common fruits and incorporated rare fruits to a degree higher than predicted based on availability. During periods of fruit abundance, fruit constituted most of the diet. When succulent fruits were unavailable, gorillas used low-quality herbs (i.e., low-protein), bark, and more fibrous fruits as fall-back foods. Fibrous fruit species, such as *Duboscia macrocarpa* and *Klainedoxa gabonensis*, were particularly important to gorillas at Mondika and other sites as fall-backs. The densities of these two species are similar across sites for which data are available, in spite of major differences in forest structure, suggesting they may be key species in determining gorilla density. No sex difference in diet was detected. Such little variation in western lowland gorilla diet across sites and between sexes was unexpected and may partly reflect limitations of indirect sampling.



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