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POLICY STATEMENT

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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $5.00 each. We are no longer printing paper issues, except those we will send to subscribers who have paid in advance. We will not accept future subscriptions, unless subscribers are willing to pay $80/year within the U.S.; $100/year outside the U.S. (Please make checks payable to Brown University.) Readers with access to electronic mail may receive the nongraphic contents of each issue by sending the message **subscribe LPN-L your-own-name** to **listserv@listserv.brown.edu** (Send the message **subscribe LPN-PEF** to receive PDF files by e-mail; or the message **subscribe LPN-WARN** to receive a notice when a new issue is put on the Website.) Current and back issues of the *Newsletter* are available on the World Wide Web at <http://www.brown.edu/primate>. Persons who have absolutely no access to the Web, or to the electronic mailing, may ask to have paper copies sent to them.

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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 photograph of a cotton-top tamarin (*Saguinus oedipus*) at Roger Williams Park Zoo, by Mark Abbott

An Improved Restraint Device for Injections and Collection of Samples from Marmosets

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Introduction

Although involuntary physical restraint of a primate causes stress if the animal is not fully habituated, it is often used to achieve experimental objectives, and sometimes to protect personnel. Considerations for the physical restraint of laboratory animals have been described by the Institute for Laboratory Animal Research (2003), and methods of restraint for the larger-bodied nonhuman primates housed in laboratories by Reinhardt et al. (1995). Considerations for restraint of the smaller bodied primates, such as marmosets (*Callithrix* spp.), have received less attention. Larger primates have been successfully trained, using positive reinforcement techniques, to cooperate with injections and blood sampling, and this is known to minimize the associated adverse effects (Reinhardt, 2003). However, because of their small size, and the precision needed, marmosets can probably not be trained using positive reinforcement techniques to present a limb for blood sampling and for injections. Therefore, methods of restraint are needed.

Marmosets have been used extensively for many years as experimental animals and yet few laboratories have used restraint devices for taking samples from them, or for giving them injections. Capture and manual restraint of marmosets is likely to cause them considerable stress (Poole et al, 1999). Sometimes two or three technicians are involved, one to restrain and the other(s) to carry out the procedure (Hearn, 1977; Buchanan-Smith, personal observation); some laboratories may even use unnecessary sedation (Morris, personal observation). Furthermore, the marmoset is often restrained on his or her back in the horizontal position (Buchanan-Smith, personal observation), which is likely to make the marmoset feel vulnerable, as this is not a normal postural position and prevents the marmoset from looking around the room. Our device holds the marmoset in a near vertical position, which is more natural, allowing the marmoset to see events and use her arms to adjust the position of her upper torso within the restraint tube.

Two papers originating from this laboratory have previously described a restraint device for marmosets (Hearn, 1977; O'Byrne & Morris, 1988). In this paper we shall describe an improved method for restraining the marmoset that appears to minimize the adverse effects of restraint and is therefore considered a Refinement (cf. Russell and Burch's [1992] "Three Rs of Replacement, Reduction and Refinement"). The device can be used for a number of techniques, is reliable and easy to maintain, and most animals can be habituated to its use. The device has been used in our laboratory for many years, and techniques using this device can be carried out by one person alone.

Marmosets who are habituated to the device do not alarm vocalize, nor do they struggle. They appear relaxed in posture and inquisitive, and will take a food reward at the end. Highly stressed marmosets behave quite differently. Ideally however, quantitative data on both behavior and physiology are required to state definitely that this method of restraint is less stressful than the alternatives.

The Device

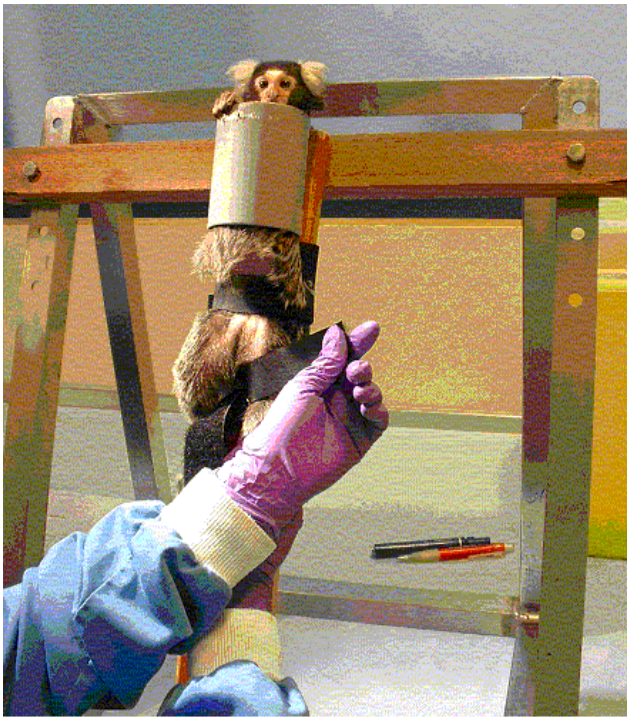

Figure 1: The marmoset in the restraint device. Her arms and head protrude from the top, the Velcro is attached around her abdomen, and the care worker is attaching a Velcro strap to one leg. Note that the tail is also restrained with the leg from which the sample is not taken.

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This device is designed for use in short-term restraint – on average 1-3 minutes, though occasionally this may be extended to up to 5 minutes. *Figure 2* illustrates the three main parts of the device; *Figures 3* and *4* the design and parts for the board supporting the marmoset. The device is constructed of inexpensive materials which can be obtained readily, and can be cleaned or sterilized easily.

Our restraining device for marmosets consists of three main parts:

1. A rigid **frame**, which supports the two moving parts and is clamped to the lab bench.

2. A **horizontal bar** which can be moved up and down on the frame, adjusting for the height of the experimenter.

3. A **vertical wooden support** for the marmoset, which can be adjusted at various angles from horizontal to near vertical.

Following are the parts and their specifications:

1. Frame.
- **a.** Body of frame: Use 314 grade stainless steel 30 mm cubed polished grain.
  - **1)** Dimensions of rectangular base: 430 mm x 330 mm
  - **2)** Height of the two vertical supports on the back: 545 mm
  - **3)** Length of the cross-piece over the top: 430 mm
- **b.** Angle bars from top to front of frame: Use 314 grade stainless steel, 30 mm x 30 mm (right-angled), and weld to the edge of the top bar and the front of the rectangular base of the frame.
  - **1)** Length of each leg: 600 mm
  - **2)** Drill 4 holes on the front of the angle bars, 11 mm in diameter and 40 mm apart.
  - **3)** Two stainless steel bolts, 10 mm in diameter and 80 mm long, with wing-nuts
- **c.** Front fitting to go over edge of bench: Use 314 grade stainless steel, 30 mm x 30 mm (right-angled), and weld to front of rectangular frame. Adjust dimensions to fit bench, if necessary.
  - **1)** Length of right-angled steel bar: 430 mm.
- **d.** Two bench clamps.

2. Horizontal bar.
- **a.** Horizontal wooden bar, 540 mm long x 45 mm wide x 30 mm thick, with holes at either end for securing to the angle bar with bolts. Holes: 11 mm in diameter.
- **b.** Flip-up hinge, 42 mm x 40 mm half measurement, with removable hinge-pin, attached to the middle of the horizontal wooden bar with screws.

3. Vertical wooden support for marmoset.
- **a.** Wooden board 630 mm long x 70 mm wide x 20 mm thick.
- **b.** Plastic pipe (PVC pipe), 90 mm long x 63 mm interior diameter. Edges (top and bottom) are rounded and smoothed with fine sandpaper.
- **c.** Aluminum strip, 140 mm long and 10 mm wide, and screws to attach PVC pipe to board. The strip is folded under the upper end of the board so it cannot damage the marmoset, and extends beyond the lower end of the pipe so that the countersunk screw is covered with Velcro® padding. (At the top, the pipe comes to the end of the board.)
- **d.** A double layer of five strips of 30 mm x 140 mm "hooked side" Velcro is wrapped around the board and glued or screwed down. This secures a back-pad, of "fuzzy side" Velcro, on the front of the board, starting at the bottom of the pipe and extending 9 cm below the pipe. Other washable padding [e.g. Vetbed®] may be used instead of Velcro as padding at the front, attached to the "hooked side" Velcro with double-sided tape. If the tape comes off in the cage washer or autoclave, it can be easily replaced. The "hooked side" Velcro also holds the abdominal and leg fixes around the animal when s/he is in the device.
- **e.** Abdominal fix: "fuzzy side" Velcro 30 mm wide x 220 mm long, attached to one side of the wooden support by two screws. (Only "fuzzy side" Velcro should come in contact with the marmoset.) The distance from the bottom of the plastic tube to the top of the abdominal strap is approximately 35 mm. (See *Figure 3*.)

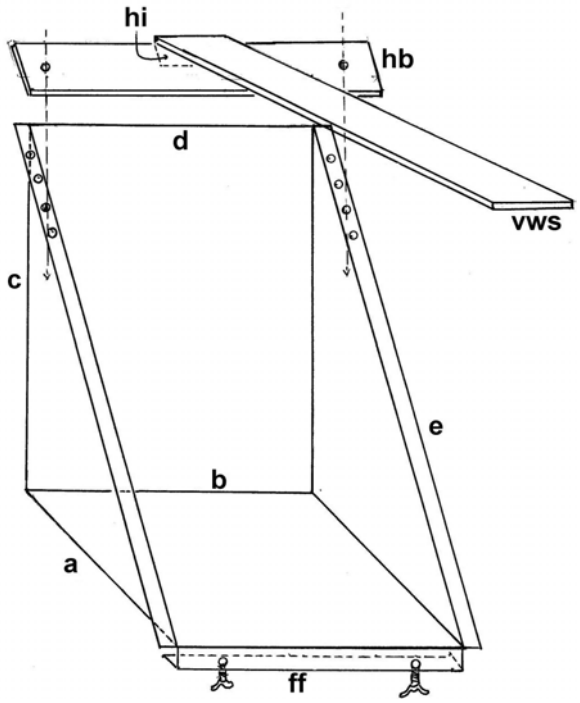

Figure 2: Principal parts of restraint device. a-d = body of frame; e = angle bars with holes drilled for horizontal bar; hb = horizontal bar; vws = vertical wooden support for marmoset; hi = hinge with removable pin connecting vertical support to horizontal bar; ff == front fitting over lab bench. Not to scale.

f. Leg fixes: One strip of "fuzzy side" Velcro 30 mm wide x 270 mm long, attached to the center of the wooden support by a screw. The distance from the bottom of the plastic tube to the top of the Velcro leg fix is approximately 100 mm. (See *Figure 3*.)

Putting it together:

1. Mitering the corners, weld the cubed stainless steel to make a rectangular base. Weld the two cubed vertical bars to the back corners of the base. Weld the cubed top piece across the two vertical bars.
2. Drill the holes in the right-angled stainless steel angle bars, and weld them onto the top and front corners of the frame so that the edge with the holes is on top and sticking out from the frame.
3. Attach the horizontal bar to the angle bars with the bolts.

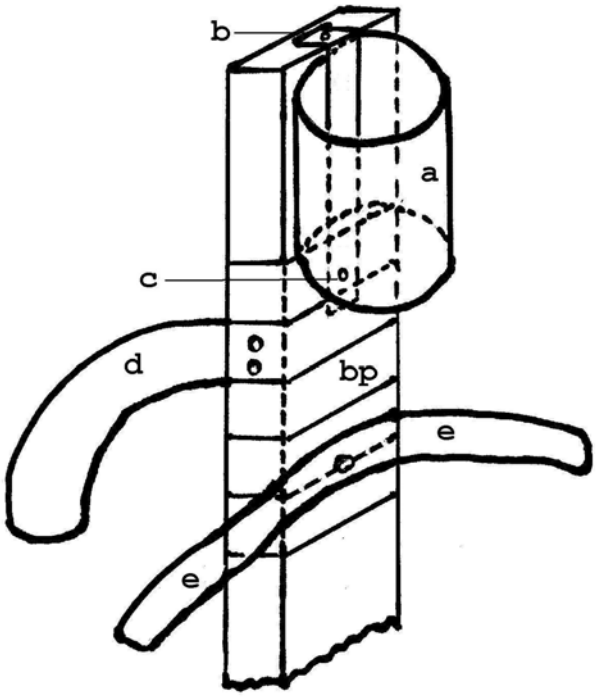

Figure 3: Wooden support for marmoset. **a** = plastic pipe; **b** = aluminum strip holding pipe to board. The end of the pipe is flush or almost flush with the end of the board. The strip is fastened to the board below the pipe with a countersunk screw (**c**). and covered with 5 rows of double-layered Velcro (the back pad, **bp**). At the top, the strip is folded 90 degrees over the end of the board and fastened there with another screw. **d** = abdominal fix (a long strap of Velcro); **e** = leg fixes (a Velcro strap fastened in the middle). Not to scale.

4. Attach the plastic pipe, back pad, abdominal fix, and leg fixes to the vertical support board. (Be sure to smooth the edges of the pipe, and countersink the screw below the pipe.)
5. Attach the vertical support board to the horizontal bar with the other half of the hinge.
6. Note that the hinge-pin is removable, permitting easy detaching of the vertical support board for cleaning.

Important: The pipe should be slightly bigger than the marmoset, so there is no pressure of the marmoset's body/back against the pipe. The purpose of the pipe is not to restrain the marmoset – the abdominal fix is for restraint – but to keep his/her head and arms out of the way. The marmoset's hands, as well as his/her head, should protrude from the top of the pipe so that he/she can adjust his/her body, preventing pressure inside the pipe.

This pipe diameter is suitable for adults (weighing approximately 300-500 g), but smaller or larger pipe diameters can easily be fitted.

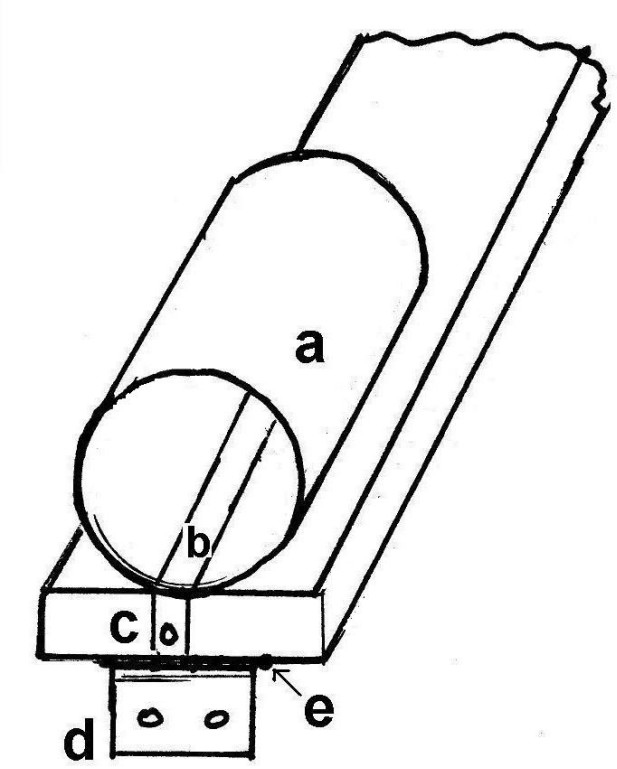

Figure 4: Detail of wooden support for marmoset as seen from above, showing a) pipe; b) aluminum strip holding pipe onto board; and c) screw on end of board fastening the metal strip at the top; d) hinge; and e) removable hinge-pin. Not to scale.

Using the Device

We emphasize at the outset that only personnel with appropriate skills and qualifications should attempt to handle and restrain marmosets. It is important for the marmosets to have positive human contact and interaction (e.g. positive reinforcement with frequent rewards), as this may help marmosets to cope better with handling and restraining procedures (Bassett et al., 2003). Taking the

time to handle the marmosets gently and with due care is of paramount importance.

To use the restraint device, the marmoset is removed from the catch box by the handler. Holding the marmoset under the arms and around the hips, he/she can be guided up through the plastic tube allowing protrusion of his/her head and arms (see *Figure 1*). The Velcro waist strap is firmly fixed around the abdomen without causing discomfort. Both leg straps are then secured just above the knee joint. On removal from the device, the marmoset is supported across the abdomen after releasing the Velcro strap. Both Velcro leg straps are now released and the animal is removed by allowing him/her to push down or up the tube. Either way the animal is then held by holding under the arms and returned to the catch box.

Habituation and Desensitization to the Device

When using the device for the first time, about 50% of the marmosets appear very relaxed; they do not struggle, alarm vocalize, or seem distressed in any outward way. About 35% of marmosets show stress during handling and when first put into the restraint device, but relax thereafter. The remaining 15% remain vocal, and may struggle throughout the first session. However all will show varying levels of improvement over a period of one week into the blood sampling routine.

To habituate and desensitize, the marmoset is spoken to in a soft voice and marshmallow or other special reward is offered for remaining calm. The length of time the marmoset is restrained can be extended gradually. After this habituation and desensitization phase the marmoset can simply be rewarded at the end of the procedure before being placed back into the catch box.

Procedures that can be carried out in the device

Blood sampling: After strapping the marmoset into the device using the abdominal and leg straps as seen in *Figure 1*, the leg used for blood sampling is then released from the Velcro strap. This leg can be held straight by firmly placing four digits curled the length of the leg to ensure that the animal cannot bend at the knee or kick. The thumb is then placed to provide extra restraint and support to the syringe as the needle is placed at the appropriate angle into the vein as shown in *Figure 5*. The syringe needle should be inserted at an angle of approximately 15 degrees into the groove midway down the leg using the thumb as a guide. The vein or the groove is not always visible in heavier animals so the midpoint is always a good guide. The syringe plunger should be slowly pulled back just after insertion of the needle point and then the needle should be inserted further until blood is seen entering the needle hub. There should be no further insertion of the needle at this point. The plunger should be pulled slowly until the appropriate volume is acquired adhering to guidelines (e.g., in the U.K., the Animals Scientific Procedures Act, 1986).

Figure 5: The marmoset in the restraint device, with a blood sample being taken from her femoral vein.

After withdrawal of blood the thumb is placed across the point of needle insertion and moderate pressure applied before the needle is withdrawn. Thumb pressure should be applied for a minimum of 2-3 minutes after removing the needle. Alternatively swabs can be applied to prevent contamination of blood on gloves from one animal to the next.

An alternative method is to keep both legs strapped while taking the sampling. In this laboratory, blood samples of 300 µl are routinely drawn from the upper region of the femoral vein using a 27 g needle and a 1 ml heparinised syringe. It is best to alternate the collection between legs to allow for recovery of any trauma to the vein.

*Method of semen collection from mated ovariectomised females or females on contraception***:** This method offers an alternative to electroejaculation for collection of semen samples. After visual proof of mating, the female is placed into the device as previously described. As shown in *Figure 1*, the wooden vertical support bar is fixed to the horizontal beam by means of a hinge. This hinge system allows the animal to be placed at any angle, and the optimum angle can be achieved by placing the beam on the operator's shoulder (see *Figure 6*). Although the marmoset may feel vulnerable in the horizontal position, the

duration of restraint at this angle is short (1-2 minutes), and the technique is considered a Refinement on electroejaculation that has traditionally been used for the collection of semen samples.

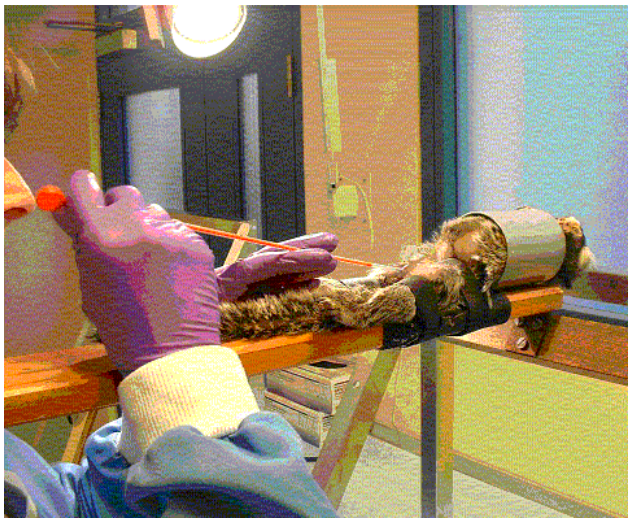

Figure 6: The hinged wooden beam is placed on the operator's shoulders to allow the syringe to be gently inserted into the marmoset's vaginal opening to collect semen.

Once restrained, a cervical mucous sampling syringe can then be gently inserted approximately 1.5 cm into the vaginal opening, and the plunger pulled back while retracting the syringe. A flush or non-flushing method can be used. Flushing with a sperm medium should ensure maximum recovery of sperm. This sperm recovery method may be used for artificial insemination, or to evaluate semen quality and quantity.

Other potential uses: Other uses of the restraint device include trans-abdominal palpation for diagnosing and monitoring pregnancy, oral dosing procedures, and injections by various routes. Protective gloves and eye protection are recommended while carrying out all these procedures.

Summary of advantages of use of the device

This method has many advantages over manual restraint:

- It requires only one person to complete the procedure.
- The animal is restrained much more securely, thus avoiding movement. The chance of a hematoma and bruising is decreased.
- Behaviorally, the animal appears to be more comfortable and less stressed.
- There is less risk of injury, due to good back support for the marmoset. In 30 years of using this device, we have never had a marmoset injury.
- Most animals can be habituated to the device.

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"Unpacking" the Variability of Metrics for Adult Male and Adult Female Mantled Howler Monkeys, *Alouatta palliata*

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Introduction

Alouatta (howler or howling monkey) is the most widely distributed primate genus in the Neotropics (A. Rylands, personal communication, 2005), found from northern Argentina to southern Mexico. Groves (2001) has recently divided howlers into ten species. Howler monkeys are arboreal folivore-frugivores, preferring new leaves, flowers, and fruit (Glander, 1975; Milton, 1980). These monkeys are adapted to environmental heterogeneity (Jones, 1995; Silver & Marsh, 2003), including climatic seasonality (Jones, 1997), a variable spatial and temporal food distribution (Jones, 1996), and a range of habitats (Jones, 1995; Groves, 2001, pp. 178-186). Environmental heterogeneity induces environmental uncertainty, unpredictability, and, possibly, risk (Piersma & Drent, 2003; Sih, 2004), factors thought to explain numerous traits exhibited by howlers (e.g., the presence or absence of birth peaks: see review in Jones, 2006, pp. 265-267). The purpose of the present note is to provide evidence for the view that the variability in weights observed for adult mantled howlers (*Alouatta palliata; Figure 1*) of both sexes can be "unpacked" and attributed to features of each group's home range ("patch"), including habitat type. Although helpful analyses of mantled howler weights and other metrics can be found in the literature (e.g., Glander, 2006; Jones, 2006), I intend to show that fine-grained, within-group analyses of traits are required to "unpack" the variability of metrics across individuals in groups.

Methods

The study was conducted in the 1970s at Hacienda La Pacífica, Cañas, Guanacaste, Costa Rica (10˚ 28' N, 85˚ 07' W: see description in Glander, 1975), a ranch located within the Holdridge zone of tropical dry forest environment. As reported by the recognized authorities on Costa Rican forests (Frankie et al., 1974; Frankie et al., 2004), tropical dry forest environment is characterized by two habitats: riparian and deciduous. Both habitats are seasonal, with flower and fruit activity occurring primarily during the dry season, November through April.

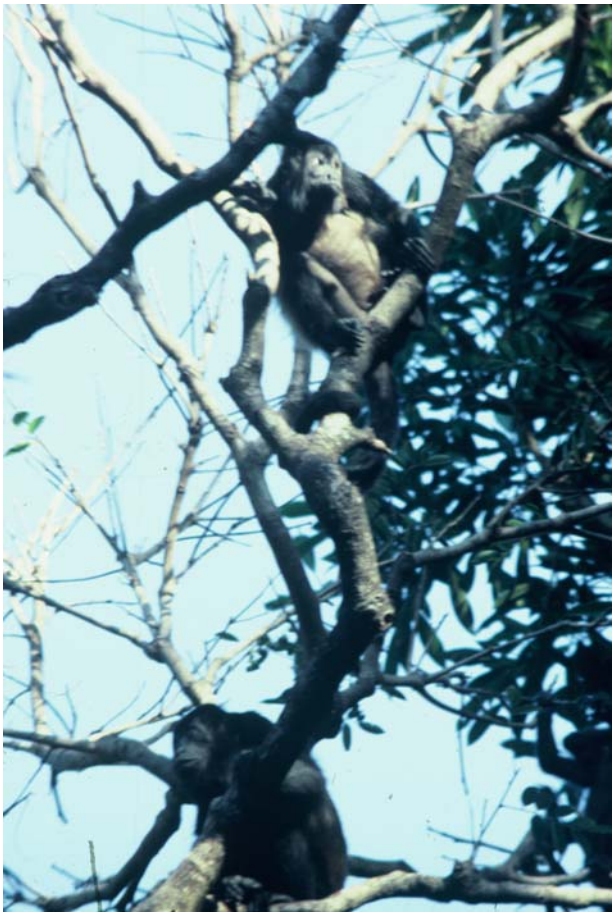

Figure 1: Adult mantled howler monkeys in consort (male above, female below). Photo taken during dry season at Hacienda La Pacífica, Cañas, Guanacaste, Costa Rica. © Clara B. Jones

In the deciduous habitat, leaf fall is synchronized for most trees during early to mid-dry season, and leaf flush occurs generally during the transition period from late dry to early wet season. In contrast, most trees in the riparian habitat retain their leaves throughout the year, displaying a pattern similar to wet forest sites in Costa Rica. In the present report, deciduous habitat is presumed to be most stressful for *A. palliata* because, when the two habitats are compared, deciduous is more strongly seasonal (Frankie et al., 1974), canopy cover is proportionately less (Jones, 2006), and primary productivity is probably lower (G. Frankie, personal communication, 2004). As a result, I hypothesized that the pattern of results reported here would be consistent with conditions of more food stress and energy constraints in the deciduous than in the riparian habitat group.

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I am grateful to Dawn Kitchen for encouraging me to publish these results and to Kitchen, Júlio César Bicca-Marques, and Thomas E. Van Cantfort for constructive criticism on an early draft. Anthony Rylands kindly answered a question about *Alouatta* geographical distribution.

Mantled howler monkeys (*Alouatta palliata*), moderately large (maximum size ~7000 g) members of the family Atelidae, are distributed as three subspecies from northern South America to southern Mexico (Groves, 2001). The phenotypic plasticity of mantled howlers has been documented (Jones, 1995, 2003, 2005, 2006 and references; Glander, 2006), including within- and between-group variability in morphometric features (e.g., body weight). *A. palliata* populations generally live in highly communal and gregarious polygynandrous (multimale-multifemale) groups, although social organization may include polygynous and "age-graded" forms of sociosexual architecture (Crockett & Eisenberg, 1987).

The present report utilizes data for two marked groups occurring on home ranges in riparian and deciduous habitats (Jones, 1978, 1980). All data reported here were collected by Norman J. Scott, Jr. (U.S. Fish and Wildlife Service), and his assistants, including the author of the present article. Ages of adults were determined by tooth wear (Scott et al., 1976), and age classifications were defined as: young adult ~5 to 7 years old; middle-aged adults ~7 to 10 y; middle-aged to old ~10 to 15 y; and old > 15 y.

In the riparian habitat group, Y, a middle-aged male, was dominant. G, a young adult attempting to ascend the male hierarchy (Jones, 1980), was subordinate to Y. R, middle-aged to old, was subordinate to Y and G. In the deciduous habitat group, the young adult male, S, was dominant to Z, a middle-aged male. (In previous reports [e.g., Jones, 1980], Z was labeled "R_{12}". To avoid confusion with R of the riparian group, this deciduous group male has been relabeled Z. To avoid confusion with the female GS of the riparian habitat group, GS of the deciduous habitat group has been relabeled GMS.)

When animals were immobilized for marking and the recording of morphometric characteristics (e.g., tooth wear, weight), their physical condition (based upon the relative proportion of wounds, parasites, etc.) was rated on a four-interval scale from poor (0) to very good (4). For purposes of statistical analyses, a score of 1+ was converted to 1.5, a score of 2-, to 1.5, a score of 3+, to 3.5, etc. Data were analyzed with EcStatic software (Chalmer, 1990), and all tests are two-tailed with α set at 0.05.

Results

Table 1 and *Table 2* display characteristics of adult males and adult females in both groups. Reinspection of the original data sheets showed that "TC", a female of the deciduous habitat group, was young, not middle-aged, as reported previously (e.g., Jones, 1980). No results of previous reports are changed as a result of this oversight.

On average, males of the riparian habitat group were significantly heavier than males of the deciduous habitat group ($t_{3.182} = 3.61$, $p < 0.05$, df = 3). Female weight, on average, did not differ between groups ($F_{1, 16} = 0.49$, $p > 0.05$. Neither male nor female condition differed by habitat, on average (♂♂: $t_{3.182} = 0.41$, $p > 0.05$; ♀♀: $F_{1, 15} = 2.91$, $p > 0.05$).

	Age	Dominance Rank	Weight (g)	Physical Condition (0 – 4)
Riparian Habitat Group				
Y	Middle-aged	1	6225	3+
G	Young	2	6550	2+
R	Middle-aged – Old	3	6630	3
Deciduous Habitat Group				
S	Young	1	5500	2+
Z	Middle-aged	2	5975	3

Table 1: Metrics (age, dominance rank, weight, physical condition) for adult male mantled howlers in the riparian habitat group and the deciduous habitat group. See *Methods* for additional information.

Within-group analyses were performed, and all variables were intercorrelated. Sample sizes for males were too small to conduct statistical tests. However, visual inspection suggests that rank is negatively associated with age and weight in both groups (high age and weight imply low rank) and that, within each group, male condition does not differ by more than a half-interval.

For females, three correlations were significant. In the riparian habitat group, rank and age are strongly negatively correlated ($r = -0.80$, $p < 0.002$, $N = 11$). In the same habitat, female rank is negatively correlated with weight ($r = -0.64$, $p < 0.02$, $N = 11$). For females in the deciduous habitat group, age is negatively correlated with condition (high age implies poor condition; $r = -0.82$, $p < 0.02$, $N = 6$). No other comparisons for either sex were statistically significant.

Discussion

Schoener's (1971) theoretical treatments showing that males are "time-minimizers", females, "energy-maximizers", have been employed in several reports on primate species (e.g., Jones, 1978, 1980, 2005, 2006; Wrangham, 1980; Smith, 1997). That male, but not female, weight differs by habitat in the present study is consistent with Schoener's (1971) models since, all other things being equal, only females are expected to compete for food (Andersson, 1994). As my findings show, male weight conforms to the predicted energy (primary productivity) available in their habitat, with less energy available in the deciduous habitat. Females, on the other hand, are expected to compete for whatever threshold of body weight is required for successful reproduction, yielding little difference in weight, on average, between adults of

this sex. Although recent research suggests that ecological constraints may influence female body size and, thus, weight (Jones, 2006), the present results are consistent with Jones' (2003, 2006) findings for between-sex comparisons of weight in riparian and deciduous habitats.

	Age	Dominance Rank	Weight (g)	Physical Condition
Riparian Habitat Group				
GRS	Young	1	4550	2
LL	?	2	?	?
GWS	Young	3	4650	2-
GS	Young	4	4150	2+
UM_1	?	5	?	?
OP	Middle-aged	6	4330	3-
UM_2	?	7	?	?
UM_3	?	8	?	?
YS	Middle-aged	9	4680	2+
BC	Young	10	4841	2-
RS	Middle-aged	11	5180	2+
PS	Middle-aged	12	4850	1+
PY	Middle-aged – Old	13	4960	2
SS	Old	14	4515	2
RYS	Middle-aged – Old	15	5160	2+
Deciduous Habitat Group				
PS	Middle-aged	1	4120	2
GY	Middle-aged	2	4900	?
GMS	Middle-aged	3	4125	2
TC	Young	4	5350	3+
RPS	Middle-aged	5	5375	3
SA	Young	6	?	?
RS	Middle-aged – Old	7	5150	2-
YPS	Middle-aged	8	4975	3

Table 2: Metrics (age, dominance rank, weight, physical condition) for adult female mantled howlers in the riparian habitat group and the deciduous habitat group. In the deciduous habitat group, GS has been relabeled GMS to avoid confusion with GS of the riparian habitat group. See text for additional information and interpretation.

In an attempt to "unpack" the variability in weight within and between sites in Costa Rica and to control for inter-observer variability among these studies, it will be important for future primate studies in Costa Rica to employ the "Frankie classification system" for tropical dry forest environment ("riparian" and "deciduous": Frankie et al., 1974, 2004) and to address the problem of independence of subjects in population surveys employing repeated sampling of the same population(s). In addition, it will be necessary for field researchers to calculate 95% confidence intervals around point estimates (Jones, 2001) in order to understand the meaning of sample means (e.g., mean weight).

Although within-group comparisons of two groups cannot confidently reveal broad patterns of animal response, these studies can document local effects (e.g., home range quality, and "microhabitat," or "patch" effects). While the present findings suggest similar responses by males of both groups (i.e., that rank is negatively associated with age and weight and that male condition is similar between groups), within-group analyses of females, who are expected to be particularly responsive to habitat effects, show important differences. Females in the riparian habitat group exhibited a strong negative correlation between age and rank (low age implies high rank), consistent with Jones' work on the "age-reversed" dominance system in this genus (1978, 1980, 1983). No such correlation was found in the deciduous habitat group, however, a finding explained by real differences between groups (e.g., home range quality, group size, coefficients of competition) or by sampling error. Females in the riparian habitat group also demonstrated a robust negative correlation between rank and weight (high rank implies lower weight), apparently similar to the male result. This finding may suggest that, in some conditions, howler females are not energetically stressed, or, simply, that low-ranking animals have more time than high-ranking individuals to devote to feeding, possibly because they are not performing key roles of dominants (e.g., policing), topics worthy of investigation. In the deciduous habitat group, only one significant result was found for females: younger females were in better condition than older ones. This result is consistent with my hypothesis that deciduous habitat is more stressful than riparian habitat, another topic requiring additional research and one that may have important implications for life history evolution (survivorship and fecundity: Jones, 1997).

My results support recent theoretical and empirical treatments showing the importance of local ("patch") effects (e.g., within-group competition for food) for group features and emergent population characteristics (West et al., 2002). A survey of a primate population is a "snapshot" of responses and the architecture of these responses for a limited time period. Since these responses, and their thresholds, occur in particular local conditions (abiotic [e.g., humidity] and biotic, including social), it is critical for researchers conducting surveys of primate populations to specify and to measure or estimate these conditions during surveys for accurate identification of the likely causes of population parameters (mean, standard deviation), their prediction and control, their variability in

space and time, and the association of conditions and individuals in groups (by sex) with features of populations (e.g., the multivariate relationship between humidity, resource dispersion, and local conspecific density relative to rates of aggression between sexes or, say, sex ratio of offspring). To date, no surveys of Neotropical primate populations meet these criteria.

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News Briefs

Biofuel to Drive Indonesian Palm Oil Expansion

Indonesia's government plans to develop 3 million hectares of palm oil plantations in the next five years to meet increasing demand for biofuel as an alternative source of energy, the agriculture minister said on Wednesday. Anton Apriyantono said two million hectares will be developed on the Kalimantan side of Borneo island and the rest in other parts of Indonesia.

The government said last year it will develop a new palm oil plantation in Kalimantan near the border with Malaysia. Covering an area of 1.8 million hectares, it has the potential to be the world's biggest palm oil plantation. "The government targets to develop three million hectares in new palm oil plantations," Apriyantono told reporters.

Biofuels are taking on renewed global importance as countries seek to avoid the soaring price of conventional oil and also cut hazardous emissions. Palm oil's emergence in the market comes decades after the introduction of ethanol, made from sugarcane. Analysts say the biofuel push could be the biggest driver of growth in demand for vegetable oils, especially as palm oil is the cheapest vegetable oil and the easiest to convert into fuel.

Indonesia is the world's second-largest palm oil producer and exporter after Malaysia. – *Reuters News Service , January 27, 2006*

Austria Enacts Ban on Ape Research

Effective January 2006, Austria has implemented legislation that prohibits any research on nonhuman apes that is not in the interest of the apes themselves. Austria has not used apes in research for several years, as the country's research community retired their last chimpanzees used for research in 2002. However, this retirement presented the opportunity to discuss a research ban covering all nonhuman apes, including not just chimpanzees, bonobos, gorillas, and orangutans, but also eight species of gibbons. With its new ban, Austria joins New Zealand, the Netherlands, and Sweden, which have legislation and/or regulations that prohibit great ape research, and the United Kingdom, which has a policy of not granting licenses for such research. Japan has taken steps to ban invasive research on great apes, and Spain is currently considering a proposal to grant legal protection to great apes from "slavery, torture, death, and extinction".

The United States is one of the few remaining countries to allow biomedical research and testing on great apes. In practice, chimpanzees are the only great ape currently used in U.S. research. The Humane Society of the United States (HSUS) has launched a campaign to end biomedical research and testing on chimpanzees. In 2000, the U.S. enacted legislation, supported by the HSUS, which designated a national sanctuary system for chimpanzees considered to be retired from research by the research community. – *HSUS'* Animal Research News *&* Analysis, *January, 2006*

Second Nonhuman Primate Genome Available

The National Human Genome Research Institute (NHGRI) announced on February 9 that a multi-center team has deposited the draft genome sequence of the rhesus macaque into free public databases for use by the worldwide research community. See *Resources* on page 17.

China's Endangered Monkeys Make a Comeback

China's golden monkeys, a species more endangered than giant pandas, have made a surprising comeback with populations quadrupling in the past two decades. The snub-nosed monkeys, which are found only in southwestern Guizhou province, have risen in number from 200 in the early 1980s to around 800, Xinhua news agency said. Despite its growing numbers, the animal is still endangered. Poaching and forest fires are two of the main causes for the decrease in population, according to Yang Yeqin, director of Guizhou's Fanjingshan National Nature Reserve, where most of the monkeys live. The gregarious animals are also vulnerable to human diseases, such as tuberculosis, cholera and measles, Yang said. Researchers believe that the number of the snub-nosed monkeys would not rise rapidly even if their habitats were enlarged. However, the numbers would drop dramatically if their habitats dwindled, which may lead to their extinction, said the researchers. Wildlife experts said the animals' living space must be extended, monitoring and protection of their environment must be strengthened, and a breeding base should be established to save the animals. – © 2006 *Agence France Presse*

CU Monkey Lab Closes, Gives Animals Away

The University of Colorado (CU) Health Sciences Center has decided to close its controversial monkey lab. About 40 monkeys have been used in experiments in AIDS, alcohol, and brain research. CU said most of the animals will go to Wake Forest University's primate research facility and 10 will be given away to an animal rights group. School officials said the move will be beneficial for the research and the animals, who will get to spend some time outdoors in their new home. CU will oversee future experiments with the help of Wake Forest University, which is located in Winston-Salem, North Carolina.

Animal rights activists have expressed concern about the safety and security of the monkeys at the CU facility. In August 2004, they were successful in gaining the

release of video from inside the lab. © *Associated Press, February 16, 2006*

Former Research Chimpanzees Leave for Florida

Ten chimpanzees from the former Coulston research facility began a 37-hour trip to Florida in a specially designed trailer. They are the first of 266 chimps that will be transported to Fort Pierce. The chimps once lived in a medical research laboratory in Alamogordo that was operated by Frederick Coulston, who helped develop or test treatments for malaria, hepatitis, and AIDS during a 72-year career.

In 2002, Coulston turned the animals over to Carole Noon, director of a recovery group called Save the Chimps. She said the animals will be introduced in Florida to a new colony of chimps and then will settle into an island home. "For the first time in their lives, they are going to walk on grass," Noon said. "No walls, no roof."

According to a news release from the organization, Save the Chimps operates the first sanctuary in the United States devoted exclusively to chimpanzees. It is the largest permanent chimpanzee sanctuary in the world. The facility provides lifetime care for chimpanzees taken from research laboratories and former chimp owners no longer able to provide adequate care.

It will take 27 trips to transport all the chimps from New Mexico to Florida. "We plan to have them all moved by the end of 2007," Noon said. – Alamogordo Daily News*, February 16, 2006*

Chimp Dies after Transfer from Ohio

One of nine chimpanzees moved to a Texas sanctuary after Ohio State University decided to close a research center died after his transfer, school officials said. The 35-year-old male, named Kermit, stopped breathing Thursday after workers at Primarily Primates in San Antonio sedated him during a move from a transfer cage to living quarters, university spokesman Earle Holland said. Workers tried to resuscitate the chimp, but the university suspects Kermit's head fell forward while he was sedated, blocking his airway. Obesity may have been a factor in the death of the 300-pound chimp, Holland said.

Ohio State veterinarians were to travel to San Antonio to check on the other chimps and meet with sanctuary officials and the veterinarian performing Kermit's necropsy.

The other chimps were successfully sedated and doing fine, Holland said. Chimps can become violent when confronted by humans, so they are sedated when moved, he said.

These animals were a part of a cognitive studies program that has contributed to the understanding of chimpanzee intelligence. The program was directed by Dr. Sally Boysen, who has protested both the closing of program and the choice of sanctuary facility. OSU officials have stated that "in recent years, research funding for primate research across the country has been shrinking and university-based primate colonies are becoming harder to support."

The university is paying $324,000 to build a facility at Primarily Primates and will provide an endowment for the chimps' care. – *Associated Press, March 5, 2006*

Note from Sally Boysen: "When I have sought information from Primarily Primates about the chimps' status, I have been told that 'they do not have any information at this time'. I am hopeful we can resolve many of the unanswered questions soon. This group of, now eight, enculturated chimpanzees is of enormous scientific value, and the University has simply thrown the baby out with the bath water. I am very grateful for the caring and thoughtful responses from our friends and supporters in Columbus, Ohio, those around the country, and all my colleagues in the primate community during this very difficult time."

Shelly Williams Paralyzed by Stray Bullet

Shelly Williams, of Smyrna, Georgia, was hit by a stray bullet in a parking lot in Smyrna on November 7. She is now paralyzed from the waist down. Smyrna police have issued arrest warrants for two men, Kendall Markell Bolden and Terrance D. Reid. Police believe Bolden fired the shot during a botched drug deal. A third man, Elliott Mitchell, who is now in prison in South Carolina on unrelated charges, was arrested earlier.

Before the shooting, Williams had planned to return to the Democratic Republic of Congo to continue her research. It was there, in the jungle, that a large animal she had never seen before walked in front of her. It wasn't a chimpanzee, or a gorilla or a bonobo ape. This new creature seemed to have features of all three. She clicked her camera and captured the "unknown ape". Other scientists are now trying to determine if the animal is a new ape species.

Within a month or two, she hopes she can change her clothes, go to the bathroom and take a shower — all by herself. She has gone through several operations, and spends her days undergoing physical and psychological therapy. She lifts weights to build strength in her arms so that she will be able to push the wheelchair. Her husband, Al Hofstetter, has been by her side every moment.

Once she gets better, she plans to write the long-overdue book detailing her work and research. With so much travel, there was never time. She hopes there will be time, too, to see that the men responsible are arrested, tried and convicted.

"I don't have time to worry about getting justice until I am at my optimal best," Williams said, "Whatever that may be." – *by Charles Yoo in* The Atlanta Journal-Constitution, *March 4, 2006*

The primatology community extends its sympathy to Shelly at this very difficult time.

* * *

Research and Educational Opportunities

Summer Veterinary 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*], or see <web.mit.edu/comp-med/Researchfellowships/index.htm>.

APV Trainee Travel Grant

The Association of Primate Veterinarians (APV) recognizes the importance of student programs and their potential for the growth and expansion of nonhuman primate care and well-being. APV supports these programs by giving students a platform and financial support to further educate its membership. Applications are solicited for the 9th annual APV Trainee Travel Grant award. Our 34th APV Annual Workshop in Park City, Utah, will be held October 12-14, 2006, and the successful three candidates will make their presentations there. The APV Trainee Travel Grant Program affords trainees the opportunity to introduce themselves to their APV colleagues and a place to share their findings – whether case report, clinical investigation, or research project. To qualify for a trainee travel grant, you must have a DVM, VMD, or equivalent degree from an accredited veterinary medical college, be enrolled in a residency or post-doctoral program, and have some experience in the clinical care of nonhuman primates. Qualified candidates must submit credentials packages and abstracts for their presentations to the APV Education Committee for review and selection. Grantees will receive free workshop registration and a $1000.00 award to defray their travel expenses to Park City; in return the participants will present their papers at the workshop. For applications and more information please contact Pat Frost [337-482-0345; e-mail: *pfrost@louisiana.edu*]. Submission deadline is May 15, 2006. Applications will be accepted electronically, but letters of recommendation will require a signature. The three successful candidates will be notified by June 15.

* * *

Animal Welfare Institute's Refinement Award Winners

Viktor Reinhardt announces the Animal Welfare Institute's 2006 Refinement Award winners. Three of the winners work with nonhuman primates: Mary Lee Jensvold: "Species-specific behaviors in interactions between chimpanzees and caregivers"; Andrew Winterborn: "Comparison of the efficacy of oral ketamine and combination of oral ketamine and medetomidine versus intramuscular ketamine for the sedation of rhesus macaques (*Macaca mulatta*) and the effects of oral dosing versus intramuscular injection on serum cortisol levels"; Jillann Rawlins: "The effect of enrichment devices on female rhesus macaque behavior".

The other winners are Robert Halliwell: *Xenopus*; Allison Bechard: mice; Rachel Dennis and Alan Fahey: chickens; Sylvie Cloutier: rats; and Anita Conte: birds.

* * *

Positions Available

Veterinarian – Alice, Texas

Covance, one of the world's largest and most comprehensive drug development services companies, is seeking a Veterinarian to join their team in Alice, Texas. This individual provides general veterinary support for site programs, oversees operations of pharmacokinetic (PK) and breeding colony areas, authors pertinent SOP's, serves as study director, ensures animal welfare and regulatory compliance, and represents surgical activities to Covance Research Product clients. DVM or VMD degree and licensure in Texas will be required. Strong surgical/PK experience is preferred and client service orientation is required.

Learn more about these opportunities and apply online at <www.covance.com/careers> (Reference 221BR).

Covance is committed to diversity in the workplace and is an equal opportunity employer. (M/F/D/V). "Your confidentiality and privacy are important to us."

Veterinary Technician – Louisiana

Chimp Haven, Inc., is seeking a veterinary technician to provide clinical care for a colony of chimpanzees retired from medical research. Responsibilities include, but are not limited to, ordering and stocking veterinary supplies; reviewing and maintaining medical records; monitoring health of colony; maintaining equipment; sedating and monitoring recovery of chimpanzees; assisting veterinarian with physical exams, treatments, and surgery; coordinating laboratory tests; training chimpanzees to cooperate with medical procedures; and participating in colony management decisions.

Qualifications: A high school diploma or GED is required, but a vet tech degree, with LAT certification, or an associate's or bachelor's degree is preferred. Three years' prior experience as a veterinary technician, performing medical monitoring, sedation, treatments, suturing, surgical assistance, and computer database entry, are required. Experience with safety and biohazard procedures is preferred, as is the ability to lift 50 pounds for short distances, and 75 pounds when lifting animals.

Please send cover letter, resume, and salary requirement to Chimp Haven, Inc., Attn: Human Resources, 13600 Chimpanzee Place, Keithville, LA 71047 [318-925-9575; fax: 318-925-9576; e-mail: *careers@chimphaven.org*].

Chimp Haven employees receive competitive salary and benefits, and work in a team atmosphere. Chimp Haven is an equal opportunity employer. See <www.chimphaven.org>.

Director, Animal Resources Program

Wake Forest University Health Sciences is currently seeking an academically oriented laboratory animal veterinarian with expertise in overseeing a major laboratory animal care program. The appointment will be at the level of Associate Professor or Professor commensurate with the experience of the applicant. The successful candidate will serve as Director, Animal Resources Program, and Attending Veterinarian, Wake Forest University, and will also participate in the research and teaching programs of the Section on Comparative Medicine, Department of Pathology. The Director will report to the Associate Dean for Research.

Candidates must have received the DVM or VMD degree from an institution accredited by the American Veterinary Medical Association. Board certification in Laboratory Animal Medicine is required. Advanced academic training as evidenced by a MS or PhD degree is desirable. Skills in verbal and written communication are essential. Applicants should have demonstrated excellence in the overall mix of clinical care, clinical teaching, scholarly activity that advances clinical medicine, and institutional service. Applicants should also have demonstrable experience and skills in management and supervision, facility design, rodent and primate colony management and disease control, and an interest in collaborative research as evidenced by publications in peer-reviewed journals. Salary will be commensurate with responsibilities and experience.

Interested candidates should send a letter of interest, CV, and names and addresses of five references, to: Sally A. Shumaker, Associate Dean for Research, c/o Ms. Pattie S. Smith, Administrative Coordinator, Wake Forest University Health Sciences, Medical Center Blvd, Winston-Salem, NC 27157-1023. Wake Forest is committed to equal opportunity, affirmative action and the diversity of its faculty and staff. Women and minorities are strongly encouraged to apply.

Chimpanzee Caregiver – Arizona

The Primate Foundation of Arizona is looking for a caregiver, who will be responsible for the direct daily care of its chimpanzees. Among other duties, caregivers feed (3 times daily), clean the cages and support areas, provide enrichment, and dispense vitamins and medications as prescribed by the veterinarian. They also participate in the psychological well-being program. The work is hard and requires heavy lifting. The chimps are housed on wood chip, straw, and shredded paper bedding. The animals also have access to outdoor cages. The facility is kept clean and well maintained at all times.

A caregiver must be able to consistently lift and carry objects weighing up to 60 pounds. Caregivers must be willing to work weekends, holidays, and overtime as required, as well as participate in training and occupational health and safety programs. Employees must be able to effectively read and write and be able to follow oral and written instructions. A valid Arizona driver's license is required. Caregivers are on a 40-hour work week.

Starting wage is $10.25/hour. Benefits include health and dental insurance, as well as paid vacation and sick time.

Contact Jim Murphy, Primate Foundation of Arizona, P.O. Box 20027, Mesa, AZ 85277 [480-832-3780; fax: 480-830-7039; e-mail: *jimpfa@qwest.net*].

Laboratory Animal Veterinarian – Philadelphia

The University of Pennsylvania (Penn) seeks a laboratory animal veterinarian to join our group of veterinarians who provide clinical veterinary care, pathology services, regulatory input, teaching, and other services. Penn is ranked second nationally among universities receiving federal research dollars for biomedical research. Located in the heart of Philadelphia, the main campus includes both a School of Medicine and a School of Veterinary Medicine. University Laboratory Animal Resources (ULAR) includes more than 100 employees and supports more than 70,000 animals on campus utilized for biomedical research. Animals housed on campus include large numbers of mice and rats and smaller numbers of many different animal species including nonhuman primates and aquatics. The majority of these animals are housed in School of Medicine facilities, which are AAALAC accredited.

ULAR supports research efforts in the Schools of Medicine and Veterinary Medicine as well as the Schools of Arts and Science and Engineering. The clinical group consists of seven laboratory animal veterinarians, a laboratory animal pathologist, and eight veterinary technicians. The successful applicant will provide clinical veterinary care and surgical support, IACUC service, regulatory input, and other related services to the University; s/he will report to the Associate Director for Clinical Care and Training. If the selected individual qualifies for a faculty appointment, duties will also include 30% time participating in collaborative research and teaching of residents and veterinary students.

Minimum qualifications include a veterinary degree from an AVMA-accredited institution, with a current license to practice veterinary medicine in at least one state in the USA, plus 3-5 years' experience working in the field of laboratory animal medicine. Preferred candidates will either be board-certified by ACLAM or will have completed an ACLAM-recognized training program in laboratory animal medicine. Candidates who also qualify for a faculty appointment in the Department of Pathobiology in the School of Veterinary Medicine will be given first consideration. Excellent organizational skills, a strong service orientation, positive interpersonal skills, and strong written and oral communication skills are essential for this position.

Preliminary inquires may be directed to William Singleton, Associate Director for Clinical Care and Training [215-898-9712; e-mail: *wls@pobox.upenn.edu*]; or to Diane J. Gaertner, Director, ULAR, and Professor, Pathobiology, School of Veterinary Medicine [215-898-2434; e-mail: *gaertner@pobox.upenn.edu*]. Applicants should send a letter of intent, a CV, and three references to Dr. Singleton, University of Pennsylvania, USAR, SVM, 3800 Spruce St, 177E Old Vet Quadrangle, M.C. 6009, Philadelphia, PA 19104; and should apply electronically at <https://jobs.hr.upenn.edu>. Please use the Search Postings feature and enter 051018540 as the Reference Number. Penn is an EEOC/Affirmative Action Employer.

* * *

Grants Available: Effects of Antiretroviral Therapy on Oral Mucosa

The National Institute of Dental and Craniofacial Research (NIDCR), <www.nidcr.nih.gov>, seeks to stimulate research on the long term effects of antiretroviral therapy (ART) on, for example, the qualitative and quantitative composition of the saliva, innate and adaptive immune networks of the oral mucosa, and oral epithelial structures and functions. These studies will be restricted to the use of ex-vivo organotypic models of human oral mucosa, simian models for AIDS, and tissues from healthy individuals and AIDS patients receiving ART. Such research will provide valuable insight into the cellular and molecular mechanisms responsible for occurrence or recurrence of oral disorders in HIV-infected/AIDS patients, despite having been treated with ART. A goal of the initiative is to identify novel strategies for prevention and management of oral manifestations of HIV infection and AIDS by reducing the negative effects of ART.

Up to $700,000 total cost (direct costs plus facilities and administrative costs) may be awarded in support of this solicitation. Up to three new grants are anticipated to be funded. This funding opportunity announcement will use the NIH exploratory/development research grant (R21) award mechanism.

Letters of Intent receipt date is July 11, 2006; application submission date is August 11, 2006. For scientific/research inquiries, contact Mostafa Nokta, Center for Infectious Diseases & Immunology, NIDCR, Bldg 45, Rm 4AN-18H, Bethesda, MD 20892-6402 [301-594-7985; fax: 301-480-8319; e-mail: *Mostafa.Nokta@nih.gov*]. For information, see <grants.nih.gov/grants/guide/rfa-files/RFA-DE-07-001.html>.

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Information Requested or Available

Trends in U.S. Primate Importation

The Aesop Project [Allied Effort to Save Other Primates] has compiled, from live primate import declarations logged by the United States Fish and Wildlife Service's LEMIS [Law Enforcement Management Information Service] division, "Trends in U.S. Primate Importation for 11 Years (1995-2005)", which is available at <www.aesop-project.org/Primate_Trade/Primate_Trade_Imports.htm>.

New NIH, USDA, and FDA "MOU"

On March 1, 2006, the National Institutes of Health, Office of Extramural Research, announced there is a new five-year Memorandum of Understanding (MOU) agreement for laboratory animal welfare. The agencies participating are the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, the U.S. Department of Health and Human Services' Food and Drug Administration, and the U.S. Department of Health and Human Services' National Institutes of Health. Each individual agency has its own authority and specific responsibilities for fostering proper animal care and welfare. The MOU sets forth a framework for reciprocal cooperation which will assist each agency in meeting its responsibilities concerning the welfare of laboratory animals. The new MOU is available at: <grants.nih.gov/grants/olaw/references/finalmou.htm>.

More Interesting Websites

- BDGEOPRIM (Database of Georeferenced Occurrence Localities of Neotropical Primates): <www.icb.ufmg.br/~primatas/home_bdgeoprim.htm>
- International Primatological Society: <pin.primate.wisc.edu/ips>
- Inventories of nonhuman primate holdings among USDA licensees and registrants (data received from a Freedom of Information Act request): <www.aesop-project.org/Inventories.htm>
- IPBIR – Integrated Primate Biomaterials and Information Resource: <www.ipbir.org>
- Living Proof: A national public awareness campaign to build understanding of the process and the promise of biomedical research: <www.living-proof.us>
- Pacific Primate Sanctuary: <www.pacificprimate.org>
- PrimateLit Bibliographic Database: <primatelit.library.wisc.edu>
- Primatology & Ecology Field School in Kenya: <primate.rutgers.edu>
- Siberut (Indonesia) Conservation Project: <www.siberutisland.org>
- *Variables, refinement and environmental enrichment for rodents and rabbits kept in research institutions: Making life easier for animals in laboratories*, by V. & A. Reinhardt: <www.awionline.org/pubs/rabrodent/rodrab.html>

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Resources Wanted and Available

Transporting Research Animals

The Institute for Laboratory Animal Research (ILAR) has just published a new report, *Overcoming Challenges in Transporting Research Animals*. In its report, ILAR mentions the need for an interagency group to coordinate the complex patchwork of federal regulations governing the transport of laboratory animals. Furthermore, the report states that steps should be taken to ensure the availability of safe, reliable air and ground shipment for research animals. The report also offers science-based guidelines for humane transportation. An executive summary in pdf format is available at <www.nap.edu/execsumm_pdf/11557.pdf>, and an online readable version of the report and information on ordering may be found at The National Academies Press Website at <www.nap.edu/catalog/11557.html>. – *from the Americans for Medical Progress* News Service Digest*, January 18, 2006*

***NIH Extramural Nexus* Bimonthly Update**

The NIH Office of Extramural Research announces the *NIH Extramural Nexus* bimonthly update. The *Nexus* will be distributed six times annually and will provide the biomedical research community with updates on NIH extramural research programs, activities, and policies. Through reader feedback, the *Nexus* will serve as a two-way communications channel between the external community and the Office of Extramural Research.

To subscribe to the *NIH Extramural Nexus*, send a plain text e-mail to *<Listserv@list.nih.gov>,* including only the words **Subscribe EXTRAMURALNEXUS** in the body of the message. To unsubscribe, follow the same procedure, using the words **Unsubscribe EXTRAMURALNEXUS** in the message body.

Inquiries regarding this notice may be directed to: *The NIH Extramural Nexus,* NIH, Office of Extramural Research, 6705 Rockledge Dr., MSC 7963, Bethesda, MD 20892-7963 [301-435-2728; e-mail: *ExtramuralNexus@mail.nih.gov*].

ZooLex Zoo Design Organization

The ZooLex Zoo Design Organization runs the ZooLex Website, <www.zoolex.org>, on which you can find a variety of enclosure designs by different zoos. You can also find firms that you can use, etc. ZooLex Zoo Design Organization is a nonprofit organization independent from companies and organizations. It relies on the support of subscribers, members, sponsors, and well-wishers to fund its activities. Contact: ZooLex Zoo Design Organization, Sobieskigasse 9/12, A-1090, Vienna, Austria [0043-1-3101060; e-mail: *zoolex@zoolex.org*].

JWatcher 1.0 Released

Daniel T. Blumstein, of the Dept of Ecology and Evolutionary Biology at the University of California, Los Angeles, has announced the newest version of the event-recorder and analysis program JWatcher 1.0, which is designed to be used on 2006-era computers (Mac OS-X and Windows-XP). "Supported by a grant from the National Institute of Mental Health, JWatcher 1.0 adds new functionality and algorithms. Version 1.0 includes a number of additional algorithms that can be used to study sequences and study conditional behaviors (e.g., to study the frequency of, or time allocated to, walking while chewing gum), as well as algorithms to combine multiple results files into one summary file, and to study inter- or intra-observer reliability. Future releases will have integrated video scoring capabilities and the ability to score behavior on a PDA or Java-equipped device.

"Since releasing JWatcher 0.9 in November 2000, we have had thousands of downloads from all over the world. Neuroscientists, human factors experts, psychologists, and veterinarians have joined the many behavioral ecologists who use JWatcher to analyze their observations and experiments. We have taught thousands of students the fundamentals of quantifying animal behavior using JWatcher, and these labs at UCLA have been extremely popular. Educators in other institutions have used these labs to teach the process of quantifying behavior to their students. We're very excited about our new release that updates JWatcher to make it more compatible with current versions of Java, as well as adding numerous new and powerful features. Our philosophy is to provide a free event recorder and analysis program to the research community. We are developing a book, "Analyzing behavior the JWatcher way," and are instituting a paid support program to help you get the most out of JWatcher. We hope that JWatcher helps you solve your behavioral analysis problems.

"As a registered user, you will be updated first when we have new releases. Thanks for your interest and support of JWatcher. To download JWatcher, please go to the JWatcher Website: <www.jwatcher.ucla.edu>. For more information, contact me at 621 Charles E. Young Dr. South, UCLA, Los Angeles, CA 90095-1606 [310-267-4746; fax 310-206-3987; e-mail: *marmots@ucla.edu*]."

New Courses on the AALAS Learning Library

Two new courses have been added to the American Association for Laboratory Animal Science Learning Library: 1) Communicating with the Non-Native English Speaker; and 2) Time Management and Goal Setting. Go to <www.aalaslearninglibrary.org>, click "Ani-

mal Care and Use Courses", and then "Management and Training".

The Design of Animal Exercise Protocols

The American Physiological Society (APS) has just published a *Resource Book for the Design of Animal Exercise Protocols*. This book was developed during a series of meetings in 2003 and 2004 involving experts in the fields of exercise physiology and animal research models. It is intended for researchers, IACUCs, and those involved with research oversight.

The authoring committee, which was composed of exercise physiologists and laboratory animal veterinarians, reviewed reference material and drew upon their own experience to compile suggestions about how to design, review, and implement experimental paradigms involving animals and exercise. The *Resource Book* was peer-reviewed by other exercise physiologists and laboratory animal veterinarians. The PDF of the book is available at <www.the-aps.org/pa/action/exercise>.

Second Nonhuman Primate Genome Available

The National Human Genome Research Institute (NHGRI) announced on February 9 that a multi-center team has deposited the draft genome sequence of the rhesus macaque into free public databases for use by the worldwide research community.

The rhesus is the second nonhuman primate, after the chimpanzee, to have its genome sequenced, and is the first of the Old World monkeys to have its DNA deciphered. Overall, the rhesus genome shares about 92 to 95 percent of its sequence with that of the human and more than 98 percent with that of the chimpanzee. Consequently, the rhesus provides an ideal reference point for comparisons among three closely related primates. Sequencing is also underway on the genomes of a number of other primates, including the orangutan, marmoset, and gorilla.

The sequencing of the rhesus genome was conducted at the Baylor College of Medicine Human Genome Sequencing Center in Houston, the Genome Sequencing Center at Washington University in St. Louis, and at the J. Craig Venter Institute in Rockville, Maryland, which are part of the NHGRI-supported Large-Scale Sequencing Research Network. The DNA samples used in the sequencing came from a female rhesus macaque at the Southwest Foundation for Biomedical Research in San Antonio.

The research community can access the sequence data through GenBank <www.ncbi.nih.gov/Genbank>; Map Viewer <www.ncbi.nlm.nih.gov/mapview>; EMBL Bank <www.ebi.ac.uk/embl>; DNA Data Bank of Japan <www.ddbj.nig.ac.jp>; the UCSC Genome Browser <www.genome.ucsc.edu>; and the Ensembl Genome Browser <www.ensembl.org>. at the Wellcome Trust Sanger Inst. in Cambridge, England. Additional information about the rhesus sequence is available through the Human Genome Sequence Center at Baylor College of Medicine <www.hgsc.bcm.tmc.edu>.

`Grants.gov` for Mac OS X

<Grants.gov> is the new unified clearinghouse for all federal grant opportunities from all federal agencies that manage grant funds. <Grants.gov> currently uses a Windows-only solution for electronic grant submission. The "PureEdge" viewer is required to complete grant application packages and, at this time, there is no native Macintosh "PureEdge" client.

IBM has acquired "PureEdge", and now calls the product "IBM Workplace Forms"; IBM plans to add Mac support in the future and <Grants.gov> has committed to providing a cross-platform solution by November, 2006. In the interim <Grants.gov>, in conjunction with NIH, has created a Citrix server solution that allows Mac OS X users to complete their application packages and submit them electronically using Mac OS X.

The University of Wisconsin has created a single preconfigured package for Mac OS X users to access this solution. This package is provided to the community as a service by the University of Wisconsin, and is not an official product of <Grants.gov>. The University of Wisconsin cannot provide support for this solution.

For more information, and to access this package, see <www.grants.gov/MacSupport>.

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Workshop Announcements

IACUC-Advanced – Davis, California

The NIH Office of Laboratory Animal Welfare (OLAW) will join the Scientists Center for Animal Welfare; the University of California–Davis; the Office of Animal Care, APHIS/USDA; GlaxoSmithKline; and Our Animal WARDS in presenting an advanced training course for members of Institutional Animal Care and Use Committees (IACUC), April 27, 2006. It will be held at the UC–Davis Activities and Recreation Center, La Rue Road and Orchard Drive, Davis, California. IACUC-Advanced is a new program to train members of IACUCs. This workshop is for experienced IACUC members and others who work with laboratory animals. The program will include small discussion groups and sharing of information among the participants on issues and controversies involving compliance with federal laws and regulations in research activities involving animals.

The latest program and registration information is posted at <scaw.com/iacuc-advanced.htm>. For questions or further information, contact Margaret Quinlan, Office of Laboratory Animal Welfare, Office of Extramural Research, 6705 Rockledge Dr., RKL 1, Suite 360, Bethesda, MD 20892-7982 [301-402-4325; fax: 301-402-2803; e-mail: *quinlanm@od.nih.gov*].

Laboratory Animal Medicine Workshop

The Charles Louis Davis, D.V.M. Foundation for the International Advancement of Education in Veterinary and Comparative Pathology sponsors a Laboratory Animal Medicine Workshop on May 11-14, 2006, at the South Theater, College of Veterinary Medicine, North Carolina State University, Raleigh. This year's agenda includes a session on Baboons, with Dr. Michelle Leland, of the Southwest Foundation for Biomedical Research. Details for registration may be found at: <www.afip.org/CLDavis>.

2006 Primate Pathology Workshop

The Paul-Ehrlich-Institut will host the 2006 Primate Pathology Workshop (PPW) on September 21 and 22, 2006, at Paul-Ehrlich-Str. 51-59, 63225 Langen, Germany. The workshop will be coordinated and held in conjunction with the German Primate Center in Göttingen, Germany.

This year's PPW will consist of short case presentations of interesting nonhuman primate material (10-minute presentations with 5 minutes for discussion) on September 21. There may be time for an optional tour of the Institute's facilities at the end of the day. On September 22 there will be a bus trip to the German Primate Center, where some presentations will be given on primate research (in Germany and in Europe). A tour of the Primate Center facilities is offered.

The deadline for registration and submission of cases is July 15, 2006. There is a $50 registration fee. For a registration form or to ask questions, contact Roland Plesker [0049-6103-77-8000; e-mail: *plero@pei.de*].

IACUC 101 and Beyond

The IACUC 101 series of training programs is designed to provide IACUC members, administrators, veterinarians, animal care staff, researchers, regulatory personnel, and compliance officers with information on the role and responsibilities of IACUCs. <grants.nih.gov/grants/olaw/iacuc101s.htm> provides information on hosting a 101, the 2006 schedule of OLAW-sponsored 101s, and descriptions of each program in the series. The following is the 2006 schedule. Questions should be directed to Mary Lou James [e-mail: *mljames@mo.net*].

- April 19-20: IACUC 101 and IACUC 201; Virginia Commonwealth University, Richmond.
- May 8: IACUC 101; The University of Texas at Austin.
- September 26: IACUC 101; California Biomedical Research Association, South San Francisco.
- November 8-9: IACUC 101/201 PLUS; Tripler Army Medical Center and the University of Hawaii, Manoa, Honolulu.

Education and Training at ACLAM Forum

The 2006 American College of Laboratory Animal Medicine (ACLAM) Forum Committee invites you to attend the 25th ACLAM Forum from June 25-29th at the Loews Don Cesar Beach Front Resort in St. Petersburg, Florida. The Forum theme is "New Frontiers in Education and Training: Better Learning for Laboratory Animal Veterinarians, Their Families, Students, Co-Workers, and the Public". *You do not need to be a member of ACLAM to attend the Forum.* The keynote speech, "Learning in Theory and Practice", will be delivered by Dr. William C. Rando of Yale University. Early registration closes on June 2, 2006. Registration information and additional details can be found at <www.aclam.org>.

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Meeting Announcements

The New York Consortium in Evolutionary Primatology (NYCEP) invites you to attend the following lectures in **The New York Regional Primatology Colloquium**. All talks will be held in the Science Center (Rm 4102) at the CUNY Graduate Center, 365 Fifth Avenue (between 35th & 34th streets), New York City.

- **Thursday, April 27, 7:30 p.m.** Dr. Joanna Lambert, University of Wisconsin at Madison: "Evolution of primate nutritional niches: Implications for interpreting species richness and coexistence."
- **Thursday, May 11, 7:30 p.m.** Dr. Patrick Hof, Mt Sinai School of Medicine: "Neuronal phenotypes in the mammalian neocortex – An evolutionary perspective."

Dinner with the speaker is open to all each evening and will normally follow the talks. Please contact Prof. Roberto Delgado at <*rdelga@hunter.cuny.edu*> if you have any questions or to request dinner information.

The **45th Annual Symposium of the Canadian Association for Laboratory Animal Science/Association Canadienne Pour la Science des Animaux de Laboratoire** will be held in Montreal, Quebec, May 27-30th. The program theme, *Thinking Outside the Box*, addresses non-traditional approaches to traditional laboratory animal species as well as issues related to large animal species in the vivarium. The program will touch upon a number of highly relevant topics for those in lab animal science, including the promise of stem cell technology in medicine, rodent transportation, new approaches for rodent and nonhuman primate refinement, emerging diseases of laboratory swine, a primer on rodent breeding techniques, rodent pain and sexual behavior, and international trends in laboratory animal science. Over 20 workshops are available. Visit <www.calas-ascal.org> for more information and online registration.

The Poznań Zoological Garden and the Institute of Systematic Zoology of the University of Adam Mickiewicz at Poznań are hosting the **III International Conference: "Animals, Zoos and Conservation"**, June 8-9, 2006. For information, contact "ZOO Conference", Ogród Zoologiczny w Poznaniu, Ul. Browarna 25, 61-063 Poland [+48 61-870 95 02; fax: +48 61 877 35 33; e-mail: *conference@op.pl* or *oo.cwiertnia@interia.pl* or *zoo@zoo.poznan.pl*]; or see <www.zoo.poznan.pl>. The Conference will be held in English. The scope of lectures will not be limited, but all should be related to research done on active conservation and animals held in zoos, rescue centers, and scientific collections.

The 4th International Veterinary Vaccines and Diagnostics Conference will be held June 25-29, 2006, in Oslo, Norway. For information, see <www.veso.no/IVVDC%202006>.

The Animal Behaviour and Welfare Group at the University of Bristol invites you to attend the **40th International Congress for Applied Ethology**. The Congress will be held in Bristol, England, August 8-12, 2006. The main theme of the meeting is "Applying Ethology: Links Between Fundamental and Applied Research". See the International Society for Applied Ethology's Website: <www.applied-ethology.org>; and the conference Website: <www.isae2006.co.uk>.

On August 14, 2006, as part of its **43rd annual meeting, the Animal Behavior Society** will host a special session exploring the relationship between knowledge of primate behavior and the ability to provide for the welfare of primates, both in the wild and in captivity. This session will be held in memory of Dr. Sylvia Taylor, an active ABS member and the primate field specialist for the USDA, APHIS, at the time of her unexpected death in January, 2005. The session will bring together people from the fields of primatology, ethology, conservation biology, and applied animal behavior, along with anyone else interested in primate behavior and/or welfare, for a discussion in which all can work together to improve our knowledge and care of the animals Dr. Taylor loved.

For information on the meeting, to be held August 12-16 at the Snowbird Ski and Summer Resort, Utah, see <www.animalbehavior.org/ABS/Meetings/Snowbird06>, and see <www.animalbehavior.org/ABSCentralOffice/sylviataylorsession>.

The **13th Biennial Meeting of the International Society for Comparative Psychology** will be held in Christchurch, New Zealand, August 31 to September 3, 2006. The program will include oral presentations (including questions), symposia, posters, and keynote addresses. The call for papers will be made shortly along with the provision of detailed information regarding registration, accommodation, social events, etc., and a registration form for completion. In the meantime, inquiries of a general nature should be addressed to: Rob Hughes, Chair, Program and Organizing Committees, Dept of Psychology, Univ. of Canterbury, Christchurch, New Zealand [e-mail: *rob.hughes@canterbury.ac.nz*].

The **American Association of Zoo Veterinarians** will hold its **Annual Conference** September 20-24, 2006, in Tampa, Florida. Session topics will include anesthesia, aquatic species medicine, avian contraception, career management, carnivores, diagnostics and imaging, information technology and bioinformatics, megavertebrates, noninfectious diseases, pathology, primates, reptiles and amphibians, sanctuary medicine, small mammals, treatment of chronic diseases and pain, welfare, and wildlife health and conservation. See <www.aazv.org>.

The **24th Annual Symposium on Nonhuman Primate Models for AIDS** will be held October 4-7, 2006, at the Omni Hotel at CNN Center, Atlanta, Georgia, hosted by the Yerkes NPRC, Emory University. For more information call 404-727-7732; fax: 404-727-3108; e-mail: <*NHPM2006@rmy.emory.edu*>; or see <www.yerkes.emory.edu/NHPM2006>.

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Call for Submissions – *Comparative Medicine*

As a new feature of the journal *Comparative Medicine*, the October issue will annually feature a Special Focus topic of general relevance to large segments of the biomedical research community. For the 2006 Special Focus issue, the Editors are seeking the submission of original data-based research and scholarly reviews relevant to the topic "Natural and induced infectious diseases in laboratory animals". All papers submitted for the Special Focus issue will undergo the normal process of peer review, and must be accepted in final form prior to August 15, 2006, to be considered for inclusion in the Special Focus issue. In the event that more meritorious submissions are received than can be included in one issue, some submissions may be published in the December, 2006, issue, with the determination made at the discretion of the editors based on content.

To be eligible for inclusion in the Special Focus issue, manuscripts must be submitted no later than June 1. Late submissions will be considered, but manuscripts submitted after the deadline may not complete the peer review and revision process in time for inclusion in the special issue. All manuscripts must be submitted online as follows: prior to April 1: <jaalas.allentrack.net>; later: <mc.manuscriptcentral.com/aalas/cm>.

As part of the online submission, please include a note in the "Comments from Authors" section, indicating that the manuscript is being submitted in response to the call for papers for the Special Topic issue.

If you have any questions about this call for papers, you may contact Linda Toth, Editor-in-Chief [e-mail: *ltoth@siumed.edu*]; Ravi Tolwani, Associate Editor [e-mail: *rtolwani@stanford.edu*]; Nicole Brown, AALAS Editorial Coordinator [e-mail: *Nicole.Brown@aalas.org*]; or the AALAS Editorial Office [e-mail: *journals@aalas.org*].

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Call for Award Nominations: Lab Products Animal Technician Award

Lab Products, Inc., announces the 3rd Annual Lab Products Animal Technician Awards Program. This program is intended to reward deserving animal care technicians with the opportunity to attend their first National American Association for Laboratory Animal Science Meeting. One award recipient will be selected from each of the eight AALAS Districts and Canada. The award will be limited to animal care personnel, with at least one year of laboratory animal care experience, who have never attended a National AALAS Meeting. The recipients of the Lab Products Animal Technician Award will each receive an award recognition plaque; airfare, hotel and registration for the National AALAS Meeting; one year's membership in National AALAS; and $250 to cover incidentals while attending the AALAS Meeting.

Nominations, which must be received by June 15, are to be submitted by letter, detailing the technician's work history, accomplishments, and community involvement, and describing how this travel award will benefit the technician and his/her facility. AALAS/CALAS Branch membership, and involvement in branch AALAS/CALAS activities, will be considered in the award selection. Supporting letters are encouraged and will be considered, but are not required.

Send nominations to: Lab Products, Inc., P.O. Box 639, Seaford, DE 19973 [800-526-0469; fax: 302-628-4309]: Attn: Awards Selection Committee.

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

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Non-Sustainable Hunting of Belizean Primates

Clara Jones writes to *Primate-Science:* "I am continuing a project initiated in 2001 on non-sustainable hunting of Belizean primates. If you have knowledge of bushmeat hunting activity in Belize that increases pressure on primates [*Alouatta pigra* (the black howler monkey) and/or *Ateles geoffroyi* (the Central American spider monkey)], please complete the survey below and return it to me, at the (e-mail or snail-mail) address here. All individuals providing information who choose not to remain anonymous will be acknowledged generously if/when their responses are utilized.

"If you do not choose to complete the survey but have information on hunting of Belizean primates, I would be very interested in receiving your anecdotal or other comments.

"Thank you for your attention."

Clara B. Jones, Dept of Psychology, Fayetteville State University, 1200 Murchison Rd, Fayetteville, NC 28301 [910-672-1575; e-mail: *cbjones@uncfsu.edu* or *theoreticalprimatology@hotmail.com*]. See also <clara.jones.socialpsychology.org> and <www.robertwilliams.org/tpp>.

Hunting Monkeys in Belize: Who, Where, and How Much?

1. What is your affiliation? (Please circle identity of your organization.)
   a. Ministry of Natural Resources and the Environment, Commerce, and Industry
   b. Programme for Belize
   c. Belize Audubon Society
   d. Other_____

2. To my knowledge, the following groups hunt monkeys in Belize:
   a. British soldiers: Yes_____ No_____ Don't Know_____
   b. Loggers: Yes_____ No_____ Don't Know_____
   c. Chinese immigrants: Yes_____ No_____ Don't Know_____
   d. Immigrants from El Salvador: Yes_____ No_____ Don't Know_____
   e. Other (Please name group(s):_____
   _____

3. Please indicate areas of the country with the greatest hunting pressure on monkey populations. Which groups (see #2 above) are responsible for the hunting activity in these areas?

AREA OF BELIZE	GROUP RESPONSIBLE FOR HUNTING IN THIS AREA OF BELIZE

4. To my knowledge, monkeys are hunted primarily for the following reasons:
   a. To sell, for bushmeat, pelts, or live animals (national, regional, or international): Yes_____ No_____ Don't Know_____
   b. Bushmeat for household consumption, not sold: Yes_____ No_____ Don't Know_____
   c. For fun: Yes_____ No_____ Don't Know_____
   d. Because they are pests: Yes_____ No_____ Don't Know_____
   e. Other (Please list other reasons for hunting of monkeys):_____
   _____

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Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

Books

• *Our Inner Ape: A Leading Primatologist Explains Why We Are Who We Are.* F. de Waal. New York: Riverhead Books, 2005. [Price: $24.95]

• *Seasonality in Primates: Studies of Living and Extinct Human and Non-Human Primates*. D. K. Brockman & C. P. van Schaik (Eds.). New York: Cambridge University Press, 2005. [Price: $120]

Contents: *I. Introduction*: Seasonality in primate ecology, reproduction, and life history: An overview, by C. P. Van Schaik & D. K. Brockman.

II. Seasonal habitats: Tropical climates and phenology: A primate perspective, by C. P. Van Schaik & K. R. Pfannes.

III. Seasonality and behavioral ecology: The influence of seasonality on primate diet and ranging, by C. A. Hemingway & N. Bynum; Seasonality in predation risk: Varying activity periods in lemurs and other primates, by M. A. Rasmussen; Physiological adaptations to seasonality in nocturnal primates, by J. Schmid & P. M. Kappeler; Seasonality and long-term change in a savanna environment, by S. C. Alberts, J. A. Hollister-Smith, R. S. Mututua, S. N. Sayialel, P. M. Muruthi, J. K. Warutere, & J. Altmann; Day length seasonality and the thermal environment, by R. Hill; Seasonality in hunting by non-human primates, by J. C. Mitani & D. P. Watts; and Human hunting seasonality, by R. Buege Bird & D. W. Bird.

IV. Seasonality, reproduction, and social organization: Seasonality and reproductive function, by D. K. Brockman & C. P. Van Schaik; Seasonality of primate births in relation to climate, by C. Janson & J. Verdolin; Energetic responses to food availability in the great apes: Implications for hominin evolution, by C. D. Knott; Human birth seasonality, by P. T. Ellison, C. R. Valeggia, & D. S. Sherry; and Seasonality, social organization, and sexual dimorphism in primates, by J. M. Plavcan, C. P. Van Schaik, & W. S. Mcgraw.

V. Seasonality and community ecology: Seasonality and primate communities, by C. P. Van Schaik, R. Madden, & J. U. Ganzhorn; and Primate diversity and environmental seasonality in historical perspective, by N. G. Jablonski.

VI. Seasonality and human evolution: Tropical and temperate seasonal influences on human evolution, by K. E. Reed & J. L. Fish; and Orbital controls on seasonality, by J. D. Kingston; What do studies of seasonality in primates tell us about human evolution? by D. K. Brockman.

• *Mammal Species of the World: A Taxonomic and Geographic Reference* (3rd Ed.). D. E. Wilson & D. A. M. Reeder (Eds.). Baltimore, MD: Johns Hopkins University Press, 2005. [Price: $125]

The classic reference book on the taxonomic classification and distribution of the more than 5400 species of mammals that exist today.

• *Nursery Rearing of Nonhuman Primates in the 21st Century*. G. P. Sackett, G. C. Ruppenthal, & K. Elias (Eds.). New York: Springer Science+Business Media, Inc., 2005. [Price: $149.00]

Contents: *Preface*: Our Historical Note.

Section I: Introduction: The history of nursery rearing and a glimpse into the future; The effects of rearing Experiences: The early years, by M. A. Novak & G. P. Sackett; The changing role of hand rearing in zoo-based primate breeding programs, by I. Porton & K. Niebruegge; Animal welfare regulations and nursery rearing, by C. M. Crockett; Data management for the nonhuman primate nursery, by J. C. Ha & A. E. Davis; and Very early rearing experience: Rationale and methodologies for studying prenatal development in nonhuman primates, by M. F. S. X. Novak.

Section 2: Introduction: Methods and outcomes for infrequently hand-reared species; The effect of hand rearing on the sexual and maternal competence of three species of lemurs, *Varecia variegata, Varecia rubra*, and *Eulemur macaco*, by K. Niebruegge & I. Porton; Nursery-reared prosimian primates, by M. K. Izard; and Hand rearing of infant common marmosets (*Callithrix jacchus*), by B. Voelkl & L. Huber.

Section 3: Introduction: Methods and outcomes for frequently hand-reared species; Immunological consequences of nursery rearing, by G. R. Lubach and C. L. Coe; Special challenges of rearing infant macaques infected with lentivirus (SIV, HIV, SHIV), by J. M. Worlein, J. C. Ha, C. Harris, J. Leigh, K. Stratton, & R. J. R. Ho; Nursery rearing and biobehavioral organization, by J. P. Capitanio, W. A. Mason, S. P. Mendoza, L. DelRosso, & J. A. Roberts; Neurobehavioral assessment of nonhuman primate neonates, by M. L. Schneider, M. Champoux, & C. F. Moore; Is it nutrients or nurturing? Comparison of the growth and development of mother-reared and laboratory-reared macaque infants (*Macaca nemestrina*), by D. L. Durham & L. L. Newell-Morris; Baboon nursery rearing practices and comparisons between nursery-reared and mother-reared individuals, by L. Brent & A. Bode; Early rearing conditions and captive chimpanzee behavior: Some surprising findings, by M. A. Bloomsmith, K. C. Baker, S. R. Ross, & S. P. Lambeth; and Effects of early rearing history on growth and behavioral development in captive chimpanzees (*Pan troglodytes*), by S. M. Howell, M. Schwandt, J. Fritz, M. W. Marzke, J. Murphy, & D. Young.

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

Section 4: Introduction: Nursery care methodology, and testing techniques for the future; Squirrel monkeys as an example of primate nursery medicine, by A. G. Brady, S. V. Gibson, L. E. Williams, & C. R. Abee; Nursery care of at-risk nonhuman primates, by G. C. Ruppenthal & G. P. Sackett; A quick and effective method for establishing self-feeding in stump-tailed macaques (*Macaca arctoides*), by A. S. Chamove; Saliva as a medium for assessing cortisol and other compounds in nonhuman primates: Collection, assay, and examples, by M. L. Laudenslager, T. Bettinger, & G. P. Sackett; The SPIT method for simultaneous and unobtrusive collection of salivary cortisol from individually housed infant monkeys, by P. G. Roma; Actimetry measurement of behavioral regulation and sleep cycles in infant rhesus macaques (*Macaca mulatta*), by P. J. Pierre, A. J. Bennett, & S. J. Suomi; Noninvasive neuroimaging techniques for the study of primate brain development, by J. K. Rilling; and Tethering with maternal and fetal catheterization as a model for studying pre- to postnatal continuities, by M. F. S. X. Novak.

Section 5: Introduction: Hematology and serum chemistry values; Hematology and serum chemistry in young captive chimpanzees (*Pan troglodytes*), by S. M. Howell, K. Hoffman, J. Fritz, & M. Schwandt; Hematology and serum chemistry reference values for rhesus macaque (*Macaca mulatta*) infants, by J. P. Capitanio; Hematology and serum chemistry reference values for pigtailed macaque (*Macaca nemestrina*) infants, by E. Rainwater; and Hematology and serum chemistry reference values for mother-reared squirrel monkey (*Saimiri boliviensis boliviensis*) infants, by L. E. Williams.

• *World Atlas of Great Apes and Their Conservation*. J. Caldecott & L. Miles (Eds.). Berkeley: Univ. of California Press, 2005. [Price: $45]

This book presents the work of an alliance of many of the world's leading great ape research and conservation organizations. Bringing together United Nations agencies, governments, foundations, and private-sector interests, the project aims to raise the international profile of great ape conservation and to build the political will for further action. Readers learn about work being done by specific organizations in support of great ape conservation, and where conservation is most needed and most likely to be effective.

• *Monkey Farm: A History of the Yerkes Laboratories of Primate Biology, Orange Park, Florida, 1930-1965*. D. A. Dewsbury. Lewisburg, PA: Bucknell University Press, 2006. [Price: $55]

The "Monkey Farm" was founded as the Laboratories of Comparative Psychobiology of Yale University by Robert M. Yerkes. During its 35-year history, the Yerkes Laboratories became the largest and most important collection of chimpanzees for research in the world and was home to some of the leading behavioral scientists of the time. After 11 years, Robert Yerkes retired as director and was succeeded by Karl Lashley, and the laboratories came under the joint sponsorship of Harvard and Yale. In 1956 sponsorship was shifted to Emory University. With the founding of a well-funded program of Regional Primate Research Centers by the federal government, Emory officials decided to seek Primate Center status and move the Laboratories to their home campus in Atlanta, Georgia. This period of the Laboratories' life, 1930-1965, coincides with the period of fundamental change in patronage for science in the United States. Thus, the history of this facility can be seen as a case study of the impact of this fundamental change on a scientific institution from dominance by private foundations to that of federal funding for research.

• *Interpreting the Past: Essays on Human, Primate, and Mammal Evolution*. D. E. Lieberman, R. J. Smith, & J. Kelley (Eds.). Leiden: Brill Academic Publishers, 2005. [Price: $50]

Contents: Estimating hominoid phylogeny from morphological data: Character choice, phylogenetic signal and postcranial data, by N. M. Young; The Napak hominoid: Still Proconsul major, by L. MacLatchy & J. B. Rossie; Testing models of faunal turnover with neogene mammals from Pakistan, by C. Badgley, S. Nelson, J. Barry, A. K. Behrensmeyer, & T. Cerling; The paleoenvironmental context of Siwalik Miocene vertebrate localities, by A. K. Behrensmeyer, C. Badgley, J. C. Barry, M. Morgan, & S. M. Raza; Of mice... again: The Siwalik rodent record, murine distribution, and molecular clocks, by L. L. Jacobs & L. J. Flynn; New lower primates from the Miocene Siwaliks of Pakistan, by L. J. Flynn & M. E. Morgan; The last common ancestor of apes and humans, by P. Andrews & T. Harrison; Twenty-five years contemplating Sivapithecus taxonomy, by J. Kelley; Habitat requirements and the extinction of the Miocene ape, Sivapithecus, by S. V. Nelson; Lots of faces from different places: What craniofacial morphology doesn't tell us about hominoid phylogenetics, by B. Brown, J. Kappelman, & S. Ward; When it rains it pours: Legends and realities of the East African pluvials, by J. D. Kingston & A. Hill; Species recognition in paleoanthropology: Implications of small sample sizes, by R. J. Smith; Chad, Central Africa: Searching west of the Rift Valley for a new understanding of the hominid origin, by M. Brunet, F. Guy, & P. Vignaud; The Delta hypothesis, by R. C. Wrangham; GD 2 in situ assemblage, Northwest Province South Africa, by J. W. Adams & G. C. Conroy; The Kapthurin formation: What we know now that we didn't know then, by S. McBrearty; Apples and oranges: Morphological versus behavioral transitions in the Pleistocene, by D. E. Lieberman & O. Bar-Yosef; and Energy metabolism and transitions in human life histories, by P. T. Ellison.

Magazines and Newsletters

• *Boletín de la Asociación Primatológica Española*, September, 2004, *11*[3]. [Depto. de Psicobiología, Buzón 50,

Fac. de Psicología, Univ. Complutense de Madrid, Campus de Somosaguas, 28223 Madrid, Spain; also at <www.uam.es/ape>.]

Contents include an article about the Camaroon Wildlife Aid Fund, by Lorena Aguirrer, a recent volunteer: "CWAF, una organización dedicada a la conservación en Camerún".

• *Boletín de la Asociación Primatológica Española*, July, 2005, *12*[1-2]. [Address same as above.]

Contents include a detailed description of Vallée des Singes in France: "Descubrimos la Vallée des Singes?" by A. Bóveda Penalba and N. Venegas Martín.

• *Folia Primatologica*, 2005, *76*[6].

Contents: Artificial neural networks and three-dimensional digital morphology: A pilot study, by R. L. King, A. L. Rosenberger, & L. Kanda; Dental microwear variability on buccal tooth enamel surfaces of extant catarrhini and the Miocene fossil *Dryopithecus laietanus* (Hominoidea), by J. Galbany, S. Moyà-Solà, & A. Pérez-Pérez; and The impact of geophagy on ranging behaviour in Phayre's leaf monkeys *(Trachypithecus phayrei),* by G. Pages, E. Lloyd, & S. A. Suarez.

• *IPPL News,* December, 2005, *32*[3]. [International Primate Protection League, P.O. Box 766, Summerville, SC 29484; e-mail: *info@ippl.org*]

Issue dedicated to Dian Fossey, on the 20th anniversary of her death.

• *Neotropical Primates: A Journal and Newsletter of the IUCN/SSC Primate Specialist Group*, December 2004, *12*[3].

Contents: The mottled-face tamarin, *Saguinus inustus*, in the Amanã Sustainable Development Reserve, Amazonas, Brazil, by L. L. de Souza, H. L. Queiroz, & J. M. Ayres; Preliminary observations on the mottled-face tamarin (*Saguinus inustus*) on the lower Río Caquetá, Colombian Amazonia, by E. Palacios, A. Rodríguez, & C. Castillo; Movements of *Alouatta palliata* among forest fragments in Los Tuxtlas, Mexico, by S. Mandujano, L. A. Escobedo-Morales, & R. Palacios-Silva; Aspects of the behavioral and endocrine ontogeny of six moustached tamarins, *Saguinus mystax* (Callitrichinae), by M. Huck, P. Löttker, E. W. Heymann, & M. Heistermann; Social structure of *Alouatta guariba clamitans*: A group with a dominant female, by J. M. D. Miranda, I. P. Bernardi, R. F. Moro-Rios, L. M. Aguiar, G. Ludwig, & F. C. Passos; Substrate manipulation by *Alouatta guariba clamitans* in solving a locomotor problem, by F. Koch & J. C. Bicca-Marques; Novos registros de muriqui-do-norte (*Brachyteles hypoxanthus*) no Vale do Rio Jequitinhonha, Minas Gerais e Bahia, by F. R. Melo, A. G. Chiarello, M. B. Faria, P. A. Oliveira, R. L. A. Freitas, F. S. Lima, & D. S. Ferraz; Planted trees as corridors for primates at El Zota Biological Field Station, Costa Rica, by J. Luckett, E. Danforth, K. Linsenbardt, & J. Pruetz; Further information on neotropical monkeys reported in the XVI century, by B. Urbani; and The meanings of *Cacajao* and Uacari: Folk etymology in neotropical primate taxonomy, by A. A. Barnett; and In memoriam: Harald Sioli.

• *Neotropical Primates: A Journal and Newsletter of the IUCN/SSC Primate Specialist Group*, April 2005, *13*[1].

Contents: Deslocamento terrestre e o comportamento de beber em um Grupo de Barbados (*Alouatta guariba clamitans* Cabrera, 1940) em Minas Gerais, Brasil, by B. Almeida-Silva, P. G. Guedes, J. P. Boubli, & K. B. Strier; Discriminative feeding on legumes by mantled howler monkeys (*Alouatta palliata*) may select for persistence, by C. B. Jones; Getting the hang of it: Age differences in tail-use by mantled howling monkeys (*Alouatta palliata*), by S. M. Russak; predation of a bearded saki (*Chiropotes utahicki*) by a harpy eagle (*Harpia harpyja*), by S. de Souza Martins, E. Moreira de Lima, & J. de Sousa e Silva, Jr.; The near extinction of a population of northern muriquis (*Brachyteles hypoxanthus*) in Minas Gerais, Brazil, by F. R. de Melo, B. A. P. Cosenza, D. S. Ferraz, S. L. F. Souza, M. S. Nery, & M. J. R. Rocha; Limites climáticos e vegetacionais das distribuições de *Cebus nigritus* e *Cebus robustus* (Cebinae, Platyrrhini), by R. Vilanova, J. de Sousa e Silva Júnior, C. E. Viveiros Grelle, Ga. Marroig, & R. Cerqueira; Structure and composition of wild black howler troops (*Alouatta caraya*) in gallery forests of the Argentinean chaco, by C. P. Juárez, R. Dvoskin, & E. Fernández-Duque; and The parasite behavior hypothesis and the use of sleeping sites by black howler monkeys (*Alouatta caraya*) in a discontinuous forest, by M. Kowalewski & G. E. Zunino .

• *NEWSLETTER: Animal Behavior Society*, 2006, *51*[1]; <www.animalbehavior.org/ABS/Newsletters/Directory>.

Special Journal Issues

• Animal models of diseases related to the fetus and newborn. *ILAR Journal*, 2005, *47*[1].

Contents include: Knowledge gained from animal studies of the fetus and newborn: Application to the human premature infant, by E. B. Gauda; and Nonhuman primate models of intrauterine cytomegalovirus infection, by P. A. Barry, K. M. Lockridge, S. Salamat, Sp. P. Tinling, Y. Yue, S. S. Zhou, S. M. Gospe, Jr., W. J. Britt, & A. F. Tarantal.

• Nonhuman primates. *Tech Talk: The Newsletter for Laboratory Animal Science Technicians*, 2005, *10*[3]; <www.aalas.org/pdfUtility.aspx?pdf=TT/10_3.pdf>.

Contents: Stock tanks for yearlong primate enrichment, by J. Rawlins; Foraging device for cynomolgus macaques, by J. W. Deck, T. Gipe, J. Pizzaia, & W. Shotwell; Tech tip – It makes good scents, by J. Ellis; Look what's hanging around! Foraging feeder cup puzzles for cynomolgus macaques, by M. Blanchard, S. Gruver, P. Kirk, V.

McLain, & M. Zebrun; A tale of two cynos, By H. Spencer; Primate Popsicles, By Jennifer Schafer, Hand-rearing at a UK cyno breeding facility; and What's the difference between Old World and New World primates?

• Recent advances in color vision research. H. M. Buchanan-Smith (Issue Ed.). *American Journal of Primatology*, 2005, *67*[4].

Contents: Introduction: Recent advances in color vision research, by H. M. Buchanan-Smith; Comparative use of color vision for frugivory by sympatric species of platyrrhines, by K. E. Stoner, P. Riba-Hernández, & P. W. Lucas; Sugar concentration of fruits and their detection via color in the Central American spider monkey (*Ateles geoffroyi*), by P. Riba-Hernández, K. E. Stoner, & P. W. Lucas; Advantage of dichromats over trichromats in discrimination of color-camouflaged stimuli in nonhuman primates, by A. Saito, A. Mikami, S. Kawamura, Y. Ueno, C. Hiramatsu, K. A. Widayati, B. Suryobroto, M. Teramoto, Y. Mori, K. Nagano, K. Fujita, H. Kuroshima, & T. Hasegawa; Influence of stimuli size on color discrimination in capuchin monkeys, by Ú. R. Gomes, D. M. A. Pessoa, E. Suganuma, C. Tomaz, & V. F. Pessoa; Color-vision polymorphism in wild capuchins (*Cebus capucinus*) and spider monkeys (*Ateles geoffroyi*) in Costa Rica, by C. Hiramatsu, T. Tsutsui, Y. Matsumoto, F. Aureli, L. M. Fedigan, & S. Kawamura; Color vision pigment frequencies in wild tamarins (*Saguinus* spp.), by A. K. Surridge, S. S. Suárez, H. M. Buchanan-smith, A. C. Smith, & N. I. Mundy; Demonstration of a genotype-phenotype correlation in the polymorphic color vision of a non-callitrichine New World monkey, capuchin (*Cebus apella*), by A. Saito, S. Kawamura, A. Mikami, Y. Ueno, C. Hiramatsu, K. Koida, K. Fujita, H. Kuroshima, & T. Hasegawa; and Color vision in marmosets and tamarins: behavioral evidence, by D. M. A. Pessoa, C. Tomaz, & V. F. Pessoa.

• Cathemerality. *Folia Primatologica,* 2006, *77*[1-2].

Contents: Preface, by D. J. Curtis, G. Donati, & M. A. Rasmussen; The concept of cathemerality: History and definition, by I. Tattersall; Polyphasic activity patterns in small mammals, by S. Halle; Eye morphology in cathemeral lemurids and other mammals, by E. C. Kirk; A re-evaluation of the role of vision in the activity and communication of nocturnal primates, by S. K. Bearder, K. A. I. Nekaris, & D. J. Curtis; Why be diurnal? Or, Why not be cathemeral? by R. A. Hill; Chronobiological background to cathemerality: Circadian rhythms in *Eulemur fulvus albifrons* (Prosimii) and *Aotus azarai boliviensis* (Anthropoidea), by H. G. Erkert & B. Cramer; Influence of abiotic factors on cathemeral activity: The case of *Eulemur fulvus collaris* in the littoral forest of Madagascar, by G. Donati & S. M. Borgognini-Tarli; Cathemerality and lunar periodicity of activity rhythms in owl monkeys of the Argentinian Chaco, by E. Fernandez-Duque & H. G. Erkert; A note on the activity cycle of captive white-fronted lemurs *(Eulemur fulvus albifrons),* by S. Y. Traber & A. E. Müller; Predation and cathemerality, by I. C. Colquhoun; Cathemerality in the Mayotte brown lemur *(Eulemur fulvus)*: Seasonality and food quality, by L. Tarnaud; and The evolution of cathemerality in primates and other mammals: A comparative and chronoecological approach, by D. J. Curtis & M. A. Rasmussen.

Animal Models

• Testing for localized stimulus enhancement and object movement reenactment in pig-tailed macaques (*Macaca nemestrina*) and young children (*Homo sapiens*). Rigamonti, M. M., Custance, D. M., Previde, E. P., & Spiezio, C. (Centro Di Primatologia HSR, Via Olgettina, 60, Milan 20132, Italy [e-mail: *marco.rigamonti@hsr.it*]). *Journal of Comparative Psychology*, 2005, *119*, 257-272.

Four puzzle boxes were used to investigate localized stimulus enhancement and object movement reenactment (OMR) in 13 pig-tailed macaques and 30 human infants. Participants received contrasting demonstrations on each box. A circular lid was gripped by its rim or handle and swiveled to the left or right. A flap door was pushed or flipped. A sliding lid was pushed to the left or right. A pin bolt was demonstrated being pushed down, or the participants were left to solve the puzzle for themselves. Despite the fact that the monkeys watched the demonstrations about 60% of the time, only a weak OMR effect was found on the sliding lid. In contrast, the children watched significantly more, and there was clear evidence of socially mediated learning on all of the boxes.

• Adaptation of *Plasmodium vivax* to growth in owl monkeys (*Aotus nancymai*). Williams, A. M., Barefield, S. J., Carter, E. R., Collins, W. E., Sullivan, J. S., & Tate, M. K. (4770 Buford Hwy MSF33, Bldg 15, Chamblee, GA 30341*). Comparative Medicine*, 2005, *55*, 528-532.

A need arose for malarial parasites for use in serologic and molecular studies and for teaching slides. This particular strain of parasite had been characterized previously as producing high-density parasitemia in splenectomized New World monkeys and therefore represented a good candidate for reactivation. *P. vivax* (Vietnam II), isolated in 1970, was reactivated after adaptation in *Aotus lemurinus griseimembra* monkeys nearly 33 years earlier and adapted to *A. nancymai* monkeys. Passage was achieved by intravenous inoculation of parasite blood stages into splenectomized *A. nancymai* monkeys. Parasitemia was determined by analyzing daily blood smears stained with Giemsa. Maximum parasite counts ranged from 10,630 to 94,000 parasites/microl; the mean maximum parasite count for the four animals was 39,565 parasites/microl. Parasite counts of > 10,000/microl were maintained for 2 to 64 days. After only three passages of the parasite, attempts to reactive were successful. *A. nancymai* proved a suitable animal model for the recovery of this parasite. In conclusion, successful reactivation and adaptation of this parasite offers the capability to perform a series of diagnostic, im-

munologic, and molecular studies as well as to provide otherwise potentially unavailable teaching materials to healthcare professionals.

• A T-cell HCV vaccine eliciting effective immunity against heterologous virus challenge in chimpanzees. Folgori, A., Capone, S., Ruggeri, L., Meola, A., Sporeno, E., Ercole, B. B., Pezzanera, M., Tafi, R., Arcuri, M., Fattori, E., Lahm, A., Luzzago, A., Vitelli, A., Colloca, S., Cortese, R., & Nicosia, A. (A. N., Ist. di Ricerche di Biol. Mol. "P. Angeletti," via Pontina km30,600, 00040 Pomezia, Rome, Italy [e-mail: *alfredo_nicasia@merck.com*]). *Nature Medicine,* 2006*, 12*, 190-197.

"Three percent of the world's population is chronically infected with the hepatitis C virus (HCV) and at risk of developing liver cancer. Effective cellular immune responses are deemed essential for spontaneous resolution of acute hepatitis C and long-term protection. Here we describe a new T-cell HCV genetic vaccine capable of protecting chimpanzees from acute hepatitis induced by challenge with heterologous virus. Suppression of acute viremia in vaccinated chimpanzees occurred as a result of massive expansion of peripheral and intrahepatic HCV-specific $CD8^+$ T lymphocytes that cross-reacted with vaccine and virus epitopes. These findings show that it is possible to elicit effective immunity against heterologous HCV strains by stimulating only the cellular arm of the immune system, and suggest a path for new immunotherapy against highly variable human pathogens like HCV, HIV or malaria, which can evade humoral responses."

• The primate amygdala represents the positive and negative value of visual stimuli during learning. Paton, J. J., Belova, M. A., Morrison, S. E., & Salzman, C. D. (C. D. S., Columbia Univ., 1051 Riverside Dr., Unit 87, New York, NY 10032 [e-mail: *cds2005@columbia.edu*]). *Nature,* 2006, *439*, 865-870.

"Visual stimuli can acquire positive or negative value through their association with rewards and punishments, a process called reinforcement learning. Although we now know a great deal about how the brain analyses visual information, we know little about how visual representations become linked with values. To study this process, we turned to the amygdala, a brain structure implicated in reinforcement learning. We recorded the activity of individual amygdala neurons in monkeys while abstract images acquired either positive or negative value through conditioning. After monkeys had learned the initial associations, we reversed image value assignments. We examined neural responses in relation to these reversals in order to estimate the relative contribution to neural activity of the sensory properties of images and their conditioned values. Here we show that changes in the values of images modulate neural activity, and that this modulation occurs rapidly enough to account for, and correlates with, monkeys' learning. Furthermore, distinct populations of neurons encode the positive and negative values of visual stimuli. Behavioral and physiological responses to visual stimuli may therefore be based in part on the plastic representation of value provided by the amygdala."

• Maternal mediation, stress inoculation, and the development of neuroendocrine stress resistance in primates. Parker, K. J., Buckmaster, C. L., Sundlass, K., Schatzberg, A. F., & Lyons, D. M. (Dept of Psychiatry & Behavioral Sci., Stanford Univ., 1201 Welch Rd, MSLS P104, Stanford, CA 94305-5485 [e-mail: *kjparker@stanford.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2006, *103*, 3000-3005.

"The stress inoculation hypothesis presupposes that brief intermittent stress exposure early in life induces the development of subsequent stress resistance in human and nonhuman primates. Rodent studies, however, suggest a role for maternal care rather than stress exposure per se (i.e., the maternal mediation hypothesis). To investigate these two hypotheses, we examined maternal care and the development of stress resistance after exposure to brief intermittent infant stress (IS), mother–infant stress (MIS), or no stress (NS) protocols administered to 30 monkeys between postnatal weeks 17 and 27. Unlike rodents, the IS condition did not permanently increase primate maternal care, nor did measures of total maternal care predict subsequent offspring hypothalamic–pituitary–adrenal-axis responsivity. Although MIS infants received less maternal care than IS and NS infants, both IS and MIS monkeys developed subsequent stress resistance. These findings indicate that rearing differences in the development of stress resistance are more closely related to differences in prior stress exposure than to differences in maternal care. A second experiment confirmed this conclusion in a different cohort of 25 monkeys exposed as infants to high foraging-demand (HFD) or low foraging-demand (LFD) conditions. HFD infants exhibited intermittent elevations in cortisol levels and received less maternal care than LFD infants. In keeping with a key prediction of the stress inoculation hypothesis, HFD males responded to stress in adulthood with diminished hypothalamic–pituitary–adrenal-axis activation compared with LFD males. Results from both experiments demonstrate that stress inoculation, rather than high levels of maternal care, promotes the development of primate stress resistance."

• Prolonged diabetes reversal after intraportal xenotransplantation of wild-type porcine islets in immunosuppressed nonhuman primates. Hering, B. J., Wijkstrom, M., Graham, M. L., Hårdstedt, M., Aasheim, T. C., Jie, T., Ansite, J. D., Nakano, M., Cheng, J., Li, W., Moran, K., Christians, U., Finnegan, C., Mills, C. D., Sutherland, D. E., Bansal-Pakala, P., Murtaugh, M. P., Kirchhof, N., & Schuurman, H.-J. (Diabetes Inst. for Immunology and Transplantation, Dept of Surgery, Univ. of Minnesota, 424 Harvard St SE, Minneapolis, MN 55455 [e-mail: *bhering@umn.edu*]). *Nature Medicine*, 2006, *12,* 301-303.

"Cell-based diabetes therapy requires an abundant cell source. Here, we report reversal of diabetes for more than 100 d in cynomolgus macaques after intraportal transplantation of cultured islets from genetically unmodified pigs without Gal-specific antibody manipulation. Immunotherapy with CD25-specific and CD154-specific monoclonal antibodies, FTY720 (or tacrolimus), everolimus and leflunomide suppressed indirect activation of T cells, elicitation of non-Gal pig-specific IgG antibody, intragraft expression of proinflammatory cytokines and invasion of infiltrating mononuclear cells into islets."

• Long-term survival of neonatal porcine islets in nonhuman primates by targeting costimulation pathways. Cardona, K., Korbutt, G. S., Milas, Z., Lyon, J., Cano, J., Jiang, W., Bello-Laborn, H., Hacquoil, B., Strobert, E., Gangappa, S., Weber, C. J., Pearson, T. C., Rajotte, R. V., & Larsen, C. P. (R. V. R., Surgical-Medical Research Inst., Univ. of Alberta, 1074 Dentistry/Pharmacy Ctr., Edmonton, Alberta, T6G 2N8, Canada [e-mail: *rrajotte@ualberta.ca*]). *Nature Medicine*, 2006*, 12*, 304-306.

"We evaluated the ability of neonatal porcine islets to engraft and restore glucose control in pancreatectomized rhesus macaques. Although porcine islets transplanted into nonimmunosuppressed macaques were rapidly rejected by a process consistent with cellular rejection, recipients treated with a CD28-CD154 costimulation blockade regimen achieved sustained insulin independence (median survival, >140 days) without evidence of porcine endogenous retrovirus dissemination. Thus, neonatal porcine islets represent a promising solution to the crucial supply problem in clinical islet transplantation."

Behavior

• Cooperative problem solving by tufted capuchin monkeys (*Cebus apella*): Spontaneous division of labor, communication, and reciprocal altruism. Hattori, Y., Kuroshima, H., & Fujita, K. (Dept of Psychology, Grad. Sch. of Letters, Yoshida-honmachi, Kyoto 606-8501, Japan [e-mail: *Yuko.Hattori@L03.mbox.media.kyoto-u.ac.jp*]). *Journal of Comparative Psychology,* 2005, *119,* 335-342.

Using an experimentally induced cooperation task, the authors investigated whether tufted capuchin monkeys share the following three characteristics of cooperation with humans: division of labor, communication, and reciprocal altruism. In Experiment 1, the authors trained individual monkeys to perform the necessary sequence of actions for rewards and tested them in pairs to assess whether they could solve the task by spontaneously dividing the sequence of actions. All pairs solved this task. In Experiment 2, monkeys worked in the cooperation task and a task requiring no partner help. They looked at the partner significantly longer in the former task than in the latter, but communicative intent could not be determined. In Experiment 3, only one of two participants obtained a reward on each trial. Monkeys maintained cooperation when their roles were reversed on alternate trials. Their cooperative performances demonstrated division of labor; results suggest task-related communication and reciprocal altruism.

• The win-stay rule in foraging decisions by free-ranging titi monkeys (*Callicebus cupreus cupreus*) and tamarins (*Saguinus imperator imperator* and *Saguinus fuscicollis weddelli*). Bicca-Marques, J. C. (Fac. de Biociências, Pontifícia Univ. Católica do Rio Grande do Sul, Av. Ipiranga 6681 Pd 12A, Porto Alegre, RS 90619-900, Brazil [e-mail: *jcbicca@pucrs.br*]). *Journal of Comparative Psychology*, 2005, *119*, 343-351.

Rainforest primates need to apply distinct foraging rules for efficiently using the spatial knowledge of the distribution of resources showing different temporal patterns of renewal. A win-stay rule is very important for exploiting abundant, long-lasting resources. Here, the author tests the use of this rule in wild groups of emperor tamarins, saddle-back tamarins, and titi monkeys during a series of foraging tasks. Four feeding stations composed of 8 visually similar feeding platforms (2 containing a food reward and 6 containing a sham reward) were constructed. The location of food rewards was reliable during some experiments and unreliable during others. All three species consistently adopted a win-stay rule for returning to reward platforms when their location was predictable over time but stopped using it when their spatial distribution changed randomly across experimental trials.

• Factors influencing the prevalence and handedness for throwing in captive chimpanzees (*Pan troglodytes*). W. D. Hopkins, J. L. Russell, C. Cantalupo, H. Freeman, & S. J. Schapiro (Div. of Psychobiol., Yerkes NPRC, Emory Univ., 954 Gatewood Rd, Atlanta, GA 30322 [e-mail: *lrcbh@rmy.emory.edu*]). *Journal of Comparative Psychology,* 2005, *119,* 363-370.

Humans throw right-handed, and it has been suggested that the neurophysiological demands of aimed throwing may have served as a precursor to the evolution of left hemisphere specialization for linguistic functions. Although there are descriptions of throwing by wild and captive chimpanzees, systematic observations of aimed throwing and handedness have not been reported. In this article, evidence of population-level right-handedness for throwing is reported in two samples of captive chimpanzees. It is further reported that right-handed throwing is more pronounced than other measures of handedness in captive chimpanzees. The implications of these findings are discussed in the context of theories relating throwing to the evolution of lateralization for language functions.

• Attention to combined attention in New World monkeys (*Cebus apella, Saimiri sciureus*). J. R. Anderson, H. Kuroshima, Y. Hattori, & K. Fujita (Dept of Psychology, Univ. of Stirling, Stirling FK9 4LA, Scotland [e-mail: *jral@stir.ac.uk*]). *Journal of Comparative Psychology,* 2005, *119,* 461-464.

Co-orientation by capuchin and squirrel monkeys was recorded in response to familiar humans abruptly switching the direction of their visual attention. Co-orientation occurred more frequently overall in capuchins than squirrel monkeys. Capuchins showed a tendency to habituate within trials involving consecutive attention switches performed by two different people, whereas squirrel monkeys co-oriented more when the second attention switch was by a second actor. These results suggest variable attention-processing abilities in New World monkeys, including differences in summation of attention by others.

• Policing stabilizes construction of social niches in primates. Flack, J. C., Girvan, M., de Waal, F. B. M., & Krakauer, D. C. (Santa Fe Inst., Santa Fe, NM 87501 [e-mail: *jflack@santafe.edu*]). *Nature,* 2006, *439,* 426-429.

"All organisms interact with their environment, and in doing so shape it, modifying resource availability. Termed niche construction, this process has been studied primarily at the ecological level with an emphasis on the consequences of construction across generations. We focus on the behavioral process of construction within a single generation, identifying the role a robustness mechanism—conflict management—has in promoting interactions that build social resource networks or social niches. Using 'knockout' experiments on a large, captive group of pigtailed macaques (*Macaca nemestrina*), we show that a policing function, performed infrequently by a small subset of individuals, significantly contributes to maintaining stable resource networks in the face of chronic perturbations that arise through conflict. When policing is absent, social niches destabilize, with group members building smaller, less diverse, and less integrated grooming, play, proximity and contact-sitting networks. Instability is quantified in terms of reduced mean degree, increased clustering, reduced reach, and increased assortativity. Policing not only controls conflict, we find it significantly influences the structure of networks that constitute essential social resources in gregarious primate societies. The structure of such networks plays a critical role in infant survivorship, emergence and spread of cooperative behavior, social learning and cultural traditions."

• Chimpanzees recruit the best collaborators. Melis, A. P., Hare, B., & Tomasello, M. (Max Planck Inst. for Evolutionary Anthropol., Leipzig, D-04103, Germany [e-mail: *melis@eva.mpg.de*]). *Science,* 2006, *311*, 1297-1300.

"Humans collaborate with non-kin in special ways, but the evolutionary foundations of these collaborative skills remain unclear. We presented chimpanzees with collaboration problems in which they had to decide when to recruit a partner and which potential partner to recruit. In an initial study, individuals recruited a collaborator only when solving the problem required collaboration. In a second study, individuals recruited the more effective of two partners on the basis of their experience with each of them on a previous day. Therefore, recognizing when collaboration is necessary and determining who is the best collaborative partner are skills shared by both chimpanzees and humans, so such skills may have been present in their common ancestor before humans evolved their own complex forms of collaboration."

Conservation

• The frontiers of India's biological diversity. Borges, R. M. (Centre for Ecological Sciences, Indian Institute of Science, Bangalore 560 012, India). *Tropinet*, 2005, *16*[3], 1-3, <www.atbio.org/tn_v16_n3.pdf>.

Disease

• Resistance of *Plasmodium falciparum* field isolates to in-vitro artemether and point mutations of the SERCA-type PfATPase6. Jambou, R., Legrand, E., Niang, M., Khim, N., Lim, P., Volney, B., Ekala, M. T., Bouchier, C., Esterre, P., Fandeur, T., & Mercereau-Puijalon, O. (Inst. Pasteur de Dakar, 36 Ave. Pasteur, Unité d'Immunologie, P.O. Box 220, Dakar, Senegal [e-mail: *rjambou@pasteur.sn*]). *Lancet,* 2005, *366,* 1960-1963.

"Artemisinin derivatives are an essential component of treatment against multidrug-resistant *Plasmodium falciparum* malaria. We aimed to investigate in-vitro resistance to artemisinin derivatives in field isolates. In-vitro susceptibility of 530 *P. falciparum* isolates from three countries (Cambodia, French Guiana, and Senegal) with different artemisinin use was assessed with an isotopic microtest. Artemether IC50 up to 117 and 45 nmol/L was seen in French Guiana and Senegal, respectively. DNA sequencing in a subsample of 60 isolates lends support to SERCA-*PfATPase6* as the target for artemisinins. The S769N *PfATPase6* mutation, noted exclusively in French Guiana, was associated with raised (> 30 nmol/L) artemether IC50s ($p < 0{\cdot}0001$, Mann-Whitney). All resistant isolates came from areas with uncontrolled use of artemisinin derivatives. This rise in resistance indicates the need for increased vigilance and a coordinated and rapid deployment of drug combinations."

• Gene-specific countermeasures against ebola virus based on antisense phosphorodiamidate morpholino oligomers. Warfield, K. L., Swenson, D. L., Olinger, G. G., Nichols, D. K., Pratt, W. D., Blouch, R., Stein, D. A., Aman, M. J., Iversen, P. L., & Bavari, S. (S. B., USAMRIID, Fort Detrick, Frederick, MD 21701 [e-mail: *sina.bavari@amedd.army.mil*]). *PLOS Pathogens, 2006, 2*(1); <pathogens.plosjournals.org>.

The filoviruses Marburg virus and Ebola virus (EBOV) quickly outpace host immune responses and cause hemorrhagic fever, resulting in case fatality rates as high as 90% in humans and nearly 100% in nonhuman primates. The development of an effective therapeutic for EBOV is a daunting public health challenge and is hampered by a paucity of knowledge regarding filovirus pathogenesis.

This report describes a successful strategy for interfering with EBOV infection using antisense phosphorodiamidate morpholino oligomers (PMOs). A combination of EBOV-specific PMOs targeting sequences of viral mRNAs for the viral proteins (VPs) VP24, VP35, and RNA polymerase L protected rodents in both pre- and post-exposure therapeutic regimens. In a prophylactic proof-of-principal trial, the PMOs also protected 75% of rhesus macaques from lethal EBOV infection. The work described here may contribute to development of designer, "druggable" countermeasures for filoviruses and other microbial pathogens.

• Disseminate cryptococcosis in a guenon (*Cercopithecus ascanius*). Helke, K. L., Denver, M. C., Bronson, E., & Mankowski, J. L. (J. L. M., Johns Hopkins Univ. School of Medicine, Dept of Comp. Med., 733 N. Broadway, BRB 835, Baltimore, MD 21205-2196 [e-mail: *jmankows@jhmi.edu*]). *Veterinary Pathology*, 2006, *43***,** 75-78.

A 23-year-old captive-bred red-tailed guenon with a brief history of inappetence, lethargy, and seizures was submitted for necropsy. On postmortem examination, multiple cryptococcomas were identified in brain and heart. *Cryptococcus neoformans* organisms were also identified microscopically in kidney, eye, and pancreas. Fungal yeast formed rare pseudohyphae. The histologic diagnosis of cryptococcosis was confirmed by a positive test for *C. neoformans* antigen in a serum sample. Immunohistochemical staining confirmed that macrophages were the principal inflammatory cell in brain lesions and often contained phagocytosed yeast. As disseminate cryptococcosis is often associated with immune suppression, serology and immunohistochemical staining for simian immunodeficiency virus were performed but showed no evidence of SIV infection.

• A new bacillus anthracis found in wild chimpanzees and a gorilla from West and Central Africa. Leendertz, F. H., Yumlu, S., Pauli, G., Boesch, C., Couacy-Hymann, E., Vigilant, L., Junglen, S., Schenk, S., & Ellerbrok, H. (H. E., Robert Koch-Institut, Center for Biological Safety, Berlin, Germany [e-mail: *EllerbrokH@rki.de*]). *PLoS Pathogens*, 2006, *2*[1]; <pathogens.plosjournals.org>.

"We determined that anthrax infection caused the sudden deaths of six wild chimpanzees in the Taï National Park, Côte d'Ivoire in 2001/2002 and in three chimpanzees and one gorilla found dead more than 1,000 mi to the east, at the northern periphery of the Dja Reserve, Cameroon, in 2004/2005. In order to characterize the *B. anthracis* isolates from a totally new habitat that were responsible for the death of wild great apes that died in Côte d'Ivoire and Cameroon, we performed VNTR analyses on DNA isolated from tissue samples and bones of these great apes. Surprisingly, for the isolates from both outbreaks, three of the six genomic VNTRs were clearly different from those of any previously described strain, as is evident from the phylogenetic tree analysis. The strain from Côte d'Ivoire, named *B. anthracis* CI (Côte d'Ivoire), and the strain from Cameroon, named *B. anthracis* CA (Cameroon) are clearly distinct from group A and group B strains. They establish a separate branch with a new 'forest anthrax cluster', termed 'F', suggesting that *B. anthracis* is a far less homogeneous species than is currently believed. No differences were found among the six cases from Côte d'Ivoire, and also the four anthrax isolates from the three chimpanzees and the gorilla from Cameroon were identical."

• Antiviral treatment is more effective than smallpox vaccination upon lethal monkeypox virus infection. Stittelaar, K. J., Neyts, J., Naesens, L., van Amerongen, G., van Lavieren, R. F., Holý, A., De Clercq, E., Niesters, H. G. M., Fries, E., Maas, C., Mulder, P. G. H., van der Zeijst, B. A. M., & Osterhaus, A. D. M. E. (A.D.M.E.O., Department of Virology, Erasmus MC, 3000 DR Rotterdam, The Netherlands [e-mail: *a.osterhaus@erasmusmc.nl*]). *Nature,* 2006, *439*, 745-748.

"There is concern that variola virus, the aetiological agent of smallpox, may be used as a biological weapon. For this reason several countries are now stockpiling (vaccinia virus-based) smallpox vaccine. Although the preventive use of smallpox vaccination has been well documented, little is known about its efficacy when used after exposure to the virus. Here we compare the effectiveness of (1) post-exposure smallpox vaccination and (2) antiviral treatment with either cidofovir (also called HPMPC or Vistide) or with a related acyclic nucleoside phosphonate analogue (HPMPO–DAPy) after lethal intratracheal infection of cynomolgus monkeys (*Macaca fascicularis*) with monkeypox virus (MPXV). MPXV causes a disease similar to human smallpox and this animal model can be used to measure differences in the protective efficacies of classical and new-generation candidate smallpox vaccines. We show that initiation of antiviral treatment 24 h after lethal intratracheal MPXV infection, using either of the antiviral agents and applying various systemic treatment regimens, resulted in significantly reduced mortality and reduced numbers of cutaneous monkeypox lesions. In contrast, when monkeys were vaccinated 24 h after MPXV infection, using a standard human dose of a currently recommended smallpox vaccine (Elstree-RIVM), no significant reduction in mortality was observed. When antiviral therapy was terminated 13 days after infection, all surviving animals had virus-specific serum antibodies and antiviral T lymphocytes. These data show that adequate preparedness for a biological threat involving smallpox should include the possibility of treating exposed individuals with antiviral compounds such as cidofovir or other selective anti-poxvirus drugs."

Evolution, Genetics, and Taxonomy

• Ancient and recent positive selection transformed opioid cis-regulation in humans. Rockman, M. V., Hahn, M. W., Soranzo, N., Zimprich, F., Goldstein, D. B., & Wray, G. A.

Dept of Biology, Duke Univ., Durham, NC [e-mail: *mrockman@princeton.edu*]). *PLoS Biology,* 2005, *3*[12]; <biology.plosjournals.org>.

"Changes in the cis-regulation of neural genes likely contributed to the evolution of our species' unique attributes, but evidence of a role for natural selection has been lacking. We found that positive natural selection altered the cis-regulation of human prodynorphin, the precursor molecule for a suite of endogenous opioids and neuropeptides with critical roles in regulating perception, behavior, and memory. Independent lines of phylogenetic and population genetic evidence support a history of selective sweeps driving the evolution of the human prodynorphin promoter. In experimental assays of chimpanzee-human hybrid promoters, the selected sequence increases transcriptional inducibility. The evidence for a change in the response of the brain's natural opioids to inductive stimuli points to potential human-specific characteristics favored during evolution. In addition, the pattern of linked nucleotide and microsatellite variation among and within modern human populations suggests that recent selection, subsequent to the fixation of the human-specific mutations and the peopling of the globe, has favored different prodynorphin cis-regulatory alleles in different parts of the world."

• Morphological affinities of the *Sahelanthropus tchadensis* (Late Miocene hominid from Chad) cranium. Guy, F., Lieberman, D. E., Pilbeam, D., Ponce de León, M., Likius, A., Mackaye, H. T., Vignaud, P., Zollikofer, C., & Brunet, M. (D. P., Peabody Museum, Harvard University, 11 Divinity Avenue, Cambridge, MA [e-mail: *pilbeam@fas.harvard.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, *102*, 18836-18841.

"The recent reconstruction of the *Sahelanthropus tchadensis* cranium (TM 266-01-60-1) provides an opportunity to examine in detail differences in cranial shape between this earliest-known hominid, African apes, and other hominid taxa. Here we compare the reconstruction of TM 266-01-60-1 with crania of African apes, humans, and several Pliocene hominids. The results not only confirm that TM 266-01-60-1 is a hominid but also reveal a unique mosaic of characters. The TM 266-01-60-1 reconstruction shares many primitive features with chimpanzees but overall is most similar to *Australopithecus*, particularly in the basicranium. However, TM 266-01-60-1 is distinctive in having the combination of a short subnasal region associated with a vertical upper face that projects substantially in front of the neurocranium. Further research is needed to determine the evolutionary relationships between *Sahelanthropus* and the known Miocene and Pliocene hominids."

• Placing confidence limits on the molecular age of the human-chimpanzee divergence. Kumar, S., Filipski, A., Swarna, V., Walker, A., & Hedges, S. B. (Biodesign Building A-240, Arizona State Univ., Tempe, AZ 85287-5301 [e-mail: *skumar@asu.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2005, *102*, 18842-18847.

"Molecular clocks have been used to date the divergence of humans and chimpanzees for nearly four decades. Nonetheless, this date and its confidence interval remain to be firmly established. In an effort to generate a genomic view of the human-chimpanzee divergence, we have analyzed 167 nuclear protein-coding genes and built a reliable confidence interval around the calculated time by applying a multifactor bootstrap-resampling approach. Bayesian and maximum likelihood analyses of neutral DNA substitutions show that the human–chimpanzee divergence is close to 20% of the ape-Old World monkey (OWM) divergence. Therefore, the generally accepted range of 23.8-35 millions of years ago for the ape-OWM divergence yields a range of 4.98-7.02 millions of years ago for human-chimpanzee divergence. Thus, the older time estimates for the human-chimpanzee divergence, from molecular and paleontological studies, are unlikely to be correct. For a given ape-OWM divergence time, the 95% confidence interval of the human-chimpanzee divergence ranges from -12% to 19% of the estimated time. Computer simulations suggest that the 95% confidence intervals obtained by using a multifactor bootstrap-resampling approach contain the true value with >95% probability, whether deviations from the molecular clock are random or correlated among lineages. Analyses revealed that the use of amino acid sequence differences is not optimal for dating human-chimpanzee divergence and that the inclusion of additional genes is unlikely to narrow the confidence interval significantly. We conclude that tests of hypotheses about the timing of human-chimpanzee divergence demand more precise fossil-based calibrations."

• Variable molecular clocks in hominoids. Elango, N., Thomas, J. W., NISC Comparative Sequencing Program, & Yi, S. V. (S. V. Y., School of Biology, Georgia Institute of Technology, Atlanta, GA 30332 [e-mail: *soojinyi@gatech.edu*]). *Proceedings of the National Academy of Sciences, USA*, 2006, *103*, 1370-1375

"Generation time is an important determinant of a neutral molecular clock. There are several human-specific life history traits that led to a substantially longer generation time in humans than in other hominoids. Indeed, a long generation time is considered an important trait that distinguishes humans from their closest relatives. Therefore, humans may exhibit a significantly slower molecular clock as compared to other hominoids. To investigate this hypothesis, we performed a large-scale analysis of lineage-specific rates of single-nucleotide substitutions among hominoids. We found that humans indeed exhibit a significant slowdown of molecular evolution compared to chimpanzees and other hominoids. However, the amount of fixed differences between humans and chimpanzees appears extremely small, suggesting a very recent evolution of human-specific life history traits. Notably, chimpanzees also exhibit a slower rate of molecular evolution compared to gorillas and orangutans in the regions analyzed."

• Body size, body proportions, and encephalization in a Middle Pleistocene archaic human from northern China. Rosenberg, K. R., Zuné, L., & Ruff, C. B. (Dept of Anthropology, Univ. of Delaware, Newark, DE 19716 [e-mail: *krr@udel.edu*]). *Proceedings of the National Academy of Sciences, U.S.A.*, 2006, *103*, 3552-3556.

The unusual discovery of associated cranial and postcranial elements from a single Middle Pleistocene fossil human allows us to calculate body proportions and relative cranial capacity (encephalization quotient) for that individual rather than rely on estimates based on sample means from unassociated specimens. The individual analyzed here (Jinniushan) from northeastern China at 260,000 years ago is the largest female specimen yet known in the human fossil record and has body proportions (body height relative to body breadth and relative limb length) typical of cold-adapted populations elsewhere in the world. Her encephalization quotient of 4.15 is similar to estimates for late Middle Pleistocene humans that are based on mean body size and mean brain size from unassociated specimens.

Instruments and Techniques

• Safe and efficient collection of cytokine-mobilized peripheral blood cells from cynomolgus monkeys (*Macaca fascicularis*) with human newborn-equivalent body weights. Ageyama, N., Hanazono, Y., Shibata, H., Ono, F., Ogawa, H., Nagashima, T., Ueda, Y., Yoshikawa, Y., Hasegawa, M., Keiya Ozawa, K., & Terao, K. (Tsukuba Primate Research Center, 1 Hachimandai, Tsukuba, Ibaraki 305-0843, Japan [e-mail: *ageyama@nibio.go.jp*]). *Experimental Animals*, 2005, *54*, 421-428.

"Hematopoietic stem cells in bone marrow can be mobilized into peripheral blood by cytokine administration. Cytokine-mobilized peripheral blood stem cells are of great use in clinical applications. We previously established a modified procedure for the collection of cytokine-mobilized peripheral blood cells from rhesus monkeys using a commercially available apparatus originally developed for human subjects. In this study, we examined the efficacy and safety of this method with even smaller macaques, cynomolgus monkeys, which are equivalent to human newborns in body weight (mean = 3.3 kg). Using the manufacturer's unmodified protocol (n = 6), one monkey died of cardiac failure and three developed severe anemia. In contrast, using our modified procedure (n = 6), no such complication was observed in any animal. In addition, the harvested nuclear cell, mononuclear cell and $CD34^+$ cell counts were significantly higher with the modified method. The modified method should allow safe and efficient collection of cytokine-mobilized peripheral blood cells from non-human primates as small as human newborns in a non-invasive manner."

• Aerial surveys give new estimates for orangutans in Sabah, Malaysia. Ancrenaz, M., Gimenez, O., Ambu, L., Ancrenaz, K., Andau, P., Goossens, B., Payne, J., Sawang, A., Tuuga, A., & Lackman-Ancrenaz , I. (Kinabatangan Orang-utan Conservation Project, Sandakan, Sabah, Malaysia). *PLoS Biology*, 2005, *3*[1]; <biology.plosjournals.org>.

"Great apes are threatened with extinction, but precise information about the distribution and size of most populations is currently lacking. We conducted orangutan nest counts in the Malaysian state of Sabah (North Borneo), using a combination of ground and helicopter surveys, and provided a way to estimate the current distribution and size of the populations living throughout the entire state. We show that the number of nests detected during aerial surveys is directly related to the estimated true animal density and that a helicopter is an efficient tool to provide robust estimates of orangutan numbers. Our results reveal that with a total estimated population size of about 11,000 individuals, Sabah is one of the main strongholds for orangutans in North Borneo. More than 60% of orangutans living in the state occur outside protected areas, in production forests that have been through several rounds of logging extraction and are still exploited for timber. The role of exploited forests clearly merits further investigation for orangutan conservation in Sabah."

• Comparative studies with six extenders for sperm cryopreservation in the cynomolgus monkey (*Macaca fascicularis*) and rhesus monkey (*Macaca mulatta*). Li, Y., Cai, K., Li, J., Dinnyes, A., & Ji, W. (W. J., Kunming Inst. of Zoology, Chinese Acad. of Sci., 32 Jiaochang Donglu, Kunming, Yunnan 650223, People's Republic of China [e-mail: *wji@mail.kiz.ac.cn*]). *American Journal of Primatology*, 2006, *68*, 39-49.

Ejaculated spermatozoa from cynomolgus monkeys and rhesus monkeys were frozen in straws with six different extenders (TTE, DM, mDM, LG-DM, G-DM, and TCG) containing glycerol. Sperm motility and head membrane and acrosomal integrity were evaluated after freezing and thawing, and the cryoprotective effects were compared among the extenders and the two species studied. The results showed that sperm motility and motility recovery with the six extenders were comparable for the cynomolgus and rhesus monkeys. There was no significant difference in sperm motility and head membrane integrity among the six extenders in either the cynomolgus or rhesus monkeys ($P>0.05$). However, a slightly but statistically lower percentage of acrosomal integrity was found with TCG in both species compared to the other extenders ($P<0.05$). These findings demonstrate that TTE, DM, mDM, LG-DM, G-DM, and TCG are equally suitable extenders for the cryopreservation of spermatozoa from cynomolgus and rhesus monkeys.

• Effect of sugar type on the survival of frozen-thawed rhesus monkey (*Macaca mulatta*) sperm. Si, W., Wang, H., Reid, C., Hildebrandt, T. B., &L Ji, W. (W. J., address

same as above). *American Journal of Primatology*, 2006, *68*, 103-108.

"Sperm-freezing extenders supplemented with sugar or a combination of different sugars are widely used for the cryopreservation of nonhuman primate spermatozoa. Understanding which sugar or combination of sugars offers the highest level of cryoprotection would be beneficial for the development of sperm-freezing extenders. In the present study we aimed to investigate the effect of glucose, lactose, and raffinose separately or in combination on the cryosurvival of rhesus monkey spermatozoa. Toward that end, we prepared eight extenders by adding various types of sugars to a basic medium (BM): G-BM (0.3 M glucose), L-BM (0.3 M lactose), R-BM (0.3 M raffinose), LG-BM (0.15 M lactose+0.15 M glucose), RG-BM (0.15 M raffinose+0.15 M glucose), LR-BM (0.15 M lactose+0.15 M raffinose), and LRG-BM (0.1 M lactose+0.1 M raffinsoe+0.1 M glucose). A saline control (0.157 M sodium chloride) was also used. The results showed no significant difference in post-thaw motility when spermatozoa were frozen with G-BM, L-BM, LG-BM, RG-BM, and LRG-BM, but the post-thaw motility was significantly lower when it was frozen with R-BM, LR-BM, and the saline control. The highest plasma membrane integrity was achieved when spermatozoa were frozen with G-BM, L-BM, LG-BM, RG-BM, and LRG-BM, and the highest acrosome integrity was achieved with G-BM, L-BM, LG-BM, RG-BM, LRG-BM, and the saline control. The results indicate that the various sugars offered different protective effects. For the cryopreservation of rhesus monkey spermatozoa, glucose (monosaccharide) and lactose (disaccharide) were shown to be more suitable than raffinose (trisaccharide) for preserving spermatozoal motility, plasma membrane, and acrosome. Specifically, raffinose was detrimental to sperm acrosome integrity."

• Microsatellite markers for standardized genetic management of captive colonies of rhesus macaques (*Macaca mulatta*). Kanthaswamyi, S., von Dollen, A., Kurushima, J. D., Alminas, O., Rogers, J., Ferguson, B., Lerche, N. W., Allen, P. C., & Smith, D. G. (Primate Population Genetics Unit, Veterinary Genetics Laboratory, Univ. of California, Davis, CA 95616 [e-mail: *skanthaswamy@ucdavis.edu*]). *American Journal of Primatology*, 2006, *68*, 73-95.

"To preserve genetic variability and minimize genetic subdivision among captive *Macaca mulatta* at each of the U.S. National Institutes of Health-sponsored regional research colonies, the genetic structure of each colony must be characterized. To compare population genetic and demographic parameters across colonies and generations, one standard panel of highly informative genetic markers is required. We assembled a core marker set of four multiplex polymerase chain reaction (PCR) panels comprising 15 autosomal short tandem repeat (STR) loci with high information content selected from existing panels of well-characterized markers that are currently used for parentage assessment and genetic management of rhesus macaques. We then assessed the effectiveness of these loci for providing high probabilities of individual identification and parentage resolution, and for estimating population genetic parameters that are useful for genetic management."

Reproduction

• Mate guarding and paternity in mandrills: Factors influencing alpha male monopoly. Setchell, J. M., Charpentier, M., & Wickings, E. J. (Dept of Biological Anthropology, University of Cambridge, U.K. [e-mail: *mandrills@yahoo.co.uk*]). *Animal Behaviour,* 2005, *70,* 1105-1120.

"We used long-term data on mate guarding and paternity in mandrills, *Mandrillus sphinx*, (1) to examine cycle day and cycle selection by males; (2) to examine associations between male rank, periovulatory mate guarding and paternity outcome; (3) to test the predictions of the priority-of-access model; and (4) to investigate factors influencing the ability of alpha males to monopolize females. Males mate-guarded on periovulatory days more than on other receptive days, and during conceptive cycles more than during nonconceptive cycles. Both periovulatory mate guarding and paternity outcome correlated significantly with male rank. Alpha males accounted for 94% of periovulatory mate guarding and 69% of paternity, confirming the existence of extremely high reproductive skew in this highly sexually dimorphic species. The fit of the observed distributions of mate guarding and paternity to predictions from the priority-of-access model was good, but in both cases the alpha males accounted for a greater proportion of reproduction than predicted. Mate guarding was a good predictor of paternity, but consistently overestimated the reproductive success of the alpha male. Splitting data into group-years revealed that the percentage of mate guarding by the alpha male decreased with increasing numbers of adult males, and the percentage of paternity decreased with increasing numbers of reproductive males (all postpubertal males). Furthermore, mate guarding became less effective as the number of reproductive males increased. We attribute this to the fact that only males aged 8 years or more mate-guarded, but that all males aged at least 3.8 years may sneak copulations, reducing the effectiveness of mate guarding and therefore reducing paternity concentration in the alpha male."

Supply

• Monkey business. Mandavilli, A. *Nature Medicine,* 2006, *12,* 266-267, <www.nature.com/nm/journal/v12/n3/full/nm0306-266.html>

A news feature: "China is preparing to become the world's supplier of research primates. But are Western scientists ready to buy?"

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