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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. Subscribers outside the United States are asked to pay US\$20.00 per year mailing charges. (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** Current and back issues of the *Newsletter* are available on the World Wide Web at <http://www.brown.edu/primate>. Since these free sources are available, we are asking readers who can use them, but who *prefer* to get the paper issues, to send us an annual donation of at least \$10 to help with printing and paper costs. Subscribers outside the U.S., that's in addition to mailing charges, please.

The publication lag is typically no longer than the three months between issues and can be as short as a few weeks. The deadline for inclusion of a note or article in any given issue of the *Newsletter* has in practice been somewhat flexible, but is technically the tenth of December, March, June, or September, depending on which issue is scheduled to appear next. Reprints will not be supplied under any circumstances, but authors may reproduce their own articles in any quantity.

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

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

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Using Fewer Research Animals

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The Problem

Most of us are probably using more animals than necessary in our research.

Commonly, when we wish to carry out an experiment, we decide on the number of subjects to use based upon

- How many subjects there are *available*,
 - The *cost* to us or to them of the test procedure, and
 - Some *intuitive feeling* about how many are necessary.
- The “gut-feeling” estimation method usually overestimates the number of subjects needed because humans are not good judges of probability. So how should we decide how many animals we need?

One Solution: Power Analysis

One advance over just guessing at the number to use would be to do a power analysis, now made easy with computer statistics packages. The decision is based on your estimate of the magnitude of effect that you expect. The estimated subject numbers are then “fixed” until the experiment is finished.

Another Solution: Sequential Sampling

Sequential sampling techniques were developed by quality-control engineers (Pyzdek, 1989) and appear not to be known or used by behavioral researchers. These techniques are more powerful in that fewer subjects are required in order to arrive at a decision with the same degree of certainty (Edwards, 1986). Using it often reduces the number of subjects needed, *especially when the magnitude of the effect turns out to be greater than you had predicted*. Such economy is possible because the decision as to the total number of animals to test is reviewed as *each* animal’s data is collected and evaluated.

Tools

If you

1. Know the mean and variability of your population, and magnitude of effect of interest **and**
2. Are able to test your subjects one at a time **and**
3. In fact have an effect magnitude greater than you had expected,

then you can more economically carry out experiments using many fewer subjects. The information about population parameters and effect magnitude is normally available from the literature or from control data, or can be estimated as in the example below. Sequential sampling

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(and power analysis) are simple to use and readily available in at least one computer statistics package: STATISTICA™ by StatSoft®.

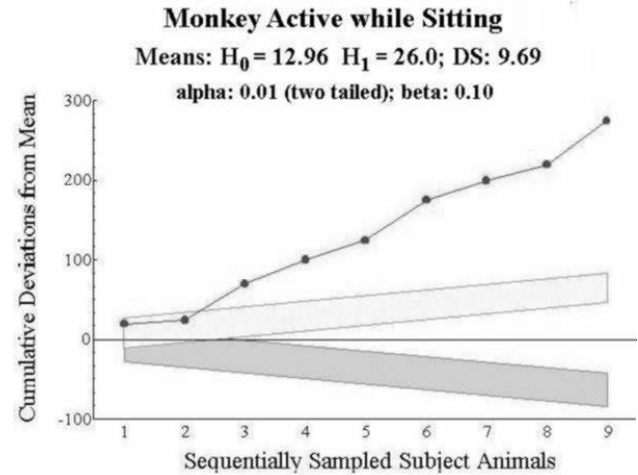


Figure 1: Output from STATISTICA showing the path the data must rise above in order to reach significance. Superimposed is actual data from this monkey enrichment experiment.

Enter the parameter values (very top of Figure 1) into the computer and the statistical package produces a plot as illustrated. You then enter the data (ascending line) from each animal sequentially. When the plot goes outside either path, significance has been achieved, testing can be stopped, and a decision made about your hypothesis. Data rising above the ascending path indicate you’ve produced a significant increase (below the descending path means a significant decrease); hovering around the zero base-line (the straight line) denotes “no effect” resulting from the experimental manipulation. If the plot remains within one of the two paths, you can conclude that your design is not powerful enough to detect an effect.

An Example

I wanted to see if providing singly-caged marmoset (*Callithrix jacchus*) monkeys with a box of wood-shavings would increase the time spent being active. (This research is illustrated in a 1990 Universities Federation for Animal Welfare video.) Before the provision of the box, they spent only 13% of the day “active while sitting” (that is the value for H_0 ; standard deviation = 9.7). For it to be worthwhile (magnitude of effect), I estimated the forage box would have to at least double the time active (that is the value for $H_1 = 26\%$ or twice 13%) at $p = 0.05$ (two-tailed as I was unsure if the box would increase or decrease activity). Before I did

the study, my subjective estimate was that I would need to test about 20 marmosets to get a reliable effect, but only nine were available and so only nine were tested.

In fact the box of wood-shavings trebled the time spent active, up to 42% of the day. If I had used *sequential sampling* procedures, I would have had to test only three monkeys before reaching significance (see data in *Figure 1*) and being able to conclude that the forage box was reliably increasing activity a “worthwhile” amount.

Meanwhile, a power analysis indicated that I would have needed to test 5.7 subjects.

In sum, my estimate was that approximately 20 animals would be needed; by default I used all nine that were available; a power analysis calculated I should test six; had I used sequential sampling procedures, I would only have needed to test three. That is an 84% reduction in the number of animals from the initial estimate, a 66% reduction from what was in fact used, and half that suggested by a power analysis (Chamove, 1997).

When you want to reduce animal numbers to the lowest number possible, especially when test procedures are aversive, *sequential sampling* is a more ethical alternative, if it can be used.

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Dietary Prevention of Iron Storage Disease in Lemurs

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Lemurs have a tendency over time in captivity to develop chronic iron storage disease (ISD). Considerable liver and kidney damage and disease is usually observed at necropsy (see, e.g., Gonzales et al., 1984). Tests have demonstrated that with dietary changes it is possible to begin to return excessive iron absorption levels back towards normal “safe” levels where ISD should not result.

The Dietary Changes Recommended

- 1) Reduce pellet use (no more than three times a week and mix with a tannin or phytate source such as tea, tamarind paste, or washed baked beans (i.e. the sugary sauce washed off. Sweetening the tea or tamarind with mashed bananas may make the mixture more palatable.) It is not recommended to eliminate pellets altogether.
- 2) Switch to low-iron pellets when they become commercially available.

- 3) Citrus fruits should not be part of a lemur’s diet.
- 4) Vitamins should be used with extreme caution.
- 5) Apples and apple juice may be beneficial.
- 6) The inclusion of tea may also be beneficial, but not exclusively in place of water.
- 7) Give a tannin source daily within an hour after the main feed and make sure some is consumed.
- 8) Increase natural browse wherever possible.

[NB: All iron-binding items should be given either with, or an hour or so after, the main feed, never before as they will not be effective. In human trials tea reduced iron absorption by 87% (Disler et al., 1975), but only when provided with or just after the main iron-containing food.]

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Ontogeny of Vocal Communication in Nonhuman Primates: A Review

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Communication in nonhuman primates can take many forms: olfactory; visual/gestural; and/or vocal. This review will focus on vocal communication and whether its developmental influences are genetic or learned, among other factors. Though current evidence is incomplete, most scientists generally agree that the ontogenies of vocalizations in nonhuman primates are probably a result of several factors: genetic fixity; learned variability by species, social organization, environment, and type of call; and physiological development. However, there is no broad consensus about the relative role of each element.

Early studies on vocal development in nonhuman primates commonly found it to be fixed at birth with little effect of experience (Nottebohm, 1972). These studies have questioned whether infant primates require acoustic feedback in order to produce species-specific repertoires. Squirrel monkeys (*Saimiri sciureus*) have provided substantial evidence supporting genetically inherited vocalizations, because they are easy to maintain in captivity and most of their vocalization falls within the range of human hearing (Biben & Bernhards, 1995). In a landmark study by Winter et al. (1973), captive female squirrel monkeys were surgically muted during pregnancy so as not to pass on normal auditory cues to their newborn infants. Within the first day after birth, the infants from both the altered and the normal groups displayed similarly structured isolation peeps, cackling, yapping, grumbling, shrieks, and alarm peep calls, and within three days after birth “location” trills began. Compared to the infants in the control group, there were no significant differences in duration or structure in the calls of infants with muted mothers, or between the calls of those infants and the call repertoires of the adults under normal conditions. This suggests that even without normal auditory input, squirrel monkey infants have an innate ability to demonstrate certain functionally and contextually correct species-specific vocal repertoires.

Another study with squirrel monkeys investigated infant isolation peeps (brief, frequency-modulated calls given by offspring when separated from mothers) in Roman Arch and Gothic Arch hybrids (named for their facial hair patterns). Lieblich et al. (1980) found that the basic calls that differentiated the two hybrids were consistent and apparent from birth, and Newman and Symmes (1982) found that the calls of the infants were structurally similar to those of their mothers.

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In certain species of nocturnal strepsirhines (*Galagidae*, *Lorisidae*, and *Cheirogaleidae* spp.), infants from birth give purr calls, scream calls, and grunt calls in situations of comfort, discomfort, hunger, injury, or anger (Kuhn, 1989; Stanger, 1988, 1993; cited in Zimmerman, 1995 and 1991). These types of calls are generally seen as involuntary and fixed at birth, reflecting emotional states and regulating the social interaction patterns between mother and infant.

Tracing inheritance patterns in nonhuman primates can present challenges because of their long lives, but some evidence for genetic vocal attributes have been found in cross-breeding and cross-fostering experiments. Two gibbon species – the Borneo gibbon (*Hylobates muelleri*) and the white-handed gibbon (*H. lar*) – were cross-bred to produce two hybrid offspring, who sang their appropriate sex-specific “parts” in gibbon songs, each with structural similarities to the same-sex parent (Marler & Tenaza, 1977). In contrast to results found in previous cross-fostering studies on macaques (Masataka & Fujita, 1989), Owren et al. (1992) found that after placing two infant rhesus monkeys (*Macaca mulatta*) with Japanese macaque (*M. fuscata*) mothers, and two infant Japanese macaques with rhesus monkey mothers, in their first week of life, no significant differences appeared in the call behavior appropriate to each species.

Different rearing conditions and their effect on chimpanzee (*Pan troglodytes*) vocalizations have been compared as well, and results have shown that the structure of whimpers and screams in infants is similar between captive and wild populations, suggesting that these sounds may be present at birth (Randolph & Mason, 1969).

Recent research continues to find evidence for genetic inheritance of call structure in certain species. In a study by Castro and Snowdon (2000), captive infant cotton-top tamarins (*Saguinus oedipus*) under twenty weeks of age were found to comprehend and “produce chirps with adult form”, suggesting that there is some fixity of chirp structure at birth.

Though inheritance of fixed call structures is generally acknowledged as a contributing factor, many scientists believe that with their high intelligence, long lives, and long periods of social development, nonhuman primates have great potential capacity for vocal learning. Learned vocalizations would naturally become more evident in studies where increased stereotypy of the known species repertoire would occur with age. Learning requires change, and “if change is predictably responsive to experiential influences, then learning may be said to occur”

(Biben & Bernhards, 1995). Some of these changes may be attributed to learning, and some to physical maturation.

Technology has facilitated our ability to investigate vocal communication through quantitative analysis by spectrograph. A recent study of squirrel monkeys improved on Winter et al.'s (1973) methodology with contrasting results. By analyzing more types of calls and using more sophisticated techniques, Hammerschmidt et al. (2001) discovered ontogenetic changes for all of the 12 call types he investigated. Most of the vocal development took place within the first four months of the squirrel monkeys' lives. These structural changes were measured using more fine-grained acoustic parameters than the previous study, allowing analyses of higher frequencies and varying durations.

There is also evidence for learned vocalizations in several species of prosimian. Zimmerman (1989) found that much of the vocal repertoire of infant Senegal galagos (*Galago senegalensis*) differed significantly from that of adults, and most of the known adult calls developed gradually after five to nine months of age. Zimmerman found similar results in 1991, concluding that for gray mouse lemurs (*Microcebus murinus*), "stabilization of a part of the vocal communication system...may be triggered by learning".

Much of the evidence for learned vocal development in primates has come from Old World species, particularly vervet monkeys (*Chlorocebus aethiops*). Dorothy Cheney and Robert Seyfarth have obtained longitudinal data on wild populations of vervets in East Africa, showing how their communication systems develop and mature. By conducting a series of playback experiments, they investigated the ontogeny of alarm calls (1980). Although they found that infant vervets produce some rudimentary alarm calls, they were significantly less sophisticated in structure than those used by adults. Most adult vervets have a repertoire that includes acoustically distinct calls for leopards, martial eagles, pythons, and baboons. Infant vervets both call and respond in a more generalized way, only distinguishing between terrestrial and aerial predators, for example. Infants also gave alarm calls to arbitrary species and objects that posed little or no threat, such as pigeons and falling leaves. This suggests that vocal development in vervets occurs gradually over a number of years.

Other evidence for gradual learning in vervets was found in studies conducted on grunts, a type of contact or cohesion call found in many Old World species (Seyfarth & Cheney, 1986). Many types of grunts are distinguishable by the monkeys themselves and by sonogram analysis, but humans find them difficult to differentiate acoustically. It is generally thought that grunts and other contact calls play an important role in the social cohesion of group-living primates. Seyfarth and Cheney found,

through a playback experiment, that although infant vervets did use grunt calls from birth, they were significantly different in usage, structure, and duration from those used by adults. These acoustic features changed at different rates during the first three years of life, suggesting that the association between call type and social context develops over time.

Vervet monkeys use "wrr" calls during intergroup encounters. Hauser (1989) investigated the comprehension and production of these calls, and concluded that they develop gradually over time. Interestingly, Hauser found that the "contact" and "lost" "wrrs" used by infants for the first three months disappear from the repertoire until ten months, when the "intergroup" "wrr" begins to form. One possible explanation Hauser suggested is the influence of the acquisition of other calls, a phenomenon known in human childhood development as "phonemic regression". A child's acquisition of new words may interfere with the production of earlier words, but these articulation rules stabilize as "...these earlier word forms regain their acoustic similarities to those produced by adults...". By focusing on topics such as phonemic regression, future studies may strengthen evidence for learned vocalizations in nonhuman primates.

Other studies on Old World species find similar results. For example, during agonistic encounters, significant contextual errors were found in the scream calls of pigtail macaques (*Macaca nemestrina*) under three years of age (Gouzoules & Gouzoules, 1989); and studies on talapoin monkeys (*Miopithecus talapoin* [Gautier, 1974]) and Japanese macaques (Nishimura, 1973) have found that vocal behavior differs both quantitatively and qualitatively between age classes. The development of the loud calls of male Nilgiri langurs (*Trachypithecus* [or *Presbytis*] *johnii*), were found to coincide with social maturation and experience, and were not completely fixed at birth (Hohmann & Vogl, 1991). The responses to conspecific barks in infant chacma baboons (*Papio cynocephalus ursinus*) were also found to be learned gradually over time and driven by experience (Fischer et al., 2000).

There is also a growing body of evidence for learned vocal development in several species of New World primate. Research into human speech development and birdsong ontogeny has found similarities in their vocal learning patterns. By studying primate species with social structures (i.e. monogamous families) similar to those of most humans and song birds, Snowdon et al., (1986) found parallel evidence for vocal learning in two species of callitrichid. The "long calls" of cotton-top tamarins and saddleback tamarins (*Saguinus fuscicollis*) serve as intergroup spacing mechanisms, promote intragroup cohesion, and attract potential mates, playing an important role in daily social life. Initial observations have suggested that some of these calls do not appear in the vocal

repertoire until maturity, while others illustrate experiential differences. Further, infant cotton-top tamarins and pygmy marmosets (*Callithrix* [or *Cebuella*] *pygmaea*) have been observed “babbling” in the absence of other vocalizations before shifting to more adult-like calls (Snowdon et al., 1986; Elowson et al., 1998; Snowdon, 1999). Babbling is found in human infants and is generally thought to play an important role in human vocal development (Locke, 1993); evidence for the same behavior in nonhuman primates suggests parallels in ontogeny. Durational and structural differences in the “trill” and “J-call” of different age classes in pygmy marmosets have also been observed, leading to similar conclusions (Elowson et al., 1992). In contrast to earlier studies on squirrel monkeys, Biben and Bernhards (1995) found that production and usage of “masted” and “peep” calls undergo age-specific changes varying with affiliative relationships, suggesting learned influences.

Studies on vocal development in apes have focused on teaching apes human languages, but the natural ontogeny of ape vocalizations is less well documented. There is evidence, however, to suggest age-class differences in some species. In gorillas (*Gorilla* spp.), mature silverback males have a vocal repertoire distinct from younger blackback males in usage and frequency, suggesting an element of social learning (Marler & Tenaza, 1977). Similarly, in chimpanzees, specific vocalizations such as laughter, barks, rough grunts, whimpers, and pant-grunts are used more extensively by individuals of specific age classes (Marler & Tenaza, 1977). Though the chimpanzee “pant hoot” has received more scientific attention than other ape vocalizations, there is little or no information on its ontogeny. Evidence suggests, however, that rates and durations of pant-hooting behavior may differ between age classes (Pusey, 1990; Marler & Hobbet, 1975).

There is much speculation about the role physical growth and maturation may play in the ontogeny of vocal repertoires. Predicted models of physiological vocal development would involve consistent patterns of the changes in repertoire over several groups in variable environments. In most species there is little data to formulate conclusive inferences, although sex classes of some species with distinct vocalizations may provide clues. The “loud calls” of adult males in species such as gibbons (*Hylobates* spp.) and howler monkeys (*Alouatta* spp.) are not possible without the supralaryngeal accessory organs or vocal sacs, which only develop at sexual maturity. Moreover, individuals of these species have not been observed “practicing” these sounds, suggesting physical growth as a key component (Newman & Symmes, 1982).

Studies on Old World species have offered some suggestions on the role of physical growth in vocal development. Research on captive populations of Japanese macaques with infants reared in isolation found three consis-

tent stages of vocal development within thirty weeks of birth comparable to control groups, suggesting fixed patterns that develop gradually (Kawabe, 1973). In studies of the “coo” calls of infant rhesus macaques, Hammer-schmidt et al. (2000) found no sex or environmental differences in the developmental stages of the vocalizations, but they did find positive correlations between increased body weight and more mature vocal production, suggesting physical growth as the main factor.

Similar results have been found in studies on a few species of callitrichids. Vocal development in pygmy marmosets has been attributed at least partially to physical growth, because duration of the “trill” call consistently increased with age for four out of five litters studied (Elowson et al., 1992).

As new data emerge, primate vocalizations are proving to be more complex than had been thought. Researchers are now speculating on the contribution made by other factors such as affiliative processes, individual variation, and social conditions. Because many of the vocalizations associated with these contexts are softer and more cryptic to the human ear, they are more difficult to measure (Snowdon, 1999).

As far back as the 1960s, inferences were already being made about the social influences of vocal ontogeny. Randolph and Mason (1969) conducted a laboratory experiment on two groups of chimpanzees ranging in age from two to four years. They found, when comparing the wild-born chimpanzee group to a captive, socially-deprived group, that wild-born chimpanzees produced more distress vocalizations when isolated from familiar group members than the socially-deprived individuals.

New World monkey “babbling” has provided some evidence of the role socialization plays in vocal development: “Within a month after birth tamarin infants are frequently left on their own ...[and]...begin to call and continue to call until a caregiver retrieves them...later on we began to notice clear elements of adult vocalizations in the chatter. However, the vocalizations were not given in the proper context and many vocalizations were juxtaposed which would never be heard in adults. Many...are not perfectly formed.” (Snowdon et al., 1986). Other research on callitrichids has described these babbling bouts as complex (Elowson et al., 1998), although the sounds have no obvious referent (Snowdon, 1999). Elowson et al. (1998) found social reinforcement to be a contributing factor in the rates and durations of babbling in infant pygmy marmosets. A caregiver was more likely to respond by contact and grooming to infants who babbled than to those who did not. Snowdon (1999) speculates that nonhuman primate infant babbling “...can be an important phenomenon for understanding how affiliative interactions shape vocal development...”.

Other evidence of social influence has been investigated in cotton-top tamarins, who show abrupt patterns of vocal change that vary as an individual enters breeding status (Roush & Snowdon, 1994). In other studies relating to the status of individuals, Roush and Snowdon (1999) found that sub-adult cotton-top tamarins shifted to more adult-like “chirp” calls only when they were mated and increased their dominance status, while subordinate individuals did not. Callitrichids have also shown a tendency to change their vocal rates and structures when infants are present (McConnell & Snowdon, 1986; de la Torre, 1999). Snowdon (1999) has found inferential evidence that certain social interactions may inhibit the expression of adult calls, and that positive affiliative relationships with new mates change vocal structure.

Much research on the role of social conditions in vocal ontogeny has focused on the separation calls used by infant rhesus macaques. Rates and variants of “coo” call structure differ according to social context and whether infants are within visual range of their mothers (Snowdon, 1999). Other studies have focused on differences between closely related species, such as food calls in rhesus and Japanese macaques (Owren et al., 1992). The results of the cross-fostering experiments found substantial evidence for individual variation, suggesting that individuality may be explained by social influences of peers, especially in cross-fostered pairs. In another study comparing four Old World species – bonnet macaques (*Macaca radiata*), liontail macaques (*M. silenus*), Nilgiri langurs, and patas monkeys (*Erythrocebus patas*) – Hohmann (1991) found that overall differences between *Macaca* spp. and *Presbytis* spp. were probably related to maternal behavior and treatment of infants by other group members, that is, to social influences.

In sum, most scientists agree that primate vocalizations are complex and often cannot be defined as simply genetic or learned. A call that begins as a genetic vocalization may develop and evolve differently with maturity and/or learning, depending on the species and type of call, and researchers are only beginning to formulate inferences regarding social influences. Some researchers maintain that conclusive evidence for vocal learning has been difficult to obtain because we may not be asking the right questions of the right species, and we must take into account selection pressures and individual vocalizations in order to fully understand differences between those calls that are necessary to survive, and those that are socially flexible (Roush & Snowdon, 1994). A more complete understanding is required of vocal repertoires and neural mechanisms across taxa, as well as the roles of physiological development, dialect, individualized calls, production, usage, and response. More cross-fostering studies would further our understanding of the roles of genetics, imitative learning, and social learning. We do not know whether full call repertoires, or simply sound

production, are fully developed at birth. Longitudinal studies of individuals and investigations of species less well adapted to captivity are necessary.

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* * *

A Descriptive Analysis of a Spontaneous Dominance Overthrow in a Breeding Colony of Rhesus Macaques (*Macaca mulatta*)

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Introduction

The social behavior of rhesus macaques is generally characterized by relatively stable and often linear dominance relationships between individuals within social groups (Maslow, 1936; Southwick, 1967; Walters & Seyfarth, 1987). However, spontaneous changes in dominance hierarchies have been observed in stable social groups in captivity (Ehardt & Bernstein, 1986; Samuels & Henrickson, 1983), yet the events immediately preceding these changes have rarely been seen or recorded, and the causal mechanisms have not been determined. Experimentally induced rank reversals in macaques have suggested precipitating factors, e.g., the absence and/or removal of agonistic allies, particularly those who are kin (Chapais, 1988; Chapais & Larose, 1988; Marsden, 1968). However, the explanations posed fail to account for all cases (Ehardt & Bernstein, 1986).

We observed the overthrow of the alpha female and reversal in rank of the members of the two high-ranking families within a single matriline in a captive social group in which dominance ranks among adults had remained stable for ten years. In accordance with Ehardt and Bernstein (1986), we use the term “overthrow” to describe the unexpected and unusually aggressive events associated with the reversal of rank relationships. The potential for severe and lethal injuries in captive social groups makes clear the need for researchers and colony managers to closely coordinate their research and management procedures, and to exchange information regarding the possible determinants of highly aggressive behaviors associated with reversals in rank (Ehardt & Bernstein, 1986; Samuels & Henrickson, 1983).

Background

Subjects: The members of a social group of rhesus macaques (*Macaca mulatta*) born in captivity at the Yerkes Regional Primate Research Center (now known as

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Yerkes National Primate Research Center) Field Station in Lawrenceville, Georgia, served as subjects. In 1992, ten years following formation of this group, it consisted of four adult males (7.5 -14.5 years), 36 adult females (3.5-14.5 years), and 37 juvenile males and females. In the ten years preceding this study, the group had a history of stable dominance relationships among its adult members. In particular, the respective positions of adult females within a single matriline of high-ranking individuals had not changed. The highest-ranking adult females, Herc, Mabel, and Um, are descendants of Nadine, a high-ranking female who died prior to the formation of this social group (See *Table 1*).

Housing: The social group was housed at the Yerkes facility in an uncovered outdoor enclosure (38.1 m x 38.1 m), which comprised one quadrant of a four-unit compound. Two walls of each enclosure consisted of sheet metal fencing (2 m height) attached vertically above chain link fencing (3 m height). The interior walls were constructed of sheet metal only, minimizing visual and tactile contact between animals in adjacent enclosures. A climbing structure was located in the center of each enclosure, surrounded by six concrete culverts that provided cover. Adjoining one of the chain link walls in each outdoor enclosure was a temperature-controlled indoor room (3 m x 10 m). On two opposite exterior fences, an observation platform overlooks the two enclosures below. Originally, the enclosures contained native north Georgia flora, but at the time of these observations, the substrate was primarily soil. For a more detailed description of Yerkes outdoor animal enclosures, see Bernstein, Gordon, and Rose (1974a). Hard plastic balls were provided periodically as toys.

Procedures: The social group was observed regularly as part of a research protocol five days per week during the three years surrounding the overthrow of the alpha female, Herc. In addition, as routine management, the group was monitored for health problems and any unusual activity twice daily. The dominance rank of each of the animals in the social group was determined from “does-receives” matrices comprised of the outcomes of dyadic agonistic interactions (Bernstein, 1970; Wilson, 1981).

Dominance Reversal

Ten years of stability in the respective positions of the highest ranking females were followed by a reversal that occurred after the temporary removal of the alpha female, Herc, for veterinary care.

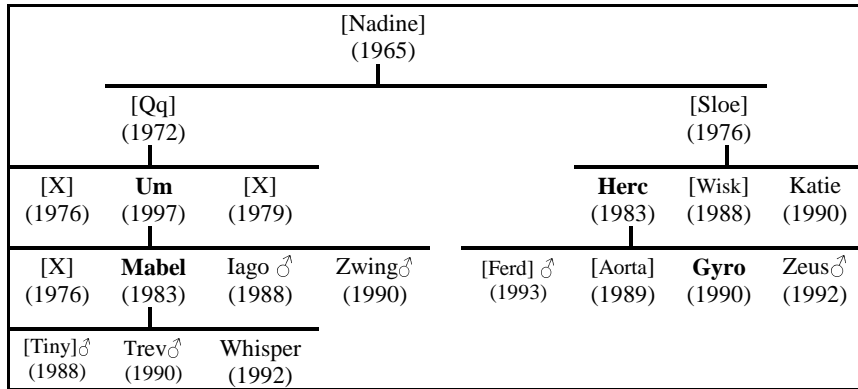


Table 1: Nadine's matriline. []: not present at time of overthrow; X: stillbirth; (): year of birth; ♂: male; **Bold**: females involved in overthrow

Herc was removed from the social group for medical treatment of mild dehydration on Friday, April 3, 1992, and was found to have a bacterial infection. Following five days of antibiotic treatment, Herc was returned to the social group.

Approximately 1.5 hours into Herc's absence, Gyro, Herc's daughter, almost two years old and second in the dominance hierarchy after her mother, was observed carrying Mabel's newborn infant Whisper. Mabel, the second ranking *adult* female, persistently followed Gyro and attempted to retrieve the infant. Gyro continued to elude her. After about 5 minutes, Mabel grabbed and bit Gyro on one side of her face, and then on the other, as Gyro squealed submissively. Mabel then retrieved Whisper from the ventrum of Gyro and pinned Gyro to the ground. Gyro continued to squeal. Mabel released Gyro after about 30 sec. Gyro fled squealing and head-flagging for agonistic aid. When she received none, Gyro ran toward and presented to Nubbs, a low ranking adult male. Nubbs looked about, mounted Gyro and then presented to her for grooming. Gyro continued head-flagging for aid for a few seconds, and then began to groom Nubbs. Over the next five days, Gyro was observed to avoid and submit to Mabel, Um, and their offspring. These events clearly indicate change in rank order among Nadine's descendants, the highest ranking females in the group.

Herc was returned to the group at approximately 11:00 a.m. on April 8, 1992. The alpha male, Yi, immediately approached and mounted her. The other group members exhibited general excitement and vocalized, but did not approach Herc and Yi at that time. Gyro was first to approach within 2 m, but she did not contact Herc. Next Mabel and Um approached, grimaced, and then avoided Herc as she approached. Yi mounted Herc again.

About 2 minutes after the return of Herc, Gyro began to scream at Um and Mabel, and to enlist Herc against them. Um charged Gyro, then Herc defended Gyro by charging and biting Um. Herc restrained Um who was squealing, and continued to bite her. Mabel attempted to

aid Um by biting Herc. Yi, the alpha male, responded in defense of Herc, biting and mounting Mabel. At this point Um ceased screaming, and both Herc and Um repeatedly bit one another. Gyro was unable to enlist others, approached and clung to Herc's ventrum momentarily during the struggle, and then fled. Mabel then joined Um in attacking Herc. Yi provided no additional aid and moved away from the three females. After about one minute, Herc broke free and fled, but Um and Mabel pursued and continued to attack her. Soon after, Herc was crouched in the tunnel door leading to the indoor quarters. At this point a number of other animals, including low ranking adult females and juveniles, joined Um and Mabel, biting and mobbing Herc. The four adult males kept clear from and did not participate in the mobbing.

To prevent further injury, Hambright entered the compound to remove Herc. All of the attackers dispersed, except a juvenile male, Frank, who persisted in attacking Herc until Hambright approached within 1 m, and then Frank fled. Herc appeared to be in shock, because she allowed Hambright to pick her up and place her in a transfer box. She was immediately taken to the Field Station veterinary hospital for treatment; an examination revealed no lethal wounds. The entire incident took place within a ten-minute period.

Following the removal of Herc, observation of the group continued. Mabel and Um had received scratches and bruises, but were not seriously injured. They sat together at the back of the compound with kin (Iago, Trev, Zwing and Whisper), and Yi, the alpha male. Gyro attended to the minor scratches she had received and kept within 5 m of Mabel and Um, occasionally lip-smacking and grimacing in submission to them. Mabel and Um appeared to ignore Gyro. Gyro was removed from the group an hour later and housed with her mother in order to prevent further aggression directed toward her.

Twenty-one days later, Gyro was returned to the social group. She assumed rank beneath the members of the Um family without any aggressive interactions at the time of reintroduction. Upon her release into the group, Gyro grimaced, approached, and maintained proximity to Mabel. Herc remained in the veterinary hospital and gave birth to Zeus on April 12, 1992.

Six months later, during the breeding season, Herc and Zeus were placed in the capture unit portion of the indoor enclosure of her former social group. When group members were first allowed to see Herc, the 3rd, 4th, and 5th ranking adult females threatened her through the fence. Um defended Herc by chasing the females. During the remaining time Herc was housed in the capture unit, she

received few threats from group members. When Herc and Zeus were released into the outdoor enclosure two weeks later, her daughter Gyro approached, contacted, and then bit Herc. Herc fled in response. When a lower ranking female, Jody, from an unrelated matriline threatened Herc, Gyro and Um defended Herc by chasing and biting Jody. During this reintroduction, Herc squealed frequently, but she also chased the 4th, 5th and several other lower ranking adult females. When Mabel approached, Herc grimaced and presented to her. The two then sat together and groomed each other. Gyro asserted her rank and displaced Herc in grooming Mabel. At that point it was clear that Herc ranked below Mabel, Um, and Gyro. Yet two weeks later, Herc ranked over Gyro, as Gyro was observed submitting to Herc. This latter dominance rank order among members of the Nadine matriline, and that of the group overall, remained stable during the following year.

Discussion

The events described above bear structural similarity to overthrows described previously, in that they are rare and appeared to be opportunistic outcomes of intra-family agonistic behavior among females (Ehardt & Bernstein, 1986). The reintroduction of individuals into an established rhesus social group can be a potent stimulus for eliciting aggression (Bernstein et al., 1974b, Southwick, 1967). Bernstein and colleagues (1974b) proposed that when introduced into an established social group, competitors for high rank meet with greater resistance than individuals that initially assume a subordinate rank and gradually work their way up through the hierarchy. Further, whether an individual can easily reclaim his/her former position depends on a number of factors such as duration of separation, individual variation, past social history of the individual, social support, whether any significant restructuring of the social dominance hierarchy occurred during his/her absence, ability to form a rapid alliance with resident high-ranking animals, and size and physical condition of the individual returned (Bernstein et al., 1974b). Chapais and Larose (1988) predicted that dominant Japanese macaques (*Macaca fuscata*) may need kin support to maintain their rank when subordinates are able to form coalitions.

Herc was briefly separated from the social group for five days. During this time, the opportunistic outcome of the "kidnapping" incident appears to have resulted in a significant restructuring of the dominance hierarchy as the entire Um family rose above Gyro, who had previously been second only to Herc, her mother. Herc's initial return to the group began much as we had expected given the group's history of stability. She was greeted and mounted by the alpha male Yi, and Mabel and Um appeared to have resumed their subordinate positions relative to that of Herc. Behavioral interactions such as these are rather typical of the return of high-ranking individuals

following a brief absence (T. P. Gordon, personal communication). Unfortunately, the routine return changed radically when Gyro enlisted Herc against Mabel and Um and the alpha male failed to aid Herc and Gyro in their aggression toward Mabel and Um. As in previous reports (see Bernstein, et al., 1983; Bernstein & Ehardt, 1985; Ehardt & Bernstein, 1986), there was an unexpected reversal from submissive to aggressive behavior by a previously subordinate individual (Um) that escalated into severe and prolonged contact aggression, which is ordinarily controlled in rhesus social groups. Submissive behavior patterns, e.g., crouching passively, failed to inhibit the attacks and the aggression peaked with the mobbing of the deposed individual by lower ranking females and their offspring.

The number of close kin in the Sloe family of the Nadine matriline from whom Herc could enlist agonistic aid had gradually, over two years, dwindled to two yearlings following the permanent transfer of her mother Sloe, the death of her daughter Aorta, and the permanent transfers of Herc's 4-year-old brother and 3-year-old son. In contrast, the Um family of the Nadine matriline included two adult females, Mabel and Um, and three juvenile males, Iago, Trev, and Zwing. Despite a number of separations for routine veterinary treatment, some of which exceeded five days, the former alpha female, Sloe, had been unchallenged. However, unlike Herc, Sloe had both adult and juvenile close kin allies for agonistic support in the event of any threat to her position by members of the Um family. These events underscore the importance of agonistic alliances in the maintenance of female dominance hierarchies.

As for physical condition, Herc was fully recovered and near term in pregnancy when returned from veterinary treatment. It is possible that her pregnancy could have contributed to physical and/or motivational limitations in terms of self-defense. Physical condition was more likely to have been a significant factor in the defeat of yearling Gyro by Mabel, an adult more than twice her weight and stature. Like her mother, Gyro had no immediate kin available for agonistic aid except another yearling, Katie.

The limited degree in which adult males participated is another important similarity with past reports. Both here and in the report of Ehardt and Bernstein (1986), the alpha male mounted female aggressors, and briefly attempted but failed to maintain the pre-existing female rank order. Subsequently, the alpha male moved away from the agonistic interactions between females. The other adult males not only refrained from participating, but also avoided them. This predominance of female-female aggression is consistent with the conclusion that female dominance hierarchies operate independently of adult males (Ehardt & Bernstein, 1986).

While the dominance relationships of individuals outside the two families in conflict were unchanged as in previous reports, in contrast, the surviving members of Herc's family did not fall to the bottom of the group hierarchy, but instead assumed the rank just beneath the Um family. One factor that may account for this is that Herc and Gyro were removed prior to serious injury, and upon their subsequent reintroductions, they were allowed in proximity to and received agonistic aid from their kin in the Um family.

In conclusion, we had a unique opportunity to observe and provide a detailed description of the preceding and perhaps causal events of a rare and substantial change in female dominance ranks within a social group of rhesus macaques. We agree with Samuels and Henrickson (1983) that regular behavioral monitoring and documentation of rank relationships are essential in the management of social groups of macaques, and that it is imperative to exercise extreme caution when considering and undertaking the removal of high-ranking animals and their kin support. Further, communication between management and investigators regarding management practices and other factors that may influence the stability of dominance hierarchies is critically important. We hope that this report will aid in the anticipation and prevention of dominance overthrows and their potentially grave consequences in captive groups of macaques.

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Travelers' Alert: Yellow Fever in Monkeys in Southern Brazil

The National Health Foundation of Brazil (*Funasa*) recommends yellow fever vaccination for people intending to spend the year-end holidays in the interior of the states of Santa Catarina and Rio Grande do Sul. This is an extension of standing recommendations for yellow fever vaccination for visitors to the Central-West, North, Northeast states, where the disease is endemic. In October, 2002, in the municipality of Rio Quente (Goias state), a sick monkey was spotted that died a few days later. In November, 2002, according to *Funasa*, a howler monkey

[*Alouatta* sp.] captured in the municipality of Jaguari, in northeastern Rio Grande do Sul, was found to be sick. *Funasa* advises that the death of monkeys could signify an outbreak of jungle yellow fever, with a risk of spread by mosquitoes to humans in the area. *Funasa* is adding the following states to the areas of risk: southwest Piaui, west Bahia, Minas Gerais, Sao Paulo, Parana, Santa Catarina and northeast Rio Grande do Sul. – A ProMED-mail post, December 7, 2002

Urine-Washing Behaviors as Condition-Dependent Signals of Quality by Adult Mantled Howler Monkeys (*Alouatta palliata*)

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Introduction

Communication may be defined as the transmission of information from one animal (“the sender”) to another (“the receiver”) that presumably benefits both (Bradbury & Vehrencamp, 1998). Information is contained in signals whose design may vary in response to constraints imposed by the physical and biotic (including social) environments as well as the physiological mechanisms of the organisms (Bradbury & Vehrencamp, 1998). Chemical signals are the most primitive mode of animal communication, and their transmission must broadcast molecules the complete distance between sender and receiver (Bradbury & Vehrencamp, 1998).

Milton (1975) studied “urine-rubbing” (i.e., “urine-washing”: Milton, 1985) in mantled howlers (*Alouatta palliata*) at Barro Colorado Island, Panama, a semideciduous lowland tropical forest, concluding that these behavior patterns were most likely to function in “intra-troop cohesion” and that adult males were likely to employ urine-washing behaviors during periods of stress. Milton also considered other possible functions of urine-washing in mantled howlers such as thermoregulation, communication of cycling state by females, and repelling of insects.

Data on urine-washing behaviors from two groups of mantled howlers in two habitats of Costa Rican tropical dry forest are presented here. It is concluded that these behavior patterns function as condition-dependent signals (see Brockmann, 2001) in sexual and agonistic contexts for adult males and females who advertise their quality by way of volatile urinary compounds.

Subjects, Study Site, and Definitions

The study was conducted in 1976 and 1977 at Hacienda La Pacífica, Cañas, Guanacaste, Costa Rica (10° 28' N, 85° 07' W). Details on study groups (Group 5: three adult males, 15 adult females, 402 hours of observation; Group 12: two adult males, eight adult females, 114 hours of observation), habitats (seasonal: Group 5, riparian; Group 12, deciduous), data collection (focal and ad lib.), social organization and mating system (multimale-multifemale, polygynandrous), and life history may be found elsewhere (Jones, 1980, 1985, 2000, and references).

“Copulation” was defined as mounting with intromission, with or without ejaculation. “Displacement” is used to mean that one animal approaches (moves at least 1 meter toward) another and the second moves away. The “receiver” of the display’s signal was defined as the “sender’s” nearest neighbor, although other animals within the range of the chemical signal may also detect the information presumably contained in the urine’s volatile compounds (“eavesdropping”: Bradbury & Vehrencamp, 1998).

The nonparametric χ^2 test (“goodness of fit”) was used to assess statistical significance with alpha set at 5%.

Results

Milton (1975) described the behavior patterns characteristic of urine-washing in mantled howlers. She observed howlers “rubbing urine on the soles of the feet and/or palms of the hands as well as the ventral surface of the tail and, occasionally, the throat” (p. 105). In addition to the motor patterns she described, I observed a behavior pattern in which both adult males and females passed the palm-like ventral surface of the tail and surrounding pelage through a stream of urine and washed urine over the body with the tail in a swooping movement. This gave the urine-wash behavior pattern the appearance of a stereotyped display.

The results of my observations for Groups 5 and 12 are presented in *Table 1*. In the riparian forest, urine-washing was observed 42 times (0.11 observations/hour), in the deciduous forest, seven times (0.06 observations/hour). The difference in rates is not statistically significant ($\chi^2 = 1.47$, $df = 1$, $P > .05$). Because of the small sample size for Group 12, further analyses will be based solely upon the results for Group 5.

Urine-washing was more likely to be observed in sexual than in agonistic contexts ($\chi^2 = 13.71$, $df = 1$, $P \leq 0.001$). Adult males of Group 5 displayed urine-washing behaviors 20 times, 14 times in sexual contexts to cycling females (see Jones, 1985) and six times in agonistic contexts to other adult males ($\chi^2 = 3.2$, $df = 1$, $P > 0.05$). Adult males, then, were as likely to display to other males as to females, although contexts differed. Agonistic contexts involving males were generally associated with mating competition since one of the males (i.e., sender or receiver) was always associated with a cycling female. Y and G, the dominant and middle-ranking males, respectively, each directed urine-washing behaviors to other males one time. R male, the lowest

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Group	Direction of Interaction	Sexual Context	Agonistic Context	?	Total
5	♂→♀	14			14
	♂→♂		6		6
	♀→♂	16			16
	♀→J		1		1
	♀→?			5	5
12	♂→♀	1			1
	♂→?			1	1
	♀→♂	2			2
	♀→♀		2		2
	♀→?			1	1
Total		33	9	7	49

Table 1: Urine-washing behaviors observed in two *A. palliata* groups (5 and 12), including direction of display (sender→ receiver) and context. Sexual contexts were identified by the exchange of sexual behaviors (e.g., the “lingual display” [Carpenter, 1934; Jones, 1985] and copulation). Agonistic contexts were identified by the presence of behaviors such as the “branch-break” display (Carpenter, 1934; Jones, 2000), paedomorphic (immature sounding) whines (Jones, 1985), fighting (Carpenter, 1934; Jones, 1985, 2000), and displacements. J= juvenile. See text for further explanation.

ranked, exhibited urine-washing behaviors to other males four times ($\chi^2 = 3.00$, $df = 2$, $P > 0.05$). Males, then, display to other males with equal likelihood. When displays to females are considered, Y exhibited urine-washing behaviors to cycling females seven times, G, five times, and R, twice ($\chi^2 = 2.71$, $df = 2$, $P > 0.05$). Thus, males were equally likely to display to cycling females.

Adult females of Group 5 exhibited urine-washing behaviors 22 times, 16 times directed at an adult male, once directed at a juvenile ($\chi^2 = 13.24$, $df = 1$, $P \leq 0.001$), and five times for which the recipient was undetermined. Related to this, displaying females were usually noted to be cycling. Females directed urine-washing behaviors to Y male, seven times, to G male, four times, and to R male, five times ($\chi^2 = 0.87$, $df = 2$, $P > 0.05$). Thus, females displayed to all males equally. Certain of these displays by females appeared to function to incite male-male competition since they were sometimes given in contexts in which more than one male was present ($n = 7$), sometimes engaging in agonistic interactions (e.g., exhibiting the “branch-break” display during ritualized confrontations [Carpenter, 1934; Jones, 2000]). Urine-washing behaviors also sometimes occurred in association with vocalizations by either sex ($N = 8$); thus, chemical, visual, and auditory signals may be components of a “compound display” (Bradbury & Vehrencamp, pp. 394-397). It is also likely that urine-washing by adult females pertains to female-female competition since the two ♀→

♀ events observed in Group 12 (Table 1) occurred in association with pairwise displacements.

Discussion

Condition-dependent behaviors are a function of environment or phenotype. The present results suggest that urine-washing behaviors by adult male and female mantled howlers are condition-dependent signals of quality (see Gosling & Roberts, 2001), since males displayed with equal likelihood to cycling females and to other males in contexts that appeared to reflect intrasexual competition for mates. Because the frequency of displays by males did not differ significantly as a function of dominance rank, they may represent “cheap” (low-cost) signals (Silk et al., 2002) that facilitate the assessment of quality and decrease the likelihood of damaging aggression. Females displayed urine-washing behaviors equally to all males, suggesting that, from their point of view, all males were equally good mating partners or that urine-washing behaviors functioned to incite male-male competition. These results are consistent with previous findings for this group that females exhibited sexual solicitations equally to all three males (Jones, 1985). The present study, combined with other work considering the significance of urinary signals in *Alouatta* (Milton, 1975; Jones, 2002), highlights the need for additional research, including laboratory and field experiments, on urine-washing behaviors and related topics in this taxon.

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Personnel / Animal Relationships: Affectionate or Neutral? A Discussion

The question, **Should animal care personnel be encouraged to establish affectionate, rather than neutral, relationships with the animals in their charge?** was raised on the Laboratory Animal Refinement & Enrichment Forum (LAREF) on October 26, 2002. Erik Moreau, McGill University, Canada; Kathy Clark, Holliston, Massachusetts; Deborah Hartley, University of Oklahoma; Ann Lablans, Queen's University, Canada; Augusto Vitale, Istituto Superiore di Sanità, Italy; Pascalle Van Loo, Utrecht University, The Netherlands; Terri Hunnicutt, St. Louis Zoo, Missouri; Anna Olsson, Institute for Molecular and Cell Biology, Portugal; Chris Sherwin, University of Bristol, England; David Morton, University of Birmingham, England; Viktor Reinhardt, Animal Welfare Institute, Washington, DC; Lydia Troc, York University, Canada; and Emily Patterson-Kane, Scottish Agricultural College, Scotland, all posted opinions, which have been edited by Viktor Reinhardt, moderator of LAREF.

Most correspondents agreed that development of an affectionate relationship with the animals in their charge is almost unavoidable (Clark, Hartley, Hunnicutt, Lablans, Moreau, Van Loo, Vitale). Empathy can even arise in researchers who go to great lengths to try to ensure that their data are objective (Sherwin). "Having a close relationship with your animals is necessary to regard them as living beings, rather than biological test tubes. As such, you are more careful and patient, and will think more about what the procedures mean to the animals. You will become more creative in finding animal-friendly alternatives for the procedures you need to do on the animals. You will thus increase the well-being of your animals and, by doing so, make them better research subjects and increase the validity of test results" (Van Loo).

There was a consensus that emotional attachment provides an assurance that the animals receive optimal care, both physically and behaviorally (Clark, Hartley, Van Loo, Vitale). "If I didn't think about the animals in my care, I wouldn't notice that someone seems a little off today, he's not participating in social activities like he normally does. I wouldn't notice that one animal suddenly flinches when I feed her something with a spoon, indicating a possible tooth problem. I've seen 'caregivers' that treat the animals with complete indifference miss a million details that they should have noticed. They don't

clean well, are callous to the animals, and forget important things. I have watched animals cringe or cower when these individuals enter the room. I have seen these individuals breaking for lunch rather than take a few extra minutes for enrichment. Their emotions may not be absent from the situation, but they're focused somewhere else and so they don't do a good job since they aren't emotionally vested in the outcome" (Hunnicutt). A relationship based on trust rather than fear is particularly important when potentially dangerous animals such as macaques are being trained to actively cooperate during handling procedures (Lablans, Moreau). "Whether such a relationship enhances training success is another question, but it certainly is an effective safeguard against injuries resulting from defensive aggression" (Reinhardt).

There was disagreement about whether it is more difficult to establish a relationship with some animal species than with others. "I wonder if there is a size limit. Is it still possible to establish a relationship of trust with mice, where they will come to you and enjoy being with you, where you can exchange signs of affection?" (Olsson). "There is definitely a taxonomic hierarchy of emotional attachment anywhere you go; the higher you go the more likely bonding will occur" (Hartley). It was pointed out that to work closely with individual animals or a small group of animals and to observe them for an extended period of time is probably a more important factor for the development of a bond with them than their evolutionary relatedness with our own species or their size (Patterson-Kane, Reinhardt). If you take the time to discover the uniqueness of individual animals and to get to know their species-typical needs well enough to develop empathy for them, you will readily form close ties also with the perhaps less charismatic species such as pigs, rats, mice or chickens (Morton, Patterson-Kane, Van Loo).

Concern was expressed that establishing an affectionate relationship with experimental subjects and knowing them as individuals would hamper one's impartiality and capacity to be objective when observing and registering their behavior (Olsson). A caregiver strongly objected: "It seems to me that we get hung up on trying to divorce our emotions from what we hope to be our objectivity. I do not think that any normally functioning human being in the world does anything for any reason other than emotional. Sure, research is done to answer questions, but

isn't the premise of all research to make human (or animal) lives better? If you want to make lives better, it's because of emotion, not because you are logically attached to life" (Hunnicut)."

"Having a name for the animals is one way of being personal" (Olsson). Several participants of this discussion give names to the animals in their charge or to the animals they study as a tool to quickly remember and recognize individuals (Hartley, Patterson-Kane) and/or as a reflection of their empathy (Moreau, Troc, Vitale). Identification numbers are kept in the records for cross-reference (Hartley, Troc). "As a clinical veterinarian I had the experience that nonhuman primate caregivers became markedly more concerned for and interested in individual animals in their charge when the identification number tags on the cages were replaced with name tags. I guess we can all relate much better to names than to numbers, and we tend to treat named animals versus numbered animals differently. The labels (numbers or names) we put on

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Publication Announcements

AJP Encourages E-Mail Submissions

The *American Journal of Primatology* Editorial Board announces that manuscript submissions as e-mail attachments in pdf format are now welcomed and encouraged. Complete instructions for contributors are available at <www.interscience.wiley.com/jpages/0275-2565/info.html>, and are published in each issue of the journal.

Nursery Rearing

Gerry Ruppenthal and Jim Sackett are co-editing a book, *Nursery Rearing of Nonhuman Primates in the 21st Century*, to be published in the Kluwer/Plenum series titled *Developments in Primatology: Progress and Prospects*, edited by Russell Tuttle. They are seeking normative data on any aspects of growth (body weights, brain, skeletal, or dental parameters, etc.) or physiology (hematology, immunology, hormone values, etc.), to be included in either an appendix or an online Web supplement. They are especially interested in data for rare spe-

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animals are irrelevant as long as we take the time to get an understanding of the subjects' needs and treat them according to those needs" (Reinhardt).

Naming can have its pitfalls. "We should remember that sometimes there are very good reasons for NOT giving laboratory animals names. When we give an animal a name, this is often because of our anecdotal impression of its appearance or behavior. But this can subsequently influence the way that we think about how an animal responds, or the motivations behind its behavior" (Sherwin). Two correspondents responded that name-giving is the result of our subjective, direct (e.g., reconnaissance observations prior to onset of data collection) or indirect (e.g., information gathered about a research subject from caretakers) experiences with a particular animal and that it is this experience rather than the name per se that preconditions our perception of the subject. It's almost impossible not to be preconditioned (Hartley, Reinhardt).

cies and species found mainly in zoo nurseries, although generally unavailable data on common laboratory species are also of interest. One primary requirement for inclusion will be a sufficient description of the nursery or hand-rearing housing, husbandry, and testing conditions under which the data were collected. They expect to publish the book by summer, 2003, so interested participants need to contact them as soon as possible.

They also wish to provide information on husbandry techniques and outcomes for nursery- or hand-rearing of any prosimian, marmoset, or tamarin species, and for other New World monkeys (with the exception of squirrel monkeys). To date, they have found only a few individuals with such information. If you are interested in participating or want more information please contact Jim [e-mail: jsackett@bart.rprc.washington.edu] or Gerry [e-mail: gruppenthal@mail.magee.edu], University of Washington Primate Center, P.O. Box 357330, Seattle, WA 98195. – posted to Primate-Science, November 14, 2002

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Applications for 2003 AVTA Exam

The Academy of Veterinary Technician Anesthetists (AVTA) announces the availability of application packets for the 2003 certification exam, which will take place in September, 2003. The AVTA certification process consists of two parts: the application and the examination. The application will require you to provide proof of the length and depth of your experience as a veterinary technician and in the practice of veterinary anesthesia, as well as your mastery of anesthesia skills and the amount of advanced training you have received in anesthesia. Only

candidates that have applications approved by the AVTA credentials committee will be eligible to take the examination.

For further information, and the application packet, contact AVTA Executive Secretary, P.O. Box 426, Ross-ville, IN 46065 [e-mail: vetamac@geetel.net]. Request either an electronic or paper copy version of the application. Include your name, address, phone number and e-mail address. The completed packet must be received by the Executive Secretary no later than January 31, 2003.

Research and Educational Opportunities

Scholarships for Research in the Biology of Aging

The Glenn/AFAR Scholarships for Research in the Biology of Aging are designed to attract potential scientists and clinicians to aging research. They provide PhD and MD students the opportunity to conduct a three-month research project. Students will work in an area of biomedical research in aging under the auspices of a mentor. Each scholarship carries an award of \$5,000. Deadline for receipt of application is February 26, 2003. For an application, see <www.afar.org/grants.html> or contact the American Federation for Aging Research of-fice [212-703-9977].

NIH Graduate Partnerships Program

While scientists at the National Institutes of Health (NIH) traditionally have participated in the training of graduate students on an ad hoc basis, graduate programs at universities have never been able to take full advantage of the resources available on the NIH campus to help achieve their predoctoral training objectives. To improve this situation, in July, 2000, the NIH implemented the Graduate Partnerships Program (GPP). The GPP has the responsibility to formally link NIH intramural research with universities in the training of predoctoral students in the biomedical sciences and to facilitate the development, operation, and oversight of university-NIH predoctoral training partnerships. The GPP's Website, <gpp.nih.gov/overview/index.html>, comprehensively provides extramural institutions and scientists descriptions of and access to the research groups at the NIH, facilitating the development of ad hoc and formal arrangements between extramural and intramural research groups, with the GPP serving as broker and facilitator.

In addition, the GPP has expanded a prior model for university-NIH partnerships in broad areas of research training. Currently, there are nine of these partnerships: Johns Hopkins University (Biological Sciences); George Washington University (Genetics); University of Maryland (Biophysics); University of Pennsylvania (Immunology); Boston University (Bioinformatics); University of Maryland (Hearing and Communication Disorders); Oxford University, England (Biomedical and Biological Sciences); Cambridge University, England (Health Sciences Scholars Program); and the Karolinska Institute, Sweden (Neurosciences). There are currently 24 predoctoral students in the National Cancer Institute Intramural Program participating in the GPP: 20 in the Center for Cancer Research (CRC), and four in the Division of Cancer Epidemiology and Genetics. While these broad arrangements more aggressively broker connections between graduate programs and intramural research groups, they do not involve any NIH funding or formally integrate extramural and intramural scientists in a specific training program.

Field Studies in Animal Behavior

The Georgia Institute of Technology and Zoo Atlanta present a four-week field course in animal behavior, tentatively scheduled from June 9 to July 6, 2003, for six semester credits in psychology. The course takes place in Atlanta (four days at the zoo), South Africa (three days), and Kenya (20 days). The goal of the course is to provide intensive instruction in animal behavior and observational methodologies. In Atlanta, students are taught data collection methods and their application and general behavioral profiles for various taxonomic groups (i.e. primates, carnivores, ungulates, birds). This information is then applied in the field through daily observations designed to permit comparisons of the same species in different habitats as well as comparisons across closely-related species. In addition, students are assigned several small-scale research projects to further their understanding of scientific methods. Observational assignments are supplemented by readings, discussions, and lectures by field scientists. The course also places strong emphasis on conservation, and students read about and discuss many of the issues related to conservation in eastern Africa. Students visit a variety of locations, including national parks and reserves, private research centers, sanctuaries, and private game reserves, as well as local cultural centers.

Estimated cost will be \$6500, which includes: round-trip airfare Atlanta-Johannesburg-Nairobi, room and board, ground transportation, tuition, lecture fees, and park fees. The application deadline is February 15, 2003. For information, contact Tara Stoinski, Zoo Atlanta, 800 Cherokee Ave, Atlanta, GA 30315 [404-624-5826; fax: 404-627-7514; e-mail: tstoinski@zooatlanta.org]; for an application, e-mail <study.abroad@gatech.edu>.

Workshop and Symposium

The Midwest Division of the Charles Louis Davis, D.V.M. Foundation will present a Workshop and Symposium on Laboratory Animal Diseases, April 23-26, 2003, in Chicago, co-sponsored by the Biologic Resources Laboratory (BRL) of the University of Illinois at Chicago.

The BRL's 2" x 2" slide collection will be available for review at the BRL, 1840 West Taylor St, beginning at 8:30 AM, Wednesday, April 23rd, and continuing through Friday the 25th. The 2" x 2" slide collection includes 14,000 Kodachromes on laboratory animal diseases and management. In addition 3,000 glass micropathology slides with histories and sixty-six T60 video tutorials of the Foundation's Independent Study Center at the BRL will be available for individual and/or group study. Microscopes, projectors, and VCRs will be available. Members of the senior staff of the BRL will give Simulated Practical Examinations on Friday the 25th.

Dr. Dean Percy will be the speaker at the Symposium on Saturday, April 26. He will review the diseases of rabbits and rats. For the complete text of the announcement and for registration information, contact Jim Artwohl [e-mail: jeart@uic.edu] or the C. L. Davis Foundation [e-mail: cldavisdvm@earthlink.net].

Research and Conservation on Endangered Species

The Research and Conservation Department in Wildlife Reserves Singapore (WRS), which manages the Singapore Zoological Gardens, Night Safari, and Jurong Bird Park, aims to promote research and conservation on endangered species by directing, coordinating and facilitating relevant activities in those institutions. The Research and Conservation Department has resumed stewardship of the Wildlife Conservation Fund, renamed the Wildlife Research and Conservation Fund. A committee composed of senior managers from the Wildlife Reserves Singapore will judiciously manage the fund, which will support research and conservation of endangered species, especially in the biological hotspots of Southeast Asia.

Native biologists from government and non-government organizations and students from Southeast Asian countries are encouraged to apply to the Wildlife Research and Conservation Fund to carry out conservation research projects to protect endangered species and their habitats. Local and foreign nationals also may conduct research at WRS institutions. For details and a copy of the application procedures, contact Dr. G. Agoramoorthy, Director (Research and Conservation), Singapore Zoological Gardens, Wildlife Reserves Singapore, 80 Mandai Lake Rd, Singapore [e-mail: agoram@mail.nsysu.edu.tw]. "We look forward to working with you."

Fyssen Foundation Postdoctoral Study Grants

The aim of the Fyssen Foundation is to "encourage all forms of scientific enquiry into cognitive mechanisms, including thought and reasoning, that underlie animal and human behavior, their biological and cultural bases, and phylogenetic and ontogenetic development." The Foundation supports research in ethology, psychology, neurobiology, anthropology, ethnology, human paleontology, and archeology. The Foundation will award grants of up to 20,124 Euros per year for the training and support of postdoctoral researchers, under 35 years of age, working in these fields. They are intended to assist French research scientists who wish to work abroad, and foreign research scientists who wish to work in France. These grants are awarded for a maximum of one year.

Application forms may be obtained from the Secrétariat de la Fondation Fyssen, 194, rue de Rivoli, 75001 Paris, France [e-mail: secretariat@fondation-fyssen.org]; or see www.fondation-fyssen.org/. The closing date for proposals is March 31, 2003.

Courses in Laboratory Animal Science

Courses in laboratory animal science will be given at the Royal Veterinary and Agricultural University in Copenhagen, Denmark, as part of the postgraduate program Master of Laboratory Animal Science, but individual courses can be taken. The language of instruction is English. Homework is required in connection with each course, if one wishes to take the exam and get credit.

Courses available are: • Anesthesia, Analgesia, Euthanasia of Laboratory Animals: March 11-13, 2003; Course number 150132. Cost: 4850 DKK.

• Laboratory Animal Health and Pathology: March 10, March 17-20, March 24-28, 2003; Course number 150131. Cost: 9300 DKK. See

www.ifp.kvl.dk/education/animal/Master_3_2003.htm.

For more information and to enroll contact Mette Sonne Brendstrup, Royal Veterinary and Agricultural University, Office of Continuing Education, Bülowsvej 17, DK-1870 Fredriksberg C, Denmark [+45 3528 2093 / +45 3528 3768; e-mail: efteruddannelse@kvl.dk].

2003 IPS – Martha J. Galante Award

Grant proposals for the 2003 Galante Award are solicited from professionals who are citizens of primate habitat countries. Money awarded is intended to be used for conservation training, such as courses or professional meetings, and may include: • transportation to a course or event location; • course or event fees; and • expenses during the event period. People interested in receiving this award should be officially connected to an academic institution or a similar organization (taking or giving courses, or doing research or conservation work). To apply, send • information about the program of interest (courses, congresses, symposia, field work, etc.); • a letter (in English) explaining your interests in participating in the course or event; • a CV in English; • a letter of acceptance for the course; and • two recommendation letters (including information about the referees). Send all this material to: Claudio V. Padua, PhD, IPE – Instituto de Pesquisas Ecológicas, UnB Colina Bloco G, Apto 503, cep 70910-900 Brasília DF Brasil [e-mail: cpadua@unb.br]. Review of applications will be made by the International Primatological Society's Conservation Committee, and the results announced by the end of August, 2003. The deadline for applications is May 1, 2003.

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Correction

An incorrect e-mail address was given for Sue Howell, first author of "From Laboratory to More Natural Enclosures: Maintaining the Well-Being of Captive Chimpanzees (*Pan troglodytes*)", pages 5-9 of the last issue. The correct e-mail address is suehpfa@qwest.net. Sorry!

Meeting Announcements

The Office of Laboratory Animal Welfare is joining the American Association for Laboratory Animal Science (AALAS), Florida State University, and Florida A&M University in co-sponsoring the **AALAS Management and Technology Conference 2003**, which will be held February 5-8, 2003, in Orlando, Florida. This conference will emphasize the latest in laboratory animal science management and information technologies, and provide educational and networking opportunities. For additional information or to register, see <www.aalas.org>.

The **National Association for Biomedical Research (NABR)** will be hosting its annual conference on legislative and regulatory issues in Washington, D.C., February 23-25, 2003, at the Metro Center Marriott. This conference is offered exclusively to official representatives of NABR member institutions. Researchers, government officials, and industry representatives will discuss developments affecting animal research: • legislative and regulatory policies; • political environment; and • animal rights campaign trends. See <www.nabr.org>.

The **8th “Luis Montané” Physical Anthropology Symposium**, the **4th Congress on Primates as National Patrimony**, the **1st Colloquium on Primates Across the Caribbean**, and the **1st Cuban-Canary Islands Anthropology Encounter** will be held together in Havana, Cuba, February 24-28, 2003, in commemoration of the 100th anniversary of the founding of the Montané Anthropology Museum. The program includes lectures by invited speakers, roundtables, workshops, colloquies, oral communications, and posters, as well as recognition to prominent scientists. Courses in primate management, anthropology, and health will be offered before the Congress. These will be four hours long and each will have a registration fee of US\$15. Registration fees for the Congress are US\$100 (US\$50 for students). For more information, contact Lic. Armando Rangel Rivero, Secretario Ejecutivo, Museo Antropológico Montané, Fac. de Biología, Univ. de La Habana, Calle 25 # 455, entre J e I. El Vedado, Ciudad de La Habana 10400, Cuba [537-832-9000/879-3488; fax: 537-832-1321; e-mail: montane@fbio.uh.cu]; or Antrop. Fís. Braulio Alberto Hernández-Godínez, Centro de Investigación de Proyecto CAMINA A.C., Calzada de Tlalpan 4430, México D.F., México [55732468; fax: 55735545; e-mail: eopithecus@hotmail.com].

An official visa is required to travel to Cuba. The Organizing Committee suggests that you contact travel agencies representing MERCADU S.A. in your country.

Trends & Expectations, the AAALAC Conference on Quality Laboratory Animal Care, will be held May 19-20, 2003, in Reston, Virginia. For details, see <www.aaalac.org/conference.htm>.

The Canadian Association for Laboratory Animal Science invites laboratory science organizations worldwide to the **42nd annual CALAS Symposium**, June 21-24, 2003, in Québec City, to meet the Canadian scientific community and exchange viewpoints on “From Theory to Practice: Revisiting the 3 R’s”. See <www.calas-acsal.org/English/Symposium.html>.

The **XVth Congress of the International Union of Anthropological and Ethnological Sciences** on “Humankind/Nature Interaction: Past, Present and Future” will be held in Florence on July 5-12, 2003. For information, contact OLIVER Srl, Via Panciatichi, 40/11, I - 50127 Florence, Italy [+39 055 4368455; fax: +39 055 4368781; e-mail: oliver@dada.it]; or see <www.icaes-florence2003.com>.

The **28th International Ethological Conference** will be held August 20-27, 2003, at Costão do Santinho Resort, Florianópolis, Brazil, on behalf of the International Council of Ethologists and hosted by the Brazilian Society of Ethology. The deadline for submission of abstracts, financial aid applications, and reduced registration rate is February 20. For information on the conference, contact Prof. Kleber del Claro [e-mail: delclaro@ufu.br]; for information on the scientific program, contact Prof. Regina Macedo [e-mail: rhmacedo@unb.br]; or see <www.iec2003.org/home.htm>.

The **8th World Congress of Veterinary Anesthesia** will be held in Knoxville, Tennessee, September 16-20, 2003, hosted by the University of Tennessee College of Veterinary Medicine and the UT-Knoxville Center for the Management of Animal Pain, at the Knoxville Marriott Hotel. The deadline for abstract submissions is March 17. Information and on-line submission of abstracts will be available at <www.vet.utk.edu/wcva>. To receive e-mail notices and registration materials, send a request to <Conferences@utk.edu>, with “WCVA” as the “Subject”.

The **American Association of Zoo Veterinarians** will hold its **annual conference** in Minneapolis, Minnesota, October 5-9, 2003. Program sessions include Nutrition, Pharmacology, Vaccinations, AZA Programs (SSP/TAG Veterinary Advisory Updates), Advances in Technology and Diagnostic Testing, Case Reports and Practice Tips, Hospital Administration and Leadership, Primates, Pathology, Conservation Medicine, and Emerging Diseases. There will also be a poster session, veterinary and graduate student paper competitions, and workshops/wet labs. For information, see <www.aazv.org> or contact Wilbur Amand, VMD, Executive Director/AAZV, 6 North Pennell Rd, Media, PA 19063 [610-892-4812; fax: 610- 892-4813; e-mail: AAZV@aol.com].

Positions Available

Assistant Animal Facility Supervisor – Maryland

An assistant animal facility supervisor is sought for the Poolesville, Maryland, area. Candidates must be certified at the LAT level and have at least four years' experience in an animal facility, including experience with nonhuman primates. Send cover letters and resumes to: Priority One Services, Inc., Attn: Recruiter, 6600 Fleet Dr., Alexandria, VA 22310 [fax: 703-971-0117]. EOE; Drug Free Workplace.

Clinical / Research Veterinarian – Puerto Rico

The Caribbean Primate Research Center is seeking a clinical/research veterinarian, to be based at the Sabana Seca Field Station, and who will also oversee the well-being of the nonhuman primates on Cayo Santiago. This person must be familiar with USDA, NIH, and other regulations governing animal welfare and care and will have primary responsibility for retaining full AAALAC accreditation for the Center. In addition to clinical and colony management responsibilities, veterinarians assist researchers utilizing the resources of the Center and must develop their own research programs, either individually or in conjunction with other researchers.

Qualifications include a DVM degree from an AVMA-accredited college of veterinary medicine and a veterinary license from a state or territory of the U.S.A. A Puerto Rican veterinary license must be obtained before the end of the first year of employment. Experience in research and nonhuman primate clinical care, husbandry and research is highly desirable.

For more information, contact Janis Gonzalez, Caribbean Primate Research Center, P.O. Box 1053, Sabana Seca, PR 00952-1052 [787-784-0322; fax: 787-797-6500; e-mail: jagonzalez@rcm.upr.edu].

Clinical Veterinarian – Rochester, New York

The University of Rochester is seeking an additional Clinical Veterinarian to help support our diverse population of research animals. Our vivarium contains approximately 23,000 animals, including rodents, primates, rabbits, ferrets, dogs, cats, amphibians and birds. The clinical veterinarian will join a staff of three veterinarians and five licensed veterinary technicians. This position includes overseeing veterinary care, teaching methodology, and maintaining a sentinel health program, as well as evaluating the health of animals entering this facility and consulting with investigators on research matters involving animal use.

Previous experience is appreciated, but not necessary. New York State licensure is required. The University is an equal opportunity employer. Candidates are asked to send a resume to: April Tirabassi, Asst. Director of Finance and Administration, DLAM, Univ. of Rochester,

601 Elmwood Ave, Box 674, Rochester, NY 14642 [fax: 585 273-1085; e-mail: april_rajca@urmc.rochester.edu].

Sanctuary Director – Texas

The Texas Snow Monkey Sanctuary (TSMS), located on a 186-acre ranch about 75 miles south of San Antonio, provides a free-range environment for 325 snow monkeys, vervets, and baboons. The TSMS is seeking a Director, who will work with the Operations Site Manager in directing sanctuary operations including facilities, veterinary care, rescues, feeding/nutrition, etc. The Director will also • provide some direct animal care to all animals at the facility; • supervise animal care staff, volunteers, and interns; • update and manage database and Internet communications; and • establish cooperative efforts with other sanctuaries and animal care facilities.

A bachelor's degree, with a biology, zoology, or other appropriate science major, and some primatology courses are required, as well as animal care experience, including primates. Excellent communication skills and the ability to work in a team environment are also important. Two or more years of supervisory experience are desirable.

Housing is provided, along with a salary to be negotiated and excellent benefits. The TSMS is an affiliate of the Animal Protection Institute (API), a national animal advocacy nonprofit organization. Contact Alan Berger, Executive Director, API, 1122 S Street, Sacramento, CA 95814 [916-485-1707 ext. 211; fax: 916-447-3070; e-mail: aberger@api4animals.org].

Primate Colony Manager – Michigan

The University of Michigan is seeking a full time colony manager for over 100 rhesus macaques. The successful candidate will • assume full accountability for developing, implementing and realizing the department's strategic, operational, personnel and research objectives; • supervise the husbandry staff and oversee the operation of all research, colony facilities, research protocols, animals and staff; • ensure that the Department's goals and objectives support and enhance compliance with AAALAC, USDA and IACUC guidelines (an in-depth knowledge of the laws and regulations pertaining to laboratory animal care is required); • review, implement, and adjust Standard Operating Procedures (SOPs) to reduce the risks associated with working with macaques; • oversee the entire staff working with nonhuman primates (NHPs) to ensure compliance with the SOPs and safe handling procedures; • maintain liaison between the Department and the IACUC and veterinary staff; • host the IACUC, AAALAC, USDA and veterinary inspections; • coordinate the disposition and acquisition of NHPs; and • oversee and assist in providing routine and emergency medical treatment to the NHPs. Minimum qualifications

include a BA or BS in a science-related field or psychology, excellent verbal and written communication skills, and computer experience. Previous supervisory and NHP experience is preferred.

Please direct inquiries to Tiffany Bass, Univ. of Michigan, Dept of Pharmacology, 1301 MSRB III, Ann Arbor, MI 48109 [734-764-4560; fax: 734-764-7118; e-mail: tifbass@umich.edu].

Research Assistants – Philadelphia

Two research positions are currently available at Thomas Jefferson University: • A research assistant is needed to work on a behavioral toxicology project examining the effects of chronic low level manganese exposure on cognitive and motor functions in nonhuman primates (NHPs). The applicant will be responsible for training monkeys to perform attention, memory and motor tasks; recording behavioral observations; administration of manganese; and continued behavioral assessment of animals. The research assistant will also be responsible for data entry and analysis, maintaining animal records, providing environmental enrichment, and ordering supplies.

• A second research assistant is needed to work on a project examining the contributions of the nicotinic acetylcholine system to attention, memory and motor deficits associated with different stages of Parkinsonism in NHPs. The applicant will be responsible for training monkeys to perform attention, memory and motor tasks, will assist in

the induction of Parkinsonism, and then will evaluate the nature of the cognitive and motor deficits and responses to administration of various nicotinic drugs through various stages of symptom progression.

Ideal candidates will have previous primate research experience. Applicants with prior research experience in other areas will also be considered. Minimum educational requirement is a bachelor's degree in psychology, physiology, neuroscience, or a related discipline. Good organizational and communication skills are essential, as is a desire to work closely with NHPs.

Contact Jay S. Schneider, Thomas Jefferson University, 1020 Locust St, Philadelphia, PA 19107 [Fax: 215-923-3808; e-mail: jay.schneider@mail.tju.edu].

Behavioral Neurobiology Postdoc – Switzerland

The Swiss Federal Institute of Technology invites applications for a postdoctoral research position to work on long-term consequences of early life experience in primates. Applicants should have a PhD in a life science, and preferably have experience in the study of primate EEG/sleep, neuroanatomy, or behavior. This appointment will be for two to three years. The application deadline is February 1, 2003. For additional information contact Dr. Christopher Pryce, Swiss Federal Institute of Technology, Schorenstrasse 16, CH-8603 Schwerzenbach, Switzerland [+41 1 655 7386; Fax: +41 1 755 7203; e-mail: pryce@behav.biol.ethz.ch].

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Information Requested or Available

Alternative Methods Bibliography

Although alternatives to methods based on the use of animals may not satisfy all requirements and needs of the biomedical research and toxicological testing communities, alternatives to the use of vertebrates are being developed and evaluated. Research on such methodologies is aimed at refining procedures to reduce pain and discomfort; to reduce the number of animals required to provide scientifically valuable results; and to replace live vertebrates when an alternative methodology can be verified and validated by the scientific community. The Toxicology and Environmental Health Information Program's Specialized Information Services, National Library of Medicine, NIH, has prepared *Alternatives to the Use of Live Vertebrates in Biomedical Research and Testing: A Bibliography with Abstracts*, to assist in: • refining existing test methods; • reducing animal usage; and • replacing animals as test systems. It can be accessed at <tox-net.nlm.nih.gov/altbib.html>. For more information, see that Website, or contact Vera W. Hudson, Project Coordinator and Scientific Editor, National Library of Medicine, NIH, 8600 Rockville Pike, Bethesda, MD 20894 [e-mail: VERA_HUDSON@NLM.NIH.GOV].

E-Mail Lists

Annie and Viktor Reinhardt, of the Animal Welfare Institute, have initiated a closed electronic forum on Laboratory Animal Refinement & Enrichment (LAREF). The purpose of this discussion group is the factual exchange of experiences about ways to improve the conditions under which laboratory animals (*all* species) are housed and handled. The forum is intended to serve the international animal care community in its attempt to promote animal welfare and improve scientific methodology by avoiding or eliminating husbandry-related stress situations. The forum is open to animal care personnel, animal technicians, students, attending veterinarians, and researchers who have had first-hand experience in the care of animals kept in laboratories. Currently there are 70 subscribers from 15 countries. To join the group, please send a message to <viktorawi@siskiyou.net>, indicating your • name, • professional affiliation, • professional experience(s) and • professional interest(s).

The **Academy for Animal Pain Management** has developed an e-mail list for discussion of pain-related issues, and committees have been formed to address

organizational needs. To join this group, contact Dr. Peter W. Hellyer [e-mail: phellyer@colostate.edu].

Topics in Primate Care

There is a new *Primate Info Net (PIN)* series, *Topics in Primate Care (TPC)*. Issues will be posted periodically on both *Primate Science* and the *Primate Enrichment Forum (PEF)*, and will include current topics (both original submissions and published material), references, news, and information on the topics of environmental enrichment, veterinary care, and colony management of nonhuman primates. This series is coordinated by David Seelig (University of Pennsylvania), Lyna Watson (Wyeth Genetics Institute), and Janette Wallis (University of Oklahoma Health Sciences Center). They encourage original submissions, including enrichment strategies and brief to moderately-sized articles or essays on enrichment or veterinary topics, as well as questions of general interest, which will be discussed in future issues in a Question & Answer section.

For information about subscribing to *Primate Science* or *PEF*, you may visit *PIN* Information Resources at www.primate.wisc.edu/pin/outreach.html and click on the link to discussion forums. Please submit original material or questions to David at dseelig@vet.upenn.edu, Lyna at watsonl@gis.net, or Janette at janette-wallis@ouhsc.edu. In addition, please write to us with any comments or suggestions on what you would like to see in this new series. *TPC* is supported by grants RR13511 and RR00167, National Primate Centers Program, NCRR, NIH.

More Interesting Websites

- Alphabetical listing of CITES Appendix I (threatened with extinction) primate species: www.aesop-project.org/Primate_Trade/CITES_Appendices.htm
- Definitions and explanation of regulation of trade in CITES Appendix I and Appendix II Species: www.aesop-project.org/Primate_Trade/CITES_Convention_Text.htm

* * *

Grants Available

Age-Related Changes in Tissue Function

The National Institute on Aging (NIA) www.nia.nih.gov/ solicits multi-component applications on biological mechanisms of aging in tissues and organs. Projects are encouraged that significantly advance basic biology research to understand how and why changes take place in tissues with age and how those changes relate to altered tissue and organ function. Projects that focus on molecular aspects, as well as cellular aspects, of tissue aging are encouraged. Projects are applicable under this announcement that a) emphasize

- Americans for Medical Progress: www.amprogress.org
- *Animal Research News & Analysis* (The Humane Society of the United States): www.hsus.org/research
- Annotated bibliography *Refinement and Environmental Enrichment for All Laboratory Animals*: www.awionline.org/lab_animals/biblio/laball.htm
- APHIS Fiscal Year 2001 Annual Report: www.aphis.usda.gov/ac/awrep2001.pdf
- Center for Orangutan and Chimpanzee Conservation: www.prime-apes.org
- Center for the Rehabilitation and Rescue of Primates, Peñaflo, Chile: www.macacos.cl/
- *Clinical Neurology in Small Animals: Localization, Diagnosis and Treatment*, by K. G. Braund. Publisher: International Veterinary Information Service: www.ivis.org/special_books/braund/toc.asp
- Coalition For Animals and Animal Research: www.swaebr.org/cfaar/index.htm
- Forests for life program: www.panda.org/forests4life/
- Frontier forests of the world: Interactive forest maps: www.wri.org/ffi/maps/
- How does deforestation affect primates? www-personal.umich.edu/~spencea/
- NIH's *Proactive Compliance Site Visits 2000 - 2002: A Compendium of Findings and Observations*: grants.nih.gov/grants/compliance/compendium_2002.htm
- NORINA, database of audiovisual aids and other alternatives/supplements to the use of animals in teaching and training: oslovet.veths.no/NORINA
- Report on current practice for assessing and monitoring the well-being of research animals in the U.K.: www.lal.org.uk/pain/
- TextBase, database of textbooks in Laboratory Animal Science: oslovet.veths.no/textbase
- Utrecht University Department of Laboratory Animal Science: las.vet.uu.nl

molecular and cellular changes that are common among tissues with aging; b) compare mechanisms of aging change in different tissues; and c) investigate the effects of age-related changes in one cell type, tissue or organ that affect the function of another tissue or organ.

This program encourages basic research into processes that lead to altered function of tissues and organs as a result of aging. Research that takes maximal advantage of emerging genetic, genomic and proteomic information on humans and other animals to understand changes that occur with aging is particularly encouraged.

For information, contact Frank L. Bellino, Endocrinology, Physiology, NIA, 7201 Wisconsin Avenue, Suite 2C231 MSC 9205, Bethesda, MD 20892-9205 [301-496-6402; fax: 301-402-0010; e-mail: bellinof@nia.nih.gov]; Jill L. Carrington, Chief, Systems Branch, Biology of Aging Program, Musculoskeletal Biology, same address [e-mail: carringtonj@nia.nih.gov]; David B. Finkelstein, Cardiovascular Biology, same address [e-mail: finkelsd@nia.nih.gov]; Rebecca A. Fuldner, Immunology, same address [e-mail: fuldnerr@nia.nih.gov]; Stanley Slater, Geriatrics and Clinical Gerontology Program, same address, Suite 3E327 [301-496-6761; fax: 301-402-1784; e-mail: slaters@nia.nih.gov]; Bradley C. Wise, Neuroscience and Neuropsychology of Aging Program, same address, Suite 3C307 MSC 9205 [301-496-9350; fax: 301-496-1494; e-mail: wiseb@nia.nih.gov].

Applications submitted in response to this program announcement will be accepted at the standard application deadlines for program project grants, at grants.nih.gov/grants/dates.htm.

Comparative Biology: Mechanisms of Aging

The National Institute on Aging (NIA) is soliciting applications that use comparative biology approaches to understand the biological mechanisms that lead to changes in human and other animal cells and tissues with age. The major questions to be addressed are: How does increasing age lead to biological changes, especially decrements in cell, tissue and organ function; and what sets the rate of aging such that different organisms have different life expectancies? Studies that take advantage of the differences in aging and life expectancy between species and within species are encouraged.

Direct your questions about general scientific/research issues and regarding projects focused on non-neural tissues to: Jill L. Carrington, Biology of Aging Program, NIA, Gateway Bldg, Suite 2C231, 7201 Wisconsin Ave, Bethesda, MD 20892-9205 [301-496-6402; e-mail: carringtonj@nia.nih.gov]. For questions on studies focused on the nervous system, contact: Bradley C. Wise, Neuroscience and Neuropsychology of Aging Program, NIA, Gateway Bldg, Suite 3C307, 7201 Wisconsin Ave, Bethesda, MD 20892-9205 [301-496-9350; fax: 301-496-1494; e-mail: wiseb@nia.nih.gov]. The application receipt date is January 23, 2003.

Early Career Development, HIV/AIDS

The National Institute of Mental Health (NIMH) announces a program for competitive supplements to support interdisciplinary research and education on active interdisciplinary HIV/AIDS research grants funded through the Center for Mental Health Research on AIDS. This competitive supplement program encourages and supports HIV/AIDS interdisciplinary research and career development for qualified candidates through an expe-

ditioned application process. The goals are: • to expand and foster the independent research capabilities of the candidate; and • to strengthen the ongoing research program of the parent grant. Applications may be submitted on behalf of postdoctoral and junior faculty candidates.

The complexity and interconnections of the rapidly growing area of the neuroscience and psychobiology of HIV-related disease underscore the need to provide research opportunities to young investigators so that they may break new ground in this area. It is anticipated that some of the most significant insights and advances in HIV disease are likely to emerge as a result of recognizing and appreciating the intricate interplay among the brain, environment, and behavior. Interdisciplinary and translational research approaches among basic, clinical, and services research are potentially powerful approaches to integrating the rapidly advancing findings in HIV/AIDS research. Yet there seems to be disciplinary fragmentation, with researchers from basic, clinical and services areas working in different venues.

Three major areas of HIV/AIDS research (HIV prevention science, NeuroAIDS, HIV therapeutics) would be facilitated and enriched through an organized research program with researchers employing different approaches. Research in these domains draws upon a number of disciplines such as epidemiology, neuropsychology, brain imaging, neuropathology, genetics, molecular biology, immunology, and behavioral and social sciences. In all cases, the proposed research must be an integral part of the ongoing interdisciplinary HIV/AIDS research program supported by the parent grant and must have the potential to significantly contribute to the research career development of the interdisciplinary candidate.

For information, contact David M. Stoff, Center for Mental Health Research on AIDS, Div. of Mental Disorders, Behavioral Research and AIDS, NIMH, 6001 Executive Blvd, Rm 6210, MSC 9619, Bethesda, MD 20892-9619 [301-443-4625; fax: 301-443-9719; e-mail: dstoff@nih.gov]. Application deadlines will be January 2 and September 1 of each year for the next three years.

Models for Emerging Diseases and Biodefense

The National Institute of Allergy and Infectious Diseases (NIAID) is offering a contract to provide • targeted screening to identify potential therapeutic and preventive modalities, as well as • resources to characterize additional antimicrobial activities of already licensed antimicrobial agents, and • small animal and nonhuman primate models to test the safety and efficacy of therapeutic and preventive modalities that target emerging infectious agents. The objective of this contract is to provide a range of developmental resources to bring new therapies and preventive measures from the laboratory to initial clinical testing in humans. For details see

<www.niaid.nih.gov/contract/archive/RFP0339.pdf>. Responses will be due approximately January 30, 2003. For further information, contact Paul McFarlane, Contracting Officer, NIH, NIAID, Contract Management Branch, 6700-B Rockledge Dr., Rm 2230, MSC 7612, Bethesda, MD, 20892-7612 [301-496-0349; fax 301-402-0972; e-mail: pm24@nih.gov].

Noninvasive Measurement of Iron by MRI

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the National Institute of Biomedical Imaging and Bioengineering (NIBIB) invite Research Grant Applications for projects that have the potential to improve the utility of magnetic resonance imaging (MRI) as a method for quantitative determinations of tissue iron, especially in the liver, heart and brain. A quantitative means of measuring body storage iron that would be non-invasive, safe, accurate, and readily available, would improve the diagnosis and management of patients with iron overload. MRI potentially provides a useful and widely available technique for examining the three-dimensional distribution of excess iron in the body, but further research is needed to develop a way to make measurements quantitative.

Among the experts potentially useful in this research may be investigators active in the development of non-invasive measures of iron, scientists and engineers interested in improving MRI technology, clinicians who care for patients with iron disorders, and experts in the physics and chemistry of iron and in iron metabolism. Projects proposing collaborations among such individuals are particularly encouraged.

Direct questions about scientific/research issues to: David G. Badman, Hematology Program Director, NIDDK, 6707 Democracy Blvd., Rm 621, MSC 5458, Bethesda, MD 20892-5458 [301-594-7717; fax: 301-480-3510; e-mail: db70f@nih.gov]; or John W. Haller, Health Scientist Administrator, NIBIB, NIH, 6707 Democracy Blvd., Suite 920, Bethesda, MD 20892-2077 [301-451-4780; fax: 301-480-4973; e-mail: hallerj@mail.nih.gov]. Letter of intent due date is January 20, 2003, and application due date is February 19, 2003.

Housing, Husbandry, and Welfare in the British Isles

The Pharmaceutical Housing and Husbandry Steering Committee of the Universities Federation for Animal Welfare (UFAW) invites applications for research based in the British Isles into any aspect of laboratory animal housing, husbandry, and welfare, including effects on the quality of science. The cost of the project should be no more than £23,000 per year for up to three years. Application will be by a two-stage process with project supervisors initially submitting a brief Concept Note by January 24, 2003. For further information and for the Concept Note forms, write to UFAW, The Old School, Brewhouse

Hill, Wheathampstead, Herts AL4 8AN, U.K. [01582 831818; fax: 01582 831414].

NHP Models of HIV-Associated Disorders

The National Heart, Lung, and Blood Institute (NHLBI) invites applications on the use of nonhuman primate models for the study of Human Immunodeficiency Virus (HIV)-associated pulmonary, cardiovascular, and hematologic disorders. These primate models (e.g., Simian Immunodeficiency Virus [SIV]- and Simian-Human Immunodeficiency Virus [SHIV]-infected monkeys) should be designed to facilitate the study of the biological and clinical characteristics of disorders of lung, heart, blood, and bone marrow, associated with HIV infections and co-infections as well as to evaluate novel methods for prevention and treatment of these conditions.

The intent is to stimulate collaborations among scientists devoted to studies of SIV/SHIV disease in primates as a model for human AIDS, and investigators with expertise and experience in the following fields of relevant research: studies of tuberculosis, *Pneumocystis carinii* pneumonia, pneumococcal pneumonia, and other pulmonary and cardiovascular infections/disorders and studies of the roles of blood cellular components in the genesis and progression of AIDS. Such collaborations should take advantage of the large wealth of knowledge and resources (e.g., biological and immunologic reagents) that have been generated during the past 15 years.

Please direct questions about scientific/research issues to: Sandra Colombini Hatch, Division of Lung Diseases, MSC 7956 [301-435-0222; fax: 301-480 3557; e-mail: hatchs@nhlbi.nih.gov]; Luiz Barbosa, Division of Blood Disease Research, MSC 7950 [301-435-0075; fax: 301-480-0868; e-mail: barbosal@nhlbi.nih.gov]; or Diane Reid, Division of Heart and Vascular Diseases, MSC 7940 [301-435-0515; fax: 301-480-1336; e-mail: reidd@nhlbi.nih.gov]. The address for all is NHLBI, 6701 Rockledge Dr., Bethesda, MD 20892. The letter of intent receipt date is February 20, 2003; and the application receipt date is March 20, 2003.

ACLAM Foundation Request for Proposals

The American College of Laboratory Animal Medicine (ACLAM) Foundation Committee announces their solicitation of research proposals in laboratory animal science and medicine. The deadline for letters of intent is February 12, 2003; full proposals must be received by May 6. Complete information is available at <www.aclam.org>; or contact: Dr. Martin Morin, Chairman, ACLAM Foundation, 208 Byford Dr., Chestertown, MD 21620 [410-810-1870; fax: 410-810-1869; e-mail: morinasc@hpiug.org].

The Foundation will focus funding on research in the following fields of laboratory animal science and medi-

cine: • analgesia/anesthesia • animal behavior/well-being • diagnostics/diseases of laboratory animals • laboratory animal husbandry • refinement of animal models, including toxicology [note: emphasis is on the 3 R's, not on biomedical research model development] • zoonotic dis-

eases. Successful grantees are encouraged to publish their results in peer-reviewed journals and must agree to provide summary research reports in lay language suitable for inclusion in ACLAM Foundation communications, fund raising solicitations, and the *ACLAM Newsletter*.

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Resources Available

The June Northrop Barker Archive at the WPRC

The Wisconsin Primate Research Center Library and Information Service has established a special archive room to include the extensive records of rhesus monkey families maintained privately for many years by the late June Northrop Barker, a research physiologist at New York University. Dr. Barker's husband, Richard Barker, of Frenchtown, New Jersey, visited the Primate Center on July 12 to dedicate the archive and tour the center. Dick Barker established a \$100,000 endowment through the University of Wisconsin Foundation to support the work of the archive. Funds from the archive will be used, in part, to support graduate student archivists from the University's School for Library and Information Studies.

June Barker's monkeys were originally involved in W. F. Windle's studies of perinatal hypoxia at New York University in 1971-72. For the next 30 years, most recently in Hunterdon County, New Jersey (1981-2001), the animals and their many offspring were raised in family groups with a highly nutritious diet. Dr. Barker's basic goal was to create an archival database of observable factors from conception to death for captive individuals and for their group interrelations. There were 46 monkeys in July, 2001, when the colony was disbanded. Most of the animals were donated to the Institute on Aging (NIH).

The material includes hundreds of audio and video observation tapes; records on nutrition, water intake, dated pregnancies, births and deaths; studies of motor and behavioral activities; reports on geriatric afflictions; audio videos; and notes on play and vocalizations.

"The archive also includes June's fascinating annual reports on exceptional and unanticipated developments," said Richard Barker. "I am hopeful that the Wisconsin archive of June's collected data will soon come to be recognized as a valuable and exciting new resource for the study of nonhuman primates."

Two other key collections in the archive are Richard Dukelow's materials from his book, *The Alpha Males*; and Deborah Blum's papers from her new biography of Harry Harlow, *Love at Goon Park*. Rounding out the initial resources are 50,000 reprints of papers indexed in PrimateLit, a major bibliographic resource for primatology; the archives of the International Primatological Society; and master copies of key audiovisual resources. For

additional information about the University's archival collections, contact WPRC archivist, Amanda Goudy-Trainor, WPRC, 1220 Capitol Ct, Madison, WI 53715-1299 [e-mail: atrainor@primate.wisc.edu].

Geo-Referenced Database of Neotropical Primates

A database, BDGEOPRIM, has been developed by André Hirsch (coordinator) and his colleagues at the Department of Zoology of the Federal University of Minas Gerais, Belo Horizonte, Brazil. BDGEOPRIM is a geo-referenced data base of 5631 locality records for 18 genera, 110 species, and 205 species and subspecies of primates in the Neotropical region, including 21 countries. The development of this database was made possible thanks to the support of the Margot Marsh Biodiversity Foundation. Access BDGEOPRIM at www.icb.ufmg.br/~primatas/home_bdgeoprime.htm.

Make comments or suggestions to André Hirsch, Depto de Zoologia, Inst. de Ciências Biológicas, Univ. Fed. de Minas Gerais, 31.270-901 Belo Horizonte, Minas Gerais, Brazil [e-mail: hirsch@mono.icb.ufmg.br].

New Upgrade Release of EthoVision

Noldus Information Technology announces the release of EthoVision 3.0, a major upgrade of its video tracking system for automation of behavioral experiments. The most important new features in this version are: • Tracking from digital video files; • Advanced experiment control, allowing you to link user-defined conditions to specific actions; and • Controlling external devices, allowing you to automate a wide range of experiments, e.g. operate a feeder, close a door, present an auditory signal, etc. For more information, see www.ethovision.com.

APSF Virtual Anesthesia Machine Workbook – Free

Chapter 1 of the Anesthesia Patient Safety Foundation (APSF) anesthesia machine workbook has been made available free of charge by the APSF at www.anest.ufl.edu/vam. The first chapter covers normal function of traditional anesthesia machines and consists of structured exercises designed for instructional use or self-paced learning. Used in conjunction with the VAM simulation, it provides step-by-step guidance to help users learn objectives related to the anesthesia machine and patient safety.

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News Briefs

Florida Sanctuary Purchases Coulston Foundation

The Florida-based Center for Captive Chimpanzee Care (CCCC) announced on September 18 that it had purchased the Coulston Foundation (TCF) facilities in Alamogordo, New Mexico, and will permanently care for approximately 266 chimpanzees and 61 monkeys from the research facility. The announcement follows years of pressure from animal protection advocates who were critical of the facility's animal care. The National Institutes of Health (NIH) had delivered a crippling blow in June, 2001, when it terminated funding to TCF; the lab had reportedly received as much as two thirds of its annual budget from the federal agency. In December, 2001, the First National Bank of Alamogordo filed a foreclosure lawsuit, claiming that the facility owed more than \$1.16 million in outstanding loans.

CCCC, headed by Dr. Carole Noon, bought Coulston's property on the condition that TCF donate all its primates to her Florida sanctuary. The purchase was made possible by a \$3.7 million grant from the Arcus Foundation of Kalamazoo, Michigan. Several animal protection organizations also provided financial support.

TCF, which once housed 650 chimpanzees and was the largest captive chimpanzee colony in the world, had a history of violating federal regulations and guidelines. The U.S. Department of Agriculture (USDA) charged TCF at least four separate times with violations of the Animal Welfare Act (AWA), including negligent deaths of research animals. In August, 1999, TCF agreed to surrender 300 chimpanzees (reportedly almost half its population) and submit to outside oversight in order to settle AWA violations. TCF also faced possible disqualification by the Food and Drug Administration (FDA) for widespread and continuous violations of Good Laboratory Practice (GLP) regulations. – *From the Humane Society of the United States's electronic newsletter, Animal Research News & Analysis, citing as sources PR Newswire, 12th Judicial District Court of New Mexico, and the Food and Drug Administration*

NIH Funds Louisiana Chimp Sanctuary

The National Institutes of Health (NIH) has announced that Chimp Haven, a private, non-profit organization, will be awarded a grant to establish and operate a chimp sanctuary near Shreveport, Louisiana. The National Center for Research Resources (NCRR), a component of NIH, will award the contract, which will total approximately \$19 million. It is a ten-year, cost-sharing contract, with Chimp Haven providing approximately \$4 million. Chimp Haven will build the sanctuary on 200 acres of land donated by the county government (Caddo Parish) and NCRR will grant another \$5 million to the

organization for construction costs. The sanctuary, which will be home to 75 free-ranging chimps, is scheduled to be completed in the Spring of 2004.

As more chimps retire from research, Chimp Haven has been authorized to expand its sanctuary facility or serve as a contractor to other qualified sanctuaries. The sanctuary may apply for additional NCCR construction grants, which would enable this expansion. While no invasive biomedical research will be allowed at Chimp Haven, both NCRR and Chimp Haven have agreed to periodic inspections by the U.S. Department of Agriculture (USDA) and the facility will comply with animal welfare regulations. In addition, according to Dr. Linda Brent, director of Chimp Haven, the sanctuary has one full-time veterinarian on its staff and there is another veterinarian in Shreveport if needed.

The chimpanzee sanctuary issue gained tremendous momentum with the passage of the federal CHIMP Act of 2000 (Chimpanzee Health Improvement, Maintenance and Protection) that was signed by President Clinton in December, 2000. This legislation created and provided the funds for a sanctuary retirement system for chimpanzees previously used in medical research supported by the federal government. – *From the NABR Update, October 11, 2002*

Malaysia to Surrender Illegally Traded Baby Gorillas

Following an investigation prompted by the Secretariat of the Convention on International Trade in Endangered Species (CITES), the Government of Malaysia has announced that it will confiscate four young gorillas imported into the country earlier this year. The investigation found that the gorillas were not born in a Nigerian zoo as claimed, but instead had been captured in the wild in Nigeria or, more likely, in a neighboring country. The commercial trade in all wild gorillas is strictly forbidden under CITES.

“Gorillas are so highly endangered that every criminal transaction such as the one uncovered here can have an impact on their future,” said CITES Secretary-General Willem Wijnstekers. “The laws are in place; we must now rely on all governments to tighten their enforcement controls and do everything in their power to stamp out illegal wildlife trade.”

The gorillas were imported into Malaysia from Nigeria by the Taiping Zoo on the basis of falsified documents. The CITES Secretariat took action after receiving information from several sources questioning whether the claim that the animals had been born in captivity was true. While the investigation continues, it has been firmly established that the gorillas were traded illegally and in violation of the treaty.

The Secretariat will issue an alert to all national CITES management authorities as well as Interpol and the World Customs Organization to help enforcement officials better target such activities. The confiscated gorillas will be sent to a breeding center or a zoo in a third country still to be determined. – *from a CITES press release, October 11, 2002*

New Wildlife Parks in Gabon

Conservationists are calling it a major victory for Africa's wildlife. The world heard about it at the United Nations Summit on Sustainable Development in Johannesburg. Gabon's president, Omar Bongo, announced his government's decision to create a new national park system protecting some of the most critically important rain forest habitats in central Africa's Congo basin. Gabon's rain forests shelter large populations of central Africa's distinctive wildlife, including endangered species such as gorillas, chimpanzees and forest elephants. – *Posted to Comparative Psychology News, October 4, 2002*

High Hopes at Launch of Africa's Largest Game Park

The leaders of three countries launched Africa's biggest national park on October 7 – a vast swathe of savanna teeming with game that they hope will draw much needed tourist dollars to the region. The Great Limpopo Transfrontier Park, which covers an area roughly the size of Belgium, straddles South Africa, Mozambique and Zimbabwe and is due to open to visitors early next year. South African President Thabo Mbeki, Zimbabwean President Robert Mugabe, and Mozambique President Joaquim Chissano officially christened the park at a ceremony in the Mozambican resort town of Xai Xai on the Limpopo River. "The successful merging of our individual parks into the Limpopo Transfrontier Park tells us that nothing is impossible, and yet this increases the challenge to all of us to ensure that we create the correct conditions for the balanced development and advancement of our countries," Mbeki said. – *Reuters news report, posted to Comparative Psychology News, December 9, 2002*

Last European Research Chimps to Retire

On October 4th, a contract was signed in The Netherlands to transfer the last remaining chimpanzees in biomedical research in the European Union to retirement facilities in The Netherlands and Spain. The Dutch Minister of Education and the Director of the Biomedical Research Centre (BPRC) agreed in writing to transfer ownership of 59 chimpanzees to the AAP Sanctuary for Primates and other Exotic Animals. The transfer will take place as soon as the retirement facilities are ready during 2003 and 2004.

The retirement of the chimpanzees is the result of an amendment to the Dutch Law on Animal Experiments that prohibits the use of great apes in biomedical experi-

ments in The Netherlands. BPRC was the only laboratory in the EU to still use chimpanzees. They have received one final exemption to the test ban for six chimpanzees which are scheduled to be infected with Hepatitis C as part of a vaccine trial later this year. – *posted to Allopri-mate by Wim de Kok, October 9, 2002*

Saving the White-Headed Langur from Extinction

Chongzuo Ecology Park in Chongzuo County of Southwest China's Guangxi Zhuang Autonomous Region, which opened to the public on August 11, 2002, is one of the world's last natural refuges of the endangered white-headed langur (*Trachypithecus francoisi leucocephalus*), which can only be found in this part of China. Fewer than 800 of these monkeys still inhabit the hillsides – a smaller number than the giant panda, which number about 1,000 in China.

A brainchild of one of the country's leading zoologists, Professor Pan Wenshi, it is a combination of a field research base and an ecotourism destination. In spite of the many challenges it faces, the park has great potential to become a model of both conservation and development under the care of a group of devoted researchers.

White-headed langurs are threatened on two fronts. Poachers seek to catch them while farmers are encroaching on their natural habitat. The professor hopes his efforts can help save the creature from extinction. "The fate of the subject of our study is much more important than any research results," he said. – *From the August 28, China Daily, reported on Primfocus*

Oregon Primate Center Files Building Plans

The Oregon National Primate Research Center plans to add a third animal housing building at its campus in Hillsboro. When completed, it will house as many as 900 rhesus monkeys. It is part of the Center's effort to move monkeys into more social housing. The Center has submitted plans for design review. If the city approves, the Center will seek building permits in January or February and begin construction in the spring. The building should be finished a year later. It is part of the Center's 20-year master plan approved by the city in 1998.

Most research in the new building will consist of behavioral studies, observing monkeys to see which have anxiety and depression and how that relates to human mental health. The monkeys also will be involved in other studies that have not yet been determined. The building will have all paired housing so that monkeys are not alone in cages. "It's part of an aggressive campaign toward social housing," Lisa Godwin, a Center spokeswoman, said. The building also will include 35 playrooms with play structures and windows facing hallways to allow the monkeys regular group interaction. – *From The Oregonian, November 1*

Annelisa M. Kilbourn, British Veterinarian, Dies at 35

Annelisa M. Kilbourn, a British veterinarian and wildlife expert who discovered that gorillas can die of the Ebola virus, died Saturday in a plane crash in the Central African nation of Gabon.

Kilbourn was working for the Wildlife Conservatory Society earlier this year when she determined that Ebola, a tropical disease for which there is no cure, caused the deaths of several gorillas that she found in Gabon. Her discovery helped explain why an earlier outbreak of Ebola in the area coincided with a steep decline in the gorilla population. It also showed that Ebola was one of the reasons why gorillas were disappearing from Africa's forests.

Born in 1967 in Zurich, Kilbourn also helped protect free-ranging orangutans and elephants in Malaysia and tried to save rhinos in Borneo. – *From an Associated Press report, November 4, 2002*

Baby Mountain Gorilla Rescued from Poachers

On Friday, October 4th, National Park authorities in northern Rwanda (ORTPN) and the Ruhengeri police rescued a baby mountain gorilla from three poachers. The poachers had hidden the infant in a mountain cave for three days while they awaited a buyer. The arrests were made in the National Parc des Volcans in Rwanda, home to about half of the world's remaining mountain gorillas.

"The three, who admitted their role, said the little gorilla had been given to them for safe-keeping by another man while he went to seek a buyer," a police spokesman said. They had each hoped to make the equivalent of 40 dollars for the sale.

The spokesman said the animal had been returned to national park authorities for a medical check and was no longer in any danger. The female gorilla baby is estimated to be 2-3 years old. Park authorities reported that she was in good health – weak but responding well to rehydration treatment. She is not a habituated gorilla from Rwanda, as all groups (research and tourism) have been checked by the International Gorilla Conservation Program (IGCP) staff and park authorities. There was speculation earlier in the week as to whether or not this was the infant that was taken by poachers on May 9 of this year, but the staff veterinarian assessed that this baby's health was too good for it to have been in captivity for five months. Also, the nose-print that park authorities have for the baby taken in May is inconsistent with the nose-print of this infant.

Park authorities are continuing the investigation. They have the infant under 24-hour care and report that she is eating well and getting stronger. Staff are discussing what next steps need to be taken to reintroduce the infant into the gorilla population. For more information, see

<www.awf.org>. – *From African Wildlife Foundation, October 12, 2002*

Jean-Jacques Petter

"It is with deep regret that I inform you of the death of Dr. Jean-Jacques Petter, Professor at the Musuem d'Histoires Naturelles, first President of the Society Francophone de Primatology. Dr. Petter was a towering figure in French primatology, specializing in the prosimians of Madagascar. He has passed away at the age of 75 years. He was a courteous man and an exceptionally good listener. All those among you who were fortunate enough to come into contact with him will carry the memory of a man of extraordinary kindness who was able to breathe new life into French primatology, in particular during the years when it was at a low ebb internationally." – *sent to Alloprimate June 9, 2002 by Nicolas Herrenschmidt*

Large Population of Orangutans Found in Borneo

The Nature Conservancy announced that a survey team has identified a large population of orangutans, the extent of which was not previously known. About 1,600 nests were counted, serving as evidence of at least 1,000 orangutans within a 345,000-acre area. This represents a population drastically larger than anyone previously thought possible and could correspond to up to 10% of the world's estimated remaining wild orangutan population.

Team leaders Linda Engstrom and Bhayu Pamungkas recruited and trained local villagers, including a number of indigenous and forest-dependent Punan Dayaks, to carefully survey the remote and difficult lowland forest terrain found in the East Kalimantan regencies of Berau and East Kutai. – *From the Winter, 2002, issue of Nature Conservancy magazine*

Waystation Set to Shake Up Its Management

The Wildlife Waystation will overhaul its management to help pull the popular animal sanctuary out of a years-long morass of regulatory violations that have forced a halt to wildlife rescues, officials said. Businessman Robert H. Lorsch said the nonprofit agency's board of directors unanimously decided this summer to resign and make way for a new board, which he expects to head.

The Waystation also expects to hire a new executive director, replacing founder Martine Colette, who is backing out of business dealings, Lorsch said. Colette instead will focus on caring for the 600-plus chimpanzees, lions, bears and other animals living at the animal rescue and rehabilitation center on Little Tujunga Road in the Angeles National Forest. Lorsch described the Waystation as a volunteer organization that became a victim of its own success and lacked the management and financial personnel to keep up with the growing number of animals and accompanying regulations. – *From a November 12, 2002, Los Angeles Times article by Kerry Cavanaugh*

Toronto Zoo Macaque Had West Nile Virus

Officials at the Toronto Zoo are looking into expanding their animal vaccination program after a monkey died with the West Nile virus. Amos, a Barbary macaque (*M. sylvanus*), was euthanized in August after becoming very ill. The results of an autopsy were released November 22.

Since it first surfaced in North America three years ago, the West Nile virus has been detected in about 230 species, including horses, birds, reindeer, and even alligators. But zoo officials say this may be the first North American case of the virus showing up in a nonhuman primate. Zoo officials have previously vaccinated birds, zebras and rhinos. Now, the vaccination program may be extended to cover all 5,000 animals at the zoo. – *from a CBC News Online staff report, posted to Primate-Science November 23*

Unexplained Deaths of Wildlife – Congo Republic

William B. Karesh, DVM, of the Wildlife Conservation Society, wrote: “I am currently in Gabon and received word via radio from associates in the Republic of Congo that six western lowland gorillas from one family group, numerous monkeys (species not indicated), and duikers (forest antelope) were found dead on December 1.

“The gorillas were habituated to human presence in the forest for ecotourism purposes as part of a European

Union-funded project managed by the Ecosystemes Forestiers d’Afrique Centrale. Project personnel (mostly local villagers responsible for the project) had not seen the gorillas for several days and made a comprehensive search of the forest near the village of Lossi, finding the carcasses of the gorillas, monkeys, and duikers. This village is on the road from Mekambo in Gabon and Mbomo in the Republic of Congo, about 30 km southwest of Mbomo.

“Villagers and staff report that finding numerous dead animals in the forest is an extremely rare event. Project personnel have been trained in basic health monitoring techniques over the last year as part of the Wildlife Conservation Society’s lowland gorilla health program and have identified the exact location of all carcasses.

“The Centre International de Recherches Medicales de Franceville in Gabon has been notified and is sending a team to the area with the invitation of the government of the Republic of Congo. They previously provided laboratory confirmation of Ebola virus in three gorillas we sampled after they were found dead earlier in 2002 in the same region of the Republic of Congo.

“The identification and reporting of this current mortality event did not result from human illness or mortality, but purely from the ongoing monitoring program for wildlife.” – *Posted to ProMED-mail, December 5*

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Awards Granted

International Prize to Andrew Whiten

The 2001 Jean-Marie Delwart Prize for Ethology and Cultural Anthropology has been awarded to Professor Andrew Whiten of the University of St Andrews for his research on the evolution of mind and culture. The Delwart Foundation was established in 1989 to promote the scientific study of animal and human behavior.

The \$10,000 prize is awarded every four years, under the auspices of the Académie Royale des Sciences de Belgique, for a study linking ethology and cultural anthropology. The prize was presented at the annual session of the Academy in December, 2001.

Animals & Society Course Awards

The Humane Society of the United States (HSUS) has announced that a panel of outside experts has selected the recipients of The HSUS’s Animals & Society Course Awards for 2002. The awards recognize excellence in the teaching of issues concerning the relationship between people and animals. Normally two awards are given annually, one for an established course and one for a new course.

This year two courses were recognized in the established course category: “Animal Welfare”, taught by Pro-

fessor Joy Mench of the University of California, Davis, and “Issues Concerning Use of Animals by Humans”, taught by Drs. David Zartman and Stephen Boyles of Ohio State University, Columbus. The winner in the new course category was “Animals and People”, taught by Professor Tracy Smith-Harris of the University College of Cape Breton (Sydney, Nova Scotia).

Winning courses are recognized with a certificate and a \$1,500 prize (divided evenly in years for which an award is split among two or more winners) and given to the institutional department in which the course is taught. The goals of the awards are to help enhance instruction in the winning courses and to foster the wider availability of high-quality curricula and instruction in a variety of relevant academic fields.

AAALAC Wins Cohen Award

The Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) was awarded the first-ever Bennett J. Cohen Animal Stewardship Award last week at the 53rd American Association for Laboratory Animal Science national meeting in San Antonio, Texas. The Cohen award was created to recognize those individuals or organizations that have achieved prominence in promoting and advancing the “three Rs” of re-

placement, reduction, and refinement in the use of laboratory animals in research.

Burroughs-Wellcome/ASP Young Investigator Award

The American Society of Primatologists (ASP) has announced that Dr. Karen Bales has been selected as the first recipient of the Burroughs-Wellcome/ASP Young Investigator Award. Dr. Bales, currently at the University of Illinois at Chicago, will conduct a series of projects on urocortins, a newly discovered class of neuropeptides related to corticotropin releasing factor (CRF) and hence potentially a critical player in the stress system. The work will be conducted at Emory University School of Medicine, Atlanta, Georgia.

ASP 2002 Awards

The **ASP Conservation Award** of \$750 went to Pierre Kakule Vwirasihikya from the Democratic Republic of Congo. The Subscription Award (for the *American Journal of Primatology*) went to Jean R. Onononga from the Republic of Congo.

Conservation Small Grants (up to \$1500) went to Ben Rawson for “A study of the ecology and behaviour of the yellow-cheeked gibbon (*Nomascus gabriellae*) in Eastern Cambodia”; Nguyen Manh Ha for “Hatinh Langur conservation” [Vietnam]; Mukesh K. Chalise for “Study of the Assamese monkey in Langtang National Park and Buffer Zone Area, Nepal”; Nicole Gross-Camp for “Seed dispersal behavior of the chimpanzee, *Pan troglodytes*, in an Afromontane forest” [Rwanda]; Soraya Ribeiro for “The brown howler monkey, *Alouatta guariba clamitans*, in a fragmented landscape in South Brazil”; Deborah Ignatoff for “Behavior and population assessment of the Sulawesi black macaque at the Tangkoko Nature Reserve, North Sulawesi, Indonesia”; Lisa Jones-Engel for “Assessing the impact of human-primate disease transmission on the endangered *Macaca nigra* of Tangkoko Nature Reserve” [Indonesia]; Monica A. Pimenta for “Habitat fragmentation and genetic variability of populations of *Alouatta pigra* (Primates: Cebidae) in the Yucatan Peninsula, Mexico: Implications for conservation”; Erwin Palacios for “Assessment of primate populations at the Pure River, Colombian Amazon”;

Gabriel E. Zunino for “Forest disturbance effects on a population of black and gold howler monkeys (*Alouatta caraya*) in Northern Argentina”; and Laurie Godfrey for “Developing a conservation strategy for *Microcebus griseorufus* and *Microcebus murinus* (Primates, Cheirogaleidae) at the Beza Mahafaly Special Reserve, Southwestern Madagascar”.

Research and Development Small Grant Awards

were given to: Corinna Ross, Hogan Sherrow, Hsiu-Hui Su, Kristin Abbot, Erin Kinnally, Thomas Junek, Jennifer Weghorst, and Simeon Reader.

The Student Award for **Outstanding Paper Presentation** went to Sarah Hankerson from the University of Maryland and California State University at San Marcos, for her work entitled, “The alarm reactions of neighboring groups have long-term effects on marmosets”, coauthored with Kimberly Short, Kimberlee Bachand, and Nancy Caine. The award for **Outstanding Poster Presentation** went to Michael Rukstalis from the University of Nebraska at Omaha, for his work entitled, “Social context affects vocal structure in a callitrichid primate (*Callithrix kuhlii*)”, coauthored with Jeffrey Fite and Jeff French. An Honorable Mention for an Outstanding Paper Presentation went to John Ruys from UC Davis for his work entitled, “Differences in personality and neuroendocrine responses to pharmacological treatment in adult male rhesus macaques (*Macaca mulatta*)”, coauthored with John Capitanio and Sally Mendoza. An Honorable Mention for an Outstanding Poster Presentation went to Pablo Stevenson from SUNY Stony Brook for his work entitled, “Weak relationships between dominance and foraging efficiency in Colombian woolly monkeys (*Lagothrix lagothricha*) at Tinigua Park”.

Eberhard Fuchs Awarded Stifterverband Prize

The Stifterverband (Germany’s donors’ association for sciences and the humanities) announced last week that the Science Award in the category “Society Needs Science” will go to Eberhard Fuchs at the German Primate Center, for his work with marmoset monkeys and the neurobiological mechanisms underlying depressive disorders. – *From The Scientist, November 6, 2002*

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Award Nominations: Fyssen Foundation 2003 International Prize

The Fyssen Foundation’s aim is “to encourage all forms of scientific inquiry into cognitive mechanisms, including thought and reasoning, underlying animal and human behavior, their biological and cultural bases, and phylogenetic and ontogenetic development.” The Foundation wishes to support, particularly, research in such fields as Ethology and Psychology, Neurobiology, Anthropology-Ethnology, and Human Paleontology.

An International Prize of 45,735 Euros is awarded annually to a scientist who has conducted distinguished research in the areas supported by the Foundation. It has been awarded to Professors P. S. Goldman-Rakic and P. Rakic, among others. The topic considered for the 2003 prize is “Function and Nature of Consciousness”. Nominations should be sent to the Secretariat of the Foundation, 194, rue de Rivoli, 75001 Paris, France before October 30, 2003.

Recent Books and Articles

(Addresses are those of first authors unless otherwise indicated)

Books

• *Love at Goon Park: Harry Harlow and the Science of Affection*. D. Blum. Boulder, CO: Perseus Publishing, 2002. [Price: \$26.00]

• *Medical Primatology: History, Biological Foundations and Applications*. E. P. Fridman. Edited by R. D. Nadler. London: Taylor & Francis, 2002. 392 pp. [Price: \$150]

This book provides a comprehensive summary text linking the use of simians in biomedical research to their kinship with humans, condensing a wide range of scientific literature into one volume.

• *Stereotactic Atlas of the Macaca mulatta Thalamus and Adjacent Basal Ganglia Nuclei: Sagittal Cytoarchitectonic Plates with Maps of the Outlined Nuclei and Their Computer Reconstructions in the Coronal and Horizontal Planes within the Intracerebral Coordinate System*. I. Ilinsky & K. Kultas-Ilinsky, in cooperation with B. Knosp. Hingham, MA: Kluwer Academic Publishers, 2002. [Price: \$75.00]

Maps of the outlined thalamic nuclei based on the cytoarchitecture and available data on the distribution of subcortical afferents in the monkey thalamus are presented in both electronic and paper formats, allowing changes to be incorporated as new data are accumulated.

• *Infectious Diseases of Wild Mammals. 3rd Ed.* E. S. Williams & I. K. Barker (Eds.). Ames, IA: Iowa State University Press, 2001. [Price: \$99.99]

• *Behavioural Diversity in Chimpanzees and Bonobos*. C. Boesch, G. Hohmann, & L. F. Marchant (Eds.). New York: Cambridge University Press, 2002. [Price: \$90.00 (Hardbound) \$33.00 (Paperback)]

Contents: Preface, by G. Hohmann, C. Boesch, & L. F. Marchant; Behavioural Diversity in *Pan*, by C. Boesch.

I. Behavioural Flexibility. Introduction, by T. Matsuzawa; Multivariate and phylogenetic approaches to understanding chimpanzee and bonobo behavioral diversity, by D. M. Doran, W. L. Jungers, Y. Sugiyama, J. G. Fleagle, & C. P. Heesy; Chimpanzees in the dry habitats of Assirik, Senegal, and Semliki Wildlife Reserve, Uganda, by K. D. Hunt & W. C. McGrew; Behavioural adaptations to water scarcity in Tongo chimpanzees, by A. Lanjouw; Bonobos of the Lukura Wildlife Research Project, by J. A. Myers Thompson; and Grooming-hand-clasp in Mahale M Group chimpanzees: Implications for culture in social behaviours, by M. Nakamura.

II. Social Relations. Introduction, by V. Reynolds; Factors influencing fission-fusion grouping in chimpanzees in

the Tai National Park, Cote d'Ivoire, by D. P. Anderson, E. V. Nordheim, C. Boesch, & T. C. Moermond; Ecological and social correlates of chimpanzee party size and composition, by J. C. Mitani, D. P. Watts, & J. S. Lwanga; Agonistic relations among Kanyawara chimpanzees, by M. N. Muller; Relationships of male chimpanzees in the Budongo Forest, Uganda, by N. E. Newton-Fisher; and Dynamics in social organization of bonobos (*Pan paniscus*), by G. Hohmann & B. Fruth.

III. Female Strategies. Introduction, by M. F. Small; Why female bonobos have a lower copulation rate during estrus than chimpanzees, by T. Furuichi & C. Hashimoto; Social relationships between cycling females and adult males in Mahale chimpanzees, by A. Matsumoto-Oda; Seasonal aspects of reproduction and sexual behaviour in two chimpanzee populations: A comparison of Gombe (Tanzania) and Budongo (Uganda), by J. Wallis; Costs and benefits of grouping for female chimpanzees at Gombe, by J. M. Williams, H.-Y. Lie, & A. E. Pusey; and The cost of sexual attraction: Is there a trade-off in female *Pan* between sex appeal and received coercion? by R. Wrangham.

IV. Hunting and Food Sharing. Introduction, by L. F. Marchant; Variations in chimpanzee-red colobus interactions, by C. Boesch, S. Uehara, & H. Ihobe; How bonobos handle hunts and harvest: Why share food? by B. Fruth & G. Hohmann; and Hunting and meat sharing by chimpanzees at Ngogo, Kibale National Park, Uganda, by D. P. Watts & J. C. Mitani.

V. Genetic Diversity. The evolutionary genetics and molecular ecology of chimpanzees and bonobos, by B. J. Bradley & L. Vigilant.

Magazines and Newsletters

• *Boletín de la Asociación Primatológica Española*, September, 2002, 9[3]. [Depto. de Psicobiología, Buzón 150, Facultad de Psicología, Universidad Complutense de Madrid, Campus de Somosaguas, 28223 Madrid, Spain; also at <www.uam.es/otros/ape/boletines.htm>]

Contents include an account of the history and current goals and projects of the Rainfer Primate Center in Madrid, Spain, by its Director, G. Bustelo González. The Rainfer Center is a nonprofit organization that conducts conservation, bioacoustic, environmental enrichment, and other behavioral research with 18 species of primates. Also included is a report, by M. Martín Esteban, of a international scientific meeting on the future of lowland gorillas, which took place last May; and a summary of a doctoral dissertation, "Patterns of change in mother-infant social interaction: A model of its development using a multi-level approach", by V. Hernández Lloreda. Finally, in the conclusion of her two-part series on the wild Barbary macaques of Gibraltar (begun in Issue No. 2, May, 2002), J. Donohoe

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

reports the fission of one of the troops and the adaptation of the displaced subgroup to a new location and lifestyle.

- *The Gibbon's Voice*, December, 2001, 5[1]. [International Center for Gibbon Studies, P.O. Box 800249, Santa Clarita, CA 91380]

Includes Observations of previously undocumented gibbons and orangutans in the Kinabatangan Wildlife Sanctuary, by M. Ancrenaz; and Differential mortality in captive white-handed gibbons (*Hylobates lar*) and siamangs (*Symphalangus syndactylus*), by C. Klein & L. K. Sheeran.

- *IPPL News*, November, 2002, 29[2]. [IPPL, P.O. Box 766, Summerville, SC 29484]

Includes extensive material about the "Taiping Four" gorillas.

- *IPPL News*, November, 2002, 29[3].

Includes follow-ups on the "Taiping Four"; and "Formosan macaques in crisis at Mt. Longevity, Taiwan", by G. Agoramorthy.

- *The Newsletter*, 2002, 13[4]. [Primate Foundation of Arizona, P.O. Box 20027, Mesa, AZ 85277-0027]

Includes Federally owned chimpanzees to start a new life in northwest Louisiana forest, by L. Brent; and PFA behavioral research interns: Where are they now? by S. Howell.

- *Positively Primates*, 2000, 6[1]. [DuMond Conservancy, 14805 S.W. 216 St, Miami, FL 33170]

Reports

- *Orangutan Reintroduction and Protection Workshop Final Report*. 15-18 June, 2001. Wanariset-Samboja and Balikpapan, E. Kalimantan, Indonesia. (Price: \$35.00, prepaid (spiral bound), from IUCN/SSC Conservation Breeding Specialist Group, 12101 Johnny Cake Ridge Rd, Apple Valley, MN 55124 [e-mail: office@cbsg.org])

This workshop and report were sponsored by: The Gibbon Foundation; The Wanariset Orangutan Reintroduction Project; The Balikpapan Orangutan Survival Foundation; and The Balikpapan Orangutan Society; in collaboration with: The Primate Specialist Group and The Conservation Breeding Specialist Group.

- *Conservation Assessment and Management Plan for the Primates of Indonesia*. (Price: \$35.00 as above)

This is the final report of the Indonesian Primate CAMP, held at Taman Safari January 15-19, 2001, co-hosted by: Conservation International, Taman Safari, Ditjen PKA, PSBK-FMIPA-UI, and APAPI, in collaboration with Conservation Breeding Specialist Group Indonesia and the CBSG (SSC/IUCN).

- FELASA recommendations for the accreditation of laboratory animal science education and training. Report of the Federation of European Laboratory Animal Science Asso-

ciations Working Group on Accreditation of Laboratory Animal Science Education and Training. (T. Nevalainen, NLAC, Univ. of Kuopio, Box 1527, 70211 Kuopio, Finland [e-mail: timo.nevalainen@uku.fi]). *Laboratory Animals*, 2002, 36, 373-377.

Special Journal Issues

- Nonhuman primate models for AIDS XIV. *Journal of Medical Primatology*, 2002, 31[4-5]. Guest Co-Editors: P. A. Marx, A. A. Lackner, R. P. Johnson, & E. Kraiselburd.

Contents: Introduction; Longitudinal follow up of SIVmac pathogenesis in rhesus macaques of Chinese origin: Emergence of B cell lymphoma, by B. Ling, R. S. Veazey, C. Penedo, K. Xu, J. D. Lifson, & P. A. Marx; Infection of macaques with a molecular clone, SHIV_{SF33A5}, provides evidence for tissue specific variants, by C. M. Buckner, A. Gettie, R. C. H. Tan, T. Eshetu, M. Ratterree, J. Blanchard, C. Cheng-Mayer, & J. M. Harouse; Species-specific variation in SIV disease progression between Chinese and Indian subspecies of rhesus macaque, by A. M. Trichel, P. A. Rajakumar, & M. Murphey-Corb; Inclusion of Vpr accessory gene in a plasmid vaccine cocktail markedly reduces Nef vaccine effectiveness *in vivo* resulting in CD4 cell loss and increased viral loads in rhesus macaques, by K. Muthumani, M. Bagarrazzi, D. Conway, D. S. Hwang, V. Ayyavoo, D. Zhang, K. Manson, J. Kim, J. Boyer, & D. B. Weiner; Changes in dendritic cell migration and activation during SIV infection suggest a role in initial viral spread and eventual immunosuppression, by S. M. Barratt-Boyes, M. I. Zimmer, & L. Harshyne; Characterization of CD4+ T helper cell fine specificity to the envelope glycoproteins of simian immunodeficiency virus, by S. Sarkar, V. Kalia, M. Murphey-Corb, & R. C. Montelaro; Whole inactivated SIV virion vaccines with functional envelope glycoproteins: Safety, immunogenicity, and activity against intrarectal challenge, by J. D. Lifson, M. Piatak, Jr., J. L. Rossio, J. Bess, Jr., E. Chertova, D. Schneider, R. Kiser, V. Coalter, B. Poore, R. Imming, R. C. Desrosiers, L. E. Henderson, & L. O. Arthur; Protection by SIV VLP DNA prime/protein boost following mucosal SIV challenge is markedly enhanced by IL-12/GM-CSF co-administration, by E. O'Neill, I. Martinez, F. Villinger, M. Rivera, S. Gascot, C. Colon, T. Arana, M. Sidhu, R. Stout, D. C. Montefiori, M. Martinez, A. A. Ansari, Z. R. Israel, & E. Kraiselburd; Magnetic resonance spectroscopy: An *in vivo* tool for monitoring cerebral injury in SIV-infected macaques, by J. B. Greco, K. E. Sakaie, S. Aminipour, P. L. Lee, L. L. Chang, J. He, S. Westmoreland, A. A. Lackner, & R. G. Gonzalez; Preclinical AIDS vaccine research: Survey of SIV, SHIV, and HIV challenge studies in vaccinated nonhuman primates, by J. Warren; Abstracts – 19th Annual Symposium on Nonhuman Primate Models for AIDS: September 8-11, Monterey, CA; and Letter to the Guest Editors: An immuno-logic hypothesis, by H. Kohler & S. Muller.

- Human Ethology and Evolutionary Psychology. P. Fedor-Freybergh, K. Grammer, & B. Fink (Eds.). *Neuroendocrinology Letters*, 2002, 23[4].

Contents include: Human ethology & evolutionary psychology, by I. Eibl-Eibesfeldt; Dynamic systems and inferential information processing in human communication, by K. Grammer, B. Fink, & L. Renninger; Human mate guarding, by D. Buss; Darwinian psychiatry and the concept of mental disorder, by A. Troisi & M. McGuire; Psychopathology or adaptation? Genetic and evolutionary perspectives on individual differences and psychopathology, by C. Crawford & C. Salmon; Marriage: An evolutionary perspective, by G. Weisfeld & C. Weisfeld; Theories of war causation in contemporary states and preindustrial societies, by J. van der Dennen; Sex hormones influence human cognitive pattern, by D. Kimura; Female mate value at a glance: Relationship of waist-to-hip ratio to health, fecundity and attractiveness, by D. Singh; The neural mechanisms of mate choice: A hypothesis, by H. Fisher, A. Aron, D. Mashek, H. Li, G. Strong, & L. L. Brown; Toward an evolutionary psychology of religiosity, by E. Voland & C. Söling; and Comparative approaches in evolutionary psychology: Molecular neuroscience meets the mind, by J. Panksepp, J. R. Moskal, J. B. Panksepp, & R. A. Kroes.

Studbooks

- 2000 North American Regional Studbook Update for Spider Monkeys: *Ateles – All Species*. Kristi Newland, Studbook keeper. Published by the Memphis Zoo. (This document may be borrowed from the Wisconsin PRC. Contact Joanne Brown [608-263-3512; e-mail: brown@primate.wisc.edu])

Anatomy and Physiology

- Extracting 3D from motion: Differences in human and monkey intraparietal cortex. Vanduffel, W., Fize, D., Peuskens, H., Denys, K., Sunaert, S., Todd, J. T., & Orban, G. A. (Lab. voor Neuro- en Psychofysiologie, Katholieke Univ. Leuven, Campus Gasthuisberg, Herestr. 49, Leuven B-3000, Belgium [e-mail: wim@nmr.mgh.harvard.edu]. *Science*, 2002, 298, 413-415.

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

Animal Models

- Monitoring and control of action by the frontal lobes. Schall, J. D., Stuphorn, V., & Brown, J. W. (Center for Integrative and Cognitive Neuroscience, Dept of Psychol-

ogy, Vanderbilt Univ., Nashville, TN 37203 [e-mail: jeffrey.d.schall@vanderbilt.edu]). *Neuron*, 2002, 36, 309-322.

“Success requires deciding among alternatives, controlling the initiation of movements, and judging the consequences of actions. When alternatives are difficult to distinguish, habitual responses must be overcome, or consequences are uncertain, deliberation is necessary, and a supervisory system exerts control over the processes that produce sensory-guided movements. We have investigated these processes by recording neural activity in the frontal lobe of macaque monkeys performing a countermanding task. Distinct neurons in the frontal eye field respond to visual stimuli or control the production of movements. In the supplementary eye field and anterior cingulate cortex, neurons appear not to control directly movement initiation but instead signal the production of errors, the anticipation and delivery of reinforcement, and the presence of processing conflict. These signals form the core of current models of supervisory control of sensorimotor processes.”

- Shadows cast by retinal blood vessels mapped in primary visual cortex. Adams, D. L., & Horton, J. C. ([Beckman Vision Center, UCSF, 10 Kirkham St, San Francisco, CA 94143-0730 [e-mail: dadams@itsa.ucsf.edu]. *Science*, 2002, 298, 572-576.

The mammalian eye is a remarkable optical device, but its design is not perfect. The blood vessels that supply the inner retina are located in front of the photoreceptor layer, blocking access to light. Their shadows create a pattern of blindness in the field of vision that corresponds precisely to the location of the largest vessels in the eye. It is shown here that in squirrel monkeys, focal deprivation by blood vessels leads to rewiring of the eye's geniculocortical projections, imprinting an image of the retinal vascular tree onto the primary visual cortex. This process illustrates vividly that local imbalances in neuronal activity can influence column formation during normal development.

- Nonhuman primate transgenesis: Progress and prospects. Wolfgang, M. J., & Golos, T. G. (T. G. G., Wisconsin RPRC, Madison, WI 53715 [e-mail: golos@primate.wisc.edu]). *Trends in Biotechnology*, 2002, 20, 479-484.

The nonhuman primate is used extensively in biomedical research owing to its close similarities to human physiology and human disease pathophysiology. Recently, several groups have initiated efforts to genetically manipulate nonhuman primates to address complex questions concerning primate-specific development and physiological adaptation. Primates pose unique challenges to transgenesis and, although this field is still in its infancy, the potential for obtaining new insights into primate physiology and gene function is unprecedented. This review focuses on the methods and potential applications of genetically altered nonhuman primates in biomedical research.

- Kinetics of expression of rhesus monkey rhadinovirus (RRV) and identification and characterization of a polycistronic transcript encoding the RRV Orf50/Rta, RRV R8, and R8.1 genes. DeWire, S. M., McVoy, M. A., & Damania, B. (B. D., Lineberger Comprehensive Cancer Center, CB 7295, Univ. of North Carolina, Chapel Hill, NC 27599 [e-mail: damania@med.unc.edu]). *Journal of Virology*, 2002, 76, 9819-9831.

Rhesus monkey rhadinovirus (RRV) is a close relative of Kaposi's sarcoma-associated herpesvirus (KSHV; human herpesvirus 8). RRV serves as an in vitro and an in vivo model for KSHV, and the mapping of its transcription program during lytic replication is significant since it represents de novo infection in the absence of stimulation with phorbol esters. Further, the RRV lytic system facilitates the making of recombinant viruses, and hence transcription profiling of the wild-type virus is important. Currently, the kinetics of lytic gene expression of RRV, the function of the RRV Orf50/Rta gene, and the presence of the RRV R8 and R8.1 genes are not known. This study details the transcription profile seen during RRV lytic replication and shows that RRV latency-associated nuclear antigen, viral FLIP (vFLIP), and vCyclin are transcribed during the RRV lytic phase. In addition, this study describes the identification of three new spliced products of the RRV Orf50, R8, and R8.1 genes, which are structural homologs of the KSHV Orf50, K8, and K8.1 genes, respectively. Characterization of the RRV Orf50 protein identifies it as a strong transcriptional transactivator capable of activating three early RRV promoters. Interestingly, the KSHV Orf50 transactivator can also activate these simian virus promoters, suggesting that there exists a conservation of gene function between the key transcription factors of KSHV and RRV.

- Restriction of lentivirus in monkeys. Besnier, C., Takeuchi, Y., & Towers, G. (G. T., Columbia Univ. College of Physicians and Surgeons, 701 West 168th Street, New York, NY 10032 [e-mail: gregtowers@hotmail.com]). *Proceedings of the National Academy of Sciences, USA*, 2002, 99, 11920-11925.

Retroviruses are able to cross species barriers and have done so many times throughout evolution. Perhaps as a consequence, dominant mechanisms have arisen to block infection by murine retroviruses in mice (restriction factor Fv1) and humans (restriction factor Ref1), as well as in other mammals. A block to HIV and simian immunodeficiency virus in monkeys is described. Like previously described restrictions, the block is saturable and gives rise to multiple-hit infection kinetics. Furthermore, like restriction of murine leukemia virus in humans, the block is before reverse transcription. Intriguingly, African green monkey cells are able to block both HIV and simian immunodeficiency virus, and each virus is able to saturate and abrogate the restriction of the other, suggesting that a common factor is responsible.

- Parallel processing of serial movements in prefrontal cortex. Averbeck, B. B., Chafee, M. V., Crowe, D. A., & Georgopoulos, A. P. (A. P. G., Brain Sciences Center, Veterans Affairs Medical Center, Minneapolis, MN 55417 [e-mail: omega@umn.edu]). *Proceedings of the National Academy of Sciences, USA*, 2002, 99, 13172-13177.

A key idea in Lashley's formulation of the problem of serial order in behavior is the postulated neural representation of all serial elements before the action begins. This question was studied by recording the activity of individual neurons simultaneously in small ensembles in prefrontal cortex while monkeys copied geometrical shapes shown on a screen. Monkeys drew the shapes as sequences of movement segments, and these segments were associated with distinct patterns of neuronal ensemble activity. These patterns were present during the time preceding the actual drawing. The rank of the strength of representation of a segment in the neuronal population during this time, as assessed by discriminant analysis, predicted the serial position of the segment in the motor sequence. An analysis of errors in copying and their neural correlates supplied additional evidence for this code and provided a neural basis for Lashley's hypothesis that errors in motor sequences would be most likely to occur when executing elements that had prior representations of nearly equal strength.

Animal Welfare

- Animal Welfare Forum: Pain Management. *Journal of the American Veterinary Medical Association*, 2002, 2, 202-237.

Contents include: What is pain? by S. A. Robertson; Pain management in laboratory animals: Are we meeting the challenge? by S. A. Robertson; Surgical trauma and chronically painful conditions: Within our comfort level but beyond theirs? by B. D. X. Lascelles & D. C. J. Main; Alternative methods for the control of pain, by P. J. Pascoe; Ethical issues regarding pain in animals, by A. Livingston; and Managing pain in human neonates: Applications for animals, by B. H. Lee.

- Recognizing and assessing pain, suffering and distress in laboratory animals: A survey of current practice in the UK with recommendations. Hawkins, P. (Res. Animals Dept, RSPCA, Wilberforce Way, Southwater, W. Sussex, RH13 9RS, U.K. [e-mail: research_animals@rspca.org.uk]). *Laboratory Animals*, 2002, 36, 378-395.

- Is it ethical to keep animals in zoos? An Animal Welfare Forum feature. *Journal of the American Veterinary Medical Association*, 2002, 221, 1528-1535.

Interviews with Michael Hutchins (American Zoo and Aquarium Association [AZA]), Terry Maple (Zoo Atlanta), Albert Lewandowski (Cleveland Metroparks Zoo), Nadja Wielebnowski (Brookfield Zoo), Gail Laule (behavioral consultant), William Foster (AZA), and Andrew Rowan (Humane Society of the United States).

Behavior

- A dynamic interaction between aggression and grooming reciprocity among female chacma baboons. Barrett, L., Gaynor, D., & Henzi, S. P. (School of Biological Sci., Univ. of Liverpool, Nicholson Bldg, Liverpool L69 3GS, U.K. [e-mail: louiseb@liv.ac.uk]). *Animal Behaviour*, 2002, 63, 1047-1053.

Data from a natural experiment on adult female chacma baboons (*Papio cynocephalus ursinus*) were used to test the hypothesis that variation in aggression through time influences patterns of grooming reciprocity within a social group. Owing to a change in the baboons' competitive regime, it was possible to compare data from periods when aggression was high (period 1) and low (period 2). During period 2, the slope of the relationship between aggression and rank was significantly shallower than during period 1 and less aggression was directed at the lowest-ranking females, suggesting there had been a reduction in the dominance gradient. This was attributed to reduced effectiveness of dominance as a means of excluding other females from feeding resources. The reduction in aggression during period 2 was accompanied by an increase in grooming reciprocity between dyads, suggesting that high-ranking females no longer attracted grooming by subordinates in exchange for tolerance, and that grooming in period 2 was exchanged for its intrinsic benefits. The loss of rank-related effects on grooming reciprocity in period 2 compared with period 1 further confirmed this. These findings show that female baboons can respond flexibly and swiftly to changes in their social circumstances and that a dynamic approach to primate social interactions is worth pursuing.

- Variations in care for cottontop tamarin, *Saguinus oedipus*, infants as a function of parental experience and group size. Washabaugh, K. F., Snowdon, C. T., & Ziegler, T. E. (Dept of Psychology, Univ. of Wisconsin, 1202 W. Johnson St, Madison, WI 53706 [e-mail: kwashaba@facstaff.wisc.edu]). *Animal Behaviour*, 2002, 63, 1163-1174.

The effects of parental experience and group size on infant care and development were examined. Ten cottontop tamarin families were followed across three consecutive births of offspring to examine differences in survival, quality of care, developmental maturation and physical development for infants in two experimental conditions: (1) in large groups with previous parenting experience and (2) in small groups with little or no parenting experience. Although there were no differences in infant mortality, parents treated infants differently between conditions. However, on examination of the cumulative care provided by parents and sibling helpers together across experimental conditions, there were no differences in the rates of retrieval or rejection of infants. Overall levels of infant transport and food transfers were similar between conditions, with fathers and sibling helpers contributing the bulk of care. Fathers in small groups carried infants and trans-

ferred food with infants much more than helpers but, as group size increased, helpers augmented this role. Infant development varied with the experience of the family both between conditions and within a family. The results indicate that infants receive similar levels of care regardless of group size and parenting experience, although the individual contributions of family members change with both factors. Parental experience with previous infants had effects on early infant development, but only for the first sets of infants.

- Mother-infant interactions in western lowland gorillas (*Gorilla gorilla gorilla*): Spatial relationships, communication and opportunities for social learning. Maestriperi, D., Ross, S. K., & Megna, N. L. (Committee on Human Development, Univ. of Chicago, 5730 S. Woodlawn Ave, Chicago, IL 60637 [e-mail: Dario@uchicago.edu]). *Journal of Comparative Psychology*, 2002, 116, 219-227.

This study investigated mother-infant interactions in lowland gorillas with particular focus on the relative role of mothers and infants in creating situations that are potentially conducive to infant social learning. Eleven gorilla mother-infant dyads were focally observed in weekly 1-hr sessions for 12 months. Spatial relationships were affected by age as well as by ambient temperature. Although the youngest infant was encouraged by its mother to walk and climb, mothers showed little or no encouragement in other contexts. In contrast, infants were quite interested in their mothers' activities, on some occasions repeated their mothers' behavior, and actively encouraged their mothers to share food, play, or follow them. These findings suggest that gorilla infants are more active than their mothers in creating situations that are potentially conducive to the acquisition of knowledge or skills.

- The relative importance of size of food and interfood distance in eliciting aggression in captive rhesus macaques (*Macaca mulatta*). Mathy, J. W., & Isbell, L. A. (L. A. I., Dept of Anthropology, Univ. of California, Davis, CA 95616 [e-mail: laisbell@ucdavis.edu]). *Folia Primatologica*, 2001, 72, 268-277.

Both food size and interfood distance were manipulated independently to examine which factor was more important in causing aggressive competition. For each of 254 trials, the monkeys were offered simultaneously two apple pieces ranging in size from 1 to 40 g at interfood distances ranging from 1 to 5 m. In contrast to other studies, food size and interfood distance were not conflated in this study. Multiple regression analyses revealed that food size was a better predictor of aggression, while interfood distance was a better predictor of the ability to monopolize foods. Growing evidence suggests that factors such as food size, quality and depletion time are more important than interfood distance in influencing aggression within groups.

- Ontogeny of tool use in cottontop tamarins, *Saguinus oedipus*: Innate recognition of functionally relevant fea-

tures. Hauser, M., Person, H., & Seelig, D. (Dept of Psychology, 33 Kirkland St, Harvard University, Cambridge, MA 02138 [e-mail: mdhauser@wjh.harvard.edu]). *Animal Behaviour*, 2002, 64, 299-311.

Adult cottontop tamarins are sensitive to the functionally relevant and irrelevant features of objects used as tools to gain access to food. Four experiments were designed to assess whether infant cottontop tamarins show comparable sensitivities to functionally relevant and irrelevant features. All subjects were reared in a species-typical social environment, but prior to the present studies had never participated in any experiments, and had no access to tools or other freely moving, manipulable objects with the exception of food. Despite their lack of experience, the pattern of object choice by infants precisely mirrored those obtained with adults. Specifically, having learned to use a hard blue cane to retrieve food (experiment 1), infant tamarins immediately generalized to other objects (experiments 2-4), recognizing that changes in color and texture play no role in an object's functionality as a tool, whereas changes in size and shape do. These data suggest that for cottontop tamarins, a species that does not naturally use tools, and infrequently manipulates objects, the capacity to distinguish between functionally relevant and irrelevant features develops in the absence of domain-specific experience.

- The role of temporal cues in rhesus monkey vocal recognition: Orienting asymmetries to reversed calls. Ghazanfar, A. A., Smith-Rohrberg, D., & Hauser, M. D. (Max Planck Inst. Biol. Cybernetics, Spemannstr. 38, D-72076 Tübingen, Germany [e-mail: asifg@tuebingen.mpg.de]). *Brain, Behavior and Evolution*, 2001, 58, 163-172.

This study explores the role of temporal features in recognition of conspecific vocalizations by rhesus macaques. Experiments were designed to extend an earlier set of findings showing that adult rhesus selectively turn with the right ear leading when a conspecific vocalization is played 180° behind them, but turn left or not at all when a non-conspecific signal is played. Two call types were used as stimuli: alarm calls and food calls. For normal calls, rhesus turned to the right, but for time-reversed calls, they oriented to the left. The asymmetry of the behavioral response, and the corresponding asymmetry in the time-amplitude waveform, may have important implications for studies of temporal coding in the primate auditory system.

- Environmental correlates of vocal communication of wild pygmy marmosets, *Cebuella pygmaea*. de la Torre, S., & Snowdon, C. T. (C. T. S., Dept of Psychology, Univ. of Wisconsin, 1202 West Johnson St, Madison, WI 53706 [e-mail: snowdon@facstaff.wisc.edu]). *Animal Behaviour*, 2002, 63, 847-856.

"We quantified the acoustic characteristics of the habitats of two wild populations of pygmy marmosets in Amazonian Ecuador to evaluate their effects on vocal signal structure. We obtained measures of ambient noise, sound attenuation and reverberation through recordings and

broadcasts of exemplars of two short-range vocalizations and one long-range vocalization of the marmosets. Ambient noise levels differed among habitats. The calls of pygmy marmosets had frequencies that coincided with relatively quiet regions of the ambient noise spectra of the habitats. The three vocalization types were degraded similarly in all habitats. The two short-range signals, with a pulsatile structure, were more affected by reverberation than was the long-range, less pulsatile vocalization. This degradation could be used by the marmosets to estimate the distance of the callers. We obtained data on context of vocalizations from six groups of pygmy marmosets, three from each population, in both the dry and rainy seasons. The use of Trills, J calls and Long calls was related to the distance between the calling animal and the potential receivers, suggesting that marmosets are using the calls in a way appropriate to the effects of habitat acoustics."

- Perception of harmonics in the combination long call of cottontop tamarins, *Saguinus oedipus*. Weiss, D. J., & Hauser, M. D. (Dept of Brain and Cognitive Sciences, Univ. of Rochester, Meliora Hall office 494, Rochester, NY 14627 [e-mail: dweiss@bcs.rochester.edu]). *Animal Behaviour*, 2002, 64, 415-426.

A number of nonhuman primates produce vocalizations with time-varying harmonic structure. Relatively little is known about whether such spectral information plays a role in call type classification. This problem is addressed by utilizing acoustic analyses and playback experiments on cottontop tamarins' combination long call, a species-typical vocalization with a characteristic harmonic structure. Specifically, habituation-discrimination experiments were used to test whether particular frequency components, as well as the relationship between components, have an effect on the perception and classification of long calls. In Condition 1, it was found that tamarins classify natural and synthetic exemplars of the long call as perceptually similar, thereby allowing the use of synthetics to manipulate components of this signal precisely. In subsequent conditions, the perceptual salience and discriminability of long calls in which we deleted (1) the second harmonic, (2) the fundamental frequency, or (3) all frequencies above the fundamental were tested; the effects of frequency mistuning by shifting the second harmonic by 1000 Hz were also examined. Following habituation to unmanipulated long calls, tamarins did not respond (transferred habituation) to long calls with either a missing fundamental frequency or the second harmonic, but responded (discriminated) to long calls with the upper harmonics eliminated or with the second harmonic mistuned. These studies reveal the importance of harmonic structure in tamarin perception, and highlight the advantages of using synthetic signals for understanding how particular acoustic features drive perceptual classification in nonhuman primates.

- Temporal cues in the antiphonal long-calling behaviour of cottontop tamarins. Ghazanfar, A. A., Smith-Rohrberg,

D., Pollen, A., & Hauser, M. D. (Max Planck Inst. for Biological Cybernetics, Spemannstr. 38, Tübingen 72076, Germany [e-mail: asifg@tuebingen.mpg.de]). *Animal Behaviour*, 2002, 64, 427-438.

"In primates, long-range communication is often mediated by the use of 'long' (or 'loud') calls. Beyond the acoustic classification of these calls and descriptions of the behavioral context in which they are produced, few experimental studies have examined how species-typical information is encoded in the structure of these signals. We present the results of eight experimental conditions designed to isolate the mechanisms underlying the perception of long calls in cottontop tamarins. Our procedure involved presenting a combination of naturally produced and experimentally manipulated long calls to individuals isolated from their group, and then recording the relationship between signal design and the production of antiphonal long calls by the test subject. Tamarins did not distinguish between normal calls and time-reversed or pitch-shifted long calls, but normal response rates did require the species-typical amplitude envelope. Furthermore, there was suggestive evidence that the number of syllables and the syllable rate may also influence antiphonal calling responses. We discuss these results in terms of the mechanisms of vocal recognition in primates and other taxa."

Care

- Self-injurious behavior is decreased by cyproterone acetate in adult male rhesus (*Macaca mulatta*). Eaton, G. G., Worlein, J. M., Kelley, S. T., Vijayaraghavan, S., Hess, D. L., Axthelm, M. K., & Bethea, C. L. (Div. of Reproductive Sci., Oregon RPRC, Beaverton, OR 97006). *Hormones and Behavior*, 1999, 35, 195-203.

"Self-injurious behavior (SIB) presents a serious problem in laboratory macaques that cannot be socially housed for scientific reasons and among institutionalized children and adults where it is often associated with different forms of brain dysfunction. We have experienced limited success in reducing SIB in macaques by enhancing their environment with enrichment devices. Psychotropic drugs also help, but problems are associated with their use. Because sexual and aggressive behavioral problems in men have been treated with progestational drugs, we tested the efficacy of cyproterone acetate (CA, 5-10 mg/kg/week) on reducing SIB in 8 singly housed, adult male rhesus macaques. The main findings were: (1) SIB and other atypical behaviors were significantly reduced during CA treatment; (2) serum testosterone was significantly reduced during CA treatment; (3) cerebral spinal fluid (CSF) levels of 5HIAA and HVA, metabolites of serotonin and dopamine, respectively, declined significantly during CA treatment; (4) the duration of SIB positively correlated with levels of 5HIAA in CSF; but (5) sperm counts were not reduced during treatment. Thus, CA was a partially effective treatment (3 months) for adult male macaques whose behavioral problems include SIB. In summary, CA re-

duced SIB, overall aggression, serum testosterone, CSF 5HIAA, and CSF HVA. We hypothesized that the progestin activity of CA represses the hypothalamic gonadal axis and decreases testosterone, which in turn decreases SIB. In addition, we speculate that the decrease in 5HIAA and HVA in CSF may have been caused by progestins decreasing the activity of MAO. Therefore, the reduction of SIB may also be related to an increase in the availability of active monoamines in the CNS."

- Short-term effects of an environmental enrichment program for adult cynomolgus monkeys. Turner, P. V., & Grantham, L. E., II. (Dept Pathobiol., Univ. Guelph, Guelph, ON N1G 2W1, Canada) *Contemporary Topics in Laboratory Animal Science*, 2002, 41[5], 13-17.

Behavior patterns (including behavior disorders) of cynomolgus monkeys are established early in life, and exploratory behavior lessens with age. Whether environmental enrichment programs benefit these animals can be questioned, particularly for animals in short-term housing. The overall effect of an environmental enrichment program was evaluated in 40 newly arrived male and female adult cynomolgus monkeys to determine whether it impacted animal well-being. Animals were allocated into two groups – one that received environmental enrichment and one that did not (the control group) – and behaviors were assessed over a 5-week period. The effect of enrichment on training time for a simple activity (entering a transfer box) was also evaluated. Animals that had environmental enrichment made use of additional cage space, toys, and foraging items, but trends in observed in-cage behavior patterns were relatively unchanged throughout the study. After study completion, physical evidence of self-trauma was found in 25% of the control animals but not in any of the enriched group. Enrichment had no notable effect on body weight or training time for a simple activity. The findings suggest that provision of a comprehensive environmental enrichment program provides a beneficial effect to adult cynomolgus macaques singly housed short-term.

- Housing and care of monkeys and apes in laboratories: Adaptations allowing essential species-specific behaviour. Röder, E. L., & Timmermans, P. J. A. (P. J. A. T., Dept of Comp. & Physiol. Psychology, Univ. of Nijmegen, P.O. Box 9104, Montessorilaan 3, 6500 HE Nijmegen, The Netherlands). *Laboratory Animals*, 2002, 36, 221-242.

During the last two decades an increasing amount of attention has been paid to the housing and care of monkeys and apes in laboratories, as has been done with the housing and care of other categories of captive animals. The purpose of this review is to develop recommendations for adaptations of housing and care from the authors' knowledge of the daily behavioral activity of monkeys and apes in natural conditions and in enriched laboratory conditions. This review deals mainly with adaptations of daily housing and care with respect to behavior, and it is restricted to commonly-used species: Callitrichidae (*Callitrix jacchus*,

Saguinus oedipus); Cebidae (*Aotus trivirgatus*, *Saimiri sciureus*, *Cebus apella*); Cercopithecidae (*Macaca fascicularis*, *M. mulatta*, *M. nemestrina*, *M. arctoides*, *Chlorocebus aethiops*, *Papio hamadryas*, *P. cynocephalus*); and Pongidae (*Pan troglodytes*).

- Self-biting in caged macaques: Cause, effect, and treatment. Reinhardt, V., & Rossell, M. (6014 Palmer Dr., Weed, CA 96094 [e-mail: viktor@awionline.org]). *Journal of Applied Animal Welfare Science*, 2001, 4, 285-294.

Injurious self-biting is one of the most serious problems in primate colonies, an alarming sign that the housing conditions are not appropriate. No exemptions should be granted, except for veterinary health care reasons, to the rearing and housing of primates in species-appropriate, compatible social settings. In the interests of both animal-based science as well as animal welfare, serious efforts must be made to remove the avoidable pain and distress resulting from pathological self-biting.

Disease

- Human exposure to herpesvirus B-seropositive macaques, Bali, Indonesia. Engel, G. A., Jones-Engel, L., Schillaci, M. A., Suaryana, K. G., Putra, A., Fuentes, A., & Henkel, R. (L. J.-E., Department of Psychology and National Primate Research Center, University of Washington, Seattle, WA 98195, [e-mail: ga_engel@yahoo.com]). *Emerging Infectious Diseases*, 2002, 8, 789-795.

Herpesvirus B (*Cercopithecine herpesvirus 1*) has been implicated as the cause of approximately 40 cases of meningoencephalitis affecting persons in direct or indirect contact with laboratory macaques. However, the threat of herpesvirus B in nonlaboratory settings worldwide remains to be addressed. The potential for exposure to herpesvirus B in workers at a “monkey forest” (a temple that has become a tourist attraction because of its monkeys) in Bali, Indonesia, was investigated. In July, 2000, 105 workers at the Sangeh Monkey Forest in central Bali were surveyed about contact with macaques (*Macaca fascicularis*). Nearly half of those interviewed had either been bitten or scratched by a macaque. Prevalence of injury was higher in those who fed macaques. Serum from 31 of 38 Sangeh macaques contained antibodies to herpesvirus B. It is concluded that workers coming into contact with macaques at the Sangeh Monkey Forest are at risk for exposure to herpesvirus B.

- Type-3 von Willebrand’s disease in a rhesus monkey (*Macaca mulatta*). Patterson, M. M., Jackson, L. R., Brooks, M. B., & Catalfamo, J. L. (Div. Comp. Med., MIT, 77 Massachusetts Ave, Cambridge, MA 02139). *Comparative Medicine*, 2002, 52, 368-371.

Severe type-3 von Willebrand’s disease (vWD) was diagnosed in a young male rhesus monkey that had excessive bleeding from minor wounds. Plasma samples from the monkey had no detectable quantitative or functional von Willebrand factor (vWF), low Factor-VIII coagulant

activity, and moderate prolongation of activated partial thromboplastin time. Testing of the affected monkey’s extended family revealed a likely hereditary basis for the vWD, in that the sire and a paternal half-sister had markedly reduced plasma vWF concentration. Fresh whole blood was transfused to control frequent bleeding episodes throughout the monkey’s life. Although vWD is the most common inherited bleeding disorder in humans and dogs, this is the first report of vWD in a nonhuman primate.

- Persistent *truncus arteriosus* in a rhesus monkey (*Macaca mulatta*). Brandt, D. J., Canfield, D. R., Peterson, P. E., & Hendrickx, A. G. (California RPRC, Univ. of California, 1 Shields Ave, Davis, CA 95616-8542). *Comparative Medicine*, 2002, 52, 269-272.

A 47-day-old female rhesus macaque was examined because of a severe holosystolic heart murmur (grade 5/6) and signs of congestive heart failure. Results of physical examination, thoracic radiography, and cardiac ultrasonography confirmed an advanced stage of congestive heart failure. Due to the animal’s age and clinical signs of disease, a congenital heart defect was suspected. Necropsy revealed a rare congenital heart defect known as persistent (common) *truncus arteriosus*.

- Histopathology of natural Ebola virus subtype Reston infection in cynomolgus macaques during the Philippine outbreak in 1996. Ikegami, T., Miranda, M. E. G., Calaor, A. B., Manalo, D. L., Miranda, N. J., Niikura, M., Saijo, M., Une, Y., Nomura, Y., Kurane, I., Ksiazek, T. G., Yoshikawa, Y., & Morikawa, S. (S. M., Special Pathogens Lab., Dept of Virology 1, NIID, Gakuen 4-7-1, Musashimurayama, Tokyo 208-0011, Japan). *Experimental Animals*, 2002, 51, 447-455.

Livers, spleens, kidneys, and lungs were collected from 24 *Macaca fascicularis* naturally infected with Ebola virus subtype Reston (EBO-R) during the Philippine outbreak in 1996. These macaques showed necrotic hepatocytes with inclusions, slight to massive fibrin deposition in splenic cords, depletion of lymphoid cells in the white pulp of the spleen, and fibrin thrombi in some organs. Immunohistochemical analysis using anti-leukocyte antigen L1 antibody revealed an increase in blood-derived macrophages/monocytes in the livers, kidneys, and lungs. EBO-R NP antigens were detected in the macrophages/monocytes, endothelial cells, and fibroblasts in the liver, spleen, kidney, and lung. These results indicate that EBO-R infection is characterized by systemic coagulopathy and an increase in blood-derived macrophages/monocytes in accordance with the EBO-R propagation in macrophages/monocytes.

Evolution, Genetics, and Taxonomy

- Inactivation of CMP-N-acetylneuraminic acid hydroxylase occurred prior to brain expansion during human evolution. Chou, H.-H., Hayakawa, T., Diaz, S., Krings, M., Indriati, E., Leakey, M., Paabo, S., Satta, Y., Takahata, N., & Varki, A. (Glycobiology Research and Training Ctr,

Depts of Med. and Cellular and Molecular Med., Univ. of California, La Jolla, CA 92093-0687 [e-mail: avarki@ucsd.edu]. *Proceedings of the National Academy of Sciences, USA*, 2002, 99, 11736-11741.

“Humans are genetically deficient in the common mammalian sialic acid *N*-glycolylneuraminic acid (Neu5Gc) because of an *Alu*-mediated inactivating mutation of the gene encoding the enzyme CMP-*N*-acetylneuraminic acid (CMP-Neu5Ac) hydroxylase (CMAH). This mutation occurred after our last common ancestor with bonobos and chimpanzees, and before the origin of present-day humans. Here, we take multiple approaches to estimate the timing of this mutation in relationship to human evolutionary history. First, we have developed a method to extract and identify sialic acids from bones and bony fossils. Two Neandertal fossils studied had clearly detectable Neu5Ac but no Neu5Gc, indicating that the CMAH mutation predated the common ancestor of humans and Neandertals, ≈ 0.5 - 0.6 million years ago (mya). Second, we date the insertion event of the inactivating human-specific sahAluY element that replaced the ancestral AluSq element found adjacent to exon 6 of the CMAH gene in the chimpanzee genome. Assuming *Alu* source genes based on a phylogenetic tree of human-specific *Alu* elements, we estimate the sahAluY insertion time at ≈ 2.7 mya. Third, we apply molecular clock analysis to chimpanzee and other great ape CMAH genes and the corresponding human pseudogene to estimate an inactivation time of ≈ 2.8 mya. Taken together, these studies indicate that the CMAH gene was inactivated shortly before the time when brain expansion began in humankind’s ancestry, ≈ 2.1 - 2.2 mya. In this regard, it is of interest that although Neu5Gc is the major sialic acid in most organs of the chimpanzee, its expression is selectively down-regulated in the brain, for as yet unknown reasons.”

• Palaeoanthropology (communication arising): *Sahelanthropus* or ‘*Sahelpithecus*’? Wolpoff, M. H., Senut, B., Pickford, M., & Hawks, J. [Paleoanthropology Lab., Dept of Anthropology, Univ. of Michigan, Ann Arbor, MI 48109-1382 [e-mail: wolpoff@umich.edu]. *Nature*, 2002, 419, 581-582.

“Beginning with *Ramapithecus*, there has been a continued search for an ape-like hominid ancestor in the Miocene Epoch. *Sahelanthropus tchadensis* is an enigmatic new Miocene species, whose characteristics are a mix of those of apes and *Homo erectus* and which has been proclaimed by Brunet et al. to be the earliest hominid. However, we believe that features of the dentition, face and cranial base that are said to define unique links between this Toumaï specimen and the hominid clade are either not diagnostic or are consequences of biomechanical adaptations. To represent a valid clade, hominids must share unique defining features, and *Sahelanthropus* does not appear to have been an obligate biped.”

• Palaeoanthropology (communication arising): *Sahelanthropus* or ‘*Sahelpithecus*’? Brunet, M. (for the authors; Fac. des Sciences et CNRS UMR 6046, Univ. de Poitiers, 86022 Poitiers, France [e-mail: michel.brunet@univ-poitiers.fr]. *Nature*, 2002, 419, 582.

“In 1925, when Dart described *Australopithecus africanus* as a hominid, critics interpreted it as a juvenile gorilla. Last year, Wolpoff’s colleagues (B.S. and M.P.) claimed that their Kenyan fossil *Orrorin* was a direct ancestor of *Homo*, and now Wolpoff et al. conclude that *Sahelanthropus* was an ape (specifically, a female gorilla ancestor) — a belief that, to our knowledge, is not supported by published or unpublished data.”

• RAPD (random amplified polymorphic DNA) profiles of ten macaque species. Vernesi, C., Sineo, L., & Chiarelli, B. (Inst. of Anthropology, Univ. of Florence, via del Proconsolo, 12, 50122 Florence, Italy [e-mail: lab@antropos.unifi.it]. *Caryologia*, 2000, 53, 185-193.

A report on the RAPD profiles of 61 individuals of 10 macaque species. Twenty-three different PRC primers were used on each sample, yielding an average of 17 bands/primer. The RAPD profiles appear to be highly reproducible; there were no differences in the amplification patterns produced by the DNA extracted from hair or blood. Strikingly, each species had a unique RAPD pattern homogeneously shared by all individuals. Comparisons between taxa showed that variability in the RAPD pattern was low, and the Sm index was below 0.601. Cluster analysis led to a division of the macaques into two main clusters: one with *M. sylvanus* and *M. silenus* and the other with *M. arctoides*, *mulatta*, *fascicularis*, *nemestrina*, *tonkeana* and *fuscata*. *Macaca nigra* and *M. radiata* were outside of these clusters. Gene flow may explain the zoogeographic pattern present in the RAPD profiles. The lack of within-species variability suggests the operation of founder effects and strong genetic drift, which may have been particularly strong in the case of peripherally placed species such as *M. radiata*, *fuscata*, and *nigra*. The position of *M. tonkeana* is divergent from all the commonly accepted taxonomic and phylogenetic schemes, suggesting that the RAPD technique is not always able to reveal the “true” phylogenetic relationships within the genus *Macaca*. The nature of genetic variation uncovered by the RAPD method is still unclear, and prudence should guide inferences about nucleotide divergence, population structure, and phylogeny based solely on RAPD markers.

• Divergence between samples of chimpanzee and human DNA sequences is 5%, counting indels. Britten, R. J. (California Inst. of Technology, 101 Dahlia Ave, Corona del Mar, CA 92625 [e-mail: rbritten@cco.caltech.edu]). *Proceedings of the National Academy of Sciences, USA*, 2002, 99, 13633-13635.

Five chimpanzee bacterial artificial chromosome (BAC) sequences (described in GenBank) have been compared with the best matching regions of the human genome

sequence to assay the amount and kind of DNA divergence. The conclusion is that the old saw that we share 98.5% of our DNA sequence with chimpanzees is probably in error. For this sample, a better estimate would be that 95% of the base pairs are exactly shared between chimp and human DNA. In this sample of 779 kb, the divergence due to base substitution is 1.4%, and there is an additional 3.4% difference due to the presence of indels. The gaps in alignment are present in about equal amounts in the chimp and human sequences. They occur equally in repeated and nonrepeated sequences.

Facilities

- Nonhuman primate cage modifications for environmental enrichment. Martin, D. P., Gilberto, T., Burns, C., & Pautler, H. C. (101 Spindle Lane, Chadds Ford, PA 19317). *Contemporary Topics in Laboratory Animal Science*, 2002, 41[5], 47-49.

To meet the regulatory requirements of the Animal Welfare Act, and because of the increasing body of evidence supporting it, most species of nonhuman primates should be group-housed whenever possible. Modifications to nonhuman primate caging are described. Perches and cage-connecting tunnels were fabricated for existing macaque caging. These are semi-permanent, easily sanitizable, and allow all cage functions to operate as designed.

Field Studies

- Patrones de distribución geográfica de los mamíferos terrestres de México [Patterns of geographic distribution of terrestrial mammals of Mexico]. Escalante, T., Espinosa, D., & Morrone, J. J. (Museo de Zool., Depto de Biol. Evolutiva, Fac. de Ciencias, UNAM, Apto Postal 70-399, 04510 México, D.F., México [e-mail: Tania_escalante@correo.unam.mx]). *Acta Zoológica Mexicana*, 2002, 87, 47-65.

Distributional data for 424 species of Mexican mammals are described, based on 56,859 records of specimens housed in biological collections and in the literature. The areas richest in species are in the center of the country, in Chiapas, and in fringes along the east and west coasts.

Instruments and Techniques

- Methods for predicting sexual maturity in male cynomolgus macaques on the basis of age, body weight, and histologic evaluation of the testes. Smedley, J. V., Bailey, S. A., Perry, R. W., & O'Rourke, C. M. (Wyeth Research, 641 Ridge Rd, Chazy, NY 12901). *Contemporary Topics in Laboratory Animal Science*, 2002, 41[5].

In drug safety testing, sexual maturity is an important experimental parameter. Histologic immaturity of the tissues of the reproductive system can interfere with the interpretation of compound-related effects on the reproductive organs. In female cynomolgus macaques, determination of sexual maturity is simplified by the presence of a menstrual cycle. For male cynomolgus macaques, predicting maturity is much more difficult. In this study, methods

were evaluated that would reliably predict sexual maturity in male cynomolgus macaques. The results of histologic examination of testes of control male cynomolgus macaques used for drug safety studies were examined retrospectively for evidence of sexual maturity. These data were compared with age and body weight determinations to establish statistical models for determining the probability that a male cynomolgus macaque is sexually mature. This model presents a simple prospective method of predicting sexual maturity in male cynomolgus macaques.

- Enzyme-linked immunosorbent assay for detection of antibodies against simian hemorrhagic fever virus. Godeny, E. K. (Dept of Pathobiol. Sciences, School of Veterinary Medicine, LSU, Baton Rouge, LA 70803). *Comparative Medicine*, 2002, 52, 229-232.

Better assays are needed for the detection of simian hemorrhagic fever virus (SHFV), which induces persistent infection without overt signs of disease in most Old World monkeys, but causes a fatal hemorrhagic fever in macaques. An enzyme-linked immunosorbent assay (ELISA) is described here that is useful in identifying primates previously exposed to SHFV. This assay involves testing serum samples against SHFV and cell antigens to obtain an ODvirus-to-ODcell ratio that eliminates potential high background values associated with primate serum. High correlation was found using this assay, compared with that found with the current "gold standard", indirect immunofluorescence assay (IFA). However, this ELISA is less time consuming, less subjective, and not as prone to human error as the SHFV-IFA.

Miscellany

- Beyond species: Il'ya Ivanov and his experiments on cross-breeding humans with anthropoid apes. Rossianov, K. (Inst. for the History of Science and Technology, Russian Acad. of Sciences, Moscow, Russia). *Science in Context*, 2002, 15, 277-316.

The possibility of crossing humans with other anthropoid species has been discussed in fiction as well as in scientific literature during the twentieth century. Ivanov's attempt to achieve this was crucial for the beginning of organized primate research in the Soviet Union, and remains one of the most interesting and controversial experiments that was ever done on nonhuman primates. The possibility of removing the boundary that separates humans from other animal species, apes in particular, is loaded with important political meaning and violates cultural and ethical taboos. The history of Ivanov's scientific experiment helps to reveal some of the twentieth century's important cultural conventions and hidden assumptions about human nature, species, and social hierarchy.

Reproduction

- Breeding of African green monkeys (*Cercopithecus aethiops*) under indoor individually-caged conditions. Cho, F., Hiyaoka, A., Suzuki, M. T., & Honjo, S. (Tsukuba Pri-

mate Center for Med. Science, NIID, 1 Hachimandai, Tsukuba, Ibaraki 305-0843, Japan). *Experimental Animals*, 2002, 51, 343-351.

This paper reports the results of reproduction with 45 wild African green monkeys (36 females and 9 males) during the nine years from 1981 to 1989, under indoor individually-caged conditions. Females who had regular menstrual cycles were subjected to “one-to-one timed mating”: females and males were put together on a one-to-one basis daily only for a certain period of time on and after the day of ovulation. Females who had irregular menstrual cycles or no menstruation were subjected to “every-other-day mating”: females and males were put together one-to-one every other day for at least 16 weeks. The pregnancy rate by timed mating was 48.9% (116/237). On the other hand, the pregnancy rate by every-other-day mating was 96% (48/50). Females who delivered normally totaled 129. The mean gestation period was 165 days for male infants, on average weighing 343 g at birth; and 166 days for females, weighing 318 g on average. The male and female newborns were nursed for 131 and 138 days, respectively, on average. There were also 23 cases of abortion, six stillbirths, and six cases of Caesarean section, by which three live infants and three dead fetuses were delivered.

- Evolutionary biology (communication arising): Significance of primate sexual swellings. Zinner, D., Alberts, S. C., Nunn, C. L., & Altmann, J. (S. C. A., Dept of Biology, Duke Univ., Durham, NC 27708 [e-mail: alberts@duke.edu]). *Nature*, 2002, 420, 142.

Exaggerated sexual signals are likely to be shaped by sexual selection, but few studies have examined signal evolution in females. Domb and Pagel have presented support for the hypothesis that individual differences in exaggerated sexual swellings in female primates are reliable indicators of differences in female quality. However, reanalysis of their data casts doubt on their conclusions.

- Evolutionary biology (communication arising): Significance of primate sexual swellings. Domb, L. G., & Pagel, M. (Lawrenceville School, P.O. Box 6008, Lawrenceville, NJ 08648 [e-mail: ldomb@lawrenceville.org]). *Nature*, 2002, 420, 143.

Domb and Pagel reply: – “Zinner et al. question our finding that the size of a female wild baboon’s sexual swellings predicts her lifetime reproductive success, suggesting that we should have controlled for female height in our analyses of female fitness. But the issue is not whether a female’s fitness is independent of her height, but whether males draw inferences about her fitness from her sexual swelling, and do so independently of her height. Our results indicate that they do, supporting the hypothesis that sexual swellings advertise female reproductive value.”

- Parental failure in captive common marmosets (*Callithrix jacchus*): A comparison with tamarins. Bardi, M., & Petto, A. J. (Dept of Ethology, Ecology, Evolution, Section of Anthropology, University of Pisa, Via S. Maria 55, I-56126 Pisa, Italy). *Folia Primatologica*, 2002, 73, 46-48.

Infant outcome in captive marmosets and tamarins varies significantly between species, despite clear similarities in their ecological, biological and behavioral characteristics. The most important explanatory variable for infant mortality is parental failure, and, regardless of many attempts to understand its causes, it is still unclear why marmosets can experience infant mortality rates as low as half those of tamarins, despite uniform housing conditions and husbandry.

- Availability and adaptive value of reproductive and postreproductive Japanese macaque mothers and grandmothers. Pavelk, M. S. M., Fedigan, L. M., & Zoharb, S. (Dept of Anthropology, Univ. of Calgary, 2500 University Dr. NW, Calgary, AB T2N 1N4, Canada [e-mail: pavelka@ucalgary.ca]). *Animal Behaviour*, 2002, 64, 407-414.

Prior tests of the grandmother hypothesis have suggested that postreproductive female Japanese macaques, *Macaca fuscata*, do not significantly improve the survival of their descendents. However, not all postreproductive females are grandmothers, and not all grandmothers are postreproductive. This study looked at the daughters and grandchildren of 70 female Japanese macaques to assess the availability and adaptive value of reproductive and postreproductive mothers and grandmothers. Results show that postreproductive Japanese macaque grandmothers are very rare. Only 2.8% of the sample of daughters had a postreproductive grandmother available when they began to reproduce, and only 4.2% of the reproductive life span of the daughter (less than 6 months for the average female) was spent with a postreproductive grandmother available to help the daughter. Grandchildren who survived to age 5 had a postreproductive grandmother available to them for only 4% of the first five years of life (i.e. a couple of months on average). The presence of a living mother, irrespective of her reproductive status, was associated with improved reproduction in her adult daughters, and the presence of a postreproductive grandmother was associated with significantly improved survival of grandchildren to age 1. While improved maternal investment does not appear to be the primary explanation for reproductive termination in Japanese monkeys, the few postreproductive females that have unweaned grandchildren appear to have a positive influence on their survival.

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