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POLICY STATEMENT

The purpose of the *Newsletter* is to provide a central source of information about nonhuman primates and related matters, which will be of use both to the community of scientists who use these animals in their research and to those persons whose work supports such research. Accordingly, the *Newsletter* (1) provides information on care, breeding, and procurement 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, the only research articles or summaries that will be accepted for the *Newsletter* are those that have some practical implications or that 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 $1.00 each. (Please make checks payable to Brown University.)

The publication lag is typically no longer than the 3 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 fifteenth of December, March, June, or September, depending on which issue is scheduled to appear next. Reprints will not be supplied under any circumstances.

PREPARATION OF ARTICLES FOR THE *NEWSLETTER*.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the References section should be referred to in the text by author(s) and date of publication, as for example: 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* (see Editor's Notes, July, 1966 issue), the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967]. 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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The cover photograph of *Loris tardigradus* is from the Napier and Napier volume cited above. Reproduced with permission.

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CONTENTS

DEPARTMENTS

COMPARISON OF VISUAL DISCRIMINATION PERFORMANCE OF RHESUS AND CYNOMOLGUS MONKEYS

C. C. Leiby III, A. L. Campbell and C. M. Butter

University of Michigan

The recent ban on the importation of rhesus monkeys (*Macaca mulatta*) and the high cost of domestically-bred rhesus monkeys has forced us, like other primate researchers, to use another primate species. The cynomolgus monkey (*Macaca fascicularis*) appears to be a suitable substitute for the rhesus with regard to closeness of relationship, cost and availability. However, before substituting one primate species for another in our neurobehavioral research, comparability of behavior, as well as of brain structure and function, must be demonstrated. With regard to behavior, we have recently compared the performance of cynomolgus and rhesus monkeys in visual discrimination learning tasks. These findings may be of interest to investigators seeking information concerning the learning abilities of the cynomolgus monkey. We also provide evidence that ablation of inferotemporal cortex in cynomolgus monkeys, as in rhesus monkeys (Gross, 1973), produces visual discrimination learning deficits.

Ten immature male cynomolgus monkeys from Malasia, 1.8 to 2.8 kg in weight, were introduced into our laboratory two years ago. Four of these monkeys were tamed and then trained to displace plaques in order to obtain food rewards from the two food wells in the stimulus tray of a standard Wisconsin General Test Apparatus (WGTA). They adapted and learned these pretraining procedures as rapidly as rhesus monkeys do. The cynomolgus monkeys were then trained to discriminate between (a) a black vs. a white plaque (B/W), (b) two plaques differing in size, and, finally, (c) two patterns (a plus and a square cut out of white paper and pasted on plaques), using the same procedures and apparatus used previously with rhesus monkeys (Butter, 1974). The cynomolgus monkeys as a group made more errors than the rhesus monkeys did in learning the discriminations, although the scores of the two groups overlapped considerably in the three tests (see Table 1). The two groups differed significantly only in performance of the size discrimination ($t=2.47$; $df=6$; $p<.05$). Several weeks after completion of discrimination training, monkeys C1 and C2 were tested for retention by the same methods used in initial training; as seen in Table 1, they made few errors and quickly relearned the discriminations.

In contrast, these two monkeys committed many more errors when they were tested for retention of the discriminations following removal of inferotemporal cortex. Both monkeys failed to perform above chance after 500 trials in the pattern discrimination, at which point testing

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Table 1. Errors in Visual Discrimination Performance of Cynomolgus (C) and Rhesus (R) Monkeys in the WGTA

	Discrimination Learning				Preoperative Retention		
	B/W	Size	Pattern		B/W	Size	Pattern
C1	9	252	25	C1	0	3	1
C2	14	120	25	C2	2	6	5
C3	63	333	44				
C4	21	375	124		Postoperative Retention		
$\bar{X}$	26.7	270.0	54.3				
R1	11	51	47	C1	354[a] (80%)[b]	350[a] (70%)[b]	290[a] (50%)[b]
R2	5	68	81				
R3	12	142	28	C2	14	139	277[a] (47%)[b]
R4	3	185	32				
$\bar{X}$	7.8	111.5	47.0				

[a]failed to attain criterion in 500 trials
[b]performance in last 30 trials

was terminated. C1 also failed to reattain criterion in the B/W and size discriminations, although it performed above chance in the last 30 trials of each of these tasks. C2 did reattain criterion in the B/W and size discriminations, making more errors in the latter than in the former.

The other six cynomolgus monkeys in the group of 10 were trained in a different series of two-choice visual discriminations, using apparatus and procedures identical to those employed with rhesus in another laboratory (Schilder, Pasik & Pasik, 1971, 1972). The monkeys were first tamed and then trained to pull in two stimulus boxes in order to obtain food rewards. They were next trained in a series of discriminations between transilluminated stimuli located on the front surfaces of the stimulus boxes. The first discrimination involved stimuli differing in brightness and flux, but equal in area (B/F). The cynomolgus monkeys as a group made more errors in the course of learning this discrimination than did the rhesus monkeys tested by Schilder *et al.* (1971, 1972), although the two sets of scores did not differ consistently from

each other (Table 2). Both groups rapidly learned the second discrimination, involving brightness and area cues (B/A); this discrimination differed from the first only in that the negative stimulus was increased in area to match the positive stimulus in flux. Subsequently, the cynomolgus monkeys on the average made more errors in learning a color (red vs. green) and a pattern (triangle vs. circle) discrimination than did the rhesus monkeys; however, the two groups did not differ significantly from each other in these or in any other tests in this series. Following color discrimination training the cynomolgus, like the rhesus monkeys, continued to respond to the positive stimulus in control tests in which the flux of each stimulus was varied. Furthermore, in control tests following pattern discrimination training both the cynomolgus and rhesus monkeys responded to the positive pattern in spite of variation in the size, orientation and flux of the two patterns.

Table 2. Errors in Visual Discrimination Performance of Cynomolgus (C) and Rhesus (R) Monkeys in the Pull-in Apparatus

	B/F	B/A		Color	Pattern
C1	274	11		45[b]	63
C2	342	3		56[b]	170
C3	224	6		23[a]	99
C4	103	14		121[b]	59
C5	164	5		45[a]	3
C6	438	6		--	--
$\bar{X}$	257.5	7.5		58.0	78.8
R627	119	8	R632	5[b]	137
R628	132	24	R639	75[b]	6
R629	200	5	R642	51[a]	8
R630	254	0	R643	22[a]	0
R631	215	2			
$\bar{X}$	184.0	7.8		38.3	37.8

[a] learned color before pattern

[b] learned pattern before color

The findings from these two experiments indicate that cynomolgus monkeys readily adapt to and perform in visual testing situations in which rhesus monkeys have been used as subjects. Similarly, Schrier (1965) reported that cynomolgus monkeys completed a series of pre-training procedures in a WGTA as quickly as rhesus monkeys did. However, the cynomolgus monkeys on the average acquired most visual discriminations more slowly than the rhesus monkeys did, although the mean acquisition rates of the two species did not differ markedly. It is possible that this slower rate of acquisition may have been due to heightened emotionality rather than to reduced learning capacity. This possibility is suggested by our observations that cynomolgus monkeys appear to be more fearful of humans than are rhesus monkeys. Although fear may somewhat retard their acquisition of discriminations, cynomolgus monkeys demonstrate good retention of previously learned visual discriminations. Furthermore, our findings suggest that cynomolgus monkeys use the same cues as rhesus monkeys do in acquiring visual discriminations. Thus, both species apparently used brightness rather than flux in learning the B/F discrimination since all monkeys showed excellent transfer from the B/F to the B/A discrimination. In addition, the results of control tests suggest that cynomolgus, like rhesus monkeys, do not use flux or brightness cues to solve color or pattern discriminations.

These results, then, indicate that cynomolgus monkeys may be a suitable substitute for rhesus monkeys in experiments involving the acquisition of two-choice visual discriminations. Furthermore, other findings suggest that the performance of cynomolgus and rhesus monkeys is not different in more complex visual discrimination learning tasks. Thus, Schrier (1966) found that these two species are indistinguishable in their asymptotic levels of performance in object discrimination learning set, although the rate of learning of the cynomolgus monkeys was slightly slower than that of the rhesus in the early stages of learning set formation. Schrier (1975) also reported that the two species do not differ markedly in degree of transfer between repeated reversal and learning set tasks. Finally, inferotemporal cortex ablation in cynomolgus monkeys, as in rhesus (Gross, 1973), leads to visual discrimination deficits, which are more severe in relearning pattern discriminations than in relearning B/W or size discriminations.

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DUKE UNIVERSITY PRIMATE CENTER AVAILABLE FOR ON SITE RESEARCH

The Duke University Center for the Study of Primate Biology and History, in Durham, North Carolina is welcoming inquiries and proposals for on site funded research. The Center houses sixteen varieties of prosimian primates representing four families and six genera of lemurs and lorises. Contact: David E. Anderson, Assistant Director, Duke Primate Center, 3705 Erwin Rd., Durham, NC 27705. (919-489-3364)

* * *

THREE PRIMATE SPECIES LISTED AS ENDANGERED ARE UNDER REVIEW

The Fish and Wildlife Service (FWS) announced (*Federal Register*, April 19, 1978) that the status of 65 foreign animal taxa, including three primate species, listed as Endangered is being reviewed to determine whether or not any of them should be reclassified as Threatened or should be removed entirely from classification under the Endangered Act of 1973. The three primate taxa are two species of langur (*Presbytis entellus* and *P. pileatus*) and the siamang (*Symphalangus syndactylus*). The 65 taxa were among 159 listed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, and designed as Endangered by the FWS on June 14, 1976. At that time, the Convention was not yet in force and all 159 taxa were considered by their nominating countries to be threatened by unregulated international trade.

Having since been ratified by 44 countries, the Convention is now considered an effective regulator of trade in jeopardized wildlife. Accordingly, the FWS believes that unregulated trade no longer is a major factor threatening the continued existence of the 159 Endangered taxa.

INSTITUTE OF PRIMATE RESEARCH: AN INTERNATIONAL PRIMATE CENTER IN AFRICA

James G. Else

National Museums of Kenya

Kenyan scientists, through the National Museums of Kenya and under the direction of Richard E. Leakey, are now developing the first international primate center in Africa, the Institute of Primate Research (IPR). This is being done with the advisory and technical assistance of scientists from the Oregon Regional Primate Research Center (ORPRC). The current IPR director, Dr. James G. Else, a United States veterinarian with research experience in primatology and infectious diseases, was appointed on a temporary basis and will eventually be replaced by a permanent Kenyan director.

The major functions of the IPR will be to: (1) develop a scientific institution devoted to the breeding and use of African primates for biomedical and behavioral research; (2) train Kenyan scientists and veterinarians in primate biology and medicine; (3) coordinate all primate activities conducted in Kenya, including field studies, and (4) assist in the establishment of a comprehensive primate conservation scheme for Kenya.

Since the IPR is the only primate center in Africa, its development should advance biomedical research in Kenya and other African nations and help insure a future supply of African primates to research institutions in other countries. It is hoped that the center will play a major role in the development of biomedical research with primates in the country of origin and encourage investigators throughout the world to bring their research there. Primate centers and breeding colonies have proved quite successful in other countries such as the United States, the main drawbacks being the acquisition of the initial breeding stock and high labor overhead. The IPR has its own trapping team and is in the process of establishing breeding colonies with prime animals having accurate capture records. In addition, the relatively low costs in Kenya will enable research on, and breeding of, primates to be accomplished at a much reduced rate.

The current facilities are located in Tigoni, on 20 acres of land, at an elevation of 7,400 ft. Here there are approximately 300 primates of the genera *Cercopithecus, Cercocebus, Colobus, Galago* and *Papio*. Vervet monkeys (*Cercopithecus aethiops)* and olive baboons (*Papio anubis*) are the major species. The location of the center, which was originally founded by Drs. Cynthia Booth and the late Louis Leakey in 1958, is too small to accommodate future expansion and the climate too harsh for outdoor caging of several of the African species. Therefore, 300 acres of government land were obtained in the Kajiado District, at an elevation of

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5,400 ft, where the climate is mild and ideal for outdoor caging of most African primates. The first phase of construction, which will enable the complete phasing out of the Tigoni site, should be completed in approximately one year.

Initial development is being financed primarily by the Kenya government with additional support from the Animal Resources Branch of the National Institutes of Health through the ORPRC and from research contracts awarded to the IPR. Nearly half a million dollars has been appropriated or promised for this coming fiscal year. Several international granting agencies have visited the IPR and have been extremely encouraging concerning the additional funds required to complete the Institute.

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INTERNATIONAL MEETING ON BIOLOGY OF MARMOSETS HELD

The third international meeting on the biology of marmosets took place September 2-5, 1977 under the auspices of the Anthropological Institute of the University of Göttingen. Over 40 scientists from the USA, South America and Europe took part. The topics discussed included reproductive biology, endocrinology, sensory and neurophysiology as well as various aspects of the animals' behavior.

Special attention was paid at the meeting to breeding in captivity and to the importance of preservation of these animals in the wild. With respect to these two subjects, the following statements represent the conclusions drawn at the meeting. (1) Techniques for animal care and strategies for breeding are not uniform for the various types of marmosets, and specific results for each individual kind of animal must be taken into account. From the present state of our knowledge of these animals it appears inadvisable to keep most species in the kind of large groups found in many places today as a result of inadequate knowledge of the biology of these primates. (2) For the development of breeding or experimental colonies only such species should be used that are neither endangered nor are subject to specific disadvantages or difficulties in breeding or maintenance. Although the results of long-term experimentation with this species are still lacking, the species *Callithrix jacchus jacchus* can be recommended as first choice. (3) Due to the rapid decrease in the wild population, the persistent encroachment on natural habitats and the good possibilities for breeding individual species in captivity, breeding experimental animals in the laboratory must be considered preferable in all respects to the purchase of animals originating in the wild. The permanent drain on wild stocks through the persistent use of imported animals can under no circumstances be justified today.

The proceedings of the meeting will be published in 1978. Orders and queries should be sent to Hartmut Rothe, Lehrstuhl für Anthropologie der Universität Göttingen, Bürgerstraße 50, D - 3400 Göttingen.--(From a note by Hartmut Rothe and H. J. Wolters in *Primate Report*, No. 2, May, 1978, 43-44.)

NOTE ON PRIMATE TAXONOMY

S. L. Washburn

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In discussions of the correct names for primates, it is frequently forgotten that the rules were adopted many years ago under very different circumstances. Before the first World War there was great emphasis on classification and nomenclature, and, inevitably, more than one name was given to specimens which later proved to belong to the same species. Priority was a necessary and useful way of settling such ambiguities. Other than zoologists, very few people used the names, so changes could be easily learned.

Today, the vast majority of people using the names are in biomedical research. The change in the name of a species widely used in medical research causes great inconvenience. A major reason for using the scientific names is to gain a stable and internationally accepted terminology. If the scientific names are frequently changed, however, the common names become a more useful guide to the identity of the species.

The issues are clear. When there was confusion over the correct names (different names for the same species were in use), the principle of priority and the aid of taxonomists were essential in the conduct of research. But today, when names such as *Papio* have been widely used for many years, and when there is agreement on usage, taxonomists only retard research by raising issues that are not relevant.

It is particularly when the species is important in medical research, where a name such as *Papio* is used and understood by many thousands of scientists, that change is intellectually irresponsible. Medical research should not be hampered by those who burrow in the literature of more than a hundred years ago, creating confusion where none existed. During my lifetime many of the names of the major groups of primates have been changed, and the changes only obstructed the understanding and use of primate taxonomy. Classification should serve science--it should not be a playground for those who try to gain prestige by making it difficult for everyone else.

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REBUTTAL OF FALSE STATEMENTS BY THE INTERNATIONAL PRIMATE PROTECTION LEAGUE

David J. Chivers

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In the April, 1978 issue of the *IPPL Newsletter* it is claimed that I was encouraged and paid by the World Wildlife Fund (WWF) to kill primates in the Krau Game Reserve, West Malaysia, during a study to formulate new management proposals for the reserve. I was not sent to Malaysia in 1977 by WWF; I was not involved in the collection of primates anywhere in the Peninsula during my visit, and certainly not in a Game Reserve; I never claimed such collection to be a necessary part of drafting management proposals; I would never engage in the collection of protected animals from protected habitats. Their implication that I have no respect for the laws of Malaysia is contradicted by my public record there over 10 years. They suggest that current trends in ecological research involve long-term observation of feeding behavior and vegetation rather than the analysis of stomach contents, supposing, quite incorrectly, that the latter would be my reason for collecting primates. This apart, such comments are insulting to someone who has tried as hard as anyone to promote long-term observations of both behavior and vegetation.

In a second article they allege that my British and Malaysian colleagues are trying to develop a project of breeding gibbons for export overseas, even though they have received written denials from the Vice-Chancelor's office of the University of Cambridge and from Universiti Pertanian Malaysia. They have chosen to ignore official statements describing the aims of the program as coordinated efforts to (1) preserve viable populations of each species in their natural habitat, (2) to conserve populations of each species in habitats disturbed by man, and (3) to achieve proper (humane and efficient) use of some of the primates displaced by such disturbance for purposes of research, including conservation. Most of this article is irrelevant, because much of the rambling discourse is based on details of a discussion document drafted prior to my visit to Malaysia; it was rapidly superseded by more informed documents (to which they make no reference), which incorporated advice from a wide variety of sources, mostly Malaysian and including the Primate Specialist Group of IUCN/SSC. They display an appalling ignorance of affairs in Malaysia, mainly of government commitments to wildlife protection and reserve establishment and management, matters which have received worldwide publicity in conservation circles. Their play on the emotions in imagining how animals might be collected are in very bad taste, and in contradiction of some of their quotes from my draft proposals. It is worth stressing that

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mothers will not be shot to obtain their infants, and that it is not intended to procure animals for captive studies from commercial dealers.

I shall be grateful, therefore, for any support that can be given to ensure (1) that false and emotive statements made by IPPL do not disrupt this and other collaborative programs concerned with the practical application of conservation to primates, and (2) that the difference between 'conservation' and 'preservation' is more clearly and widely understood--a distinction often glossed over by IPPL in their muddled thinking. The Editor of the *Laboratory Primate Newsletter* called attention some years ago (Editor's Notes, October, 1975 issue) to IPPL's tendency to play fast and loose with the facts and to greatly overgeneralize. He also emphasized the questionable tactics that they often employed to achieve their goals. Since then, it appears that, if anything, IPPL has become even worse in these respects. This is a critical time in the affairs of monkey and man; there is no time for the obstruction and disunity currently being promoted by IPPL. Sadly, it is the primates that are suffering most.

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TRENDS IN PRIMATE IMPORTS INTO THE UNITED STATES

Primate imports into the United States as reported by the U. S. Department of Commerce (USDC) Bureau of the Census (1978) dropped below 30,000 in 1977 for the first time in well over a decade. It can be assumed that roughly one-third of the imports originated in India and were probably rhesus macaques. A second third were probably cynomolgus macaques, the most commonly imported primate from other Asian countries. Six of the 24 source countries in 1977 supplied more than 1,000 primates each. These major source countries, India, the Republic of the Philippines, Malaysia, Bolivia, Kenya, and Indonesia, together supplied 86 percent of the total imports. Although Peru was not listed in the USDC (1978) statistics, it should be added to the list of source countries. Dr. Benjamin Blood, Executive Director of the Interagency Primate Steering Committee, has reported that 770 squirrel monkeys and tamarins were made available in 1977 by the Peruvian government through the auspices of the Pan American Health Organization.

The total value of the primates in the countries of origin as claimed for the purposes of assessing U. S. import tariffs has remained at roughly $1 million (U.S.) over the past decade. The overall fourfold decrease in imports between 1968 and 1977 (from 127,000 to 29,000) has been compensated for by a fivefold increase in the mean dollar value per primate from $9 in 1968 to $45 last year. (Based on a note by Nancy A. Muckenhirn and Andrea L. Cohen in *ILAR News*, 1978, *21*, [2], 17-18.)

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THE KIDNAPPING OF A NEONATE SQUIRREL MONKEY *SAIMIRI SCIUREUS* (PERUVIAN)

Patricia A. Scollay

San Diego State University

Two recent articles (Taub, Lehner, & Adams, 1977; Eveleigh & Hudson, 1973) have described the enforced adoption of a squirrel monkey (*Saimiri sciureus*) neonate. In each case an orphaned, newborn infant was presented to a female who had recently lost her own infant. In one instance, the new infant was presented only hours after a stillbirth; in the other, it was presented 21 days after a stillbirth (prolactin was administered to the adoptive mother). Such adoptions are apparently frequently arranged for orphaned rhesus monkeys, but rarely employed in squirrel monkey colonies.

Hopf (1970) has commented that it is relatively difficult to find a squirrel monkey female who will accept an infant other than her own. Kaplan (1976) has also noted the rare occurrence of infant adoptions in *Saimiri*. These experiences are surprising in light of the aunting behavior typical of squirrel monkeys. Aunting, the phenomenon of non-mother females carrying and interacting with infants, is well recognized as an integral part of the developing squirrel monkey infant's experiences (Rosenblum, 1968; DuMond, 1968). Mothers in the semifree-ranging environment of Monkey Jungle (Goulds, Florida) leave even very young infants with other females during extended periods of foraging (personal observation). Because of the prevalence of aunting, one might expect it to be rather easy to find squirrel monkey females that will accept infants other than their own and that "permanent aunting" or kidnapping might even be a problem. Kidnapping has, in fact, been cited as a potential problem of maintaining breeding colonies of squirrel monkeys (Rosenblum, 1971). In these cases the infant was never returned to the mother, which invariably led to the infant's death in cases where the aunt was not lactating.

It is the purpose of this communication to report a kidnapping in which the infant did survive. San Diego State University maintains a colony of approximately 20 squirrel monkeys of Peruvian origin. The group contains nine adult females, one adult male and several juveniles of both sexes and is housed in an outdoor facility of about 700 cubic feet. Most of the adult females in the group have been housed together for at least five years. Since females are the social nucleus of Peruvian *Saimiri* groups (Baldwin, 1971), it seems safe to assume that the group is now socially stable.

Female F09 was a wild-born animal, about 10 years old, who had been in the colony for at least seven years at the time of the present

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observation. Her previous reproductive history included two stillbirths and three viable infants. One daughter, F12, was 3 1/2 years old and had been part of the colony since birth. For medical reasons, F09 had been removed from the colony for 10 months immediately preceding the 1977 breeding season. Initially following her reintroduction, she was actively excluded from social participation, but seemed fully integrated into the group when she gave birth to a male infant six months later (July 23, 1977). Her daughter, F12, gave birth to a female infant, her first, three days later. This infant was weak at birth and lived less than 24 hours.

The day her own infant died, F12 was frequently observed aunting her infant brother. Like other females whose infants are being aunted, F09 spent little time near the pair, but occasionally returned to retrieve her infant. Both females were observed nursing the infant. The following day F12 aunted her mother's infant more frequently, kept it for longer periods, and resisted F09's attempts at retrieving it. On the second day after the death of F12's infant, F09 quit approaching F12 and the infant; and, after that time, she was never observed carrying it. Female F12 exhibited normal maternal behaviors toward the adopted infant; she carried it dorsally, nursed it, and retrieved it in time of danger. There were no behavioral indicators that could be found to distinguish this adoptive relationship from the biological mother-infant relationships in the group.

The infant died when it was nine weeks old. At that time, it was well nourished and behaved normally. Its growth had been normal and it was not dehydrated when it died. The infant had shown no signs of depression and had not been rejected by the adoptive mother. It was concluded, therefore, that the infant had received adequate maternal care, both nutritionally and behaviorally; and death is believed to be unrelated to the adoption.

If kidnapping and aunting are not frequently noted in squirrel monkeys in captivity, it may be related to the lack of appropriate females (Rosenblum, 1968). It is not feasible for a squirrel monkey female to carry two infants, her own and another, simultaneously for long periods of time, in part because squirrel monkey infants are so large relative to the size of adults. Moreover, squirrel monkey infants need almost continual contact with older animals for body heat maintenance, at least during their first month of life; a mother cannot leave her own infant unattended to carry another infant. Appropriate aunting females, then, are adults without infants and older juvenile females, and in the absence of such females, aunting may not be observed.

Foster mothering is obviously an ideal way of raising orphaned squirrel monkey infants and is decidedly preferable to hand rearing (Taub, Lehner, & Adams, 1977). It is not always possible to achieve enforced adoption in *Saimiri* when a lactating, infantless female is available (Hopf, 1970; Kaplan, 1976), but it is a procedure definitely

worth trying if the orphaned infant is still warm and vigorous. On the other hand, kidnapping of *Saimiri* infants by lactating or nonlactating females may not be a particularly uncommon event in captivity. If breeding colonies are not carefully observed and/or maternity is not accurately recorded at birth, cases of infant kidnapping may well be undetected. In cases where "permanent aunts" aren't lactating, infants will be found unexplainably dead. In cases where a lactating female's own infant has died and she kidnaps another, lack of careful observation could lead to the assumption that the infant which died belonged to the other (now infantless) mother.

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HUMAN NEONATAL AND INFANT BEHAVIORAL ASSESSMENT SCALES BEING APPLIED TO CHIMPANZEES

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The fundamental problem with generalizing behavioral and biomedical research findings from nonhuman primates to humans concerns the comparability of the observational, experimental and assessment procedures used for the two populations. Any difference in the procedure is confounded with species differences or similarities, and thus rigorous cross-species generalization is obviated. There is a need for sophisticated and predictive behavioral assessment procedures which are suitable and comparable for both human and nonhuman subjects. If it were possible to construct identical assessment procedures, such procedures could provide the most rigorous, generalizable data.

The author and his co-investigator, Mary Elizabeth Kelly, M.D., are currently investigating the cross-species applicability of several behavioral assessment scales designed for human neonates and infants. This research is being conducted at the International Center of Environmental Safety of the Institute of Comparative and Human Toxicology, Holloman AFB, New Mexico. The current investigation, which began in September, 1977, is also attempting to establish the chimpanzee neonate and infant as a reliable behavioral and neurological model for the human neonate and infant. If the assessment procedures prove suitable for both chimpanzee and human subjects, a valid model would be available for an assessment of the effects of diseases and toxins on neonatal and infant neurosystems.

The behavioral scales currently being assessed are the Brazelton Neonatal Behavioral Assessment Scale and the Bayley Scales of Infant Development. The Brazelton Scale (Brazelton, 1973) consists of a neurological examination and measures of responsiveness to inanimate and animate stimuli in the environment. During the course of the examination, which requires 60 to 90 min., the neonate's state of consciousness is observed along with interactive, motor, and organizational capacities with respect to state control and physiological responses to stress. Measurements are obtained by observing the neonate's spontaneous state of alertness and ability to orient to objects such as a ball or the sound of a rattle or bell. Animate stimuli, the human face and voice, are also presented. Reflexes are assessed in the manner of Prechtl and Beintema (1967). In addition, consolability and cuddliness likewise are rated, as are motor maturity, irritability, and other parameters.

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This assessment has been used extensively in human evaluation (Als, Tronick, Lester, & Brazelton, 1977). The Brazelton scale is based on the notion that the neonate is complexly organized to respond at birth to the environment. The style and extent to which any given neonate can organize its behavior differs and depends on a number of genetic and perinatal variables. In recent years the Brazelton scale has been found to be sensitive to a number of variables including maternal obstetrical medication, birth weight, maternal drug addiction, postnatal intervention and culture. The Brazelton scale is also clinically useful in screening for mild as well as severe neurological dysfunction. Preliminary examinations of 12 chimpanzee and 5 human neonates have suggested that the chimpanzees are easily scored on all but a few of the Brazelton items. In addition, the item scores are sensitive to individual differences between chimpanzee neonates.

The Bayley Scales of Infant Development (Bayley, 1969) are suitable for human infants between 2 and 30 months of age. The scales yield a Mental Development Index and a Psychomotor Development Index which provide standard scores for 14 age groups. The Bayley scales also have been used extensively in human developmental research. A feasibility study of the Bayley scales has only begun, but the mental scale appears to contain suitable items for up to at least 8 to 12 months of age for the chimpanzee infants. Most of the psychomotor scale items from all age groups are directly suitable for the chimpanzee infants.

The International Center of Environmental Safety is using its chimpanzee nursery to conduct this study. The Center's breeding colony produces about 20 chimpanzee neonates per year. These neonates are removed from the mothers immediately after birth and are reared entirely in the closely regulated nursery environment. Ample room is available for group housing of infants as well as strict isolation for infants ill with communicable diseases. After one year of age the infants are sent to other facilities.

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SYMPOSIUM ON USE OF NONHUMAN PRIMATES IN CARDIOVASCULAR DISEASE

The Southwest Foundation Forum of the Southwest Foundation for Research and Education in San Antonio, Texas, announces the first in a prospective series of symposia on nonhuman primates in biomedical research. This symposium on "The Use of Nonhuman Primates in Cardiovascular Diseases" will be followed by others: infectious diseases, behavior, pharmacology, cancer, environment, dentistry, reproductive biology and fertility, experimental surgery, congenital malformations, neurophysiology, immunology, cell culture and vaccine development, etc.

The three-day symposium will be held February 18-21, 1979, at the Hilton Palacio del Rio, San Antonio, Texas. Participation will be limited to 150, and speakers will be by invitation. Informal discussants will be provided time at the end of each session. Invited speakers will not be charged the $50.00 registration fee. Individuals interested in participating in this first symposium are invited to submit a title and short abstract for review by the program committee (Drs. T. B. Clarkson, P. J. Gerone, J. R. Held, B. M. Levy, W. Montagna, C. W. McPherson, O. A. Smith, Jr., and S. Washburn). Further information and correspondence may be addressed to Dr. S. S. Kalter, Organizing Secretary, Southwest Foundation Forum Symposium, PO Box 28147, San Antonio, TX 78284.

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MACAQUES FOR SALE

32 (24 male and 8 female) lab-born stumptail monkeys (*Macaca arctoides*), approximately 1-7 years old. 12 (1 male and 11 female) imported stumptail monkeys, approximately 7-12 years old. 27 (male) lab-born rhesus monkeys, (*M. mulatta*), approximately 1-4 years old. 13 (female) lab-born rhesus monkeys, approximately 5-11 years old. 43 (33 male and 10 female) imported rhesus monkeys, approximately 4-8 years old. 15 (7 male and 8 female) imported rhesus monkeys, greater than 8 years old. Purchaser must incur cost of animals, transport cages and transportation. Contact: Th.C. van Schie, Primate Center TNO, Rijswijk, Holland, tel. 015-140930, telex no. 32785 REPGONL.

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GROUP FLIGHTS TO IPS CONGRESS IN INDIA

Anyone interested in participating in a group flight from the United States to the International Primatological Society Congress in Bangalore (January 8-12, 1979) should write to Dr. Stephen Suomi (Dept. of Psychology, Primate Laboratory, 22 N. Charter St., Madison, WI 53706). The tentative deadline is October 1, 1978. Please indicate preferred departure and return dates and departure location (East Coast, Chicago, West Coast). Obviously, the greater the range of possible dates you indicate, the greater the chances of arranging such flights. You might also want to indicate what stopovers (London, Athens, or Teheran, for example, for East Coast departures), if any, you would be interested in. Stopovers increase the cost of the trip. Currently, airfares to New Delhi via Pan American airlines, with a minimum stay of 14 days and a maximum of 120, are $854 from New York or Boston and $1,102 from Los Angeles either trans-Pacific or through New York. The standard stopover privileges with this plan are: Outbound only, London or Frankfurt only for an extra $50. On a group flight, there would be a reduction in the fare with the amount depending on the number of persons in the group.

* * *

STATUS OF RHESUS MONKEY IN BANGLADESH UNDER REVIEW

The Fish and Wildlife Service has announced (*Federal Register*, April 13, 1978) that it will review the status of the rhesus macaque (*Macaca mulatta*) in Bangladesh to determine whether or not this population should be listed as Endangered or Threatened.

The decision to undertake this review was based primarily on a petition submitted in September, 1977 by Ken Green of the National Zoological Park, Washington, DC. Having collected data in Bangladesh over a 5-month period in 1976 (see the article by Green in the October, 1977 issue of this *Newsletter*), Green presented evidence to support his contention that the Bangladesh population of rhesus macaque should be listed as Endangered.

According to Green, forest destruction and land clearing represent the chief threats to the species. Furthermore, significant numbers of rhesus monkeys have been exported to the United States despite a prohibition on the export of Bangladesh's endemic primates. Comments on this subject were due during June, 1978. (Based on a note in the *Endangered Species Technical Bulletin*, 1978, *3* [5], 11.)

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AVAILABILITY OF CHIMPANZEES FOR HEPATITIS RESEARCH

The Division of Blood Diseases and Resources of the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health, is interested in the use and development of the chimpanzee as a model for human hepatitis research. The Division maintains a sizeable colony of chimpanzees under a contract with the New York University Medical Center in the Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), Sterling Forest, New York. A limited number of juvenile seronegative animals as well as hepatitis B antigen carriers are available for on-site use by the scientific community. Since the chimpanzees are a rare and expensive resource, a proposal to utilize this animal resource and the research project itself should be carefully designed and the proposal submitted to Dr. Luiz H. Barbosa, Room 4A08, Building 31, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland 20014. Proposals will be reviewed for scientific merit by outside consultants, and chimpanzees will be reserved for studies judged most likely to advance hepatitis research and lead to the elimination of the threat of hepatitis associated with the transfusion of blood and blood products.

The NHLBI has not set aside funding for the support of research that would utilize this chimpanzee resource. Investigators who may not have secured research funds at the time the proposal is submitted should indicate the source from which the funds have been requested and the anticipated date of funding. The user's source of funding may be from Federal or non-Federal sources. Should a proposal be recommended for chimpanzee use, the Division will reserve animals for a designated period of time. The time will be established on a case-by-case basis according to the conditions of the proposal. Once the investigator demonstrates that funding has been obtained for the proposal, the chimpanzee(s) will be released for the investigator's use. Investigators will also be provided with LEMSIP contract-supported staff assistance to assure optimal security and efficiency of procedures. Once the research is initiated, the investigator must assume the cost of all expenses associated with the chimpanzee for the agreed-upon period. These expenses include the daily maintenance cost of the animal (per diem) as well as expenses related to experimental procedures, such as liver biopsies and plasmapheresis. (From the *NIH Guide for Grants and Contracts*, Vol. *7* [8], June 9, 1978).

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LABORATORY PRIMATE NEWSLETTER QUARTERLY SURVEY: THIRD QUARTER 1977

The present report is one of a series summarizing data from the quarterly surveys being conducted by the *Laboratory Primate Newsletter*. The data in Tables 1 and 2 are based on reports from the following facilities: California, Delta, New England, Washington (includes the Field Station), and Yerkes Regional Primate Research Centers, Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), National Institutes of Health (includes both the Primate Quarantine Unit and the Primate Research Units), and the Southwest Foundation for Research and Education. (See the April, 1978 issue for the previous survey report.)

TABLE 1. MORTALITY SUMMARY BY SYSTEM: JULY 1-SEPTEMBER 30, 1977

SPECIES	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes	1				1	1	1					
Macaca arctoides						2				2		1
M. cyclopis				1		1					1	
M. fascicularis	1			1		1					2	
M. fuscata				1								
M. maurus	1											
M. mulatta	12		1	39[a]	3	52[b]	1		1		15	19
M. nemestrina	5			17		87	3	3			31	1
M. radiata				1		1					1	1
M. hybrids												1
Cercopithecus aethiops				1		2						
Papio cynocephalus	3			1		1				1	1	
P. papio				2								1
P. spp.	10			1		3	2				2	1
Saimiri sciureus				3		8					2	38
Cebus albifrons							1					1
C. apella				1							1	2
Aotus trivirgatus	9			2								3
Callithrix jacchus											1	
Saguinus fuscicollis				1		3						1
S. oedipus	14			4		10	1				1	9
Nyctecebus coucang						1						
TOTALS	56		1	76	4	173	9	3	1	3	58	79

[a] Includes 20 tuberculin reactors

[b] Includes 5 Shigella infections

TABLE 2. CENSUS, NUMBER OF BIRTHS, AND MORBIDITY SUMMARY BY SYSTEM: JULY 1-SEPTEMBER 30, 1977

SPECIES	Census	Births	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes	389	5				1			1				4	
Pongo pygmaeus	36	1	1		1	1	1	30		1				
Macaca arctoides	193	7	1	3				12					3	4
M. cyclopis	85	1												
M. fascicularis	470	8	4	1				5	1				6	
M. fuscata			1											
M. mulatta	5644	83	24	50	33	50[b]	2	290[c]	43	5	5	1	116	25
M. nemestrina	1101	61	8	7		8		50	9			2	33	
M. nigra[a]	25	1	2	1				1	1					
M. radiata	301	5	1	4	12			38	6	2			8	3
M. hybrids	31													
Erythrocebus patas	108							31					2	
Cercocebus atys	51	3												
Cercopithecus aethiops	44		2										2	
Papio cynocephalus	113	4	6			1							1	
P. papio	53							6						
P. spp.	1550	46	15	1				34		1			52	3
Saimiri sciureus	838	19	5		4		2	22	3	80			10	1
Cebus apella	77	5	1											
C. spp.	122													
Aotus trivirgatus	154	5	4					1						
Callithrix jacchus		1												
Saguinus mystax	117	8												
S. fuscicollis								2	1	1				1
S. oedipus	203	4				6		5	1	1		1		2
Galago crassicaudatus		2												
TOTALS	11674	265	71	67	50	67	5	527	71	91	5	4	236	39

[a] also referred to as *Cynopithecus niger*

[b] Includes 30 tuberculin reactors

[c] Includes 3 parasitic infestations, 17 Shigella infections

RECENT BOOKS AND ARTICLES
(Addresses are those of first authors)

Books

Recent Advances in Primatology. D. J. Chivers and J. Herbert (Eds.). London: Academic Press, 1978, 980 pp. [Price: £19.20]

This is the first of four volumes containing the proceedings of the VIth Congress of the International Primatological Society held in Cambridge, England, August 22-28, 1976. Contents: INTER-INDIVIDUAL RELATIONSHIPS AND GROUP STRUCTURE. Inter-individual relationships and group structure: introduction to a symposium, by R. A. Hinde; Ontogeny of social systems, by W. A. Mason; Discussion note, by J. W. Leonard; Nature and implications of the complexly organised social system in nonhuman primates, by E. Vaitl; Grooming relationship and object competition among Hamadryas baboons, by H. Kummer, J. J. Abegglen, Ch. Bachmann, J. Falett, & H. Sigg; Some principles relating social interactions and social structure among primates, by R. M. Seyfarth, D. L. Cheney, & R. A. Hinde; Inter-individual relationships and group structure: concluding remarks, by R. A. Hinde; Social relations in a free-ranging troop of *Macaca arctoides*, by A. Estrada; Ranging patterns and associations of a small community of chimpanzees in Gombe National Park, Tanzania, by A. H. Pierce; Factors affecting dominance relationships in adult female baboons, by L. H. Nowell & A. G. Heidrich; Dominance relations among free-ranging female baboons in Gombe National Park, Tanzania, by J. Moore; Kin preference in the behavior of young baboons, by L. T. Nash; Behaviour affecting immigration of male baboons at Gombe National Park, by C. Packer; Behavioural correlates of male dispersal in patas monkeys, by J. Gutstein; Network of feeding relationships: an experimental and quantitative analysis in one troop of *Macaca fuscata*, by J. J. Burton; Peripheralisation of weaned male juveniles in *Presbytis entellus*, by S. M. Mohnot; Attention structure and social organisation, (Round-table discussion lead by M. R. A. Chance). EARLY SOCIAL BEHAVIOUR. Early social behaviour: introduction, by L. White & S. J. Suomi; Olfactory recognition of mothers by infant squirrel monkeys, by J. N. Kaplan; Markovian states in the regulation of mother-infant body contact in rhesus monkeys, by H. Dienske, E-A van Luxemburg, & H. A. J. Metz; The analysis of mother-infant interaction in groups: possible influence of yearly siblings, by C. M. Berman; Comparison of mother-infant proximity among wild and

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In many cases, the original source of references in this section has been the Current Primate References prepared by The Primate Information Center, Regional Primate Research Center SJ-50, University of Washington, Seattle, WA 98195. Because of this excellent source of references, the present section is devoted primarily to presentation of abstracts of articles of practical or of general interest. In most cases, abstracts are those of the authors. Any author wishing to have a published paper abstracted in this section may do so by sending the Editor a copy of the reprint with a summary or abstract and indicating his desire on the reprint.

captive chimpanzees, by J. B. Silk & H. C. Kraemer; Age changes in the mother-offspring association of wild chimpanzees, by A. Pusey; Mother-infant interaction and infant cognitive performance, by M. Lewis & D. Coates; A comparison of play and non-play activities in feral olive baboons, by N. R. Chalmers; Ethological analysis of social interactions in chimpanzees, orang-utans and children, by J. T. Braggio; The ontogeny of playful behaviour in family groups of the common marmoset, by M. F. Stevenson; Social interactions within marmoset family groups, by J. C. Ingram; Comparative aspects of the behaviour of juveniles in two species of baboon in Tanzania, by J. I. Oliver & P. C. Lee; Development of gender role behaviors in heterosexual and isosexual groups of infant rhesus monkeys, by D. A. Goldfoot & K. Wallen; The effects of gonadal hormones on peer interactions, by L. A. Rosenblum & L. J. Bromley; Adult male-infant relations in captive rhesus monkeys, by W. K. Redican; Allomaternal care and abuse of infants among hanuman langurs, by S. B. Hrdy; Relationships between patas infants and group members other than the mother, by J. Chism; Concluding remarks, by S. J. Suomi & L. White. DEMOGRAPHY AND SOCIAL ORGANIZATION. Demography and social organisation: opening remarks, by G. H. Manley; Grouping behaviour and sex ratio in mantled howling monkeys, by N. J. Scott, Jr., L. A. Malmgren, & K. E. Glander; Size and characteristics of primate groups in Guyana, by S. H. Vessey, B. K. Mortenson, & N. A. Muckenhirn; Rhesus of Cayo Santiago: effective population size and migration rates, by C. R. Duggleby; 'Wanderers' in *Presbytis senex*, by G. H. Manley; Demographic and social organisation: summary of discussion, by G. H. Manley. TERMINOLOGY IN BEHAVIOURAL RESEARCH. Introduction, by V. Reynolds; A suggestion for fixed criteria definitions of terms that describe the social organisation of nonhuman primates, by P. Asquith; Discussion, edited by V. Reynolds & P. Asquith. PRIMATE FEEDING BEHAVIOUR IN RELATION TO FOOD AVAILABILITY AND COMPOSITION. Primate feeding behaviour in relation to food availability and composition, by D. J. Chivers & C. M. Hladik; Ecological and physiological adaptations of five sympatric nocturnal lemurs to seasonal variations in food production, by J. J. Petter; Food habits of five monkey species in the Kibale forest, Uganda, by T. T. Struhsaker; Comparable activity budgets of red colobus, by C. Marsh; Characteristics of the diet of West African red colobus, by B. L. Gatinot; Diet of green monkeys in Senegal, by G. Galat, & A. Galat-Luong; Soils, forest structure and feeding behaviour of primates in a Cameroon coastal rain-forest, by J. S. Gartlan, D. B. McKey, & P. G. Waterman; Food niches and co-existence in sympatric primates in Gabon, by A. Gautier-Hion; Food availability as a limiting factor on population density of the Japanese monkey and the gelada baboon, by T. Iwamoto; Comparative feeding ecology of six sympatric primates in West Malaysia, by J. R. & K. S. MacKinnon; Dispersion and food availability in Malaysian forest primates, by F. P. G. Aldrich-Blake; Competition for food between lesser apes, by J. J. Raemaekers; Locomotion, posture and habitat use of two sympatric leaf-monkeys in West Malaysia, by J. G. Fleagle; Aspects of the diet of the Hanuman langur, by J. R. Oppenheimer; Feeding, spacing, and movements as correlates

of troop size in the lion tailed macaque, by S. M. Green; Foraging patterns in a group of longtailed macaques in Kalimantan Timur, Indonesia, by B. P. Wheatley; Earth-eating by macaques in Western Thailand: a preliminary analysis, by A. A. Eudey; Voluntary lead ingestion as a quasi-adaptive feeding behaviour in rhesus monkeys, by C. T. Snowdon & J. L. Jacobson; Social distribution of an avian prey in an enclosed troop of stumptail macaques, by V. L. Fifield & G. R. Stephenson; Contrasts in feeding behaviour in squirrel and titi monkeys, by D. M. Fragaszy; Color discriminations during food foraging by a new world monkey, by M. Snodderly; Feeding behaviour and molar features in two species of titi monkey, by W. G. Kinzey; The quality of diet as a possible limiting factor on the howler monkey population of Barro Colorado island, by K. Milton; Distribution of plants available as food to different primate species: a mathematical approach; by A. Hladik; Species differences in feeding and ranging behaviour in primates: an abstract, by T. H. Clutton-Brock & P. H. Harvey; A general model of optimal diet, by S. A. Altmann & S. S. Wagner; Variability and constancy of feeding behaviour in man, by I. de Garine; Reproductive and feeding strategies in an undescribed primate, Anonymous; Concluding discussion: ecological factors and specific behavioural patterns determining primate diet, by C. M. Hladic & D. J. Chivers. SEXUAL AND AGGRESSIVE BEHAVIOUR. Introduction, by J. Herbert; Development of play and mounting behaviour in female rhesus virilized prenatally with esters of testosterone or dihydrotestosterone, by R. W. Goy; Progesterone and sexual attractivity in female primates, by M. J. Baum; Growing points in research on sexual behaviour, by B. J. Everitt; Androgen treatments of young male rhesus monkeys, by F. Bielert; How female reproductive cycles affect interaction patterns in groups of patas monkeys, by T. Rowell; Oestrous behaviour and social relationships among Gelada baboons, by R. I. M. Dunbar; The consort relationship in a troop of Japanese monkeys, by L. M. Fedigan & H. Gouzoules; Hormones and behaviour during puberty in the marmoset, by D. H. Abbott; Ovarian hormones and behaviour in greater galagos (*Galago crassicaudatus crassicaudatus*), by A. F. Dixson, C. H. Phoenix, & J. A. Resko; Behavioural fluctuations in *Lemur fulvus*: within and without the breeding season, by K. J. Boskoff; Tail marking in *Callimico goeldii*, by J. F. Wojcik & P. G. Heltne; Labour and parturition in feral olive baboons *Papio anubis*, by L. H. Nowell, A. G. Heidrich, & S. Appolynaire; Sexuality and aggressivity: development in the human primate, by R. Green; Sex differences in apes and children, by J. T. Braggio, R. D. Nadler, J. Lance, & D. Miseyko; Dominance, aggression and sexual behaviour in social groups of talapoin monkeys, by E. B. Keverne, R. R. Meller & A. M. Martinez-Arias; Hypothalamic regulation of behavioral and hormonal aspects of aggression and sexual performance, by A. A. Perachio; Sexual selection in baboons (*Papio cynocephalus*): a computer simulation of differential reproduction with respect to dominance rank in males, by C. Saunders & G. Hausfater; Seasonal influences on aggression in *Macaca mulatta*, by J. Teas, H. G. Taylor, & T. L. Richie; Join-aggression and protective aggression among captive *Macaca fascicu-*

laris, by F. B. M. de Waal; Factors contributing to intragroup aggression in captive pigtail monkey groups, by J. Erwin; Effects of rank on female removed in *Macaca nemestrina*, by L. Swenson, L. Bartlett, & D. Sackett; Relationships between grooming and aggression in a stumptailed macaque (*Macaca arctoides*): a stochastic approach, by C. Goosen & H. A. J. Metz; Infanticide and social organisation in the redtail monkey (*Cercopithecus ascanius schmidt*) in the Kibale forest, Uganda, by T. T. Struhsaker; The aggressive strategy of individual vervets during long fights, by D. Y. Shapiro; Mysterious anger of vervets in captivity, by V. I. Chernyshev; Behavioural changes during group integration in *Saimiri*, by D. K. Candland, L. Dresdale, K. O'Connor, & B. Cahill; Social structure dynamics in small groups of captive squirrel monkeys, by S. Anschel & G. Talmage-Riggs; Sexuality in apes: introduction, by G. D. Jensen; Sexual behaviour of orang-utans in the laboratory, by R. D. Nadler; Sexual behaviour of wild siamang, by D. J. Chivers; Sexual behaviour of wild mountain gorillas, by A. H. Harcourt & K. J. Stewart; Sexual morphology and behaviour in *Pan paniscus*, by S. Savage & R. Bakeman; Sequential information transfer: an hypothesis about sexual arousal in chimpanzees, by G. D. Jensen. MOTOR CO-ORDINATION IN PRIMATES. Chairman's introduction, by C. G. Phillips; The organisation of the motor system in primates, by H. Kuypers; Cortical and subcortical mechanisms in voluntary movement, by H. H. Kornhuber; The primate superior colliculus and visually guided eye movements, by R. H. Wurtz; Activity of neurones in the precentral gyrus during active and passive movements in the conscious monkey, by R. N. Lemon; The role of afferent feedback in the regulation of movement, by C. D. Marsden, P. A. Merton, H. B. Morton, & J. E. R. Adam; Functional relationships between muscles, motor cortex, and cerebellar nuclei during forelimb movement in macaques, by W. T. Thach, Jr.; Neural mechanisms in visually controlled arm movements, by J. Stein; Invited notes, by R. Jung; Epilogue, by C. G. Phillips. HEARING AND ACOUSTIC COMMUNICATION IN PRIMATES. Introduction, by W. C. Stebbins; Hearing of the primates, by W. C. Stebbins; Auditory lateralization and localization in monkeys, by G. Gourevitch; Contribution of auditory cortex to hearing in the monkey (*Macaca mulatta*), by H. Heffner & B. Masterton; Detection of biologically significant sounds by single neurons, by J. D. Newman; Some behavioural effects of removal of superior temporal cortex in the monkey, by J. H. Dewson, III; Brain mechanisms in learned phonation of *Macaca mulatta*, by D. Sutton, H. H. Samson, & C. R. Larson; Problems arising and methods used in analysing the communicative meaning of the acoustic signals of squirrel monkeys, by M. Maurus; Vocal ethology of primates: implications for psychophysics and psychophysiology, by P. Marler; Projections from different limbic vocalization areas in the squirrel monkey, by P. Müller-Preuss & U. Jürgens; Selective cortical lesions and auditory behaviour in the monkey, by S. R. Pratt & S. D. Iversen; Responses of pygmy marmosets to synthesized variations of their own vocalizations, by C. T. Snowdon & Y. V. Pola; On the functional anatomy and physiological aspects of the auricle in primates, by R. Seiler; Hearing and vocalization in a malagasy lemur: *Phaner furcifer*,

M-M. Niaussat & D. Molin; The ontogenesis of the 'great call' of gibbons (*Hylobates concolor*), by C. Demars, C. Berthomier, & M. Goustard; Vocal repertoire of *Lemur fulvus albifrons*, by M. Paillette & J. J. Petter; The vocal response of *Saguinus fuscicollis* and *Callithrix jacchus* to pictorial stimuli, by A. G. Pook; Sign vehicles in loud calls of Japanese macaques, by G. R. Stephenson; Behavioural sequences in squirrel monkey groups: the relevance of inter-individual distances, by H. Pruscha & M. Maurus; Patterns of inter-group spacing among primates, by P. M. Waser; Concluding discussion, by S. D. Iversen. LANGUAGE AND ITS ORIGINS. Ape language projects: a perspective, by D. M. Rumbaugh; Conversing with Lana, by T. V. Gill; Comparison of language-related factors in ape and man, by D. Premack; Implications of chimpanzee language-training experiments for primate field research--and vice versa, by E. W. Menzel; Natural communications and sign combinations in the use of sign language by chimpanzees, by L. W. Miles; Colour perception and colour classification of Lana chimpanzee, by S. M. Essock; Discussion, (Morning session); Language and communication in primates, by P. A. M. Seuren; Language is a developing social skill, by E. Lieven & J. McShane; Discussion (Afternoon session); Language and its origins: a synthesis, by G. Ettlinger. COGNITION AND LEARNING. Learning in prosimians, by H. M. Cooper; A comparison of developmentally progressive intellectual skills between *Hylobates lar*, *Cebus apella* and *Macaca mulatta*, by D. R. Snyder, L. M. Birchette, & T. M. Achenbach; Visual observing behavior by stumptailed monkeys during learning set formation, by A. M. Schrier & M. L. Povar; Cross-modal performance in monkeys and apes: is there a substantial difference?, by M. J. Jarvis & G. Ettlinger; Sorting of objects by the chimpanzee and monkey, by H. S. Garcha & G. Ettlinger; Experimentally-induced visual hallucinations in the rhesus monkey, by A. Auerbach; Creative manipulation of the environment among *Macaca fuscata*, by D. K. Candland, P. Weldon, G. Lorinc, & K. O'Conor; General discussion, H. J. Jerison. ASPECTS OF THE VISUAL SYSTEM. An anatomical investigation of the nervous pathway from the eyes of the cynomolgus monkey mediating intrapineal serotonin concentration, by G. C. T. Kenny & E. C. Rivron; The relationship of cortical unit activity to behaviour as shown by recording from unanaesthetized monkeys, by R. M. Ridley; Encoding, retrieval and the inferotemporal cortex, by A. Sahgal & S. D. Iversen.

Behavioral Variation: Case Study of a Malagasy Lemur. Alison F. Richard. Cranbury, New Jersey: Bucknell University Press, 1978. 213 pp. [Price: $22.50]

Contents: 1. *Propithecus verreauxi:* a Malagasy prosimian. 2. Previous studies of *Propithecus verreauxi*. 3. Aims of this study. Description of Methods and Study Areas. A. Methods. 1. Broad census techniques. 2. Preparation of study areas. 3. Sampling of vegetation. 4. Study groups. 5. Sampling methods and observational techniques in focal study. B. The Study Area. 1. Climate. 2. Forest structure. 3. Species Composition of Forests.

4. Phenology. Group Size, Composition, and Changes through Time. 1. Areas surveyed. 2. Group size and composition. 3. Births and reproductive cycles. 4. Disappearances and possible causes of death. 5. Movement of animals between groups. 6. The population of *P. verreauxi* at Berenty. Maintenance Behaviors. 1. The home-range. 2. Ranging behavior. 3. Feeding behavior. 4. Positional behavior. 5. Resting. 6. Daily patterns of activity. Social Behaviors. 1. Interactions with individuals within the group. 2. Interactions with other groups and nongroup individuals. The Meaning of "The Group" for *P. verreauxi*. 1. Group size and composition. 2. Structuring of the group. 3. The group as part of a wider network. An Overview of Behavioral Variability in *P. verreauxi*. 1. Maintenance behaviors. 2. Social behavior. 3. Correlates of behavioral variability. The Relationship between Ecology and Social Organization. 1. *P. verreauxi* as a leaf-eating primate. 2. The classification of primate social systems. 3. The study of social organization and ecology.

The Langurs of Abu: Female and Male Strategies of Reproduction. Sarah Blaffer Hrdy. Cambridge, Mass.: Harvard University Press, 1977. 361 pp. [Price: $17.50]

The results of field studies by the author of langur troops that live on the slopes of Mount Abu in Rajastan, India. The author analyzes the behavior of these monkeys from the standpoint of both sexes and from a feminist point of view. Contents: 1. Opponent Consorts. 2. Langurs through the Eyes of Humans. 3. A Highly Adaptable Colobine: Given a colobine; The flexible hanuman; Langur troop dynamics; Genetic consequences of langur troop structure; Reproductive features of the limiting sex. 4. Mount Abu and its Langurs. Morbidity and causes of mortality; Identifying individuals; Aging a langur; Cast of characters; Pros and cons of a social existence. 5. Larder, Nursery, and Seraglio. The seasonal menu; Encounters between troops; The pros and cons of male invasion strategies; The curious case of adulterous solicitations; Summary of territorial options. 6. Competition among Females. Insiders and outsiders; In-house squabbles; The female displacement hierarchy; Correlates of female rank; Egoistic young females and their "altruistic" elders. 7. The Puzzle of Langur Infant-Sharing. The "learning-to-mother" hypothesis; The langur case: methods and subjects; Information gathering; Costs and potential benefits to the infant; Attractive, available, but not necessarily related infants; Brutal multiparas and solicitious, wary nulliparas; Cooperation and exploitation. 8. Infanticidal Males and Female Counter-Strategists. Struggle for control of the Hillside and Bazaar troops; Splitear's ouster from Toad Rock troop; Fission in the I.P.S. troop; Population density, political change, and infanticide; The evolution of infanticide; Female counter-strategies; Infant counter-strategies; Infanticide as a primate reproductive strategy. 9. Two Different Species. Growing up a langur; The reproductive years; Concurrent and conflicting interests between the sexes. Appendix 1. Plants Used by Langurs. Appendix 2. Weights of Hanuman Langurs at

Mount Abu, Jodhpur, and Melemchi. Appendix 3. A Numerical Method of Estimating Coefficients of Relationship in a Langur Troop, by Jon Seger. Appendix 4. Average Male Tenure at Abu.

Morphological and Epidemiological Aspects of Simian Herpesvirus Infections. [Versuchstierkunde Series, No. 5] Manfred Brack. Berlin-Hamburg: Paul Parey, 1977. Soft cover. 63 pp. [Price: DM 24]

This small volume summarizes epidemiological, cultural, clinical, and pathological data of simian herpesvirus infections accumulated in the literature. The data are organized as follows: Serology, Growth in cell cultures, Original hosts, Heterologous hosts, Clinical symptoms, Pathological lesions, and Epidemiology. For subgrouping of the simian herpesviruses the classification given by Hull (1973) is followed, distinguishing the four subgroups of: Typical Herpesviruses, Cytomegaloviruses, Varicella-Zoster-like Herpesviruses, and Oncogenic Herpesviruses. Some isolates that have not been classified are also mentioned.

Bibliographies

Pharmacokinetics of Analgesics, Except Steroids and Narcotics, in Nonhuman Primates. Benella Caminiti. Seattle: Primate Information Center, 1978. 90 Citations with Primate Index, Drug Index and Fluid/Tissue Index. [Price: $3.00. Send orders to: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195]

Tool Use in Nonhuman Primates. Jean Balch Williams. Seattle: Primate Information Center, 1978. 123 Citations with Primate Index. [Price: $3.00. Order address same as in previous reference.]

The Aged Nonhuman Primate. Benella Caminiti. Seattle: Primate Information Center, 1978. 141 Citations with Primate Index and Subject Index. [Price: $3.00. Order address same as in previous reference.]

Bibliographic Review of Research on Cebus Monkeys. Dow, D., & Poirer, F. E. (Dept. Anthropology, The Ohio State Univ., 1775 S. College Rd., Columbus, OH 43210) *Primates,* 1977, *18,* 731-746.

The article includes a cross-reference bibliography in which reference is categorized with respect to two sets of categories, one set being Behavior, Cognition/Learning, Morphology, Physiology, and Miscellaneous, and the other set of the categories Social Structure, Field Studies, Communication, Evolution/Taxonomy, Diet, and Experimental Studies.

Prosimian sensory capacities. Fobes, J. L., & King, J. E. (Dept. of Psychology, Calif. State Univ., Los Angeles, CA 90032) *Primates,* 1977, *18,* 713-730.

This paper reviews laboratory research on sensory capacities of prosimians. Most investigations to date have concentrated on visual and auditory sensitivity with relatively little attention directed

toward olfactory and gustatory sensitivity. Diurnal prosimians have at least rudimentary color vision and appear deficient to anthropoids in other visual measures such as acuity. The most striking difference between prosimian and anthropoid auditory sensitivity is the increased sensitivity of the former group to highly frequencies. No psychophysical data have been published on olfactory sensitivity of prosimians, but the relatively large olfactory areas in their brains and their propensity for scent marking strongly suggest that they have acute olfactory sensitivity. Most data on gustatory thresholds in prosiminas does not permit sensitivity estimation since the data are joint functions of sensitivity as well as preferences.

Field research on tree shrews and prosimians: An historical, geographical, and bibliographical listing. Baldwin, L. A., & Teleki, G. (203 Special Services Bldg., Pennsylvania State Univ., University Park, PA 16802) *Primates*, 1977, *18*, 985-1007.

This is the seventh report in a series that covers field research on the ethology and ecology of nonhuman primates. Together with the previous listings (Baldwin *et al.*, 1972, 1973, 1974, 1975, 1976, 1977), the present one nearly completes this survey of prosimians, monkeys, and apes. Only the Old World *Macaca* and *Cynopithecus* genera remain to be done. Most of the current report is devoted to field research on the five taxonomic families of prosimians (Lemuridae, Indriidae, Daubentoniidae, Lorisidae, Tarsiidae) which today inhabit Madagascar, Africa, and Asia. The single tree shrew family (Tupaiidae) which survives in Asia, ranging from India to the Philippines, is included here despite its ambiguous affinity to the true primates.

Disease

Acerca de disfunção pigmentar em *Leontopithecus rosalia chrysomelas* (Kuhl, 1820) seu tratamento e recuperação (Callitrichidae, Primates). Coimbra-Filho, A. F., Rocha, N. da Cruz. (Dept. de Conservação Ambiental, Estrada da Vista Chinesa, 741 - Alto da Boa Vista, C.P. 23011, 20.000 Rio de Janeiro-RJ, Brasil) *Rev. Brasil. Biol.*, 1978, *38*, 165-170.

A case of lack of pigmentation and alopecia in *L. r. chrysomelas* is described. This anomaly was doubtless acquired due to precarious maintenance in captivity, especially from a nutritional point of view. Brief comments are made referring to the taxon as well as the psychophysiological deficiency of the marmoset upon arrival. The importance of sulphated proteins in the diet of *Leontopithecus* is emphasized, among other aspects. Failure to ingest certain substances is sufficient to cause almost total absence of melanin formation.

The prevalence of *Hepatocystis kochi* in African green monkeys. Leathers, C. W. (Dept. of Vet. Microbiol. & Pathol., Washington State Univ., Pullman, WA 99164) *Laboratory Animal Science*, 1978, *28*,

186-189.

The prevalence of *Hepatocystis kochi*, a blood protozoan parasite, was studied in 178 African green monkeys from Kenya and 61 from Ethiopia. Examinations of blood smears for gametocytes and examinations of the livers for merocysts were performed to determine the presence of infection in these animals. The overall prevalence of infection was 29%. No significant difference in infection rate was found between monkeys from the different geographic areas or between males and females.

Observations on acute gastric dilatation in nonhuman primates. Soave, O. A. (Div. of Lab. Ani. Med., Stanford Univ., Stanford, CA 94305) *Laboratory Animal Science*, 1978, *28*, 331-334.

In the years 1967-1977, we diagnosed 23 cases of acute gastric dilatation in monkeys. Fourteen of these animals were *Macaca mulatta*, five *M. fascicularis*, and one each of *M. nemestrina*, *Aotus trivirgatus*, *Saimiri sciureus*, and *Colobus guereza*. Fourteen of the animals were males, nine were females, and all were adults or subadults. Mortality was 78% (18 of 23 animals). Thirteen of the animals had received an anesthetic, immobilizing, or tranquilizing drug 1-2 days before developing acute gastric dilatation; seven monkeys were overfed, and two had been transferred from one area to another the day prior to developing the disease. Two animals were found dead in their cages with no apparent cause for the gastric dilatation. Five *M. mulatta* and three *M. fascicularis* recovered following treatment, but two *M. mulatta* subsequently succumbed to another episode of acute gastric dilatation. Treatment consisted of evacuation of the stomach, correction of blood volume deficits and acid-base disturbances by administration of appropriate fluids, and supportive therapy for shock.

Photic and pentylenetetrazol-induced seizure susceptibility in *Macaca mulatta*. David, J. & Grewel, R. S. (Ciba-Geigy Res. Ctr., Bombay 400063, India) *Journal of Medical Primatology*, 1977, *6*, 337-343.

95 out of 100 male *Macaca mulatta* of varying ages from a restricted habitat in N. India showed no abnormal seizure susceptibility or EEG response to photic stimulation and no electro-clinical features of epilepsy after pentylenetetrazol, 40 mg/kg s.c. Autopsy studies on the remaining five monkeys with increased seizure proneness revealed depressed skull fractures with cortical trauma in four and a neoplasm in one. Presumably, these factors were responsible for the lowered seizure susceptibility to photic stimulation and pentylenetetrazol activation. Routine photo-chemical activation procedures as outlined in the report are recommended as a necessary prerequisite for rhesus monkeys employed in neurobiological research, as EEG recordings, *per se*, do not always reveal underlying cortical pathology.

Genital *Ureaplasmas* in nonhuman primates. Swenson, C. E., & O'Leary, W. M. (Dept. of Microbiology, Cornell University Med. Coll., 1300 York Ave., New York, NY 10021) *Journal of Medical Primatology*, 1977, *6*,

344-348.

Ureaplasmas were isolated from the genital tracts of four of 22 (18.4%) male chimpanzees and eight of 23 (34.8%) female chimpanzees. Twenty-nine female rhesus monkeys, 38 female baboons, one gibbon, one black ape and one Java monkey were shown to be free of genital *Ureaplasmas*. The rate of reproductive failure among the chimpanzees was high and it is suggested that *Ureaplasma* may be responsible in part. The chimpanzee may serve as a useful model for human *Ureaplasma* genital infections.

Physiology

Sequence of eruption of permanent teeth and epiphyseal union in three species of African monkeys. Wintheiser, J. G., Clauser, D. A., & Tappen, N. C. (Dept. of Anthropology, University of Wisconsin-Milwaukee, WI 53201) *Folia primatologica*, 1977, *27*, 178-197.

Sequence of eruption of teeth and union of epiphyses are determined for three species of African Cercopithecinae. These sequences are highly scalable and are highly comparable between and among the species. Some sex differences in sequence were found within each species. The sequence of epiphyseal union in these species of Old World monkeys are very similar to published sequences in New World monkeys and other groups of higher primates. It appears that there is a single pattern common to the Anthropoidea as a whole.

The electrocardiogram of *Macaca fascicularis*. Toback, J. M., Clark, J. C., & Moorman, W. J. (National Institute for Occupational Safety and Health, Div. of Biomed. & Behav. Sci., 4676 Columbia Parkway, Cincinnati, OH 45226) *Laboratory Animal Science*, 1978, *28*, 182-185.

Electrocardiograms from 16 male cynomolgus monkeys were studied. Standard and augmented limb leads (I, II, III, aVR, aVL, aVF) were obtained with the animals restrained in a sitting position. Normal electrocardiographic parameters were determined, including PR and QT intervals; P, QRS, and T wave axes; P and QRS wave widths. Voltages in all standard and augmented limb leads were lower than previously reported for similar size monkeys.

Blood group antigens and population genetics of *Macaca mulatta* on Cayo Santiago. I. Genetic differentiation of social groups. Duggleby, C. R. (Dept. of Anthro., State Univ. of NY, Buffalo, NY 14226) *American Journal of Physical Anthropology*, 1978, *48*, 35-40.

The red blood cell phenotypes for eight polymorphic loci were determined for 293 free-ranging *Macaca mulatta* living on Cayo Santiago; this number represents the total population of the island, disposed in four social groups plus peripheral males. The rhesus population shows significant genetic heterogeneity over blood group systems (loci) and social groups. No particular genetic locus or social group is solely responsible for the genetic heterogeneity observed. The distributions of genotypes for two loci (G and H) do not deviate significantly from Hardy-Weinberg expectations within social groups or in the population as a whole. Correction of the equilibrium ex-

pectations for the effect of population subdivision yields no statistically significant results. Overall, the results suggest that the interaction of a variety of processes (random genetic drift, founder effect, migration and selection) may be responsible for the diversity observed. These data, combined with those from further studies, may allow an application of behavioral and genetic knowledge to the study of microevolutionary processes among nonhuman primates.

Blood group antigens and the population genetics of *Macaca mulatta* on Cayo Santiago. II. Effects of social group division. Duggleby, C. R. (Dept. of Anthro., State Univ. of New York, Buffalo, NY 14226) *Yearbook of Physical Anthropology*, 1976, *20*, 263-271.

It has been demonstrated that the social groups of *Macaca mulatta* on Cayo Santiago are genetically differentiated with reference to blood group isoantigens. This is true despite the movement of adult males between social groups. In order to determine what causal factors might be involved in genetic differentiation, the products of two recent group divisions, or splits, were examined. While divisions tended to follow matrilineages in both original groups, this tendency was far more pronounced in the division of social group J. The genotypic and phenotypic frequencies of red cell isoantigens in the two groups resulting from each split were compared. The differences found, although sometimes large, never reached a level of statistical significance. It would appear that genetic differentiation of social groups on Cayo Santiago cannot be wholly ascribed to group divisions. The significance of other processes involved in such differentiation must be ascertained.

Behavior

Deprivation of vision in social interaction in monkeys. Chamove, A. S. (Dept. of Psychology Primate Unit, University of Stirling, Stirling FK9 4LA, Scotland) *Journal of Visual Impairment & Blindness*, 1978, *72*, 103.

To assess the role of vision in social development 8 stumptailed macaques were separated from their mothers before one week of age and reared in separate cages, visually isolated from one another. All were given daily social experience, four in the dark and four in the light. Social behavior in the dark was similar to controls except for a complete absence of aggression. When given normally-illuminated social experience at 1 yr, aggression appeared in the deprived group but remained at a level much lower than in controls.

Some sampling considerations in the quantitation of monkey behavior under field and captive conditions. Baulu, J., & Redmond, D. E., Jr. (Dept. of Psychiatry, Yale Univ. Sch. of Med., 333 Cedar St., New Haven, CT 06510) *Primates*, 1978, *19*, 391-399.

Observations of monkey behavior were made on free-ranging and corral-enclosed *Macaca mulatta*. Two sampling techniques were used:

focal animal and group observations. Group observations measured frequencies of social behavior whereas focal observations used time samples which estimated durations of social and nonsocial activities as well as frequencies of social behavior. Analysis of concordance within and between sampling techniques revealed that short duration focal time samples provide a reliable estimate of total frequencies of social behaviors derived using group observations and furthermore, allows the recording of important nonsocial activities not easily recorded in terms of frequencies. Focal time sampling is advantageous for certain types of studies where the equal distribution of observation time between individuals is important, particularly in the field where visibility if often limited and individuals can only be observed continuously for short periods of time.

Establishment of a free-ranging colony of stumptail macaques (*Macaca arctoides*): Social relations I. Estrada, A., Estrada, R., & Ervin, F. (Instituto de Investigaciones Biomédicas, U.N.A.M., Apartado Postal 70228, México 20, D. F.) *Primates*, 1977, *18*, 647-676.

Data on the social behavior of a free-ranging troop of stumptail macaques are reported for a 3-month period in 1974.

Patterns of predation in a free-ranging troop of stumptail macaques (*Macaca arctoides*): Relations to the Ecology II. Estrada A., & Estrada R. (Address same as in previous reference.) *Primates*, 1977, *18*, 633-646.

Data on patterns of systematic and occasional hunting of birds, mammals, reptiles, mollusks and insects by stumptail macaques are reported for a period of 10 months.

Further data on predation by free-ranging stumptail macaques (*Macaca arctoides*). Estrada, A., Sandoval, J. M., & Manzolillo, D. (Address same as in previous reference.) *Primates*, 1978, *19*, 401-407.

Additional data on systematic and occasional hunting of insects, water snails, reptiles, and birds by free-ranging stumptails are reported. Adult males participated in hunting and meat-eating. However, the hunt was dominated by the adult females and by dominant individuals. Meat-sharing between mother and offspring, between hunter and close friends, and piece-dropping types were observed. In general, almost all troop members including infants displayed an interest in meat eating.

A statistical investigation of the time-sampling methods in studying primate behavior. Chow, I. A., & Rosenblum, L. A. (Medical Data Control, Pharmaceutical Div., Ciba-Geigy Co., 556 Moris Ave., Summit, NJ) *Primates*, 1977, *18*, 555-563.

Two commonly used time-sampling techniques in studying animal behavior, namely fixed interval time point technique and fixed interval time span technique have been investigated, in which their statistical properties and the estimators for frequency and duration

have been discussed. Three simple numerical examples have been used to illustrate the calculation of estimates. Finally, a sketch of a stochastic approach to the problem and the resultant estimators are presented, in which all the possible transitions are considered. Therefore, both total frequency and duration of a certain behavior can be estimated by summing up the estimators during each fixed intervening interval with only two end-points being observed.

Quantification of social behavior in pigtail monkeys. Maxim, P. E. (Dept. of Psychiatry & Behav. Sci., Sch. of Med., Univ. of Washington, Seattle, WA 98195) *Journal of Experimental Psychology*, 1978, *4*, 50-67.

An interval scale of 21 behavior categories was constructed from data on 120 pairs of pigtail macaques, while they were establishing a social relationship. A special case of the Law of Categorical Judgments, the Method of Successive Categories, was used to obtain interval estimates of these categories from 4,784 social interactions occurring as two-step chains--a single dominant stimulus category followed by a single submissive response category, preceded and followed by at least 15 seconds of no social interaction. There was a second group of 2,884 social interactions that occurred as long-step chains--3 or more behavior categories preceded and followed by at least 15 seconds of no social interaction. The derived scale was applied to these long-step chains to analyze the possible meaning of the complex sequences. Results of this analysis were similar to those from an earlier study on rhesus monkeys where a 17-category scale was found. Comparison of data from the two studies indicated that the 4 additional categories in pigtail social repertoire variously represent a condensation of long sequences in rhesus behavior, provide earlier warning of aggressive intent, or are part of heterosexual interaction.

Facilities, Care and Breeding

Pregnancy diagnosis in an orangutan using two prepared test kits. Davis, R. R. (Oregon Zoological Res. Ctr., 4055 SW Canyon Rd., Portland, OR 97221) *Journal of Medical Primatology*, 1977, *6*, 315-318.

The Nonhuman Primate Pregnancy Test (NPPT) kit and the Gravindex Slide Test (GST) were compared for the diagnosis of pregnancy in an orangutan. The NPPT was found to consistently detect chorionic gonadotropin earlier and longer than the GST. During approximately the last trimester of pregnancy, both tests registered negative results. It was concluded that the NPPT is a simple, effective pregnancy test for breeding age orangutans.

Use of monkeys as experimental animals: Report of a ten-year experience in a Nordic country. Hyvärinen, J., Linnankoski, I., Poranen, A., Leinonen, L., & Altonen, M. (Institute of Physiology, University of Helsinki, Helsinki, 17, Finland) *Annales Academiae Scientiarum*

Fennicae. Series A. V. *Medica.*, 1978, *172*, 1-27.

The authors summarize 10 years of experience with a captive colony of stumptailed macaques (*Macaca speciosa*) in Finland. General guidelines are presented for the acquisition of monkeys and their handling, housing, diet, diseases and breeding in captivity. Successful maintenance and enlargement of a colony by local breeding has proven feasible even this far north provided that, with the help of experience, diseases are prevented and the breeding conditions made favorable. Such small scale local colonies or larger jointly operated primate centers may provide the solution for researchers requiring monkeys for their laboratory work within Scandinavia.

Sexual behavior of captive orangutans. Nadler, R. D. (Yerkes Reg. Prim. Res. Ctr., Emory Univ., Atlanta, GA 30322) *Archives of Sexual Behavior*, 1977, *6*, 457-475.

Opposite-sex pairs of orangutans were tested for sexual behavior during the intermenstrual period of the female. The male orangutan was the primary initiator of sexual interactions and initiated copulation forcefully on a daily basis, irrespective of female resistance. However, although single copulations occurred daily, copulations beyond the first occurred most frequently during midcycle. Other evidence of cyclicity in behavior was the midcycle decrease in female avoidance of the male and increased grooming, proceptivity, and masturbation by the female. Comparative analysis suggests that differences in sexual cyclicity among the great ape species are related to interspecies differences in sexual assertiveness of males and females. Sexual activity in the cycle is relatively brief when the female controls mating, more prolonged when the male is in control.

Parturition in nonhuman primates. Lanman, J. T. (National Institute of Child Health & Human Development, National Institutes of Health, Bethesda, MD 20014) *Biology of Reproduction*, 1977, *16*, 28-38.

At present the sequence of events at parturition in nonhuman primates is less clear than in some other mammals. In at least the macaque, the best studied of the nonhuman primates, it appears likely that fetal participation in the onset of parturition occurs. Progesterone acts in its classical role of maintaining uterine quiescence; as term approaches its concentration in uterine venous effluent and therefore presumably in the myometrium declines. A prepartum estrogen rise occurs as in sheep, but there is conflicting evidence in macaques whether estrogen administration will either terminate pregnancy or cause a rise in $PGF_{2\alpha}$ levels as it does in sheep. There is some evidence the $PGF_{2\alpha}$ plays a role in normal parturition in the macaque, and that the declining influence of progesterone is at some point overridden by other events precipitating delivery. The "other events" are not well defined except by a hazardous extrapolation from other better-studied species. More information is needed in the macaque on the interrelationship of progesterone,

estrogens, prostaglandins and perhaps on other agents not presently recognized as critical. If the purpose of pregnancy and parturition research among nonhuman primates is to improve understanding of the human counterparts, the macaque, at least as evidenced by the patterns of pregnancy hormones, does not appear to be the best animal. By these limited criteria, either the chimpanzee or marmoset is closer to the human.

Potency in male rhesus monkeys: Effects of continuously receptive females. Michael, R. P., & Zumpe, D. (Dept. of Psychiatry, Emory Univ. Sch. of Med., Atlanta, GA 30322) *Science*, 1978, *200*, 451-453.

Ejaculations decreased and mount latencies increased over a 4-yr. period when intact males were paired regularly over a 3.5-year period (3180 tests) with ovariectomized females made constantly receptive by daily injections of estradiol. The deterioration in potency was abruptly and completely reversed by substituting a group of new but similarly treated females for the original ones.

Aspects of reproduction in ruffed lemurs (*Lemur variegatus*). Boskoff, K. J. (Zoology Dept. & Primate Facility, Duke Univ., Durham, NC 27706) *Folia primatologica*, 1977, *28*, 241-250.

Results of breeding of ruffed lemurs at the Duke Primate Facility provide information concerning estrous cycle, sexual behavior, age of first conception, gestation period, parturition, litter size. *L. variegatus* differs from other *Lemur* species in these respects.

Sobre um caso de triplo-hibridismo em *Callithrix* (Callitrichidae, Primates). Coimbra-Filho, A. F. (Dept. de Conservação Ambiental, Estrada da Vista Chinesa, 741 - Alto da Boa Vista, C.P. 23011, 20.000 Rio de Janeiro-RJ, Brasil) *Rev. Brasil. Biol.*, 1978, *38*, 61-71.

The coupling between the ♂ hybrid (♂ *Callithrix jacchus* × ♀ *C. geoffroyi*) and the ♀ double hybrid [♂ (♂ *C. jacchus* × ♀ *C. geoffroyi*) × ♀ *C. p. penicillata*] produced, in 4 pregnancies, 9 triple hybrid young, all of which developed well. Almost all of them reached adulthood. The phenotype of this hybrid line is described. Brief comments on their developmental sequence are included as well as behavioral considerations. There is also a short discussion on the genetic aspects correlated with the taxonomic situation of the forms of this taxon.

Ecology and Field Studies

A comparative ecology of Asian apes. MacKinnon, J. (University of Cambridge, Sub-Dept. of Vet. Anatomy, Tennis Court Rd., Cambridge, England) *Primates*, 1977, *18*, 747-772.

Field studies of orangutans, gibbons, and siamangs in Borneo, Sumatra, and Malaya provide evidence to show that, irrespective of species feeding preferences, differences in body size guarantee sufficient ecological separation for different ape species to coexist.

A field study of the ecology and behavior of the black-mantle tamarin (*Saguinus nigricollis*). Isawa, K. (Japan Monkey Ctr., Inuyama, Aichi, 484, Japan) *Primates*, 1978, *19*, 241-274.

The author made an ecological study of the black-mantle tamarin in the primary forest in the basin of the River Caquetá in the upper Amazon in Colombia for 88 days. The tamarin group repeats three activity patterns--feeding, resting, and moving--regularly in a day. In their feeding activity, the tamarins preferred to eat small insects and resin. They showed a special liking for large grasshoppers, and spent much of the day searching for them. In the transition time from feeding activity to resting activity, fruit eating behavior was always observed. It was also observed that mother tamarins shared their hard-to-capture grasshoppers with their offspring although the latter had already become independent of their mothers. In general, the tamarins lived in a small and compact group consisting of an adult male, an adult female, and their offspring. Some of these small groups had amicable interrelationships and often moved together, whereas other groups kept aloof from each other. It appears that a number of these closely knit small groups moving together form the "upper structure" of tamarin societies.

Taxonomy

The golden langur, *Presbytis geei* Khajuria: Its discovery, authorship, taxonomic status, and bibliography. Khajuria, H. (High Altitude Zoology Field Station, Zoological Survey of India, Rajgarh Rd., Solan, H. P., India) *Primates*, 1978, *19*, 237-240.

The article provides an appraisal of the present information available on the discovery, authorship, and taxonomic status of the golden langur, *Presbytis geei* Khajuria of Assam, India. An exhaustive list of 26 references so far published or in press dealing with this recently discovered species of exceptional beauty has also been provided. The length of bibliography shows the keen interest shown by various workers in the animal in a short period since its discovery in 1956.

Phylogenetic and population systematics of the mangabeys (Primates: Cercopithecoidea) Groves, C. P. (Dept. of Prehistory & Anthro., The Australian National University, PO Box 4, Canberra, Australia) *Primates*, 1978, *19*, 1-34.

On the basis of original craniological studies, it is concluded that recently published claims based on blood proteins that the mangabeys are diphyletic are valid, and it is proposed to divide them into two distinct genera: *Cercocebus* (with three species: *torquatus* (including *Atys*), *agilis*, and *galeritus*), which belongs to the Cercocebini but has a somewhat isolated position in this tribe, and *Lophacebus* (with one species, *albigena*: including *aterrimus* as a subspecies), which is closer to *Papio*. The interrelationships within each genus are discussed, with particular

reference to the problem of subspecies vs. allopatric species. A new subspecies is named and described, *Lophocebus albigena osmani*, and the anomalous position of the poorly-known subspecies *L. a. opdenboschi* is extensively discussed.

Instruments and Techniques

The use of scat samples in primate diet analysis. Moreno-Black, G. (Dept. of Anthro., Coll. of Liberal Arts, Univ. of Oregon, Eugene, OR 97403) *Primates*, 1978, *19*, 215-221.

The need for increased dietary studies on nonhuman primates is discussed. A method combining both direct observation and fecal analysis is proposed as the most satisfactory for such studies. The procedure for fecal analysis is outlined and the application of the results discussed. A field investigation concerning the diet of four primates--baboon, vervet, Sykes', and colobus--was greatly aided by the investigator's use of scat analysis. The information proved invaluable for gathering data on the insect portion of the diet as well as for determining the period over which items were eaten. Analysis also indicated the presence in the diet of some items which were not observed being eaten and counteracted differences in morphology and behavior that affected feeding behavior data.

New apparatus for exercising a monkey seated in a primate chair. Gisolfi, C. V., Mora, F., Nattermann, R., & Myers, R. D. (Dept. of Psychological & Physiological Sci., Purdue Univ., Lafayette, IN 47906) *Journal of Applied Physiology*, 1978, *44*, 129-132.

The apparatus consists of a set of hand and foot bars mounted at either end of a rocker arm that pivots in a vertical plane. This arm is connected by a steel cable to a wooden box that houses lead weights. By simultaneously pushing the foot bar and pulling the hand bar, the monkey lifts a weight and triggers a microswitch which releases a banana-flavored food pellet into a well close to the animal's mouth. The amount of work performed can be varied. Some physiological measures of work performed are presented.

Conservation

Kenya's new primate reserve. Homewood, K., & Mkunga, J. (Welcome Inst., Comp. Physiol., Zoolog. Soc. London, London, England) *Oryx*, 1977, *14*, 175-177.

Two endangered monkeys, the Tana crested mangabey and the Tana red colobus, survive only in a small area of the Tana river in northern Kenya. The government has now created a small reserve to protect them on land given up voluntarily by the local people. But the threat of a large irrigation project upstream could still jeoparsize their survival. Mr. Mkunga is warden of the new reserve.

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The Institute of Anthropology has available the remaining copies of the volume "Taxonomy and phylogeny of Old World Primates with References to the Origin of Man" (Torino: Rosenberg and Sellier, 1968). The volume will be sent, on request, for a charge of $5.--Contact: The Librarian, Institute of Anthropology, Via Accademia Albertina 17, 10123 Torino, (Italy).

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