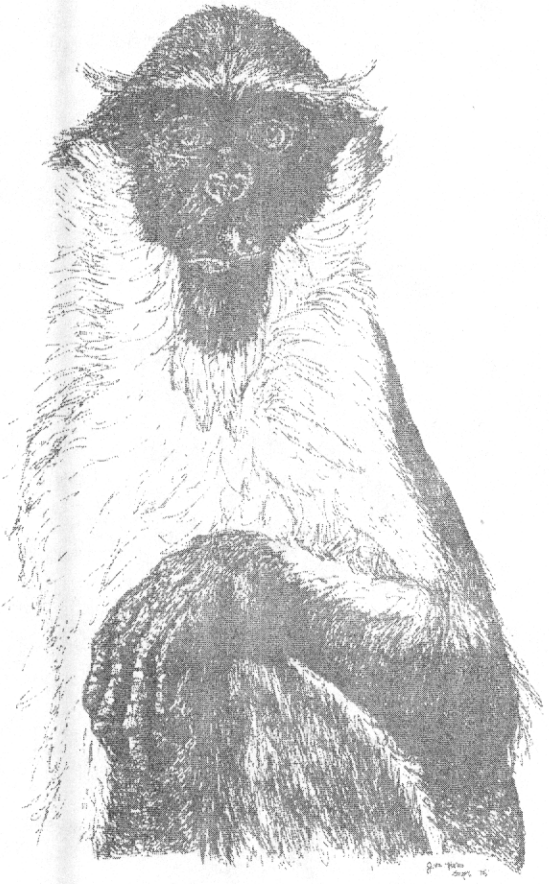
LABORATORY PRIMATE NEWSLETTER

Volume 15, Number 2

April, 1976



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Published Quarterly by the Primate Behavior Laboratory
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POLICY STATEMENT

The purpose of the *Laboratory Primate Newsletter* is (1) to provide information on care, breeding, and procurement of nonhuman primates for laboratory research, (2) to disseminate general information about the world of primate research (such as announcements of meetings, research projects, nomenclature changes), (3) to help meet the special research needs of individual investigators by publishing requests for research material or for information related to specific research problems, and (4) to serve 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. New issues are mailed free of charge in the United States. Persons outside of the U. S. A. are requested to pay $1.50 per year to cover the additional cost of mailing. 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 publications, 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* the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967].

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ACKNOWLEDGMENT

The *Newsletter* is supported by U. S. Public Health Service
Grant RR-00419 from the Animal Resources Branch,
Division of Research Resources, N.I.H.

Cover drawing compliments of Janet Miyo Kato

Managing Editor: Helen Janis Shuman

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AGGRESSIVE BEHAVIOR OF CAPTIVE PIGTAIL MACAQUES: SPATIAL CONDITIONS AND SOCIAL CONTROLS

J. Erwin

University of Washington

Nonhuman primates, like humans, are capable of inflicting mortal injury on members of their own species. While destructive violence has been observed in free-ranging primates, it is more common under captive conditions. Yet, even under captive conditions, it is clear that not all aggression is destructive, i.e., that some forms of aggression promote order and stability in primate societies (cf. Bernstein & Gordon, 1974). The series of studies reported here was designed to assess the motivation of destructive and constructive aspects of aggression among a large number of pigtail monkeys (*Macaca nemestrina*) housed in the Regional Primate Research Center Field Station, Medical Lake, Washington. This evaluation of aggression followed three basic lines of inquiry, (1) relationships between spatial factors and aggression; (2) mechanisms of social control of aggression with special emphasis on the "control role" of males; and (3) effects of group composition on aggression, trauma, and mortality in newly formed groups.

Study 1. Spatial Density and Aggression

At the time this study was initiated, groups of pigtail macaques at the Regional Primate Research Center Field Station were typically housed in two-room "suites," that is, members of each group had access to two rooms of identical dimensions via a small shuttle door between rooms. Every day each group was crowded first into one room and then the other for a short time while the empty room of each suite was cleaned. Since experimental crowding of mammals has resulted in increased aggression (cf. Archer, 1970), I was concerned that this procedure might be re-

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This research was supported primarily by PHS Grant RR00166 to the Regional Primate Research Center at the University of Washington. Additional support was received under PHS Grant HD08633 to the Child Development and Mental Retardation Center at the University of Washington (Gene P. Sackett, Principle Investigator) and from an intramural grant from the Fund for Instructional Development and Innovation, University of Washington. The author appreciates the assistance and encouragement of Orville Smith, Gene Sackett, Gerald Blakley, Dorothy Reese, Carolyn Wilson, Nancy Erwin, Brian Anderson, Joe Dazey, Kathy Kuyk, Michael Oswald, Jim Martenson, Douglas Sackett, Linda Lewis, Dan Flynn, and the Staff of the Regional Primate Research Center and Field Station.

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sponsible for some aggression-related trauma in these groups. The experiment reported here was designed to assess the influences of short-term crowding on aggression under these conditions.

Subjects.--The subjects for this experiment were 99 pigtail macaques (5 adult males, 68 adult females, and 26 infants) housed in six groups. Five groups contained 1 adult male each and the sixth group contained no adult male. Each room was 2.2 × 3.1 × 2.8 m.

Procedure.--Absolute frequencies of 10 classes of agonistic behavior (hit, push, grab, bite, chase, threaten, bark, grimace, screech, and crouch) were monitored by experienced observers. The scoring procedure allowed identification of the perpetrator and recipient of each act as an adult male, adult female, or infant. Behavior was measured while group members had access to both rooms or only one room. Two test sequences were employed: the 1-2-1 sequence (pretest in 1 room, test in 2 rooms, and posttest in 1 room), and the 2-1-2 sequence (pretest in 2 rooms, test in 1 room, and posttest in 2 rooms). Each test sequence consisted of 3 consecutive 20 minute periods. Each group was observed twice, on different days, with test sequence balanced across groups and days.

Results.--Interactions among adult females were much more frequent than were other types of interaction and only female-female aggression exhibited reliable effects of crowding. Contrary to expectation, females directed about twice as much contact aggression (hit, push, grab, bite) and threatened aggression toward other females in the two-room than in the one-room situation. Under the 1-2-1 sequence each group that contained an adult male exhibited increased female-female aggression when given access to two rooms and decreased aggression when restricted again to one room. The group containing no male exhibited increased aggression when given access to two rooms but aggression did not diminish when that group was again restricted to one room. The results of the 2-1-2 sequence were generally similar to those of the 1-2-1 sequence but were less reliable across groups.

Study 2. Spatial Density, Spatial Change, and Aggression

The inverse relationship between amount of available space and incidence of female-female aggression seemed incredible, and the differential reliability of the results of the 1-2-1 and 2-1-2 sequences suggested that spatial change *per se*, rather than spatial restriction, might have been responsible for the results of Study 1. A second experiment employing static 1-1-1 and 2-2-2 control conditions was designed to test this possibility.

Subjects.--The subjects were 109 pigtail monkeys (8 adult males, 79 adult females, and 22 infants) housed in eight groups. Each group contained 1 adult male, and no group employed in the previous study was used in Study 2. All groups were housed under exactly the same spatial

conditions as in the first experiment.

Procedure.--Testing was done as in the first study except that two test sequences were conducted each day for two consecutive days. On each day a control sequence was followed by an experimental sequence. Within these constraints all possible orders of testing were balanced.

Results.--The results of the second study were consistent and convincing and were again opposite initial expectations. Both contact and threatened aggression among females were more than three times as frequent in the two-room as in the one-room situation. In all groups and under control and experimental conditions, aggressive behavior occurred more frequently in the two-room than in the one-room situation. Thus, the results of these studies clearly indicated that the daily crowding of groups into single rooms for cleaning purposes was very unlikely to have resulted in increased violence as compared with the usual two-room housing condition. The results suggested instead that single-room housing might have been preferable to housing in two-room suites. An examination of treatment records confirmed that more animals had been treated for bite wounds during the three-month period following the adoption of two-room housing than during the three months prior to that change (when groups had been housed in single rooms). Most groups at the Field Station have now been returned to the one-room condition. Anderson *et al.* (Note 1) have written a detailed account of Studies 1 and 2.

Study 3. Social Density and Aggression

In their review of aggression in cercopithecoid primates, Nagel and Kummer (1974) distinguished between two kinds of crowding experiments, those involving manipulation of "spatial density" and those involving changes in "social density." Studies of spatial density are those in which the actual amount of physical space is varied (as in Studies 1 and 2). Social density refers to the number of individuals inhabiting a particular space. It is not surprising that studies of spatial density in captive primates have received more attention than those of social density, since changes in social density, i.e., addition or removal of primates from their groups, obviously has effects beyond those that can be ascribed to social density (e.g., disruption of emotional attachments, disturbance of dominance status hierarchies, or xenophobic responses to intruders). The best method of evaluating social density effects would be a survey of many groups of differing social density under identical spatial conditions. Fortunately, this was possible at the Field Station.

Subjects.--All observable groups of pigtail macaques housed at the Field Station were used in this study. Each available group was observed four times over a four month period. The social density of most

groups changed during that period (only 15% of groups retained identical densities from one observation to the next due to withdrawal or addition of animals for experimental use or treatment). Consequently, each observation was considered unique for the purposes of this survey, and data were evaluated on the basis of the number of adult females per group. A criterion was set of at least 6 observations on groups of each density (in order to assure reliability). The criterion was met by 72 groups ranging in density from 8 to 13 adult females per group.

Procedure.--Observations were conducted in the same way as those for the previous studies except that all were done with groups confined to single rooms.

Results.--The mean frequency of female-female contact aggression per capita was highly correlated with the number of females per group (rho = 0.99). Although some groups of each density displayed no contact aggression during the observation periods, the percentage of those that did so was related to density in the same fashion as was mean frequency (rho = 0.99). The results of this survey are described and discussed in detail in Erwin and Erwin (Note 2).

It is interesting to note that studies of spatial and social density in human children (Hutt & Vaizey, 1966; Loo, 1972; & McGrew, 1970) have yielded results similar to those we found in pigtail macaques. Our data and the human data suggest that the influences of social density are stronger than those of spatial density. It seems especially important, then, that the number of captive primates housed in a restricted space should be a matter of particular concern, and that reduced social density is likely to minimize aggression and its effects.

The reasons for decreased aggression under spatially restricted conditions were not yet apparent, but it seemed plausible that social mechanisms for the control of aggression might have operated more efficiently under conditions of forced proximity. A major influence on intragroup aggression in primates appears to be exerted by adult males (Bernstein, 1964a, 1966; Smith, 1973; Tokuda & Jensen, 1968) which assume a "control role," that is, they interfere in aggressive encounters among group members by attacking or threatening to attack one or more of the combatants.

Study 4. The Control Role of Males: Experimental Analysis

While there have been several reports of the "control role" phenomenon, its generality had not been well documented experimentally across groups (Tokuda & Jensen, 1968, used only one group of pigtail monkeys), and never under the conditions present at the Field Station. Although the control role notion was interesting in terms of its possible contribution to the spatial density paradox noted above, it was also important for a very practical reason. There have been some circumstances in which

it has been necessary to house adult females together in groups containing no male in order to avoid their impregnation by an unwanted sire, yet the possibility existed that removal of a control male might result in violence and consequent injury of females in such a situation. Thus, a study was designed to test the effects of removing males from harem groups on aggression among females in those groups.

Subjects.--The subjects for this study were 64 pigtail macaques (6 adult males, 51 adult females, and 7 infants) housed in 6 groups. Each group contained 1 adult male and was housed under the two-room condition described above.

Procedure.--Each group was confined to one room during the entire test sequence in order to maintain constant spatial conditions throughout testing. The testing sequence consisted of three phases, the pretest (with all group members present), the test (with the male absent), and the posttest (with the male again in the room). Observations were done as in the previously described studies.

Results.--Without exception, aggression among females increased dramatically upon removal of males and decreased to preseparation levels upon their reintroduction. A complete description and discussion of this project has been described by Oswald and Erwin (Note 3). The results of this study along with those of Tokuda and Jensen (1968) leave little doubt about the generality of the role of male pigtail macaques in controlling intragroup aggression. It was conceivable, however, that the response to male removal might have been temporary so another study was designed to test this possibility.

Study 5. The Control Role of Males: Survey of Aggression in All-Female and Harem Groups

In order to test for the persistent effects of male absence on aggression among females, a survey of aggression in groups containing one or no adult male was initiated.

Subjects.--The subjects for this study were 67 pigtail macaques (3 adult males, 56 adult females, and 8 infants). All groups had remained stable for at least one month prior to the survey. Groups were housed in the two-room condition described above.

Procedure.--Data were recorded as in the other studies described here. Each group was observed twice, an initial observation and a replication.

Results.--The mean frequencies *per capita* of all agonistic behaviors were higher in groups containing no males than in those containing one male each. There was no overlap between conditions for contact aggression during either the initial observation session or the

replication session. Detailed results and discussion are included in Sackett, Oswald, and Erwin (in press). An additional study by Swenson and Bartlett in which high- and low-ranking females were briefly removed from groups found no evidence of control role behavior by female pigtail macaques under Field Station conditions. These results are consistent with those of Tokuda and Jensen (1968).

The high rates of intragroup aggression among female pigtail macaques in the absence of males suggests that great care should be taken not to remove males for more than very brief intervals. If it is necessary that females be housed in groups away from fertile males for purposes of contraception, inclusion of a vasectomized control male might be useful.

Another recent study (Dazey, Martenson, & Erwin, Note 4) indicated that males interfered in female-female aggressive encounters most frequently when such encounters occurred proximal to the males, and that this action effectively prevented retaliation by the recipient of the aggressive act. The intervention of males usually did not include contact aggression; consequently females appeared to be free to aggress other females at will without fear of retaliation, as long as they did so when they were near the male. Thus the control of aggression by males is probably partly responsible for affiliation of females to them.

Study 6. Effects of Provision of "Cover" and Group Stability on Aggression

The rooms in which pigtail macaques are housed at the Field Station contain no physical barriers that would allow aggressed animals to escape or hide from their assailants. Concrete pipes were introduced into rooms to provide cover. The effects of introduction of these pipes on aggression within groups was evaluated.

Subjects.--The subjects for this study were 98 pigtail macaques (7 adult males, 69 adult females, and 22 infants) housed in six social groups. Groups were housed in the two-room condition described above. No group contained more than 1 adult male at any time. The composition of four groups remained stable during the evaluation period, but 2 females were added to one group between the pretest and test phases of the study. Another group underwent a major change: the resident male was removed and a group containing an adult male and six adult females was added. These manipulations were not intended by the experimenters, but were done in the course of routine colony maintenance.

Procedure.--Groups were observed using the same procedure as in the previous studies described here, in which group members had access to both rooms of their suites. The study was conducted for 20 minutes per group on five consecutive days with a nine day interval between phases. At the beginning of the test phase, concrete pipe sections

(1 m in length and about 0.5 m in diameter) were introduced into one room of each two-room suite.

Results.--Mean frequencies of all agonistic behaviors among females in stable groups was less during the period when cover was provided than when it was not. Aggressed animals frequently succeeded in avoiding their aggressors by hiding in the cylinders. Aggressive behavior was especially frequent in unstable groups following the addition of animals (not surprisingly). The frequency of contact aggression was far higher for the group that underwent extreme change than for any other group. Several members of the merged groups were seriously injured, one fatally, in the fighting that ensued when the groups were put together. Within six weeks all members of the initial group (from which the male had been removed) had been treated at least once for bite wounds while only one member of the incoming group that contained its own male had been injured. A complete description of this study is reported in Erwin *et al.* (in press).

The decreased aggression that occurred in stable groups during access to a physical barrier was encouraging; however most of the concrete cylinders were broken by the animals in a very short time. The animals also chipped off and ate pieces of concrete which can't have done them much good. Evaluation of less destructable forms of spatial enrichment are in progress.

Study 7. Group Formation Strategies, Aggression, and Trauma

It was clear that the provision of cover was not sufficient to allay the consequences of merger of two groups of unfamiliar animals. Certainly, formation of new groups should be avoided whenever possible and when necessary should be carefully supervised. Unfortuantely, little is known about the relative merit of various group formation strategies aside from the work of Bernstein (cf. Bernstein & Mason, 1963; Bernstein, 1964b, 1969). Bernstein (1969) found that sequential introduction of individual pigtail macaques into groups resulted in more aggression and injuries than did simultaneous release of all animals, introduction of trios, or merger of preformed groups. When spatial limitations recently required reorganization of groups at the Field Station, an evaluation of the three simultaneous introduction techniques explored by Bernstein (1969) was initiated.

Subjects.--The subjects for this study, 161 pigtail monkeys (9 adult males, 121 adult females, and 21 infants), were formed into nine groups containing one adult male per group. Each group was placed in a two-room suite.

Procedure.--Groups were formed by simultaneous introduction according to 3 general strategies: (1) merger of females from two groups, (2) merger of subsets of females consisting of triads and

quatrads from different groups, and (3) merger of single females and dyads from different groups. For each of the first two strategies, two of the males were unfamiliar with any females with which they were integrated, and one male was familiar with one segment of the females with which he was housed. Group aggression was observed as in previous studies for 20 minutes per group each day for two weeks following the formation of groups.

Results.--Merger of subgroups (triads and quatrads) resulted in more casualties (11) than did either of the other strategies. No injuries occurred in groups composed of individuals and dyads, and an intermediate number of injuries occurred in groups formed by merger of two groups (no injuries occurred in one such group). None of the casualties during the first month following group formation were members of groups or subgroups familiar to males. Males familiar with female group members displayed more aggressive behavior, however, than did any of the other males. Retrospectively, it was discovered that five of the nine males no longer had canine teeth. Those with canine teeth exhibited much more observed aggression than did any of the males whose canines had been pulled. Nevertheless, more injuries occurred in each group formed from triads and quatrads than in any other group from either of the other conditions, regardless of the possession or nonpossession of canines by males. A complete description and discussion of the results of this study is forthcoming (Erwin *et al.*, Note 5).

Conclusion

The studies reviewed here have raised many more questions about housing conditions and primate motivation than they have answered, but I think they illustrate some important points about domestic production and research, including the following: (1) management procedures must be experimentally evaluated because intuition and speculation do not provide accurate information upon which to base policy decisions; (2) accurate and detailed records of animal histories, procedural changes, and morbidity and mortality rates must be kept and must be analyzed periodically; (3) information gathered at various institutions must become matters of public record, and comparative reviews of such data must be encouraged; (4) there is no substitute for measurement of the effects of various procedures, including effects on behavior; (5) it is possible to do intrinsically interesting research in the context of application; (6) funding specifically designated for evaluation of housing conditions and husbandry procedures should be offered by appropriate agencies, and such evaluation should be required of all domestic breeding programs; (7) conservation efforts should be aimed to encourage research on techniques of maintenance and production of nonhuman primates for biomedical uses.

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2. Erwin, N. & Erwin, J. Social density and aggression in captive groups of pigtail monkeys (*Macaca nemestrina*). Unpublished manuscript.

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4. Dazey, J., Martenson, J., & Erwin, J. Spatial factors and the social control of aggression in captive groups of pigtail monkeys (*Macaca nemestrina*). In preparation.

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JOURNALS NEEDED

The Primate Library at the Wisconsin Regional Primate Research Center is interested in obtaining back issues of the following journals: *Behavior:* Vols. 20 (1963) to 47 (1973). *Journal of Human Evolution:* Vols. 1 (1972) to 4 (1975). *American Journal of Physical Anthropology:* Vols. 1 (1943) to date. *Proceedings of the First International Congress of Primatology*, 1967.

If anyone has copies of these journals or books on primatology, we would appreciate hearing from them. We are particularly interested in books by Washburn, Yerkes, and Zuckerman. The Primate Library is a supplemental resource library in the Midwest Health Sciences Library Network and serves library users in six states. We would like to strengthen our collection of primate journals and books to better serve our users. If you can help us, or we can help you with information about primates, please write Larry Jacobsen, Primate Library, University of Wisconsin, 1223 Capitol Court, Madison, WI 53706, or phone 608-263-3512.

SURGERY AND RECOVERY IN A 15 YEAR OLD POTTO

U. M. Cowgill

University of Pittsburgh

No naturally occurring tumor has been reported in the nocturnal prosimian *Perodicticus potto ibeanus* Thomas, 1910. This note concerns the development and subsequent successful removal of a tumor from a female potto. Since this is the first published information on operative procedures on this species it was thought of interest to record drugs and their dosages.

The living conditions and diet of the potto have been previously described (Cowgill, 1974). The present pair have been living together since 1961 and were believed to be about a year old at the time of their capture.

There was considerable blood in the cage one morning in November, 1974. At that time the source could not be determined. A month later, it was noticed that the female had a sizeable growth in the lower groin. Its position was suggestive of a mammary gland tumor. The area around the mass was swollen, non-painful to touch, and had a decubital ulcer with frank blood, the probable source of earlier bleeding.

Beginning on December 9, 7.5 µg of dexamethasone were orally administered daily for three days with no remission. Since she continued to lose blood, it was decided to remove the growth surgically on the 13th. The surgery was performed by Drs. G. Bingham and R. Sembrat.

At the time of the operation she weighed 1.3 kg and her heart rate was 148 per min. Physical examination revealed no abnormality other than the growth. Appetite and bodily functions had been within normal range throughout the preoperative observation period. She was premedicated with 2.5 mg demerol and 0.057 mg of atropine sulfate. Anesthesia was via a face mask employing a non-rebreathing system. The gas mixture used was 3% methoxyflurane, 100 ml/min oxygen and 300 ml/min nitrous oxide. The region was prepared in a routine manner and she was positioned supinely.

A circular incision was made approximately 2 mm away from the decubitus of the mass. The tumor was encapsulated in a complete, translucent sheath. It, and a portion of the ulcerated region were removed intact. No major vascular supply was encountered. The skin and subcutaneous tissue were loosely closed with 00 silk and 00 Dexon respectively to facilitate drainage. Nitrofurazone ointment was applied to a

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gauze pad as a protective dressing. 75,000 units of procaine penicillin G and 75,000 units of benzathine penicillin (IM) were given postoperatively. The procedure took one and a half hours. The recovery period spanned 12 hours and was uneventful. She remained under observation the first night and was returned to her living cage the following day.

Semi-weekly dressing changes employing 10 mg of ketamine hydrochloride to facilitate handling and penicillin at 5-day intervals were given during the healing period (December 14-January 9). Additional sutures were placed on December 19, 27, and January 2 under local anesthesia (0.2 ml of 1% solution lidocaine) to hasten healing. The incision was entirely healed by January 27, 1975 and her health has been excellent ever since. At no time prior to surgery nor during her convalescence did she make any attempt to groom or otherwise disturb the region where the tumor had been.

The tumor weighed 62 gm and was approximately 5.5 cm in diameter. It appeared to be a mixed cell tumor consisting of an outer portion of adipose tissue with a hard center core. The tumor is believed to be a malignant neoplasm because of the immature lipoblasts, the sarcomatous appearance of the cells and small foci of immature erythrocytes. A diagnosis of myeloliposarcoma was made (Bingham, Sembrat, & Migaki, in press).

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AALAS CAPITAL AREA BRANCH SEMINAR

The National Capital Area Branch of the American Association for Laboratory Animal Science announces the 6th Annual Seminar: "The Continuing Evolution of Laboratory Animal Science". The seminar will be held September 22-23, 1976 at Hunt Valley Inn, Hunt Valley, MD--For information and registration contact: Mr. Asa B. Dorsey, Department of Veterinary Medical Sciences, Naval Medical Research Institute, National Naval Medical Center, Bethesda, MD 20014.

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COLONY REPRODUCTION OF THE WHITE-FACED MONKEY *(CEBUS CAPUCINUS)* IN PANAMA

Richard N. Rossan and David C. Baerg

Napier and Napier (1967) observed that breeding of *Cebus* species in captivity is relatively rare in consideration of world zoo records, which gave a total of only 133 births over 4 years. A recent report by Hayes *et al.* (1972) and a review bibliography by Morrow and Terry (1973), indicated a paucity of published information on capuchin reproduction subsequent to a note by Hill (1941). We have maintained the 2 Panamanian subspecies of *Cebus capucinus* as hosts for human malaria during our investigations with New World monkeys (Young *et al.*, 1975). They represent the typical form *C. c. capucinus* (Linnaeus), found east of the Canal Zone, and a western geographical variant, *C. c. imitator* Thomas; differentiation is by a greater transverse extent of the premolars in the latter (Goldman, 1920; Hall & Kelson, 1959; Handley, 1966). Both adapted remarkably well to the laboratory environment.

The animal facilities were located outdoors at the Gorgas Memorial Laboratory compound in Panama City. Pens with concrete floors and chain-link walls and ceiling (4 × 4 × 2 m) served as cages. Shade and protection from rain was afforded by partial overhang of corrugated metal sheets. Each cage contained peripheral steel tubing for resting and a centrally located swing. Food consisted primarily of high protein monkey chow (Ralston Purina) supplied twice daily, supplemented with in season fruit and vegetables. Water was available *ad lib.*

Two troops of *C. c. imitator,* captured in Alanje, Chiriqui Province, were retained as separate entities. The first acquired in March, 1970, was comprised of 12 males and 8 females. Of these, 6 males and 6 females (adults and subadults) were confined together for 1 1/2 years (Group 1). The second troop, also captured intact as 5 adult and 1 juvenile males with 2 adult and 1 juvenile females, was obtained in July, 1970; all were housed in another gang cage for one year (Group 2). Each social unit thereafter was reduced in size by occasional removal of individuals through June, 1975. As shown in Table 1, during the inclusive 5-year period at least five colony female *C. c. imitator* conceived and produced full term offspring. A total of 10 progeny was recorded, plus one infant from a feral pairing; the latter birth occurred one month after acquisition. The first progeny resulting from cage mating were realized 14 and 11 months after arrival of the 2 respective family groups. Three mothers were multiparous, with 4 interbirth intervals ranging from 15 to 27 months ($\bar{X}$=19).

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The work reported here was supported in part by U. S. Army Research and Development Command contracts, current year no. DADA 17-72C-2031.

Table 1. Colony Births of *Cebus capucinus*.
(M=Male, F=Female, NR=Not Recorded)

	Female	Deliveries
		C. c. imitator
Group 1	4902	24 April 1970(M)[a]; 3 July 1972(M); 8 February 1974(M)
	4885	20 May 1971(F)
	4889	9 June 1971(F); 5 September 1972(M)
	4901	8 February 1972(M)
	NR	17 March 1975 (unsexed)
Group 2	5298	1 June 1971(M); 15 October 1972 (unsexed)
	NR	13 December 1973 (unsexed)
		C. c. capucinus[b]
	684	December 1968(F); 24 April 1970(F); 1 July 1971(F); 6 May 1972 (unsexed)[c]
	206D	12 March 1971(M)
	NR	9 May 1969(F)
	NR	9 April 1971(F)
	NR	11 April 1971(M)
	NR	14 January 1974(F)
	NR	27 February 1974(M)

[a]Conceived prior to captivity

[b]Data not recorded for two additional infants, mother(s) unknown.

[c]Mother and fetus died during parturition.

Cebus c. capucinus, from scattered localities, were purchased on an individual basis beginning October, 1965. Males and females (adults and juveniles) were randomly pooled after acclimation into units of less than 10 animals. In subsequent holding, 2 to 4 cages of these monkeys were maintained, with *ad hoc* removal and reintroduction of subjects. Captive pairings in the above, to mid-year 1975, gave a total of nine viable births. In most instances, the mothers were not monitored and thus the frequency of multiparous females is not known. One individual (No. 684), over 3 1/2 years, was identified as having 3 live births. She died during her fourth parturition, 11 months after the third.

Mating males for the two subspecies of *Cebus* could not be established, however dominant individuals were seen to couple with more than one female. The gestation period for *Cebus* is given as six months (Napier & Napier, 1967). Although births occurred virtually throughout the year, the fewest (2 of 19 with known dates) were evidenced from August to November, corresponding to the season of heaviest rainfall in Panama. Infant mortality was negligible as abandonment was rare during the three-month period of close postpartum maternal association. While all progeny have remained with their family groups, thus far only one second generation pregnancy (in a 5-year-old *C. c. capucinus*) has been noted which ended in a stillbirth at approximately 5 months.

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LETTERS: IPPL REPLY TO EDITORIAL ON IPPL

Dear Dr. Schrier: On behalf of the International Primate Protection League (IPPL), I would like to respond to your editorial criticisms of the organization which appear in the October, 1975 issue of *Laboratory Primate Newsletter*. Following your own example, I will direct most of my comments to the IPPL position on the recently approved US Public Health regulations restricting the importation of nonhuman primates for the pet trade, and your reactions to this position. However, I would appreciate it if you would specify your early "misgivings" about IPPL, to which you only allude in your editorial, in order that they may be responded to at another time.

As was originally stated in the May, 1975 issue of the IPPL *Newsletter*, the International Primate Protection League opposes these regulations not because they would contribute to the elimination of private ownership of primates, a position which IPPL has always supported, but because the rules fail to regulate the importation of primates in terms of sound conservation and protection principles, a fact omitted from your editorial. It is probably incorrect to suggest, as you do in your editorial, that "at least half of all imported primates" are destined for the pet trade. Figures compiled by the Committee on Conservation of Nonhuman Primates, Institute of Laboratory Animal Resources (ILAR), in *Nonhuman primates; usage and availability for biomedical programs* (National Academy of Sciences, 1975, p. 27) establish that "Approximately three-fourths of the primate trade entering the United States is consumed for biomedical uses annually". (The recommendations section of this publication is reviewed in the July, 1975 issue of *Laboratory Primate Newsletter*.) In order to reduce this drain on wild populations, IPPL advocates such procedures as the replacement of wild-caught animals by laboratory (or colony) bred primates and the elimination of unnecessary or inappropriate research involving primates through official review of experiments, as is currently done in England. In the new regulations "bonafide" scientific research is not defined. The IPPL position is systematically discussed in an article recently published in the *Proceedings of the Symposia of the Fifth Congress of the International Primatological Society*.

The International Primate Protection League has no argument with your reservations about the efficacy of the 31-day quarantine which it recommends in the IPPL *Newsletter*. The Primate Research Center, University of California, Davis, imposes a 90-day quarantine on primates. The State of California has demonstrated, however, the effectiveness of quarantine in significantly reducing the number of primates entering the pet trade and, at the same time, improving the quality of those that do. In 1970 the State of California instituted minimum quarantines for primates, ranging from 33 to 60 days. Although no "hard figures" are available prior to December, 1970, public health officials estimate that before the imposition of this quarantine, 10,000 monkeys were imported

annually into California, with approximately 90% destined for the pet trade. Figures compiled during the four succeeding years indicate that approximately 110 monkeys were imported monthly, with only 10% going to the pet trade. The quarantine, in effect, made it unprofitable to deal in primates. One assumes that comparable federal legislation would have accomplished the same results. Therefore, it is possible to approach the new US Public Health regulations from a perspective other than the one which you suggest.

The inference of the International Primate Protection League that the US Public Health regulations were designed "to divert all available primates into biomedical activities" was made after careful consideration of the response of certain sectors of the biomedical research community to the attempts of habitat countries to limit or eliminate primate exports and to proposed US regulations on importation of injurious wildlife. For example, the April, 1974 issue of *Laboratory Primate Newsletter* reprints an announcement in the *National Society for Medical Research Bulletin* in which it is expressly stated that classifying all primates as "injurious wildlife" "could be justified if the result means cessation of primate importation for the pet trade and diversion of a substantial number of primates to the needs of the biomedical research community". To return to a point made earlier, however, the ILAR Committee on Conservation of Nonhuman Primates (p. 30) contends that "the (probable) number of primates that would be saved by eliminating the pet trade has been overestimated....(revised) estimates suggest that nearly half of the 20,000-40,000 primates that have been attributed to the pet trade may in fact be losses inherent in the present system of commercial collecting".

The International Primate Protection League does not equivocate that it advocates that research projects should be "well-planned, promising, humanely designed, and demonstrate regard for conservation principles in species selection and sample size" and that "limitations on the severity and duration of pain in experiments should be legally defined and enforced" (*Proceedings of the Symposia of the Fifth Congress of the International Primatological Society*, 1975, p. 572). But the IPPL *Newsletter* is not, as you suggest, "*filled* with stories about waste of monkeys by scientists and the horrors scientists are perpetrating on their animals" nor are whole classes of individuals indicted (emphasis added). Each recent issue of the IPPL *Newsletter* has contained one article which focuses on a given research project or a series of related projects which appears to be questionable, such as the death of 85 primates in simulated automobile crashes caused by a pneumatically-operated cannon impactor. You, yourself, "grant that some of these stories may be true". Through these exposures IPPL seeks to encourage responsible members of the biomedical research community to see that extant abuses are checked. I do not feel that this represents "flagrant anti-laboratory-research-bias".

The International Primate Protection League would like to request

that its position on the use of primates in laboratory research be assessed in terms of its policy paper on this subject published in the *Proceedings of the Symposia of the Fifth Congress of the International Primatological Society.* [See also the article by J. Erwin on pp. 20-25 of this issue of the *Laboratory Primate Newsletter.*--ed.] And IPPL welcomes this opportunity to increase its contacts with the biomedical research community.--Ardith A. Eudey, Ph.C., Department of Anthropology, University of California, Davis, CA 95616.

Specific examples of material which have contributed to the editor's misgivings about IPPL have been forwarded to Ms. Eudey. Also contributing to his attitude toward IPPL is his impression that IPPL spokespersons have at times been too willing to take a brief statement or casual remark by some "authority" and treat it as gospel without looking more deeply into the matter. It is this sort of thing that has led the editor to conclude that the IPPL is not very careful about what it uses as evidence to back up its statements. This is unfortunate because good causes can be destroyed by misinformation and misuse of fact.

The editor also objects to IPPL's repeatedly mixing issues of conservation of nonhuman primates with those of animal welfare, antivivisection, and philosophy, methods, and morality of science. It is not that all of these issues are independent of one another, but IPPL mixes them in a manner which is counterproductive for the purpose of conservation because it confuses the issues. The editor objects to IPPL setting itself up as the judge of what is "good" research and what is "bad" research as it has been doing in its Newsletter (e.g., Harlow's kind of developmental research is "bad" and Hinde's is "good" as suggested in the May, 1975 issue of the IPPL Newsletter). *One can hardly object to the lofty objectives quoted in Eudey's letter--"that research projects should be 'well-planned, promising, humanely designed, and demonstrate regard for conservation principles in species selection and sample size' and that 'limitations on the severity and duration of pain in experiments should be legally defined and enforced.'" But when it comes to applying such principles in specific cases, the matter becomes very controversial at best and impossible to decide at worst. Some research that is offensive to some can be ardently and, in the editor's opinion, convincingly, defended as necessary for the good of mankind, and, in some cases, animalkind, too. Many people who do field research or who otherwise have a naturalistic orientation believe that laboratory research can reveal little useful information about behavior, while other people believe the opposite. Whatever the case, it seems that to follow through on the IPPL objectives quoted above from Ms. Eudey's letter means that someone or some one group will have to decide which research does and which research does not meet the criteria outlined, as IPPL has been doing in its Newsletter. This is a very dangerous game and a reading of the history of science suggests that it is one that cannot*

be won in the manner IPPL seems to be suggesting. It may be that some such group may have to be established for this purpose in connection with use of primates for research. Hopefully, this will not come to pass because committees simply cannot decide what research will ultimately be of greatest benefit to mankind, but if it does, the editor hopes that its methods will be considerably more objective and careful than IPPL's have been so far.

Regarding the question of the percentage of imported animals used in biomedical research, the editor's statement was based on data that has been issued by CDC and other government sources for many years. What Ms. Eudey quotes from the NAS report as an "established" percentage is actually an overstatement when taken out of context. The data on which the percentage is based are, as stated elsewhere in the report, highly subject to definition, assumption, and interpretation (but that, of course, goes for the previous data issued by the other agencies). But, more important, the statement that 75% of imports annually go for biomedical research, should read 75% as based on figures for the one year (1973) on which the data of the report are based. The report doesn't deal with data for a number of years and hence doesn't reveal trends in either direction or the reliability of the percentage. But debating the exact percentage is beside the point. Twenty-five percent of imported monkeys (or 15 percent) is still a lot of monkeys to be concerned about (each of us in our own way).

Ms. Eudey says that IPPL's position should be judged by the policy statement that appears in the Proceedings *of the Japan meeting of the International Primatological Society. Dr. J. Erwin, whose article supporting some of the goals of IPPL appears on pp. 20-25 of the present issue, makes a similar point. But IPPL's position will have to be judged by its Newsletter and other statements and actions of its policy makers as well.*

Ms. Eudey also indicates that she wants the opportunity to respond to the editor's misgivings at another time. That would be very difficult to do since they are based not only on the accumulation of specific statements that he regards as erroneous or exaggerated, but on his interpretation of the tone and direction of the IPPL literature, which must, as already mentioned, include the IPPL Newsletter. *The overall approach that the IPPL is taking will generate more negative emotion and controversy than constructive action and, hence, it should not expect the support of scientists doing research with nonhuman primates.--A.M.S.*

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CONSERVATION AND LABORATORY PRIMATE RESEARCH: A PLEA FOR UNITY

J. Erwin

University of Washington

I was disappointed that the Editor of *Laboratory Primate Newsletter* recommended withdrawal of support of the International Primate Protection League (IPPL) by members of the scientific community (Schrier, 1975). The Editor mentioned that he had some reservations about IPPL from the time of its inception. I must admit that I share some of his reservations, especially with regard to the apparent anti-laboratory-research bias of IPPL. Nevertheless it would be unfortunate, I believe, for members of the scientific community to become polarized into pro-IPPL and anti-IPPL factions at this time. It is a waste of time and energy for us to fight among ourselves.

Let us examine the official IPPL program as outlined by McGreal and Eudey (1975). The following position statements are listed:

> (1) All *laboratories using primates should be required to publish complete and public reports of nonhuman primate acquisitions, holdings, and use.* (p. 571)

Surely there can be no argument with the necessity of this policy. How else can conservation of nonhuman primates be accomplished? Responsible members of the scientific community are engaged in assessment of primate usage at the present time (cf. The National Research Council Committee in Conservation of Nonhuman Primates [NRCCCNP], 1975). The IPPL is not at cross purposes with such efforts, and is committed to cooperation with the Primate Conservation Group of the International Primatological Society and the International Union for Conservation of Nature and Natural Resources (IUCN) (Thorington, 1975). My feeling is that the policy statement quoted above should be strengthened by specifically requesting detailed data on mortality and morbidity in primate colonies. Of course, the same requirements should apply for primates not used in research such as those kept privately as pets or in zoos for exhibition.

> (2) *No primate species designated as endangered in the IUCN Red Data Book (1973) or the Convention on International Trade in Endangered Species should be used in research of a terminal nature or such as would endanger its health, well-being, or reproductive capacity.* (p. 571)

Author's address: Regional Primate Research Center Field Station, University of Washington, Medical Lake, WA 99022.

This is an obviously reasonable position. There might be extreme cases in which a procedure that might be hazardous should be employed on a small scale if there is great promise that the procedure would provide information critical to the survival of the remnant of the species. Such cases are likely to be rare and should be fully and publicly justified. The thrust of this statement is obviously directed at the use of wild-caught animals more than at the use of captive-bred subjects.

(3) *Primates caught by killing of the mother should be eliminated from research.* (p. 571)

This is not simply a "bleeding heart" statement. It refers to a technique commonly employed in the capture of nonhuman primates, especially of apes (all kinds of apes). Of course emphasis should not be placed solely on research use. Unfortunately, the rarer a species becomes, the higher the price members of that species command in the international zoo market. Killing of females of reproductive age is especially wasteful.

(4) *Feral nonhuman primates should be replaced by laboratory animals in research programs and experimental animals reused.* (p. 571)

Self-sufficiency of domestic breeding programs for production of primates must be given highest priority. Genetically-defined subjects of known age and rearing experience are especially valuable. While the cost of each subject may be greater for laboratory-born than feral primates, the number of laboratory-born subjects required to reach valid conclusions in many projects is likely to be considerably less than that required using feral subjects. As the NRCCCNP (1975) has pointed out, however, "...the results of captive breeding...suggest that basic studies of husbandry are needed before self-perpetuating breeding colonies can become productive on a large scale" (p. 61). It is absolutely essential that funding for such research be sought relentlessly, that it be funded, and that the results be communicated accurately, efficiently, and publicly. With appropriate planning many primate researchers can pursue topics of special interest to them in the context of programs designed to improve reproduction and survival rates in captive colonies. Some of us are already doing so. I believe that popular support is essential to assure increased funding for such efforts. The IPPL can help in that respect, but it is unlikely to do so without the involvement of responsible laboratory research personnel.

(5) *The use of primates should be terminated in cases for which alternative methods of research on drug and vaccine production and testing are available.* (p. 571)

It is clear that the use of large numbers of nonhuman primates as currently practiced in some areas (such as vaccine production, drug testing, and experimental surgery) cannot possibly continue much longer,

if only because the supply of primates will be exhausted. Surely none of us wants that to happen; consequently we must insist that large users of primates (such as Merck & Co., Litton Bionetics, Inc., Hazelton Laboratories, Inc., The Dow Chemical Company, etc., see NRCCCNP report, 1975) fully justify their uses of primates, find more efficient methods of use, use appropriate alternatives to primates when possible, support research on husbandry procedures, and initiate breeding programs with realistic plans for self-sufficiency in production of primates. Likewise, the many users of small numbers of primates must be encouraged to produce their own subjects when possible, and to make efficient use of those they employ. After all, nonhuman primate models are not always the most efficient models available. In many cases, development of nonhuman primate models should await the development of rodent (or other) models; after substantial progress has been made using the nonprimate model, the model can be refined and further developed using primates prior to human application. This strategy would result in progressive development of important nonhuman primate models with improved efficiency and reduced wastage. Of course, there are many appropriate and necessary uses of nonhuman primates. The point is that the use of primates as subjects should be justified; that is not asking too much.

> (6) *Housing standards should be revised to reflect the physiological and psychological needs of the animals rather than the economy and convenience of laboratories and personnel.* (p. 572)

Surely some middle ground can be found here. It is essential that laboratory primates be accessible if they are to be used by researchers, and that the safety of all personnel be assured. At the same time, extreme spatial restriction, social isolation, and social instability can produce grossly abnormal subjects for research and lead to high mortality rates (although primates reared under restrictive conditions apparently get along better than do feral animals subjected to the same circumstances). Humane treatment makes good economic sense to the hardhearted as much as the softhearted. Well-designed research on husbandry procedures and housing conditions is essential, since intuition and trial-by-error clearly do not supply reliable solutions to management problems. [See for example the article by Erwin on pp. 1-10 in the present issue of the *Laboratory Primate Newsletter*--Ed.]

> (7) *All countries should establish, or strengthen, agencies to evaluate research proposals. Only those proposals should be accepted which are well-planned, promising, humanely designed, and demonstrate regard for conservation principles in species selection and sample size.* (p. 572)

All of us involved in primate research realize the difficulty of obtaining and maintaining research funds, and we aren't fond of policies

that make the procedure more difficult for us. On the other hand, we don't mind too much if our competitors are eliminated by policies that expose their lack of responsibility. Policies such as the one stated above do not result in reduction of chances for funding for those of us who are careful, capable, and conscientious; they only help to reduce the likelihood that the inexperienced, ignorant, or irresponsible will be granted funds that could have been more effectively used by us.

> (8) *In no case should laboratories bypass, or seek to bypass, protective legislation in the acquisition of primates.* (p. 572)

None of us do that, do we? Yet the IPPL *Newsletter* lists several examples of individuals and institutions circumventing protective legislation. It should be pointed out, however, that many of the cases cited (especially those involving endangered species) involved transactions among suppliers and zoos. Nevertheless, as the NRCCCNP report (1975) concludes: "Approximately three-fourths of the primate trade entering the United States is consumed for biomedical uses annually. The other fourth of the trade supports exhibitors, a large pet industry, and includes losses absorbed in dealers' compounds" (p. 27). The Committee's estimates "suggest that nearly half of the 20,000-40,000 imported primates that have been attributed to the pet trade may in fact be losses inherent in the present system of commercial collecting" (p. 30). Certainly the same kinds of restrictions advocated for laboratories should apply to individuals, zoological societies, and circuses, but it must be admitted that the largest consumers must bear the greatest burdens of conservation.

As I previously mentioned, I share some reservations about IPPL's anti-laboratory-research bias with the Editor of *Laboratory Primate Newsletter*. The statement cited by the Editor as an important reason for withdrawal of support for IPPL was entitled "IPPL Opposes New Regulations" (Anonymous, 1975). The IPPL statement opposed legislation that would prohibit importation of nonhuman primates except for scientific, educational, or exhibition purposes. It seemed to me that opposition to the regulation of the primate pet trade was an irresponsible position for a conservation organization to take. I hope that the sources of all items in the IPPL *Newsletter* will be acknowledged in the future and that the mechanism for decisions on policy for IPPL will be clearly stated. Hopefully some appropriate laboratory researchers will be appointed to the Advisory Board of IPPL in order to facilitate communication among field and laboratory investigators and other interested individuals.

The IPPL clearly has strong and dedicated leadership, and I am sure that withdrawal of support for IPPL by laboratory scientific personnel will not cause the organization to fold. What it will accomplish is divisiveness within the scientific community, provision of presumptive evidence that laboratory uses of primates are not easily justifiable and that laboratory researchers are unconcerned about primate con-

servation. It is the obligation of primate researchers not to withdraw from, defend against, or passively support the IPPL, but to become involved in it and/or other primate conservation efforts. The reports of flagrant violations of protective legislation included in the IPPL *Newsletter* (cf. McGreal, 1975) clearly indicate the necessity for public examination of the success of conservation measures. The IPPL *Newsletter* is surely open to reports on existing and newly-established breeding colonies, and to reports of research and evaluative studies bearing on development of self-sufficient production. The IPPL *Newsletter* also publishes correspondence from readers; laboratory investigators who feel they have been unjustly indicted in the IPPL *Newsletter* are obligated, in my opinion, to set the record straight. I imagine the Editor of IPPL *Newsletter* would be receptive to publication of responses from researchers, but the IPPL *Newsletter*, like other periodicals, cannot publish items unless they are submitted.

The scientific community has nothing to lose and everything to gain from involvement in conservation efforts. During the 10-year period, 1964-1973, at least 954,894 nonhuman primates were imported into the United States (cited in NRCCCNP report, 1975). Of the 700,000-800,000 of those probably designated for biomedical use no more than 5% are still alive; even a very conservative estimate leaves the total of imported nonhuman primates used up at well over half a million in the United States alone. It is clear that the use of nonhuman primates cannot possibly continue at the present rate without exhausting most wild populations. If primate researchers do not support conservation efforts they are cutting their own throats. The policies outlined by McGreal and Eudey (1975) may seem idealistic, but if primate research is to survive researchers must translate those policies into reality.

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ADULT FEMALE CHIMPANZEES WANTED

We are interested in purchasing adult female chimpanzees of reproductive age. If possible should be showing regular menstrual cycles.--Dr. J. Moor-Jankowski, LEMSIP, N.Y.U. Medical Center, New York, NY 10016 (Phone: 212-679-3200, ext. 4123 or 5205).

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INFORMATION ON ALBINO PRIMATES WANTED

The Wisconsin Regional Primate Research Center is interested in obtaining information on the location and availability of albino nonhuman primates. As the Center currently possesses a female albino *Cercopithecus aethiops,* information concerning an albino male of that species would be particularly welcome.--Dr. Dan Houser, Wisconsin Regional Primate Research Center, 1220 Capitol Court, Madison, WI 53706.

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REQUEST FOR INFANT SQUIRREL MONKEYS

As part of a long-term study on phylogenetic and ontogenetic correlates of human hiccup, I need squirrel monkey neonates (*Saimiri sciureus*) for intensive behavioral observation. I wish to locate pregnant squirrel monkeys, whose young I might use. I would be interested either in purchase of the pregnant females or in being present at the birth of young that could be purchased.--Terence R. Anthoney, M.D., Ph.D., School of Medicine and Department of Zoology, Southern Illinois University-C, Carbondale, IL 62901 ("Call Back 7" calls will be accepted evenings at 618-549-3057).

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LETTERS: ON SURVIVAL AND BREEDING OF PYGMY CHIMPANZEES IN ZOOS

In a letter published in the January, 1976 issue of the *Laboratory Primate Newsletter*, Dr. Adriaan Kortlandt comments that "The survival and breeding records in zoos have been rather discouraging until now" (p. 15) concerning the pygmy chimpanzees (*Pan paniscus*).

Contrary to his statement, the survival and breeding records in zoos is quite encouraging, especially considering the small numbers of such animals that have ever been captive in zoos, and the increasing success in reproduction and longevity is most encouraging. This suggests, indeed, that these animals can be just as successful in captivity as the larger chimpanzee and other great apes in zoos.

The following chronological data are not exhaustive, but do presumably reflect the trend of pygmy chimpanzee status in zoos.

1698: 1st live pygmy chimpanzee believed to have reached London.
1884: 1st live pygmy chimpanzee at Berlin.
1911: Imported to Amsterdam Zoo, "Mafuca," 1st acknowledged captive pygmy.
1923: Male purchased by Yerkes from Bronx Zoo, where it was being boarded and not known to be a pygmy; died in Havana.
1929: Officially described by Schwarz.
1938: 4 pygmy chimpanzees exhibited at Munich.
1940: 1st exhibited at Paris.
1958-59: 86 captured by Laboratoire Medical in Stanleyville for research purposes.
1962: 1st captive birth at Frankfurt Zoo.
1963: 2nd captive birth at Frankfurt Zoo.
1964: Exhibited in only 3 zoos (Antwerp, Frankfurt, and San Diego).
1966: 3rd captive birth at San Diego Zoo (1st in USA).
1967: 4th captive birth at San Diego Zoo.
1968: 5th captive birth at Frankfurt Zoo.
1969: 6th captive birth at San Diego Zoo. A total of 17 pygmy chimps in 5 zoos.
1970: A total of 11 pygmy chimps in 7 zoos.
1971: 4 males, 11 females in 4 collections (5 captive born).
1973: 5 males, 12 females in 5 collections (1 male, 6 females, captive born).
1974: 7 males, 15 females in 5 collections (1 male, 6 females, captive born).

Ronald T. Reuther, Executive Director,
Philadelphia Zoological Garden

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RECORD PRIMATE LONGEVITIES AT PHILADELPHIA ZOOLOGICAL GARDEN

World's Oldest Captive Mandrill Dies

The world's oldest captive mandrill died of cancer originating in the kidney on December 1, 1975 at the Philadelphia Zoo. The 31-year, 5-month-old female was born at the Philadelphia Zoo on June 29, 1944 and lived in the Zoo's Monkey and Ape House. She exceeded the previous known longevity record by several years.

World's Oldest Captive Gorilla Celebrates 45th Birthday

Massa, the world's oldest captive gorilla, celebrated his 45th birthday and the 40th anniversary of his arrival at the zoo on Tuesday, December 30, 1975. Brief festivities including the presentation of a two-pound birthday Zoo-cake were held.

Massa, a lowland gorilla, was born sometime in 1931 in Western Africa. After his mother was slain while raiding village crops, he was raised by sympathetic natives. He was then sold to a sea captain who in turn sold him to Mrs. Gertrude Lintz, a devoted animal lover who specialized in rearing baby primates. Mrs. Lintz also owned Gargantua who became the famous circus gorilla. Massa and Gargantua were playmates.

One day, Massa, then weighing more than 100 pounds, was inadvertently surprised by his surrogate mother while she was scrubbing the kitchen floor. The frightened animal attacked Mrs. Lintz so severely that she decided reluctantly to give him up. On December 30, 1935, she brought him to the Philadelphia Zoo where he has lived in the Monkey and Ape House ever since.

Recognizing the fact that Bamboo, the Zoo's former record-holding gorilla, died of a heart attack (at age 34), Zoo officials have kept Massa slim (he now weighs approximately 300 pounds) and his diet well balanced. Massa's generally healthy condition is probably responsible for his excellent recovery from a series of operations performed in 1969 to relieve infected sinuses.

One of World's Oldest Orangutans Dies

Guarina, one of the two oldest orangutans and nonhuman primates in captivity in the world, is dead at the age of 56. Philadelphia Zoo Senior Veterinarian Dr. Wilbur B. Amand euthanized Guarina on Friday,

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From news releases supplied by Ronald T. Reuther, Executive Director, Philadelphia Zoological Garden.

January 16, 1976 when it became obvious that medical treatment was having no substantial effect on the orangutan's deteriorating condition. An autopsy performed by Dr. Robert L. Snyder, Director of the Zoo's Penrose Research Laboratory, revealed that Guarina was suffering from arterial nephrosclerosis and emphysema.

Dr. Amand said Guarina showed signs of illness on December 31 with occasional coughing, lung congestion, and a decreased appetite. She seemed to rally for several days and then declined again on January 8. Guarina was removed from her mate, Guas, the other longevity record-holder, and placed in isolation for further tests and treatment. She was taken under medication to the Veterinary Hospital of the University of Pennsylvania for further examination, X-rays, and electrocardiograms.

Guarina and her mate Guas came to the Philadelphia Zoo on May 1, 1931, from the private collection of the late Madame Rosalia Abreu of Quinta Palatino, Havana, Cuba, a woman who devoted much of her life to keeping and breeding primates in captivity. Former Curator of Mammals Frederick A. Ulmer previously estimated both Guarina and Guas to have been 10 years old when they arrived and their year of birth to be 1919. During their reproductive years, between 1929 and 1955, Guarina and Guas had a total of 9 offspring, 8 of them at the Philadelphia Zoo. Guas sired an additional four with another female.

* * *

LETTERS: SIGNATURE WITHDRAWN FROM PETITION

I wish to make it known that I would like to remove my name as a signee of the petition regarding the importation of pygmy chimpanzees by the Yerkes Regional Primate Center that was published in the January, 1976 issue of the *Laboratory Primate Newsletter*. I now know the petition to be an unfortunate misinterpretation of event.--Harold Bauer, Primate Group, TD114, Stanford University, Stanford, CA 94305.

* * *

MALE SQUIRREL MONKEYS AVAILABLE

Five male squirrel monkeys (*Saimiri sciureus*) in good health are available. These animals have been in our colony for 2-7 years and are no longer suitable for our research purposes. All have experimental histories.--Contact: R. R. Hutchinson or G. S. Emley, Foundation for Behavioral Research, 600 Cherry St., Augusta MI 49012 (Phone: 616-731-5775).

* * *

PAPIO HAMADRYAS AVAILABLE

We are in possession of 47 baboons (*Papio hamadryas*). They are all young adults, a closed colony that has never been used in research. There are 10 males in the group, several pregnant females and 2 with 1 month old babies. They vary in age from 4 to 6 years and are all in excellent condition. We would like to dispose of this resource, preferably as a whole, but would consider dividing them into smaller groups.--A. E. Farwell, Jr., Director, Animal Services, Division of Laboratory Animal Medicine, School of Medicine. The Johns Hopkins University, 720 Rutland Ave., Baltimore, MD 21205 (Phone; 301-955-3713).

* * *

ORANGUTAN ACCOUNT AVAILABLE; ACCOUNTS OF OTHER PRIMATES WANTED

The American Society of Mammalogists initiated a new series of accounts of mammals in 1969. To date, 68 species have been covered. The only primate has been the orangutan (*Pongo pygmaeus*) (6 pp. by Colin Groves). Each number deals with a separate species and is intended to be a concise and knowledgeable summary of biological knowledge, including sections on synonymy, diagnosis, general characters, form, function, fossil record, distribution, behavior, and ecology. We would like to issue more primate accounts. If any reader would like to consider writing one, or suggest an appropriate contributor, please contact the editor, Sydney Anderson, American Museum of Natural History, New York, New York 10024.

The series sells for $15.00 per 200 pages ($12.00 to members of the Society). The second 200 pages are in various stages of production now. Or, if you would just like to have the orangutan account, send $1.00 (the minimum order) to Dr. B. P. Glass, Secretary-Treasurer, The Museum, Oklahoma State University, Stillwater, OK 74074.

* * *

POSITION WANTED

ETHOLOGIST, M.A., Ph.D. 1976. Lab/field experience and interest in behavioral biology, animal social systems, and human evolution with chimpanzee field work. Desires research/teaching/conservation position. Contact Harold Bauer, Primate Group, TD114, Stanford University, Stanford, CA 94305.

* * *

CDC RHESUS MONKEY BREEDING COLONY

Spurred by restricted availability of rhesus monkeys from India, the Center for Disease Control is rapidly developing a breeding colony of these monkeys at its Lawrenceville Facility. The breeding stock has already been procured, and the physical facility, including the monkey enclosure, is presently under construction. If all goes as well as anticipated, the colony should be able to supply all of the rhesus monkeys required for essential diagnostic needs of the Center within a few years. Surplus production, if any, will be available for research purposes at the Center for Disease Control.

The colony is unusual in that the breeding stock has been screened for tuberculosis, measles, shigellosis, and monkey B virus infections. As well as being serious health problems for the monkeys themselves, these diseases can also cause human disease in animal handlers and laboratory workers exposed to them.

Two expeditions were conducted in 1974 and 1975 to trap the monkeys in Kashmir and Uttar Pradesh, India. Dr. J. Roger Broderson, Bureau of Laboratories, and Dr. Arnold F. Kaufmann, Bureau of Epidemiology, participated in both field operations, which produced a total of 300 monkeys. After being captured, the animals were given a physical examination, vaccinated against measles, tuberculin tested, and bled for serologic screening. They were held in individually compartmented cages, fed pelleted foods, and given only water that had been boiled and chlorinated to drink. They were also kept as remote as possible from unnecessary human contact, to minimize the danger of exposure to human disease.

Following arrival at the CDC animal breeding farm at Lawrenceville, Georgia, the monkeys have been subjected to a lengthy quarantine, under the supervision of Dr. Samuel R. Adams, the veterinarian responsible for their care. They have been treated for parasitic infections and repeatedly tested to detect the development of tuberculosis, shigellosis, and monkey B virus infections. To date no tuberculosis has been found, and no evidence of monkey B virus activity has been detected since the initial culling of those animals in the 1974 group that showed positive serology. A few animals in that group also have asymptomatic shigella infections, which will be eliminated by use of trimethiprin and sulfonamides. The 1975 shipment has been uniformly free of indications of tuberculosis, shigellosis, and monkey B virus infections.

In addition to providing healthier monkeys, the procedures used have contributed to the conservation of the limited available supply of rhesus monkeys, since the postshipping death losses have been only 2%, compared with the 10%-15% commonly experienced with monkeys imported

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From *CDC Veterinary Public Health Notes*, January, 1976, pp. 5-6, issued by the Center for Disease Control, Atlanta, Georgia.

under usual commercial conditions.
Source: Dr. George H. Connell, Assistant to the Director, CDC.

* * *

NEW WORLD PRIMATE TISSUES AND PARTS AVAILABLE

The Department of Nutrition at the Harvard School of Public Health maintains a New World primate colony, breeding squirrel (*Saimiri sciureus*; Letician) and cebus monkeys (*Cebus albifrons;* Barranquilla), supported as a part of a National Heart and Lung Institute Program Project in atherosclerosis. Approximately 70-100 infants are born per year (70 per cent of which are squirrel monkeys) to be raised from birth on semi-purified diets for long-term nutritional study with primary emphasis on atherogenesis. Although these animals and most of their cardiovascular tissues are committed to protocols of our own design, it is our objective to utilize these monkeys to their fullest and to make tissues and parts of them available to interested, qualified persons as they become available. The cost of these biological materials will depend on actual cost of preparation, handling, and shipping. We are prepared to take special care in preparation within reasonable limits of our expertise and time. Priorities for allocating tissues will be based on availability of tissues, merit, and relationship of the proposed use of tissue with Heart-Lung Institute objectives as judged by our program project personnel and on demonstration of eventual productive use of these tissues. Tissues range from aborted fetuses and culled, aged breeders to normal placentas, stillborn monkeys, and tissues from monkeys one day to four years of age. We intend to have available eventually a computerized print-out detailing sex, sire, dam, age, weight at birth, growth data, experimental diet, organ weights, relevant autopsy findings, etc. to accompany all tissues.--Dr. K. C. Hayes, Department of Nutrition, Harvard School of Public Health, 665 Huntington Avenue, Boston, Massachusetts 02115 (Phone: 617-734-3300, ext. 593).

* * *

PRIMATE SKELETAL MATERIAL NEEDED

Primate skeletal material from any taxa except *Macaca* are needed for a small research and teaching laboratory. At present, our facilities do not permit chemical or dermestid maceration, so that we would be able to accept only fully macerated specimens.--Dr. Marc F. Feldesman, Department of Anthropology, Portland State University, Portland, Oregon 97207.

* * *

SIAMANG-GIBBON HYBRID

Duane M. Rumbaugh, Joan Wolkin, Beverly J. Wilkerson, & Rick Myers

Georgia State University

On August 11, 1975 one of two female siamangs housed with a single male gibbon unexpectedly gave birth at the Grant Park Zoo, Atlanta, Georgia. The mother (*Symphalangus syndactylus*, according to Napier & Napier, 1967, or *Hylobates syndactylus*, according to Groves, 1972) and the father (*Hylobates lar*, subspecies likely either *abbotti* or *moloch*) had been maintained together for the past four years. There had been no opportunity for other than the male gibbon to be the father of the hybrid, a female.

The animal is now housed in the Primate Behavior Laboratory of Georgia State University's Psychology Department, where her physical and psychological development is under study. She has been termed a "siabon" to reflect her hybrid origin. She is in excellent health and active.

Her karyotype has been confirmed as the average (47) between the diploid chromosome count for the mother (50) and the father (44). Cytogenetic studies are being made to identify the parental chromosomes within the hybrid cells, including electrophoretic analyses of blood and plasma proteins.

Developmental studies include the Bayley Scales of infant development and the Uzgiris-Hunt scale for the development of object permanence. Other studies involve comparative assessments of vocalizations, learning capacities, perceptual skills, morphological measures, and general behavioral repertoire.

Investigators who have specific proposals or requests for materials are invited to write to the Primate Behavior Laboratory, Department of Psychology, Georgia State University, Atlanta, Georgia, 30303.

References

Groves, C. P. Systematics and phylogeny of gibbons. In D. M. Rumbaugh (Ed.), *Gibbon and siamang: A series of volumes on the lesser apes* (Vol. 1). Basel: Karger, 1972.

Napier, J. R. & Napier, P. H. *A handbook of living primates*. London: Academic Press Inc., 1967.

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LABORATORY PRIMATE NEWSLETTER QUARTERLY SURVEY: LAST TWO QUARTERS OF 1975

The following tables summarize the data from the quarterly surveys being conducted by the *Laboratory Primate Newsletter*. (The first report appeared in the January, 1976 issue, pp. 18-21.) The data in Tables 1 through 4 are based on reports from the following facilities: California, Delta, New England, and Yerkes Regional Primate Research Centers, Laboratory for Experimental Medicine and Surgery in Primates, National Institutes of Health, and The Southwest Foundation for Research and Education.

TABLE 1. MORTALITY SUMMARY BY SYSTEM: JULY 1, 1975-SEPTEMBER 30, 1975[a]

SPECIES	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes											1	
Pongo pygmaeus				1								
Macaca arctoides	1					3					1	
M. assamensis						1						
M. cyclopis						1						1
M. fascicularis	6			1		2						3
M. mulatta	7		1	49	4	16	1	1		2	9	26
M. nemestrina				1								
M. radiata						2			1			2
Cercocebus atys				1								
Cercopithecus aethiops											5	
Cynopithecus niger											1	
Papio anubis				2	2	1						17[b]
Theropithecus gelada				2		1						
Saimiri sciureus	7			5	1	6	1				2	21
Cebus												3
Aotus trivirgatus	4										1	1
Saguinus oedipus	1					6						1
S. nigricollis						1						10
S. spp.				2								2
Galago crassicaudatus												1
Hybrid					1							
Totals	26		1	64	8	39	2	1	1	2	20	88

[a] Includes 3 reports from July 1-August 31, 1 report from June 1-August 31.

[b] Includes 16 Study related.

TABLE 2. CENSUS, NUMBER OF BIRTHS, AND MORBIDITY SUMMARY BY SYSTEM: JULY 1, 1975-SEPTEMBER 30, 1975[a]

SPECIES	Census	Births	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Gorilla gorilla			2					1					1	
Pan troglodytes	358	6	4	1	1	2		81	2	2			1	3
Pongo pygmaeus	37				1			15						1
Hylobates spp.														1
Macaca arctoides	212	8		9	1	2		50	2		1		3	5
M. cyclopis	91	1												
M. fascicularis	438	4		2		2		10[d]					1	
M. maurus								1						
M. mulatta	4179	78	21	195	77	198[b]	21	850[c]	43	6			208	62
M. nemestrina	75				1								18	2
M. radiata	246	6		16	11	5	5	43	14	4	1			8
Cynopithecus niger	29		4					2					1	
Erythrocebus patas	50							1						
Cercocebus atys	41	3											1	
Cercopithecus aethiops	63		1		26			2					2	3
C. talapoin													1	
Papio anubis	958	30	11	26	2	1		15	4				3	19
P. cynocephalus	7			4	1			23	2					2
P. papio	72	1											1	
Theropithecus gelada														2
Saimiri sciureus	901	15	1	1	2		3	3	1				1	7
Cebus	196	2		1				1						
Aotus trivirgatus	207	1												
Saguinus oedipus	90		1						1					
S. mystax		1												
S. nigricollis	72			3	2		2	6	1					3
S. spp.	51													
Hybrid	27	1												
Totals	8400	157	45	258	125	110	31	1094	70	12	2		242	117

[a]Includes 1 report July 1-August 31, 1 report June 1-Aug. 31.

[b]Includes 140 Pneumonia or Bronchitis, 42 Tuberculosis.

[c]Includes 192 *Shigella* spp., 36 *Salmonella* spp., 344 Unspecified Digestive, including parasites, "stress", diarrhea, etc., 6 Prolapse.

[d]Includes 2 *Shigella* spp., 1 *Salmonella* spp.

TABLE 3. MORTALITY SUMMARY BY SYSTEM: OCTOBER 1, 1975-DECEMBER 31, 1975

SPECIES	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes	3					3						
Pongo pygmaeus						1						
Macaca arctoides	1			1		1	2				1	1
M. cyclopis	2											
M. fascicularis	2					4	1					3
M. mulatta	32			74[d]	6[c]	38[e]	1	2		1	8	45[a]
M. nemestrina				2		2						1
M. radiata										1	1	1
M. silenus	1											
Cercocebus atys						1						
Cercopithecus aethiops	2			4		1					5	1
Cynopithecus niger	1											
Erythrocebus patas	1			4[f]		1						
Papio anubis	1			9	4	7		1			2	9[b]
P. cynocephalus						1						
P. papio						1						
Mandrillus sphynx											1	
Theropithecus gelada												1
Saimiri sciureus	16			8	2	7	2		2		13	17
Ateles geoffroyi						1						
Cebus				2								
Aotus trivirgatus	12	1		2		2	1				1	2
Saguinus oedipus	2			1		8						6
S. nigricollis						1					2	3
S. spp.	4			5		3	1					2
Callithrix jacchus						2						
Totals	80	1		112	12	85	8	3	2	2	34	92

[a]Includes 18 study related.

[b]Includes 6 study related.

[c]Includes 2 Anaphylactic deaths related to tuberculin testing.

[d]Includes 40 Tuberculin reactors. (Thirteen rhesus monkeys were examined for tuberculosis. Eleven were involved in one study from a lab reporting two tuberculin-positive reactors in the same monkey quarters. Of the 11, ten were tuberculin-negative and had no TB; one tuberculin-negative reactor had TB. The other two were TB positive.

[d]Includes 3 Esophagostomum.

[f]Includes 2 Tuberculin reactors.

TABLE 4. CENSUS, NUMBER OF BIRTHS, AND MORBIDITY SUMMARY BY SYSTEM: OCTOBER 1, 1975-DECEMBER 31, 1975[a]

SPECIES	Census	Births	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Gorilla gorilla			2					1						
Pan troglodytes	361	6	4	1	2	1		47	1				2	4
Pongo pygmaeus	36			1				12	1				1	1
Hylobates spp.													1	
Macaca arctoides	213	4		8			3	82	1				2	5
M. cyclopis	91													
M. fascicularis	333	6		2		8[d]		17[e]	1	2			7	
M. maurus		2											1	
M. mulatta	3763	97	3	186	88	120[b]	23	657[c]	62	5	2		73	49
M. nemestrina	72	1				2		1					11	5
M. radiata	282	1		6	5	1		101	8					1
M. silenus			1			1								
Cercocebus atys	43	2											1	
Cercopithecus aethiops	49	1												
Cynopithecus niger	27	1			1			2						
Erythrocebus patas	87					2[f]		4[g]					5	
Papio anubis	1041	57	17	66	1			48	3				1	41
P. cynocephalus	8			2			1	18						1
P. papio	74	3												
Theropithecus gelada					1				1				1	
Saimiri sciureus	923	16	5	3	4		2	9	1				7	5
Ateles geoffroyi		1												
Cebus	165													
Aotus trivirgatus	193	8												
Saguinus oedipus	80													
S. nigricollis	57	1		4	2		1	8		1				4
S. spp.	63	2												
Hybrid	27	1											1	
Callithrix jacchus														1
Totals	7988	210	32	277	104	135	30	1003	79	8	2		114	118

[a]Includes 4 reports from September 1-December 31, 1975.

[b]Includes 38 Tuberculin reactors.

[c]Includes 124 *Shigella*, 35 *Salmonella*.

[d]Includes 4 Epistoxic cases related to staphylococcal infection

[e]Includes 5 *Shigella*.

[f]Tuberculin reactors

[g]Includes 3 *Shigella*

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

Books

Advances in Neurology. Vol. 10. *Primate Models of Neurological Disorders*. B. S. Meldrum & C. D. Marsden (Eds.). New York: Raven Press, 1975. 378 pp. [Price: $22.50]

This volume presents an overview of what has been achieved through the relatively recent introduction of nonhuman primate models in research on neurological disorders. The chapter authors participated in a Symposium held at the Institute of Psychiatry, London, August 28-30, 1974.

Contents: I. MOTOR DISORDERS. Introduction, by C. D. Marsden. Stereotaxic lesions and movement disorders in monkeys, by L. J. Poirier, J. C. Péchadre, L. Larochelle, J. Dankova, & R. Boucher. Tremorgenic mechanisms in primates, by Y. Lamarre. Stereotaxic technique for stimulation and recording in nonanesthetized monkeys: Application to the determination of connections between caudate and substantia nigra, by J. Fèger, C. Ohye, F. Gallhouin, & D. Albe-Fessard. Drug-induced dyskinesia in monkeys, by J. F. Sassin. Primate models of postural abnormalities, by S. Gilman. Experimental models of oculomotor dysfunction in the Rhesus monkey, by T. Pasik & P. Pasik. Cortical control of motor prostheses: Using the cord-transected baboon as the primate model for human paraplegia, by M. D. Craggs. II. EPILEPSY. Introduction, by C. D. Marsden. Neurophysiology of photically induced epilepsy in *Papio papio*, by R. Naquet, J. Catier, & C. Menini. Photically induced epilepsy in *Papio papio* as a model for drug studies, by B. S. Meldrum, G. Anlezark, E. Balzamo, R. W. Horton, & M. Trimble. Central seizures induced by proprioceptive afferents: An experimental study in the monkey, by P. Chauvel, M. Lamarche, & R. Pumain. Afterdischarges elicited by electrical thalamic stimulation in the hemicerebellectomized baboon, by S. Walter, A. Basso, G. Guiot, G. Barrionuevo, & M. Gautron. Four models for studying cerebral lesions secondary to epileptic seizures, by B. S. Meldrum, J. J. Papy, M. F. Touré, & J. B. Brierley. III. CEREBROVASCULAR DISORDERS. Introduction, by W. B. Jennett. Autonomic control of cerebral circulation, by I. M. James. Raised intracranial pressure and its relation to cerebral blood flow in the

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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, University of Washington. 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 or abstract and indicating his desire on the reprint.

baboon, by J. D. Miller. Experimental model of stroke in the baboon, by L. Symon. Comparison between effects of profound arterial hypotension, hypoxia, and cyanide on the brain of *Macaca mulatta*, by J. B. Brierley. Four patterns of perinatal brain damage and their conditions of occurrence in primates, by R. E. Myers. IV. METABOLIC AND DEGENERATIVE DISORDERS. Introduction, by B. S. Meldrum. Experimental vitamin B_{12} deficiency in the baboon, by R. C. Siddons, J. A. Spence, & A. D. Dayan. Peripheral neuropathy in baboons, by R. W. Gilliat, T. J. Fowler, & P. Rudge. V. VIRUSES. Introduction, by B. S. Meldrum. Movement disorders in Rhesus monkeys after infection with tick-borne encephalitis virus, by D. M. Asher. Familial and sporadic chronic neurological degenerative disorders transmitted from man to primates, by D. C. Gajdusek & C. J. Gibbs, Jr. Clinical studies in primates inoculated with Kuru and Creutzfeldt-Jakob agents, by F. Cathala, L. Court, J. J. Hauw, R. Escourolle, F. Rohmer, & P. Castaigne. Neuropathological studies in primates suffering from experimental Kuru and Creutzfeldt-Jakob disease, by E. Beck & P. M. Daniel. Future problems and possibilities, by B. S. Meldrum.

Proceedings from the Symposia of the Fifth Congress of the International Primatological Society, Nagoya, Japan, 1974. S. Kondo, M. Kawai, A. Ehara, & S. Kawamura (Eds.). Tokyo: Japan Science Press, 1975. 602 pp. [Price: $60, plus $2 for postage and handling. Order from Japan Science Press, Neiho-sha, 2-23 Kanda-jinbocho, Chiyoda, Tokyo, Japan]

This volume includes 45 papers presented in the following 5 symposia and one special seminar: SYMPOSIUM I: Social Structure of Primates. SYMPOSIUM II: Determinants of Behavioral Variation in Primates. SYMPOSIUM III: Locomotor behavior and Hominization. SYMPOSIUM IV: Perinatal Physiology. SYMPOSIUM V: Neurophysiology and Neuropsychology of Primate Prefrontal Cortex. SPECIAL SEMINAR: The Present Status of Primates and Methods for Conservation.

Contemporary Primatology: Proceedings of the Fifth International Congress of Primatology, Nagoya, 1974. S. Kondo, M. Kawai, & A. Ehara (Eds.). Basel: Karger, 1975. 522 pp. [Price: $110]

This volume contains 78 papers presented in the following paper reading sessions: Morphology. Genetics and Biochemistry. Reproduction. Thermoregulation. Cognition, Learning and Memory. Social Behavior. Sociology and Ecology. Medical Sciences.

Gibbon and Siamang. Vol. 4. *Suspensory Behavior, Locomotion, and Other Behaviors of Captive Gibbons; Cognition.* D. M. Rumbaugh (Ed.). Basel: Karger, 1976. 327 pp. [Price: $91]

In this fourth volume of the series, C. R. Carpenter has contributed an illustrated photo essay on the role of suspensory behaviors in the daily lives of gibbons maintained on Hall's Island in Bermuda. Carpenter analyzes their postures and locomotion patterns in relation to the activities which fill the day. Lori A. Baldwin and Geza Teleki have conducted studies on the same gibbon group that provided material

for Carpenter's photographic study. They have constructed a detailed ethogram of standard behaviors for gibbons, which is intended to serve as a resource for future field research. Enrique Abordo provides a comparative review of what is known about hylobatid learning and problem solving skills. M. Goustard offers an analysis of gibbon vocalizations intended to describe them sonagraphically and to interpret their probable social significance. The article from P. Andrews and C. P. Groves is an attempt to clear up the confusion surrounding the term "brachiation". Finally, N. Creel and H. Preuschoft present a study of the cranial morphology of the lesser apes, including an appendix of comparative statistics. The volume also contains a general index for volumes 1-4.

Contents: Suspensory behavior of gibbons *Hylobates lar*. A photoessay, by C. R. Carpenter; Patterns of gibbon behavior on Hall's Island, Bermuda. A preliminary ethogram for *Hylobates lar*, by L. A. Baldwin & G. Teleki; The learning skills of gibbons, by E. J. Abordo; The vocalizations of *Hylobates*, by M. Goustard; Gibbons and brachiation, by P. Andrews & C. P. Groves; Cranial morphology the lesser apes. A multivariate statistical study, by N. Creel & H. Preuschoft.

Phylogeny of the Primates: A Multidisciplinary Approach. W. P. Luckett & F. S. Szalay (Eds.). New York/London: Plenum, 1975. 483 pp. [Price: $39.50]

A multidisciplinary volume based on the proceedings of Burg Wartenstein Symposium No. 61, July, 1974. Contents: Part I. BACKGROUND TO PRIMATE PHYLOGENY. 1. Recent advances in methods of phylogenetic inference, by G. G. Simpson. 2. Toward a phylogenetic classification of the Mammalia, by M. C. McKenna. 3. Phylogeny, behavior, and ecology in the Mammalia, by J. F. Eisenberg. 4. Nocturnality and diurnality: An ecological interpretation of these two modes of life by an analysis of the higher vertebrate fauna in tropical forest ecosystems, by P. Charles-Dominique. Part II. PHYLOGENY OF PRIMATE HIGHER TAXA. 5. Phylogeny of primate higher taxa: The basicranial evidence, by F. S. Szalay. 6. The development of the chondrocranium in primates, by D. Stark. 7. Ontogeny of the fetal membranes and placenta: Their bearing on primate phylogeny, by W. P. Luckett. 8. The central nervous system: Its uses and limitations in assessing phylogenetic relationships, by C. B. G. Campbell. 9. The visual system of primates in phylogenetic studies, by C. R. Noback. 10. Protein sequence and immunological specificity: Their role in phylogenetic studies of primates, by M. Goodman. 11. DNA evolution data and its relevance to mammalian phylogeny, by D. Kohne. Part III. STREPSIRHINE PHYLOGENY. 12. The bearing of reproductive behavior and ontogeny on strepsirhine phylogeny, by R. D. Martin. 13. Relationships among the Malagasy lemurs: The craniodental evidence, by I. Tattersall & J. H. Schwartz. 14. Strepsirhine basicranial structures and the affinities of the Cheirogeleidae, by M. Cartmill. Part IV. HAPLORHINE PHYLOGENY. 15. Phylogeny, adaptations, and dispersal of the tarsiiform primates, by F. S. Szalay. 16. Evolution and inter-relationships of the

catarrhine primates, by E. Delson & P. Andrews. 17. Parallelism, brachiation, and hominoid phylogeny, by R. Tuttle.

CRC Handbook of Laboratory Animal Science (3 vols.). E. C. Melby & N. H. Altman (Eds.). Cleveland, Ohio: CRC Press, 1974-1976. 451 pp., 523 pp., and 900 pp., respectively, in the 3 vols. [Price: $130 for the set]

A reference source for information in the field of laboratory animal science. Provides information on legislation pertaining to laboratory animals, housing, handling, disease, physiology and other topics.

Films

Towards an understanding of squirrel monkey communication. I. *Searching for structures in the behavioural repertoire.* By M. Maurus *et al.* (16 mm, color and sound, approx. 30 min.). From Max Planck Institute for Psychiatry, Department of Primate Behavior, 8 München 40, Kraepelinstrasse 2, Germany. [For sale only: DM 1,550]

The film deals with the problems which arise when an attempt is made to perceive the communicative meaning of the visually-recognizable signals in squirrel monkey intra-specific communication. It explains why these problems exist and illustrates technical and mathematical methods with which such problems can be approached.

Audio-Visual Material

Hazard Control in the Animal Laboratory. (60 color clides, 15 min. audiocassette, 20-page script). Produced by the Office of Biohazard and Environmental Control, DHEW. Title No. 009432, 1975. [Price: $10.00] Order by name and title no.: Order Section, National Audiovisual Center, (GSA), Washington, DC 20409. Make checks payable to: National Archives Trust Fund (NAC)

Hazards that are associated with use of laboratory animals can be minimized if those who work with them are aware of the dangers and problem areas and are informed of the measures that can be taken to control them. This slide/tape program, produced by the Office of Biohazard Control, was designed for use by laboratory supervisors, research investigators, and others whose work involves laboratory animals. Using a combination of photographs and narrative, the hazards associated with animal care facilities, laboratory procedures associated with increased risk, and measures that can be taken to minimize risks are detailed and explained. Procedures covered include: Allergies and accidents; Animal bites and scratches; Transmission of infectious diseases; Aerosol exposure; and Labeling and disposal of contaminated animals, bedding, and carcasses.

Disease

Hazards from simian herpes viruses: Reactivation of skin lesions with virus shedding. McCarthy, K., & Tosolini, F. A. (Dept. of Med. Micro-

biol., Liverpool Univ., PO Box 147, Liverpool L69 3BX, England) *The Lancet*, 1975, *1* [7908], 649-650.

A new simian herpes virus with biological properties similar to herpes simplex and to simian "B" virus has been used as a model system for studying virus latency in dorsal root spinal sensory ganglia. Following intradermal injection, virus is present in the skin lesions and corresponding ganglia only, during the acute stage of the disease. By organ-culture techniques, latent virus was rescued from ganglia up to 2 years later. No latent virus was ever found in skin organ cultures of the primary site. Treatment with cortisone up to 18 months later reactivated virus latent in the ganglia, and virus returned to the skin where it produced small but typical herpes lesions which shed virus. Reactivation of *Herpesvirus tamarinus* was achieved after 28 months. This is believed to be the first report of a model system for the study of herpes latency in which skin lesions are found to recur, and provides an opportunity for more detailed investigations of the mechanisms of virus latency in man. The presumption that reactivation of skin lesions will also be possible in rhesus monkeys seropositive for "B" virus points to a possibly grave and largely unsuspected hazard for those engaged in primate research.

Review of primate herpes viruses. McCarthy, K. & Tosolini, F. A. (Dept. of Med. Microbiol., Liverpool Univ., PO Box 147, Liverpool L69 3BX, England) *Proceedings of the Royal Society of Medicine*, 1975, *68*, 145-150.

Although many new simian herpes viruses have been isolated in recent years, studies of these viruses require the utmost care and necessarily proceed slowly. The present profusion of isolations is probably the result of two factors. Firstly, the intensive study of certain species of primates and the use of their tissues for cell culture has revealed a number of latent agents; these are probably indigenous to the species from which they have been isolated. Secondly, accidental cross-infection of primates from some other species, with the production of clinical illness, has revealed several more viruses; in many of these instances the natural host is now known. Seroepidemiological studies are needed to define the primary hosts and the distribution of the infections in the wild.

All herpes virus infections include the possibility of virus latency, yet few studies have been made of the mechanisms of latency of the primate herpes viruses. A knowledge of these mechanisms is clearly needed for a fuller understanding of herpes virus oncogenicity. So far, only one human and two simian herpes viruses have been shown to be oncogenic, but further investigations of the other thirty-four primate herpes viruses may reveal a selective capacity for inducing malignancy when tested in an appropriate host species. The possibility that man may prove to be such a species must be kept in mind when working with these agents.

Since there is no accepted classification system of the primate

herpes viruses, the writers suggest one to serve as an interim aid pending more detailed serological and physico-chemical studies.

Diaphragmatic herniation of the liver in macaques demonstrated by intravenous hepatography. Dalgard, D. W., Adamson, R. H., & Vemess, M. (Hazleton Labs., Vienna, VA 22180) *Laboratory Animal Science*, 1975, *25*, 753-756.

A suspected diagnosis of diaphragmatic herniation of the liver in 2 monkeys (*Macaca fascicularis* and *M. mulatta*) are confirmed radiographically by using various contrast media. Experimental compound AG 60.99, which is selectively concentrated in the liver and spleen, allowed excellent visualization of these 2 organs and confirmed the presence of a portion of the liver in the right thorax. Cholografin Meglumine was subsequently utilized to determine the location of the gall bladder. Other potential uses for AG 60.99 were discussed.

Tuberculosis in a ring-tailed lemur (*Lemur catta*). Schmidt, R. E. (Veterinary Sciences Division, USAF Sch. of Aerospace Med., Aerospace Med. Div., AFSC, Brooks Air Force Base, TX 78235) *The Journal of Zoo Animal Medicine*, 1975, *6* [3], 11-12.

The present paper describes a recent case of tuberculosis which may be the first in 45 years in a zoo lemur. The writer points out that although tuberculosis is rarely reported in prosimians, this does not necessarily indicate a greater degree of resistance, but possibly less exposure and/or errors in diagnosis.

Breeding

Captive breeding of nonhuman primates. Dukelow, W. R. (Endocrine Research Unit, Michigan State University, East Lansing, MI 48823) In *Proceedings of the American Association of Zoo Veterinarians*, 1974. Pp. 52-67. [Reprints available from author.]

Early literature concerning breeding nonhuman primates in captivity dealt overwhelmingly with a single species, *Macaca mulatta*, while more recent literature encompasses the reproductive parameters of many other nonhuman primates. This results from the vastly increased research with these other species. The article discusses those factors influencing captive reproduction such as adaptation to a new environment, effects of rapid seasonal changes caused by shipment, changes in rank order in new colony, the disruptions of colonies or troops, and the effects of transport itself. Data is presented on the normal physiological parameters of various species and is accompanied by detailed tables. Several systems of husbandry and breeding are reviewed and tabulated with references, and there is a review of specialized breeding techniques. The bibliography accompanying the articles is extensive.

Primate breeding season: Photoperiodic regulation in captive *Lemur catta*. van Horn, R. N. (Oregon Reg. Prim. Res. Ctr., 505 Northwest 185th Av.,

Beaverton, OR 97005) *Folia Primatologica,* 1975, *24*, 203-220.

Under natural light in Portland, Oreg., captive ring-tailed lemurs (*Lemur catta*) experience a breeding season that differs by nearly half a year from the season in Madagascar. A series of experimental day length changes from 1971 to 1974 demonstrated the ability of both temperate and tropical photoperiod cycles to induce estrous cycles in quiescent animals. After photoperiodic activation, most impregnated females failed to resume estrous cycles even after infant separations unless they received additional photoperiod changes. Unimpregnated females, on the other hand, showed no significant decline in the incidence of estrous cycles under prolonged exposure to a constant day length regimen (12.0L:12.0D) for over a year.

The following five papers were presented in a Seminar at the 25th Annual Meeting of the American Association for Laboratory Animal Science, Cincinnati, OH, October 22, 1974.

Comparative primate reproductive endocrinology: Advancements important in domestic breeding programs. Hodgen, G. D. (Section on Endocrinology, Reproduction Research Branch, National Institute of Child Health & Human Development, National Institutes of Health, Bethesda, MD 20014) *Laboratory Animal Science,* 1975, *25*, 793-797.

Recent advancements in primate reproductive endocrinology are reviewed with special emphasis given to hormonal patterns indicative of ovulation, technics for early pregnancy diagnosis, comparison of steroidal and gonadotropic hormonal patterns among various primates during advanced gestation, and identification of the individual contributions of the maternal, fetal, and placental compartments to the hormonal milieu of pregnancy. Each of these topics is examined according to its application to the management aspects of primate breeding.

The breeding and utilization of baboons for biomedical research. Moore, G. T. (Southwest Foundation for Research and Education, San Antonio, TX 78206) *Laboratory Animal Science,* 1975, *25*, 798-801.

The baboon (*Papio cynocephalus*) has been used extensively for biomedical research at the Southwest Foundation for Research and Education (SFRE) since 1958. This animal has adapted well to captivity, has reproduced efficiently, and has proved to be very useful in many areas of medical research. Reproductive data from the SFRE baboon colony, the establishment of a breeding colony from imported animals, the present use of baboons as research models, and the predicted availability and use of these animals are discussed.

Reproduction of wild-caught and laboratory-born marmoset species used in biomedical research (*Saguinus* sp, *Callithrix jacchus*). Wolfe, L. G., Deinhardt, F., Ogden, J. D., Adams, M. R., & Fisher, L. E. (Dept. of Microbiology, Rush-Presbyterian-St. Luke's Med. Ctr., Chicago, IL 60612) *Laboratory Animal Science,* 1975, *25*, 802-813.

Reproductive performances of wild-caught and laboratory-born marmosets

maintained in a paired-cage system are summarized. Wild-caught, white-lipped (WL) marmosets (*Saguinus fusicollis, S. nigricollis*) averaged 2.6 live births per pair per yr. compared with 1.6 for cotton-topped (CT) marmosets (*S. oedipus); S. fuscicollis illigeri* pairs were the best producers. Of first and second generation laboratory-born animals, crossbred or hybrid WL pairs were the best producers; first generation pairs averaged 2.7 live births per pair per yr., comparable to the production of wild-caught WL pairs. In contrast, laboratory-born *S. f. illigeri* pairs produced only 0.8 live births per pair per yr. No significant differences in reproductive performance were observed between first generation outbred vs. inbred and between parent-reared vs. hand-reared pairs. Based on limited data, the reproductive capabilities of wild-caught and laboratory-born *Callithrix jacchus* appeared superior to both WL and CT marmosets. 10 examples of marmoset models in biomedical research were discussed briefly.

A review of reproductive patterns in New World monkeys. Wolf, R. H., Harrison, R. M., & Martin, T. W. (Dept. of Animal Care, Div. of Vet. Sci., Delta Reg. Prim. Res. Ctr., Covington, LA 70433) *Laboratory Animal Science,* 1975, *25*, 814-821.

A review of the literature indicated that most of the information on reproductive patterns in New World monkeys has been gained from studies on the squirrel monkey. This species has been successfully bred in both indoor and outdoor colonies. Both sexes exhibit seasonal cyclicity that appears to be influenced by a number of environmental conditions. Reports indicated that most of the other New World species have been bred in captivity, most commonly in zoos. The scientific data on these species are sparse, usually obtained from small groups or individual animals.

Reproductive, gestational, and newborn physiology of the chimpanzee. Keeling, M. E. & Riddle, K. E. (Yerkes Pri. Res. Ctr., Emory Univ., Atlanta, GA 30322) *Laboratory Animal Science,* 1975, *25*, 822-828.

The Yerkes Regional Primate Research Center has successfully bred chimpanzees since 1930. Breeding statistics for the last 6 yr. and problems of fetal waste and infant mortality are presented here. Experience with and potential advantages of semi-free-ranging breeding systems are presented. This 6-yr. study period also produced considerable information on gestational and newborn physiology.

Instruments and Techniques

Diagnostic radiology: Its utilization in nonhuman primate medicine. Silverman, S. (Dept. of Radiology, Sch. of Vet. Med., Univ. of Calif., Davis, CA 95616) *Laboratory Animal Science,* 1975, *25*, 748-752.

Approximately 1000 radiographic examinations, including several types of special procedures were performed at the California Primate Research Center, University of California, Davis. The avail-

ability of modern x-ray equipment and radiology consultants have facilitated the utilization of radiology in primate medicine and research programs as well as in the instruction of veterinary medical students.

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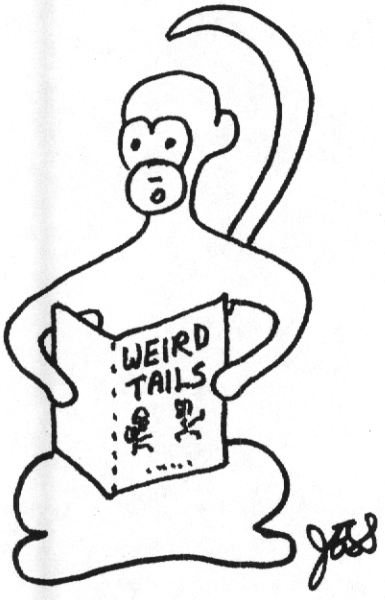
ASIAN LEAF MONKEY WANTED

One Asian Leaf-monkey, preferably *Presbytis cristata* or *P. obscura*, is needed for practice of anesthesia, marking, and examination in preparation for a long-term field study of the social behavior of *P. cristata*. Other species would be considered.--Katherine Wolf, Department of Anthropology, Yale University, New Haven, CT 06520.

* * *



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