LABORATORY PRIMATE NEWSLETTER

Volume 19, Number 2 April 1980

ALLAN M. SCHRIER, EDITOR

MORRIS L. POVAR, CONSULTING EDITOR

Published Quarterly by the Primate Behavior Laboratory
Psychology Department, Brown University
Providence, Rhode Island

ISSN 0023-6861

POLICY STATEMENT

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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $2.00 each. (Please make checks payable to Brown University.)

The publication lag is typically no longer than the 3 months between issues and can be as short as a few weeks. The deadline for inclusion of a note or article in any given issue of the *Newsletter* has in practice been somewhat flexible, but is technically the fifteenth of December, March, June, or September, depending on which issue is scheduled to appear next. Reprints will not be supplied under any circumstances.

PREPARATION OF ARTICLES FOR THE *NEWSLETTER*.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the References section should be referred to in the text by author(s) and date of publication, as for example: Smith (1960) or (Smith & Jones, 1962). Names of journals should be spelled out completely in the References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *NEWSLETTER* (see Editor's Notes, July, 1966 issue), the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967]. For an introduction to and review of primate nomenclature see the chapter by Maryeva Terry in A. M. Schrier (Ed.), *Behavioral Primatology: Advances in Research and Theory* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

All correspondence concerning the *Newsletter* should be addressed to:
Allan M. Schrier, Psychology Department, Brown University,
Providence, Rhode Island 02912. (Phone: 401-863-2511)

ACKNOWLEDGMENTS

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.

The cover photograph is of a gray gibbon (*Hylobates moloch*)
and is used with the permission of the San Diego Zoo.

Managing Editor: Helen Janis Shuman

CONTENTS

WHITE SPIDER MONKEYS (GENUS *ATELES*): DESCRIPTION OF AN UNUSUAL COLOR CHANGE

Kenneth R. Kaemmerer

Southern Illinois University at Carbondale

In 1976, the Knowland Park Zoo in Oakland, California had a colony of 11 spider monkeys of which the majority were determined to be *Ateles belzebuth hybridus*, but which also included one *A. geoffroyi* and two white adult female *Ateles* whose species could not be determined using Hill's (1962) or Kellogg & Goldman's (1944) taxonomic keys. However, the white monkeys' status was clarified for me by Lorne Jackson, Senior Zookeeper (pers. comm.). Apparently the pelage of these two monkeys changed gradually during 3-4 years' time from a gold or buffish color to a whitish color. In fact, one of the females still had a distinct area of buff-colored fur surrounding the perineal region (see below). At one time the zoo had an old male in the colony who changed color in the same way, also within about 3 years' time. A few years later he died. Unfortunately the zoo had no records of the site of origin, age, or physical description for these monkeys at the time of their acquisition. As of May, 1978, the monkeys were still alive and in good health.

The purpose of the present paper is to describe in detail the present body color of the two white female spider monkeys and to discuss possible explanations of the color. The following descriptions are based on 35 mm color slides (Kodachrome 25, Agfachrome 64) projected onto a film screen. The color descriptions are based on Maerz & Paul (1950). In some slides, parts of the body are shaded so that it is difficult to assign a pure color to that body part. Therefore, in those cases, the color of the body will be described as a possible variation of a pure color (e.g., whitish, pinkish).

Description of Female A

I estimated her age to be about 15-20 years old. She was typically pot-bellied. Her overall coat was pure white in the sunlight, but in the shade looked "dirty" or white with an overlying penguin coloration.

Head. The skin of her face was entirely black. The fur on the forehead, extending from the top of the orbits to approximately 10 mm above the orbits, appeared whitish. About 8 mm superior to this was a

---

Author's present address: Jardin Zoológico, Calle 77 Carreras 68 y 70, Barranquilla, Atlántico, Colombia.

I would like to thank Lorne Jackson who provided the initial information and Drs. Terence Anthoney, and George Waring for their critical review of the manuscript.

black triangle surrounded by fur of an aztec or indian tan color which darkened to a black cap on the top and back of the head. The black of the cap faded into white as the fur approached the nape and shoulders. The cheek whiskers were whitish near the nose and eyes, but blended laterally to parchment color at the ears.

Arms. The fur on the upper arms was entirely white. That on the anterior, posterior, and lateral (outside) surfaces of the elbows and lower arms was completely black down to and including the hands. Fur on the medial (inside) surface of the lower arms was whitish to the middle before darkening to black, which extended down to the palms. The skin of the palms was black.

Legs. The fur on the anterior, lateral, and medial surfaces of the legs was white except for a long black kneepatch that started about two-thirds of the way down on the thigh and extended down about one-half the way onto the shin. The fur on the posterior surface of the legs was whitish. The fur and skin on the dorsal and plantar surfaces of the feet were entirely black.

Tail. Only the basal third of the tail fur was visible in the slides. On the ventral and dorsal surfaces, the tail was white at the very base which blended within the next 3 mm to a buff color and this continued for the next 10 cm before starting to blend back to white.

Anal-genital region. The perineal skin was baby pink posterior to and including the anal hillock. Anterior and lateral to the anal hillock, the skin was black extending about 1 cm from the edge of the perineal skin on each side, except in the middle, where the pinkish color continued about 3-4 cm anterior to the vagina before darkening into black. The black continued to the anterior-most edge of the perineum. The clitoris was baby pink also, except for a black glans. The fur surrounding the perineum was buff or golden yellow for the first 4 cm, then faded into white.

Description of Female B

I estimated her age to be in excess of 20 years and she appeared to be very old. She was slim, hunchbacked, and had few or no teeth. Her overall coat was pure white, more so than Female A's.

Head. The skin of her face was entirely black. Except for a thin black triangle near the top, the fur on the forehead was a chamois color and extended 2-3 cm onto the top of the head, continued down the side of the head at the ears and onto the nape. There was a black cap on the top and back of the head. The cheek whiskers were white near the face and blended laterally to chamois near the ears.

Arms. The fur on the lateral and posterior surfaces of the upper arms was white until reaching a black patch about 2 cm above the elbows which continued down covering the lateral and posterior surfaces of the lower arms and hands. The fur on the anterior and medial surfaces of the upper and lower arms was completely white until reaching the wrist which was black. The skin of the palms was also black.

Legs. The fur on the anterior, lateral, and medial surfaces of the legs was white except for a black kneepatch that extended about 3 cm above and below and 2 cm around the kneecap. The fur on the posterior surfaces of the legs was entirely white. The fur on the dorsal surfaces of the feet was black. The skin on the plantar surfaces of the feet was black except for two oblong baby pink splotches on the sole of the right foot and one oblong splotch on the sole of the left foot. In addition, the tips of several toes on both feet appeared to be pinkish.

Tail. The tail was completely white, except for the hairless black tail pad and possibly the dorsal fur above the tail pad.

Anal-genital region. The skin of the perineal region was baby pink except for the black glans and a black spot, approximately 2 mm in diameter, on the anterior surface of the clitoris. The surrounding fur was entirely white.

Discussion

Since the geographic origin is unknown, one cannot conclusively assign these two monkeys to a particular species or subspecies. If the white areas were buff or gold at one time, as apparently they were, then one might conclude that they were the Central American species, *A. geoffroyi*. However, they were housed with eight *A. belzebuth hybridus* which complicates this conclusion.

Many authors have noted intra-troop and intra-subspecific color variations (Hill, 1962; Gray, 1870; Hernández-Camacho & Cooper, 1976). In *A. b. hybridus,* specimens characteristically have dorsal pelage ranging from an almond (wood-brown in Hill, 1962) to a date color and ventral pelage ranging from buff to white. A pale dull cream specimen, which Gray (1870) described as a distinct species, *A. albifrons,* was termed a flavistic mutant of *A. b. hybridus* by Hill (1962). Hernández-Camacho & Cooper (1976) mentioned that in certain areas, *A. paniscus hybridus* (=*A. belzebuth hybridus*) have a bleached look, appearing light buffy-gray. In addition, they mention seeing an extremely light, uniformly buffy-colored specimen of the same subspecies. Finally, they report that a completely white-haired specimen with pink skin and blue eyes has been exhibited in the Barranquilla Zoological Gardens in Colombia. This last mentioned specimen seems to be the only other white or albinotic spider monkey that has been reported in the literature.

Hershkovitz (1977) described examples of color variations in *Callimico goeldii* in which some specimens had distinct areas or spots of white hairs. Past authors had suggested that these areas might be due to changes caused by previous injuries (Goeldi & Hagmann, 1904; Thomas, 1904), natural aging (Cruz Lima, 1945), or the retention of juvenile characteristics in the adults (Hill, 1966). Hershkovitz (1977, p. 894) thought that all three explanations were possibly valid, but suggested that perhaps the most likely explanation lay in a case reported by Crandall (1964), where a male and female *C. goeldii* changed from black to white on several parts of the body over a period of one year. Hershkovitz attributed this change to an unseasonal molt induced by a change in climate or conditions in captivity and in which "Old pigmented hairs of parts of skin preconditioned by disease or injury were then replaced by unpigmented hairs." (p. 894). The difference between the Goeldi's marmosets and the spider monkeys is that the color changes on the marmosets occurred, for the most part, irregularly over their bodies, while in the spider monkeys, the patterns of color changes were regular and predictable (i.e., only the previously golden areas changed, not the black areas).

Hershkovitz (1977) also noted that, in captivity, *Leontopithecus rosalia rosalia* sometimes molt from a goldish saturated color to a partial, complete, or variegated whitish color. Based on his observations and literature review, he implied (p. 827 & 846) that these changes might be caused by over or under exposure to ultraviolet irradiation.

The cause of the color changes in the spider monkeys considered in this report is not known. Some factors that might have influenced the changes include over or under exposure to sunlight, improper nutrition, genetic predisposition, and aging. However, I believe that the first two factors are unlikely, since (1) the spacious cage (7.6 m diameter, 15.2 m height--estimated from pictures) they have lived in offers a choice of sun or shade; (2) they have received a nutritious diet of fresh produce and commercial monkey chow for the past 12 years (C. Jackson, pers. comm.); and (3) with the exception of the deceased male, none of the other cage members who have been exposed to the same environmental conditions have yet changed colors, although the possibility remains that they may change in the future.

Two final points should be made. First, if these or similar animals ended up in a museum collection without a background history, an uninformed investigator might mislabel them as partial albinos or even as representing a new subspecies. In fact, Hershkovitz (1949) came across the skin of an albino capuchin monkey which was once labeled a distinct species, *Cebus albus*. Secondly, if further study on these animals were pursued, some insight into the biological mechanisms of slow color change might be attained.

References

Crandall, L. S. *The Management of Wild Animals in Captivity.* Chicago: University of Chicago Press, 1964.

Cruz, Lima, E. d. *Mammals of Amazonia. 1. General Introduction and Primates.* Belém de Pará and Rio de Janeiro: Contribution from the Museu Paraense Emilio Goeldi de Historia Natural E. Etnografia, 1945.

Goeldi, E. A., & Hagmann, G. Prodromo de um catalogo crítico, commentado da colleccão de mammiferos no museu do Pará (1894-1903). *Boletin del Museu Goeldi Historia Natural Etnografia,* 1904, *4*, 35-106.

Gray, J. E. *Catalogue of Monkeys, Lemurs, and Fruit-eating Bats in the Collection of the British Museum.* London: British Museum of Natural History, 1870.

Hernández-Camacho, J., & Cooper, R. W. The nonhuman primates of Columbia. In R. W. Thorington, Jr. & P. G. Heltne (Eds.), *Neotropical Primates: Field Studies and Conservation.* Washington, DC: National Academy of Sciences, 1976. Pp. 35-69.

Hershkovitz, P. Mammals of northern Colombia. Preliminary report no. 4: Monkeys (Primates), with taxonomic revision of some forms. *Proceedings of the United States National Museum,* 1949, *98*, 323-427.

Hershkovitz, P. *Living New World Monkeys* (Platyrrhini). (Vol. 1) Chicago: University of Chicago Press, 1977.

Hill, W. C. O. *Primates, V. Cebidae, Part B.* Edinburgh: Edinburgh University Press, 1962.

Hill, W. C. O. On the neonatus of *Callimico goeldii* (Thomas). *Proceedings of the Royal Society of Edinburgh, Series B,* 1966, *69*, 321-333.

Kellogg, R., & Goldman, E. A. Review of the spider monkeys. *Proceedings of the United States National Museum,* 1944, *96*, 1-45.

Maerz, A., & Paul, M. R. *A Dictionary of Color* (2nd ed.). New York: McGraw-Hill, 1950.

Thomas, O. New *Callithrix, Midas, Felis, Rhipidomys,* and *Proechimys* from Brazil and Ecuador. *The Annals and Magazine of Natural History, Series 7,* 1904, *14*, 188-195.

VARIATIONS IN THE GROWTH OF LITERATURE ON DIFFERENT PRIMATES DURING THE 1970's

Maryeva W. Terry

University of Washington

About 27,000 of the more than 60,000 records in the bibliographic data base maintained by the Primate Information Center (PIC) describe primatological and biomedical studies of nonhuman primates published between 1970 and 1979. As these records were created, the primate species discussed in each publication were described in a standard vocabulary. For reasons related to the design of the PIC's computer system, the frequency with which each generic and species name occurred in the records for publication year 1970 and later was determined in 1974 and again in January, 1980. A record mentioning more than one species of a genus was counted once for the genus and once for each species.

A casual comparison of the results of the two countings suggested that while the number of records per publication year had remained fairly constant throughout the decade, the rate of literature growth had not been constant for all kinds of primates. A growth ratio for the literature on each genus was therefore calculated by dividing the number from the first counting into the increment revealed by the second and rounding the result to the nearest tenth. When a frequency distribution of the resulting ratios was plotted, 23 of the 52 genera clustered at the center of the distribution, where the arithmetic mean also fell. The extreme ratios were five tenths below and six tenths above the mean.

Table 1 lists the genera with ratios falling above or below the central group. The genera are listed in descending order of the frequencies yielded by the second counting.

Since the frequencies provided no means of distinguishing laboratory research from other forms of scientific study, a list of 34 species for which laboratory reports contribute much of the literature was prepared arbitrarily. Table 2 shows the rankings by descending frequency for the top 15 laboratory taxa in the first and second countings. The genera *Cebus* and *Saguinus* have been included rather than any of their species because many reports of laboratory studies on these animals do not identify the species.

All taxa listed in the right-hand column were mentioned in at least 2 per cent of the records. The rhesus monkey (*M. mulatta*) was mentioned in about 55 per cent of the records, its frequency being a

---

Author's address: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195.

Table 1. Growth of Literature

More than Average	Less than Average
Cercopithecus	Saimiri
Gorilla	Aotus**
Hylobates	Alouatta
Pongo*	
Callithrix*	Microcebus
Presbytis*	Loris
Tupaia	Cheirogaleus
Lemur	Cacajao
Colobus*	Indri
Theropithecus	Arctocebus**
	Chiropotes
Leontopithecus	Phaner
Callicebus	Brachyteles
Nasalis	Rhinopithecus**
Pithecia*	Urogale
	Dendrogale**

*Indicates growth ratio more than three tenths above mean for all genera.

**Indicates growth ratio more than three tenths below mean for all genera.

Note.--Genera above the line in each column were mentioned in more than 1 per cent of records in second counting.

little more than three times greater than that for the second group, the common baboons.

Although neither counting describes exactly the literature for a half decade, the differences between the two lists in Table 2 probably do reflect changing patterns of use over the 1970's. Noteworthy in this regard are the increase in the rank of the cynomolgus macaque (*M. fascicularis*) from fifth to third and the appearance of the common marmoset (*C. jacchus*) on the list derived from the second counting.

Table 2. Rankings of Common Laboratory Taxa[a]

First Counting	Second Counting
Macaca mulatta	Macaca mulatta
Papio cynocephalus	Papio cynocephalus
Saimiri sciureus (-)	Macaca fascicularis
Pan troglodytes	Saimiri sciureus
Macaca fascicularis	Pan troglodytes
Cercopithecus aethiops (+)	Cercopithecus aethiops
Cebus species	Cebus species
Macaca arctoides (-)	Macaca arctoides
Macaca nemestrina	Macaca nemestrina
Aotus trivirgatus (-)	Saguinus species
Saguinus species	Aotus trivirgatus
Erythrocebus patas	Erythrocebus patas
Macaca fuscata	Callithrix jacchus (+)
Tupaia glis	Macaca fuscata
Papio hamadryas (+)	Papio hamadryas

[a]A plus or minus sign in parentheses indicates that the growth ratio for the literature on the species equalled values considered above or below average on the curve for all genera.

Not revealed by the lists is a great narrowing of the gap between the frequencies for the stumptailed macaques (*M. arctoides* and *M. nemestrina*), which were nearly tied for ranking as eighth at the end of the decade. The displacement of the tree shrew (*T. glis*) resulted entirely from very rapid growth of the literature on *C. jacchus* and *P. hamadryas*, the ratio for each being equal to the maximum value on the curve for all genera.

* * *

PREDATION OF BIRDS BY GANG-CAGED RHESUS MONKEYS

M. J. Kessler, R. J. Brown, and T. P. O'Neill

Naval Aerospace Medical Research Laboratory

In response to a recent article by Caine et al., and to the need to document information on unusual behavior of captive nonhuman primates, this article reports on the occasional predatory behavior of gang-caged rhesus monkeys (*Macaca mulatta*) maintained at the Naval Aerospace Medical Research Laboratory, Pensacola, Florida.

Rhesus monkey breeding harems consisting of approximately 10 adult females and 1 adult male were housed in modified dog kennel runs measuring 6.0 m long by 1.2 m wide. The perimeters of each run were constructed of 0.9 m high cinderblock walls and 1.5 m high cyclone fencing extending from the tops of the walls to cyclone fence ceilings. A crawl space of approximately 0.6 m existed between the ceilings of the runs and the roof of the common building. Twenty modified dog kennel runs of this type were contained in the open-air building. The monkeys were housed in 12 to 15 of the total of 20 runs. Routine twice-daily feeding was performed without moving the monkeys out of their respective runs. A complete cleaning and sanitization occurred every 2 weeks at which time an intact harem would be relocated into one of the vacant runs. Thus the vacant run became occupied for the following 2-week period.

Local small birds, mostly various sparrow species, could easily fly through the openings in the cyclone fencing and into the runs. Being free from attack in the vacant runs, the birds apparently became accustomed to using them for flying, perching, and searching for pieces of discarded monkey chow and apple seeds during the early morning hours. Unfortunately for the birds, this behavior led to their ultimate demise, for whenever a harem was changed in location for cleaning, the monkeys would attack and devour the unsuspecting birds as they entered the runs. When animal caretakers would arrive at the building to do their routine chores, they would find the remains: a few bones and scattered feathers. Since in most cases no flesh was found, one could conclude that the monkeys had eaten their prey. This predatory behavior was the routine finding when rhesus were moved from run to run, but not at other times. One could therefore speculate that rhesus monkeys are opportunistic predators.

References

Caine, N., Vanovitz, C., VanTassell, J., Yee, K., & Mitchell, G. Predatory behavior in a captive rhesus monkey. *Laboratory Primate Newsletter*, 1979, *18* [1], 25-26.

First author's address: Caribbean Primate Research Center, PO Box 1053, Sabena Seca, Puerto Rico 00749.

MARBURG VIRUS DISEASE IN KENYA

On January 15, 1980, a 58-year-old man with an 8-day history of progressive fever, myalgia, and backache was transferred from a hospital in western Kenya to the Nairobi Hospital. On admission, he was hemorrhaging from the gastrointestinal tract and from needle puncture wounds. The patient died within 6 hours of admission, despite an attempt by a physician and a nurse to resuscitate him. The postmortem examination showed extensive liver necrosis.

The attending physician, a 29-year-old Ugandan male, became ill on January 24 with fever, malaise, myalgia, joint pains, headache, dry mouth, vomiting, and diarrhea. He also developed jaundice and right upper quadrant tenderness. No rash was seen. Laboratory findings included leukopenia (1,400 white blood cells/mm^3 on day 7) with atypical monocytes, occult blood in the stool, and elevations of serum transaminases and alkaline phosphatase. A laparotomy performed on the 12th day of illness ruled out obstructive jaundice, but a liver biopsy showed microabscesses consistent with a bacterial septicemia. A *Salmonella* organism was isolated from his stool. Indirect fluorescent-antibody tests performed at CDC on paired sera, using an original Marburg isolate as antigen, showed a reciprocal antibody titer rise from 4 to 256. An organism morphologically similar on electron microscopy to Marburg virus was isolated from an acute serum specimen.

Formalinized liver and kidney specimens, taken at the autopsy of the first patient, were reviewed by the National Institute for Virology in Johannesburg, South Africa, and by CDC. These specimens showed histologic features characteristic of Marburg virus disease; also, Marburg-like particles were seen by electron microscopic examination of tissues from both organs. The physician, who is recovering, is believed to have had a mild form of Marburg virus disease complicated by bacterial septicemia.

Approximately 120 persons who had contact with these patients, their tissues, or laboratory specimens were placed under medical surveillance and divided into cohorts, according to the degree of contact and the date of their last exposure. Persons with close contact were placed in strict isolation and under active surveillance; casual contacts were confined to their own homes or to their quarters in the nurses' home. Several contacts became ill, but the diagnosis of Marburg virus disease either was unlikely or was ruled out on the basis of antibody testing.

One such contact, the nurse who assisted with the resuscitation of the index patient, became ill on January 26, 11 days after exposure. She developed fever, malaise, myalgia, sore throat, nausea, and vomiting. On the fifth day of illness, a transient erythematous rash, with subsequent desquamation, was observed on her shoulders and arms. Her

menstrual period, which began during the illness, was markedly prolonged, although heavy bleeding did not occur. Laboratory findings included elevated transaminases, amylase, and bilirubin, and an early drop in white cell count with a relative lymphocytosis. Serum samples collected on days 14 and 26 were negative for Marburg virus antibody, when tested at CDC. The patient recovered after 8 days of illness. Epidemiologic investigations are underway in western Kenya to identify the source of the index patient's infection. [From *Morbidity and Mortality Weekly Report*, 1980, *29*, 145-146.]

* * *

NEW OFFICERS OF ASP ELECTED

The following have been elected officers of the American Society of Primatologists. They will assume office at the meeting in Winston-Salem, North Carolina in June.

President: Irwin S. Bernstein, University of Georgia
Vice President (President Elect): Andrew G. Hendrickx, University of California, Davis
Treasurer: W. Richard Dukelow, Michigan State University
Executive Secretary: David M. Taub, Yemassee Primate Center

* * *

REMINDER OF UPCOMING PRIMATE MEETINGS

Third Meeting of the American Society of Primatologists, Winston-Salem, NC. June 3-5, 1980. For information: Dr. David M. Taub, Dept. of Comparative Medicine, Bowman Gray School of Medicine, Winston-Salem, NC 27103.

VIIIth Congress of the International Primatological Society, Florence, Italy, July 7-12, 1980. For information: Dr. B. Chiarelli, Istituto di Antropologia, Università di Firenze, Via del Proconsolo, 12, 50122, Firenze, Italy.

* * *

NATIONAL PRIMATE PLAN APPROVED

The Surgeon General of the Public Health Service, has approved release of the "National Primate Plan," DHEW Publication No. (NIH) 80-1520.

The National Institutes of Health Interagency Primate Steering Committee was given responsibility for the preparation of a national plan to ensure adequate and continuing supplies of primates for essential biomedical research and health activities. The committee was established by the Assistant Secretary for Health, Department of Health, Education, and Welfare (DHEW) as a result of the critical need for nonhuman primates in biomedical research, along with the difficulty in acquiring many species of these animals. It is charged with developing a unified approach to ensure short- and long-term availability of nonhuman primates. Membership in the committee presently includes representatives from the National Science Foundation, the Department of Defense, the Department of State, the Environmental Protection Agency, the Veterans Administration, and five DHEW components: the Alcohol, Drug Abuse, and Mental Health Administration; the Center for Disease Control; the Food and Drug Administration; the Office of International Health; and the National Institutes of Health, the lead agency. Other agencies such as the Department of the Interior assist the committee on an *ad hoc* basis.

Comments on the proposed plan were solicited in a *Federal Register* notice published February 10, 1978; and on February 2, 1979, an announcement of replies to that solicitation was published. This plan presents recommendations designed to structure, balance, and extend the many already existing programs of the Federal Government and others, together with the development of new programs to ensure that the requirements for nonhuman primates of all essential health activities can be met now and in the future. Specific recommendations include increased conservation measures, additional programs of domestic primate production, and the establishment of international arrangements to ensure a stable supply and long-term availability of primates from their countries of origin.

Copies of the "National Primate Plan" may be obtained by writing to: Executive Director, Interagency Primate Steering Committee, NIH Building 31, Room 4B30, Bethesda, MD 20205.

* * *

THREE MONKEY SPECIES CONSIDERED FOR TRANSFER TO APPENDIX I

Based on information indicating the need to further restrict their trade, the U. S. Fish and Wildlife Service is considering proposing the transfer of the Diana monkey (*Cercopithecus diana* Linnaeus, 1758), the yellow-tailed or Hendee's wooly monkey (*Lagothrix flavicauda*), and the mandrill (*Mandrillus sphinx*) from Appendix II to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). All of these species and one additional primate (subsequently shown to be ineligible) had been included in proposals previously presented by the United States at a Special Working Session of CITES party nations in October, 1977. Although the delegates to the technical meeting endorsed the U. S. proposals, they could not be formally adopted until submitted to the Conference of the parties.

The Service is now seeking information on the status of these animals now listed under Appendix II (those species which, although not now necessarily threatened with extinction, may become so unless trade in them is strictly controlled) to determine whether to proceed with U. S. proposals to place them on the more restrictive Appendix I (those species threatened with extinction which are or may be affected by trade). [Based on a note in the *Endangered Species Technical Bulletin*, 1980, *5* [2], 3.]

* * *

POSITION WANTED BY PHYSICAL ANTHROPOLOGIST

Primate Geneticist (M.A., Ph.D., 1977) with experience in the biochemical genetics, anatomy, and evolution of primates. Seven years University-level teaching experience. Postdoctoral experience in human genetics. Seeking a teaching and/or research position where knowledge and skills in primate genetics is desirable. Contact: David R. Risser, Department of Human Genetics, 1137 E. Catherine St., Ann Arbor, MI 48109.

* * *

OLDEST LIVING CAPTIVE MALE CHIMPANZEE

A male chimpanzee (*Pan troglodytes*), Jimmy, will celebrate his 50th birthday in July of this year. "Jimmy" arrived at the Seneca Park Zoo, Rochester, New York in July of 1931. His age was estimated to be one year and his weight was 18 lb. This is the same animal that Ivan T. Sanderson describes in his book, *The Monkey Kingdom* (p. 156), as "...the most astonishing Chimpanzee ever exhibited....a gigantic male, densely clothed in long silky black hair all over, with beetling brow, large ears and immensely long arms...." Jimmy remains in good physical condition although he has lost some weight. At his prime it was estimated that he tipped the scales at 225 lb. (Frank V. Velte, Assistant Director, Seneca Park Zoo.)

MALASIA: NEW WILDLIFE PROTECTION REGULATIONS REQUIRE EXPORT APPLICATIONS

The Malasian Minister of Science, Technology and Environment announced the following Regulations under the Protection of Wildlife Act of 1972:

1. These Regulations may be cited as the Protection of Wildlife (Trade in Specimens of Species Under Export Ban) Regulations 1980, and shall come into force on the 1st February 1980.

2. These Regulations shall apply to all trade in specimens of species of macaques included in the Schedule to P.U. (A) 172 dated the 9th August 1979 (referred to in these Regulations as scheduled macaques).

3. All applications for export of scheduled macaques shall be in the form in the Schedule. Such applications shall be in triplicate and forwarded for processing through the Director General of Wildlife and National Parks, West Malaysia, at least three months before the earliest date of intended export.

4. The export of scheduled macaques shall require the prior grant and presentation of an export permit which may be granted after: (a) the Director General of Wildlife and National Parks is satisfied that--(i) the scheduled macaques were not obtained in a manner otherwise than in accordance with the Protection of Wildlife Act 1972; and (ii) the scheduled macaques are prepared and transported in such a manner as to obviate risk of injury, health hazards and cruelty; and (b) the Minister is satisfied--(i) that such export is made for the furtherance of *bona fide* scientific research and development beneficial to humanity carried out by institutions supported with public funds as evidenced in writing by the Government of the country of import, or by any international agency of the United Nations Organization; and (ii) the proposed export is not likely to put in jeopardy the maintenance of viable population of the scheduled macaques.

Scheduled macaques include cynomolgus or long-tailed monkeys (*Macaca fascicularis*). The "Schedule," or application for an export permit (which is not reproduced here), is required of the institutions of all users and is something like the Certificate of Need that once was used for permission to import Indian rhesus monkeys (*M. mulatta*), except that it can be obtained from your animal exporter. The form requires indication of Government approval of the research institution, which, in the case of U. S. importers, would be the Department of Agriculture license number and/or a photostat of this document.

* * *

ARISHIYAMA "A" JAPANESE TROOP TO REMAIN INTACT: SUPPORT SOLICITED

We are soliciting tax deductible contributions to maintain the relocated troop of Arashiyama "A" Japnaese monkeys. Their relocation is necessary because the land on which they live is being sold by their previous owner, Mrs. Clementina Dryden, in order to settle her late husband's estate. She has donated the entire troop, two two-bedroom trailer houses, and the current fencing and trapping structures to the Arashiyama West Institute (AWI). AWI is a tax exempt, non-profit corporation formed in Texas to serve as an owner and management organization for the "A" troop. We plan to move the troop to a large ranch south of Dilley, Texas (about 50 miles north of their present location). AWI has been donated a 15-year lease on 100 acres that is protected from curiosity seekers by surrounding ranches. Until research grants or other revenues provide a more secure operating budget, all of the primatologists involved in the project are donating their time. Veterinary services have been offered gratis by two Dilley veterinarians. The National Science Foundation's Division of Behavioral and Neural Sciences has granted us $30,000 to construct a 50 acre, 8 ft. high electrified enclosure at the new site. Both trailers will be set up in close proximity to the enclosure to provide office and living space for researchers. University of Texas, Austin faculty and students contributed about $2,000 and another $6,000 has been given and pledged by interested scientists in the U. S. and Canada. The colony will be relocated in May or June.

Future plans include construction of an adjacent 50 acre enclosure to accomodate an increasing population and to encourage the troop to fission. The troop currently has 260 members with 80 females of breeding age. There were 42 births in the 1979 birth season, and 41 infants survived. We plan to limit colony size by harvesting selected animals for sale to zoos or medical research. There is a steady accumulation of young adult males that will leave the troop spontaneously. We intend to remove kinship units, containing all age and sex categories, and provide them as units to take advantage of our size and geneologies and to do the minimum damage to the remaining kin groups. Proceeds from animal sales will go to colony support.

AWI is a public corporation without obligation to any agency or university that restricts or commits its resources. The facility is primarily a resource for the study of behavior and we welcome inquiries from persons who are interested in using the colony for research or educational purposes. Since AWI is truly a low overhead, nonprofit organization, we need only generate enough income to sustain the colony. Investigators from the U. S., Canada, and Japan are working to establish the facility, and we are hoping to provide a laboratory that meets the problems that most often defeat or confound studies of nonhuman primates.

Advantages of AWI include (1) genealogies (since 1954), (2) social histories, (3) sample size, (4) low cost, (5) animal identification, (6) security, (7) accessibility, (8) on-site lab resources and researcher housing, (9) maximum animal habituation to observation or manipulation.

We estimate that it will cost $10,000 per year for food, veterinary supplies, etc. and we have set a two-year ($20,000) maintenance fund as an immediate goal. The immediate and urgent need is for monetary support from interested primatologists and for proposals for research which generate income. A list of trustees and members of the Executive Committee of AWI may be obtained from the Project Director. Inquiries should be directed to Claud A. Bramblett, Project Director, Department of Anthropology, The University of Texas, Austin, TX 78712.

* * *

CHANGE IN POLICY ON CHARGES BY SIMIAN VIRUSES COLLABORATING CENTER

The WHO and NIH Collaborating Center for Reference and Research in Simian Viruses has been operational for approximately 15 years. Our current work load approximates 5,000-6,000 specimens per year, principally serologic testing for evidence of B virus (*Herpesvirus simiae*) infection.

There have been no charges for the services to those laboratories supported by NIH or other governmental agencies. A fee of $10.00 was charged for serologic testing and $50.00 for virus isolations from those organizations not supported by governmental grants or contracts. This program was first initiated in response to the need for virus diagnostic support to primate users. It is now recognized that this need continues, but that unrestricted use of the service has resulted in an indiscriminate flow of specimens rather than an effort to obtain data as part of a facility's quality control. We still wish to provide the utmost in virology support to all primate laboratories. We are also confident that all investigators recognize that funds are not as free as they previously were and pressure has been exerted for us to change our emphasis from pure diagnostic support to diagnostic research. Accordingly, our future efforts will be geared to developing more specific methodology as well as improved diagnostic methods. We trust you recognize the need.

It has been recommended, therefore, by the Animal Resources Branch, Division of Research Resources, that effective September 1, 1980, we make a change in our policy of charges. As a consequence, the following become effective as of that date:

Serologic testing. A fee of $10.00 will be assessed nonprofit organizations and government supported programs for each serum (regard-

less of the number of tests on that serum) submitted for serologic testing. Commercial organizations will be charged $20.00 for that service.

Virus isolation. A fee of $50.00 will be charged for isolation studies on each animal regardless of the number of specimens on that animal.

Special studies. In general, special problems will need to be evaluated in terms of the work load. However, we will continue to provide diagnostic resources at no charge to those nonprofit and government supported primate facilities in which an unexpected infectious disease outbreak of suspected viral etiology occurs.

From time to time we request specimens for special studies--poxvirus, rotavirus, etc. These are collaborative efforts for which there will be no charge.

* * *

LABORATORY ANIMAL DATA BANK AVAILABLE

A new online information resource is now available to biomedical researchers--the Laboratory Animal Data Bank (LADB). It was developed by the National Library of Medicine acting on behalf of the Department of Health, Education, and Welfare's Committee to Coordinate Environmental and Related Programs, and several other government agencies. (National Cancer Institute, National Center for Toxicological Research, Environmental Protection Agency, and the Interagency Regulatory Liaison Group.)

The LADB allows scientists to have rapid access to information about laboratory animals used in experiments. Included are baseline data on physical characteristics and control measurements as well as data on hematology, pathology, environment, and behavior. Using LADB, scientists may (1) select and examine baseline data for various physiologic and biologic values; (2) determine the environmental and husbandry conditions for each animal group selected; (3) evaluate pathologic changes in animals; (4) statistically analyze the retrieved data; and (5) print out the data as distributions (such as histograms or data tables) and as complete reports.

As of January 14, 1980, when it became available to the scientific community, LADB contained data on 754,388 observations from 229 animal groups (29,294 animals of 64 strains/species). Information to enlarge the data bank continues to be contributed voluntarily by the pharmaceutical industry, government agencies, and other types of institutions throughout the country. At present the data bank is being accessed from computer terminals in 20 institutions in the United States, a figure

that is expected to exceed 100 over the next year. Those now using the system include scientists in government agencies, academic institutions, and pharmaceutical companies, and animal breeders. The LADB data are in the computers of Battelle Columbus Laboratories. The TYMNET network provides the communication link to the data bank. Battelle Columbus Laboratories was the major contractor to the National Library of Medicine in the development of LADB over a four-year period.

Under current user agreements, there are two types of users. The *offline* user telephones the LADB Search Center in Columbus, Ohio to request a search and analysis. The charge ranges from about $50 to $250, depending on the complexity of the request and the amount of professional assistance required. The *online* user has direct computer access via TYMNET. The per-hour cost is about $20. Although LADB is not part of the National Library of Medicine's MEDLARS/MEDLINE network, user agreements and collection of user charges are similar to those used for that system.

Further information about the Laboratory Animal Data Bank, including an application kit, may be requested from: LADB Project Office, National Library of Medicine, Bethesda, MD 20209 (Phone: 301-496-5023).

* * *

CAGES AND CHAIR FOR SALE

12 cages (6 double sets) of Wahmann LC-109 rear draining cage sets for monkeys. Galvanized cages with stainless steel drip pans and drain troughs 30" wide, 40" deep, 32" high. Price negotiable FOB Holland, Michigan. Primate restraint chair and stand (complete) Plaslabs. Lansing, Michigan. Price $500 FOB Holland, Michigan. Contact: Dr. James P. Motiff, Department of Psychology, Hope College, Holland, MI 49423 (Phone: 616-392-5111).

* * *

LABORATORY PRIMATE NEWSLETTER QUARTERLY SURVEY: FOURTH QUARTER 1978

The present report is one of a series summarizing data from the quarterly surveys being conducted by the *Laboratory Primate Newsletter*. The data in Tables 1 and 2 are based on reports from the following facilities: California, Washington (including the Field Station), Wisconsin Regional Primate Research Centers, Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), National Institutes of Health (including both the Primate Quarantine Unit and the Primate Research Units), the Southwest Foundation for Research and Education (excluding morbidity data), and the University of Texas System Cancer Center. (See the Jan., 1980 issue for the previous survey report.)

TABLE 1. MORTALITY SUMMARY BY SYSTEM: OCT. 1-DEC. 31, 1978

SPECIES	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes				1				1				
Macaca arctoides						2						
M. fascicularis	1			1		1			1		1	1
M. mulatta	1			11[a]		23	2			1	4	10
M. nemestrina	15	3		11		46	5	1	2		15	
M. radiata	4			1	1	6	1					1
Papio cynocephalus	1			2			1				1	
P. hamadryas	1											
P. spp.	24			11		16	2	1			2	
Saimiri sciureus						1						
Cebus apella	2											9
Callithrix jacchus	20											
Saguinus labeatus	3											3
S. nigricollis						1						
S. oedipus	11											
TOTALS	83	3	0	37	1	96	11	3	3	1	23	24

[a]Includes 1 Tuberculosis

TABLE 2. CENSUS, NUMBER OF BIRTHS, AND MORBIDITY SUMMARY BY SYSTEM: OCT. 1-DEC. 31, 1978

SPECIES	Census	Births	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes	232	1	1	1	1	3		2	1					
Macaca arctoides	42	1		1			1	11					2	
M. fascicularis	434	16	8	8	10	11	3	15	2	3			26	4
M. mulatta	4463	60	3	54	42	130	20	193	58	12	5		100	11
M. nemestrina	1135	72	22	5	7	25		122	15	3	1		6	
M. radiata	351	1		4	4	6	1	32	4	5	1		3	7
Erythrocebus patas	5													
Papio cynocephalus	194		12	1	4	3	9	16	5				14	1
P. hamadryas	129													
P. papio	30													
P. spp.	1838	126						7						
Saimiri sciureus	231	2			1	1	1	2		1			2	1
Cebus apella	44	1												
C. spp.	30													
Aotus trivirgatus	100													
Callicebus moloch	43			3	2			1					3	
Callithrix jacchus	125	20												
Saguinus labeatus	35													
S. oedipus	38													
TOTALS	9499	300	46	77	71	179	35	401	85	24	7	0	213	24

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

Books

The Human Model: Primate Perspectives. Harry F. Harlow & Clara Mears. Washington, DC: Winston, 1979. (Distributed by Halsted Press Division of Wiley.) 312 pp.

Contains many of the significant articles, reproduced in full or excerpted, of Harry F. Harlow, who has been making outstanding contributions to the field of experimental study of nonhuman primate behavior for the past 50 years. A number of the articles were rewritten to include more recent findings. Contents: PART I. THE LEGEND OF LEARNING. 1. The development of primate testing. 2. The development of learning. 3. The evolution of learning. 4. Learning to learn. PART II. THE MEANING OF MOTIVES. 5. The matrix of motives. 6. Monkeys, mice, men, and motives. 7. The nature of love. 8. The nature of love simplified. 9. The power and passion of play. PART III. THE LOVES OF LIFE. 10. The linkage of loves. 11. The basic tryad. 12. Peer persuasions. 13. Heterosexual love. PART IV. THE PRICE OF PATHOLOGY. 14. Pathological perspectives. 15. Broken bonds. 16. The hell of loneliness. 17. Love restored.

Contributions to Primatology. Vol. 14. *Functional Morphology of Forelimb Joints in the Wooly Monkey* Lagothrix lagothricha. Linda K. Ziemer. Basel: Karger, 1978. Soft cover. 130 pp. [Price: DM 93. Approx. $47]

I. Introduction. II. Materials and Methods. III. Findings. Shoulder complex; Elbow complex and radioulnar joints; Hand complex; Metacarpophalangeal joints; Interphalangeal joints. IV. Discussion. V. Correlation of the morphology of forelimb joints with the use of the forelimb in positional and prehensile activities. Appendix A. The MacConaill structurofunctional framework for joint studies. Appendix B. Stabilization of bones in their reference positions.

Contributions to Primatology. Vol. 15. *External Neuroanatomy of Old World Monkeys (Cercopithecoidea).* D. Falk. Basel: Karger, 1978. Soft

---

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

cover. 96 pp. [Price: DM 71. Approx. $36]

I. Introduction. II. Historical Overview. III. Materials and Methods. IV. Theoretical foundations for interpreting sulcal patterns. V. Morphology of Cercopithecoid endocasts. A. Colobinae. B. Cercopithecinae. C. Relationship between sulci and brain size. D. Asymmetry in brains of Cercopithecoids. E. Generic differences in cortex. F. Differences in sulcal patterns of Colobines and Cercopithecines. VI. Interpretation of endocast morphology. A. Cortical asymmetry. B. Generic differences in brain morphology. C. Colobines and cercopithecines. D. Evolutionary trends. VII. Conclusions.

Disease

Biological hazards in the nonhuman primate laboratory. Prepared for Office of Biohazard Safety, National Cancer Institute, by Enviro Control, Inc., Rockville, MD, 1979. 39 pp. [Copies may be obtained free of charge from: Safety Information Office, Box B, Frederick Cancer Research Center, Fort Detrick, Frederick, MD 21701.]

This monograph was prepared to assist investigators and their professional and technical staff in recognizing the potential biohazards that may be encountered in the nonhuman primate laboratory, to provide guidance in the implementation of appropriate control and containment measures, and to safeguard not only the laboratory worker, but the experimental animals and the general community as well. The monograph is not intended to provide a procedural laboratory manual or a comprehensive discussion of all the infectious agents that may be encountered. The agents mentioned are those generally considered to be the most hazardous, and serve as examples that should provide the basis for establishing fundamental concepts in the control and containment of biohazards.

Protection against *Klebsiella pneumoniae* respiratory tract infection of mice and squirrel monkeys given kanamycin by aerosol and injection. Berendt, F. R., Schneider, M. A., Young, H. W., & Frola, F. R. (U. S. Army Med. Tes. Inst. of Infect. Dis., Fort Detrick, Frederick, MD 21701) *American Journal of Veterinary Research,* 1979, *40*, 1231-1235.

Squirrel monkeys treated with aerosol of kanamycin at a dose level of 11.25 mg/kg were completely protected against *K. pneumoniae* exposure at 6 and 24 hours, whereas only one of eight monkeys treated with the same dose given IM survived the exposure at 6 hours and none survived at 24 hours. Antibiotic clearance curves indicated that kanamycin remained in the lungs at higher concentrations and for longer periods after aerosol treatment than after IM treatment.

An oral disease resembling noma in six rhesus monkeys (*Macaca mulatta*). Adams, R. J., & Bishop, J. L. (Div. of Comp. Med., The Johns Hopkins University Sch. of Med., 720 Rutland Ave., Baltimore, MD 21205) *Laboratory*

Animal Science, 1980, *30*, 85-91.

Over a 19-month period, 5 rhesus monkeys developed oral lesions of gingival erosion and bone denudation with sequestration. One other rhesus monkey developed facial necrosis which communicated with the oral cavity. These lesions were consistent with those seen in the disease called noma (cancrum oris) in humans.

Measles in monkeys: An epidemiological study. MacArthur, J. A., Mann, P. G., Oreffo, V., & Scott, G. B. D. (Fourth author: Dept. of Histopathology, Royal Free Hosp., Sch. of Med., London NW3, England) *Journal of Hygiene (Cambridge)*, 1979, *83*, 207-212.

This study describes aspects of measles in nonhuman primates. Monkeys infected before importation are shown to produce non-immune offspring in captivity in England. The high antibody titres found in most recently imported monkeys decline slowly during captivity in England. While measles is often fatal to monkeys, we have described an outbreak in which a number of symptomless infections occurred. Histological examination of fatal cases produced evidence of infection in the wall of the urinary bladder in one monkey. The close similarity between measles in humans and monkeys has been confirmed. It is considered that the study of infection among the latter may have significance for the former.

Some aspects of cross infection presented by primates. Southee, T. J. (Dept. of Clin. Virology, Guy's Hosp., London SE1 9RT, England) *Journal of the Institute of Animal Technicians*, 1979, *30*, 17-21.

Paper draws attention to the potential viral hazards of working with primates and primate tissue.

Therapeutic efficacy of vitamin E and selenium in treating hemolytic anemia of owl monkeys (*Aotus trivirgatus*). Sehgal, P. K., Bronson, R. T., Brady, P. S., McIntyre, K. W., & Elliott, M. W. (New England Reg. Prim. Res. Ctr., One Pine Hill Dr., Southborough, MA 01772) *Laboratory Animal Science*, 1980, *30*, 92-98.

Hemolytic anemia was the major cause of death in a colony of owl monkeys, *Aotus trivirgatus*, maintained at the New England Regional Primate Research Center. The roles played by vitamin E and by selenium in the anemia of owl monkeys were studied by injecting a mixture of the two antioxidants in 17 anemic monkeys. The result was an increse in mean hemoglobin concentration from 8.6 ± 2.2 to 11.9 ± 2.5 g/dl; in 13 of these monkeys with typically elevated numbers of circulating nucleated erythrocytes, the mean number of such cells per 10^2 leukocytes declined from 50.1 ± 49.9 to 0.6 ± 1.2. Injections of vitamin E alone in eight monkeys were less consistently effective; selenium administered alone to nine monkeys had no therapeutic effect. Neither anemic nor normal owl monkeys were deficient in serum vitamin E, plasma selenium, erythrocyte glutathione peroxidase or other related erythrocyte enzymes. Oral administration of vitamin E brought about

no increase in serum levels of the vitamin, but hemolysis of erythrocytes in dialuric acid decreased from 18.6 ± 15.8% to 1.0 ± 0.03%. Selenium therapy brought about increased plasma selenium in two of three experiments, but glutathione peroxidase, which is selenium dependent, did not increase.

Physiology

Persistence of sexual behavior in ovariectomized stumptail macaques following dexamethasone treatment or adrenalectomy. Baum, M. J., Slob, A. K., de Jong, F. H., & Westbroek, D. L. (A. K. Slob, Dept. of Endocrinology, Growth & Reprod., Faculty of Med., Erasmus Univ., Rotterdam, The Netherlands) *Hormones and Behavior*, 1978, *11*, 323-347.

Three experiments are reported which suggest that sex steroids are normally not required in the female stumptail macaque for activation of proceptive and receptive sexual behaviors or for maintenance of sexual attractivity.

Ontogeny of the visual evoked response in the stump-tailed macaque. Dustman, R. E., Snyder, E. W., Creel, D., & Beck, E. C. (R. E. Dustman, Neuropsychology Res., Vet. Admin. Hosp., Salt Lake City, UT 84148) *Developmental Psychobiology*, 1979, *12*, 161-167.

Visual evoked responses (VER's) of stumptailed macaques were studied from birth to 80 weeks in an attempt to establish the utility of this species as a model of human neurophysiological development. Although human subjects and monkeys share a unique complexity of the VER at birth, the postnatal development of their VER's does not appear to follow a parallel sequence. The relatively dynamic nature of the VER during the first few weeks in a monkey's life may limit the usefulness of this species as a model of human development. The rapid changes in the VER of the developing monkey and the observation that these changes continue beyond 2 years of age should be considered in studies of the VER in which repeated measures are obtained over a prolonged period of time.

Visual evoked potentials in monkeys. Snyder, E. W., Beck, E. C., & Dustman, R. E. (Vet. Admin. Med. Ctr. & Univ. of Utah Coll. of Med., Salt Lake City, UT 84148) *Electroencephalography and Clinical Neurophysiology*, 1979, *47*, 430-440.

Visual evoked potentials (VEPs) were recorded from 2 cortical sites in stumptailed macaques. VEPs recorded from striate cortex were basically consistent between animals (especially at low light intensity), remained remarkably stable over time, and compared favorably to VEPs reported by other investigators.

Supernumerary epiphyses in the macaque (*Macaca nemestrina*). Newell-Morris, L., Seed, J., Tarrant, L., & Fahrenbruch, C. (Dept. of Orthodontics (SM-46), Sch. of Dentistry, Univ. of Washington, Seattle, WA

98195) *Journal of Medical Primatology*, 1979, *8*, 338-348.
The frequency, age distribution and development of supernumerary epiphyses in the hand and foot were radiographically documented in 98 macaque fetuses and infants. Extra epiphyses were observed only on distal metacarpal 1 and metatarsal 1, and were present in 15% of a cross-sectional sample and 20% of a longitudinal sample. They appeared coincidentally with the ossification of other secondary epiphyses of the hand and foot. Development of extra epiphyses in this species seems to be a normal phenomenon.

Selection and pairing of 'normal' rhesus monkeys (*Macaca mulatta*) for research: Procedures, techniques, and observations. Kessler, M. J., Kupper, J. L., Grissett, J. D., & Brown, R. J. (Matthew J. Kessler, Caribbean Primate Res. Ctr., PO Box 297, Sabena Seca, PR 00749) *Journal of Medical Primatology*, 1979, *8*, 365-371.
A selection process has been developed by the authors to insure investigators that animal subjects used in their experiments will accurately reflect biological changes associated with the project design. The procedure involved the following: complete physical examination; complete hemogram, serum electrolytes, serum biochemistry, body weight; and anthropometric determinations; aging by dentition; electrocardiography; total-body radiography; fecal culture; fecal ova and parasite examinations; and examination of other conditions. Arithmetic means and standard deviations were calculated and used to eliminate monkeys whose values varied from the mean by more than two standard deviations.

Weights and heights of stump-tailed macaques (*Macaca arctoides*) living in colony groups. Harvey, N. C., Rhine, R. J., & Bunyak, S. C. (N. C. Harvey, Dept. of Psychology, Univ. of Calif., Riverside, CA 95202) *Journal of Medical Primatology*, 1979, *8*, 372-376.
Weights and heights of adults, week-old infants, and animals of intermediate ages were obtained from colony groups of stumptailed macaques and are compared with similar measurements of rhesus, Japanese macaques, and other stumptailed monkeys.

Blood groups of Old World monkeys, evolutionary and taxonomic implications. Moor-Jankowski, J., & Socha, W. A. (Lab. for Exp. Med. Surg. in Primates, New York Univ. Med. Ctr., New York, NY 10016) *Journal of Human Evolution*, 1979, *8*, 445-451.
For practical purposes two classes of blood groups of Old World monkeys can be distinguished: human-type and simian-type, depending on the kind of reagents used for testing. Of the human-type blood groups, only the A-B-O groups, defined by saliva inhibition and serum tests, are polymorphic in some, but not all, monkey species. The distributions of those groups show wide differences not only among monkey species but also among troops of one and the same species. The tests for other human-type antigens give with the monkey red cells either uniformly positive or uniformly negative results. Thus, the human-type blood

groups seem to be of limited use as taxonomic tools in the systematics of the Old World monkeys. On the other hand, the simian-type blood groups, defined by iso- or crossimmune monkey sera, display highly polymorphic patterns in most species of Old World monkeys, and the capability of the antisera to react with combining groups on the red cells of monkeys of closely related species seems to reflect the taxonomic closeness of two or more species. The fact that some of the simian-type specificities, notably those belonging to the rhesus Drh graded blood group system, are shared by many species of Old World monkeys, indicates that they were introduced into genotypes during early stages of evolution of the Cercopithecidae.

Blood groups of anthropoid apes and their relationship to human blood groups. Socha, W. W., & Moor-Jankowski, J. (Lab. for Exp. Med. Surg. in Primates, New York Univ. Med. Ctr., New York, NY 10016) *Journal of Human Evolution*, 1979, *8*, 453-465.

Affinity between blood groups of man and those of anthropoid apes is reflected not only in similarities or identities of reactions of the red cells with many specific typing reagents, but also in overall structures of some of the main blood group systems defined in man and in apes.

Behavior

Aspects of infant socialization, attachment, and maternal caregiving patterns among primates: A cross-disciplinary review. McKenna, J. J. (Dept. of Sociol. & Anthropol., Pomona Coll., Claremont, CA 91711) *Yearbook of Physical Anthropology*, 1979, *22*, 250-286.

During the last decade, research conducted in both the laboratory and field setting on maternal caretaking patterns and the biosocial factors influencing infant development have been examined from the perspectives of many different disciplines. So much data has accumulated that it is virtually impossible to keep up on all major theoretical developments in these areas. This paper critically reviews a sampling of recently published research (some of which emerges from earlier works), especially that relating to socialization, attachment, recognition of mother, the neurological substrates of learning, the effects of mother-loss, alloparenting, and recent data on prosimian maternal care. The confluence of data from different fields suggests that several traditional questions commonly asked in studies of primate maternal systems ought to be refocused in specific ways. Evolutionary models including kin selection hypothesis are discussed, especially as they are applied to explanations of parent-offspring conflict and alloparenting behavior. Competing and alternative hypotheses that relate to maternal care are presented. It is suggested that primate behavioralists are still far from being able to define species-specific behaviors.

Pharmacology and Anesthesia

Anaesthetic effects of various ratios of ketamine and xylazine in rhesus monkeys (*Macaca mulatta*). Naccarato, E. F., & Hunter, W. S. (Southern Illinois Univ. Med. Sch., Carbondale, IL 62901) *Laboratory Animals*, 1979, *13*, 317-319.

Intramuscular injection of selected ratios of ketamine and xylazine provided smooth anesthetic induction, a wide safety margin, and no significant undesirable side effects. Induction and recovery times, duration of anesthesia, and thermoregulatory ability can be affected by different combinations of ketamine and xylazine. The addition of xylazine to ketamine increases muscle relaxation, recovery time, and duration of anesthesia, while generally decreasing induction time and thermoregulatory ability.

Facilities and Care

Committee on Laboratory Animal Records, National Academy of Sciences, *Laboratory Animal Records*. Washington, DC: National Academy of Sciences, 1979. 67 pp. [Free copies available from: Institute of Laboratory Animal Resources, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, DC 20418.]

The goal of this report is to specify a recordkeeping system for primates, though such a system is applicable to other species as well. The premise is that an effective records system would be needed to meet the objectives of efficient management of colonies and the achievement of captive self-sustaining populations. The report attempts to identify the basic information that should be shared among primate research and breeding institutions and items that should have standard nomenclature. It also defines information that is useful for local colony management and defines specific and routine colony procedures that can be easily recorded. Accumulation of such data is expected to enable compilation of basic demographic profiles that are currently unavailable at most primate colonies.

7 percent fiber diet improves monkey health during quarantine. Morin, M. L. (Primate Res. Unit, NIH, Bethesda, MD 20205) *Lab Animal*, 1980, *9* [2], 33-41.

Feeding an open formula nonhuman primate diet with 7 percent crude fiber to 1000 rhesus monkeys in quarantine resulted in a lower incidence of intestinal disorders, lower numbers of treatment days for intestinal disorders, and a lower mortality rate than when feeding similar groups of rhesus monkeys a diet containing 2.2 percent crude fiber. This application of an open formula diet led to a better understanding of the rhesus monkeys' requirement for crude fiber and improved their health. Additional studies using similar methods should be carried out to further identify the nutrient requirements of nonhuman primates.

Breeding

Breeding and hand-rearing mandrills *Mandrillus sphinx* at Portland Zoo. Littlewood, A., & Smith, J. (Washington Park Zoo, 4001 S. W. Canyon Rd., Portland, OR 97221) *International Zoo Yearbook*, 1979, *19*, 161-165.

In a four-year period 2 female mandrills have given birth to six infants, including one set of twins. All but the first infant survived; three were hand-reared (two, the twins, having been sent to another zoo; one returned to the troop) and both adult females are currently nursing.

Reproduction and development of the Black howler monkey *Alouatta caraya* at Columbia Zoo. Shoemaker, A. H. (Riverbanks Zoological Park, Columbia, SC 29210) *International Zoo Yearbook*, 1979, *19*, 150-155.

Information is provided on care and development of two black howler monkey infants.

Hand-feeding parent-reared Golden lion tamarins *Leontopithecus rosalia rosalia* at Monkey Jungle. Dumond, F. V., Hoover, B. L., & Norconk, M. A. (Monkey Jungle, PO Box 246, Goulds, FL 33170) *International Zoo Yearbook*, 1979, *19*, 155-158.

Male twin golden lion tamarins were hand-fed from Day 3-58. The method used was relatively problem free with the key to success apparently a close rapport established with the mother during the 30 days prior to birth of the twins.

Training an unrestrained orang-utan mother *Pongo pygmaeus* to permit supplemental feeding of her infant. Fontaine, R. (Monkey Jungle, PO Box 246, Goulds, FL 33170) *International Zoo Yearbook*, 1979, *19*, 168-170.

This report describes a successful training program designed to teach 'Suzie', an otherwise competent adult female orang-utan with a past history of inadequate milk production and active resistance to attempted supplemental infant feeding, to permit attendants to deliver necessary food supplements to her infant.

The breeding and management of Black lemurs *Lemur macaco macaco* at St. Louis Zoo. Frueh, R. J. (St. Louis Zoological Park, St. Louis, MO 63110) *International Zoo Yearbook*, 1979, *19*, 214-217.

This paper summarizes information on housing, care, and breeding of a colony of black lemurs which currently number 28 animals. Two females and a male formed the nucleus of the colony that has so far produced 14 first generation, 26 second generation, and 4 third generation births.

Estrogen and luteinizing hormone secretion in diverse primate species from simplified urinary analysis. Hodges, J. K., Czekala, N. M., & Lasley, B. L. (J. K. Hodges, Res. Dept., PO Box 551, San Diego Zoo,

San Diego, CA 92112) *Journal of Medical Primatology*, 1979, *8*, 349-364.
A practical approach for monitoring urinary estrogen and luteinizing hormone (LH) in various primate species is described. Total immunoreactive estrogen (E_t) levels, measured without chromatography, provided a convenient estimation of estrone, estradiol and estriol as the sum of their separated parts. Bioactive LH in urine was measured by the rat interstitial cell testosterone (RICT) *in vitro* bioassay. Correction for urinary creatinine content allowed for the comparison of hormone production from small volumes of urine collected from single daily voidings. Using these methods, urinary E_t and LH profiles through the reproductive cycles of a human, gorilla, chimpanzee and capuchin monkey have been determined.

Vital statistics from a laboratory breeding colony of squirrel monkeys (*Saimiri sciureus*). Rasmussen, K. M., Ausman, L. M., & Hayes, K. C. (Div. of Nutritional Sci., Savage Hall, Cornell Univ., Ithaca, NY 14853) *Laboratory Animal Science*, 1980, *30*, 99-106.
An analysis of 512 pregnancies that occurred over a 9-year period in a laboratory colony of squirrel monkeys revealed year-to-year variation in pregnancy outcome and birth weight. Although births occurred through the year, 72% were between May and August. Male infants outnumbered females 1.31:1 and were heavier at birth. Birth weight was an important determinant of infant survival. Maternal age did not affect birth weight in this sample. Dams present in the colony for long periods tended to deliver smaller infants with a decreased potential for survival. Reproductive causes contributed to 48% of the maternal deaths. Hemorrhage at or near the time of delivery was the principle cause of maternal reproductive mortality. Most neonatal deaths were attributable to accident, prematurity or trauma.

Ovulation detection and control relative to optimal time of mating in nonhuman primates. Dukelow, W. R. (Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48823) *Symposia of the Zoological Society of London*, 1978, *43*, 195-206.
Adaptation of feral nonhuman primates to captive breeding conditions requires an appreciation of the animal's reproductive biology as well as knowledge of its response to captivity. Adaptation to captivity, as evidenced by normal cyclicity, requires from nine to 24 months in nonhuman primates and patterns of seasonality, although attenuated and often shifting temporally, will persist for many years. In the squirrel monkey, the seasonal response is very pronounced but ovulation and pregnancy can occur throughout the year by the use of exogenous hormones. Detection of ovulation and prediction of probable ovulation are important in breeding programs. Laparoscopy provides a quick and easy method of detecting and predicting ovulation, but other methods, including hormonal assay, can be utilized. Varying

systems of mating can be utilized, on an experimental basis, to determine the optimal time for mating to yield a pregnancy. Traditionally zoo animals have been housed continuously in pairs or harem groups to provide maximum opportunity for mating and pregnancy while at the same time providing a "family group" display. The same approach applies to large troops of primates in compounds. In the caged environment females are housed separately or in small groups and exposed to the male for limited periods of time. This strategy, termed "timed mating", provides valuable data for teratological studies and is also applicable to the breeding of primates in captivity. The present study concerns analysis of 144 "timed" pregnancies from two species of macaques where male-female exposure ranged from 20 min to 24 hours. Using extremely short periods of exposure (20-30 min) a conception rate of about 19% (i.e., 5.26 matings per conception) can be expected. With longer exposure times the conception rate increases. In determining the optimal time for mating, the day of breeding to cycle length (DB/CL) ratio was calculated. Optimal DB/CL ratios for successful pregnancies were 0.41 ± 0.05 (mean ±s.e.), and 0.45 ± 0.04 for the stumptailed macaque and the cynomolgus macaque respectively. Ovulation occurs, on a corresponding scale, at 0.48 ± 0.08 in the latter species.

Maturation and in vitro fertilization of follicular oocytes of the squirrel monkey (*Saimiri sciureus*). Kuehl, T. J., & Dukelow, W. R. (Dukelow: Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48824) *Biology of Reproduction*, 1979, *21*, 545-556.

These studies were conducted to examine the procedures and variables of an in vitro fertilization system used to provide embryos for developmental studies in the squirrel monkey, *Saimiri sciureus*. During these trials, conducted over the past 5 years, 745 oocytes were aspirated from 2168 follicles (34.4% recovery rate). Of these oocytes 137 (18.4%) were atretic. Of the remaining 608 oocytes, 38% matured to the metaphase II stage. Differences in aspiration procedures did not affect maturation or in vitro fertility. Male squirrel monkeys used to supply semen were of significantly differing fertility. Volumes and cellular composition of follicular fluid were determined for 4 sizes of follicles and of these the smallest (1 mm diameter) follicles yielded significantly higher proportions of atretic ova. The highest in vitro fertilization rates occurred with 5% CO_2 in air with a TC-199 medium containing both pyruvate and serum proteins. Addition of either 10 or 100 mIU of insulin to this culture medium did not alter in vitro maturation or fertilization, but did significantly reduce the formation of monolayers of follicle cells.

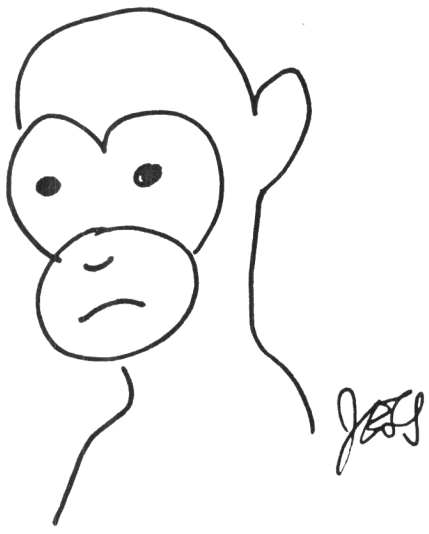
* * *

PATHOLOGY OF LABORATORY ANIMALS COURSE

The "Pathology of Laboratory Animals" course will be conducted at the Armed Forces Institute of Pathology (AFIP) from August 11 to 15, 1980. Military and federal service employees in the veterinary and other medical science fields are requested to consult their agency regulations for appropriate application procedures. Civilian veterinarians and allied scientists are invited to apply and will be considered on a space available basis.

All applications must be received by August 1, 1980 and may be made by writing to: The Director, Armed Forces Institute of Pathology, ATTN: AFIP-EDE, Washington, DC 20306. Upon application, non-federal and foreign national registrants are required to submit a $125.00 fee, payable to the Treasurer of the United States.

* * *



'"STAR WARS". "STAR TREK". NO, MY FAVORITE SCIENCE-FICTION MOVIE IS STILL "PLANET OF THE APES"!'

ADDRESS CHANGES

Robert Cederquist
Department of Orthodontics
School of Dentistry
Case Western Reserve University
2123 Abington Rd.
Cleveland, OH 44106

Brunetto Chiarelli
Institute of Anthropology
Via del Proconsolo, 12
50122 Firenze, Italy

Robert G. Geil
3030 S. 9th St.
Kalamazoo, MI 49009

Albert M. Jonas
Tufts Veterinary School
Tufts University
Boston, MA 02111

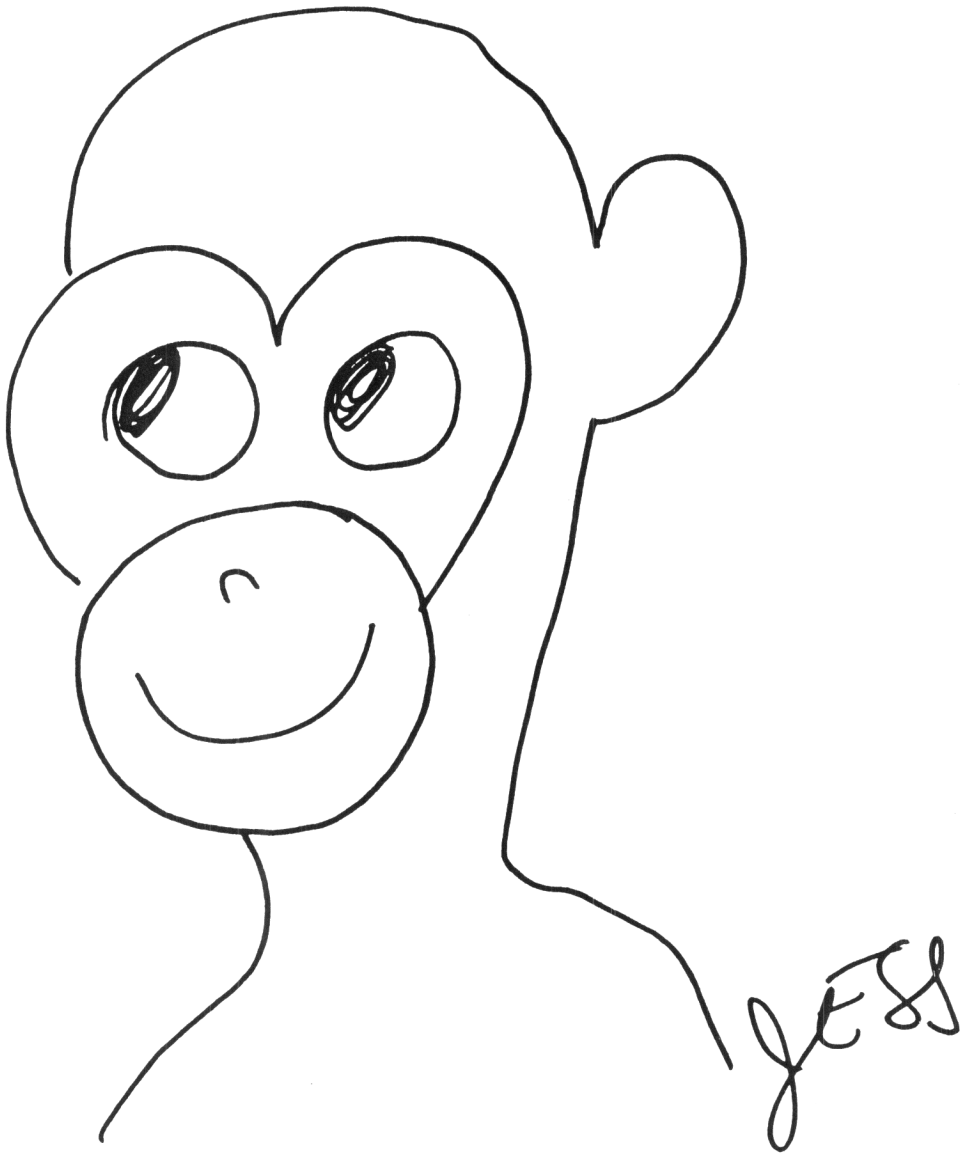
Russell A. Mittermeier
Department of Anatomical Sciences
Health Sciences Center
Stony Brook, NY 11794

Charles A. Montgomery, Jr.
Department of Pathology
Uniformed Services University of
the Health Sciences
School of Medicine
4301 Jones Bridge Rd.
Bethesda, MD 20014

Carl C. Smith
Department of Medical Biophysics
Ontario Cancer Institute
500 Sherbourne St.
Toronto, Ontario, Canada M4X 1K9

James F. Taylor
Veterinary Medical Division
US Army Biomedical Laboratory
Aberdeen Proving Ground, MD 21010

* * *



'PIGTAIL MACAQUES GET AN AUTOMATIC "10"!'