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POLICY STATEMENT

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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $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.

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LONGEVITY OF A COLONY OF *PERODICTICUS POTTO IBEANUS*

U. M. Cowgill and L. B. Zeman

University of Pittsburgh

Late in 1959 three pairs of fully mature *Perodicticus potto ibeanus* Thomas, 1910 arrived at Yale University.[1] In January of 1964, two of the pairs were given to the first author and have been with her ever since. Their living conditions and food supply have been described in detail elsewhere (Cowgill, 1964, 1969, 1974; Martin, Rivers & Cowgill, 1976). The purpose of this paper is to record the length of their life span. Pertinent information is set forth in Table 1.

Table 1. Longevity of a *Perodicticus potto* colony

Sex	Date of Arrival in USA	Date of Death	Length of Captivity (yrs.)	Probable Age (yrs.)	Weight at Death (kg)	Time of Death[a] (h)
F	12/20/59	1/9/64	4	5	1.20	16.00
M	12/20/59	4/9/71	11	12	1.36	15.00
F	12/20/59	1/9/79	19	21	0.92	21.00
M	12/20/59	Alive	19	20		

[a]Causes of death in order of listing: Endometriosis, poison, circulatory collapse due to occlusion of major vessels by tumor of unknown origin.

Crandall (1964) states that two years is about as long as *P. potto* might be expected to live in captivity. However, a pair of *P. potto ibeanus* he had at the New York Zoological Park survived over 8 years.

Thanks are due to the Department of Biological Sciences of the University of Pittsburgh and to the Animal Care Facility of its Medical School for their continuous financial and medical support, respectively. The authors are grateful for the kindness and care shown to *P. potto* over the years by the Stanley States family.

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[1]For years the first author had been under the impression that three pairs of *P. potto* arrived at Yale University in early 1961. A recent discussion with Dr. John Buettner-Janusch, formerly of Yale University and now at New York University, indicated that he procured the animals and that they arrived in December, 1959.

Jarvis and Morris (1960) record the survival of one *P. potto* in captivity for a period of 9 years. Charles-Dominique (1977), in discussing his present colony, points out that the development of the teats indicates a female to be multiparous. The female in the authors' colony, who just died, had developed teats at the time of her arrival in 1959, thus suggesting she was at least two years old at that time. Unfortunately, the average life span under natural conditions is still largely unknown. Furthermore, there is scant information available on longevity of *Perodicticus* in captivity. It is believed that the present living male in the authors' colony is the oldest recorded member of *Perodicticus* in captivity.

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SUSPECTED ADENOVIRUS OR RESPIRATORY SYNCYTIAL VIRUS ILLNESS IN A COLONY OF CHIMPANZEES

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Two family groups of chimpanzees were maintained at Stanford University from 1974 to 1978. Each group was housed in a 1 1/2 acre outdoor enclosure, one having 6 adults and 3 young, and the other having 4 adults and 5 young. In December of 1975, 14 of the chimpanzees developed a respiratory illness consisting of sneezing, nasal discharge, listlessness, and anorexia, lasting about 2 weeks. The animals were moved indoors for 1 week until the acute phase of the disease had subsided. No attempts to determine the specific cause of illness were made at that time.

In December, 1977, a 7 month-old chimpanzee was seen to fall off its mother several times. It appeared weak and uncoordinated, and died 48 hours after signs of illness were observed. At autopsy, bronchopneumonia with inflammation and adhesions in the pleural cavities was noted grossly and confirmed histologically. Lung tissue was saved frozen at -65°C and virologic studies were subsequently done at the Viral and Rickettsial Disease Laboratory, California Department of Health Services. Standard virus isolation and microtiter complement-fixation (CF) serologic methods were used (Lennette & Schmidt, 1969). Virus isolation from the lung tissue was attempted in primary rhesus monkey kidney, human fetal diploid lung line, and HEP_2 line cell cultures, without success. Serologic tests on a serum sample obtained postmortem revealed CF titers of 1:8 for respiratory syncytial virus (RSV), and 1:128 for adenovirus group, while micoplasma, influenza A, influenza B, parainfluenza types 1-4, and measles CF titers were negative (<1:8).

Direct fluorescent antibody (FA) staining for presence of RSV antigen in the lung tissue was subsequently attempted, but was negative. There was insufficient tissue to do direct FA staining for adenovirus antigen. Adenoviruses should be easy to isolate in cell culture, but the high antibody level may have neutralized the virus in frozen-thawed tissue suspensions. In contrast, RSV is very labile and may be difficult to isolate unless the aspirate or tissue homogenate can be added directly to cell cultures without freeze-thawing.

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In May, 1978, 13 chimpanzees including 12 which had experienced the respiratory illness in December, 1975, were given their semi-annual physical examination, including tuberculin-testing and collection of blood for hematological and chemical analyses. This provided the opportunity to test the animals for antibodies and to try to relate the colony's respiratory illness to the findings in the dead chimpanzee. No samples of sera from earlier bleedings were available for comparative testing. In January, 1979, one additional chimpanzee (Mwelo, born in January of 1978) was also bled. Of the 14 serum samples collected, 12 were found to have RSV CF antibody titers, ranging from 1:8 to 1:64, and 12 had adenovirus CF antibody titers ranging from 1:16 to 1:128 (see Table 1). Ten of the RSV-positive and 11 of the adenovirus-positive animals were animals which had been observed to be ill in December, 1975. These results indicated extensive past exposure of the animals to these viruses and their possible etiologic role in the illness, in contrast to the results for influenza A, influenza B, parainfluenza, and mycoplasma. Although we could not prove it, the infant chimpanzee may have died as a result of adenovirus or RSV infection also.

Human and simian adenovirus serotypes and RSV commonly infect chimpanzees as well as other simian species, but their role in causing severe disease is little known. A brief review of the literature pertaining to this and to the episode described above may be of interest to others working with chimpanzees.

RSV was first isolated in 1955 from a throat swab of one out of 14 acutely ill animals in a colony of 20 chimpanzees at the Walter Reed Army Institute of Research. Development of complement-fixing antibodies in the ill chimpanzees, in other experimentally-infected chimpanzees, and in a laboratory worker handling the isolated virus were demonstrated, and antibodies were also found in human populations surveyed (Morris et al., 1956). The virus was then recovered from infants with respiratory illness (Chanock & Finberg, 1957), and it has increasingly been recognized as a significant cause of severe respiratory illness in infants, and of milder disease in older children and adults (Brandt et al., 1974; Chanock et al., 1970; Kim et al., 1973; Parrott et al., 1973; Tyeryar et al., 1978). Natural infection also occurs in numerous other primate species besides the chimpanzee, as shown by antibody studies (Kalter & Heberling, 1971; Kalter et al., 1974; Mutanda & Mufson, 1974; Tyeryar et al., 1978). Experimental RSV infection and disease have also been demonstrated in chimpanzees and various primates and their value for studying the pathogenesis of disease, for vaccine development, and other purposes has been recognized (Belshe et al., 1977; Belshe et al., 1978; Morris et al., 1956; Richardson et al., 1978a, 1978b; Tyeryar, et al., 1978). We are not aware of any reports of natural RSV disease outbreaks since the initial report by Morris et al. (1956).

Adenoviruses were first isolated from human adenoidal tissue (Rowe et al., 1953) and subsequently at least 31 immunologically distinct serotypes have been found, most of them associated with human disease. Severe

Table 1. Results of serologic survey for respiratory viral and mycoplasmal antibodies in Stanford chimpanzee colony, May, 1978

Animal	Sex	Age	Origin	Complement-fixing antibody titers[a]							
				RSV	Adenovirus	Influenza A	Influenza B	Parainfluenza 1	2	3	4	*Mycoplasma pneumoniae*
Bido	F	14	wild	16	32	<8	<8	<8	<8	<16	<8	8
Bandit	M	13	wild	16	64	<8	<8	16	8	8	8	8
Polly	F	14	wild	8	64	<16	<16	<8	<8	<16	<8	<16
C.J.[b]	M	9	wild	64	16	<8	<16	<8	<8	8	<8	8
Shadow	M	15	wild	8	32	<16	<16	<16	<16	<16	<16	<16
Bashfull	F	13	wild	64	32	<8	<8	8	<8	<8	<8	<8
Willey	M	13	wild	16	128	<8	<8	<8	<8	<16	<8	<8
Mwelo[c]	M	4 mo	Stanford	8	<32	<32	<32	<32	<32	NS	<32	<32
Delta	F	6	Delta Ctr.	<16	<32	<16	<16	<16	<16	<32	<16	<16
Betty	F	4	Stanford	<16	128	<8	<8	<8	<8	<8	<8	8
Zippy	M	8	wild (pet)	16	64	<8	<8	<8	<8	16	<8	<8
Judy	F	10	wild	32	128	<8	<8	<8	<8	<8	<8	8
Rock	M	17	wild	32	64	<8	<8	8	<8	16	<8	8
Gigi	F	13	wild	16	32	<8	<8	<8	<8	8	<8	8

[a] Reciprocal of microtiter complement-fixing antibody titer; many sera were nonspecific or anti-complementary.

[b] Not ill in December, 1975; from San Diego Marine World, performing animal in frequent, close contact with humans.

[c] Bled in January, 1979

and even fatal pneumonia may occur, especially in infants or children. Numerous other adenovirus serotypes also infect nonhuman primates, as well as other animal species. All adenoviruses share to some extent common antigenic reactivity by the CF test. Human adenoviruses serotypes are probably not important as infectious agents of monkeys, but several serotypes have been isolated from chimpanzees. Simian adenovirus serotypes, on the other hand, have been isolated from throat, rectum, stool, or tissues of most primate species studied, and adenovirus group CF or type-specific neutralizing antibodies are commonly found during serologic surveys (Asher et al., 1978; Basnight et al., 1971; Berquist et al., 1970; Boyce et al., 1978; Heberling, 1972; Heberling & Kalter, 1974; Hillis et al., 1968; Hillis & Goodman, 1969; Hillis et al., 1969; Kalter & Guilloud, 1970; Rogers et al., 1967; Rowe et al., 1958; Rowe et al., 1965; Soike et al., 1967; Soike et al., 1969a; Soike et al., 1969b; Soike et al., 1971a; Soike et al., 1971b). In some cases, the adenoviruses have been implicated as probable causes of severe or fatal illness in the animals, and not just passenger viruses (Berquist et al., 1970; Boyce et al., 1978; Heberling, 1972).

We conclude that the outbreak of respiratory illness and the subsequent fatal case of pneumonia in the Stanford chimpanzee colony may have been due to RSV or to an adenovirus, although this could not be proven. Closer clinical and virological surveillance of chimpanzee and other primate colonies would help to better define the role of such human and simian viruses in the etiology of naturally occurring diseases.

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MONKEYPOX IN HUMANS IN WEST AFRICA

The 36th case of monkeypox reported from West and Central Africa since 1970 was recorded in December, 1978. On November 24, 1978, a 35-year-old man in the Omifounfoun Village, Oyo State, Nigeria, noted a skin eruption, and on December 5 he was seen at the hospital in Parakou, Borgou Province, Benin. Medical authorities in Benin diagnosed his illness as smallpox or monkeypox. They immediately placed the man in isolation and took specimens for laboratory tests. Typical poxvirus particles were seen on electron microscopic examination by a World Health Organization (WHO) collaborating center on December 24, 1978, and monkeypox virus was isolated on December 27.

The patient's residence is in Benin, but he was reported to have been in Nigeria visiting his family for 2 months before onset of his rash. He had no smallpox vaccination scar. No additional cases have been reported in Benin. Joint investigations by Benin, Nigeria, and WHO are under way.

Of the 36 cases of monkeypox reported from West and Central Africa, 27 have occurred in Zaire, 4 in Liberia, 2 in Nigeria, and 1 each in the Ivory Coast, Benin, and Sierra Leone. Clinically, the disease resembles smallpox. However, the most important epidemiologic difference is that monkeypox does not transmit easily between humans; in only 2 instances has secondary spread possibly occurred in the same family. The monkeypox secondary attack rate is less than 4% among susceptible family members compared with 30-40% for smallpox. In 32 of the 36 cases, the patient had not been vaccinated against smallpox. Twenty-eight of the cases have been in children 9 years old or younger. Six patients died.

Monkeypox is an orthopoxvirus but differs from variola virus in several biologic characteristics. The source of monkeypox for humans is unknown, but it is thought to be a zoonosis. The virus was associated with 10 outbreaks in nonhuman primates in captive monkey colonies in laboratories in Europe and North America in the period 1958-1968.

Special study groups convened by WHO in 1973, 1976, and 1978 concluded that although monkeypox is not a major public health problem, surveillance should be continued to confirm that monkeypox and not smallpox occurs sporadically in West and Central Africa and to further define the epidemiology and ecology of the disease. [From World Health Organization: *Weekly Epidemiol. Rec.*, No. 2, January 12, 1977, as reproduced in *CDC Veterinary Public Health Notes*, July, 1979.]

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LETTERS: THAI OFFICIAL OBJECTS TO ITEM IN NEWSLETTER NOTE

I am writing you in response to the article 'International Notes on Primate Supply' which appeared in the January, 1979 issue of the *Laboratory Primate Newsletter.*

The article contained the comment that 'Thailand exports primates originating from other South Asian countries. Thailand is considering stopping this practice.' I should like to inform you that this statement is completely false. Thailand banned all export of primates in 1975 on conservation and humanitarian grounds and has no intention of reversing this policy. Under no circumstances would Thailand traffic in the primates of its neighbor countries.

In these circumstances, we believe that Dr. H. J. Kuhn's comments are irresponsible and are unwarranted insults to the Government of Thailand, and that you should not have published them without first verifying their accuracy with Thailand's Wildlife Conservation Division.

I should also like to correct Dr. Kuhn's assertion that the smuggling of primates to other European countries via Belgium constitutes a 'grey market.' It is, in fact, a *black* market. In recent years, Belgium has imported large numbers of gibbons and other primates smuggled from Thailand and other Southeast Asian countries. These gibbons have disappeared from Belgium, presumably into other West European countries, including West Germany. Such importation into countries which are members of the Convention on International Trade in Endangered Species would require issuance of an import permit based on proof of legal export from the habitat country involved. In the case of Convention Appendix I species such as gibbons, commercial trade is banned. Shipping them across unmanned borders is easy but nonetheless *illegal.*

It is most unfortunate that scientists appear to consider the 'Belgian Connection' and the 'Panama Connection' to be legitimate means to acquire animals--a grey rather than a black market. Smuggling of primates to user countries via laundry countries poses a serious threat to wild primate populations and must be stopped.--Pong Leng-EE, Director of Wildlife Conservation, Department of Wildlife Conservation, Royal Forestry Department, Bangkhen, Bangkok, Thailand (March 27, 1979).

Professor Kuhn's reply appears below. In our own reply to Mr. Pong Leng-EE, we objected to the last paragraph of the letter, which appeared to us to be gratuitous. There was no indication in Prof. Kuhn's note, as we read it, that he was condoning "grey markets" or any sort of illegal market whatever it is called. He indicated that they exist, as we all know they do, and that they will cease in the instances mentioned. Perhaps his choice of words in his statements about grey markets was unfortunate, with unintended implications, but that is another matter altogether. Furthermore, whether this is the case or not, we see no reason

why Mr. Pong Leng-EE should suggest, as he does in his last paragraph, that all, or even most, scientists condone grey markets or regard them as legitimate. We feel that this is as much an insult to an entire profession as Mr. Pong Leng-EE seems to feel the statement about exports is to Thailand.--The Editor.

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LETTERS: REPLY TO THAI OFFICIAL

This concerns my letter to *Primate Report* (1978, No. 3, November, 1978) which was subsequently reprinted in the *Laboratory Primate Newsletter* (1979, *18* [1], p. 32) and which prompted Mr. Pong Leng-EE's letter. My letter was intended to warn primatologists and members of the biomedical community of the possibility of illegal sources of imported primates. It was certainly not intended to condone illegal acts or to insult the Government of Thailand. I regret any possible misinterpretation of the intent of my letter.

The primary source of information for my letter was an article in the *IUCN Bulletin* (1978 (New Series), *9* [9], p. 52), entitled 'Bangkok - Brussels - It's Monkey Business.' This bulletin, well known for its concern about matters of conservation, is hardly a source to which one would turn for purposes of condoning illegal acts. In addition, I had, up until the time the letter was written, personally seen numbers of primates imported by animal dealers in Europe which in my judgement had come from or through Thailand. I think he must admit that anybody reading the above mentioned article in the *IUCN Bulletin* and seeing shipments of primates from Bangkok coming in at Brussels must come to my conclusion. After I wrote my letter, authorities of Thailand took steps to stop such shipments: 'Thai Airways has banned the acceptance of transit consignments of live animals from Vientiane, Laos, and has brought the whole matter before the airline representatives' board of Thailand' (*IUCN Bulletin*, 1978 (New Series), *9* [12], p. 65).

I do not want to argue about the shades of part of the present primate market. To me a grey market is just as illegal as the black market. By the way, I have never bought a single animal which possibly could have been obtained through the black market or any other illegal market.

I fully agree with Mr. Pong Leng-EE's statement that some European members of CITES are unable to meet their obligations at present.--Hans-Jürg Kuhn, Anatomisches Institut Der Universität, 34 Göttingen, West Germany (August 28, 1979).

* * *

1980 AND 1981 MEETINGS OF ASP ANNOUNCED

The Board of Directors of the American Society of Primatologists has accepted an invitation from Dr. Thomas B. Clarkson, Chairman, Department of Comparative Medicine, Bowman Gray School of Medicine, to hold its next meeting in Winston-Salem, North Carolina, on June 3, 4, and 5, 1980. Dr. David M. Taub will chair the Local Organizing Committee. Meeting details, registration forms and call for papers will be mailed to members shortly.

The Board of Directors also accepted an invitation from Drs. S. S. Kalter and Anthony M. Coelho to hold the 1981 ASP meeting in San Antonio, Texas under the auspices of the Southwest Foundation for Research and Education. The dates for that meeting are undecided.

ASP is interested in invitations for future meetings. Anyone considering this should contact the Executive Secretary, Dr. D. R. Snyder, Sect. of Comp. Med., Yale Univ., School of Med., 375 Congress Ave., New Haven, CT 06510.

* * *

INFORMATION ON HOUSING PRIMATES OF DIFFERENT SPECIES WANTED

Information is being collected on the possible ill effects, or lack of same, when two primate species are housed in the same animal room. Federal regulations state that no two species are to be housed in the same room and yet with many colonies this is a common practice. If you have experience in this type of housing I would appreciate receiving your comments on clinical problems that may have resulted from the joint housing. This can be in the form of a narrative letter but should include listing of the species, the number of animals, and the nature of the housing. This should include only animals which are "conditioned" to captivity and not become complicated by the addition of fresh animals from the wild to existing colonies. In return for your assistance, you will receive a summary of all of the responses received from other individuals.--Dr. W. Richard Dukelow, Endocrine Research Unit, Michigan State University, East Lansing, MI 48824.

* * *

PHOTOGRAPHS PORTRAYING FACIAL EXPRESSIONS WANTED

Frontal photographs of nonhuman primates showing various facial expressions are needed for a study of communication patterns. Photographs of the face would be preferred, but any of the whole body would be useful if the face is shown in reasonable detail. Donations will be acknowledged in publications.--James R. Anderson, Stirling University Psychology Primate Unit, Stirling FK9, 4LA, Scotland, U.K.

TRENDS IN PRIMATE IMPORTS INTO THE UNITED STATES

Primate imports into the United States, as reported for 1978 by the U. S. Department of Commerce (USDC) Bureau of the Census, remained at a level of just under 30,000 animals for the second consecutive year. About 75% of these primates originated in Asia; the remaining 25% were almost evenly divided between African and Latin American origin. The six countries that individually exported more than 1,000 primates in both 1977 and 1978 (Malaysia, Indonesia, India, the Philippines, Kenya, and Bolivia) were joined as major source countries in 1978 by two other countries: Thailand and Somalia. Together, these eight source countries accounted for 90% of the imported primates.

The government of India announced a ban on the export of primates that became effective on April 1, 1978. This ban caused a 50% reduction in the importation of South Asian primates, mostly rhesus macaques. A compensatory jump in importation from Southeast Asia--from 9,500 in 1977 to 16,100 in 1978--buffered the impact of this ban. The increase, which consisted largely of cynomolgus macaques, was supported by large increases between 1977 and 1978 in export levels from Malaysia (from 3,500 to 5,900) and Indonesia (from 1,700 to 5,500).

Another estimate of primate imports comes from the records for 1978 of the U. S. Dept. of the Interior (USDI), a preliminary summary of which was made available. These records show that cynomolgus macaques were imported in greater numbers (9,346 animals plus 41 uncounted shipments) than rhesus macaques. After *Macaca*, the next taxa in importance were *Saimiri* (2,465), *Tupaia* (1,497), *Callitrichidae* (1,186 plus 4 uncounted shipments), *Cercopithecus aethiops* (1,033 plus 3 uncounted shipments), *Papio* (605 plus 16 uncounted shipments), and *Aotus* (442 plus 4 uncounted shipments).

For a variety of reasons the records of USDC and USDI are incomplete and also differ from one another. It appears that the best minimum estimate of the total primate imports from the available data might be obtained by adding for each category the larger value from the two agencies. Using this method the minimum estimate is 31,333. [Based on an article by Dr. Nancy A. Muckenhirn in *ILAR News*, 1979, *22* [3], 22-23.]

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INTERNATIONAL JOURNAL FOR THE STUDY OF ANIMAL PROBLEMS ANNOUNCED

The Institute for the Study of Animal Problems announced that this journal is to be published bimonthly beginning January, 1980. It will carry original and review articles on the welfare of companion and service animals, food animals, laboratory animals, and wildlife. Each issue will feature reports of current legislation and regulatory activity in the field and will provide a forum for dialogue through editorials, news and comment pieces, book reviews, and letters. In 1980 the new journal will include: A six-part series by Temple Grandin, livestock system design consultant, on humane considerations in livestock handling and slaughter; A fresh look at the development of laboratory animal science and its contribution to improvements in animal welfare, by John Bleby, Director of the MRC Laboratory Animal Centre; and an article by Victor Scheffer, retired biologist with the U. S. Fish and Wildlife Service, discussing man's impact on wildlife and the growing trend toward benign use alternatives.

Annual Subscription: Six 64-page issues--$45 (institutions), $25 (individuals), $17.50 (students). Send orders to: Subscription Department--ISAP, 2100 L St. NW, Washington, D. C. 20037. (Make checks payable to "HSUS for ISAP"). For further information, contact: Dr. Andrew Rowan, Institute for the Study of Animal Problems, 2100 L St. NW, Washington, D. C. 20037.

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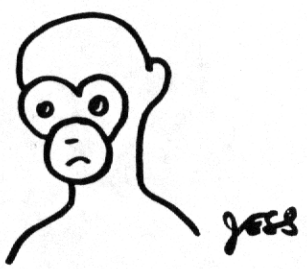

"I DON'T KNOW WHY EVERYONE IS SO EXCITED ABOUT THE PRICE OF GOLD. HAVE YOU SEEN THE PRICE OF PEANUTS LATELY?"

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

Books

Captivity and Behavior: Primates in Breeding Colonies, Laboratories, and Zoos. J. Erwin, Terry L. Maple, & Gary Mitchell (Eds.) New York: Van Nostrand Reinhold, 1979. 286 pp. [Price: $22.50]

The authors discuss environmental enrichment techniques, crowding, birth in captivity, and behavioral engineering, as well as the development of social bonds and patterns of abnormal behavior caused by a variety of settings. They evaluate techniques for encouraging adequate behavioral development and reducing aggressive behavior and depression. Information is provided on a number of factors reputed to affect human development and behavior, particularly those suspected of producing mental retardation, emotional disturbances, or personality disorders. Throughout the volume the authors emphasize the importance of behavioral measurement in the management of primates in captive settings. Contents: Strangers in a strange land: Abnormal behaviors or abnormal environments? by J. Erwin & R. Deni; Primate psychology in historical perspective, by T. L. Maple; Development of social attachment potential in captive rhesus monkeys, by G. Mitchell, T. L. Maple, & J. Erwin; Behavior of primates present during parturition, by N. Caine & G. Mitchell; Baboon behavior under crowded conditions, by R. H. Elton; Aggression in captive macaques: Interaction of social and spatial factors, by J. Erwin; Titi and squirrel monkeys in a novel environment, by D. Munkenbeck Fragaszy; Environmental enrichment and behavioral engineering for captive primates, by H. Markowitz; Great Apes in captivity: The good, the bad, and the ugly, by T. L. Maple.

Primate Ecology and Human Origins: Ecological Influences on Social Organization. Irwin S. Bernstein & Euclid O. Smith (Eds.) New York: Garland STPM Press, 1979. 362 pp. [Price: $24.50]

This volume stems from a conference entitled "Ecological Influences on Social Organization: Evolution and Adaptation," held at the European Conference Center of the Wenner-Gren Foundation for Anthropological Research, Burg Wartenstein, in August, 1977. One major theme of the paper is that there are a multiplicity of factors involved

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

in primate ecology and human origins, and another is that evolutionary processes do not invariably produce optimal adaptations. Contents: How would we know if social organization were *not* adaptive? by T. E. Rowell; Significant parameters of environmental quality for nonhuman primates, by F. Bourlière; Demographic constraints on behavior and social organization, by S. A. Altmann, & J. Altmann; Population demography, social organization, and mating strategies, by R. I. M. Dunbar; The phylogenetic and ontogenetic variables that shape behavior and social organization, by J. D. Baldwin, & J. I. Baldwin; Ecological influences on Australian aboriginal social organization, by J. B. Birdsell; The variation and adaptation of social groups of chimpanzees and black and white Colobus monkeys, by A. Suzuki; Activity patterns in howler and spider monkeys: An application of socio-bioenergetic methods, by A. M. Coelho, C. A. Bramblett, & L. B. Quick; Home range size, population density, and phylogeny in primates, by T. H. Clutton-Brock, & P. Harvey; Habitat, economy, and society: Some correlations and hypotheses for the neotropical primates, by J. F. Eisenberg; Biological parameters and pleistocene hominid life-ways, by C. L. Brace; Ecological factors and social organization in human evolution, by B. G. Campbell; On describing primate groups as systems: The concept of ecosocial behavior, by U. Nagel; In summary, by I. S. Bernstein, & E. O. Smith.

Behavioral Sex Differences in Nonhuman Primates. G. Mitchell. New York: Van Nostrand Reinhold, 1979. 515 pp. [Price: $27.50]

Taxonomically organized, this book examines literature derived from both field and laboratory research. Physical sex dimorphism in primates is examined, including differences in size, coloration, dentition, and other characteristics. Surveying research into prenatal androgens and adult hormones, the author examines their role in predisposing primates to behavior considered masculine and feminine. He examines puberty and adolescence at various taxonomic levels, and attempts to show why sex differences at this stage are the result of dynamic developmental processes. Primate responses to birth and infant care are described. Also investigated are a number of aspects of social behavior and pathological conditions in relation to sex differences. Contents: SECTION 1. INTRODUCTION. 1. Introduction. 2. The primate order. SECTION 2. PHYSICAL AND HORMONAL BACKGROUND. 3. Physical sexual dimorphism. 4. Sexual differentiation: Structure, behavior, and nervous system. 5. The development of play. 6. Puberty and adolescence. 7. Sex hormones in adulthood: Prosimians, New World monkeys, and rhesus macaques. 8. Sex hormones in adulthood: Other Old World monkeys, apes, humans, generalizations, and speculations. 9. Sexual behavior: Prosimians, New World monkeys, and rhesus macaques. 10. Sexual behavior: Other Old World monkeys, apes, humans, generalizations, and speculations. SECTION 3. ONTOGENY. 11. Male and female responses to birth. 12. Infant care: Prosimians, New World monkeys, and macaques. 13. Infant care: Other Old World

monkeys, apes, and humans. SECTION 4. INTRAGROUP ORGANIZATION. 14. The role of gender in social spacing and structure: Prosimians, New World monkeys, and macaques. 15. The role of gender in social spacing and structure: Old World monkeys, apes, and implications for humans. 16. Dominance: Prosimians, New World monkeys, rhesus, and Japanese macaques. 17. Dominance: Other Old World monkeys, apes, and implications for humans. 18. Leadership and alliances. SECTION 5. EXTRATROOP BEHAVIOR. 19. Extratroop behavior: Vigilance, protection, territoriality, and inter-troop behavior. 20. Feeding and predation. SECTION 6. COMMUNICATION. 21. Sex differences in grooming. 22. Sex differences in vocalizations. 23. Sex differences in visual communication. 24. Aggression: Prosimians, New World monkeys, and macaques. 25. Aggression: Other Old World monkeys, apes, and comments on *Homo sapiens*. SECTION 7. PATHOLOGICAL CONDITIONS. 26. Sex differences in response to early social deprivation and separation. 27. Fear, stress, and crowding. 28. Vulnerability and mortality. SECTION 8. LEARNING AND THE BRAIN. 29. Learning and performance. 30. Sex differences in the brain. SECTION 9. VARIABILITY. 31. Cyclical variation. 32. Non-cyclical variability. 33. Self-awareness. 34. Summary and epilogue.

Reports

REP: Annual report 1978. Rijswijk, The Netherlands: Organization for Health Research TNO, 1979.

This is the annual report of the REP, which stands for the Radiobiological Institute TNO, Institute for Experimental Gerontology TNO, and Primate Center TNO, Rijswijk Z. H., The Netherlands. Of the many short notes describing the accomplishments of the organization, the following are concerned with primates: RADIOBIOLOGY. Effect of total body irradiation on skeletal growth and cataract formation in rhesus monkeys, by P. Sonneveld, E. Peperkamp, & D. W. van Bekkum; Susceptibility of four mammalian species to total body irradiation, by H. M. Vriesendorp, & D. W. van Bekkum. TRANSPLANTATION AND IMMUNOGENETICS. The influence of blood transfusions and matching for DR-antigens on kidney allograft survival in unrelated rhesus monkeys, by A. A. van Es, & H. Balner; Mixed lymphocyte reactivity (MLR) in rhesus monkeys is controlled by several loci, by A. A. van Es, & H. Balner; Cellular typing for D locus antigens in rhesus monkey families, by A. A. van Es, & H. Balner; B cell specific antigens of rhesus monkeys, by H. Balner, W. van Vreeswijk, & J. Roger. MICROBIOLOGY AND GNOTOBIOLOGY. Faecal concentration of neomycin in decontaminated monkeys, by W. D. H. Hendriks, J. M. Davies, C. P. J. Timmermans, & P. J. Heidt; Meningitis in three chimpanzees (*Pan troglodytes*), by H. A. Solleveld, M. J. van Zwieten, L. W. Stitz, & P. J. Heidt. ETHOLOGY. The effect of a playmate on proximity to the mother in rhesus monkeys, by P. J. C. M. van Luxemburg, & L. G. Ribbens; How much do rhesus monkey infants influence each other's

behaviour? by G. de Jonge, & T. G. C. M. Kokx; Social play and rank order in rhesus monkeys, by H. Dienske, & A. Tartabini.

Bibliographies

Colony Breeding of African Monkeys: A Bibliography. Benella Caminiti. Seattle: Primate Information Center, 1979. 140 Citations with Primate Index. [Price: $3.00. Send orders to: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195]

Colony Breeding of New World Monkeys: A Bibliography. Benella Caminiti. Seattle: Primate Information Center, 1979. 209 Citations with Genera Index. [Price: $5.00. Order information same as in previous reference.]

Disease

Treatment regimen for air sacculitis in the chimpanzee (*Pan troglodytes*). Strobert, E. A. & Swenson, R. B. (Yerkes Reg. Prim. Res. Ctr., Emory Univ., Atlanta, GA 30322) *Laboratory Animal Science*, 1979, *29*, 387-388.

Six chimpanzees developed air sacculitis. Except for air sac distension and malodorous breath, clinical signs were rare. A variety of organisms, mainly enteric, were isolated from the air sacs. Only one case was treated surgically. Other cases were treated by the conservative method of irrigation which worked well.

Breeding

Pregnancy diagnosis in owl monkeys (*Aotus trivirgatus*): Evaluation of the hemagglutination inhibition test for urinary chorionic gonadotropin. Hall, R. D. & Hodgen, G. D. (Div. of Vet. Med., Walter Reed Army Inst. of Res., Walter Reed Army Med. Ctr., Washington, DC 20012) *Laboratory Animal Science*, 1979, *29*, 345-348.

The Subhuman Primate Pregnancy Test (SPPT) was evaluated as a means of detecting urinary chorionic gonadotropin to aid in pregnancy diagnosis in owl monkeys. Using radioimmunoassay, the excretion patterns of chorionic gonadotropin from pregnant owl monkeys was delineated, the hormone being detected from 16 weeks prepartum until birth. By comparison, the pregnancy test kit detected chorionic gonadotropin between the 14th week prepartum and the last week of gestation with 94% accuracy. In a 2-year study using a simplified urine collection technique, the SPPT was shown to be a valuable procedure for diagnosing pregnancy and detecting spontaneous abortions in owl monkeys.

Estimation of gestational and skeletal age in *Macaca mulatta*. Michejda, M., Bacher, J., Hayes, N., Johnson, D., Killens, R., & Watson, W. (Prim. Res. Unit, Vet. Med. & Surg. Sect., Vet. Res. Br., Div. of Res. Serv., NIH, Bethesda, MD 20014) *Journal of Medical Primatology*, 1979, *8*, 143-154.

Results of qualitative and quantitative studies of prenatal skeletal development in *Macaca mulatta* are presented. Longitudinal radiographic observations were carried out on 20 monkeys of known gestational age, beginning on 120 days of gestation until the neonatal stage of skeletal development. These studies were based on multiple uterotomies on each pregnant female. The technique described provides accurate data on prenatal bone ossification, and permits an accurate estimation of fetal age in pregnant rhesus monkeys with unknown conception dates.

Establishing a free-ranging breeding colony of rhesus monkeys. Part I. Kerber, W. T., Herbert, H. J., & Vickers, J. H. (Caribbean Prim. Res. Ctr., PO Box 297, Sabana Seca, PR 00749) *Journal of Medical Primatology*, 1979, *8*, 129-142.

The Caribbean Primate Research Center recently contracted with the Food and Drug Administration to establish a free-ranging island breeding colony of rhesus monkeys. The goal of the program is to produce 600 to 800 offspring yearly from 1,000 breeding age females. The initial colony stock will consist of approximately 360 animals from an existing colony that was established on an island off the southwestern coast of Puerto Rico in 1961. Expansion of the colony will be accomplished by the purchase and introduction of rhesus females obtained from the wild. The colony site, reproductive history, composition, and the methodology of our expansion plans are discussed. In addition, anticipated problems are identified and analyzed.

Characteristics of the menstrual cycle in nonhuman primates. I. Similarities and dissimilarities between *Macaca fascicularis* and *Macaca arctoides*. Dukelow, W. R., Grauwiler, J., & Brüggemann, S. (Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48824) *Journal of Medical Primatology*, 1979, *8*, 39-47.

Comparative studies of reproductive characteristics were carried out on a colony of *Macaca fascicularis* and *M. arctoides*. Seasonal differences were not significant between species, and conceptions occurred throughout the year. The occurrence of short cycles ('luteal phase defect') was found in 2.9% of all *M. fascicularis* cycles and 1.5% of all *M. arctoides* cycles. Long cycles (40-50 days) were found in 4.0% of all *M. fascicularis* cycles and 3.5% of all *M. arctoides* cycles. Gestation lengths averaged 172.4 and 165.3 days, respectively, for *M. arctoides* and *M. fascicularis*. Ovulation in *M. fascicularis* occurred at a day of ovulation/cycle length ratio of 0.48 ± 0.08 compared with 0.48 ± 0.09 for *M. mulatta* data previously published.

Characteristics of the menstrual cycle in nonhuman primates. II. Ovulation and optimal mating times in macaques. Dukelow, W. R., & Brüggemann, S. (Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48824) *Journal of Medical Primatology*, 1979, *8*, 79-87.

An analysis of the results of 1,259 limited-duration matings was conducted on colonies of *Macaca arctoides* and *M. fascicularis*. Maximum

conception occurred at a day of breeding/cycle length (DB/CL) ratio of 0.40-0.41 with a range of DB/CL ratios for successful matings from 0.39 to 0.44. These values are compared with published values for various endocrine parameters equated to cycle length.

Return of postpartum menstruation and fertility in laboratory *Macaca fascicularis*. Dang, D. C. (Lab. d'Anatomie, U.E.R. Biomédicale, 45 rue des Saints-Peres, F-75270 Paris, France) *Annales de Biologie animale*, 1979, *19*, 375-383.

Return of menstruation and fertility after parturition was studied in 28 healthy *Macaca fascicularis* females raised in the laboratory. Three cases were defined: 1) Non-nursing females: The menstrual cycle reappeared after a mean of 61.7 ± 7.3 days and its duration was immediately normal. Fertility, which was zero before menstruation reappeared, became normal after two cycles. 2) Nursing females which menstruated during lactation: 15 out of 21 nursing females menstruated during the nursing period at mean of 50.9 ± 8.3 days after parturition. Menstruation was followed by a return of the normal cycles only after weaning. During nursing, mothers with young clinging to the abdomen refused to copulate. Fertility, low before menstruation reappeared after weaning, was immediately reestablished during the following cycles. 3) Females which presented amenorrhea during lactation: Regular menstrual cycles began at a mean of 50.5 ± 20.8 days after weaning. Fertility, at zero before menstruation reappeared, was reestablished more slowly than in the females of the preceding group. While fertility became immediately normal after Caesarian performed during the first half of of gestation, it only returned to normal gradually after parturition. In our rearing conditions, the season did not influence postpartum reestablishment of the reproductive function of *Macaca fascicularis* females.

Seasonal variation of reproductive parameters in the laboratory-housed male cynomolgus macaque (*Macaca fascicularis*). Mahone, J. P. & Dukelow, W. R. (Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48824) *Journal of Medical Primatology*, 1979, *8*, 179-183.

Changes in body weight, sperm concentration, and testicular volume were monitored for a 13-lunar month period in 7 laboratory-housed adult male *Macaca fascicularis*. No significant change was noted in body weight or sperm concentration between periods of maximal and minimal mean values nor between periods standardized for comparison between the three parameters. Testis volumes were significantly greater during the months of July through early September and during the standardized period of May through July than during January through March and the standardized interval October through January.

An epidemiological study of neonatal and postneonatal mortality in *Macaca radiata* at the California Primate Research Center (1966-1973). Redman, H. C. & Schneider, R. (Inhalation Toxicology Res. Inst., Lovelace Biomed. & Environmental Res. Inst., PO Box 5890, Albuquerque, NM 87115) *Journal*

of Medical Primatology, 1979, *8*, 1-17.

This study evaluates neonatal and postneonatal survival of *Macaca radiata* to 180 days of age at the California Primate Research Center from 1966 through 1973. Of a total of 287 live births, infant mortality rates (IMR) for three different types of housing were significantly different: 12% for inside cages, 41% for an outside one-half acre enclosure, and 31% for outside corncrib cages. Experience of the female in raising an infant to weaning age was a significant determinant only for the outside housing IMR. Introduction of laboratory-reared females into the breeding colony made the maternal breeding experience an important factor.

Rearing of conventional and gnotobiotic nonhuman primates (*Pan troglodytes, Papio cynocephalus, Saguinus nigricollis)*. Eichberg, J. W., Moore, G. T., Kalter, S. S., Rodriguez, A. R., & Berchelmann, M. L. (Southwest Found. for Res. & Ed., San Antonio, TX 78228) *Journal of Medical Primatology*, 1979, *8*, 69-78.

Rearing techniques for conventional and gnotobiotic nonhuman primates are described. Up to 4 months of age there was no significant differences in weight gain between conventionally and gnotobiotically reared chimpanzees or baboons. After 4 months, gnotobiotic chimpanzees exceeded their conventional counterparts in weight gain, whereas conventional baboons showed higher weight gain than gnotobiotic baboons. Gnotobiotic chimpanzees and baboons had significantly lower absolute numbers of neutrophils than their conventional counterparts, but the absolute numbers of lymphocytes were not different. The gnotobiotic rearing of marmosets is also reported.

Sexual activity of male rhesus monkeys introduced into a heterosexual group. Wilson, M. E. & Gordon, T. P. (Yerkes Reg. Prim. Res. Fld. Stat., 2409 Collins Hill Rd., Lawrenceville, GA 30245) *American Journal of Physical Anthropology*, 1979, *50*, 515-524.

Unfamiliar males were introduced during the breeding season to a stable heterosexual group of rhesus monkeys. Initially, new males were allowed access to females under controlled conditions both in the presence and absence of resident males. Sexual activity, including ejaculation rate, of the new males was initially inhibited by the presence of more dominant, resident males, but this did not carry over to periods when the resident males were absent and diminished with time. Group females preferentially directed their behavior towards the new males throughout the study.

Effects of the menstrual cycle, social grouping, and exogenous progesterone on heterosexual interaction in laboratory housed stumptail macaques (*M. arctoides*). Slob, A. K., Baum, M. J., & Schenck, P. E. (Dept. of Endocrinology, Growth & Reprod., Fac. of Med., Erasmus Univ., PO Box 1738, Rotterdam, The Netherlands) *Physiology & Behavior*, 1978, *21*, 915-921.

The effect of endogenous fluctuations in ovarian hormones during the female's menstrual cycle on heterosexual interaction was studied in

groups of stumptail macaques. When 5 different trios of females were paired for 5 consecutive weeks with each of 5 males no aspect of male-female interaction changed as a function of phase of the menstrual cycle. Moreover, males usually preferred to copulate with the same female of each trio in consecutive tests, regardless of the ovarian condition of any of the females. It appeared that the most dominant females in the trios were sexually most preferred. Subcutaneous implantation of silastic capsules containing progesterone into the sexually most preferred females of each trio affected neither the males' sexual preference, nor the behavior of these females, nor the behavior of sexually non-preferred females in each trio. Likewise, progesterone in sexually preferred females had no effect on male-female interaction in pair tests. It is concluded that in stumptail macaques social factors are more important than ovarian hormones in regulating heterosexual interaction.

A twinning event in *Macaca sylvanus* of Gibraltar. Burton, F. D. & de Palham, A. (Dept. of Anthro., Univ. of Toronto, Toronto Scarborough College, West Hill, Ont. M1C 1A4 Canada) *Journal of Medical Primatology*, 1979, *8*, 105-112.

Linear measurements and body proportions for a set of free-ranging *Macaca sylvanus* twins are presented. Their measurements are compared to a full-term perinatal dead female. The twins are dizygous and probably 28 days premature.

Clinical appearance of the hyaloid artery system in the newborn rhesus monkey. Johnson, P. T. (Div. of Lab. Ani. Med., Sch. of Med., Univ. of NC, Chapel Hill, NC 27514) *Journal of Medical Primatology*, 1979, *8*, 184-186.

Fifteen healthy newborn rhesus monkeys (*Macaca mulatta*) were given funduscopic examinations as part of a screening process before utilization in a research project. The hyaloid vasculature, a system that supplies blood to the embryonic ocular structures, was observed in each subject and was noted to regress clinically at two to three weeks of age. Although the phenomenon, which could unknowingly be misconstrued as an abnormal finding, has been described morphologically in the literature, its clinical appearance has not been illustrated for the primate clinician.

Taxonomy

Races of the emperor tamarin, *Saguinus imperator* Goeldi (*Callitrichidae*, Primates). Hershkovitz, P. (Fld. Museum of Nat. Hist., Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605) *Primates*, 1979, *20*, 277-287.

The two described subspecies of the emperor tamarin, *Saguinus imperator imperator* Goeldi and *Saguinus imperator subgrisescens* Lönnberg, are defined and compared, the geographic range of each plotted.

On the types of *Presbytis barbei* Blyth. Khajuria, H. & Agrawal, V. C. (Zool. Survey of India, 8 Lindsay St., Calcutta-16, India) *Primates*, 1979, *20*, 317-319.

An attempt was made to clarify the position regarding the types of leaf monkey (*Presbytis barbei* Blyth) present in the Zoological Survey of India, Calcutta. The presence of an asymmetrical white patch at the interior base of the thighs in the female specimen, which is in the nature of an individual variation, establishes its identify as one of the syntypes. The change in the color of lips from white to black is probably due to the use of chemicals on the soft parts of the face or subsequent falling of white hairs of the lips, as these specimens were exhibited in the galleries of the Indian Museum.

Instruments and Techniques

Statistical methods for analyzing data on daily activity cycles of primates. Sussman, R. W., O'Fallon, W. M., Sussman, L. K., & Buettner-Janusch, J. (Dept. of Anthro., Wash. Univ., St. Louis, MO 63130) *American Journal of Physical Anthropology*, 1979, *51*, 1-14.

Many field studies on primates have recently been carried out in which quantitative data have been collected using instantaneous scan sampling techniques. However, data collected in this manner are difficult to analyze statistically because of the problem of independence of samples, and a number of investigators have analyzed such data incorrectly. In this paper, we evaluate such analyses and suggest alternative techniques that may be more appropriate. Examples are drawn from data on daily activity cycles of *Lemur catta* and *Lemur fulvus*.

Root canal procedure for disarming nonhuman primates. Tomson, F. N., Schulte, J. M., & Bertsch, M. L. (Dept. of Lab. Ani. Med., Coll. of Med., Univ. of Cincinnati, Cincinnati, OH 45267) *Laboratory Animal Science*, 1979, *29*, 382-386.

Nonhuman primates were disarmed by shortening their canine teeth. These teeth were cut off near the gingival level, the entire pulpal tissue removed and the canal filled with a formulated paste which was radiopaque, adhesive, and germicidal. The teeth were sealed with a commercial alloy. This endodontic procedure was a quick, practical, one-step method for permanently disarming nonhuman primates.

Multiple cannulation of the primate superficial lateral coccygeal vein. Stickrod, G. & Pruett, D. K. (Dept. of Psychol., Univ. of OR, Eugene, OR 97403) *Laboratory Animal Science*, 1979, *29*, 398-399.

The superficial lateral coccygeal veins of *Macaca fascicularis* were exposed surgically and cannulated with polyethylene tubing. The cannula was used for administering continuous infusions or obtaining multiple blood samples, and it was removed 12-18 hours after insertion.

A tethering system for direct measurement of cardiovascular function in the caged baboon. Byrd, L. D. (Yerkes Reg. Prim. Res. Ctr., Emory Univ.,

Atlanta, GA 30322) *American Journal of Physiology*, 1979, *236*, H775-H779.
A device suitable for the continuous measurement of physiological activity in large, conscious monkeys has permitted the direct recording of systemic arterial blood pressure and heart rate in caged baboons. The device comprises a lightweight fiberglass backpack, retained in place on the baboon by a thoracic elastic band and shoulder straps, and a flexible stainless steel tether connecting the pack to an electrocannular slip-ring in the top center of the baboon's cage. A chronically indwelling arterial catheter inserted retrograde into the abdominal aorta via the internal iliac artery and connected to a small pressure transducer on the pack provides direct measurement of blood pressure and heart rate. Body fluids can be sampled or drugs administered via an indwelling catheter in the inferior vena cava. Electrical and fluid connections between the fiberglass pack and recording and infusion equipment located outside the cage pass through the flexible tether and remain protected from the subject. The reliability of the tethering system has been demonstrated in physiological, pharmacological, and behavioral experiments with baboons.

Conservation

A glimmer of hope for Sulawesi. MacKinnon, J. (c/o WWF, Jl, Juanda No. 9, Bogor, Java, Indonesia). *Oryx*, 1979, *15* [1], 55-59.
The author, manager of two WWF projects in North Sulawesi (formerly North Celebes), reports rapid destruction of wildlife habitats as a result of logging, hunting, and agriculture; however, there is some reason for optimism in that Indonesia has recently shown a new interest in conservation. Included in a summary of the status of the various species of animals that inhabit the region is the following: *Macaca nigra, M. nigrescens* and *M. hecki* (allopatric) are heavily hunted as food and for pets, particularly near cultivated fields where they are regarded as pests. Very low densities are found over wide areas of forest, but surprisingly high densities are found in fruit-rich strongholds. *M. nigra* and *M. nigrescens* should be safe in proposed reserves. *M. hecki* is present in the Panua reserve but rare. It is yet to be seen how many occur in the proposed Panua extension. *Tarsius spectrum* has been found wherever looked for. Large healthy populations survive in all types of forest between sea level and 1500m at densities up to eight animals per hectare.

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