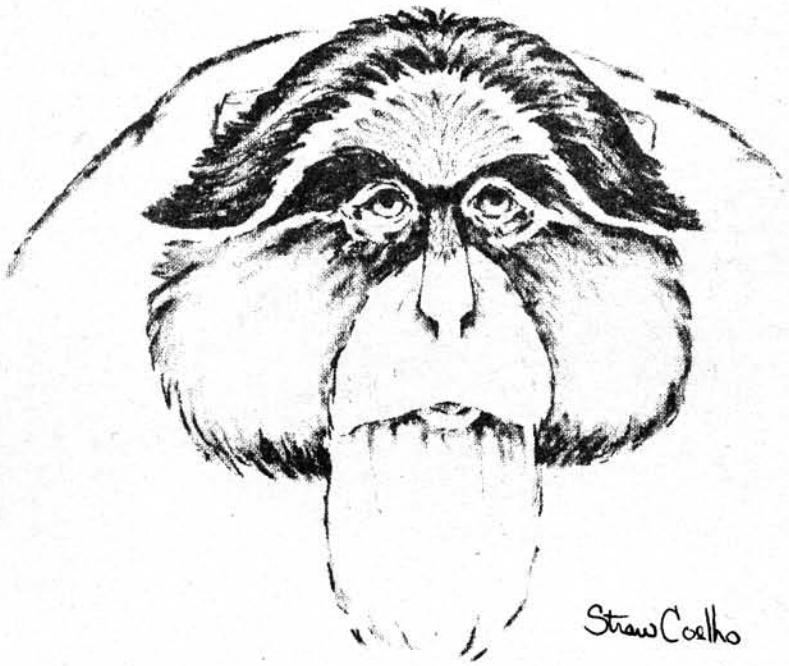
LABORATORY PRIMATE NEWSLETTER

Volume 22, No. 4 October, 1983



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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 infomation 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, notes, and announcements 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 in *Mammal Species of The World: A Taxonomic and Geographic Reference* J. H. Honacki, K. E. Kinman, & J. W. Koeppl (Eds.). Lawrence, KA: Allen Press and the Association of Systematics Collections, 1982]. 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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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.

We are grateful to Linda Straw Coelho for providing the cover drawing
of a De Brazza's monkey *(Cercopithecus neglectus).*

Managing Editor: Helen Janis Shuman

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Preliminary Report on the Establishment in Brazil of a Breeding Colony of Marmosets *(Callithrix humeralifer humeralifer)*

W. R. Kingston and J. A. P. C. Muniz
Brazilian National Primate Center

The Brazilian National Primate Center, in the course of its development in Belem, Para, has as its main objective the establishment of breeding colonies of all primate species of interest to national biomedical research projects, with particular emphasis on the human health problems of the Amazonian region of Brazil. Because of the proven ease with which *Callithrix jacchus*, found in the northeast of Brazil, can be bred in captivity, it was decided to set up colonies of the two species of this genus found in the Amazonian region, *C. humeralifer humeralifer* and *C. argentata*. Both of these species are abundant in the basin of the Tapajos River south of Santarem.

We started with *C. h. humeralifer*. The animals were trapped by our own staff and transported after an interval of not more than two or three days by air to Belem. On arrival they were weighed, examined and caged separately in the quarantine room. The weights of the animals judged to be adult by teeth and body size were males (N = 15) 475 g + 42 g and females (N = 13) 472 g ± 26 g. Maximum weight of males 540 g and females 560 g, the latter were not visibly pregnant nor were they detectably so by palpation or subsequent births.

While in quarantine fecal and blood samples were taken and examined by the staff of the Evandro Chagas Institute, an associated biomedical research laboratory. However, due to pressure of other work it was not possible for them to make a very detailed study of the parasites found in the feces or to look for blood parasites and nothing unusual was found. No routine medication was done but when symptoms of health problems appeared appropriate veterinary treatment was given.

Records

All animals received at the Center are entered in a permanent register. An individual numbering system has been devised using the initials of the genus, species and subspecies, sex, and consecutive number of that sex e.g. Chh/M/10 is the tenth male of *C. h. humeralifer* received in the Center. Using a system of colored plastic beads, carried on a fine neck chain, each color representing a digit and a bead of different shape and color for the sex, positive identification of each animal can be ascertained without the need to catch it. At the same time two individual record cards are prepared for each animal. The first records the site and date of capture; sex; estimated age and condition; results of clinical examination; date of leaving quarantine room and subsequent location. In the event of death a full post mortem is carried out and the results recorded and, when the condition permits it, a museum type skin is prepared complete with skull. The reverse of this card provides a record of the breeding performance of fit animals passed from quarantine to the breeding room. The second card provides a detailed record of health including all subsequent weight records, disease symptoms and veterinary treatment.

Caging

The breeding room currently in use for Callitrichids provides 48 cages, each 3 × 1 × 2 m. The sides are of brick and cement, the front, back, top and floor of 1" woven mesh wire. The floor of the cage is 50 cm above the concrete floor of the building. The building itself (43 × 14 m) is of brick and concrete construction, the sides being of wooden framed nylon fly-screen panels. These are at an angle of 30° from the vertical and, as the building is oriented North/South, all cages on both sides of the room have several hours daily of exposure to direct sunlight. The cages are fitted with small wooden nest boxes and natural tree branch perches.

Diet.

Since balanced compounded primate diets are not available in Brazil, a diet based on locally available materials has been devised. The basis of this is wholemeal brown bread and a selection of fruits and vegetables including bananas, papaya, pumpkin, carrot, and string beans. The protein requirement is met by hard boiled eggs and baby mice, a colony of which are maintained for this purpose. The bread is dampened with

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reconstituted whole milk powder to which sugar is added. A complete range of vitamins is added to the drinking water or food at regular intervals.

While it is appreciated that this diet has been devised without the benefit of expert nutritional advice, it would appear to be satisfactory. This opinion is based on the satisfactory growth of both wild-caught young animals and those born in the Center to date and survival and breeding performance of all stock. Losses from all causes are well under 10% of stock received and we have had very few health problems of any kind.

Breeding.

Twenty pairs were set up over the period May to December, 1982. About half of these were obviously adult when paired, the remainder being adolescent. Pairing was random from each batch of animals trapped. To date 10 births have occurred of which three were singletons, six were twins, and one was triplets, totalling 18 young in all. The earliest birth following pairing was a set of twins born 25 weeks later and the same pair produced triplets after another 30 weeks. A second pair produced a singleton after 28 weeks and twins 36 weeks later. All adult pairs but one have produced young, the longest interval being 67 weeks. The one adult female not overtly pregnant was paired 45 weeks ago. One pair, obviously very young when mated, produced twins only 34 weeks after pairing and, surprisingly, appears to be raising them without difficulty although experience with *C. jacchus* is that primiparous females frequently fail to do so. On the assumption that gestation is of similar length to *C. jaccus* i.e., 20 weeks, this suggests that puberty is attained at about the same age as that species, that is, 14 to 15 mo. All births have occurred overnight and the usual callitrichid pattern of the male normally carrying the young applies to *C. h. humeralifer*. No parturition problems have so far arisen.

Because of the relatively large cages currently in use for these animals, we have not risked catching the parents to examine, weigh, or photograph the young. However, two young which died shortly after birth weighed 34 and 35 g: another which died at 16 days old weighed 50 g and a fourth 26 days old weighed 55 g. The oldest surviving young, now some 8 mo old, is visually as large as its parents. Because of the known need for young animals to experience the birth and care of siblings if they are subsequently to breed successfully, we are leaving them with their parents until a second litter has been born.

So far as we are aware, this is the first time that *C. h. humeralifer* has been bred in captivity. On the results so far attained we feel justified in believing that this species will prove as satisfactory as *C. jacchus* as a small, easily kept, handled, and bred laboratory primate. We are fully aware that this species is classed as potentially endangered, particularly as its habitat is in an area undergoing considerable human settlement. However, if a self-propagating colony can be developed from the animals we already have, which appears likely, there should be no need to take further animals from the wild, since we have a sufficient number to satisfy the theoretical requirements for an acceptable level of genetic diversity. These results also suggest that the much rarer and more endangered subspecies, *C. h. chrysoleuca* and the recently discovered *C. h. intermedius*, could reproduce with equal ease in captivity if this is thought to be desirable to ensure survival. We currently have one young male *C. h. intermedius* paired with a female.

We have now established a small colony of *C. argentata* and the first births have recently occurred. A comparable report of the performance of this species under our conditions will be published in due course. This species, being white skinned, is particularly useful in immunological studies involving cutaneous reactions to antigens which are difficult or impossible to see on dark skinned animals.

Although we are much in favor of housing all our animals in cages of adequate size to allow ample space for exercise and normal behavior patterns, there is no doubt that the cages described above are considerably larger than is necessary to meet these criteria. At the same time close observation of the health of the animals is difficult, catching for any purpose is risky, particularly for dependent young, several of which have been lost simply by falling. We have designed a building of the same overall dimensions and construction as the above, but providing for the installation of 112 all-wire suspended cages each 1 × 1 × 1.5 m. Experience with several Callitrichid species in similar but smaller cages has proven to be very successful. The advantages are not only lower costs and greater capacity for a given building but, much more important, the animals can be observed, caught and examined with greater ease. Also, the risk of death of newborn young caused by falling is much reduced. Unfortunately however, although the plans have been approved, the funds for the construction of this building are not yet available.

NIH and WHO Collaborating Center for Reference and Research in Simian Viruses

This center now enters its sixteenth year of providing virologic support to those primate facilities and laboratories which have such a need. As in the past, our primary purpose is to offer a simian virus diagnostic laboratory service. In accomplishing this aim our activities will include the following: (1) *Diagnosis of simian virus diseases*. Assistance is provided in the event a viral disease occurs or is suspected in an animal or animal colony and the investigator feels loss of animals can be prevented by having appropriate laboratory diagnostic support. To accomplish this, epidemiological aid may also be furnished. (2) *Preparation of diagnostic reagents*. To offer the proper laboratory diagnostic assistance, appropriate reagents (virus, specific antisera) must be available. These are continuously prepared and maintained at the center. (3) *Training of personnel in virus laboratory procedures*. Such training is offered to staff of primate facilities who may wish to better understand the relationship between clinician and laboratory in making a final diagnosis. Such training may also help in etablishing a virus laboratory at the primate facility. (4) *Holding of workshops*. Workshops are given at irregular intervals to familiarize individuals with our capabilities and procedures. (5) *Consultation services*. Questions continually arise regarding possible virologic problems encountered in primate colonies. Expertise, generated over some 25 years in this area and which may be of value in reducing or even eliminating such problems, is available. (6) *Improvement of diagnostic methodologies*. In such a rapidly developing area as virus diagnosis, this laboratory not only continues to utilize improved and more rapid procedures, but also is involved in developing such methodologies.

This laboratory is specifically designed and equipped to provide the above services. Most important is the availability of biocontainment equipment for performing studies on highly infectious agents with maximal protection of staff and environment.

The "Simian Virus Reference Center Newsletter" will no longer be issued, but information about the Center will be published regularly in the *Laboratory Primate Newsletter*.

For further information, inquiries should be directed to: Dr. S. S. Kalter, NIH and WHO Collaborating Center for Reference and Research in Simian Viruses, Southwest Foundation for Research and Education, PO Box 28147, San Antonio, TX 78284.

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Hepatitis-Exposed Chimpanzees For Study

The Primate Research Institute (PRI) has a large research colony of chimpanzees, about 60 of which have been used in hepatitis, A, B, or non-A, non-B research. In order to stimulate research use of hepatitis-exposed animals, PRI is prepared to make these animals available on a cost-sharing basis. Such research might include study of non-A, non-B hepatitis and its effects in exposed animals, studies that can use previous hepatitis exposure as an experimental parameter (e.g. liver cancer and metabolism studies), and studies that would be unaffected by previous hepatitis exposure.—Contact: Director, Primate Research Institute, New Mexico State University, PO Box 1027, Holloman AFB, NM 88330. Tel.: (505) 679-2214.

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News Briefs

Taub's Conviction Overturned

Dr. Edward Taub has won his appeal of his conviction on one count of cruelty to animals. The Maryland Court of Appeals, the state's highest court, announced its unanimous decision on August 10, 1983. The court ruled that Maryland's 93-year-old animal cruelty law does not apply to federally funded projects which fall under the federal Animal Welfare Act. As such, the decision cannot be considered a vindication of Taub. However, the opinion also stated that "clearly the legislature recognized that there are certain normal human activities to which the infliction of pain to an animal is purely incidental and unavoidable" and to which the law cannot apply.

In a later development, the Appeals court refused to review its decision overturning the conviction. The request for reconsideration of the decision was made by the state's Attorney General who argued that the issue of inapplicability of animal cruelty laws to research facilities had not been debated during the appeals hearing. The Appeals Court offered no reason for their rejection of the Attorney General's request. (See the April, 1983 issue of this *Newsletter*, p. 5, for further information and for references to previous *Newsletter* News Briefs on the Taub case.)

Hunt Awarded Charles River Prize

The 6th Charles River Prize was awarded to Dr. Ronald D. Hunt at the annual meeting of the AVMA in July, 1983. The award is presented by the Charles River Foundation to a veterinarian selected by the AVMA in recognition of a distinguished contribution to the field of laboratory animal medicine. Dr. Hunt is director of the New England Regional Primate Research Center and professor of comparative pathology and director of the Animal Resources Center at Harvard Medical School. He earned his veterinary degree from the University of California at Davis in 1959 and became a diplomate of the American College of Veterinary Pathologists in 1964. His research interests have focused on the pathology of diseases of laboratory animals and the development of systems to understand human disease through animal models more thoroughly. He served twice as president of the New England Branch of the American Association of Laboratory Animal Science.

Research Animal Legislation: Future Not Clear

The question of laboratory animal legislation being enacted during this session of the 98th Congress seems now to rest upon how the U.S. House of Representatives resolves the political issue of what it views as good management practices for the National Institutes of Health (NIH).

Until the Congress returned in mid-September from its summer recess, the House appeared to be moving toward enactment of HR 2350, the NIH authorization renewal bill (see News Briefs, p. 8, in the July issue of this *Newsletter),* which would place much of the decision-making and research management of NIH in the hands of the Congress. In addition to renewing the existing NIH authorization, the bill has more than 30 amendments that would regulate Federally supported research including two amendments that concern laboratory animals. HR 2350 and its amendments won early support in the Subcommittee on Health and the Environment and the full Committee on Energy and Commerce. But when HR 2350 was introduced on the House floor it was met by a bipartisan alternative bill proposed by several members of the Committee on Energy and Commerce. The alternative bill calls for the renewal of all existing NIH authorities at the funding levels proposed in HR 2350 and the establishment of a separate institute for arthritis and musculo-skeletal diseases and the creation of 24 NIH demonstration centers for research and disease prevention. All of the other amendments in HR 2350 are deleted in the alternative bill, *including the two amendments relating to research animals.*

The outcome of this political battle over the philosophical question as to how scientific decisions at NIH should be made could end in a stalemate unless some compromises are achieved in both houses of the Congress.

Even if HR 2350 prevails in a House vote, there has been little display of support for it in the Senate. The Senate's version of the NIH renewal authorization (see News Briefs, cited above) contains only a few of the provisions found in the bill. Furthermore, Sen. Robert Packwood (R-OR) has placed a "hold" on the Senate bill because of his opposition to the provisions concerning fetal research. As long as Packwood maintains his hold the bill cannot be forwarded from the committee to the Senate floor.

Should both houses move ahead with their respective versions of the NIH renewal authorization, further

compromises will have to be achieved in the House-Senate conference committee, an area where the Congress has failed before to agree on NIH legislation. One representative has cited such differences of the past, saying "A NIH reauthorization bill has not been signed into law since December, 1980 when the House and the other body reached a stalemate and threw out both (House and Senate) bills, replacing them with a simple reauthorization—" [Based on a report in the *NSMR Bulletin*, 1983, *34*[8], 1.]

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Trends in Primate Imports: 1982

Imports of nonhuman primates in 1982 declined by 26% over 1981, from 22,457 to 16,651. Although there was no breakdown by species, of the 8,836 from Asia, most were almost certainly cynomolgus monkeys *(Macaca fascicularis)*, as was the case last year (See this *Newsletter*, October, 1982, pp. 10-11.). The next largest source of monkeys was South America and the Caribbean (5,023).

Not all imported primates become research animals. Many are dead on arrival or die within the first few months, and others are reexported to other countries. For example, in 1978 and 1979 combined, only 62 percent of all primates imported (30,586 out of 50,834) were actually available for use in research in the United States; 10,366 were reexported; and 9,024 were dead on arrival or died within 90 days. Applying this percentage to the 16,651 primates imported in 1982, it can be estimated that only 10,324 animals were made available for research.—From a longer article, entitled "Trends in Primate Imports into the United States, 1982," by David Mack, in *ILAR News*, 1983, *26*[4], 10-15.

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Research Opportunities at Duke University
Center for the Study of Primate Biology and History

Duke University Primate Center is the largest breeding center for prosimians in the world. At present we hold 630 individuals in 19 species and 27 subspecies. Our dual objective is, first, to breed self-sustaining populations of the rarest and most endangered prosimian primates and, second, to pursue conservation-oriented research and, where possible, benign biological research on unknown or little known species. At present research is being undertaken on social organization and behavior, reproductive behavior, and in 'natural habitat' enclosures, behavioral ecology. Research programs on reproductive physiology, nutrition, aging, vitamin biosynthesis, metabolic rates, thermoregulation, chromosome evolution, and biochemistry are in progress or planned. Tissues and organs of animals dying suddenly are preserved for DNA analysis, protein sequencing, and vision research. Furthermore, frozen cell lines are available from most species for a variety of biochemical uses. Cadavers are used for a wide variety of anatomical studies.

It is the policy of the center to use this unique library of living animals for the widest possible range of non-invasive programs of research. We are especially interested in attracting post-doctoral investigators to pursue research goals in the areas of animal nutrition, reproductive endocrinology, social organization and behavior of nocturnal species, chemical communication, immunology, and behavioral ecology.

Interested parties should write to the Director, Professor E. L. Simons, or Dr. J. I. Pollock, Research Manager, giving details of their research programs and protocol. Address: Duke University Primate Center, 3705 Erwin Road, Durham, NC 27705.

* * *

Position Open in St. Kitts Field Research Station

There is a position open for someone with interests in medical primatology and/or primate social behavior at a new field research station in St. Kitts, West Indies. Several investigators (D. E. Redmond, Jr., R. H. Roth, M. T. McGuire, and M. J. Raleigh) have been working on the island for a number of years and have recently set up a new facility to support biomedical and behavioral research. At least one is at the station most of the time, and some undergraduate or medical students are also there for weeks or months. There is a local business manager and staff for animal care and routine operation, but a longer term person is needed on-site to provide supervision and continuity and such a position will be available in the near future.

The most important qualification is personal maturity and adaptability, since there is considerable social and cultural isolation. Previous successful experience in similar situations, field stations, or field studies has been the best predictor that someone would enjoy the experience. Academic or practical experience in any field of primatology would be a help, along with basic knowledge of carpentry, stone masonry, electronics, computers, cooking, bacteriology, parasitology, etc., since the station has to be almost self-sufficient for periods of time. Research interests in (a) primate social behavior, (b) field studies of African green monkeys, (c) animal censusing and humane trapping methods, or (d) some aspect of medical primatology would be an asset, though other interests could be accommodated at the facility or on the island.

We would like to have a commitment for a stay of at least a year, and a longer term could be worked out if desired. We also would consider part-time employment if someone had their own partial support, or we would be willing to support 2-4 hours per day for the individual's own research interests.

There are rustic accommodations in a renovated sugar estate manager's house on the field station, and other housing is available in the area. Individuals would have to provide their own transportation on the island, but we would cover the cost of an annual round-trip airfare home to and from St. Kitts. Salary has to be negotiated through the Yale University personnel office.—Contact: D. E. Redmond, Jr., M.D., Yale University, Primate Research Facilities, Neurobehavioral Laboratory and Dept. of Psychiatry, 333 Cedar St., New Haven, CT 06510 (Phone: 1-203-785-4432).

* * *

Upcoming Primate Meetings

ASP

Sixth annual meeting of the American Society of Primatologists. Arcata, California. June 29 - July 3, 1984. The deadline for abstracts is January 31, 1984. Program information is available from the program Chairman: Dr. David M. Taub, c/o Yemassee Primate Center, 414 New St., Beaufort, SC 29902 (Phone: 803-524-6872).

IPS

Xth Congress of the International Primatological Society, July 22-27, 1984. Nairobi, Kenya. Despite any rumors to the contrary, this meeting will definitely be held as scheduled. For information about the Congress contact: IPS Congress Office, Institute of Primate Research, P.O. Box 34505, Nairobi, Kenya. The first notice of the meeting was reproduced in the April, 1983 issue of this *Newsletter*.

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Recent Books and Articles

(Addresses are those of first authors)

Books

International Zoo Yearbook 22. P. J. S. Olney (Ed.) London: Zoological Society of London, 1982. 488 pp. [Price: £23.75 hardback; £18.50 softback]

The special subject of this edition is New World Primates. The first section of the volume begins with discussions of the primates of various South American regions, and continues with reports on a wide range of work now being done with these primates in captivity. The final, Reference, section includes a directory of zoos and aquaria of the world, a taxonomic list of vertebrates bred in captivity in 1980, a census of rare animals in captivity and a list of authorized studbooks. The contents of most immediate relevance to primatologists are: SECTION 1 NEW WORLD PRIMATES. Introduction, by R. A. Mittermeier. Conservation of primates in the Atlantic forest region of eastern Brazil, by R. A. Mittermeier, A. F. Coimbra-Filho, I. D. Constable, A. B. Rylands, & C. Valle. Conservation of primates in Brazilian Amazonia, by A. B. Rylands, & R. A. Mittermeier. Primate conservation in Peruvian Amazonia, by P. Soini. Conservation of the Yellow-tailed woolly monkey *Lagothrix flavicauda* in Peru, by M. L. Luna. Conservation and status of wild primates in Venezuela, by R. Rudran, & J. F. Eisenberg. Conservation of primates in Surinam, by R. A. Mittermeier, & M. G. M. van Roosmalen. Introduction, reintroduction and translocation of neotropical primates; past experiences and future possibilities, by W. R. Konstant, & R. A. Mittermeier. Breeding New World monkeys at Miami's Monkey Jungle, by R. Fontaine, & M. Hench. The management and breeding of New World monkeys at London Zoo 1972- 1981, by B. C. R. Bertram. Observations on a breeding group of pygmy marmosets *Cebuella pygmaea* at Skansen Aquarium, by H.-O. Larson, M. Hagelin, & M. Hjern. An analysis of recent reproductive trends in captive Golden lion tamarins *Leontopithecus r. rosalia* with comments on their future demographic management, by D. G. Kleiman, J. D. Ballou, & R. F. Evans. Maintenance of the Goeldi's monkey *Callimico goeldii* at Jersey Wildlife Preservation Trust, by J. B. Carroll. Breeding the Goeldi's monkey *Callimico goeldii* at Brookfield Zoo, Chicago, by B. B. Beck, D. Anderson, J. Ogden, B. Rettberg, C. Brejla, R. Scola, & M. Warneke. Some observations on the reproductive physiology and behavior of the owl monkey *Aotus trivirgatus* in captivity, by A. F. Dixson. Karyological problems in breeding owl monkeys *Aotus trivirgatus*, by L. E. M. de Boer. Notes on the reproductive biology of the white-faced saki *Pithecia pithecia* in captivity, by A. H. Shoemaker. Behavioural considerations in the acclimitisation and nutrition of young black howlers, *Alouatta caraya*, by D. A. Meritt, Jr. Outdoor housing of spider monkeys and common squirrel monkeys *Ateles* spp and *Saimiri sciureus* during prolonged subfreezing temperatures, by K. R. Kaemmerer, & T. R. Anthoney. The reproductive physiology of the common marmoset *Callithrix jacchus* in captivity, by J. P. Hearn. The reproductive biology of capuchin monkeys *Cebus* spp., by C. A. Nagle, & J. H. Denari. SECTION 2 NEW DEVELOPMENTS IN THE ZOO WORLD. Breeding statistics of Western lowland gorillas *Gorilla g. gorilla* in United States Zoological Parks, by M. F. Murphy. Observations on sexual development in male Orang-utan *Pongo pygmaeus*, by A. F. Dixson, J. Knight, H. D. M. Moore, & M. Carman. Variability of behavioural data recorded by volunteer observers, by K. Ralls, B. Lundrigan, & K. Kranz. The reintroduction of a hand-reared Lion-tailed macaque or Wanderoo *Macaca silenus*, by J. R. Meyer, & C. Wilcox. Growth and development of twin Orang-utans *Pongo pygmaeus*, by M. R. Bond, & J. A. Black.

Primate Communication. Charles T. Snowden, Charles H. Brown, & Michael R. Peterson (Eds.) Cambridge: Cambridge University Press, 1982. 444 pp. [Price: $39.50]

This volume stems from a satellite symposium held in connection with the VIIIth Congress of the International Primatological Society that was held in Florence, Italy in 1980. The symposium was held in Parma, Italy, July 5-6, 1980. Contents: PART 1 AFFECTIVE AND SOCIAL ASPECTS OF PRIMATE COMMUNICATION. 1. Vocal communication within a group of monkeys: An analysis by biotelemetry, by J.-P. Gautier, & A. Gautier-Hion. 2. Vocal concomitants of affiliative behavior in squirrel monkeys, by H. J. Smith, J. D. Newman, & D. Symmes. 3. A neuroethological approach to the classification of vocalization in the squirrel monkey, U. Jürgens. PART II SOCIAL AND ENVIRONMENTAL DETERMINANTS OF PRIMATE VOCALIZATIONS. 4. Duetting in male and female songs of the white-cheeked gibbon *(Hylobates*

In many cases, the original source of reference 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.

concolor leucogenys), by B. L. Deputte. 5. Vocal systems regulating within-group spacing, by J. G. Robinson. 6. The evolution of male loud calls among mangabeys and baboons, by P. M. Waser. 7. Auditory localization and primate vocal behavior, by C. H. Brown. PART III PERCEPTUAL AND PSYCHOLINGUISTIC APPROACHES TO PRIMATE COMMUNICATION. 8. The perception of species-specific vocalizations by primates: A conceptual framework, by M. R. Petersen. 9. Linguistic and psycholinguistic approaches to primate communication, by C. T. Snowdon. 10. How monkeys see the world: A review of recent research on East African vervet monkeys, by R. M. Seyfarth, & D. L. Cheney. PART IV ONTOGENY AND PRIMATE COMMUNICATION. 11. Inheritance and experience in the acquisition of primate acoustic behavior, by J. D. Newman, & D. Symmes. 12. The role of chemical communication in aggressive behavior and its gonadal control in the tamarin *(Saguinus fuscicollis),* by G. Epple, M. C. Alveario, & Y. Katz. 13. A cognitive analysis of facial behavior in Old World monkeys, apes, and human beings, by S. Chevalier-Skolnikoff. PART IV SINGLE- VERSUS MULTIPLE-CHANNEL COMMUNICATION: COMMUNICATION OF REPRODUCTIVE STATE. 14. Experimental examinations of baboon *(Papio ursinus)* sex stimuli, by C. Bielert. 15. Olfaction and the reproductive behavior of nonhuman primates, by E. B. Keverne. 16. Multiple channels of sexual communication in rhesus monkeys: Role of olfactory cues, by D. A. Goldfoot.

The Embryology of the Lesser Galago (Galago senegalensis) *(Contributions to Primatology,* Vol. 19). H. Butler. Basel: Karger, 1983. Softcover. 158 pp. [Price: $45.50]

This monograph presents the data necessary to stage lesser galago *(Galago senegalensis)* embryos, thus making the first time that a Prosimian embryo has been placed in the Carnegie stages of development, which are based on size and evolution of external and internal features. This provides a basis for meaningful comparison with other mammals and the chick. The author describes the several varieties of trophoblast which precede the formation of the definitive epitheliochorial placenta as well as the fetal membranes. Particular attention is given to the development of the musculoskeletal, cardiovascular, genitourinary, gastrointestinal, respiratory, and nervous systems and to the emergence of species-specific characters. The author concludes that, despite radical differences in implantation and placentation, lesser galago embryos follow the same pattern of development as human embryos. Using the Carnegie stage criteria, the author relates the various lesser galago embryos to comparable stages of development in *Loris, Nycticebus, Callithrix, Macaca, Papio* and *Homo.*

Reports

REP: ANNUAL REPORT 1982. Rijswijk. The Netherlands: Organization for Health Research TNO, 1983.

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: IMMUNOLOGY AND TRANSPLANTATION BIOLOGY. Monoclonal antibodies specific for rhesus monkey lymphocytes, by G. van Meurs & M. Jonker. The immunosuppressive effects of monoclonal antibodies specific for human lymphocyte subsets in rhesus monkeys, by M. Jonker, B. Malissen, W. van Vreeswijk, C. Mawas, G. Goldstein, W. Tax, & H. Balner. The influence of alloimmunization of MLC reactivity between RhLA identical rhesus monkey siblings, by F. J. M. Nooij, M. Jonker, A. A. van Es, & H. Balner. Platelet transfusions have a positive effect on kidney allograft survival in rhesus monkeys and induce virtually no cytotoxic antibodies, by J. C. C. Borleffs, M. Jonker, P. Neuhaus, J. J. van Rood, & H. Balner. ETHOLOGY. Reduction of the separation response to young rhesus monkeys, by H. Dienske & S. J. Suomi. Treatment with serotonergic antidepressants reduces stereotyped locomotion in rhesus monkeys, by C. Goosden, L. G. Ribbens, H. G. M. Westenberg, & K. J. van den Berg.

IUCN/SSC Primate Specialist Group Newsletter. No. 2, August, 1982. R. A. Mittermeier (Ed.) Produced and circulated courtesy of the World Wildlife Fund—US and the Dept. of Anatomical Sciences, State University of New York, Stony Brook.

The main purpose of this newsletter is to serve as a means of communication for members of the Primate Specialist Group and other people concerned with primate conservation. Such persons are urged to contribute to the newsletter, and to use it in whatever way they feel appropriate to assist in achieving the common goal of conserving the current diversity of the Order Primates. All members of the Primate Specialist Group receive the newsletter free-of-charge. Non-members interested in subscribing to the newsletter may do so at a cost of $10 per calendar year. Checks should be made out to World Wildlife Fund—US and should be sent to William R. Konstant, Assistant Editor, Dept. of Anatomical Sciences, Health Science Center, State University of New York, Stony Brook, NY 11794, USA.

Bibliographies

Yersinia pseudotuberculosis *and* Y. enterocolitica *in nonhuman primates: A bibliography*. Benella Caminiti. Seattle: Primate Information Center, 1983. 6 pp. [Price: $5.00. Send orders to: Primate Information Center, Regional Primate Research Center SJ-50, University of Washington, Seattle, WA 98195]

Behavioral observations of feral and free-ranging rhesus monkeys (Macaca mulatta): *A bibliography*. 2nd ed. Jean Balch Williams. Seattle: Primate Information Center, 1983. 14 pp. [Price: $7.00 ($6.00 prepaid) Ordering information same as in previous reference.]

Colony breeding of African monkeys: A bibliography. 2nd ed. Benella Caminiti. Seattle: Primate Information Center, 1983. 9 pp. [Price: $6.00 ($5.00 prepaid) Ordering information same as in previous reference.]

Fertility and birth rates among feral or free-ranging nonhuman primates: A bibliography. Benella Caminiti. Seattle: Primate Information Center, 1983. 12 pp. [Price: $7.00. ($6.00 prepaid) Ordering information same as in previous reference.]

Behavioral observations of feral and free-ranging baboons (Papio): *A bibliography 1940-1970*. Jean Balch Williams. Seattle: Primate Information Center, 1982. 21 pp. [Price: $7.00 ($6.00 prepaid) Ordering information same as in previous reference.]

Behavioral observations of feral and free-ranging baboons (Papio): *A bibliography 1980-1983*. Jean Balch Williams. Seattle: Primate Information Center, 1983. 6 pp. [Price: $6.00. ($5.00 prepaid) Ordering information same as in previous reference.]

Disease

Rotavirus antibodies in Hanuman langurs *(Presbytis entellus)*. Hrdy, D. B. (Dept. of Microbiol. & Molecular Genetics, Harvard Med. Sch., Boston, MA 02115) *Journal of Medical Primatology*, 1982, *11*, 35-38.

Serum samples from wild Hanuman langurs from Mysore State, India, were compared to samples from a laboratory colony from Davis, Calif., for antibodies to rotavirus, which is an important cause of gastroenteritis in mammals. Animals from the laboratory colony had a higher frequency and higher levels of antibody than wild animals. It is likely that wild populations of langurs have a much lower incidence of rotaviral infection than laboratory populations, which are exposed to both crowded conditions and rotaviruses from other species.

Epizootic of balantidiasis in lowland gorillas. Teare, J. A., & Loomis, M. R. (Dept. of Animal Health, National Zool. Park, Wash., DC 20008) *Journal of the American Veterinary Medical Association*, 1982, *181*. 1345-1347.

Acute enteritis characterized by watery diarrhea and lethargy occurred in 4 lowland gorillas *(Gorilla gorilla gorilla)* during a 5-wk period at the Los Angeles Zoo. Numerous trophozoites of *Balantidium coli* were seen in fresh feces from each gorilla. Potentially pathogenic bacteria were isolated from 1 fecal sample. Results of fecal flotation examinations were negative for eggs of metazoan parasites. The gorillas were treated with antibiotics and metronidazole or paromomycin, or both. The most severely affected gorilla had blood and mucus in its feces, became dehyrated, and required hospitalization for supportive fluid therapy. This gorilla as well as the other gorillas recovered rapidly with treatment. *Balantidium coli* was not seen in fecal samples after the gorillas' recovery.

Yersiniosis in a breeding unit of *Macaca fascicularis* (cynomolgus monkeys). MacArthur, J. A., & Wood, M. (Chemical Defence Establishment, Porton Down, Salisbury, Wilts SP4 OJQ, England) *Laboratory Animals*, 1983, *17*, 151-155.

2 outbreaks of acute fatal enteric disease involving 20 animals in a breeding unit of approximately 200 cynomolgus monkeys were diagnosed as yersiniosis; *Yersinia pseudotuberculosis* was isolated from 50% of the clinically affected animals. Post-mortem findings included enlarged mesenteric lymph nodes with some enterocolitis and necrotic foci in liver and spleen. Approximately 7% of clinically healthy monkeys were found to be excreting *Y. pseudotuberculosis* and a further 5% *Y. enterocolitica*. Rectal swabs, though less convenient, were better than fecal samples for the detection of *Yersinia* spp. in `healthy monkeys. Efficiency of the cold saline technique and direct plating for isolating *Yersinia* spp. were compared. It is thought likely that the infection was introduced into the unit by asymptomatic infected monkeys.

Epidemic toxoplasmosis in captive squirrel monkeys *(Saimiri sciureus)*. Dickson, J., Fry, J., Fairfax, R., & Spence, T. (Animal Hlth. Lab., Dept. of Agric., Jarrah Rd., South Perth, Western Australia 6151, Australia) *Veterinary Record*, 1983, *112*, 302.

All 17 adult squirrel monkeys maintained in the Perth zoological gardens in one large open-fronted cage died within a four-day period. Histopathological analysis of tissues from 5 of the animals strongly indicated a diagnosis of toxoplasmosis. Following a similar outbreak in a non-primate species, it was found that the meatloaf that had been part of the diet of the squirrel monkeys, contained raw minced sheep hearts and this was suspected

to be the source of the infection, based on background knowledge of toxoplasmosis in Australian sheep. Since, then all meat has been cooked and there have been no further outbreaks in the year since this has been done.

Respiratory disease associated with parainfluenza Type I (Sendai) virus in a colony of marmosets *(Callithrix jacchus)*. Flecknell, P. A., Parry, R., Needham, J. R., Ridley, R. M., Baker, H. F., & Bowes, P. (Div. of Comp. Med., Clin. Res. Ctr., Watford Rd., Harrow, M1DDX HA1 3UJ, England) *Laboratory Animals*, 1983, *17*, 111-113.

An outbreak of acute respiratory disease was observed in a colony of marmosets. Parainfluenza Type I (Sendai) virus was isolated from the lungs and from throat swabs of 2 animals which showed clinical signs of disease. A rising titre of serum neutralizing antibody to the virus isolated was detected in several affected animals. Approximately 50% of the colony showed clinical signs of disease, and 3 animals died. The duration of illness ranged from 3 to 16 days.

A comparison of two tuberculins in nonsensitized macaques. Fox, J. G., Niemi, S. M., & Murphy, J. C. (Div. of Comp. Med., Mass. Inst. of tech., 37 Vasaar St., Cambridge, MA 02139) *Journal of Medical Primatology*, 1982, *11*, 380-388.

2 tuberculins (mammalian and Old Tuberculin) were compared in 3 species of macaques after one of the tuberculins elicited nonspecific reactions up to 72 hours after intradermal inoculation in nontuberculous monkeys. A significant difference in initial intradermal eyelid reactivity between the tuberculins was found in some subjects. The heterogeneity of tuberculins and the necessity of accurate interpretation of intradermal testing are important components in addressing tuberculosis screening in nonhuman primate colonies.

Natural transmission of *Entamoeba histolytica* from mother cynomolgus monkeys *(Macaca fascicularis)* to their newborn infants under indoor rearing conditions. Sakakibara, I., Sugimoto, Y., Koyama, T., & Honjo, S. (Tsukuba Primate Ctr. for Med. Sci., National Inst. of Hlth., Hachimandai, Yatabemachi, Tsukuba-gun, Ibaragi-ken 305, Japan) *Experimental Animals*, 1982, *31*, 135-138.

Natural transmission of *Entamoeba histolytica* from infected mother cynomolgus monkeys to their newborn infants was investigated by stool examination under indoor individually-caged conditions. Every infant became positive for *E. histolytica* between 5 and 10 wk after birth. Although some infants were demonstrated to harbor the trophozoites, no overt amebic diarrhea occurred in any of the infants throughout the period of this study.

Epistaxis and bullae in cynomolgus macaques *(Macaca fascicularis)*. *Olson, L. C., & Palotay, J. L. (Sect. of* Prim. Med., Oregon Reg. Prim. Res. Ctr., 505 NW 185th Ave., Beaverton, OR 97006) *Laboratory Animal Science*, 1983, *33*, 377-379.

Epistaxis (bloody nose syndrome) and bullae occurred in 35 of 54 cynomolgus macaques. Individual cases developed randomly during a 3-4 wk period in the winter, and resolved within a week of onset. Clinical signs included nasal and eyelid swelling, bloody nasal discharge, sneezing, and bullous areas above the eyes. Affected animals remained active and alert. *Staphylococcus aureus* and *Neisseria catarrhalis* were isolated from nasal swabs. Hemagglutination inhibition titers for measles were negative. Biopsies of the bullous areas disclosed acute inflammatory edema and cellulitis.

Stomatocytosis in a colony of captive squirrel monkeys *(Saimiri sciureus)*. Dunn, C. D. R., Gibson, L., Pombier, R., & Dardano, J. (Life Sci., Lab., Northrop Serv., PO Box 34416, Houston, TX 77234) *Laboratory Animal Science*, 1983, *33*, 308-310.

Chronic stomatocytosis, which increased in severity as a function of the time that animals were held in captivity, was observed in a small colony of squirrel monkeys. The stomatocytosis was associated with increasing hematocrits possibly due to a change in packing characteristics of the erythrocytes rather than any overt changes in the erythrocyte mass. Reticulocytes remained at control levels throughout development of the stomatocytosis. The most probable cause of this alteration in erythrocyte shape distribution was dietary, but the exact etiology was not determined.

Campylobacter jejuni isolated from patas monkeys with diarhea. Bryant, J. L., Stills, H. E., Lentsch, R. H., & Middleton, C. C. (Sinclair Comp. Med. Res. Farm, Univ. of Missouri, Columbia, MO 65201). *Laboratory Animal Science*, 1983, *33*, 303-305.

Campylobacter jejuni was isolated from 11 (46%) of 24 patas monkeys with chronic diarrhea. 8 of these 11 (73%) monkeys were characterized clinically by mucohemorrhagic diarrhea for periods up to a month followed by loose, semi-formed feces for a 12-month period. Half of the monkeys were treated with erythromycin for 10 da and the other half with tetracycline for 10 da, with all responding to treatment. Despite treatment, all monkeys again had an outbreak of mucohemorrhagic diarrhea. Biopsy specimens were taken from all 8 monkeys over a period of 3 mo. The clinical signs, treatment, and the gross and microscopic lesions seen in these monkeys were similar to those reported in humans and animals infected with *Campylobacter jejuni*.

Physiology and Behavior

Serum concentrations of calcium and vitamin D metabolites in prosimians. Gray, T. K., Lester, G. E., Moore, G., Crews, D., Simons, E. L., & Stuart, M. (Dept. of Med., Univ. of North Carolina, Sch. of Med., Chapel Hill, NC 27514) *Journal of Medical Primatology,* 1982, *11,* 85-90.

The concentrations of total calcium, 25-hydroxyvitamin D and 1.25-dihydroxyvitamin D_3 were measured in serum obtained from brown lemurs. The mean serum calcium level was 10.6 mg/dl in male and female lemurs. The mean serum mean 25-(OH)D concentration in serum from male and female lemurs was 27.1 and 31.0 ng/ml, respectively. The mean serum level of 1.25-$(OH)_2$ D_3 in the female and male lemurs was 65.2 and 65.9 pg/ml, respectively. A small segment of the lemurs had hypercalcemia and elevated serum concentrations of 25-(OH)D or 1.25-(OH)D or 1.25-$(OH)_2$ D_3 , suggesting the idea that the episodic ingestion of a large quantity of the calcium- and vitamin D-enriched diet normally provided ad libitum might cause hypercalcemia.

Blood vitamin values of common marmosets *(Callithrix jacchus).* McNees, D. W., Lewis, R. W., Ponzio, B. J., Stein, F. J., Sis, R. F., & Levy, B. M. (McNees, D. W., Dept. Biochem. & Biophys., Coll. of Agriculture, Texas A & M Univ., Coll. Station, TX 77843-2128) *Primates,* 1983, *24,* 266-272.

The blood vitamin analyses of the common marmoset were determined to provide baseline reference values for the normal animal. Ascorbic acid, riboflavin (erythrocyte glutathione reductase)[ECR] measurement, thiamin (erythrocyte transketolase) measurement and vitamin A (retinol) were determined for Texas A&M colony-born animals and those obtained from the wild. The analyses were completed on the animals, three times each, for a total of 93 analyses, which included 51 colony-born and 60 wild-born marmosets. A mean value of 0.98 mg/dl for ascorbic acid was found for the colony with a range from 0.06 to 4.1 mg/dl. The normal range for the marmosets appeared to be 0.5 to 1.5 mg/dl. The mean activity coefficient (AC) for the marmosets was 1.0 indicating that the animals had adequate riboflavin in the diet. The mean transketolase activities were (ribose remaining -30.1 IU/L) and (sedoheptulose appearance -7.9 IU/L). The mean and range for serum vitamin A (retinol) were 20.4 mg/dl and 6.96-57.44 mg/dl, respectively. None of the animals (colony-born or wild-born) exhibited any clinical signs of vitamin deficiencies as a result of being maintained in an indoor-outdoor environment over a 3-yr period.

Normal hematology values of Sykes monkeys *(Cercopithecus mitis albogularis).* Wall, H. S., & Else, J. G. (Inst. of Primate Res., PO Box 34505, Nairobi, Kenya) *American Journal of Primatology,* 1983, *5,* 77-81.

Hematologic values are presented for the Sykes monkey. The values are, in general, similar to published findings for other primate species. Elevated hemoglobin, possibly caused by high altitude, was noted. Significant differences of several values between males and females are discussed.

Growth and development in the saddle-back tamarin: The sequence and timing of dental eruption and epiphyseal union. Glassman, D. M. (Behavioral Medicine Lab., Southwest Found. for Res. & Ed., San Antonio, TX 78284) *American Journal of Primatology,* 1983, *5,* 51-59.

A cross-sectional sample of 121 colony-born saddle-back tamarins *(Saguinus fuscicollis)* was examined. The data indicated that deciduous incisors and canines were present at birth and that all deciduous teeth were erupted by 12 weeks. The first permanent tooth, M(1), erupted between weeks 16 and 23; the permanent dentition was fully erupted by 45 wk. Union of the long bone epiphyses began in the third month at the distal humerus and continued until the first quarter of the second year. The secondary centers at the ischial tuberosity and iliac crest were united slightly later than 4 and 6 yr of age, respectively. Regression analysis of the data indicate their potential use as parameters for predicting age in feral specimens.

Longevity of captive mammals. Jones, M. L. (Zoological Society of San Diego, PO Box 551, San Diego, CA 92112) *Zool. Garten N. F. Jena,* 1982, *52,* 113-128.

The most up-to-date listing by this author that includes the order Primates. The oldest prosimian listed is a hybrid lemur *(fulvus* x *macaco)* that was 39 years old when it died in 1969. The oldest New World monkey is a cebus monkey that was almost 47 yr old when it died in 1976. The oldest Old World monkey listed is a cynomolgus monkey that was 37 years old when it died in 1971. Finally, the oldest Great Ape listed is an orangutan estimated to be 59 years old. The oldest Great Ape for which there is firm information is an orangutan that was 49 yr old when it died in 1977. Several Great Apes close to this age were still alive at the time of the most recent report of their status.

Blood characteristics of the crab-eating monkeys *(Macaca fascicularis)* in Bali and Sumatra. Takenaka, O. (Prim. Res. Inst., Kyoto Univ., Inuyama, Aichi 484, Japan) *Kyoto University Overseas Research Report of Studies on Indonesian Macaque,* 1981, *1,* 41-46.

Blood characteristics of the crab-eating monkeys in Bali and West Sumatra were examined to see their normal

values and the effect of environment on them. Trends of water deficiency in the macaques of the western part of Bali Island were deduced from the high concentration of total plasma protein, plasma creatinine and plasma sodium ion. The crab-eating monkeys of West Sumatra appeared to have hemolytic anemia, as judged by their low red cell values, and elevation of transferrin and a dectesase or disappearance of haptoglobin.

A brief report on the hematological values of the crab-eating macaques *(Macaca fascicularis)* of Belawan in North Sumatra. Munir, W., & Takenaka, O. (Takenaka, O.: Same as in previous reference.) *Kyoto University Overseas Research Report of Studies on Asian Non-Human Primates*, 1982, *2*, 75-78.

The abnormally low hematological values found by Takenaka (see article above) were not found in the present case and so does not appear to be a characteristic of Sumatran crab-eating macaques.

Langur monkey *(Presybtis entellus)* development: The first 3 months of life. Dolhinow, P., & Murphy, G. (Dept. of Anthro., Univ. of Calif., Berkeley, CA 94720) *Folia Primatologica*, 1982, *39*, 305-331.

Observation for the first 3 mo of life of 19 Indian langur monkey infants living in well-established colony social groups revealed complex and related patterns of social development which are described.

Facilities and Care

Evaluation of a pelleted diet in a colony of marmosets and tamarins. Flurer, C., Scheid, R., & Zucker, H. (Inst. of Physiol., Physiol. Chem., & Nutritional Physiol., Univ. of Munich, Veterinärstr. 13, 8000 München 22, Federal Republic of Germany.) *Laboratory Animal Science*, 1983, *33*, 264-267.

By offering various pelleted diet modifications to 5 species of Callitrichidae, a palatable 24% protein diet was developed. The animals received limited fruit supplement, and families received an additional meal of commercial baby food. The pellets supplied approximately 75% of dietary energy and 95% of total protein. In 15 mo on this regimen, mortality dropped drastically and fertility improved. No signs of nutritional deficiency were observed. It was concluded that the nutrient levels of this diet were adequate or above actual requirements.

Incidence of bites from cynomolgus monkeys in attending animal staff—1975-80. Tribe, G. W., & Noren, E. (Shamrock Farms Ltd., Victoria House, Small Dole, Henfield, Sussex, England) *Laboratory Animals*, 1983, *17*, 110.

During a 6-yr period there were 67 incidents of cynomolgus monkey bites in men and 18 in women who were caring for these animals. All these casualities received first aid. Prior serological data suggest that it is probable that 48 incidents in male staff and 13 in females involved a B-virus infected monkey. However, no evidence of clinical B-virus infection, either locally at the site of the bite or systemically was observed. This suggests either that patients did not receive an infective dose, or the first-aid treatment provided prevented establishment of the virus in their tissues.

Breeding

Analysis of reproductive data in a breeding colony of African green monkeys. Kushner, H., Kraft-Schreyer, N., Angelakos, E. T., & Wudarski, E. M. (Dept. of Physiology & Biophysics, Hahnemann Medical Coll. & Hosp., 230 North Broad St., Philadelphia, PA 19102) *Journal of Medical Primatology*, 1982, *11*, 77-84.

In a breeding colony of *Cercopithecus aethiops aethiops* and *C. A. pygerythrus*, containing 109 feral females which have lived in the colony for at least one year, 89% have given birth, and 92% have become pregnant. There were 221 pregnancies and 186 live births with multiple births and no evidence for a birth season. A net estimated reproductivity rate indicates 180 sexually mature females would produce over 100 offspring per year.

Key Lois and Raccoon Key: Florida islands for free-ranging rhesus monkey breeding programs. Pucak, G. J., Foster, H. L., & Balk, M. W. (Scientific Activities, Charles River Breeding Laboratory, Inc., 251 Ballardvale St., Wilmington, MA 01887) *Journal of Medical Primatology*, 1982, *11*, 199-210.

The importance of the rhesus monkey *(Macaca mulatta)* in biomedical research has resulted in the development of domestic breeding programs to ensure annual quantities for specific research projects. Charles River Breeding Laboratories, Inc. began the establishment of the first commercial, free-ranging rhesus monkey island (Key Lois) breeding colony in 1971 within the continental United States. A second island (Raccoon Key) was developed in 1977. Operations unique to these free-ranging colonies with respect to procurement, quarantine, microbiological assessment, transportation, facilities, and daily operational procedures are described.

Photoperiod and ovulatory menstrual cycles in female macaque monkeys. Wehrenberg, W. B., & Dyrenfurth, I. (Laboratories for Neuroendocrinology, The Salk Inst., PO Box 85800, San Diego, CA 92037) *Journal of Reproduction & Fertility*, 1983, *68*, 119-122.

Macaques *(Macaca mulatta* and *M. assamensis)*

which had been maintained on a 12L:12D light cycle for the previous 4 yr and had 25-35 da menstrual cycles were randomly assigned to 2 groups. Those in Group 1 were kept in 12L:12D for 13 mo. Those in Group 2 were subjected to 3 successive 5-mo periods of 20L:4D, 4L:20D and 20L:4D. There were no significant differences between the two groups in the frequency, duration and percentage of ovulatory menstrual cycles, suggesting that photoperiod is not the sole regulator of seasonal breeding in these animals.

The relationship between female urinary estrogen excretion and mating behavior in cotton-topped tamarins, *Saguinus oedipus oedipus*, Brand, H. M., & Martin, R. D. (Dept. of Reproduction, Inst. of Zool., Zool. Soc. of London, Regent's Park, London NWl 4RY, England) *International Journal of Primatology*, 1983, *4*, 275-290.

Daily urinary estrogen excretion in 6 singly housed adult female cotton-topped tamarins was measured by radioimmunoassay. Each female was paired with a male for 1 hr every day, during which behavioral observations were conducted on the pair. The results reveal a high degree of behavioral variation between pairs, although a relationship between rhythmic changes in sexual activity and female estrogen excretion in individual pairs is apparent. Mating occurs throughout the female cycle and also during at least the first 2-3 wk of pregnancy. A gestation period of 170-172 days is estimated in respect of 1 female, in agreement with a previous observation of 1 gestation of at least 166 da. The high frequency and intensity of mating recorded in this controlled-introduction study give support to the proposition that mating is important in pair-bonding in this monogamous species. It is concluded that under the experimental procedure followed, mating behavior did not reliably reflect the female's reproductive hormonal state.

Parturition in *Macaca nemestrine*. Goodlin, B. L., & Sackett, G. P. (Sackett, G. P.: Univ. of Washington, Primate Ctr. SJ-50, Seattle, WA 98195) *American Journal of Primatology*, 1983, *4*, 283-307.

Measures were taken on 187 pregnancies of 104 pig-tailed macaques to document the normative course of parturition and to identify factors correlated with high risk for poor pregnancy outcomes. Analyses involved weekly physical examinations and diurnal sleep-wakefulness patterns during trimester three; behavior during labor and delivery; and newborn sex, Agpar ratings, birthweight, and reflexes. Onset of labor was estimated at 3-4 hr before delivery, the time when circadian activity level first deviated from its predelivery pattern. Active labor averaged 92 min, and was characterized by increased uterine contractions and manipulation of the vaginal area. The modal delivery time was 2200 hr through 2400 hr. Most infants emerged from the vulva in a cranial-anterior-anterior presentation, with only a brief pause between head expulsion and complete emergence. Females with histories of poor pregnancy outcomes were more likely to deliver after midnight and showed less labor-unique behavior than females with good outcome histories. Infants of high-risk females that were delivered after midnight had lower Apgar scores and more bruising than infants of low-risk females delivered before or after midnight, suggesting that high-risk females may have more difficult deliveries. Overall, the results show that simple direct observations of parturition can yield important quantitative normative information that is correlated with reproductive risk factors.

Consequences of first pregnancy in rhesus monkeys. Wilson, M. E., Walker, M. L., & Gordon, T. P. (Yerkes Reg. Prim. Res. Ctr., Emory Univ., Atlanta, GA 30322) *American Journal of Physical Anthropology*, 1983, *61*, 103-110.

The breeding records of female rhesus monkeys *(Macaca mulatta)* living in provisioned, outdoor-housed social groups were examined with respect to age of sexual maturity. Of the 78 colony-born females contributing to the analysis, 20.5% had their first parturition at 36 mo of age. The majority of females, 73.1%, had first parturition at 48 mo; 6.4% did so at 5 yr of age. An examination of outcomes of successive pregnacies revealed that both early- and typical-maturing females experienced a significant decline in live births, owing to a significant increase in sterile years, for the reproductive year following a successful first parturition. This decline was even more pronounced for early-maturing females. The frequency of birth tragedies remained constant throughout the second and succeeding pregnancies. Thus, the capacity to conceive was reduced for some females in the reproductive year following their first pregnancy. Those females that did conceive in the year following a successful first pregnancy had a significantly longer interbirth interval between their first and second parturitions than between subsequent parturitions. The nutritional costs of lactation associated with successful first pregnancy may preclude or delay ovulation the following year, and this effect may be greater for young females that are still in a growth phase at first pregnancy. Although these early-maturing females had proportionally fewer live births during their second reproductive year, they were equal to their age-mates when compared on the basis of offspring produced by a female at any given age. In addition, since early maturing females have offspring entering the breeding pool a full year earlier, they may not necessarily be reproductively disadvantaged.

Moderate social restriction during infancy reduces sexual receptivity in adult female rhesus macaques. Phoenix, C. H., & Chambers, K. C. (Oregon Reg. Prim. Res. Ctr., 505 NW 185th Ave., Beaverton, OR 97006) *Behavioral and Neural Biology*, 1982, *36*, 259-265.

The sexual behavior of 5 adult, ovariectomized, female rhesus macaque born and reared in a laboratory was compared with that of 5 adult, ovariectomized rhesus females born in the wild and imported when they were about 2 yr old. Receptive behavior depends less on hormonal stimulation for its display than does proceptive behavior (female-initiated sex and behavior), and is seriously impaired by even moderate social deprivation in infancy.

Factors influencing population growth of a colony of cotton-top tamarins. Kirkwood, J. K., Epstein, M. A., & Terlecki, A. J. (Dept. of Pathology, Univ. of Bristol Med. Sch., Univ. Walk, Bristol BS8 lTD, England) *Laboratory Animals*, 1983, *17*, 35-41.

43% of full-term births in a colony of *Saguinus oedipus oedipus* occurred during April and May. Interbirth interval was usually 12 mo in females which reared live young and 7 mo in those whose young died perinatally. 81% of all full-term births were of twins, the rest were singles. High mortality among neonates was seen with a group of brought-in animals which had been taken from their parents at an early age without participating in the rearing of siblings, and was attributable to parental incompetence. Colony management aiming to ensure that animals gain experience in caring for young before breeding is described. Mortality among all animals older than 7 days was very low. Marginal protein deficiency may have been involved in a chronic diarrhea and weight loss syndrome seen in some animals. They recovered after addition of hard-boiled egg to the diet.

Ecology and Field Studies

Twenty-year changes in rhesus monkey populations in agricultural areas of northern India. Southwick, C. H., Siddiqi, M. F., & Oppenheimer, J. R. (Southwick, C. H.: Dept. of Environmental, Population & Organismic Biol., Univ. of Colorado, Boulder, CO 80309) *Ecology*, 1983, *64*, 434-439.

Over a 20-yr period, 1959-60 to 1979-80, rhesus monkey populations in agricultural areas of northern India declined substantially. Roadside populations decreased 77%, from 5.7 rhesus groups to 1.3 groups/100 km. Canal bank populations declined 76% from 11.5 to 1.8 groups/100 km. Village populations of rhesus declined 89%, and a new sample of 245 additional villages in 1979-80 revealed no rhesus monkeys in or near these villages. Rhesus groups in towns showed the least decline: 24% over the past 20 yr. A few localities in India continue to have abundant rhesus. Banda District in southern Uttar Pradesh had one village with more than twice as many rhesus in 1979-80 as in 1959-60 (11 rhesus groups with 267 monkeys in 1980 compared to only 5 groups with 109 monkeys in 1960), but all of these groups were associated with Hindu temples or a sacred hill. In other sites of religious significance for Hindus, including temple areas around Ajodhya in central U.P., rhesus have declined over 90%. Although a few localities and special sites in India still have good populations of rhesus monkeys, they are no longer a common or widespread feature of agricultural India.

Macaca mulatta and *Rhinopithecus* in China: Preliminary research results. Poirier, F. E., & Hu, H. (Dept. of Anthropol., Ohio State Univ., Columbus, OH 43210) *Current Anthropology*, 1983, *24*, 387-388.

Little information is available on the distribution and abundance of the 6 genera of Chinese primates, most of which inhbit the South Yunnan zoogeographical subregion. *Macaca* is the most numerous and widely distributed Chinese primate; *Rhinopithecus* may be the rarest and have the most restricted distribution. Rhesus monkeys are listed as a third-priority endangered species in China, meaning that they are not in immediate danger. Our limited research suggests that this is an optimistic prognosis. *Rhinopithecus* was listed as a first-priority endangered species in 1975; the golden monkey is now totally protected, and reservations have been established for its protection and breeding.

Polyspecific groups of macaques on the Kowloon Peninsula, New Territories, Hong Kong. Southwick, C. H., & Southwick, K. L. (Dept. of EPO Biol., Box B-334, Univ. of Colorado, Boulder, CO 80309) *American Journal of Primatology*, 1983, *5*, 17-24.

3 polyspecific groups of free-ranging macaques were observed in 1980 and 1981 in the forests of the New Territories of mainland Hong Kong. 2 groups were composed of rhesus monkeys *(Macaca mulatta)* and long-tailed, or crab-eating monkeys *(M. fascicularis)*, and one group was composed of both the former plus Japanese macaques *(M. fuscata)*. All 3 groups contained hybrids between *M. mulatta* and *M. fascicularis*. This combination of species within the same social group is an unusual circumstance in natural habitats, and it offers a unique opportunity for field studies in primate ecology and behavior.

Instruments and Techniques

A tandem cage for individually handling group-living monkeys. Chance, M. R. A., Byrne, B., & Jones, E. (Sub-dept. of Ethology, Uffculme Clinic, Queensbridge Rd., Birmingham B13 8Qd, England) *Laboratory Animals*, 1983, *17*, 129-132.

A Tandem Cage is described which consists of two circular or hexagonal cages joined by two 'tunnels' to enable the individuals to be separated as the group is circulated through one of the tunnels. This tunnel is fitted with partitions which can be inserted through slots in order to trap an individual monkey in a removeable section of the tunnel. Cage 'furniture' is described which maximizes the possibilities of effective distancing between individuals as a means of reducing group tension. An observation section is incorporated on one side of the tunnels in the space between the two cages, which permits simultaneous one-way viewing of both cages and the tunnels.

Design of a protective splint for nonhuman primate extremities. Rose, B. W., Mackinnon, S. E., Dellon, A. L., & Snyder, R. A. (Dellon, A. L.: The Hampton Plaza, 300 East Joppa Rd., Baltimore, MD 21204) *Laboratory Animal Science*, 1983, 33, *306-307*.

A splint was designed that effectively protected a nonhuman primate extremity following an injury or experimental procedure. The splint was fabricated from a thermoplastic material. Fabrication was simple, rapid, inexpensive, and versatile.

Taxonomy

Bunopithecus: A genus-level taxon for the hoolock gibbon *(Hylobates hoolock)*. Prouty, L. A., Buchanan, P. D., Pollitzer, W. S., & Mootnick, A. R. (Pollitzer, W. S.: Dept. of Anatomy, Med. Res. Bldg. D 331H, Univ. of North Carolina, Chapel Hill, NC 27514) *American Journal of Primatology*, 1983, *5*, 83-87.

The recent discovery that the hoolock gibbon *(Hylobates hoolock* [Harlan, 1834]) has a karyotype distinct from all other hylobatids provides a new and strong motive for revising gibbon taxonomy and establishing hoolocks in a separate, higher taxon. Revising Groves's taxonomy of 1972, we propose that *hoolock*, along with the fossil species *sericus*, occupy a subgenus, *Bunopithecus*. With the newly added taxon, the genus *Hylobates* would thus contain four subgenera: *Bunopithecus, Hylobates, Nomascus,* and *Symphalangus*.

About the name of marmosets family. de Carvalho, C. T. (Instituto Florestal, Secr. Agricultura (Sec. Animais Silvestres), Caixa Postal, 1322 Sao Paulo, SP, Brazil) *Mammalia*, 1983, *47*, 144.

The author states that the family name for marmoset should be Callithricidae, rather than Callitrichidae.

Subspecies and geographic distribution of black-mantle tamarins *Saguinus nigricollis Spix* (Primates: Callitrichidae). Hershkovitz, P. (Field Museum of Natural History, Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605) *Proceedings of the Biological Society of Washington*, 1982, *95*, 647-656.

A new subspecies from Colombia of the black-mantle tamarin *Saguinus nigricollis,* is distinguished from *S. n. nigricollis* and *S. n. graellsi* by color pattern. Geographic range of each of the three subspecies is revised and discussed, and differentiation of the taxa during early Recent-Late Pleistocene is hypothesized on the basis of past climates.

Taxonomy and evolution of the sinica group of macaques: 4. Species account of *Macaca thibetana*. Fooden, J. (Div. of Mammals, Dept. of Zool., Field Museum of Natural History, Chicago, IL 60605) *Fieldiana Zoology*, 1983, *17*, 1-20.

Macaca thibetana is one of two species of stumptail macaques that are native to China; the other is *M. arctoides*. These two macaques differ strikingly in form and size of the glans penis and baculum, which are about half as long in *M. thibetana* as in *M. arctoides*, and presumably also in structure of the female reproductive tract. Despite conspicuous differences, they frequently are confused and often have erroneously been assumed to be conspecific because both species are large, stumptailed, and generally brownish in dorsal pelage color. Based on reproductive anatomy, *M. thibetana* is assigned to the *sinica* group of macaques (Fooden, 1971), which also includes *M. sinica, M. radiata,* and *M. assamensis*. The tail length morphocline and pattern of geographic distribution in this group suggests that *M. thibetana* is the most derived of the four species. A comprehensive comparative overview of the group is in preparation. The present account of *M. thibetana* is based on a study of 29 available museum specimens and review of relevant literature.

Taxonomy and phylogeny of black-and-white colobus monkeys: inferences from an analysis of loud call variation. Oates, J. F., & Trocco, T. F. (Dept. of Anthropol., Hunter Coll., CUNY, 695 Park Av., NY, NY 10021) *Folia Primatologica*, 1983, *40*, 83-113.

Field recordings of male loud calls (or roars) from each major form of black-and-white colobus monkey have been analyzed spectrographically, and features of tempo and pitch measured. Considered together with data on cranial dimensions, coat pattern, and geographical distribution, the results of this analysis suggest that there

are 5 species of black-and-white colobus: *Colobus angolensis, C. guereza, C. polykomos, C. satanas,* and *C. vellerosus. C. guereza* and *C. vellerosus* may have differentiated more recently during a major arid event prior to the last Pleistocene glacial maximum; they have an identical low-pitched roar which we consider to be a shared, derived character. The other species, of which *C. satanas* has the most distinct roar, may belong to older lineages.

Conservation

Tropical forest primates and logging—Can they co-exist? Johns, A. D. (Sub-dept. of Vet. Anatomy, Univ. of Cambridge, Cambridge CB2 1QS, United Kingdom) *Oryx,* 1983, *17*, 114-118.

Faced with the continuing exploitation of tropical forest, efforts should perhaps be directed at determining which species are incapable of surviving in logged forests and thus require protection in national parks or equivalent reserves, and which species are able to co-exist with the timber industry. Perhaps more attention should be paid to possibilities for the integration of timber exploitation and wildlife conservation: the two are not always mutually exclusive. If commercial exploitation of tropical forest is unstoppable, at least we can try to lessen its effects.

Can translocation help wild primates? Caldecott, J., & Kavanagh, M. (Sub-dept. Vet. Anat., Univ. of Cambridge, Tennis Court Rd., Cambridge CB2 1QS, United Kingdom) *Oryx,* 1983, *17*, 135-139.

Translocation is the relase in a new location of one or more free-ranging animals that come from anywhere other than the place in which they are released. There are so many problems inherent in translocation that it should not normally be attempted, and never without meticulous planning and adequate funding. An exhaustive feasibility study should precede the operation. The special cases in which translocation appear to be a viable and constructive option are discussed.

* * *

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