LABORATORY PRIMATE NEWSLETTER

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Edited by

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POLICY STATEMENT

The primary purpose of the *Laboratory Primate Newsletter* is to provide information on maintenance, breeding, and procurement of nonhuman primates for laboratory studies. A secondary purpose is to disseminate general information about the world of primate research. Requests for information, for special equipment, or for animal tissues or animals with special characteristics will be included in the *Newsletter*. 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. There is no charge for new issues or the current issue. Volumes 1-4 may be purchased for $4.00 per volume, Volumes 5-8 for $2.50 per volume, and back issues for the current year for $0.50 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. As a rule, authors of longer articles will receive five extra copies of the issue in which the article appears; reprints will not be supplied under any circumstances.

PREPARATION OF ARTICLES FOR THE *NEWSLETTER*.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the References section should be referred to in the text by author(s) and date of publications, as for example: Smith (1960) or (Smith & Jones, 1962). Names of journals should be spelled out completely in the References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *Newsletter* (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].

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ACKNOWLEDGMENT

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Managing Editor: Kathryn M. Huntington

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INTRAMUSCULAR METHOHEXITAL IN CONJUNCTION WITH HALOTHANE ANESTHESIA IN RHESUS MONKEYS

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This paper describes the use of methohexital sodium (Brevital, Eli Lilly, Co.), an ultrashort-acting barbiturate, as a preanesthetic sedative in conjunction with halothane anesthesia in rhesus monkeys (*Macaca mulatta*)[2]. Although some previous workers (e.g., Taylor, 1969) have reported the successful use of phencyclidine hydrochloride (Sernylan, Parke-Davis) as premedication for halothane, we found considerable respiratory depression during halothane induction when intramuscular phencyclidine (2.3 mg/kg) was used for premedication. This consideration, together with previous findings of phencyclidine-induced body cooling and prolonged CNS depressant effects (Stoliker, 1965), prompted our use of an ultrashort-acting barbiturate as an alternative to phencyclidine.

Our choice of methohexital was suggested by its previous successful intramuscular use in children. Frank, Fraser, and Whitcher (1966), for example, found that intramuscular injections of methohexital (7.0 mg/kg) induced sleep in hyperkinetic children within 3 minutes, and that the period of sleep lasted for less than 70 minutes. Elman and Denson (1965) found 5.5 mg/kg to be an adequate intramuscular dose for preanesthetic medication of children, with onset of action in 2-5 minutes and effective duration of less than 60 minutes. We felt this short duration of action, permitting dissipation of the drug shortly after establishment of anesthesia and prompt onset of sedation to be highly desirable for experimental surgery in primates. Accordingly, we used methohexital on a trial basis in monkeys undergoing experimental brain surgery and have found it to be a highly effective preliminary sedative for halothane anesthesia.

In our procedures, the initial injection of methohexital was administered intramuscularly while the animals were temporarily held immobile in a squeeze cage. We found a dose of 13.0 mg/kg to produce drowsiness in approximately 3 minutes and deep sedation in 4-5 minutes.

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[2]The animals used in this study were handled in accordance with the "Guide for Laboratory Animal Facilities and Care" issued by the National Academy of Sciences--National Research Council.

When deeply sedated, the monkeys were removed from the squeeze cage and prepared for surgery; preparatory procedures such as clipping of hair and application of depilatory cream were done rapidly since the methohexital-induced sedation rarely lasted longer than 30-40 minutes. Some animals occasionally made feeble attempts to move during this preparatory period, but did not normally require additional sedation; the few animals that did become too active to handle were re-sedated with 5.0 mg/kg methohexital administered intramuscularly.

Halothane induction following this preliminary sedation was relatively simple. A corrugated hose delivering the oxygen-halothane mixture from the anesthesia machine was placed 1/2 inch from the monkey's nose, and the halothane concentration was increased from 1-4% in 0.5% steps per minute. The animals usually accepted a face mask soon after 4% halothane was reached; halothane was then delivered through the face mask at 2.0% and then increased to 3.0%. When the lower jaw was sufficiently relaxed to introduce a laryngoscope into the mouth, a tetracaine hydrochloride spray (Cetacaine, Cetylite Ind.) was administered directly onto the larynx. Following a short period of re-exposure to halothane, another Cetacaine burst was delivered, being certain that the spray was directed down the trachea. After one more minute of halothane administration, tracheal intubation was performed, using a 3.5 mm internal diameter (I.D.) cuffed tube for monkeys in the 2-3 kg weight range and a 4.0 mm I.D. tube for the 3-6 kg animals. A stylet was used to support the tubes. Following intubation the halothane concentration was immediately reduced to 1.0% or 1.5% and the level of anesthesia was stabilized prior to the beginning of the surgical procedure.

We have found heart rate and jaw tension to be good indices of depth of sedation and anesthesia during these procedures. Heart rates averaging approximately 200 beats per minute were common under the methohexital sedation, while rates of approximately 160 per minute seemed to be optimum for tracheal intubation. For surgical procedures lasting approximately two hours, the heart rates averaged 140 $\pm$ 10 beats per minute, with halothane concentrations of 1.0-1.5%. During surgical procedures lasting 6-9 hours, heart rates of 120 were not uncommon; rates lower than 120 were avoided when possible. Our experience indicates that all animals should routinely receive 0.1 to 0.2 mg of atropine sulfate subcutaneously at the time of preparation for surgery, and 0.04 mg intravenous doses as necessary to prevent the excessively slow heart rates that may occur during a long procedure because these rates are not reversed by lightening the depth of anesthesia.

A dual beam oscilloscope was used to monitor both heart rate and jaw tension. Lead II EKG was displayed on one oscilloscope channel to supply heart rate information and allow detection of premature ventricular contractions. Electromyographic (EMG) activity from the jaw muscles was recorded on the other oscilloscope channel by mounting 23 gauge needles on shielded cables and implanting the needles (bilaterally) into the masseter muscle. The amplitude of the EMG increased as the anesthesia

level became too light; jaw clenching caused significant EMG changes on the 200 μV/cm scale. Once the animal reached a stable anesthetic plane, the job of the anesthetist became primarily that of keeping the heart rate up and the EMG down.

Rapid recovery from anesthesia was one of the primary advantages of this methohexital-halothane technique. In our experience, animals subjected to 2-hour surgical procedures usually began moving about 12 minutes after halothane was terminated, and were able to hold themselves up after 16 minutes or so. Longer surgical procedures (4-8 hours) required 30-60 minutes for awakening to occur. This compares very favorably with the long recovery (sometimes lasting 6 hours or more) that we have seen with intravenous pentobarbital anesthesia in monkeys. It also drastically reduced the period of time during which the surgical area and brain implant hardware was susceptible to damage from the agitation and thrashing around that usually accompanied recovery from pentobarbital anesthesia.

In summary, we have found the methohexital-halothane anesthesia technique described above to be safe, effective, and advantageous for experimental surgical procedures in rhesus monkeys.

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AN UNUSUAL LUNG MITE LESION IN A BABOON (*PAPIO PAPIO*)*

R. E. Schmidt and G. L. Wiley

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A 19.3 kg male baboon (*Papio papio*) was purchased by the 6571st Aeromedical Research Laboratory on 24 June 1969. The vendor's records indicated that the animal had been T.B. tested with negative results prior to arrival at this laboratory. Upon arrival, the animal was given a routine physical examination, including chest radiographs. A cystic lesion approximately 2.2 cm in diameter was noted by radiography in the left upper lung lobe at the level of the second rib. This lesion was interpreted as being either tuberculous or parasitic. An intrapalpebral TB test done the same day as the radiographs was negative. On the third day after the cyst was noted the animal was anesthetized and its abdomen surgically prepared. KOT was injected intradermally on one side of the abdomen and PPD on the other. These tests were also negative. In view of the fact that in some cases of pulmonary tuberculosis false negative results occur (Shaffer & Goldin, 1969, p. 1068), the animal was euthanized.

At necropsy, lesions were noted in both the left apical lung lobe and the right apical lung lobe. The lesion in the left lobe was 2.5 × 2.5 × 1 cm and in the right lobe 1 × 1 × .5 cm. Grossly, both were glistening white and turgid, the larger lesion resembling that of a cavitated tuberculous lesion. On sectioning, the lesions consisted of cyst-like spaces with many small white granules attached to their walls. When examined with a dissecting microscope these granules were seen to be lung mites. Histologically the lesion consisted of a dense connective tissue wall with compression of adjacent lung parenchyma. Numerous pigment laden macrophages and eosinophils were present within and adjacent to the fibrous capsule.

Strong, Miller, and McGill (1965) found that *Pneumonyssus* sp. were present in almost all the baboons they necropsied. The lesions they found differed from those described above in that they were grey or yellow nodules less than 5 mm in diameter. Histologically, the nodules consisted of mites in the bronchioles, chronic bronchiolitis, pigment accumulation and occasionally squamous metaplasia of bronchiolar epithelium.

The findings in this report indicate that infection with lung mites should be considered as a possibility when large cystic spaces are noted

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*Animals used in this study were handled in accordance with the "Guide for Laboratory Animal Facilities and Care" prepared by the National Academy of Sciences--National Research Council and in accordance with the Secretary of Agriculture Standards in "Laboratory Animal Welfare."

on radiographs of the baboon lung. The reasons for formation of this type lesion are unknown.

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MEETING ANNOUNCEMENTS: SIXTH ANNUAL CARNEGIE SYMPOSIUM ON COGNITION

This symposium will be held March 26-27, 1970 at Carnegie-Mellon University in Pittsburgh. The symposium will be concerned with "cognitive processes of nonhuman primates" with papers given by Harry F. Harlow, Leonard E. Jarrard, Donald R. Meyer, David Premack, and Larry Weiskrantz. Discussants include Lee W. Gregg, Norman Geschwind, and Raymond C. Miles. For information write to Leonard E. Jarrard, Department of Psychology, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213.

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REQUEST FOR PRIMATE MATERIAL: PITUITARIES FROM NONHUMAN PRIMATES

Frozen pituitaries from nonhuman primates are requested for a hormone crossreactivity study. Quantities of from one to ten pituitaries from each separate species would be greatly appreciated. All samples will be acknowledged.--G. M. Brown, M.D., Neuroendocrinology Research Section, Clarke Institute of Psychiatry, 250 College Street, Toronto 2B, Canada.

* * *

REQUEST FOR AGED PRIMATES

I am interested in obtaining living aged nonhuman primates of various species for gerontological studies on brain tissues. I am willing to pay for them if necessary.--Kenneth R. Brizzee, Division of Environmental Health, Delta Regional Primate Research Center, Tulane University, Covington, Louisiana 70433.

SURVIVAL OF AN ESCAPED *CALLICEBUS MOLOCH* IN SOUTHERN LOUISIANA

Clyde Jones[1], Thaddius W. Martin, William A. Mason

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In June, 1968, a titi monkey, *Callicebus moloch ornatus*, escaped from an outside enclosure for small primates at the Delta Regional Primate Research Center, Covington, Louisiana. The animal was recovered by the Primate Center in November, 1968. The purpose of this report is to record and discuss briefly the survival of an escaped *C. m. ornatus* for about five months in southern Louisiana.

Data presented herein with regard to the aforementioned animal were obtained mostly from the records of the Division of Behavioral Sciences, Delta Regional Primate Research Center. Contents of the stomach of this *Callicebus* were examined grossly following routine pathological examination of the animal. In addition, contents of the stomach were preserved in 10% formalin and examined later with the aid of a stereoscopic microscope.

This specimen of *C. moloch* was received at the Delta Center on 18 March 1968. The animal, an adult female, was tattooed with an identification number and placed in quarantine for about six weeks. Although recorded as being in fair condition on arrival, the state of health of the animal declined constantly thereafter; there were no apparent responses to either medication or supplements of the diet (boiled eggs, cottage cheese, apples, oranges, grapes, bananas, peanuts, celery, pound cake, Purina Monkey Chow) provided routinely to *Callicebus* housed at the Delta Center. The condition of the captive animal was recorded last as extremely thin with patches of missing hair. It was moved to an outdoor compound as a last resort on 3 May 1968. The specimen was seen last in the enclosure on 10 June 1968. On 6 November 1968, the animal was brought to the attention of the Delta Center by a local squirrel hunter. The specimen was shot at a locality approximately 6 miles south of the aforementioned animal compound.

The following general description of the condition of the animal was taken from the autopsy report of this animal prepared by H. R. Seibold, the pathologist at the Delta Center. The pelage of the animal was thick and in good condition, except for some areas of sparse hairs on the tail. The carcass was practically obese and was well muscled. The stomach and small intestine were filled with ingesta. Fecal materials in the colon appeared normal in amount, color, and consistency. There were no gross indications of any abnormal condition of the gastro-intestinal

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tract.

The contents of the stomach of the aforementioned *Callicebus* included mostly parts of fruits of *Quercus*. In addition, the ingesta included bits of unidentified leaves, fruits, and flowers. Microscopic examination revealed the presence of a considerable amount of pollen. Several pieces of wings of insects, members of the orders Orthoptera and Odonata, were found among the stomach contents examined. Because no published data were found with regard to the natural diet of *C. moloch*, no comparisons were made of the foods utilized by the free-ranging *Callicebus* in Louisiana and wild titi monkeys in South America.

The geographic distribution of *C. m. ornatus* was mapped by Hershkovitz (1963). Comparisons of climatic data[2] from a locality within the area inhabited by this race of titi monkey (Villavicencio, 4° 8' N lat, 73° 49' W long, Colombia) and the Delta Center (Covington, 30° 28' N lat, 90° 7' W long, Louisiana) indicated considerable differences between these geographic regions with regard to monthly rainfall and temperature. From June through October, mean monthly rainfall totalled 1765.8 mm less at Covington than at Villavicencio. In June through August, mean monthly temperatures ranged from 2.1 to 3.2 C warmer at Covington than at Villavicencio; in September and October, mean monthly temperatures were 0.7 and 4.3 C cooler at the former locality than in the latter area.

Callicebus has been considered a delicate animal difficult to maintain successfully in captivity (Crandall, 1964). On the basis of the limited data presented herein, considerable plasticity was implied for this particular form of titi monkey with regard to some aspects of diet as well as tolerance of environmental temperatures.

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[2]These data were obtained from a general report by the Food and Agriculture Organization of the United Nations (Anon., 1965) and the United States Weather Bureau, New Orleans, Louisiana.

ENDANGERED SPECIES: UNITED STATES CONGRESS CURBS INTERNATIONAL TRADE IN RARE ANIMALS*

The Himalayan giant panda and the Nubian wild ass were granted a reprieve early in December when the President signed into law a bill (PL 91-935) to eradicate U.S. trade in endangered species of wildlife. Instead of relying on game wardens here and abroad to halt poachers at the production end of the rare animal trade, the law would eliminate the market for such rare animals as the Asiatic cheetah, woolly spider monkey, bush baby, and snow leopard.

Conservationists have long stressed the importance of preserving individual species of wildlife, both for possible genetic, behavioral, or medical research and for esthetic reasons. "The prospective picture of man, living alone on his planet except for domesticated food animals or pets, seems a rather dreary one," observed one Congressional sub-committee.

But with human expansion into former wildlife habitat, many wild animal populations have been reduced to the point where hunting pressure or climatic quirks could push them over the brink. Since the turn of the century, an average of one species a year has quietly made its exit somewhere in the world, and one endangered species list currently popular in government circles includes 275 mammals and over 300 species of birds. The U.S. Department of the Interior fears that some North American animals, including the Southern bald eagle, the whooping crane, and the peregrine falcon might soon follow the passenger pigeon and Carolina parakeet to extinction if no action were taken to save them.

Over the last few years, a three-point federal welfare policy has emerged for endangered species, regardless of their economic worth:

Since 1966, the Bureau of Sports Fisheries and Wildlife has maintained a captive propagation program at its Patuxent Research Refuge in Maryland. The Bureau is experimenting with breeding stocks of the Hawaiian nene goose, the Aleutian Canada goose, the Southern bald eagle, the whooping crane, and the masked bobwhite. The National Zoological Park and other zoos in the United States are emphasizing captive propagation rather than further collection of endangered foreign species.

Rare animals have been traditionally protected by regulating hunting and by including critical habitat types in the 28-million-acre National Wildlife Refuge System. The bill authorizes an extra $1.75 million for land acquisition in the endangered species program, plus $1 million annually for fiscal 1970-1972 for purchase of privately owned lands within the boundaries of areas administered by the Interior Secretary to preserve or protect endangered species.

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*From *Science*, 1970, *167*, 152-154.

Under the new legislation, the pet and fur market for both native and foreign endangered species will be outlawed in the United States. The Secretary of the Interior will maintain a list of fish and wildlife threatened with worldwide extinction. Federal inspectors at ports of entry, warehouses, or retail stores could confiscate imported live specimens or any imported skins, coats, or manufactured items made from a species on the list. Federal law now prohibits the interstate commerce of birds, fish, or mammals poached in any state, whether or not they are rare. The new law extends this protection to reptiles, amphibians, mollusks, and crustaceans taken in violation of federal, state, or foreign laws, and to fish taken illegally in a foreign country.

The law provides an exception to the prohibition on importation of endangered species for zoological, educational, scientific, or propagation purposes.

In the past, the idea of preserving a species indirectly by restricting the consumption end of the trade has worked well with some native animals. In the early 1900's, the Audubon Society found that its game wardens were fighting a losing battle to save the American egret, a bird, common in the South, whose large white feathers were prized for ladies' hats. But once the federal government exercised its authority under the interstate commerce laws to outlaw the trade (after a warden had been murdered), egret poaching came to a halt.

Without the protection of an interstate commerce law, an animal such as the alligator could be poached in its home territory and then transported to a hide market in New York. A New York City ordinance recently signed by Mayor John Lindsay appears to end this situation. The alligator population in the United States has dropped to 200,000 and is declining rapidly in the face of heavy poaching and marsh drainage. The soft belly skin of the reptiles (the only part that poachers use) sells for as much as $10 a linear foot, and reptile poaching is reportedly a $1 million industry in southern Florida alone.

Last March Secretary of the Interior Walter J. Hickel publicized the alligators' plight with a visit to Everglades National Park. "A million alligators once abounded in the Park, and now only about 20,000 remain," Hickel said at the time. "Because of the limited manpower and equipment available to the National Park Service, poachers have been able to butcher the alligators by the thousands and sell the illicit hides at fancy prices." Hickel assigned seven extra rangers and a "conservation posse" of local residents to control poaching over the park's vast area. Interior officials expect the antipoaching drive to cost nearly $100,000 this year; yet it will still offer incomplete protection.

The developing nations have experienced comparable problems in protecting endangered species in the field. For example, prior to 1966, orangutans were effectively protected only in their native Indonesia and

Malaysia, and the wild orangutan population dropped to an estimated 4000 individuals under pressure from human settlements and zoo collectors. Once a collector reached Bangkok, Singapore, or Hong Kong with a contraband orangutan, the local game laws would not apply to his cargo.

Zoo directors in the United States watched the price of the wild apes climb to $3000 apiece as the supply dwindled, and in 1966 they decided to preserve the wild population by cutting off the trade and relying on captive propagation for future zoo display. British, Japanese, and German zoo directors eventually joined the orangutan embargo, and the international market has been virtually eliminated. "We chose the orangutan because it is a very conspicuous animal," said John Perry, Assistant Director of the National Zoological Park in Washington, D. C., but the zoo directors have since extended their embargo to the Galapagos tortoise, the golden marmoset, and the woolly tapir.

However, women's fashion crazes and the demand for exotic pets pose a much greater threat to rare wildlife than zoo collectors do. Last year, U.S. fur brokers imported the skins of 1,283 cheetahs, 13,516 jaguars, and 9,556 leopards--a small harvest when compared with the total volume of the U.S. fur trade, but a number far larger than some subspecies of these big cats can sustain.

Some fur industry spokesmen, recalling the loss of jobs after a 1952 embargo on Russian and Communist Chinese furs, have not been overjoyed at the prospect of import restrictions. New York, they claim, is the world's middleman for furs much as London is for gold, and unilateral U.S. legislation would simply eliminate this broker role. Unless the endangered species bill "is accompanied by some form of joint international action, it would have the effect of simply diverting these skins from our country to some other, while not one single endangered species would be benefited," said Herman Ringelheim, a New York fur dresser.

Supporters of the legislation argue that, if a species is rare enough to be put on the endangered list, it can be of little permanent economic importance. The new law's impact on any business, said John Perry of the National Zoological Park, would be "well under 1 percent of its existing volume." The International Union for Conservation of Nature and Natural Resources (IUCN), a semigovernmental group that keeps track of rare wildlife, has proposed an international convention to protect endangered species. The IUCN members expect the major consumer and producer nations to sign the pact by the end of next year. U.S. legislation "will give considerable impetus to the convention on a worldwide basis," S. Dillon Ripley, secretary of the Smithsonian Institution, told a Congressional subcommittee.

The new law directs the Interior Secretary, through the Secretary of State, to seek the convening of an international meeting on fish and wildlife prior to 30 June 1971, for the purpose of drawing up a binding international convention for the conservation of endangered species.

Congress has authorized $200,000 for this purpose.

For any one species, this international convention and the new U.S. law would come into play only at the last minute, if then. The rules would not curb the excesses that deplete a wildlife population in the first place. In East Africa, for example, much of the poaching is done for the domestic meat market and not for the international fashion trade. In northern South America, the new regulations would not affect local live animal markets that supply the U.S. laboratory and pet supply industry. Some ecologists estimate that only 1 out of 50 birds survives the trip from the jungle to the U.S. market, and the Amazon River Basin, despite its lushness and size, stands in danger of losing even its common fauna to satisfy U.S. demand for reptiles, monkeys, and parrots. For some animal populations, the endangered species bill may offer little hope for survival.--Mark W. Oberle.

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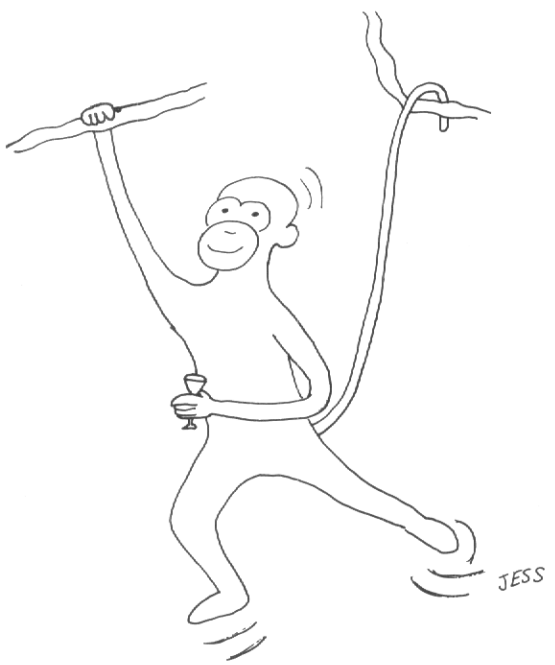

"Wow! This is a really swinging party!"

MEETING REPORTS: SYMPOSIUM ON INFECTIONS AND IMMUNOSUPPRESSION IN SUB-HUMAN PRIMATES

This symposium was held at the Radiobiological Institute TNO, Rijswijk, The Netherlands, December 17-19, 1969.

The use of sub-human primates (monkeys and apes) in medical research is rapidly expanding, the main reason being that certain clinical problems are not easily solved unless animals of a closely related species are employed for the required experimental work. As a consequence of the close phylogenetic relationship between man and monkey, however, many infections of sub-human primates will more readily affect man (and vice versa!) than rodents or dogs, for instance. This circumstance, plus the fact that several primate species are threatened by extinction, has focussed attention on infectious diseases of primate animals. A better knowledge of the characteristics of the causative agents, the epidemiology of the diseases, etc., should improve the therapeutic possibilities and thus help reduce morbidity and mortality of primates in their habitat, as well as in the laboratory. Better knowledge of these affections will improve the methods of quarantine and protective measures, thus reducing the hazards to laboratory personnel (a very real danger as shown by a recent epidemic in Europe) to an acceptable level.

Immunosuppression is frequently practiced in transplantation research; depression of immune reactivity, while preventing the rejection of grafted tissues, enhances an animal's susceptibility to bacterial and viral infections, also of the latent type. The current extensive use of sub-human primates in transplantation research (the main field of application for immunosuppression) makes it imperative to be aware of the dangers of this form of treatment to the experimental animals, as well as the laboratory personnel working with them. It is for this reason that immunosuppression deserved particular attention and was selected as one of the main topics discussed at the Rijswijk Symposium.

The Symposium was attended by about 120 scientists from 12 countries and a number of administrators and representatives of pharmaceutical industries with a vested interest in the acquisition and safe maintenance of large numbers of primate animals.

The program was as follows:

Bacterial infections.--*Procedures for eliminating the hazards of tuberculous infection in a primate colony* by L. H. Schmidt, Birmingham, Alabama. *Eliminating bacteria from monkeys with antibiotics* by D. van der Waaij *et al.*, Rijswijk, The Netherlands.

Viral infections.--*Epidemiology* by W. Hennessen, Marburg, Germany. *Laboratory studies* by D.I.H. Simpson, Salisbury, United Kingdom. *Investigations in Uganda relating to the Marburg agent* by G. W. Kafuko *et al.*,

Entebbe, Uganda. *Hepatitis in sub-human primates* by F. Deinhardt, Chicago. *The major groups of Simian viruses; with special reference to the origin of these viruses in monkeys* by G. D. Hsiung, New Haven, Conn. *An outbreak of monkeypox; clinical observations in a primate colony* by J. C. Peters, Rotterdam. *Monkeypox--prevention and control* by S. McConnell, College Station, Texas. *A review of immunological studies with yellow fever and other group B arboviruses in rhesus and vervet monkeys* by G. W. Kafuko, Entebbe, Uganda. *Simian hemorrhagic fever* by N. M. Tauraso and K. McCarthy, Bethesda.

Latent viral infections.--*Serology of virus diseases of monkeys* by S. S. Kalter and R. Heberling, San Antonio, Texas. *Latent virus infections in monkey tissue cultures* by O. G. Gaudin and R. Sohier, Lyon. *Epidemiological studies* by G. J. P. Schaap, Rotterdam.

Cancer viruses.--*The NIH program for detection of human oncogenic viruses* by R. Kinard, Bethesda (was unable to attend). *A herpes virus inducing cancer in monkeys* by L. V. Méléndez *et al.*, Southborough, Massachusetts.

Safety measures.--*The handling of simians to prevent transmission of disease* by F. T. Perkins and E. G. Hartley, London. *Control of communicable diseases through a convenient architectural and technical design* by G. Mahouy and J. C. Friedmann, Paris. *WHO recommendations about capture, transport, quarantine and handling of primates* by W.I.B. Beveridge, Geneva.

Various environmental and experimental conditions.--*Stress and its effect in stimulating infections* by B. A. Lapin, Sukhumi, U.S.S.R. (was unable to attend). *Stress and the latent pathogen* by R.N.T.-W. Fiennes, London. *A severe chronic intoxication in a monkey colony* by L. M. van Putten *et al.*, Rijswijk.

Immunosuppressive regimens (Hazards to experimental animals and personnel).--*Introduction and general survey* by D. W. van Bekkum, Rijswijk. *Limitations and complications of immunosuppression in the rhesus monkey* by H. Balner *et al.*, Rijswijk. *Biological methods of immunosuppression in the baboon* by J. H. Groenewald *et al.*, Buffalo, N.Y. *Infectious complications during ALS treatment of monkeys and man* by J. Traeger *et al.*, Lyon. *Immunosuppression in rhesus monkeys with anti-human lymphocyte sera; protective measures to prevent the spread of infections* by C. C. Darrow *et al.*, Bethesda. *Total body irradiation and bone marrow transplantation in monkeys* by D. W. van Bekkum and D. van der Waaij, Rijswijk.

Miscellaneous subjects.--*Immunosuppressive influence of the transplanted liver* by R. Y. Calne *et al.*, Cambridge. *Heterotransplantation in primates; current state of affairs* by R. Cortesini, Rome. *The induction of tolerance to tissue antigens in monkeys* by R. H. Levey *et al.*, Boston. *Maintenance of a mortality free colony of primate animals*

for immunological, surgical and other medical experimentation by J. Moor-Jankowski, New York.

The proceedings will be published by Munksgaard, Copenhagen, and should be available in the spring of 1970.

Organizing Committee: Prof. W.I.B. Beveridge, World Health Organization, Geneva, Prof. D. W. van Bekkum and Dr. H. Balner, Rijswijk.

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NEWSPAPER CLIPPINGS: MONKEYS GET REPRIEVE

Washington.--Just in time for Christmas, 290 research monkeys destined for the death house because of fiscal constraints on the government's cancer-virus program have been granted a reprieve. A spokesman for the National Institutes of Health said the monkeys are being shipped, starting today, to four of the NIH's seven regional primate research centers for use as breeders.

The 290 monkeys, most about five years old, were inoculated with material from human cancers shortly after birth. This material came from tumors suspected of having been caused by viruses. None of the monkeys inoculated developed cancer, the spokesman said. He added, "In September, because of fiscal constraints, the National Cancer Institute ordered a cutback in the size of the monkey colony involved in its cancer-virus program. The 290 monkeys now released to the primate centers were part of a group of 380 slated for death because of conceivable problems in their use in other medical research programs." But he said scientists have since declared the 290 animals safe--that is, showing no evidence of cancer and no evidence of being able to apread any virus material.

The scientists may release additional monkeys from among the original 380 to the primate centers at a later date, he said. The centers provide facilities throughout the nation for scientists who are using primates in their investigations. The 290 reprieved monkeys, valued at about $500 each, include rhesus, macaques, African green monkeys, and some other types. They will be divided among centers at Atlanta, Georgia; Southborough, Massachusetts; Beaverton, Oregon; and Davis, California.

Ithaca Journal, December 16, 1969.

MEETING REPORTS: SECOND CONFERENCE ON EXPERIMENTAL MEDICINE AND SURGERY IN PRIMATES

This meeting, sponsored by the New York University School of Medicine, was held in New York City, September 7-12, 1969. The conference co-chairmen were E. I. Goldsmith, Cornell University Medical College and J. Moor-Jankowski, New York University School of Medicine.

The titles of the sessions and the papers presented in them were as follows:

Cross-circulation.--*Clinical experiences with cross-circulation for hepatic coma* by David M. Hume, Medical College of Richmond, Virginia. *Heterologous cross-circulation for massive hepatic necrosis: a case report* by Allyn G. May, Raphael Cestero, Richard Satran, and Michael Turner, University of Rochester Medical Center, Rochester, N.Y. *The treatment of hepatic coma in man by cross-circulation with baboon* by Joseph G. Fortner, Edward J. Beattie, Jr., Man Hei Shiu, William S. Howland, Karamat Chaudry, Neil Martini, Paul Sherlock, William Wright, J. Moor-Jankowski, and A. S. Wiener, Memorial Hospital, Sloan-Kettering Institute; and New York University School of Medicine, New York, N. Y. *Cross-circulation between a patient in hepatic coma and a chimpanzee* by F. H. Seigler, J. Patterson, R. S. Metzgar, G. T. Zwiren, R. C. MacDonnell, Jr., B. L. Behrens, and J. J. Corrigan, Duke University Medical Center, Durham, N. C., Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga.; and The Henrietta Egleston Hospital, Atlanta, Ga. *Exchange transfusion of nonhuman primates with human blood: a program for preparation of cross-circulation partners for patients in hepatic failure* by Edward I. Goldsmith, J. Moor-Jankowski, Alexander S. Wiener, F. H. Allen, and Robert Hirsch, Cornell University Medical College; New York University School of Medicine; and New York Blood Center, New York, N. Y.

Experimental transplantation in primate animals.--*Erythropoietin studies in baboon renal allografts* by G. P. Murphy, E. A. Mirand, and J. H. Groenewald, Roswell Park Memorial Institute, Buffalo, N. Y.; and Faculty of Medicine, University of Stellenbosch, Bellville, South Africa. *Three-hour liver preservation in the primate by simple cooling and subsequent orthotopic autotransplantation* by Maurice Slapak and Michael Baddeley, Harvard Medical School, Boston, Mass. *Methods of chemical immunosuppressive treatment in baboon and rhesus monkey allotransplants* by J. H. Groenewald, H. W. Weber, J. N. De Klerk, and G. P. Murphy, Roswell Park Memorial Institute, Buffalo, N. Y.; and Faculty of Medicine, University of Stellenbosch, Bellville, South Africa. *Serological studies in kidney allograft rejection in the baboon* by H. D. Brede, G. P. Murphy, and J. J. Van Zyl, Faculty of Medicine, University of Stellenbosch, Bellville, South Africa; and Roswell Park Memorial Institute, Buffalo, N. Y. *The effects of biological agents on baboon kidney allotransplants* by J. H. Groenewald, H. D. Brede, H. W. Weber, and G. P. Murphy, Roswell Park Memorial Institute, Buffalo, N. Y.; and

Faculty of Medicine, University of Stellenbosch, Bellville, South Africa. *Orthotopic liver homografts in the baboon* by Joseph G. Fortner, Man Hei Shiu, Nobuhiro Kawano, Zolika Heath, and Ronald W. Csurny, Memorial Hospital, Sloan-Kettering Institute, New York, N. Y. *Transplantation immunology in the marmoset* by N. Gengozian and R. P. Porter, Oak Ridge Associated Universities, Oak Ridge, Tenn. *Human ABO blood groups and leukocyte antigens of* Papio ursinus by Elias Cohen, Johannes H. Groenewald, Shirley G. Gregory, and Aubrey Dozier, Roswell Park Memorial Institute, Buffalo, N. Y. *Allogeneic tooth transplantation* by Leonard B. Shulman, Harvard School of Dental Medicine, Boston, Mass. and New England Regional Primate Research Center, Southborough, Mass.

Immunological response between man and nonhuman primates.--*The distribution of human HLA antigens in chimpanzees and gorillas* by Martin E. Dorf and Richard S. Metzgar, Duke University Medical Center, Durham, N. C., and Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga. *Nonhuman primates pre-clinical ALS testing program* by J. J. Smith, C. Darrow, K. W. Sell, G. LaFontaine, and D. E. Kayhoe, Naval Medical Research Institute, Bethesda, Md.; National Institute of Allergy and Infectious Diseases, Bethesda, Md.; and Bionetics Research Laboratory, Kensington, Md. *Immunological studies on the human response to chimpanzee tissue antigens* by Richard S. Metzgar and H. F. Seigler, Duke University Medical Center, Durham, N. C., and Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga. *Leukocyte antigens of chimpanzees and rhesus monkeys* by H. Balner, A. van Leeuwen, H. Dersjant, W. Vreeswijk, and J. J. van Rood, Radiobiological Institute TNO, Rijswijk Z. H. and Academic Hospital, Leiden, The Netherlands. *The baboon as a model for the evaluation of ALS/ALG for use in human patients* by H. D. Brede, G. P. Murphy, H. W. Weber, J. J. W. Van Zyl, J. N. De Klerk, and E. R. Rudman, Faculty of Medicine, University of Stellenbosch, Bellville, South Africa; and Roswell Park Memorial Institute, Buffalo, N. Y.

Reports from major primate laboratories and programs.--*Care and management of a great ape colony* by Michael Keeling and Norman Guilloud, Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga.; and University of Georgia, Athens, Ga. *The visiting scientists program at Southwest Foundation for Research and Education* by Robt. L. Hummer, Southwest Foundation for Research and Education, San Antonio, Texas. *Regional Primate Research Center at the University of Washington: unique features and research themes* by T. C. Ruch, University of Washington Regional Primate Research Center, Seattle, Wash. *Studies of primate diseases at the Delta Center* by Arthur J. Riopelle, John P. Ayres, Herman R. Seibold, and Robert H. Wolf, Tulane University Delta Regional Primate Research Center, Covington, La. *The characterization of the New England Regional Primate Research Center research program* by Bernard F. Trum, New England Regional Primate Research Center, Harvard Medical School, Southborough, Mass. *Primates in pesticide research* by Glenn Morrison, Division of Pesticides, Food and Drug Administration, Perrine, Fla. *Primate eye movements and learning* by Allan M. Schrier, Morris L. Povar, and Jonathan Vaughan, Brown University, Providence, R. I. *Primates in*

dental research by Barnet M. Levy, Samuel Dreizen, A. Cecil Taylor, and John K. Hampton, Jr., The University of Texas Dental Science Institute at Houston, Texas. (Discussants: Joseph Gary, New York University College of Dentistry, New York, New York , Morris L. Povar, Brown University, Providence, R. I.) *Studies on comparative atherosclerosis of non-human primates* by N. D. M. Lerner, T. B. Clarkson, and B. C. Bullock, The Bowman Gray School of Medicine, Wake Forest University, Winston-Salem, N. C. *A primate program developed for the testing of biological products* by Ruth L. Kirschstein and Amos E. Palmer, Division of Biologics Standards; and Laboratory Aids Branch, National Institutes of Health, Bethesda, Md. *Chronic drug administration in the chimpanzee* by R. G. McIver, C. H. Kratochvil, P. E. Steffes, and T. M. Butler, 6571st Aeromedical Research Laboratory, Holloman AFB, N. M. *A program for inoculation of primates with potentially oncogenic viruses* by Roy Kinard, National Cancer Institute, Bethesda, Md. *The care of baboons used in a human leukemia and oncogenic virus study* by William R. Voss, Baylor College of Medicine, Houston, Texas. *Maintenance of juvenile simians used for oncogenic studies* by Stevan Sibinovic, David A. Valerio, John C. Landon, and Sergio Leiseca, Bionetics Research Laboratories, Kensington, Md.; and National Cancer Institute, Bethesda, Md. *Use of marmosets in biomedical research* by Friedrich Deinhardt, Presbyterian-St. Luke's Hospital and University of Illinois Medical School, Chicago, Ill. *A consideration of male and female cell populations in the Chimeric marmoset* by N. Gengozian, Oak Ridge Associated Universities, Oak Ridge, Tenn. *Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP): A collaborative venture of the medical community* by Edward I. Goldsmith, J. Moor-Jankowski, and Joseph H. Davis, Cornell University Medical College and New York University School of Medicine, New York, N. Y. *The Primate Center of the University of Turin, Italy* by B. Chiarelli, Centro di Primatologia, Universita di Torino, Italy. *Architectural and technical design of the French Primate Center* by G. Mahouy and J.-C. Friedmann, Laboratoire d'Expérimentation Animale, Hôpital St. Louis, Paris, France. *Primate studies in Britain, with a note on the functional anatomy of the vena cava in relation to hypotensive states* by R. N. T-W-Fiennes, The Nuffield Institute of Comparative Medicine, The Zoological Society of London, England. *Report on the planned Primate Center of Western Germany* by Hans-Jurg Kuhn, Dr. Senckenbergische Anatomie, Der Universität Frankfurt, a.M., Germany. *The University of Stellenbosch, South Africa, Primate Colony* by J. J. W. Van Zyl, Faculty of Medicine, University of Stellenbosch, Bellville, South Africa. *The Primate Information Center (PIC)* by Maryeva W. Terry, Regional Primate Research Center at the University of Washington, Seattle, Washington. *Teaching program in medical primatology for medical students* by Elizabeth Muchmore, Jacobus L. Potter, J. Moor-Jankowski, and Edward I. Goldsmith, Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), New York University School of Medicine; and Cornell University Medical College, New York, N. Y. *The logistics of supply of primate animals for medical research* by Michael A. Nolan, Primate Imports Corp., Port Washington, L. I., N. Y.

Comparative biology, genetics and phylogenetics.--*Molecular biology*

and primate systematics by Clifford J. Jolly, New York University, New York, N. Y. *Phylogenetic relationships among primates from immunodiffusion data* by Morris Goodman, Wayne State University School of Medicine, Detroit, Mich., and Plymouth State Home and Training School, Northville, Mich. (Discussant: W. Manski, Columbia University College of Physicians and Surgeons, New York, N. Y.) *Comparative studies on blood groups of man, apes and monkeys* by J. Moor-Jankowski and Alexander S. Wiener, New York University School of Medicine; and Office of the Chief Medical Examiner, New York, N. Y. (Discussant: William H. Stone, Laboratory of Genetics, The University of Wisconsin, Madison, Wisc.) *The comparative biology of histaminase and diamine oxidase among New and Old World primates* by John K. Hampton, Jr., M. L. Parmelee, and L. J. Rider, The University of Texas Dental Science Institute at Houston, Texas. *Investigations of nonhuman primate hemoglobin: fetal hemoglobin* by W. Carey Hanly and Harold A. Hoffman, 6571st Aeromedical Research Laboratory, Holloman AFB, N.M.; and National Cancer Institute, Bethesda, Md. *Evolutionary relationships of some enzymes by* Ann L. Koen, Hawthorn-Plymouth Research Center, Northville, Mich. *Comparative virology of primates* by S. S. Kalter, Southwest Foundation for Research and Education, San Antonio, Texas. *Cytogenetic studies and observations in the Yerkes primate colony* by H. M. McClure, K. V. Hill, W. A. Pieper, C. B. Jacobson and D. Picciano, Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga.; and The George Washington University School of Medicine, Washington, D. C. *Alkaptonuria in a chimpanzee* by Stanley P. Watkins, Hugh Binley, and N. Raphael Shulman, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.; and Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), New York University Medical Center, New York, N. Y.

The nervous system: similarities between man and nonhuman primates.--*Comparative neuroanatomy of primates* by Donald F. Buxton, University of Arkansas Medical Center, Little Rock, Ark. *The evolution of the brain and its importance for physiological research* by H. O. Hofer, Tulane University Delta Regional Primate Research Center, Covington, La. *Sleep in primates* by Jacques Bert, Université de Dakar, Senegal, Africa. *Visual similarities of nonhuman and human primates* by Francis A. Young and Donald N. Farrer, Primate Research Center, Washington State University, Pullman, Wash., and 6571st Aeromedical Research Laboratory, Holloman AFB. *The primate superior olivary complex* by M. L. Feldman and J. M. Harrison, New England Regional Primate Research Center, Harvard Medical School, Southborough, Mass., and Boston University, Boston, Mass.

The nervous system: perinatal biology and development.--*Early sematosensory deprivation as an ontogenetic process in the abnormal development of the brain* by James W. Prescott, Walter B. Essman, and Robert G. Heath, National Institute of Child Health and Human Development, Bethesda, Md.; Queens College, Flushing, N. Y.; and Tulane University School of Medicine, New Orleans, La. *Motor development after extensive lesions of the cerebral cortex in the neonatal monkey* by Arthur Kling and Thomas Tucker, University of Illinois College of Medicine, Chicago, Ill. *Umbilical cord compression and brain damage in monkeys* by Ronald E. Myers, Laboratory of Perinatal Physiology, NINDS, San Juan, Puerto

Rico. *Consequences of asphyxia at birth in the monkey* by A. J. Berman, Jonas Waizer, and Leslie Dalton, Jr., Jewish Hospital and Medical Center, Brooklyn, N. Y.

Neuroendocrinology.--*The isolated hypothalamus in the* Macaca mulatta by Paul R. McHugh, Cornell University Medical College, White Plains, N. Y. *Neural control of growth hormone in the rhesus monkey* by Gerard P. Smith, Cornell University Medical College, White Plains, N. Y. *Diabetes mellitus in the hyperphagic monkey* by Charles Hamilton, University of Pennsylvania, Philadelphia, Pa. *Endocrine and thermoregulatory responses from the hypothalamus in baboons* by Charles C. Gale, University of Washington, Seattle, Wash.

Behavioral physiology.--*Studies of cardiovascular physiology in controlled and unrestrained environments* by O. A. Smith, Jr., G. K. Weiss, F. Spelman, C. Wilson, D. Reese, and E. Snow, Regional Primate Research Center, University of Washington, Seattle, Wash. *Alteration of sleep and circadian rhythms through the use of drugs* by John C. Rhodes, C. Vernon Pegram, and Hans Halberg, University of New Mexico, Albuquerque, N.M.; and 6571st Aeromedical Research Laboratory, Holloman AFB, N.M. *Behavioral temperature regulation in the squirrel monkey: some limits of hypothalamic control* by Eleanor R. Adair, John B. Pierce Foundation Laboratory, New Haven, Conn.

Reproduction, perinatal, growth and development studies.--*Light and electron miscroscopic observations on the ovary of the squirrel monkey,* Saimiri sciureus by Arthur T. Hertig, Norval W. King, Barbara Barton, Laurel Johnson, John Mackey, and Charles Bates, New England Regional Primate Research Center, Southborough, Mass.; and Harvard Medical School, Boston, Mass. *The physiological implication of induction of ovulation in the rhesus monkey* by Livia S. Wan and Howard Balin, New York University School of Medicine, New York, N.Y.; and University of Pennsylvania School of Medicine, Philadelphia, Pa. In vivo *study of tubal motility in the rhesus monkey during the various phases of the menstrual cycle* by Alexander Neri and Stewart L. Marcus, Cornell University Medical College, New York, N. Y. *The analysis of male fertility, artificial insemination and natural matings in the laboratory breeding of macaques* by D. A. Valerio, W. E. Leverage, J. C. Bensenhaver, and D. H. Thornett, Bionetics Research Laboratories, Inc., Kensington, Md. *Experimental factors on the development of sexual and maternal behavior in primates* by W. B. Lemmon, University of Oklahoma, Norman, Okla. *Reproductive physiology and pregnancy in marmosets* by John K. Hampton, Jr., S. H. Hampton, and B. M. Levy, The University of Texas Dental Science Institute at Houston, Texas. *The electron microscopy of the placental membrane in nonhuman primates* by M. Panigel, Hôpital St. Antoine, Paris, France; National Center for Primate Biology, Davis, Calif.; and Ecole des Sciences de Brazzaville, Congo, Africa. *Comparative aspects of chorionic gonadotropin excretin in nonhuman primates* by W. W. Tullner and R. Hertz, National Institute of Child Health and Human Development, Bethesda, Md.

Some effects of fetal and maternal hypophysectomy in pregnancy by Ronald A. Chez, Donald L. Hutchinson, Hernando Salazar, and Daniel H. Mintz, The University of Pittsburgh School of Medicine, Pittsburgh, Pa. *Metabolism of progesterone injected into the umbilical vein of the pregnant rhesus monkey* (Macaca mulatta) by Samuel Solomon and Kiu Leung, McGill University, Montreal, Canada. *Metabolism of pregnenolone and dehydroisoandrosterone injected into the umbilical vein of the pregnant baboon* (Papio cynocephalus) by Irwin Merkatz, Kiu Leung, Fritz Fuch, and Samuel Solomon, Cornell University Medical College, New York, N. Y.; and McGill University, Montreal, Canada. *The placental transfer of polypetide hormones related to carbohydrate metabolism* by Ronald A. Chez, Daniel H. Mintz, Edgar O. Horger III, and Donald L. Hutchinson, The University of Pittsburgh School of Medicine, Pittsburgh, Pa. *Anesthesia for hysterotomy in the subhuman primate* by H. O. Morishima and A. Hyman, Columbia University College of Physicians and Surgeons, New York, N. Y. *The effect of halothane-induced maternal hypotension on the fetus* by A. W. Brann, Jr., R. E. Myers, and R. Giacomo, University of Mississippi School of Medicine, Jackson, Miss.; and Laboratory of Perinatal Physiology, NINDB, San Juan, Perto Rico. *Regional circulation in the fetal and neonatal primate* by R. Behrman and C. W. de Lannoy, University of Illinois College of Medicine, Chicago, Ill. *Fetal biology of the rhesus monkey* by G. R. Kerr and H. A. Waisman, Wisconsin Regional Primate Research Center, University of Wisconsin, Madison, Wisc. *Maternal hyperaminoacidemia and its effect on the fetus* by H. A. Waisman and G. R. Kerr, Wisconsin Regional Primate Research Center, University of Wisconsin, Madison, Wisc. *Studies on embryology and spontaneous teratology of the baboon* by Andrew W. Hendrickx, Southwest Foundation for Research and Education, San Antonio, Texas. *The influence of ethanol infusion on the course of spontaneous and induced labor* by R. A. Baratz, H. O. Morishima, T. Horiguchi, L. S. James, and K. Adamsons, Columbia University College of Physicians and Surgeons, New York, N. Y.

Virology.--*Recent developments in nonhuman primate virology: a review* by R. L. Heberling and S. S. Kalter, Southwest Foundation for Research and Education, San Antonio, Texas. *Isolation and properties of simian foamyviruses provisionally designated as Type 4 and Type 5* by Paul B. Johnston, University of Louisville School of Medicine, Louisville, Ky. *Simian hemorrhagic fever* by Nicola M. Tauraso, Division of Biologics Standards, National Institutes of Health, Bethesda, Md. *Viral oncogenesis in nonhuman primates* by Lauren Wolfe, Barbara Marczynska, Harvey Rabin, and Friedrich Deinhardt, Presbyterian-St. Luke's Hospital, Chicago, Ill., and the Zoological Society of San Diego, San Diego, Calif. *Rabies in primates* by R.N.T-W-Fiennes, Tulane University Delta Regional Primate Research Center, Covington, La., and The Nuffield Institute of Comparative Medicine, The Zoological Society of London, England. *Herpes viruses from South American monkeys* by Luis V. Méléndez and M. D. Daniel, New England Regional Primate Research Center, Harvard Medical School, Southborough, Mass. *A pox disease of monkeys transmissible to man* by Carlos Espana, National Center for Primate Biology, University of California, Davis, Calif. *A comparative study of cytomegaloviruses of primates and non-primates* by G. D. Hsiung, N. S. Swack, M. Gharpure, and K. Tscholl, Yale University

School of Medicine and Veterans Administration Hospital, West Haven, Conn. *Comparison of viral infection in chimpanzees recently imported and in a closed colony* by K. F. Soike, J. D. Douglas, and F. Coulston, Albany Medical College, Albany, N.Y.; and 6571st Aeromedical Research Laboratory, Holloman AFB, N.M. *Identification of the virus-like antigen of human hepatitis in nonhuman primates* by N. Raphael Shulman, Richard J. Hirschman, and Lewellys F. Barker, National Institute of Arthritis and Metabolic Diseases, Bethesda, Md.; Columbia University College of Physicians and Surgeons, New York, N. Y.; Division of Biologics Standards, National Institutes of Health, Bethesda, Md. *Studies on human serum hepatitis in primates* by Alfred M. Prince, The New York Blood Center and The New York Hospital--Cornell Medical Center, New York, N. Y.

Infectious diseases.--*Spontaneous melioidosis in recently imported monkeys* by Jack D. Douglas, Richard J. Cronin, and Arnold F. Kaufmann, 6571st Aeromedical Research Laboratory, Holloman AFB, N.M.; University of New Mexico School of Medicine, Albuquerque, N.M.; and National Communicable Disease Center, Atlanta, Ga. *Experimental streptococcal infections in subhuman primates* by A. Taranta, G. Goldstein, M. Spagnuolo, M. Davidson, and J. W. Uhr, New York University School of Medicine, New York, N. Y. *Humoral aspects of treponematoses in chimpanzees* by U.S.G. Kuhn III and F. W. Chandler, National Communicable Disease Center, Atlanta, Ga. *Physiopathology of endotoxemia: primate animal as a prospective subject for study* by F. K. Beller, New York University Medical Center, New York, N. Y. *Primates as models for parasitological research* by Thomas C. Orihel, Tulane University Delta Regional Primate Research Center, Covington, La. *Experimental trachoma in owl monkeys and Taiwan monkeys* by C. E. O. Fraser and S. D. Bell, New England Regional Primate Research Center, Harvard Medical School, Southborough, Mass.; and Harvard School of Public Health, Boston, Mass.

The following films were shown in two sessions:

Behavioral temperature regulation in the squirrel monkey by Eleanor T. Adair, John P. Pierce Foundation Laboratory, New Haven, Conn. *Behavioral aspects of hypothalamic stimulation in the marmoset* by John K. Hampton, Jr., The University of Texas Dental Science Institute, Houston, Texas. *The Southwest Foundation story* by Robt. L. Hummer, Southwest Foundation for Research and Education, San Antonio, Texas. *The ORAU Marmoset Research Center* by N. Gengozian, Oak Ridge Associated Universities, Oak Ridge, Tenn. *Caging systems and colony design features at the Regional Primate Research Center, University of Washington* by T. C. Ruch, University of Washington, Regional Primate Research Center, Seattle, Wash. *Research at the Delta Primate Center* by Arthur J. Riopelle, Tulane University Delta Regional Primate Research Center, Covington, La. *Primates in medical research* and *Pioneers of the vertical frontier* by Jack D. Douglas, 6571st Aeromedical Research Laboratory, Holloman AFB, N.M. *Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP)* by Joseph H. Davis, Laboratory for Experimental Medicine and Surgery in Primates of New York University Medical Center, New York, N. Y.

NEW PRODUCTS AND SERVICES:
ERYTHROCYTE TYPING OF RHESUS MONKEYS *(M. MULATTA)*

Arthur E. Bogden, James H. Gray and Marie E. Brule

Department of Immunology, Mason Research Institute
Harvard Street, Worcester, Mass. 01608

As a result of studies on allogeneic bone marrow transplantation in the rhesus monkey, the Mason Research Institute has served as the repository for reference reagents with the rhesus blood group specificities A, B, C, D, and E, as originally developed by Ray D. Owen (Owen and Anderson, 1962). The availability of these reagents has permitted pre-testing of in-house rhesus populations and the preparation of quantities of antisera that duplicate Owen's specificities. The serological test-system is specifically absorbed rabbit antirhesus erythrocyte serum used in an anti-globulin technique (Owen, 1961) in which goat antirabbit globulin serum provides the developing reagent.

The frequency of the various blood groups that might be expected in a random population is indicated in the table below which compares the population frequencies of the five blood groups as obtained by Owen and Anderson (1962) and our laboratory.

Population Frequencies of Five Rhesus Blood Groups as Determined With Rabbit-Antirhesus Sera

Rhesus Erythrocyte Groups*	Total Population Tested	
	269 (Owen & Anderson)	400 (Bogden)
A	34.9%	30.5%
B	98.1%	95.5%
C	48.7%	34.7%
D	18.2%	26.5%
E	35.7%**	23.5%

*The rhesus specificities are not related to the human A, B blood grouping system.

**Based upon a test population of 84 monkeys.

Of particular importance to investigations involving whole blood transfusions or bone marrow transplantation is that chimerism in the rhesus monkey can be relatively easily detected and quantitated by taking advantage of the major erythrocyte group A and B difference in donor-recipient combinations. Antiserum reagents with the A and B reactivities have been successfully used in the indirect fluorescent antibody technique to quantitate minor rhesus erythrocyte populations in admixture with a

major population when minor to major cell population ratios were well above 1:20,000 (Bogden and Gray, 1966). This method has been modified to permit quantitation of minor to major cell population ratios of 1:20 or less. Thus, the sensitive fluorescent antibody technique has been extended into that area of minor to major population ratios that originally permitted only the relatively crude hemagglutination test-system.

Experience in this special area of rhesus blood grouping, and the availability of adequate quantities of specific typing reagents, permits us to offer (a) routine blood typing services, and (b) serological services for the detection and quantitation of minor erythrocyte populations in an admixture (chimerism) in which donor-recipient combinations differ by erythrocyte Group A or B. For additional information write or telephone: Area Code 617, 752-4601.

REFERENCES

Bogden, A. E., & Gray, J. H. Detection and quantitation of minor erythrocyte populations in an admixture by means of fluorescent antibody: rhesus monkey. *Blood*, 1966, *28*, 573-580.

Owen, R. D. Methods in mammalian genetics. In W. J. Burdette (Ed.) *Methodology in mammalian genetics*. San Francisco: Holden-Day, 1961, pp. 347-379.

Owen, R. D., & Anderson, D. R. Blood groups in rhesus monkeys. *Annals of the New York Academy of Sciences*, 1962, *97*, 4-8.

* * *

REQUEST FOR FEMALE *NYCTICEBUS COUCANG*

We are extremely interested in obtaining a female *Nycticebus coucang* as mate to an adult male of the species. We would prefer an animal that has not been previously used in any physiological experiments. We would expect to pay transportation.--Dr. Frances Burton, Department of Anthropology, University of Toronto, Toronto 5, Canada.

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

BOOKS

Proceedings of the Second International Congress of Primatology. Vol. 1. *Behavior.* C. R. Carpenter (Ed.) Basel: Karger, 1969. (282 pages, $18.00)

The papers are organized into nine sections as follows: Introduction; Historical: Robert M. Yerkes and the chimpanzee; Social organization and ecology; Studies of social behavior in (large) enclosures; Communicative behavior; Comparisons of behavioral characteristics; Early life and developmental studies; Stress: physical and behavioral interactions; Methods, procedures, and techniques.

Proceedings of the Second International Congress of Primatology. Vol. 2. *Recent advances in primatology.* H. O. Hofer (Ed.) Basel: Karger, 1969. (224 pages, $15.00)

The papers are organized into three sections as follows: Reproduction; Histology; Anatomy and anthropology.

Proceedings of the Second International Congress of Primatology. Vol. 3. *Neurology, physiology, and infectious diseases.* H. O. Hofer (Ed.) Basel: Karger, 1969. (203 pages, $15.00) [The three volumes are available as a set for $40.00.]

The papers are organized into five sections as follows: Communication; Neurology; Physiology and pharmacology; Immunology; Pathology.

Laboratory animal handbooks. No. 4: *Hazards of handling simians.* F. T. Perkins and P. N. O'Donoghue (Eds.) London: Laboratory Animals Ltd., 1969.

Proceedings of the 29th Symposium organized by the Permanent Section for Microbiological Standardization of the International Association of Microbiological Societies. Held at Brighton, April 9-11, 1969. Papers are organized into sections on: Tuberculosis; Other non-viral diseases; Virus diseases; Measures to be taken during trapping, transport and holding; Measures to be taken during quarantine; Breeding of simians in the laboratory; and Proposed procedure

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*In many cases, the original source of references in the following section has been the Current Primate References prepared by The Primate Information Center, Regional Primate Research Center, University of Washington. Because of this excellent source of references, the present section is devoted primarily to presentation of abstracts of articles of practical or of general interest. In most cases, abstracts are those of the authors.

for the housing and handling of simians to decrease the transmission of disease to man. The volume is paperbound, about 240 papers, and costs about $5.00.

A stereotaxic brain atlas of the tree shrew (Tupaia glis). Tigges, J. & Shantha, T. R. Baltimore, Maryland: The Williams & Wilkins Co., 1969.

DISEASE

Pneumococcal meningitis and peritonitis in rhesus monkeys. Kaufmann, A. F., & Quist, K. D. (Epidemiology Program, Nat. Communicable Dis. Cen., Atlanta, Ga. 30333) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1158-1162.

In a 2-week period, 4 rhesus monkeys (*Macaca mulatta*) died of pneumococcal infections. In 3 of these, fibrinosuppurative meningitis was observed on postmortem examination; *Streptococcus pneumoniae* type 19 was isolated in pure culture from their lungs and meninges. The 4th monkey had suppurative peritonitis from which *S. pneumoniae* type 6 was isolated in pure culture.

Systemic cryptococcosis in 2 monkeys. Garner, F. M., Ford, D. F., & Ross, M. A. (Vet. Pathol. Div., Armed Forces Inst. Pathol., Washington, D. C. 20305) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1163-1168.

Cryptococcosis was diagnosed in a rhesus monkey (*Macaca mulatta*) and in a Formosan monkey (*Macaca cyclopsis*). The disease was not suspected clinically in either case, and the diagnoses were made only after gross and histologic examinations of necropsy specimens. There was generalized systemic infection in both, but gross lesions were apparent in only 2 organs--lungs and brain. Histologically, the infection was characterized by a mild granulomatous inflammatory reaction in association with numerous cryptococci. The discovery of typical cryptococcic granulomas deep in brain parenchyma was of particular interest.

Leptospirosis in Barbary apes (*Macaca sylvana*). Shive, R. J., Green, S. S., Evans, L. B., & Garner, F. M. (Vet. Pathol. Div., Armed Forces Inst. Pathol., Washington, D. C. 20305) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1176-1178.

Three fatal cases of leptospirosis occurred in a colony of 26 Barbary apes (*Macaca sylvana*) at the National Zoological Park in Washington, D. C. Clinical signs were not observed in any cagemates nor in any other primate species at the zoo. Serologic studies indicated the presence of previous infection by serotype *icterohaemorrhagiae* in 2 of the cagemates.

Spirochetes were observed in tissues of all fatally affected apes. Serogroup ichterohaemorrhagiae bacteria were isolated by direct bacteriologic culture of tissues and by hamster inoculation from one of the apes.

Pulmonary nocardiosis in a vervet monkey. Al-Doory, Y., Pinkerton, M. E., Vice, T. E., & Hutchinson, V. (Div. Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Texas 78228) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1179-1180.

Pulmonary nocardiosis may be mistaken for tuberculosis, either by gross examination or microscopic observation, and this may explain why tuberculosis and other pulmonary bacterial and viral diseases overshadow nocardiosis in case reports involving pulmonary disorders in the majority of primates. The obvious explanation is that most fatal pulmonary afflictions are diagnosed only by gross observation at necropsy, without benefit of histologic and confirmatory cultural studies. The present report concerns the finding of a granulomatous lesion in a lung of a vervet monkey (*Cercopithecus aethiops*) and the isolation of *Nocardia* sp. from this lesion.

An epizootic shigellosis in a monkey colony. Mannheimer, H. S., & Rubin, L. D. (Mannheimer Primatological Foundation, Toms River, N.J. 08753) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1181-1185.

An epizootic of shigellosis occurred in a monkey colony 8 months after arrival of an unsuspected carrier monkey. The infection spread rapidly to 80 monkeys, ranging in age from a few months to 8 years; the entire colony was affected. Containment, reinfection, and overgrowth of nonsusceptible bacteria (of which the last-mentioned created special problems among the youngest monkeys) were successfully handled. There were no deaths except for the carrier monkey.

Paralytic poliomyelitis in laboratory primates. Guilloud, N. B., Allmond, B. W., Froeschle, J. E., & Fitz-Gerald, Frances L. (Yerkes Reg. Primate Res. Cen., Emory U., Atlanta, Ga. 30601) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1190-1193.

In 1964, paralytic poliomyelitis occurred in 2 gorillas and 1 orangutan housed at the Yerkes Regional Primate Research Center, Orange Park, Fla. The causative agent was poliomyelitis virus type 1. Diagnostic and treatment methods were similar to those used for human beings.

A mite infestation in squirrel monkeys (*Saimiri sciureus*). Flatt, R. E., & Patton, N. M. (Sinclair Comparative Med. Res. Farm, U. Missouri, Columbia, Mo. 65201) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1233-1235.

Numerous mites identified as *Fonsecalges saimirii* were recovered in scrapings of scurfy skin lesions from several squirrel monkeys (*Saimiri sciureus*).

Acute bloat syndrom (gastric dilatation) in *Macaca mulatta*. Smith, A. W., Casey, H. W., LaCroix, J. T., & Johnson, D. K. (Vet. Sci. Div. USAF Sch. Aerospace Med., Brooks Air Force Base, Texas 78235) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1241-1244.

During a 12-month period, 24 of 800 monkeys in a vivarium died of acute gastric dilatation. Pathogenic organisms were not identified. Attempts to reproduce the disease by inoculating gastric contents via stomach tube from monkeys that had died into healthy monkeys failed.

Tuberculin testing in monkeys (*Macaca mulatta*) with naturally occurring tuberculosis. Sibinovic, S. (Bionetics Res. Lab., Inc., Div. of Litton Industries, Kensington, Md. 20795) *Laboratory Animal Care*, 1969, *19*, 621-623.

Five of 90 *Macaca mulatta* monkeys tested gave false negative responses to Koch's Old Tuberculin (KOT) in saline at a 1:10 dilution (10 mg/injection) when the intradermal tuberculin test was performed intrapalpebrally. Two of these animals had 2 negative responses to a 1:10 dilution of KOT prior to positive responses to a 1:5 dilution (20 mg/injection) at the third tuberculin test. One monkey gave 3 consecutive negative responses to the 1:10 dilution and 1 negative response to the 1:5 dilution of KOT in the fourth tuberculin test. Four additional tuberculin tests were performed on all surviving animals without detection of any additional positive tuberculin reactions with either dilution. At necropsy, animals with positive reactions at the 1:5 dilution of KOT and 2 tuberculin negative animals which died during the first week in quarantine were shown to have tuberculosis. Direct smears of lung and regional lymph nodes contained acid-fast bacteria. Mycobacterium tuberculosis was isolated from both lung and regional lymph node tissues.

An epizootic of tuberculosis in a rhesus monkey conditioning colony. Keeling, M. E., Froehlich, R. E., & Ediger, R. D. (Animal Farm Div., Fort Detrick, Frederick, Md. 21701) *Laboratory Animal Care*, 1969, *19*, 629-634.

An epizootic of tuberculosis in a group of 230 rhesus monkeys (*Macaca mulatta*) being conditioned in a single room at the Fort Detrick Animal Farm resulted in 61 confirmed cases of the disease. Despite preventive, control, and eradication measures, the disease progressed over an 8-month period until the decision was made to survey the remaining population. At this time 153 tuberculin-negative animals were radiographed, euthanized, and necropsied. Fifteen of these had tuberculosis in varying degrees of severity.

Physical facilities, control measures, diagnostic methods, and pathological findings are described.

Analyse d'un cas de variole du singe (monkeypox) chez le chimpanzé (*Pan troglodytes*) [Analysis of a case of monkeypox in the chimpanzee (*Pan trogloydtes*)]. Milhaud, C., Klein, M., & Virat, J. (C.E.R.M.A., 5 bis, Avenue Porte de Sèvres, Paris XV, France) *Expérimentation animale*, 1969, *2*, 121-135.

The clinical and virological details of a case of monkeypox appearing in a newly imported chimpanzee are described. The evidence includes a number of clinical symptoms characteristic of monkeypox (location and evolution of the eruptions and stomatitis). The virological data indicated that a human pox or cowpox was not involved. These findings confirm the susceptibility of the chimpanzee to this disease.

PHYSIOLOGY AND BEHAVIOR

The mycology of the freeliving baboon (*Papio* sp.). Al-Doory, Y. (Dept. Mycology, Div. Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Texas) *Mycopathologia et Mycologia Applicata*, 1969, *38*, 7-15.

Three field trips were conducted to study the mycoflora of the baboon in its native habitat, East Africa. The flora of the throat, nose, ear, rectum, vagina, and skin of over 300 male and female baboons was studied. A total of 1102 yeast isolates was obtained. None of the molds isolated were of known significant pathogenicity, while yeast isolates were found to belong to the following major genera: *Candida*, *Cryptococcus*, *Rhodotorula*, *Saccharomyces*, *Torulopsis*, and *Trichosporon*. *Candida albicans* was found to be the yeast most frequently isolated in both 1964 and 1966, while species of *Rhodotorula* and *Cryptococcus* were more frequently found in 1968. It was concluded that various ecological and geographical conditions have an effect on the mycoflora of the animals, specifically from the quantitative point of view.

FACILITIES, CARE, AND BREEDING

A primate corral. Alexander, B. K., Hall, A. S., & Bowers, J. M. (Oregon Reg. Primate Res. Cen., Dept. Reproductive Physiology & Behavior, Beaverton, Ore.) *The Journal of the American Veterinary Medical Association*, 1969, *155*, 1144-1150.

A simple two-acre corral at the Oregon Regional Primate Center has proved highly practical for maintaining Japanese monkeys (*Macaca fuscata*). It has been found unnecessary to provide heated winter facilities, and cleaning has not been necessary. The troop has been maintained in good health and has reproduced efficiently. The size of the corral has permitted the existence and convenient observation of a social

structure very similar to that observed in free-ranging troops.

Breeding activity in prosimians and small rodents in West Africa. Jewell, P. A., & Oates, J. F. (Div. Biol. Sci., U. Biafra, Nsukka, Biafra) *Journal of Reproduction and Fertility*, 1969, Suppl. 6, 23-28.

The results of a 10-month study of reproductive activity in several prosimians and small rodents in Biafra (E. Nigeria) are presented. Particular emphasis is placed on the information obtained about the little-known angwantibo, *Arctocebus calabarensis*, of which thirty-one specimens were handled. The reproductive condition of adult females, together with information on the weights of all adult animals examined, is summarized. The ages of fourteen youngsters obtained are calculated and their birth-dates thereby derived. Growth rates are plotted for three individuals. Scanty information on four other species of forest prosimian is presented. The breeding activity of the pygmy mouse, *Mus minutoides*, is recorded, together with information for eight other species of rodents. The discussion considers our own and published evidence for seasonal breeding in tropical small mammals. In prosimians there is a high incidence of births in the period covering the second half of the dry season and beginning of the wet season, but records are not adequate to support an assertion that breeding is wholly restricted to this period. Where wet and dry seasons are well contrasted, rodents appear not to breed in the second part of the dry season, but in humid tropical forest the seasonal effects have not been adequately studied. The lack of information on the precise environmental conditions favoring seasonality in reproduction is stressed, and the need for further study emphasized.

Sexual behavior in a captive group of pigtailed monkeys (*Macaca nemestrina*). Tokuda, K., Simons, R. C., & Jensen, G. D. (Japan Monkey Centre, Inuyama, Aichi, Japan) *Primates*, 1968, *9*, 283-294.

Sixteen pigtailed monkeys (*Macaca nemestrina*) were studied to determine patterns of estrous cycles and sexual behavior. The average estrous cycle lasted 42 days, the average tumescent period 21 days, and the average quiescent period 17 days. Results are consistent with those obtained from studies of individually caged monkeys. The mean length of gestation for five live births was 174.6 days with a range of 167 to 179 days. Patterns of heterosexual, homosexual, and self-oriented sexual behavior are described and quantified. Mating behaviors of Japanese and pigtailed monkeys were compared. Although individual elements of sexual patterns were similar, there were quantitative differences and differences in the temporal patterning of the behavior.

ECOLOGY AND FIELD STUDIES

Ecological observations on the lorisoid primates of African lowland Forest. Jewell, P. A., & Oates, J. F. (Dept. Zoology, Univ. College London, Gower St., London, W.C.1, England) *Zoologica Africana*, 1969, *4*, 231-248.

A pioneer ecological study on five lorisoid primates of the African Lowland Forest is described. During a period of 10 months in Eastern Nigeria the following species were studied:--*Arctocebus calabarensis, Periodicticus potto, Euoticus elegantulus, Galago alleni* and *Galago demidovii*. Methods of field observation and captive study are outlined. Evidence is presented that the lorisoids are more widely distributed and more abundant than was previously supposed. Information collected in the field on habitat preferences and behavior is amplified by studies on captive specimens of *Arctocebus* and *Periodicticus*. Interactions between captive individuals and the results of food preference experiments are described. Unlike the apes, monkeys and the majority of lemurs, the lorisoids are shown to be basically solitary animals. The effect of man on the distribution and abundance of lorisoid primates is discussed. The destruction of mature forest may have created temporarily favorable conditions for some of the lorisoids. However, the angwantibo in particular is hunted for food and may well become scarce if not protected.

INSTRUMENTS AND TECHNIQUES

A pole and leash handling system for primates. Wood, R. W. (U. Rochester, Rochester, N.Y. 14627) *Journal of the Experimental Analysis of Behavior*, 1969, *12*, 758.

Réalisation d'un casque support de moyens d'émission biotélemétrique pour le chimpanzé. [Development of a helmet for chimpanzees for support of biotelemetric equipment.] Klein, M., Milhaud, C., & Fondanesche. (C.E.R.M.A., 5 bis, Avenue Porte de Sèvres, Paris XV, France) Report No. 1113, Centre d'Enseignement et de Recherches de Medecine Aeronautique, Paris, France, 1969.

A closed system audio helmet for monkeys. Dalton, L. W., Jr., Henton, W. W., Taylor, H. L., & Allen, J. N. Technical Report No. ARL-TR-69-17, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico, 1969.

This report describes a closed system audio helmet for monkeys which is both reliable and inexpensive. The need for head restraint is eliminated and also permits self-feeding. No problem was experienced in the daily fitting of the helmet; the operation required less than 5 minutes.

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