LABORATORY PRIMATE NEWSLETTER

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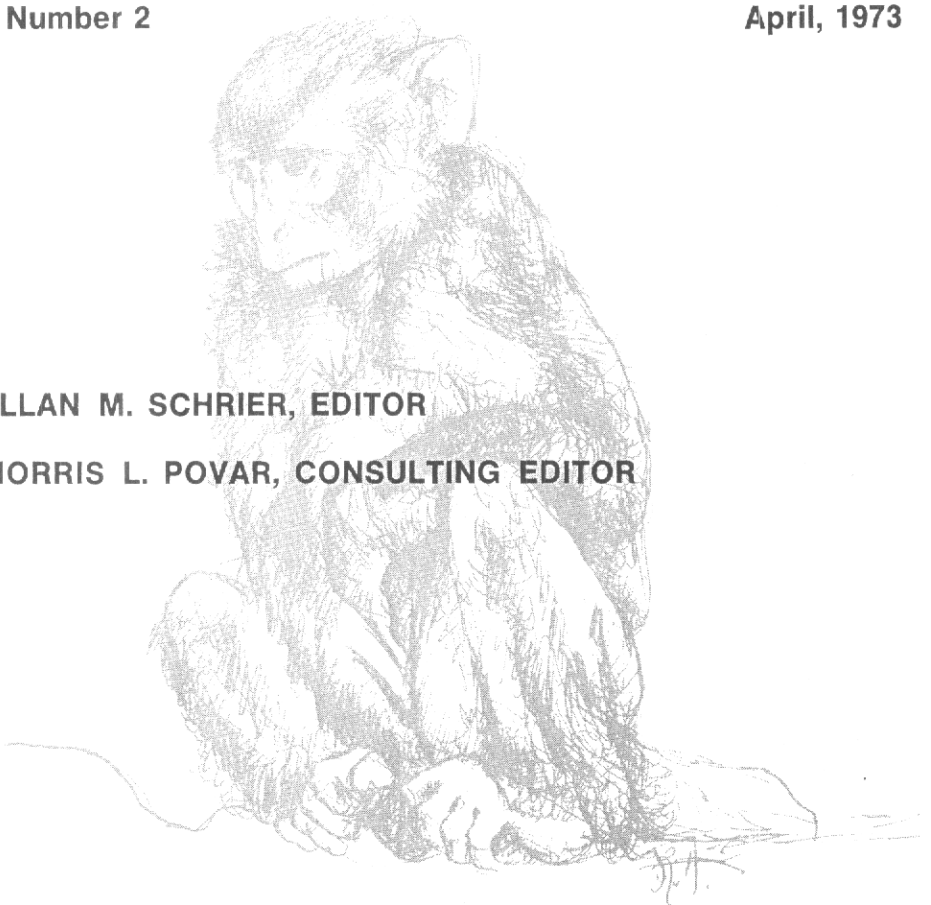

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Published Quarterly by the Primate Behavior Laboratory
Psychology Department, Brown University
Providence, Rhode Island

POLICY STATEMENT

The purpose of the *Laboratory Primate Newsletter* is (1) to provide information on care, breeding, and procurement of nonhuman primates for laboratory research, (2) to disseminate general information about the world of primate research (such as announcements of meetings, research projects, nomenclature changes), (3) to help meet the special research needs of individual investigators by publishing requests for research material or for information related to specific research problems, and (4) to serve the cause of conservation of nonhuman primates by publishing information on that topic. As a rule, the only research articles or summaries that will be accepted for the *Newsletter* are those that have some practical implications or that provide general information likely to be of interest to investigators in a variety of areas of primate research. However, special consideration will be given to articles containing data on primates not conveniently publishable elsewhere. General descriptions of current research projects on primates will also be welcome.

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. New issues are mailed free of charge in the United States. Persons outside of the U. S. A. are requested to pay $1.50 per year to cover the additional cost of mailing. Back issues may be purchased for $1.00 each. (Please make checks payable to Brown University.)

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

PREPARATION OF ARTICLES FOR THE *NEWSLETTER*. Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the References section should be referred to in the text by author(s) and date of publications, as for example: Smith (1960) or (Smith & Jones, 1962). Names of journals should be spelled out completely in the References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *Newsletter* the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967].

All correspondence concerning the *Newsletter* should be addressed to:
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CONTENTS

A PRIMATE DISTRIBUTION PROGRAM TO END WASTAGE OF SACRIFICED SPECIMENS

Russell A. Mittermeier and John G. Fleagle

Department of Anthropology and Museum of Comparative Zoology
Harvard University

A recent paper by Otis (1972) points out the importance of recycling living primates used in research. The newly instituted Primate Exchange Service of the Regional Primate Research Center at the University of Washington greatly facilitates such recycling of living primates (Smith, 1972). However, thus far, little has been said about recycling dead specimens and preventing single-purpose sacrifice and wastage of potentially valuable biological specimens.

A simple hypothetical case should explain what we mean. Let us say that a medical researcher is working on a certain eye disease and, for his study, needs the eyes of some nonhuman primates. He buys and sacrifices 10 *Cebus* and 10 *Aotus*, removes their eyes and incinerates what remains of their bodies, simply because he does not need them. At the same time, an anthropology graduate student doing thesis research on the limb musculature of *Cebus* and *Aotus* buys 10 specimens of each (at high commercial prices) and sacrifices them for his study. Unfortunately, he was not aware that the eye researcher could have given him the specimens he needed for nothing more than the cost of shipping.

The net result is that 40 monkeys are removed from natural populations. Had the anthropology student and the eye researcher known of each other's existence, 20 animals could have been spared. Such situations are partly the fault of funding institutions which do not question origin, use and ultimate fate of primates used in research, and partly our own fault since we often consider our own convenience first and find it easier to incinerate a specimen than to save it for someone else.

We have reached a point where cases like this (which are unfortunately commonplace) are inexcusable. Prudent, multiple-use of specimens is necessary and no primate carcass should be wasted. Many major museums have poor or nonexistent collections of postcranial skeletal material, even of the commonest species like *Cebus*, *Saimiri* and *Macaca*. Most museums and universities could use specimens to build up study collections that can be freely circulated among students (accurate locality data is not necessary for such collections). Universities are full of people who would like to study various aspects of primate anatomy, morphology, etc., but are prevented from doing so by the high cost or unavailability of primate cadavers. Yet, in spite of the need for material, hundreds of perfectly good specimens are thrown into the incinerator every year.

What can be done? The answer is that there must be a much better communication network between primatologists and greater responsibility on the part of those using primates, not to mention closer supervision of primate usage by granting agencies. The *Laboratory Primate Newsletter* and *Current Primate References* can play an important role in improving communication. *Current Primate References* has made an important start by listing available live animals. The *Laboratory Primate Newsletter* already publishes individual requests for live animals and cadavers. However, as Otis (1972) points out, synchronization is a big problem and sporadic individual requests for specimens don't always provide sufficient incentive for major users to keep sacrificed animals in storage.

However, if research institutions could provide lists of available "used" specimens (living *and dead*), turnover of specimens would be much more rapid and storage less of a problem. Such lists could easily be compiled by major users and could be published quarterly in *Laboratory Primate Newsletter* and/or monthly or weekly in *Current Primate References* or a similar publication. Those desiring specimens could consult such lists and immediately send in requests, rather than having to wait for replies to their ads.

As a long term goal, something like a "central storage bank" should probably be created at one or more research institutions. Such a "bank" would alleviate many of the present problems of specimen storage. Sacrificed animals could immediately be sent to the "bank" and kept in cold storage until needed. The "bank" could also take over the task of circulating periodical availability lists.

A "central storage bank" might also be useful for live animals. "Used" specimens could be sent to it and kept in spacious quarters and tended by experienced keepers. A "bank" of this kind could also be a focus for captive breeding, using animals that would otherwise be destroyed as the source for future laboratory specimens.

As the demand for nonhuman primates continues to increase and free-living populations and natural habitats continue to decrease, it becomes imperative for researchers to limit their use of primates to the absolute minimum and work with captive bred animals wherever possible. Eventually, we will hopefully be able to captive breed all the primates needed for research. However, in the meantime, it is essential to cut down on waste and excess utilization as much as possible. The "primate distribution program" suggested here would make possible maximum multiple-use of specimens, thus increasing opportunities for primate research without increasing the demand on free-living populations.

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AAAS ASKS FOR CONSERVATION OF NONHUMAN PRIMATES

At its 139th meeting, the American Association for the Advancement of Science passed a resolution calling for protection of nonhuman primates in order to avoid the extinction of any species in that category. The resolution is as follows: The Council of the AAAS, composed of scientists of many disciplines: being aware of the unique value of nonhuman primates as man's closest relatives and as models serving the biological and medical sciences in the advancement of human health, welfare, and knowledge; being aware of their responsibility to preserve the existence of the whole spectrum of contemporary primate species; being aware that expanding human populations and the growing exploitation of nonhuman primates and their habitats have threatened some species and sub-species with extinction while others have become drastically reduced; in order to ensure the survival of all primates and their natural habitats for posterity and the benefit of mankind, urgently submit to International and National Organizations the appeal that scientists be selective in the usage of nonhuman primates and that governments contribute to the conservation needs of nonhuman primates by all feasible means.

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PRESERVED PRIMATES WANTED

We would like to purchase fixed or frozen cadavers with intact musculature of Malagasy primates, *Arctocebus*, *Colobus*, and certain Asian colobine species. Contact: Jack T. Stern, Jr., Department of Anatomy, University of Chicago, 1025 E. 57th Street, Chicago, Illinois 60637

EFFECT OF LAPAROSCOPY AND ANESTHESIA ON OVULATION, CONCEPTION, GESTATION, AND LACTATION IN A *MACACA FASCICULARIS**

J. M. R. Rawson and W. Richard Dukelow

Endocrine Research Unit
Michigan State University

Over the past several years, studies at the Endocrine Research Unit at Michigan State University have utilized laparoscopy to observe follicular morphology, to define ovulation time for short term mating trials, to diagnose pregnancy, and to screen the effects of various pharmacological agents on the reproductive system. Laparoscopy in several species has been used over extended time periods (9-12 hours) and also serially for several consecutive days. Because of these variations in examination schedules a recent question has centered around the effect of the technique on the animal's normal reproduction. This report describes a successful reproductive response of an animal following a series of such procedures.

The animal (female #52) was one of a colony of regularly cycling *Macaca fascicularis* and was being used in a study involving daily exposure to a male, anesthesia, venapuncture, and periodic laparoscopy. Figure 1 summarizes the procedures that were carried out during gestation and first 20 weeks of lactation. The procedures were initiated on Day 13 of her normal 30 day menstrual cycle. Anesthesia was induced with 0.15 mg Sernylan (phencylidine hydrochloride, Bio-Ceutic Laboratories, St. Joseph, Mo.), and blood samples were taken from the femoral vein. Mating, anesthesia and venapuncture were continued for 33 days and laparoscopy was performed twice during this interval. The animal ovulated and conceived on Day 16 of her cycle (Day 3 of anesthesia and venapuncture) and exhibited implantation bleeding 18 days later. Laparoscopy was again performed during the seventh week of gestation and gravid uterus was observed. On Day 169 of gestation a normal female infant was delivered.

Following parturition, laparoscopy was performed at regular intervals to detect resumption of ovarian activity. Examinations at 6, 10, 14, 16, and 22 weeks following delivery revealed no follicular or luteal development, and photographic recordings were made. No deleterious effect of the procedure on lactation was noted and the infant was weaned at 24 weeks of age and a weight of 840 g. During

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*This work supported by USPHS Grant No. 5-P06-RR 00366-04, to the Center for Laboratory Animal Resources; and NIH Career Development Award No. 1-K4-HD35, 306-01. Authors' address: Endocrine Research Unit, Michigan State University, East Lansing, Michigan 48823.

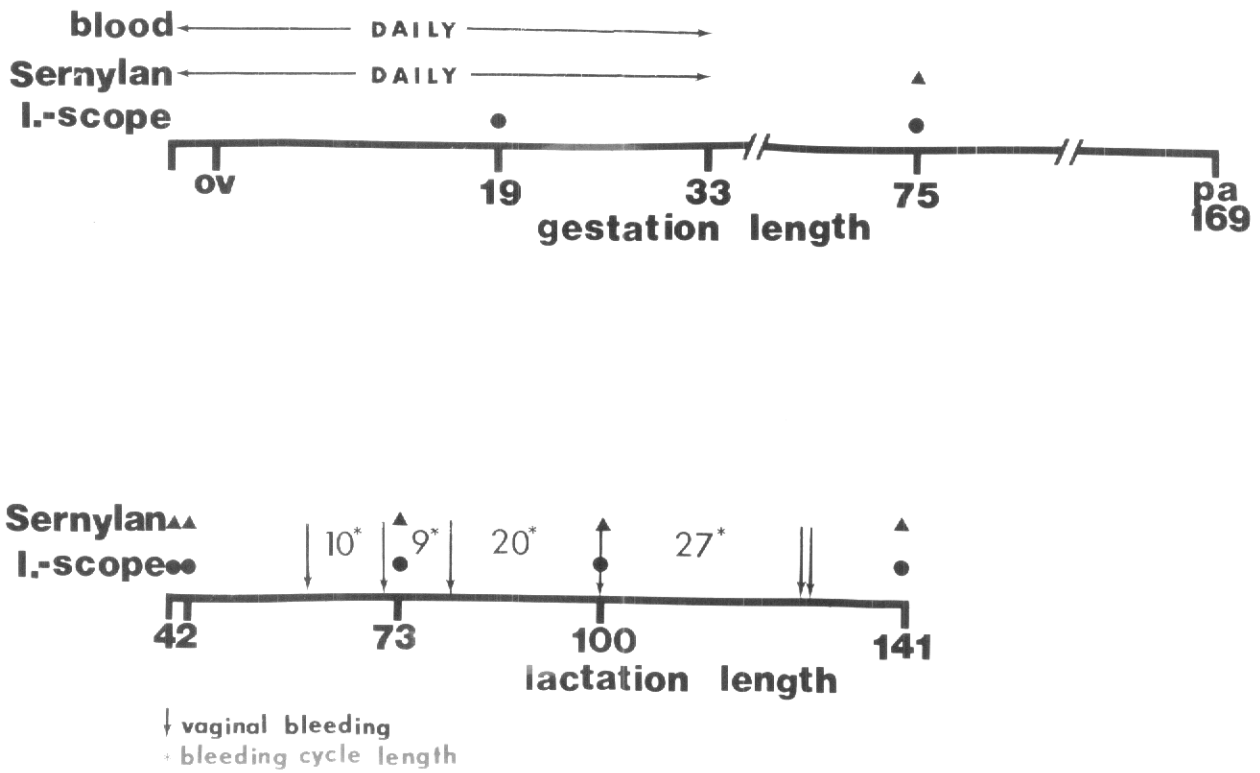

Figure 1. Summary of procedures carried out during gestation and lactation in *Macaca fascicularis* female #52. Circles indicate day of performance of laparoscopy. Triangles indicate day of administration of Sernylan.

lactation menses were irregular, beginning on Day 61, with gradually longer intervals between bleedings. Twenty-one days following separation from her infant mestruation began. Ovulation was confirmed at laparoscopy on Day 16, and a subsequent menses was observed on Day 27. During the next cycle ovulation was again confirmed and it was assumed that cyclicity had resumed.

The significance of these observations relates to the fact that the frequent handling, anesthesia, venapuncture, and laparoscopy had no detectable effect on conception, pregnancy, and lactation in this animal. Such observations tend to support the hypothesis that these techniques are less traumatic than laparotomy and that they do not alter normal reproduction. It is interesting that no follicular or luteal development was noted during lactation. This observation suggests that if an active corpus luteum is present throughout pregnancy, it develops beneath the ovarian surface and is not externally visible. Follicular development did not occur during lactation which was suggestive of an inhibition of gonadotropin secretion. Normal cyclicity resumed shortly after lactation ceased.

BLOOD GROUPS OF THE PIGMY CHIMPANZEE *(PAN PANISCUS)*: FURTHER OBSERVATIONS*

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and the Department of Forensic Medicine, New York University
School of Medicine

Charles J. Sedgwick

San Diego Zoological Garden, Zoological Society of San Diego

Before primate animals became more freely available for research, blood group findings on even a single chimpanzee were considered sufficient to warrant a special report (Wiener, 1952). By now, however, hundreds of chimpanzees, *Pan troglodytes*, have been tested (Wiener and Moor-Jankowski, 1972). One exception, which still merits a report on findings in a single animal is the rare pigmy chimpanzee, *Pan paniscus*, of which to date only eight animals have been tested for their blood groups, one by Butts (1953), four by Schmitt (1968), and three by us (Moor-Jankowski *et al.*, 1972; Moor-Jankowski and Wiener, 1972). Among these, only the latter three pigmy chimpanzees were thoroughly tested for simian-type as well as human-type blood groups. Recently, another blood specimen from a pigmy chimpanzee became available to us from the San Diego Zoological Garden, and the findings obtained are presented in this paper.

In tests for the human-type A-B-O blood groups, the pigmy chimpanzee proved to be subgroup A_1, like the three other animals previously tested by us. As was first pointed out by Schmitt, *Pan paniscus* differs in this respect from the common chimpanzee, *Pan troglodytes*, whose red cells typically give reactions of intermediate intensity with anti-A_1 reagents, in contrast to *Pan paniscus* whose red cells give reactions indistinguishable from human subgroup A_1 blood. On this basis alone, therefore, red cells of *Pan paniscus* can be distinguished from red cells of *Pan troglodytes*.

As for the human-type M-N blood types, the red cells of the pigmy chimpanzee were strongly agglutinated by rabbit immune anti-M, but not by anti-N rabbit serum or anti-N^V lectin *(Vicia graminae)*, namely, the same results that we had obtained with the three previously tested pigmy chimpanzees. In tests with anti-He(Henshaw) rabbit immune serum, a reagent we have not used routinely for testing chimpanzee blood, no agglutination was observed. Weak agglutination occurred with

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*Supported by Grant No. GM-12074 from the U. S. Public Health Service

an anti-M^e rabbit serum, a reagent that strongly agglutinates red cells of *Pan troglodytes*.

In tests for the human-type Rh-Hr blood factors, positive reactions were obtained for Rh_o and hr', but not for rh', rh" or hr", which agrees with previous findings in chimpanzees, both *Pan troglodytes* and *Pan paniscus*.

As for the simian-type V-A-B-D blood factors, the red cells of the pigmy chimpanzee failed to agglutinate with anti-V^c reagent, whether iso-immune or cross-immune, and negative reactions were obtained also with anti-A^c and anti-B^c. On the other hand, positive reactions were obtained with anti-D^c (Lindsay) and other reagents reactive for red cells having D^c specificity. Thus, the phenotype of the pigmy chimpanzee was v.D (part of the type originally designated as v.0), i.e., the same as for the other three pigmy chimpanzees previously tested by us. This is a striking finding because the type v.D had a frequency of only 1.9 percent in an unpublished series of 113 *Pan troglodytes* typed by us.

With regard to the simian-type C-c-E-F system, positive reactions were obtained with anti-C^c and anti-E^c sera while negative reactions were obtained with anti-F^c and anti-c^c. Thus, the pigmy chimpanzee was of type CCEf, the same as we had previously obtained for the other three animals of that species. It is noteworthy that type CCEf has a frequency of less than 1 percent in *Pan troglodytes*.

Summarizing, the same blood groups have been found for this pigmy chimpanzee as for the three previously tested by us, derived from a different group of animals. The findings confirm striking differences between *Pan paniscus* and *Pan troglodytes* in the human-type A-B-O blood groups, and in the simian-type V-A-B and C-E-F types.

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PRIMATE TEETH WANTED

Histological studies of primate teeth have shown that there is a considerable range or variability among certain species. The variability exists mainly in the hypoplasias of enamel and dentine; a higher frequency of developmental defects in the teeth of some species than in others. Man has the most poorly mineralized dentine while several cercopithecoid species have the best. The dentine structure of pongids varies in quality between these two extremes.

We are engaged in comparative histological studies of primate teeth and samples from a variety of species are needed. Any tooth is useful for our study but we would prefer first permanent molars, an upper and lower from each animal if possible. Teeth from any species are desired. Data on age, sex, species, and a note on any pathological condition are necessary. These samples will also be used to expand data on mineral metabolism of primates and so information on type of diet would be useful. Please send teeth to: Dr. Stephen Molnar, Department of Anthropology, Washington University, St. Louis, Missouri 63130.

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PRIMATE MATERIAL WANTED: LENSES FROM EYES

We would like to receive lenses of various species of primates preserved as follows: As soon as it is removed, the lens must be washed in cold Veronal acetate buffer (pH 8.6). The lens should then be dried on fine blotting paper. The lenses must then be preserved in test tubes at -20°C. We need to know the diameter of each lens, whether from the left or right eye, and the species and sex of the animal from which it was taken. The material should be mailed in a container with dry ice to the following address: A. M. Conti Fuhrman, Instituto di Biologia Generale, Via Viotti 3/5, Università di Milano, 20133 Milano, Italy.

COMPLEMENTARY ASPECTS OF FIELD AND LABORATORY METHODOLOGY IN PRIMATE RESEARCH: A LOCOMOTOR EXAMPLE*

James P. Wells

University of Massachusetts

Phyllis D. Coley

Hampshire College

Traditionally, primate research has been carried out either in the natural environment or under laboratory conditions. Although each approach is appropriate for the generation of hypotheses, a combination of the two research approaches offers the promise of yielding more meaningful data. The laboratory animal, or the animal housed in a large out-door "corral", offers the researcher a chance to manipulate both the animal and the environment to better fit the requirements of his particular research design. The natural field situation permits collection of behavioral data unaltered by the impinging requirements of experimental control. By using complementary data from both the laboratory and the natural field situation, the researcher may be in a better position to formulate and test his hypotheses.

Avis (1962), in her study of primate locomotion, followed an experimental design which utilized two cages equipped with artificial substrate. In this zoo study, several primate genera were introduced into the experimental situation and three kinds of data were collected: type of locomotor activity, preference for a particular type of substrate, and the relation between locomotor type and support type. As one of her findings she has stated:

> Customary arboreal locomotor behavior in Old World monkeys was quadrupedal and was confined almost exclusively to large supports or to those smaller ones offering firm relatively unyielding support. (1962, p. 132)

> The conclusion seems inescapable that the Old World monkey has developed into the remarkably effective cursorial leaping quadruped which it is by exploiting the possibilities offered by this particular segment of the arboreal setting. But quadrupedalism is not only ineffective where firm support is lacking, it is apparently impossible as a rule. For the fact that, while practiced by all primates tested, quadrupedal movement occurred only on

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*This research was supported in part by the Behavioral Science Foundation Summer Fellowship, and a Grant-in-aid of research to the first author from the Society of Sigma Xi.

stable supports suggests that the animals are unable to maintain themselves atop flexible ones...(1962, p. 137)

In a study of terminal branch feeding among the gibbon (*Hylobates lar)* and macaque *(Macaca sinica)*, Grand (1972) used direct observation and films of locomotor behavior in a natural field situation. He sought a biomechanical explanation, in terms of distribution of body weight and functional locomotor capabilities, for the differential use of the terminal portions of the branches during feeding. His findings demonstrated the greater utilization of a "terminal branch niche" by the gibbon, permitted by its anatomical adaptation for "hang-feeding". The macaque was also found to rely on this zone for feeding, but to use only the upper surfaces of the flexible branches for support. Our own research with the quadrupedal green monkey *(Cercopithecus aethiops sabaeus)* reinforces this view and demonstrates the habitual use of this zone during many phases of locomotion. Avis' erroneous conclusion was due at least in part to the limited nature of the test situation substrate which was not designed to replicate the variety found in the natural environment.

Our own research began as a field study and was enhanced by the addition of laboratory animals into a controlled physical environment. The research was aimed at defining habitual patterns of locomotion and selective use of available substrate, and at determining the morphological features of the green monkey which permit the observed locomotor behavior. To accomplish this, the research design has been divided into three analytic phases: 1) description of available substrate in ecological and structural terms, and definition of habitual locomotor modes as related to selective use of substrate, 2) delineation of relevant morphological components expressed in terms of bone and joint morphology, relative amounts of muscle mass, and the distance from muscle origin and insertion to the joint center (a measure of mechanical advantage), 3) biomechanical analysis of locomotor film sequences which permits the integration of locomotor and anatomical data.

In order to test hypotheses regarding the selective use of available substrate and the association between locomotor capability and morphology, both field and laboratory test situations were utilized. The field study was conducted on an island with extensive vegetative variety, supporting a large population of green monkeys. This natural environment offered all the attributes of a testing ground for the first phase of the locomotor study.

After an initial period of locomotor observation, the entire substrate of the field area was classified with respect to vegetative type and zones within these types. Classification was based on structure as well as differential use. Locomotor behavioral sequences could then be recorded accounting for locomotor mode or postural position, substrate portion utilized, and concurrent non-locomotor behavior. In addition, an analysis of sequential behavior yields probabilities of occurrence of a series of locomotor events.

The second phase of our study, collection of morphological data, is appropriately carried out in the laboratory.

Requirements for the third phase of the research design are stringent and place severe limitations on the situation under which biomechanical analysis can be accomplished. These requirements are best met under artificial conditions where the substrate may be altered in accord with the selected locomotor sequences to be observed.

In this biomechanical analysis the sequence of events comprising a pattern of locomotion are quantitatively expressed in terms of the rate of displacement of body parts and the forces and moments of force operating to achieve this displacement. The body is treated as a series of linked segments. In motion these segments work interdependently, affecting one another via their connecting joints. Determination of the role played by various muscle groups in moving body segments, and delineation of the contribution made by individual body segments to the motion as a whole are the goals of the analysis.

Technical as well as manipulative requirements must be met to accomplish the analysis. Slow motion films (with the subject in lateral aspect and horizontal alignment with reference to the camera) yield many increments of motion when subjected to a frame-by-frame analysis. In this analysis each frame is projected in turn upon a recording sheet and all body segment joint centers are connected to form a stick-figure. By proceeding frame-by-frame for the entire motion, the relative displacements of all body segments over time are derived. This data is then supplemented by anatomical data on body segment lengths, weights, and measures of the distribution of mass when the segment is both immobile and in motion. A computer analysis generates the forces and moments of force about all joint centers for each body segment throughout the motion. Moments of force are expressed as dominant muscle action (i.e., flexors versus extensors) and, in conjunction with data on segment contribution to motion, are now in a form directly comparable with the gross anatomical data to be collected in the laboratory during the second phase of the research design.

While the natural environment is inappropriate for application of this analytical procedure, both laboratory and small enclosure conditions are ideal as long as the investigator has a working knowledge of locomotor behavior in the naturally occurring substrate. As he is no longer dealing with the entire repertoire of positional behavior, he must remain aware of the primate's complete range of locomotor capabilities and be sure he is adequately representing them in the analysis.

While neither the natural environment nor the laboratory permits feasible collection of certain data when used independently, and may actually lead an investigator to draw erroneous conclusions,

complementary use of both field and laboratory methodologies permits a more comprehensive analysis of certain empirical problems and imparts an added dimension of scope and reliability to experimental results.

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* * *

MEETING ANNOUNCEMENTS: FOURTH CONFERENCE ON EXPERIMENTAL MEDICINE AND SURGERY IN PRIMATES

This conference will be held in Israel, February 24-27, 1975. Interested scientists should contact the Conference Co-Chairmen: E. I. Goldsmith, M. D., New York Hospital-Cornell Medical College, 525 East 68th Street, New York, N. Y. 10021, and J. Moor-Jankowski, M. D., Laboratory for Experimental Medicine and Surgery in Primates, New York University School of Medicine, New York, N. Y. 10016.

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SQUIRREL MONKEYS AVAILABLE

Seven squirrel monkeys *(Saimiri sciureus)* (2 females, 5 males) in good health are available. These animals have been in our colony for 18 months to 6 years and are no longer suitable for our research purposes. The females are naive and the males have varying experimental histories. For more information please contact: R. R. Hutchinson or G. S. Emley, Research Department, Kalamazoo State Hospital, Kalamazoo, Michigan 49001. (Telephone: 616-349-7571)

SUCCESSFUL FOSTERING OF A NEWLY BORN SQUIRREL MONKEY (*SAIMIRI SCUIREUS*)[1]

J. R. Eveleigh[2] and C. E. Hudson

B. D. H. (Research) Ltd., Godalming, Surrey, England

Hopf (1969) attempted to foster a newly born squirrel monkey onto a squirrel monkey who had previously lost her baby, without success. The foster mother did not show the essential maternal behavior characteristics of letting the infant ride on her back or nurse. This brief article is to record the successful fostering of a newly born squirrel monkey.

At 6:30 a.m. on the 14th of May 1972 a female squirrel monkey was found dead in her cage lying prostrate with a live newly born male squirrel monkey clasped to her dorsal surface. The mother had died of an intra-uterine hemorrhage.

Not having the equipment for immediate hand rearing, it was decided to foster him onto another female squirrel monkey who had lost her baby (stillborn) at parturition 21 days previously.

The baby was offered to its prospective foster mother who accepted him very readily and exhibited normal maternal behavior patterns (Ploog, Hopf, & Winter, 1967). It was uncertain whether or not the foster mother's milk supply was adequate so the following day she was given 10 I.U. of prolactin (intramuscular) followed by a further 10 I.U. 24 hours later.

Table 1

Growth Rate of a Fostered Male Squirrel Monkey from Birth to Twelve Weeks of Age.

Age(Weeks)	Weight(Grams)
Birth	98
2	117
4	164
6	191
8	217
10	233
12	264

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[1]We would like to thank Keith Prior for devoting so much time, care and understanding in the general management of the squirrel monkey colony.

[2]Present address: M. R. E., Porton Down, Salisbury, Wiltshire.

Our fostered baby weighed 98 g at birth and was weighed daily. He lost 7 g during the first four days and then began to gain weight steadily. As shown in Table 1, his weight gain was normal when compared with other babies bred within our colony (Bantin, 1969).

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Ploog, D., Hopf, S., & Winter, P. Ontogenese des Verhaltens von Totenkopf - Affen *(Saimiri scuireus)* *Psychologische Forschung*, 1967, *31*, 1-41.

* * *

MEETING ANNOUNCEMENTS: CALAS

Individuals wishing to present papers of 15 minutes duration in the Scientific Program of the 12th Annual Convention of the Canadian Association for Laboratory Animal Science are requested to submit the title and an abstract of no more than 200 words to: Dr. H. C. Rowsell, Department of Pathology, University of Ottawa, Ottawa, Ontario. K1N 6N5

The theme for the convention is "Man and the Animal". Emphasis in the Scientific Program will be placed on those papers relating specifically to behavioral problems; however, papers of merit concerning laboratory animal science will be considered. The convention will be held in Ottawa, Canada at the Skyline Hotel, on November 4-7, 1973. No submissions will be considered after June 30, 1973 and those whose submissions are accepted will be notified by July 30, 1973.

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CHIMPANZEES AND CHIMPANZEE URINE AVAILABLE

Two male chimpanzees 6-8 years old are offered for sale. Also urine samples from chimpanzees, collected weekly throughout full-term and abortion terminated pregnancies. Prices and details on request. Contact: Gwen Fitzgerald, Primate Centre TNO, 151 Lange Kleiweg, Rijswijk, The Netherlands.

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

BOOKS

Primate socialization. Poirier, F. E. (Ed.) New York: Random House, 1972.

Chapters include the following: The integration of biology and behavior in the socialization of *Macaca sylvana* of Gilbraltar, F. D. Burton; A preliminary essay on the relationship between social organization and incest avoidance in nonhuman primates, J. Itani; Paternal behavior in primates, G. Mitchell & E. M. Brandt; Early social development of feral baboons, T. W. Ransom & T. E. Rowell.

Transplantation genetics of primates. Balner, H. & van Rood, J. J. New York: Grune & Stratton, 1972.

New perspectives on ape and human evolution (1st, preliminary ed.). Kortlandt, A. Amsterdam: Stichting voor Psychobiologie, 1972.

This 100-page book, intended for the non-specialist as well as the specialist, can be ordered by sending a check for US $5, Engl. £2, DM 15, Fr. Frs 25, Sw. Frs 18, B. Frs 200 Or Neth. f 15 to the Stichting voor Psychobiologie, Plantage Doklaan 44, Amsterdam-C. Contents: Part I. The Apes, 1. The Problem, 2. Paleogeography and Taxonomy, 3. Dating the Divergences, 4. Ramapithecus. Part II. Man. 5. The Gracile and the Robust, 6. Ape-Men of the Woodlands, 7. Man's Shadow. Appendix I. The Use of (Rudimentary) Weapons by Apes and Man. Appendix II. "Hunting" and "Predatory" Behavior in Chimpanzees and Man. Bibliography.

BIBLIOGRAPHIES

Aeromedical review: An annotated bibliography in laboratory animal medicine and veterinary surgery. Herpesviruses. Irving, G. W., III *et al.* Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1972. (Review 3-72)

The literature citations in this work were compiled for a monthly literature review seminar by residents in veterinary surgery, residents in laboratory animal medicine, and staff members at the USAF School of Aerospace Medicine, Brooks Air

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

BOOKS

Primate socialization. Poirier, F. E. (Ed.) New York: Random House, 1972.

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Force Base, Texas 78235. These residency programs are under the direction of the Veterinary Education Branch. Each month 35 to 40 scientific journals are reviewed by this group and articles are selected that have information pertinent to the specialties of laboratory animal medicine and veterinary surgery. The citations included here were collected between August 1970 and February 1972.

Aeromedical review: An annotated bibliography in laboratory animal medicine and veterinary surgery. Primate viruses. Irving, G. W., III *et al.* Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1973. (Review 8-72)

See comments on preceding reference.

Aeromedical review: Selected topics in laboratory animal medicine. Vol. VI. Pharmacology. Pryor, W. H., Jr., & Carter, V. L., Jr. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1972. (Review 6-72)

This is one of a series of Aeromedical Reviews entitled "Selected Topics in Laboratory Animal Medicine". These publications contain information on the care and use of animals in biomedical research; they are intended for veterinary educators, managers of animal colonies, and individuals who use animals in scientific investigations. The information in these reviews was initially presented as lectures and handouts for residents in laboratory animal medicine and veterinary surgery and in the annual symposia on Current Trends in Laboratory Animal Medicine. The authors are veterinarians who are specialists in the respective fields of laboratory animal medicine, pathology, toxicology, and surgery. This work was directed and coordinated by the staff of the Veterinary Education Branch, Education Division, USAF School of Aerospace Medicine, Brooks Air Force Base, Texas 78235.

Aeromedical review: Selected topics in laboratory animal medicine. Vol. VIII. Parasitology. Irving, G. W., III. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1972. (Review 2-72)

See comments on preceding reference.

Aeromedical review: Selected topics in laboratory animal medicine. Vol. XV. Selecting primates for use in biomedical research. Taylor, G. D. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1972. (Review 4-72)

See comments on preceding reference.

Aeromedical review: Selected topics in laboratory animal medicine. Vol. XVIII. The squirrel monkey. Kupper, J. L., & Britz, W. E. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, 1972. (Review 5-72)

See comments on preceding reference.

Cholesterol and other plasma lipids in nonhuman primates: A tabulation from the literature. Morrow, A. C., & Terry, M. W. Seattle, Washington: Primate Information Center, Regional Primate Research Center, University of Washington, 1972.

BOOKLETS

Guide for the care and use of laboratory animals. Committee on Revision of the *Guide for Laboratory Animal Facilities and Care* (Rev. ed.). Dept. of Health, Education, and Welfare Publication No. (NIH) 73-23.

The fourth revised edition of this *Guide* is now available for distribution. The revision by a study committee of the Institute of Laboratory Animal Resources of the National Research Council, under contract with the Animal Resources Branch which is the extramural animal resource component of The Dept. of Health, Education, and Welfare. The *Guide* was first published in 1963 under the title, *Guide for Laboratory Animal Facilities and Care.* The principal purpose was to provide guidelines for professionally appropriate care for laboratory animals. It is National Institutes of Health policy that institutions abide by the standards set forth. It was revised in 1965, and again in 1968. A free copy of the *Guide* may be secured from the Information Office of the Division of Research Resources, National Institutes of Health, Bethesda, Maryland 20014. Contents: Laboratory animal management, Laboratory animal quality and health, Personnel, Use of laboratory animals, Physical plant. Appendixes: Selected bibliography, Professional and certifying laboratory animal science organizations, Training programs in laboratory animal medicine, Animal technology programs, Relevant federal laws and implementing rules and regulations.

DISEASE

Viral zoonoses of importance to laboratory animal personnel. Quist, K. D. (Ctr. Disease Control, Atlanta, Ga. 30333) *Journal of the American Veterinary Medical Association,* 1972, *161*, 1572-1577.

Includes a brief review of the following human diseases that are related to nonhuman primates: encephalitis, hepatitis, measles, pox, tumors, Marburg disease, and Kyasanur forest disease.

An epidemiologic account of tuberculosis transmitted from man to monkey. Cappucci, D. T., Jr., O'Shea, J. L., & Smith, G. D. (Veterinary Sec. Calif. State Dept. Public Health, 2151 Berkeley Way, Berkeley, Calif. 94704) *American Review of Respiratory Disease*, 1972, *106*, 819-823.

Tuberculosis was diagnosed and confirmed in an animal caretaker and a pig-tailed macaque *(Macaca nemestrina)* from the same research laboratory of an institution. Epidemiologic evidence suggested that cross infection between species occurred within the environment of the research laboratory. It is possible that occupational exposure within another research laboratory at a different facility was the source of the caretaker's infection.

Hemagglutination assay of antibodies associated with pulmonary acariasis in rhesus monkeys *(Macaca mulatta)*. Kim, C. S., Bang, F. B., & DiGiacomo, R. F. (Dept. Pathobiol. Sch. Hygiene and Public Hlth., Johns Hopkins U., Baltimore, Md. 21202) *Infection and Immunity*, 1972, *5*, 137-142.

Antibodies associated with infection by lung mites *(Pneumonyssus simicola)* in rhesus monkeys were measured by passive hemagglutination methods. Tanned human Rh negative O red blood cells or sheep red blood cells coated with soluble acarine antigens were used to detect mite-specific antibodies. Large quantities of host-specific mite antigens *(P. simicola)* were difficult to obtain, so free-living mite species such as *Dermatophagoides farina*, *Acarina sheldonii*, and *Tyrophagus putrificiensis* were also utilized. Although the best serological specificity and sensitivity were obtained with *P. simicola* and its derivatives (1:640), several free-living acarine species were useful in detecting antibodies to mites. Skin tests carried out on a limited number of animals were positive for both immediate and delayed hypersensitivity.

Intestinal microsporidiosis in *Callicebus Moloch*. Seibold, H. R., & Fussell, E. N. (Tulane U. Delta Reg. Primate Res. Ctr., Covington, La. 70433) *Laboratory Animal Science*, 1973, *23*, 115-118.

Invasion of jejunal epithelium by a gram-positive, acid-fast microsporidian having a polar filament with as many as 7 coils was found in a *Callicebus moloch cupreus*. It was presumed that ingestion of arthropods bearing the parasite was the source of infection.

Outbreaks of monkeypox and serological surveys in nonhuman primates. Arita, I., Gispen, R., Kalter, S. S., Lim, T. W.,

Marennikova, S. S., Netter, R., & Tagaya, I. (Smallpox Eradication, WHO, Geneva, Switzerland) *Bulletin of the World Health Organization*, 1972, *46*, 625-631.

In connection with the recent detection of cases of monkeypox in man in West and Central Africa, the frequency of monkeypox outbreaks in monkeys since 1958, when the disease was first recognized in captive animals, has been investigated. Special incidence surveys were made for this purpose. During the last 3 years, a serological survey has been conducted to find natural foci of monkeypox virus, and a total of 2,242 sera from monkeys of different species from various parts of Africa and Asia have been examined for poxvirus antibodies. The survey failed to detect any significant indication of poxvirus infections. The observations suggest that although a few human cases of monkeypox have been identified, monkeypox in the natural environment is not widespread and is perhaps localized in small areas.

Experimental rubella virus infection of marmosets (*Saguinus* species) Patterson, R. L., Koren, A., & Northrop, R. L. (Dept. Microbiol., Rush-Presbyterian-St. Luke's Med. Ctr., 1753 W. Congress Pkwy., Chicago, Ill. 60612) *Laboratory Animal Science*, 1973, *23*, 68-71.

Marmosets, *Saguinus nigricollis*, *S. fuscicollis*, and *S (Oedipomodas) Oedipus* were found to be susceptible to rubella virus infection after intranasal inoculation. Virus excretion, development of virus specific hemagglutination-inhibition antibody, and natural spread were similar to those features of natural rubella in man. Neither clinical rubella nor congenital infection were observed in these inoculated animals.

PHYSIOLOGY AND BEHAVIOR

Intraspecies variation in serum cholesterol levels in imported *Macaca nemestrina*. Blakley, G. A., Morrow, A. C., & Morton, W. R. (Reprints may be obtained from the Primate Inf. Ctr., Reg. Primate Res. Ctr. SH-50, U. Wash., Seattle, Wash. 98195) *Laboratory Animal Science*, 1973, *23*, 119-121.

Serum cholesterol levels for 2 groups of *Macaca nemestrina* imported from different areas differed on arrival, and significant differences between the groups persisted after the animals were released into the breeding colony. These findings indicate that intraspecies variability can occur despite uniform husbandry, and such variability must be taken into account in determining "normal" values for experimental purposes.

Cyclicity and gestation length of *Macaca fascicularis*. Jewett,

D. A., & Dukelow, W. R. (Endocrine Res. Unit, Mich. State U., East Lansing, Mich. 48823) *Primates*, 1972, *13*, 327-330.

Menstrual cycle records were kept on all of the females in the colony for a period of 14 months. The mean cycle length was 30.8 days; the median, 33 days; and, the mode, 28 days. Cycles ranging from 27 to 32 days in length comprised 66.4% of all cycles. Regular cycles were scored on the basis of menses beginning within 2 days of a projected date based on an average of 6 previous cycles. Regular cycles were observed in 62.4% of the cases. The mean cycle length for regular cycles was 29.2 days. 45% of all females had regular cycles at least 70% of the time. The duration of menstrual flow for 150 cycles averaged 2.8 days. Menses ranged from 1 to 8 days in length, with 90.7% of the cases ranging from 1 to 4 days in length. For a given duration of menses, the percentage of cases of light flow increased as the end of the menstrual period was reached. The mean gestation length of 3 pregnancies was 164.4 days, with implantation bleeding beginning on day 19 of pregnancy and lasting from 4 to 9 days.

Comparison of hematologic values from peripheral blood of the ear and venous blood of infant baboons *(Papio cynocephalus)* Berchelmann, M. L., Kalter, S. S., & Britton, H. A. (WHO Reg. Ref. Ctr. for Simian Viruses, Div. of Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Tex. 78284) *Laboratory Animal Science*, 1973, *23*, 48-52.

16 baboons ranging in age from 1 day to 1 year were studied for comparison of hematologic values from peripheral blood of the ear and venous blood. 4 adult and 5 juvenile African green, and 2 adult cynomolgus monkeys were included in this study. The erythrocyte values were found to be higher in peripheral blood of the ear than the venous blood values. The leukocyte counts had no consistent pattern, but several animals had leukocyte differential counts that varied significantly.

Intraocular pressure in the juvenile rhesus monkey *(Macaca mulatta)* by applanation tonometry, preliminary report. Schiavo, D. M. (Schering Corp., Ophthalmology Unit, Pathol. & Toxicol. Lab., P. O. Box 32, Lafayette, N. J. 07848) *Laboratory Animal Science*, 1973, *23*, 84-85.

The normal intraocular pressure in the rhesus monkey was measured. Values obtained from 50 juveniles using the Draeger applanation tonometer were found to be between 11.1 and 24.3 mm Hg, with a mean of 17.7 mm Hg.

Ecology and behaviour of the Hanuman langur, *Presbytis entellus* (Primates: Cercopithecidae) invading fields, gardens and orchards around Jodhpur, western India. Mohnot, S. M. (Dept. Zoology, Jodhpur U., Jodhpur, India) *Tropical Ecology*,

1971, *12*, 237-239.

The way langur *(Presbytis entellus)* groups attack artificial feeding sites, such as gardens, orchards and fields, and some related features are dealt with here. Xerophytic plants constitute their natural food supply. To supplement their diet, they attack plantations and also feed on other vegetarian (mostly cooked) food provided by people. They are primarily leaf- and fruit-eaters and are fully vegetarian.

It is difficult to generalize upon the attack time, period of stay, total feeding hours and quantity of staple food consumed by different groups in the feeding locales. Bisexual groups inhabiting the periphery of feeding sites are at an advantage, being acquainted with feeding places. Often, instead of the leader, females initiate and lead attacks due probably to easy accessibility of the sites. Groups living away from the periphery show a 'procession order' during raids and withdrawals. To and fro progressions in such groups are normally headed by the dominant male leader, except during mating season when a male attack is led by adult males through the shortest routes passing over peripheral groups. The feeding of adult males decline in this period. During sexual inactivity males cease trespassing and take long runs to reach feeding sites.

Ordinarily, langurs are fond of gardens and orchards, where a variety of food, foliage and hiding places are available. Vegetable fields also attract langurs, but here their encroachments are less successful as these sites are constantly guarded by watchmen. The langurs show indifference to grain crops. If a feeding group is scared, it becomes turbulent and active, displays anger and causes considerable damage.

DRUGS

Methods of anesthesia in nonhuman primates. Martin, D. P., Darrow, C. C. II, Valerio, D. A. & Leiseca, S. A. (Litton Bionetics, Inc., 5510 Nicholson Lane, Kensington, Md. 20795) *Laboratory Animal Science*, 1972, *22*, 837-843.

Techniques and agents used in sedating and/or anesthetizing over 400 primates per year for various experimental and clinical procedures were described. Species and weights ranged from infant *Macaca mulatta* (450 g) and adult *Galago senegalensis* (300 g) to *Papio* sp (25 kg) and *Pan* sp (40 kg). Types of agents discussed included tranquilizers, analgesics, anesthetics, and combinations thereof. Emphasis was placed on the choice of an agent (based on procedure and species), dosages utilized, and techniques of administration.

Dissociative anesthesia in dogs and primates: clinical evaluation

of CI 744. Bree, M. M., Cohen, B. J. & Rowe, S. E. (Unit for Laboratory Animal Med., U. Mich. Med. Sch., Ann Arbor, Mich. 48104) *Laboratory Animal Science*, 1972, *22*, 878-881.

CI 744, an experimental dissociative anesthetic, consists of tiletamine hydrochloride, an analog of phencyclidine and ketamine, combined with flupyrazapon, an agent having minor tranquilizing properties. When administered intramuscularly, profound analgesia and cataleptoid anesthesia were induced rapidly in 38 dogs and 199 primates. Doses used were 6-12 mg/kg of body weight in dogs and 2-6 mg/kg in primates. Sleeping times were shown to be dose-related. The quality of anesthesia was excellent as judged by muscular relaxation and ability to perform major surgical procedures. Recovery from anesthesia was smooth and uneventful. CI 744 is a promising anesthetic for use in dogs and primates.

FACILITIES AND CARE

Outdoor housing of nonhuman primates. Hoffmann, R. A. & Stowell, R. E. (Calif. Primate Res. Ctr. (formerly National Ctr. for Primate Biol.), Davis, Calif. 90241) *Laboratory Animal Science*, 1973, *23*, 74-83.

Various aspects of outdoor caging of several species of primates, including cage structures, cage bases, environmental protection, escape prevention, and husbandry, were evaluated over 2 1/2 years at the National Center for Primate Biology in Davis, California. Factors to be considered in determining the relative merits of outdoor versus indoor housing of nonhuman primates include climate, species, husbandry, experimental objectives, and available finances. Depending upon the circumstances, outdoor, indoor, group, or single caging may be judged most appropriate. Adequate acclimatization and compatibility of members of the group are extremely important in forming outdoor gang cage groups. Animals born at the Center and housed outdoors for maturation withstand weather extremes better than animals imported as adults. Environmental protection is most important in housing nonhuman primates outdoors. The amount and type of protection needed varies with the climate and species. During winter, in the absence of any supplemental heat, consideration of the chill factor is important. Of the various types of cages evaluated, those locally constructed with pipe frames and chainlink fencing were most satisfactory and inexpensive. Large concrete base pads supporting numerous cages were highly satisfactory; although expensive initially, maintenance costs were negligible. Small gravel or bark chips were good temporary bases for outdoor cages.

Nutrient requirements of the monkey. Portman, O. W. (Oregon Reg. Primate Res. Ctr., 505 N. W. 185th Ave., Beaverton, Ore. 97005)

In Subcommittee on Laboratory Animal Nutrition (Eds.), *Nutrient requirements of domestic animals No. 10. Nutrient requirements of laboratory animals* (2nd ed.). Wash., D. C.: National Academy of Sciences, 1972. Pp. 29-45.

A longevity record of the pigmy bushbaby *Galagoides demidovii*. Linn, I. (Dept. Biol. Sciences, U. Exeter, Exeter, England) *Journal of Zoology, London*, 1971, *164*, 265-266.

A short note on the care of a male pigmy bushbaby that survived approximately 10 years in captivity. The animal was judged to be almost adult at the time of capture.

INSTRUMENTS AND TECHNIQUE

Automated apparatus for the study of learning in monkey and rat. Livesey, P. J., Han, M. F., Lowe, H., & Feakes, R. (Dept. Psychol., U. Western Australia, Nedlands 6009) *Australian Journal of Psychology*, 1972, *24*, 211-218.

Automated apparatus for the study of learning in animals is desirable for various reasons yet attempts to develop such apparatus have met with variable success. In Experiment 1, 14 mature female rhesus monkeys learned a 4 response double alternation sequence, 7 in a semi-automatic WGTA and 7 in an automated two lever apparatus (ATLA) designed to give contiguity between bar-press and presentation of reward. Animals in the ATLA learned as efficiently as those in the WGTA. When animals were able to trigger the onset of each new sequence they performed significantly better than animals working with a 30 sec. delay between sequences. Incorporating the findings from this study with those from work on automated equipment for simultaneous visual discrimination learning with monkeys, an automated discrimination apparatus for rats was developed. 9 rats working in this equipment learned a simultaneous brightness discrimination task in 120-260 trials.

A field cage for old world primates designed to encourage natural behavior. Candland, D. K., Geiger, W. C., & Bell, J. (Dept. Psychol., Bucknell U., Lewisburg, Pa. 17837) *Primates*, 1972, *13*, 315-322.

The construction of an all-weather field cage housing Old World primates *(Macaca fuscata)* is described. The 40 x 40 foot enclosure includes some simulated aspects of the animals' natural environment thereby encouraging natural behavior. The animals are observed from a tower equipped with one-way glass to eliminate the animals' being aware of observers. By using prefabricated construction and adaptations of standard supplies and equipment, the cage

and tower were constructed at a cost of $7,000.

A versatile liquid diet for nonhuman primates. Pieper, W. A., & Skeen, M. J. (Dept. Psychol., Georgia State U., Atlanta, Ga. 30303) *Laboratory Animal Science*, 1972, *22*, 916-918.

A totally liquid diet was developed for use with nonhuman primates. Total caloric content and the proportion of calories derived from protein, fat, and carbohydrate are easily adjusted by changing the relative amounts of the standard dietary ingredients.

A restraint system for squirrel monkeys. Dost, F. N., Johnson, D. E., & Wang, C. H. (Science Res. Inst., Sch. Science, Ore. State U., Corvallis, Ore. 97331) *Laboratory Animal Science*, 1972, *22*, 893-897.

A restraint device for squirrel monkeys was devised which allows apparently comfortable confinement for periods of several days. Very little training or acclimation of monkeys is required. The chair is intended for use in metabolic studies employing continuous parenteral infusion of radioactive substances, with concurrent collection of respiratory gases.

Study of spontaneous behavior in squirrel monkey groups: observation techniques, recording devices, numerical evaluation and reliability tests. Hopf, S. (Max-Planck-Institute for Psychiatry, Dept. Primate Beh., Munich) *Folia primatologica*, 1972, *17*, 363-388.

The purpose of this paper is to describe, examine, and discuss a relevant method for quantifying social behavior. The investigation is extended to each stage of the study: the process of observation, the different codes (observing, paper recording, computer storage), the programs, the numerical data reduction, and statistical testing, if reasonable models are available.

Design of cages and diet for metabolic studies using small new world primates. Herbert, R. T. (Nuffield Inst. Comparative Med., Zoological Society of London, Regent's Park, London, N. W.1, England) *Laboratory Animals*, 1971, *5*, 257-265.

Metabolic studies using monkeys are difficult. Some of the problems involved are discussed. A stainless-steel cage unit, suitable for metabolic studies using small New World monkeys, is described. The composition and method of preparation of an appropriate pelleted, semi-synthetic diet is also described.

CONSERVATION

The use of primates in research and its effect on conservation.

Hartley, E. G. (National Inst. for Med. Res., London) *British Veterinary Journal*, 1972, *128*, 481.

It has been estimated that 250,000 primates are used annually in research throughout the world. This situation is discussed in relation to the value of primates in research and the present efforts being made to conserve the wild population. Statistics covering the species and numbers of monkeys imported into the U. K. over recent years are given. Methods for conservation are described and the future role of primates in research is discussed.

GENERAL

Recent developments of biomedical research in nonhuman primates. With a short historical review. Fridman, E. P. (Sukhumi Primate Information Ctr., Inst. Exp. Pathol. & Ther. of the USSR Academy Med. Science, Sukhumi) *Journal of Medical Primatology*, 1972, *1*, 220-229.

The number of publications on the use of nonhuman primates in biomedical research has greatly increased in the last decade by far outpacing the average increase of all other scientific information. The animals most often used in experimentation are rhesus, squirrel and green monkeys, chimpanzees, crab-eating macaques and baboons, in that order. The countries in which most of the experimentation was performed were USA, USSR, Great Britain, West Germany, France, and Japan.

JOURNAL OF HUMAN EVOLUTION BEGINS SECOND YEAR

This journal, edited by A. B. Chiarelli, covers all aspects of human evolution including those concerned with nonhuman primates and contains articles on the biochemical, skeletal and physiological development of man. It tries to integrate the many disciplines involved in the study of man and his evolving behavior and publishes articles in cytogenetics and heredity as well as paleontology and taxonomy. Problems of specificity will be treated along with studies in biological variability, and anthropological aspects considered in social, cultural, and physical contexts.

There will be an extended special issue each year. The subject of the 1972 special issue was Molecular Evolution of the Nonhuman Primates and Man. The contents were as follows: S. H. Boyer, A. N. Noyes, C. F. Timmons and R. A. Young: Primate hemoglobins: polymorphisms and evolutionary patterns. R. E. Tashian, R. J. Tanis, R. E. Ferrell, S. K. Stroup and M. Goodman: Differential rates of evolution in the carbonic anhydrase isozymes of catarrhine primates. G. L. Wooding and R. F. Doolittle: Primate fibrinopeptides: evolutionary significance. P. J. McLaughlin, L. T. Hunt and M. O. Dayhoff: Techniques for determining protein sequence evolution applied to primates. J. N. Davidson and B. M. Dancis: The role of the genetic code in protein evolution. F. W. Putnam: Molecular evolution of human immunoglobulins. A-C. Wang and H. H. Fudenberg: Evolution of unblocked immunoglobulin variable regions in primates. D. E. Kohne, J. A. Chiscon and B. H. Hoyer: Evolution of primate DNA sequences. B. H. Hoyer, N. W. van de Velde, M. Goodman and R. B. Roberts: Examination of hominoid evolution by DNA sequence homology. S. Ohno: An argument for the genetic simplicity of man and other mammals. M. Goodman, J. Barnabas and G. W. Moore: Man, the conservative and revolutionary mammal: molecular findings on this paradox.

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