# LABORATORY PRIMATE NEWSLETTER

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Edited by

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## 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. 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* (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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Managing Editor: Kathryn M. Huntington

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# A HIGHLY PALATABLE AND EASY TO MAKE DIET FOR PRODUCING PROTEIN-CALORIE MALNUTRITION IN THE RHESUS MONKEY

Robert R. Zimmermann and Charles R. Geist

University of Montana

A method for the production of diets deficient in protein which are useful in the investigation of protein-calorie malnutrition (PCM) in developing rhesus monkeys (*Macaca mulatta*) has been developed for use in our laboratory by Dr. Richard Barnes of Cornell University. Through manipulation of the casein content, diets of known protein concentrations are achieved. If the carbohydrates are then adjusted with respect to the casein, protein deficient diets can be produced which are isocaloric.

For our purposes, diets containing 2%, 3.5%, and 25% casein by weight have been formulated and found ideal for the investigation of PCM. Originally, only protein concentrations of 3.5% and 25% were utilized. However, in our experience, 3.5% protein does not produce sufficient PCM if introduced at an age equal to or greater than 220 days. For this reason, 2% protein was introduced to such animals. If, however, 2% protein is given to animals at 120 days of age, severe PCM results, which caused the death of one of our animals by what appeared to be a kwashiorkor-like syndrome. Thus, it seemed reasonable to place the animals on 3.5% protein at 120 days of age and on 2% at 220 days of age. Following this procedure an optimal severity of PCM has been induced in the developing rhesus macaque.

The composition of the diets is shown in Tables 1 and 2. They are prepared by adding each of the ingredients to a mixing apparatus and blending until a dry homogeneous powder is obtained. For our purposes an 80-quart Hobart mixer (Hobart Company, Helena, Montana) has proven satisfactory for large amounts of diet. Each of the diets is blended according to the following procedure:

1. Weigh out the Primex and melt over moderate heat.

2. Weigh and place in a container of suitable size all of the dry ingredients except dextrin (omission of dextrin at this time eliminates lumpiness of diets) in the following order: Cerelose, casein, salts, choline dihydrogen citrate (powdered), B-vitamin premix (in Cerelose), ascorbic acid, Alphacel.

3. Weigh dextrin and place in a separate container.

4. Weigh the fat soluble vitamins and add to the melted Primex;

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Table 1

Diet Composition in Grams per 100 Grams of Diet

| Components | Low Protein 2% Protein | Low Protein 3.5% Protein | High Protein 25% Protein |
|---|---|---|---|
| Primex[a] | 9.00 | 9.00 | 9.00 |
| Fat-soluble vitamins (see Table 2) | 1.00 | 1.00 | 1.00 |
| Crude casein | 2.00 | 3.50 | 25.00 |
| Cerelose[b] | 39.70 | 39.00 | 29.00 |
| Dextrin[c] | 39.90 | 39.20 | 27.70 |
| Salts (HMW)[d] | 4.00 | 4.00 | 4.00 |
| B-vitamin premix (see Table 2) | 2.00 | 2.00 | 2.00 |
| Choline dihydrogen citrate | 0.30 | 0.30 | 0.30 |
| Ascorbic acid | 0.03 | 0.03 | 0.03 |
| Alphacel[e] | 2.00 | 2.00 | 2.00 |
| | 99.93 | 100.03 | 100.03 |

[a]Primex, Proctor and Gamble Co., Cincinnati, Ohio.
[b]Cerelose, Coin Products Co., Argo, Illinois.
[c]Dextrin (white technical), Nutritional Biochemicals Corp., Cleveland, Ohio.
[d]Hubbell, R. B., Mendel, L. B., and Wakeman, A. J. Salt Mixture, Nutritional Biochemicals Corp., Cleveland, Ohio.
[e]Alphacel (non-nutritive bulk), Nutritional Biochemicals Corp., Cleveland, Ohio.

Table 2

Vitamin Contents of Diet

| B-vitamin Premix | mg |
|---|---|
| Cerelose | 2,000.00 |
| Thiamine HCl | 0.40 |
| Riboflavin | 0.80 |
| Pyridoxine HCl | 0.40 |
| Calcium pantothenate | 4.00 |
| Niacin | 4.00 |
| Inositol | 20.00 |
| Biotin | 0.02 |
| Folic acid | 0.20 |
| Vitamin B-12 | 0.003 |
| Menadione | 1.00 |
| **Fat-soluble vitamins in corn oil** | **mg** |
| Vitamin A acetate | 0.31 |
| Vitamin D (calciferol) | 0.0045 |
| Alpha-tocopherol | 5.00 |

food coloring may be added to denote various concentrations of protein.

5. Mix the above dry ingredients until well blended (about 10 minutes).

6. Pour the melted Primex containing both the fat soluble vitamins and food coloring into the dry mixture and blend for five minutes.

7. Add dextrin to the mixture and blend for 10 minutes.

8. Refrigerate until needed.

Biscuits are formed from the dry dietary preparation prior to feeding. A small amount of water is added to the powder and mixed until a doughy consistency is obtained. The diet is then rolled onto a cutting board. A circular cookie-cutter approximately two inches in diameter yields biscuits which range in weight from 150-200 grams. The biscuits may then be given to the animals in quantities which meet the needs of the investigation. With constant refrigeration both the dry dietary powder and biscuits may be kept for several days.

We have found that 90-day-old monkeys can be weaned from a liquid diet to this solid food diet in less than 30 days, so that all animals are consuming 100% of their daily food from the purified mixture. This diet appears to be highly palatable to both young and adult monkeys at all concentrations of protein used. The one shortcoming that we have discovered is that animals maintained on the 25% protein do not test well for food rewards and must be deprived before they will operate with efficiency in food related tasks.

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## SMALL PRIMATE LABORATORY ESTABLISHED IN ISRAEL

In August, 1971 the Brain and Behavior Group (Isotope Dept., The Weizmann Institute of Science, Rehovot), headed by Professor David Samuel, established a nonhuman primate laboratory. A pilot group of 12 young baboons (*Papio anubis*) was imported from Kenya. After an acclimatization period of 3 months, work has started on three topics: (1) learning and learning sets with the WGTA, (2) self-recognition and mirror-image stimulation, (3) the circadian rhythm and its influence on learning, retention, and other behaviors.

# LABORATORY BREEDING AND REARING OF *CEBUS APELLA*

M. R. D'Amato and Norman Eisenstein[1]

Rutgers University

Although laboratory breeding and rearing of *Macaca mulatta* and other Old World monkeys is fairly commonplace, there appears to be far less experience with such New World monkeys as *Cebus*. About three years ago we became involved, quite unintentionally, with the breeding of *Cebus apella*, and our experience since that time indicates that the breeding and rearing of this intelligent and hardy primate species is relatively simple and inexpensive.

Our original colony of 24 animals was received in the laboratory during 1964-1965. All animals were represented as having been captured in Peru, and judging from our recent weight data on laboratory-reared animals, almost all were very young, probably no more than 1-2 years of age. As anyone who has worked with young *Cebus apella* knows, it is extremely difficult to sex these animals accurately by casual observation alone. In any event, upon their arrival we segregated them according to sex, and our judgment in this regard appeared vindicated until August, 1969, when Sam (now Samantha) produced the first of our laboratory offspring. Because of the nature of our research interests and the lack of appropriate facilities, the event was as much a nuisance as a surprise. We therefore took no particular measures to insure the survival of the offspring, other than to remove the male with which Samantha was caged. During the past three years we have had 11 births, not all unplanned, including one instance of twinning (Eisenstein & D'Amato, 1972).

## Housing and Environmental Conditions

The living quarters for all of our animals consist of conventional stainless steel monkey cages (24 in. × 24 in. × 28 in.) in which we usually house two animals per cage. These same cages are used for breeding and rearing. The environmental conditions under which the animals have been maintained during the last eight years have not been stringently controlled. Although the temperature is usually maintained between 70-78°F, extremes of 60 and 90°F have occurred occasionally. Relative humidity most often lies in the 40-60% range, with infrequent deviations to the 30-85% range. These fluctuations apparently have not adversely affected the health of either the adult or infant animals. During the time that our colony has been in existence we have lost only one animal to disease; and medical problems, including respiratory infections, have been minimal.

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[1]Supported by National Science Foundation grant GB-24386X.

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## Diet

For animals not on deprivation the standard diet consists of a ration of Purina Monkey Chow 25 equal to approximately 5 percent of the animal's body weight. When an animal is participating in an experiment this ration is reduced to a value at which the animal works reliably, and depending upon the animal the resulting deprivation ration is such as to result in a weight loss of 0 to 20 percent. The only supplements provided are vitamins (A, C, and $D_3$--administered via White's Cod Liver Oil Concentrate Tablets with cholecalciferol (Schering, Bloomfield, N.J.) which the animals eagerly accept) and an occasional treat of raisins and fresh fruit. Gestating and lactating females, as well as weaned offspring, receive the same diet, except that the monkey chow is more freely available and the raisin and fruit supplement is increased somewhat.

## Mating, Gestation, and Rearing

There is little chance of a female in heat going unnoticed. Grasping her upper limbs across her chest, she emits a doleful wail towards the object of her affection, usually a male in an adjacent cage. Unless she is satisfied, her cries may persist for several days. When such a female is placed with a cooperative male, immediate copulation usually results, not infrequently the female leading the way. Judging from our experience, females begin to reproduce at 6 or 7 years of age, which accounts for the absence of births in our colony during the first few years of its establishment.

In three instances where the times of copulation and parturition were accurately known, the gestation period has ranged between 160 and 175 days. Pregnancy can be established in the second or third month by rectal palpation, the fetus being detectable as a relatively hard mass 2-4 cm anterior to the anus. In this manipulation, as in others that require a sedated animal, we routinely use 1 mg/kg of Sernylan (phencyclidine HCL). A less accurate method of establishing pregnancy, mentioned below, makes use of the animal's weight chart.

From birth, the offspring subsist entirely on the mother's milk. After a few months they begin to eat the food pellets, at which they become quite proficient by 5-7 months of age. We usually separate the mother and its offspring when the latter is 10-12 months old. We have encountered only one case in which a mother failed to nurse her offspring. The infant was maintained for two days on a 50% (by volume) mixture of Similac (Ross Labs., Columbus, Ohio) and 5% dextrose in water, at which time it was returned to, and accepted by, the mother. Two days later, however, the infant died, apparently of a renal failure.

The sex of an infant can be accurately established by close examination of the perineal region for the presence of a vaginal opening.

Weights of Pregnant Females and Offspring

Figure 1 presents weight data for three animals over the 20 weeks which immediately preceded delivery. All three animals were on full rations during the entire gestation period. Figure 2 presents similar data for four animals who endured deprivation for the periods indicated by the arrows. In the case of Dixie and Lucy, deprivation began before the beginning of gestation. The weights of six of the offspring during the first year of life are shown in Figure 3[2]. Peanut's offspring is not presented because, due to an accidental injury, this animal died at a very young age. The accuracy of the weight data shown in Figures 1-3 varies somewhat inasmuch as some data points are based on only a single weighing while others represent the average of several independent weighings.

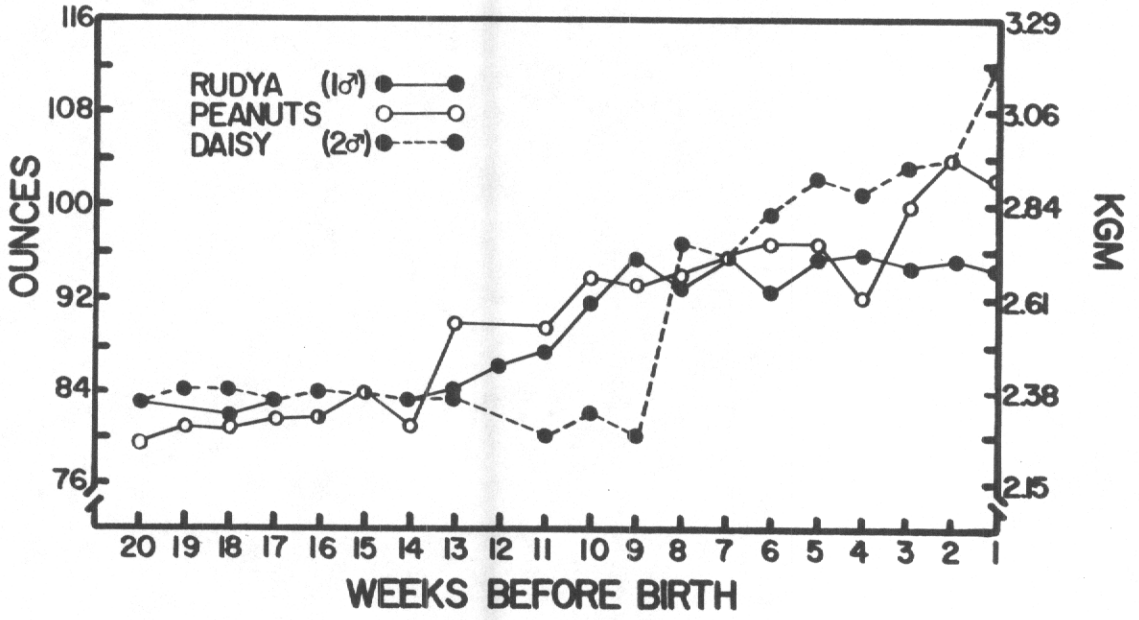


Figure 1. Weight curves for three females on full rations throughout gestation. The number in parentheses refers to the corresponding offspring whose first-year weights appear in Figure 3. Peanut's infant died at an early age, before its sex had been recorded.

It is interesting to observe from Figures 2 and 3 that, unless deprivation was extremely severe, the offspring suffered no lasting weight disadvantage. Samantha was on deprivation for approximately six

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[2]For a chart of weights of infant *Cebus* during the first eight weeks of life, as well as a recent description of nursery care of New World monkeys, see Ausman *et al.* (1970).

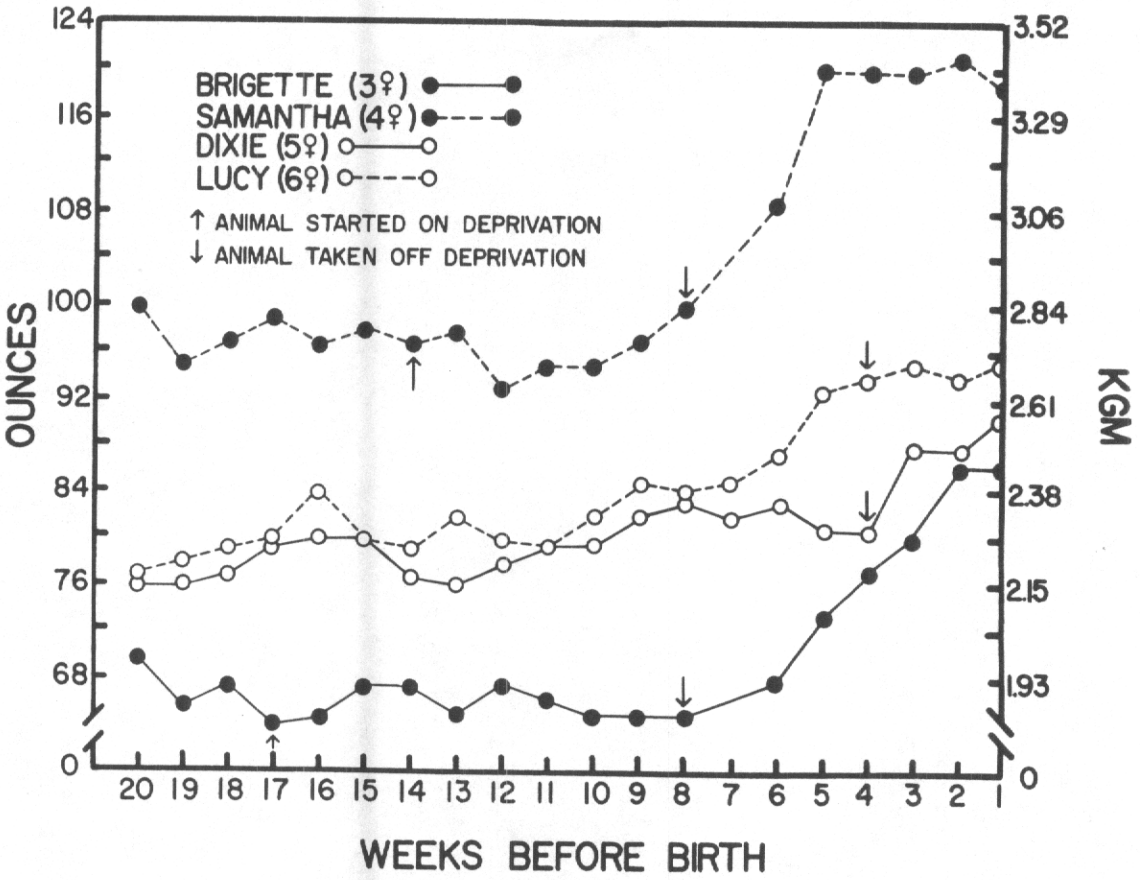


Figure 2. Weight curves for four animals on deprivation rations during the gestation periods indicated. Dixie and Lucy were on deprivation from before the beginning of pregnancy.

weeks (Figure 2), and Bridgett was on a deprivation diet from before conception until two months before delivery. Yet their offspring (4 and 3, respectively) differ little in weight from the two offspring (1 and 2) born of females that were on full rations throughout gestation.

On the other hand, Lucy was on deprivation until approximately one month before delivery, and her offspring (6) showed a definite weight deficit during the first 38 weeks of life, after which the difference disappeared. A more permanent weight deficit is shown by Dixie's offspring (5), whose weight function remained substantially below that of the other animals. This animal, who is now 22 months old, still shows a marked weight deficit.

Although Dixie and Lucy were on deprivation rations for the same

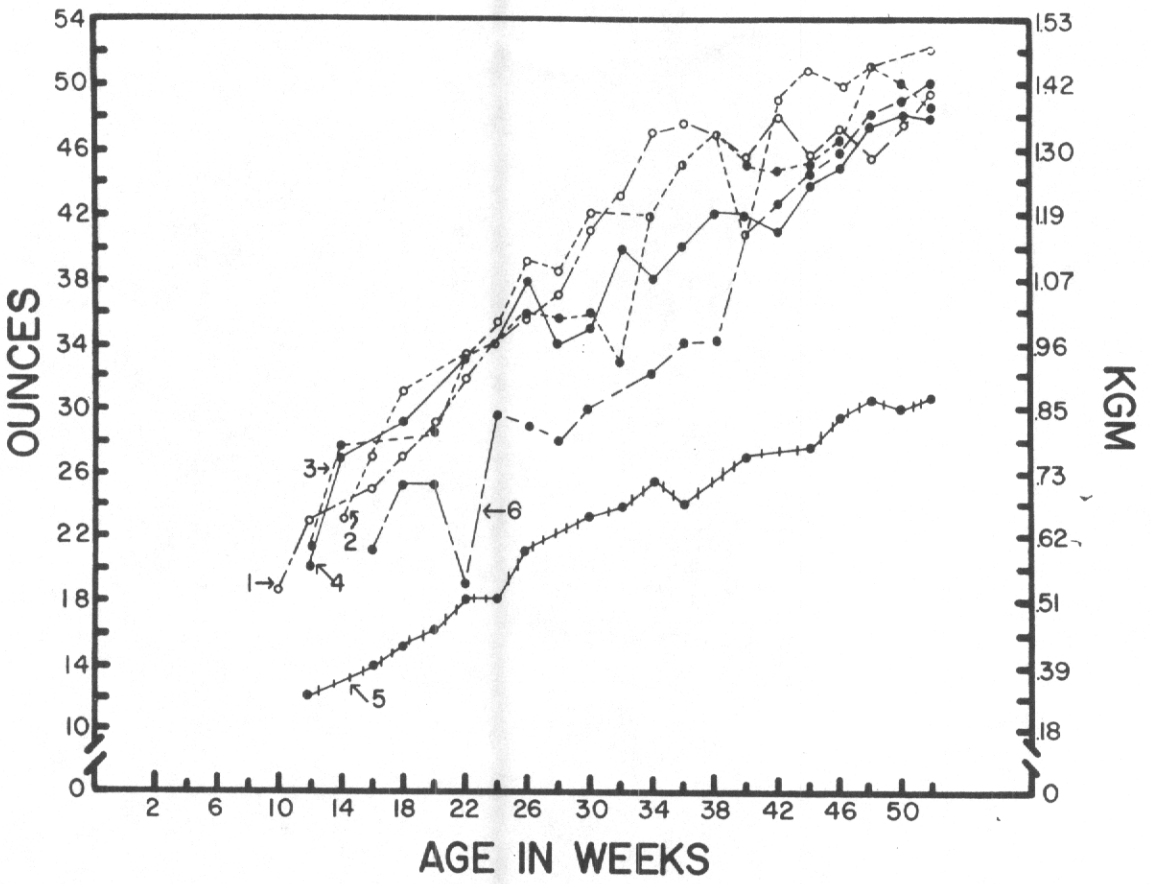


Figure 3. First-year weight curves for six *Cebus* offspring. The dams are identified by pairing the numbers in the figure to those in Figures 1 and 2.

periods of gestation, it is clear from Figure 2 that Lucy's weight showed signs of increasing before full rations were restored, whereas Dixie's weight remained depressed until after the restoration of full rations. The most likely interpretation of this difference is that Lucy received additional food supplies from unauthorized sources. We have observed more than once the passing of food from an animal on full rations to one in an adjacent cage on deprivation. The extent of this unauthorized feeding, which is a fascinating phenomenon in its own right, can be quite significant. In any case, it is clear that a gestating animal can be on restricted intake for a substantial portion of the gestation period without lasting effects on the weight development of the offspring.

Figure 1 shows that, in animals fed a full ration, there is very little weight change in the mother during the first 10 weeks or so of gestation, and that a rapid increase in weight develops at about that time or somewhat later. This sequence of events may be useful as a sign

of pregnancy.

## Some Advantages of *Cebus* as a Research Animal

We have found *Cebus apella* to be a very hardy animal, even under colony conditions that are by no means ideal. Their relatively small size (none of our animals weighs more than 10 pounds) is also an advantage, both with respect to ease of handling and lower maintenance costs. The facility with which these primates are bred and the early age at which the offspring become mobile, make them a suitable candidate for developmental research.

As subjects for behavioral research they have proven to be excellent workers, capable of acquiring very complex visual discrimination (although their color vision is poorer than that of Old World monkeys; DeValois & Jacobs, 1971), and, if performance on delayed matching-to-sample is any criterion, possessed of a remarkable short-term memory (e.g., D'Amato & Worsham, 1972). However, there are profound (and stable) individual differences among the animals, both with respect to learning ability and "personality." Depending on one's research direction, these differences present either an added source of error variance or an interesting set of research possibilities.

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## REQUEST FOR PRIMATE MATERIAL SHOWING ARTHRITIS OF THE CERVICAL SPINE

In conjunction with a study of arthritis of the cervical spine, we need x-rays or gross specimens illustrating spontaneous cases in macaques, especially pigtails (*Macaca nemestrina*).--Contact: Dr. D. H. Reigel, Department of Neurosurgery, 8700 West Wisconsin Avenue, Milwaukee, Wisconsin 53226 (Telephone: 414-384-2000, ext. 2338).

# MONKEYPOX IN HUMANS*

William H. Foege, M.D., and Stanley O. Foster, M.D., of the Smallpox Eradication Program, CDC, furnished the following summary of monkeypox in humans in Africa.

Between October 1970 and May 1971, seven cases of human infection with monkeypox virus were identified in Liberia, Sierra Leone, Nigeria, and the Republic of Zaire. Five were confirmed by viral isolation, and two were diagnosed on epidemiologic and serologic evidence. All cases occurred in individuals not vaccinated against smallpox.

The World Health Organization, in cooperation with its member nations, is currently embarked on a program to eradicate smallpox worldwide by 1975. The program is based on the assumption that the interruption of human smallpox transmission will bring about eradication. As two previous eradication programs, yellow fever and malaria, have been severely hindered by the detection of nonhuman reservoirs of infection, WHO has carried out an active search for evidence of nonhuman smallpox transmission, especially in nonhuman primates. Monkeys that have been infected under laboratory conditions have transmitted variola virus. However, surveillance of nonhuman primate populations in smallpox endemic areas has failed to detect variola infection.

In 1958, a non-fatal pox disease was identified in cynomolgus monkeys in Copenhagen. The etiologic agent, known as monkeypox, has since been identified in animal colonies in the United States, the Netherlands and France. The virus has also been isolated in tissue cultures prepared from monkey kidney.

Twenty West and Central African countries, assisted by the United States Agency for International Development, have successfully completed a 5-year cooperative regional program of smallpox eradication. A combined approach of mass vaccination, surveillance, and epidemic control has resulted in a decrease of smallpox cases from 7,599 in 1966 to zero in 1971. Intensive surveillance, including epidemic and laboratory investigation of reported rash disease cases, has failed to detect a single case of smallpox in the 20-country area since May 1970. The surveillance system has, however, uncovered three human cases of pustular disease clinically indistinguishable from smallpox, from which a non-variola pox virus--monkeypox virus--was isolated. Four human monkeypox cases were found during field investigation.

*Case 1.*--The patient, a 4-year-old unvaccinated girl from Boudua, Liberia, became ill on September 10, 1970, with a "severe cold"

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*From *CDC Veterinary Public Health Notes*, May, 1972, 4-7.

manifested by fever, sore throat, and malaise. On September 13, a generalized rash developed; she was admitted to the district hospital in Zwedru with suspected smallpox the following day. On examination on September 18, the fifth day of rash, she was an afebrile, uncomfortable child with a diffuse vesiculopustular rash with peripheral distribution. The lesions were discrete, deep seated, and present on both palms and soles. Collection of specimens was difficult because of the viscosity of the pustular fluid and the adhesiveness of the scabs. Follow-up examination on December 13 found a healthy, active child with scattered hyper-pigmented spots on the face and extremities; no pitted scars were seen.

*Case 2*.--The patient, a 4-year-old unvaccinated boy also from Boudua, Liberia, developed a low-grade fever on September 11. The next evening, a mild vesicular rash of approximately 10 scattered lesions was noted. The lesions cleared in 3-5 days and left no scars or pigmentary changes.

*Case 3*.--The patient, a 6-year-old unvaccinated girl also from Boudua, had a mild illness of a 2- to 3-day febrile prodrome followed by a 3- to 5-day episode of rash, consisting of 10 scattered vesicular lesions.

*Case 4*.--The patient, a 9-year-old boy from Tarr, Liberia, developed rash on October 2 and was isolated on the family farm. When examined on October 10, the ninth day of rash, the boy had a generalized vesiculopustular rash with all lesions in the same stage. The lesions were firm, deep-seated, and measured approximately 0.75 cm in diameter. Lesions on the face and lower extremities had been broken by local treatment. The rash had a peripheral distribution with greatest involvement of the face, arms, and legs. There were scattered lesions on the back, abdomen, buttocks, and both palms and soles. The patient had a warm, tender mass in the right submaxillary area, which produced a generalized swelling of the right side of the face, and a pustular lesion on the right cornea. The submaxillary mass reponded to treatment with penicillin. Examination on October 26, the 25th day of rash, showed areas of depigmentation, a right corneal scar, a subsiding submaxillary mass, and an active child.

*Case 5*.--The patient, a 24-year-old unmarried, unvaccinated man from Aguebo, Sierra Leone, became ill with severe headache, fever, stiff neck, and cough on November 26, 1970. Four days later, a generalized rash developed, and he was seen at the Mogamba Hospital, where the diagnosis of smallpox was made. Examination on the 10th day of rash revealed a moderately ill man with a generalized pustular rash. When the patient was re-examined on the 37th day of rash, there were residual hypo-pigmented lesions 3-12 mm in diameter, surrounded by 1-2 mm area of hyper-pigmentation. Three to four shallow pits were noted on the face.

*Case 6*.--The patient, a 4-year-old unvaccinated girl from Ihie

Umuduru, Nigeria, developed fever, malaise, headache, sweating, and severe prostration on April 14, 1971. Five days later she had a maculopapular rash on the distal extremities. Over the next few days a generalized vesicular rash developed, and the local native doctor diagnosed the case as smallpox. The rash involved all areas of the body, including the palms and soles.

*Case 7*.--The patient, a 9-month-old boy from Bokenda, Equateur-province, Zaire, developed fever and rash on August 24, 1970; he recovered. Scabs were sent to investigators in Moscow, who isolated monkeypox virus from them. This case could not be followed up because the child died of measles on October 29 prior to the field investigation.

Post-infection serologic studies showed high hemagglutination inhibition and neutralizing antibody titers to pox group virus in Cases 1-4. Repeated challenge vaccination with potent smallpox vaccine resulted in equivocal reactions in all cases. This lack of response is consistent with laboratory studies which show cross-protection between vaccinia, variola, and monkeypox viruses.

Twenty-four susceptible household contacts were exposed to the infected patients, but none contracted disease. All susceptibles subsequently responded to vaccination with a primary reaction, thus confirming their susceptibility and ruling out asymptomatic infection. If monkeypox in West Africa is as infective as smallpox, which has an infection rate of 37 cases per 100 susceptibles with household exposure, nine cases of monkeypox would have been expected among the 24 contacts. This difference between expected, nine, and observed, zero, is highly significant and indicates that monkeypox has a much lower rate of human-to-human transmission than smallpox. There are three possible explanations for the recent detection of human monkeypox cases: (1) monkeypox has occurred in the past but has been diagnosed as smallpox, (2) monkeypox infection has occurred in the past but has not been detected, and (3) monkeypox in humans is a new disease. Forty pox isolates from smallpox outbreaks in West Africa have been screened for monkeypox virus, and all have been identified as classical variola. These findings make it unlikely that monkeypox has been misdiagnosed as smallpox. As investigation and control activities were directed at the larger outbreaks and usually did not take place until the third or fourth generation, isolated cases of pox disease would not have been detected. The refinement of surveillance, required for eradication, in which every suspect smallpox case is thoroughly investigated, has in all probability brought about the recognition of a low-frequency rural disease.

With the identification of monkeypox virus, investigation was directed toward identifying an animal source of human infection. All cases had limited exposure to domestic animals, including dogs, cats, sheep, goats, pigs, and poultry. Residential or farm contact with household rodents and bats was also possible. In Cases 1-5 and 7, the

patients lived in a tropical rain forest where hunting of game was common. Monkeys and duiker were the most frequent game animals hunted and served as the main source of animal protein. However, in none of the cases could any definite exposure to sick animals, wild or domestic, be obtained. In Cases 4 and 5, the patients regularly prepared freshly killed monkeys for food, and in Cases 1, 2, and 3, the patients were observed playing with internal organs of monkeys during the cleaning process; however, no definite monkey contact could be established for any of the five in the 3 weeks prior to onset of rash. Although monkeys have occasionally been observed near the village of Case 6, monkeys are not used as food in this village, and monkey exposure was highly unlikely.

Serologic surveys of animal populations for pox virus antibody have been undertaken in an effort to determine the prevalence of pox infection. Studies carried out by WHO on over 2,000 monkey serum samples from Chad, Malaysia, and primate laboratories have failed to find serologic evidence of pox virus infection. In the current investigation, serologic specimens were obtained from selected species of monkeys collected in Boudua, and Tarr, Liberia. Three animals had low-level HI titers to pox virus, and one animal, a *Cercopithicus buttikoteri* from Tarr Town, had a neutralizing titer of 1:30. Systematic surveys of mammalian populations have been carried out in the affected areas. Monkeypox virus has been isolated by Dr. Marennikova in Moscow from a chimpanzee from Zaire. Of 353 specimens collected from 59 mammalian species in Liberia, no pox virus was isolated. However, one of two chimpanzees (*Pan troglodytes*), one of five Gambian sun squirrels (*Heliosciurus gambianus*), and three of 12 African giant squirrels (*Protoxerus stangeri*) demonstrated neutralizing antibodies to pox virus.

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## NUMBER OF PRIMATES IMPORTED INTO THE U.S.A. IN 1971

*ILAR News* (April, 1972) reports that 86,535 primates were imported into the United States last year. Of these 54,333 entered through the port of Miami, 26,710 through the port of New York, and the remainder through various other ports.

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## PRIMATE ZOONOSES SURVEILLANCE REPORT ISSUED

Primate Zoonoses Surveillance Report No. 8: Annual Summary, 1971 has recently been issued. It has the same format as previous issues (see the April, 1972 issue of this *Newsletter*).

Of particular interest is the report that the frequency of tuberculin conversion in 1970 and 1971 in the small study population represented by the participating centers was much higher than would be anticipated by chance alone. In the United States, the estimated annual rate for new tuberculosis infections as measured by tuberculin conversions and the detection of active cases is 3 per 10,000. The infection rate in the human population under surveillance at the participating centers was 171 per 10,000 in 1970 and 320 per 10,000 in 1971. These rates indicate a need for intensified tuberculosis control programs for all persons handling nonhuman primates.

All colony personnel exposed to nonhuman primates or their tissues should be included in a tuberculosis control program. This is essential for protection of the monkeys as well as the employees. All prospective employees should receive a pre-employment tuberculin test and chest x-ray. Persons with abnormal x-rays should be medically evaluated. Ideally, tuberculin-positive individuals who have not received chemotherapy should not be hired to work with monkeys. If they are hired, isoniazid therapy for a period of 1 year should be strongly considered. Tuberculin-negative employees should be routinely re-tested every 6 months. To avoid interpretive error on a series of tuberculin tests in an employee, the same person should administer and read the test if at all possible. Also, the same source and type of test antigen should be used for all tests. If chest x-rays are part of the screening program, all employees regardless of the tuberculin sensitivity status should be x-rayed.

Tuberculin conversions in the colony staff should be promptly reported to local tuberculosis control personnel for appropriate treatment and follow-up. An employee who has converted to tuberculin-positive should not work with monkeys until shown to be non-infectious. If such an employee does not have evidence of active disease at the time of conversion, isoniazid therapy for a period of 1 year should be strongly considered. Six to 8 percent of all newly tuberculin-positive individuals will develop active tuberculosis during their lifetime, with the greatest risk of developing active disease in the first few years following tuberculin conversion. Isoniazid therapy will reduce the risk of developing active disease by 50 to 85 percent. Employees who convert to tuberculin positive but refuse isoniazid therapy should not be allowed to continue working directly with nonhuman primates and should be advised of their risk of developing clinical disease.

Although protective clothing, masks, and gloves are recommended for general infectious disease control, there is no evidence that such

measures provide meaningful protection against acquiring tuberculosis of the respiratory tract.

Although BCG vaccination of personnel exposed to nonhuman primates is practiced at some institutions, the use of this vaccine presents difficulties. BCG vaccine has questionable value in preventing development of active tuberculosis, based on experience in the United States. A program of routine skin testing and isoniazid therapy after conversion is generally accepted as being more effective in preventing active disease than BCG vaccination. Because BCG vaccination induces tuberculin sensitivity, this vaccine prevents detection of tuberculosis transmission to individuals who have not developed post-vaccination immunity. For these reasons, BCG vaccine should not be used without careful consideration.

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## VACANCY FOR SUPERINTENDENT, SMALL PRIMATES

The position of Superintendent of Small Primates at Yerkes Primate Center, Emory University will become vacant on or about September 1, 1972.

The job involves full-time responsibility for a large wing of the main building and several out buildings with a population of about 315 monkeys, predominantly macaques, but with representatives of several other species. These animals are used as vehicles for biomedical research by a Center faculty of approximately 25 scientists. There are 8 employees in this department of the Center.

Applicant should have several years experience in research animal care and management with supervisory responsibility over a number of individuals and with some primate experience. He should be thoroughly knowledgeable in modern techniques for the care and handling of laboratory animals. He should be able to express himself clearly, orally and in writing. The individual we seek should have the initiative to constantly seek new and better ways of doing the job. The ability to establish and maintain high standards of performance, to supervise personnel and maintain good relations with professional and technical staff is essential.

Salary open, based on qualifications and experience.

Those interested should apply in writing, with references and a resumé of qualifications and experience, to the Assistant Director, Yerkes Primate Research Center, Emory University, Atlanta, Georgia 30322.

## USDA IMPLEMENTS NEW ANIMAL CARE STANDARDS*

Regulations to insure the humane handling, care, treatment, and transportation of zoo and performing animals, pets, and research animals have been adopted by the U.S. Department of Agriculture (USDA).

The new regulations were originally published as a proposal in the *Federal Register* of October 22, 1971. More than 350 written comments on this proposal were received and were considered in writing the final version, published in the *Federal Register*, December 23, 1971.

They became effective on December 24, as provided in the Animal Welfare Act of 1970 (P.L. 91-579), an amendment to the Laboratory Animal Welfare Act of 1966 (P.L. 89-544). Enforcement of the Act is delegated to USDA's Animal and Plant Health Service (APHS).

Zoos, circuses, carnivals, animal acts, the wholesale pet trade, research animal and pet auction markets, and previously exempted research facilities, are affected by the regulations. Animals newly protected are wild, warm-blooded species. Excepted are aquatic animals, rats, mice, birds, horses, and farm animals.

Most enterprises affected by the regulations will have to be licensed by USDA as animal dealers. Those operating principally as dealers will pay a license fee as determined by gross income. Auction markets will pay on the basis of commissions. Enterprises operating principally as animal exhibitors will pay on the basis of the number of animals owned.

Research institutions and exhibitors that do not deal in animals are required to register. Registrants will pay no fee, but they must abide by the same USDA minimum standards for animal care as licensed businesses.

Research institutions must follow special requirements for substantiating annually that their animals received adequate drugs to avoid pain. If pain relief is incompatible with research design, the institutions must explain the circumstances.

Standards for humane care affecting all licensees and registrants include provisions on facilities and space requirements, feeding, watering, sanitation, handling, and veterinary care. Special rules cover vehicles, cages, food, water, and care for animals transported by licensees and registrants, but common carriers are not affected. Humane handling is defined in terms of contact between man and animals, including protection for exhibited animals and safety precautions for the viewing public.

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*From *ILAR News*, 1972, *15* [3], 29.

To ensure humane care of animals, enforcement of regulations and standards will be handled by the APHS field force, with offices in principal state capitols.

Copies of the regulations may be obtained from APHS field offices or from Veterinary Services, U.S. Department of Agriculture, Hyattsville, Maryland 20782

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## NIH INSTITUTE TO DEVELOP A PRIMATE BREEDING COLONY

The National Institute of Child Health and Human Development (NICHD) is establishing a primate breeding colony at the National Center for Primate Biology at the University of California, Davis for the express purpose of helping to meet the needs of NICHD grantees for a resource of defined nonhuman primates. The colony will supply rhesus monkeys at various stages of development to selected NICHD-supported investigators. Animals born in the colony will be systematically characterized as the colony is developed. Pertinent data on the animals' biological and behavioral profiles will be made available to the individual investigator acquiring animals from the colony. The major portion of the animals will be reared and monitored in outdoor group housing units. A substantial part of the colony will be immediately committed to the development of timed pregnancies for distribution to investigators requiring dated conceptions for their studies.

Application for animals may be made by any investigator who has been awarded a grant or contract by the institute. Applications will be reviewed by an ad hoc advisory committee with selections made on the basis of scientific merit (as determined by NIH scientific review), unique need of the applicant for high quality animals and available supply. No prior commitment to supply animals can be made before award of a grant or contract, and application for animals should not be made before notification of award. The recipient investigator will pay all transportation costs as well as partial cost of the animal.

Application forms and other information can be obtained by writing to: NICHD Primate Resource, c/o Dr. Florence Mayer, Growth and Development Branch, National Institute of Child Health and Human Development, Bethesda, Maryland 20014.

## PRIMATE FOUNDATION BEGINS OBSERVATION PROGRAM

The Primate Foundation of Arizona, a non-profit organization devoted to the preservation and propagation of the chimpanzee (*Pan troglodytes*) (see the April, 1971 issue of this *Newsletter*), is developing a program in cooperation with Arizona State University, Tempe, Arizona, wherein graduate anthropology students may receive credit for research. The students in this program will be selected by the university's faculty on the basis of their interest and goals in the field of primatology. Each student will have the opportunity, for several hours each week, to observe the Foundation's chimpanzees. Behavior studies will be done in detail and comparisons made with behavior of chimpanzees in the wild. The program is under the direction of Leanne Nash, Assistant Professor of Anthropology at Arizona State University. Professor Nash spent a year at the Gombe Stream Reserve and is a member of the Foundation's Board of Directors. One student has already participated in this program as of the Spring Semester 1972. The Foundation will also benefit greatly from these observations. The resulting records will give us much needed information regarding compatability and the eventual construction of the chimpanzee's social groups.

Further information regarding this program or the Primate Foundation may be obtained by writing to: Primate Foundation of Arizona, P. O. Box 26304, Tempe, Arizona 85282.

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## CHIMPANZEES WANTED FOR BREEDING COLONY

Chimpanzees ages 6 through 20 are wanted for the breeding colony of the Primate Foundation of Arizona (see April, 1971 issue of this *Newsletter*).--Contact: Jo Finley, P. O. Box 26304, Tempe, Arizona 85282 (Telephone: 602-838-3542).

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## AGED PRIMATES WANTED

The Neuropathology Division would like to purchase senile primates of any species. We would also be pleased to receive tissue from the cerebral cortex, especially frontal, temporal, and hippocampal, of animals which have been sacrificed for other purposes. It would be best if this tissue were either frozen unfixed, or had been well perfused with either formalin or glutaraldehyde. Please send a list of available animals to Dr. Robert D. Terry, Department of Pathology, Albert Einstein College of Medicine, 1300 Morris Park Avenue, Bronx, New York 10461, or telephone him at 212-430-2827.

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

### BOOKS

*Pathology of simian primates. Part I: General pathology.* Fiennes, R. N. T-W- (Ed.) Basel: Karger, 1972. [Price: $95.20]

The first of two volumes that attempt to provide comprehensive information on pathology of simians. The volume is divided into three sections. Their titles and the chapters in them are as follows: *I. Natural history of primates.* B. A. Lapin, The rational use of primates in biomedical experiments; C. P. Groves, Phylogeny and classification of primates; C. Jones, Natural diets of wild primates; B. A. Lapin & G. M. Cherkovich, Biological normals. *II. Development, growth, nutrition and metabolism.* A. H. Schultz, Developmental abnormalities; R. W. O'Gara & R. H. Adamson, Spontaneous and induced neoplasms in nonhuman primates; R. H. Wolf, The pathology of nutritional deficiencies in nonhuman primates; J. Moor-Jankowski & A. S. Wiener, Red cell antigens of primates; Christine Hawkey, Coagulation, fibrinolysis and platelet function; C. W. Hill & C. E. Thomsen, Stress; R. T. Damian & N. D. Greene, The immunology of nonhuman primates; O. Felsenfeld, Autoimmune diseases; H. G. Spies & M. T. Clegg, Diseases of the endocrine system; R. N. T-W-Fiennes, Poisons and toxins. *III. The bodily systems.* R. N. T-W-Fiennes, The skin and appendages, and special senses; M. J. M. Barker & R. T. Herbert, Diseases of the skeleton; M. Nelly Golarz de Bourne & G. H. Bourne, Skeletal muscle pathology in nonhuman primates; K. R. Brizzee, Diseases of the nervous system; B. Cohen & W. H. Bowen, Diseases of the oral cavity; R. N. T-W-Fiennes, B. A. Lapin, E. K. Dzhikidze, & L. A. Yakovleva, The respiratory and alimentary systems; S. M. Kruckenberg, C. E. Cornelius, & J. E. Cook, Liver function and disease in primates; W. P. McNulty & M. R. Malinow, The cardiovascular system; B. A. Lapin & L. A. Yakovleva, Blood formation disturbances in monkeys; J. A. Roberts, The urinary system; D. C. Kraemer & N. C. Vera Cruz, The female reproductive system; J. A. Roberts, The male reproductive system.

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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.

*Pathology of simian primates. Part II: Infectious and parasitic diseases.* Fiennes, R. N. T-W- (Ed.) Basel: Karger, 1972. [Price: $95.20]

This volume is divided into five sections as follows: *I. Protozoa.* R. B. Burrows, Protozoa of the intestinal tract; J. R. Barker, Protozoa of tissues and blood (other than the haemosporina); A. Voller, Plasmodium and hepatocystis. *II. Helminths.* T. C. Orihel & H. R. Seibold, Nematodes of the bowel and tissues; R. E. Kuntz, Trematodes of the intestinal tract and biliary passages; Betty J. Myers, Echinococcosis, coenurosis, cysticercosis, sparganosis, etc.; G. D. Schmidt, Acanthocephala of captive primates. *III. Arthropods.* R. N. T-W-Fiennes, Ectoparasites and vectors; J. R. M. Innes & W. B. Hull, Endoparasites; J. T. Self & G. E. Cosgrove, Pentastomida. *IV. Fungal and bacterial diseases.* Y. Al-Doory, Superficial mycoses; Y. Al-Doory, Intermediate mycoses; Y. Al-Doory, Systemic mycoses; Mary Pinkerton, Spirocheta, spirillum, leptospira; A. Fribourg-Blanc, Treponema; R. N. T-W-Fiennes, Mary Pinkerton, & E. K. Dzhikidze, Enteropathogenic organisms; R. N. T-W-Fiennes & E. K. Dzhikidze, Respiratory pathogens and other organisms; Mary Pinkerton, Miscellaneous organisms; R. N. T-W-Fiennes, Tuberculosis; B. D. Thorpe, Anthrax, fusiformis, anaerobic organisms. *V. Viruses and small organisms of indeterminate position.* S. S. Kalter, Identification and study of viruses; S. S. Kalter, Serologic surveys; R. L. Heberling, The simian picornaviruses; R. L. Heberling, The simian reoviruses; A. D. Felsenfeld, The arboviruses; G. D. Hsiung & N. S. Swack, Myxovirus and pseudomyxovirus groups. R. L. Heberling, The simian adenoviruses; M. D. Daniel, L. V. Meléndez, R. D. Hunt, & B. F. Trum, The herpesvirus group. W. P. McNulty, Pox diseases in primates, R. N. T-W-Fiennes, Rabies; H. F. Smetana, Infectious hepatitis, A. W. Holmes, L. Wolfe, & F. Deinhardt, Infectious hepatitis in marmosets; D. I. H. Simpson, Other virus diseases; L. F. Barker, Chiamydiae and rickettsiae; B. A. Lapin & L. A. Yakovleva, Oncogenic viruses.

*Primate patterns.* Dolhinow, Phyllis (Ed.) New York: Holt, Rinehart and Winston, 1972.

The contents of the book are as follows: Phyllis Dolhinow, The nonhuman primates: An overview. *Part 1. Field studies.* Jane van Lawick-Goodall, A preliminary report on expressive movements and communication in the Gombe Stream chimpanzees; G. B. Schaller, The behavior of the mountain gorilla; K. R. L. Hall & I. DeVore, Baboon social behavior; Phyllis J. Dolhinow, The North Indian langur. *Part 2. Analysis of behavior: Special topics of primate behavior.* S. L. Washburn, Phyllis C. Jay, & Jane B. Lancaster, Field studies of Old World monkeys and apes; K. R. L. Hall, Social learning in monkeys; S. L. Washburn & D. A. Hamburg, Aggressive behavior

in Old World monkeys and apes; Judith Shirek-Ellefson; Social communication in some Old World monkeys and gibbons; Phyllis J. Dolhinow & Naomi Bishop, The development of motor skills and social relationships among primates through play; S. L. Washburn & R. S. Harding, Evolution of primate behavior; Phyllis Dolhinow, Primate patterns.

*Primate socialization.* Poirier, F. E. (Ed.) New York: Random House, 1972. [Price: $3.95]

The chapters in this book are as follows: F. E. Poirier, Introduction; Frances D. Burton, The integration of biology and behavior in the socialization of *Macaca sylvana* of Gibraltar; N. R. Chalmers, Comparative aspects of early infant development in some captive cercopithecines; Jane B. Lancaster, Play-mothering: The relations between juvenile females and young infants among free-ranging vervet monkeys; T. W. Ransom & Thelma E. Rowell, Early social development of feral baboons; Y. Sugiyama, Social characteristics and socialization of wild chimpanzees; J. Itani, A preliminary essay on the relationship between social organization and incest avoidance in nonhuman primates; G. Mitchell & Edna M. Brandt, Paternal behavior in primates; T. R. Williams, The socialization process: A theoretical perspective.

*The evolution of primate behavior.* Jolly, A. New York: Macmillan, 1972. [Price: $4.25]

Following the introduction, the book is organized into 3 sections. The titles of these sections and the chapters in them are as follows: *I. Ecology.* Phylogeny and ecology; Habitat and locomotion; Food; Predation; Interspecific relations; Why be social?; Group range, size, and structure. *II. Society.* Learning and instinct; Communication; Status; Affiliation and sex; Mothers and infants; Growing up in a troop; Violence and warfare. *III. Intelligence.* Primate psychology; Manipulation and tools; Cognition; Language; Social learning; The evolution of intelligence.

*International zoo yearbook.* Lucas, J., & Duplaix-Hall, Nicole (Eds.) London: Zoological Society of London, 1972. [Price: $21.00, hardbound; $15.75, paperback]

This year's volume includes a section on South American primates in captivity. The section includes 15 articles, many of which were specially commissioned with the help of Dr. Philip Hershkovitz, Research Curator at the Field Museum of Natural History, Chicago. The first article discusses the present status of South American primates in the wild, and others describe methods of capture and handling, propose conservation measures for endangered species and describe husbandry techniques in

captivity. The range of subjects covered include the biology of marmosets, social communication by olfactory signals and internal parasites found in various species of platyrrhines.

*Nutrient requirements of laboratory animals*. Washington, D. C.: National Academy of Sciences, 1972. [ISBN 0-309-02028-X; 1972, vi + 122 pages, paperbound, $4.95]

This revision of a 1962 report deals with a class of animals bred primarily for scientific experimentation, bioassay, and related uses. Prepared by a subcommittee of the Committee on Animal Nutrition, *Nutrient Requirements of Laboratory Animals* presents up-to-date information on the nutritional requirements of cats, guinea pigs, hamsters, monkeys, mice, and rats. For each of these species, the report recommends proper feed combinations, suggests feed mixtures, and discusses the symptoms of nutritional deficiencies that may be harmful to the animal and may limit its value in research. (Available from the National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Avenue, Washington, D. C. 20418)

REPORTS

*REP: Annual report, 1971*. Rijswijk, The Netherlands, 1972.

This is the annual report of the REP, which stands for the Radiobiological Institute TNO, Institute for Experimental Gerontology, TNO, and Primate Center TNO, Rijswijk Z. H., The Netherlands. Of the many short notes describing the accomplishments of the organization, the following are concerned with primates: *Immunology*. H. Dersjant, W. van Vreeswijk, & H. Balner, Cross-species typing in primates; H. Balner, H. Dersjant, & W. van Vreeswijk, Current state of tissue typing in rhesus monkeys; H. Balner, H. Dersjant, & W. van Vreeswijk, The leukocyte antigens of chimpanzees; R. L. Marquet, G. A. Heystek, C. F. Hollander, & D. W. van Bekkum, Allogeneic heart transplantation in rhesus monkeys; U. W. Schaefer, D. P. B. M. Snel, & G. A. Boorman, Intraperitoneal administration of bone marrow cells in monkeys. *Haematology*. U. W. Schaefer & K. A. Dicke, Proliferative capacity of mouse and monkey bone marrow after storage at low temperature. *Primate behaviour and reproduction*. C. Goosen, Grooming behaviour and inter-individual proximity in the stump-tailed macaque (*Macaca arctoides*); C. Goosen, E. J. Beyersbergen, G. A. Boorman, & T. M. Speltie, Breeding at the Primate Center. *Bacteriology and parasitology*. A. C. Ford, T. M. Speltie, & D. van der Waaij, Incidence and therapy of salmonella in newly arrived non-human primates; A. C. Ford & T. M. Speltie, Some aspects of the parasitology of non-human primates.

DISEASE

A cytomegalovirus isolated from an owl monkey. Ablashi, D. V., Chopra, H. C., & Armstrong, G. R. (Viral Leukemia & Lymphoma Br., Nat. Cancer Inst., NIH, Bethesda, Md. 20014) *Laboratory Animal Science*, 1972, *22*, 190-195.

An infectious agent was isolated from the oral and anal orifices of an adult, male owl monkey. The isolate produced intranuclear and cytoplasmic inclusions in primary owl monkey kidney cells. The progression of the cytopathic effects (CPE) was slow. Infectious virus was mainly cell-associated. Electron micrographs of infected cells revealed herpes-like particles. The agent was found to be sensitive to ether, heat, and low pH. The isolate was not neutralized by antisera to cytomegalovirus isolated from human and Old World primates. A survey of sera from owl monkeys showed that over 70% of the sera contained complement fixing antibodies to the isolate. All evidence indicates that this isolate is a cytomegalovirus.

Diabetes mellitus in two rhesus monkeys. Kirk, J. H., Casey, H. W., & Harwell, J. F., Jr. (Radiation Biology Br., Radiobiology Div., Brooks Air Force Base, Texas 78235) *Laboratory Animal Science*, 1972, *22*, 245-248.

Diabetes mellitus was diagnosed by clinical demonstration of hyperglycemia, glycosuria, and abnormal glucose tolerance tests in 2 rhesus monkeys involved in a latent radiation effects study. Radiation induction of the disease is questionable because of the low incidence of the disease in the remaining animals in the study.

Microbial flora of imported marmosets: viruses and enteric bacteria. Murphy, B. L., Maynard, J. E., Krushak, D. H., & Berquist, K. R. (Disease Investigations Sec., Phoenix Labs., Ecological Investigations Program, Cen. Disease Control, PHS, Phoenix, Arizona 85014) *Laboratory Animal Science*, 1972, *22*, 339-343.

Surveillance of the microbial flora of imported *Saguinus nigricollis* and *Saguinus mystax* has been conducted for over 1 year; and 3 groups of viruses (herpesviruses, myxoviruses, and reoviruses) as well as *Salmonella* sp and *Shigella* sp have been isolated.

Enteropathy resembling sprue in nonhuman primates. Seibold, H. R., Clewe, T. H., & Wolf, R. H. (Delta Reg. Primate Res. Cen., Tulane U., Covington, La. 70433) *Laboratory Animal Science*, 1972, *22*, 353-361.

An enteropathy resembling sprue was found in 3 *Cercopithecus talapoin* and a *Macaca arctoides*. Clinical signs were progressive weight loss and intermittent diarrhea. Steatorrhea was not observed, but the amount of fat in the

diet was low compared with the average diet of people. Anatomical changes were partial to subtotal villous atrophy and glandular hyperplasia in the mucosa of the entire small intestine. The disease differed from idiopathic sprue in the severe involvement of the ileum which has not been reported in the latter disease. It also differed from tropical sprue in the absence of macrocytic anemia.

Tetanus in a free-ranging colony of *Macaca mulatta*: A clinical and epizootiologic study. DiGiacomo, R. F., & Missakian, Elizabeth A. (Lab. Perinatal Physiol., Nat. Inst. Neurol. Dis. & Stroke, NIH, San Juan, Puerto Rico) *Laboratory Animal Science*, 1972, *22*, 378-383.

A clinical and epizootiologic study of 10 cases of tetanus in the free-ranging rhesus (*Macaca mulatta*) of Cayo Santiago was conducted. Tetanus was characterized clinically by trismus, rigidity of extremities with difficulty in locomotion, abdominal respiration, and piloerection. The overall incidence of tetanus during a 14-month study period was 1%; it accounted for 11% of the total deaths. An 83% case fatality rate was observed, with 70% of the deaths occurring within 24 hours after the onset of clinical signs. The attack rate was doubled for monkeys 6 years of age and older. Although skin lacerations were present in 40% of the cases, the remainder were free from obvious wounds. A review of the literature revealed that a close proximity to soil is probably a necessary ingredient in the development of tetanus infection. Immunization of monkeys with tetanus toxoid appeared completely efficacious, and an immunization schedule similar to that used in man may be expected to render monkeys protected for life.

Penetrating thorns in the head and neck of *Saimiri sciureus*. De Vito, June L. (Reg. Primate Res. Cen. & Dept. Neurol. Surgery, U. Washington, Seattle, Wash. 98105) *Laboratory Animal Science*, 1972, *22*, 388-389.

Penetrating thorns were observed in the muscles and subcutaneous tissues of the head and neck of *Saimiri sciureus*. In one instance a thorn had penetrated the prefrontal region of the brain.

Lessons from Marburg disease. Smith, C. E. G. (London Sch. Hyg. & Tropical Med., Keppel St. (Gower St.), London WC1E 7HT, England) *The scientific basis of medicine annual reviews 1971*. London: The Athlone Press, U. London, 1971. Pp. 58-80.

In Germany, during August 1967, there was a small but dramatic outbreak of a new disease among laboratory workers who had had contact with the blood or tissues of recently imported vervet (*Cercopithecus aethiops*) monkeys. One additional similar case occurred in Belgrade. Other

cases occurred due to contact with these patients. Of a total of 30 cases, seven died; and no inapparent or subclinical infections have been recorded in these outbreaks. It was clearly an unusually severe infection and potentially very infectious but its spread was limited by its unusual means of transmission. Some of the lessons to be learned from this episode are discussed.

Improving existing methods of control of tuberculosis: A prime challenge to the experimentalist. Schmidt, L. H. (Kettering-Meyer Lab., Southern Res. Inst., Birmingham, Alabama 35205) *American Review of Respiratory Disease*, 1972, *105*, 183-205.

A review and evaluation of tuberculin testing procedures used for *Macaca* species. Stunkard, J. A., Szatalowicz, F. T., & Sudduth, H. C. (Nav. Med. Res. Inst., Nat. Nav. Med. Cen., Bethesda, Md. 20014) *American Journal of Veterinary Research*, 1971, *32*, 1873-1878.

Forty-seven research facilities contributed data on the testing of 51,652 animals of *Macaca* species for tuberculosis. The results proved useful in determining the best procedures. Most facilities used 0.1 ml. of undiluted veterinary old tuberculin (O.T.), usually believed to contain 25 mg. of tuberculin. The 25-mg. dose of O.T. was significantly more effective than doses of 0.1 to 10 mg. to detect tuberculosis. Regardless of the dosage used, tuberculosis was confirmed in more than 95% of the reactors to the skin test. The incidence rate of tuberculosis was determined for *Macaca spp.* and *M. mulatta*. The tuberculosis infection rates in these primates after capture were determined to be 7.3/1,000 at 30 days, 6.0/1,000 at 60 days, and 17/1,000 within 90 days after capture occurred and then decreased to 3/1,000 in "conditioned" primates. It is believed that the present practice of quantitating tuberculin by milligrams should be changed to tuberculin units of O.T. or purified protein derivative (PPD).

*Herpesvirus saimiri* malignant lymphoma in spider monkeys. Hunt, R. D., Meléndez, L. V., King, N. W., & Garcia, F. G. (New England Reg. Primate Res. Cen., Harvard Med. Sch., Southboro, Mass. 01772) *Journal of Medical Primatology*, 1972, *1*, 114-128.

*Herpesvirus saimiri* resulted in the development of malignant lymphoma in 2 of 6 spider monkeys (*Ateles geoffroyi*) inoculated via the intramuscular route. One monkey died 129 days after inoculation and the other was sacrificed at 179 days. The disease resembled *H. saimiri* induced lymphoma as seen in marmosets (*Saguinus oedipus*) and owl monkeys (*Aotus trivirgatus*); characterized by extensive lymphoblastic infiltration in multiple organ systems. In

one monkey solid tumor masses were present. Two other animals had lymphocytic hyperplasia and 2 died without histopathological lesions. The findings expand the already wide host spectrum of this oncogenic herpesvirus.

Ophthalmic lesions in non-human primates. Schmidt, R. E. (6571st Aeromed. Res. Lab., Holloman AFB, N. Mex.) *Veterinary Pathology*, 1971, *8*, 28-36.

Over a 2-year period a number of spontaneous ophthalmic lesions were noted in non-human primates. These included lesions in baboons, Old World monkeys, and chimpanzees. The lesions were divided into general etiologic categories of congenital, inflammatory, traumatic, degenerative, and undetermined. Specific lesions included colobomas, cataracts, detached retina, iridocyclitis, and morphologic changes due to myopia. Clinical and gross and/or histologic descriptions of the lesions were given, and their relative importance in a colony situation was described.

Trichospirurosis in South American monkeys. Orihel, T. C., & Seibold, H. R. (Delta Reg. Primate Res. Cen., Covington, La. 70433) *The Journal of Parasitology*, 1971, *57*, 1366-1368.

The data collected in this survey demonstrate that *Trichospirura* is not confined to marmosets but occurs in a much wider range of South American monkeys. The extension of the study to still other neotropical primates may demonstrate an even wider host and geographical distribution of the parasite. The eggs of *Trichospirura* which are shed in the feces are easily found by standard parasitological methods. Of special interest and importance is the observation that this parasitic infection can be transmitted in the laboratory probably through an arthropod intermediate host. Because of the existing potential for transmission in the laboratory, it is difficult to assess the prevalence of infection in any group of monkeys held in captivity for an extended period of time.

## PHYSIOLOGY AND BEHAVIOR

Effects of Sernylan on selected physiologic functions of rhesus monkeys. Popovic, N. A., Vick, J. A., Mullane, J. F., & Kobrine, A. (Walter Reed Army Inst. Res., Washington, D. C. 20012) *Federation Proceedings*, 1972, *31*, 540 Abs.

Effects of intramuscular injection of Sernylan (1-(1-Phenyl-cyclohexyl) piperidine hydrochloride) on selected physiologic functions was studied in 13 rhesus monkeys. Sernylan administration caused a statistically significant decrease in heart rate starting approximately 3 minutes following injection and lasting for 120 minutes. Bradycardia was associated with a corresponding decrease

in systolic and diastolic arterial pressures as well as a decrease in central venous pressure. However blood pressure changes were significant only during the initial 90 minutes of the experiment. Respiratory rate remained unchanged but a respiratory acidosis and decrease in $PaO_2$ occurred and lasted 45 to 120 minutes respectively. The increase in $PaCO_2$ correlated with fall in pH and $PaO_2$. Repeated intramuscular injections caused increase in arterial pressure and catalepsis. Our work indicates that *M. mulatta* given tranquilizing levels of Sernylan will go through stages of sleep as demonstrated by the presence of slow delta waves, sleep spindles, and K-complexes. Additional intramuscular injection of Sernylan, which in effect elevates the blood concentration of the drug, produced a multitude of high voltage peaks persisting for several hours following the last injection. These spikes may represent a mild convulsive activity. EEG activity similar to that observed in grand mal seizures of man can be elicited by injections of large or repeated doses of Sernylan.

Dietary intake of pregnant and nonpregnant rhesus monkeys. Riopelle, A. J., Hill, C. W., & Wolf, R. H. (Delta Reg. Primate Res. Cen., Covington, La. 70433) *Federation Proceedings*, 1972, *31*, 688 Abs.

Although it is generally believed that the pregnant monkey needs a supranormal ration (perhaps up to 25%) even in relation to body weight to take care of the growth of the placenta and the fetus, relevant data are not public if they exist at all. 22 rhesus monkeys (*Macaca mulatta*), pregnant about 30 days, were offered satiating amounts of a palatable semisynthetic diet scaled to provide more than 130 calories daily per kilogram of body weight and either 4, 2, or 1 gram of protein per kilogram. Protein was in the form of casein. 19 nonpregnant animals also underwent the comparable regimens for 6 months. The 4-gram diet is the standard prepregnant diet fed to all animals in the project. Although this quantity of food was thought to include the excess reserved for pregnancy, the nonpregnant animals ate more than 90% of the ration offered, or roughly 125 calories per kilogram per day. Pregnant animals also ate about the same amount.

Protein needs of adult cebus monkeys. Ausman, Lynne M., Dorr, B. B., Hegsted, D. M., & Hayes, K. C. (Dept. Nutrition, Harvard Sch. Publ. Health, Boston, Mass. 02115) *Federation Proceedings*, 1972, *31*, 696 Abs.

Young adult cebus monkeys received otherwise adequate diets with white bread as the sole source of protein (10% protein by weight; 9.5% of protein calories) and the same diet supplemented with lysine (0.3% of the bread). After

12 weeks, one-half of the bread protein was replaced by lactalbumin for some animals. Blood samples were obtained every 8-12 weeks; liver biopsies at 33, 47 and 63 weeks. Diets with or without lysine caused a loss of weight (10-20%) during the first 12 weeks. Unsupplemented animals continued to lose weight (30-40%, in 63 weeks). They showed a moderate fall in plasma proteins and a loss of endoplasmic reticulum, rounding of mitochondria, and depletion of cytoplasmic organelles. Lysine animals eventually regained original weight; plasma proteins were maintained and hepatic changes were minimal. Lactalbumin animals regained and substantially exceeded original weight, were vigorous and normal in all respects. No significant anemia was observed in any group. The bread diet is inadequate whether supplemented or unsupplemented. Results were discussed relative to current estimates of human protein needs and protein quality.

Erythrocyte survival in chimpanzees, gibbons and baboons. Rowe, A. W., & Davis, J. H. (The New York Blood Center, 310 East 67th St., New York, N. Y. 10021) *Journal of Medical Primatology*, 1972, *1*, 86-89.

Erythrocytes of chimpanzees, gibbons and baboons have a half-life (T/2) of 14 days and a life span (T/10) of approximately 50 days based on disappearance of chromium-labeled autogenous red cells. These survival times are about half that found in man.

Normal values for blood constituents of the baboon, Part II. De la Pena, A., Matthijssen, C., & Goldzieher, J. W. (Div. Clinical Sci., Southwest Found. Res. Educ., P. O. Box 28147, San Antonio, Texas 78284) *Laboratory Animal Science*, 1972, *22*, 249-257.

The levels of various constituents in the blood of baboons have been studied cross-sectionally over a period of 2 years, in order to establish normal ranges for this species. Freshly imported animals, as well as others which had undergone a period of acclimatization, were included. Group and sex related differences were observed in a number of parameters, which included: (1) vitamin A, (2) carotene, (3) vitamin E, (4) amylase, (5) cholinesterase, (6) glutathione, (7) lactic acid, (8) acetone, (9) triglycerides, (10) free glycerol, (11) glyceride-glycerol, (12) phospholipids, (13) the lipoprotein spectrum, (14) magnesium, (15) zinc, (16) ceruloplasmin, (17) iron, and (18) iron binding capacity. Constituents 2, 4-9, 11, 13, and 16-18 had ranges quite different from those found in man.

Estimation of gestational age and birth weight in the rhesus monkey (*Macaca mulatta*). DiGiacomo, R. F., & Shaughnessy, P. W. (Lab. Slow, Latent & Temperate Virus Infections,

Nat. Inst. Neurol. Dis. & Stroke, NIH, Bethesda, Md. 20014) *American Journal of Obstetrics and Gynecology*, 1972, *112*, 619-628.

An analysis of 260 rhesus (*Macaca mulatta*) pregnancies was performed in order to formulate predictive equations of fetal gestational age and infant birth weight. Gestational age was expressed in terms of maternal uterine size while birth weight was considered as a function of several factors. Of these factors, prepregnant weight, maternal weight gain, gestational age, and sex proved to be significant determinants of birth weight. Since these factors also have a significant influence on human birth weight, the rhesus monkey may prove useful in studies in which factors of this nature are manipulated to test their effect on pregnancy.

The reproductive cycle of the crab-eating macaque (*Macaca fascicularis*). Nawar, M. M., & Hafez, E. S. E. (Wayne State U., Detroit Mich.) *Primates*, 1972, *13*, 43-56.

Characteristic changes in the menstrual cycle of the crab-eating macaque were evaluated. Cyclical changes in type and abundance of exfoliated cells in vaginal smears as well as the ferning pattern of cervical mucus were observed. These indices were useful in predicting approximate ovulation time. The cyclical changes in sexual skin swelling and/or coloration were detected only in adolescent females. Micro-sections from ovaries of autopsied animals revealed large Graafian follicle formations often rupturing by day fourteen of the cycle. Length of the menstrual cycle ranged from 26-38 days with a modal value of 28 days.

Behaviour and ecology of nocturnal prosimians/Comportement et Ecologie de Prosimiens Nocturnes. Charles-Dominique, P., & Martin, R. D. (Muséum Nat. D'Hist. Nat. Ecologie Générale, Brunoy, France) *Fortschritte der Verhaltensforschung--Advances in Ethology* (Zeitschrift für Tierpsychologie--Supplements to Journal of Comparative Ethology), 1972, No. 9

This supplement contains two independent reports of field-studies of nocturnal primate species--one by P. Charles-Dominique on the habits of the bushbaby, *Galago demidovii* (in French) in Gabon, and one by R. D. Marton on the mouse lemur, *Microcebus murinus* (in English) in Madagascar. It is 91 pages, is cloth backed, and costs $12.76.

Effect of protein-calorie malnutrition on food consumption, weight gain, serum proteins, and activity in the developing rhesus monkey (*Macaca mulatta*). Geist, C. R., Zimmermann, R. R., & Strobel, D. A. (Dept. Psychol., U. Montana, Missoula, Montana 59801) *Laboratory Animal Science*, 1972, *22*, 369-377.

Five groups of infant rhesus macaques were separated from their mothers at 90 days of age, housed in individual

cages, and placed on purified diets that were isocaloric but contained either 25% (high), or 2% or 3.5% (low) protein by weight at 380, 210, or 120 days of age. The subjects sustained on the low protein diets showed a marked reduction in weight gain when compared to high protein controls. On the whole, monkeys on diets deficient in protein consumed less than animals fed normal quantities of protein. However, all groups, regardless of diet regime, consumed food in quantities that were proportional to their body weights. Analysis of blood serum components revealed values of albumin and total protein which consistently reflected the level of dietary protein fed. Globulin serum levels, however, consistently failed to relate to the dietary level of protein. Activity, as measured in a living cage situation, showed no effects of diet and suggested that the low protein animal had a general level of activity that was equal to that of the high protein control.

## FACILITIES, CARE, AND BREEDING

Breeding the greater bushbaby, *Galago crassicaudatus*, in a laboratory environment. Valerio, D. A., Johnson, P. T., & Thompson, G. E. (Bionetics Res. Labs., Inc., 5510 Nicholson Lane, Kensington, Md. 20795) *Laboratory Animal Science*, 1972, *22*, 203-206.

A breeding colony of greater bushbabies (*Galago crassicaudatus*) was established in 1965 to obtain offspring for long-term carcinogenic studies. Estrus was detected by observation of gross changes of the vulva. Mating was accomplished by the use of monogamous pairs. The mean estrus length was 15.9 days; the mean estrous cycle length was 50.3 days. The postpartum estrus in this species had a mean initiation time of 10.2 days; its mean length was 23.3 days. Eighty-one percent of postpartum estrus conceptions resulted in live births, while only 68% of regular estrus conceptions resulted in live births. The mean gestation length of 69 pregnancies which terminated in live births was 128 ± 13 days. There were 77 live births during 53 months of breeding, which included 8 sets of twins. The fetal wastage rate experienced was 30%. Hand-rearing of infants was more successful than mother-rearing.

A method for hand-rearing of *Saimiri sciureus*. Hinkle, D. K., & Session, H. L. (Environmental Protection Agcy, Pesticide Office, Perrine Primate Res. Br., P. O. Box 490, Perrine, Fla. 33157) *Laboratory Animal Science*, 1972, *22*, 207-209.

A method for hand rearing newborn and very young New World monkeys (*Saimiri sciureus*) was described. There has been an increased demand for the type of animal in toxicological investigations in which the experimental design requires separation of the mother from the neonate.

The infants were housed in incubators for the first 8 weeks of life and then transferred to individual stainless steel cages. Their diet consisted of liquid formula made from a combination of several commercial human infant nutriments. This report includes mean values for increase in body weight and formula consumption, as well as some clinical observations during the first 12 weeks of life.

## ECOLOGY AND FIELD STUDIES

Distribution of the primates on the eastern shore of Lake Tanganyika. Kano, T. (Lab. Human Ecology, Sch. Hlth Sci., U. Ryukyus, Yogi, Naha, Okinawa, Japan) *Primates*, 1971, *12*, 281-304.

The mountainous and broken hill country in the middle part of the eastern shore of Lake Tanganyika is one of the areas which have been well studied primatologically. In particular, the chimpanzee has been studied for years by many primatologists at several sites. At least ten species of primates appear in this area. Nevertheless, the geographical range of some of these primates has been quite unknown. This paper proposes geographical maps and localities for these primates as well as brief ethological descriptions of them, a result of a survey throughout this area. Before the survey three species of primates in the area had been subspecifically unidentified. Two of them have proved to be *Cercopithecus ascanius schmidti* and *Cercopithecus mitis doggetti*, identified by Dr. W. C. Osman Hill, both of which are newly recorded in this area. The third is probably *Colobus polykomos*, but as no specimen or fur could be obtained, its taxonomic status remains obscure. In the last chapter of this paper, some zoogeographical problems concerning the primates of this area are discussed.

Group composition and population density of rhesus monkey (*Macaca mulatta* (Zimmermann)) in northern India. Mukherjee, R. P., & Mukherjee, G. D. (Zoological Survey of India, 8 Lindsay St., Calcutta 16, India) *Primates*, 1972, *13*, 65-70.

A field survey of road-side rhesus monkeys of northern India was conducted during 1964-65 for the study of group composition and population density. In the 1651-km distance covered during this survey, a total of 83 groups of rhesus monkeys were counted. Adult females were predominant over other members in the group and were twice the number of adult males in a group. Infants were more than double the numbers of juveniles and juveniles formed the smallest percentage in any group and showed a tendency of decline in their population. Percentages of group size varied from 2.50 to 28.09. Sex-ratios, proportions of infants and juveniles to adults, proportions of juveniles to infants

and the population density in different zones and sectors have been discussed.

Field observations on habits of Indian langur, *Presbytis entellus* (Dufresne) in Gir Forest, Gujarat. Kurup, G. U. (Zoological Service of India, Madras City, Madras, India) *Rec. zool. Serv. India*, 1970, *62*, 5-9.

Two troops of langurs were studied. Each troop had its distinctive territory with clear territorial adherence. The troop consisted of 18-22 members of both sexes and young ones. Activity rhythm showed 2 peak periods, morning and evening. Daily routine can be categorized into feeding time (peak activity periods), recreation time, and resting time. Recreation follows the morning feeding when members indulge in playful antics. This is followed by resting on shady trees near river bank till the evening feeding starts. Each troop has a leader whose authority is conspicuous only when the troop faces danger or disturbance. Common concern and care of infants by females other than the mother was observed.

Observations sur le macaque rhesus, *Macaca mulatta* (Zimmermann 1780), en Afghanistan. Puget, A. (Cen. de Recherches sur les Toxicités, 205, route de Narbonne, Toulouse, France) *Mammalia*, 1971, *35*, 199-203.

The distribution of *Macaca mulatta* in Afghanistan and the numeric importance of some colonies in the Kamdech valley were determined. Some aspects of the biology and possible uses for scientific research are also considered.

A note on the ecology of the red-colobus monkeys (*Colobus badius tephrosceles*) living in the Mahali mountains. Nishida, T. (Dept. Anthropol., Faculty of Science, U. Tokyo, Hongo, Tokyo, 113 Japan) *Primates*, 1972, *13*, 57-64.

Red-colobus monkeys of the Mahali mountains utilize many vegetation types; although their main habitat is composed of forest vegetation (gallery forest and montane forest), they sometimes penetrate into even the *Miombo* woodland. Red-colobus monkeys mainly live on leaves of trees, but sometimes eat flowers, fruits, and barks. Most of the plant leaves which the chimpanzees eat have proved to be delicacies to colobus monkeys also. Colobus monkeys live in compact bisexual groups, ranging from 30 to 50 in size. No solitary male has so far been observed. A colobus group living in the gallery forest moved 100 to 200 meters daily within its well-documented home range. The home ranges of groups do not seem to overlap each other extensively. Their natural enemies are leopards, birds of prey and probably chimpanzees. The Tongwe inhabitants avail themselves of the colobus coat as part of their native

bellows (*mufuba*) and some pagan inhabitants kill them for their meat.

Population studies of Malaysian primates. Southwick, C. H., & Cadigan, F. C., Jr. (Dept. Pathobiol., Johns Hopkins U., 615 North Wolfe St., Baltimore, Md. 21205) *Primates*, 1972, *13*, 1-18.

Systematic field studies on the abundance of primates were made in five different types of forest in West Malaysia in 1970. Primate groups of 7 species were seen on 97 occasions during 527 hours of field observations. Secondary forests had the greatest primate density of any of the natural forest habitats surveyed. Estimated primate group densities varied from less than 4 groups per square mile to 40, with an average of 7.2 groups per square mile. The most abundant species was the banded leaf monkey (*Presbytis melalophus*) with 2.95 groups per square mile, followed by the long-tailed macaque (*Macaca fascicularis*) with 1.54 groups. Primary forest had a lower density which varied from less than 2 groups per square mile to 15, and averaged 5.9. *P. melalophus* was again the most abundant species with an average of 2.22 groups per square mile, followed by gibbons (*Hylobates lar*) and siamangs (*H. syndactylus*) each with 1.11. *M. fascicularis* averaged only 0.37 groups per square mile in primary forests. Primates were unexpectedly rare in mangrove forests and rubber plantations. Twenty-four primate groups were found in urban forests and parks. Twenty of these groups were *M. fascicularis*, 3 were silver leaf monkeys (*P. cristatus*) and 1 was the dusky leaf monkey (*P. obscurus*). In urban areas, *M. fascicularis* groups varied from 7 to 44 individuals per group, with an average of 24. A great need exists for increased scientific and conservation attention for the primate populations of Malaysia.

## INSTRUMENTS AND TECHNIQUES

Radiotelemetry techniques for measurement of blood pressure and flow in unrestrained animals. Franklin, D. L., Kemper, W. S., Van Citters, R. L., & Watson, N. W. (Div. Biomed. Eng., Scripps Clinic & Res. Found., U. California, La Jolla, Calif. 92037) *UCLA Forum med. Sci.*, 1970, *10*, 377-382.

Recent technological developments in measuring instruments compatible with standard telemetry methods have made possible studies of cardiovascular dynamics in animals totally unencumbered by tethers or the classical laboratory paraphernalia and uninfluenced by anesthesia or the laboratory environment. A practical system for the measurement and radio telemetry of blood pressure and flow from unrestrained animals is described.

Automated behavioral conditioning in animals. Ishiyama, E., Lewandowski, J. R., & Myers, E. N. (Otological Res. Lab., Presbyterian-University of Pennsylvania, Med. Cen., Philadelphia, Pa.) *Pract. oto-rhino-laryng.*, 1971, *33*, 271-277.

The authors are introducing an automated method of behavioral conditioning and determining the hearing threshold in the squirrel monkey. This apparatus is practical, convenient and very accurate for measuring auditory responses, yet does not require constant observation by the investigator.

Training monkeys by Linc-8 computer. Ettlinger, G. (Inst. Psychiatry, De Crespigny Park, Denmark Hill, London S.E.5, England) *Cortex*, 1970, *6*, 410-416.

A method of training monkeys to perform cue-dependent tasks under control of a standard small laboratory computer is described.

Computerized animal intelligence testing. Davenport, J. W., Benson, R. W., Hagquist, W. W., Rankin, G. R., & Shelton, S. E. (Reg. Primate Res. Cen., U. Wisconsin, Madison, Wisc. 53706) *Behavior Research Methods and Instrumentation*, 1972, *4*, 67-70.

In 1970, an on-line computer-controlled system for assessing the performance of monkeys and rats in batteries of learning tasks began operating in our laboratory. During the past year, we have used this system extensively for testing animals in mental retardation projects on hypothyroidism and malnutrition and have gained some appreciation of the system's utility for conventional learning studies of either the free-operant or discrete-trial type.

A chronically implanted liquid delivery system for restrained primates. Noah, J. C., & Mattsson, J. L. (Holloman Air Force Base, New Mexico) *Journal of the Experimental Analysis of Behavior*, 1972, *17*, 191-192.

The report describes a reliable liquid delivery system based on a modified catheter-protection assembly used for chronic intravenous administration of drugs.

A low-cost, high-capacity maintenance feeding device for primates. Taylor, E. M., Sutton, D., & Burns, J. D. (Arizona State U., Tempe, Arizona) *Journal of the Experimental Analysis of Behavior*, 1972, *17*, 247-248.

The feeder described has the following characteristics not found in standard commercial feeders: (1) sufficient capacity to dispense a full maintenance ration over a period of several days; (2) capability to dispense food items of various configurations; (3) remote operation and compact size; (4) portability and adaptability to a variety of equipment configurations; (5) reliable operation without

direct access to the mechanism during use; and (6) low expense.

Measurement of social dominance in squirrel monkeys. Clark, L. D., & Nakashima, E. N. (U. Utah Coll. Med., Salt Lake City, Utah 84112) *Behavior Research Methods and Instrumentation*, 1972, *4*, 143-144.

Several laboratory methods for measuring social dominance in squirrel monkeys are described.

A new restraining device for testing antiradiation drugs in monkeys. Withrow, G., & Devine, M. C. (Div. Med. Chemistry, Walter Reed Army Inst. Res., Walter Reed Med. Cen., Washington, D. C. 20012) *Laboratory Animal Science*, 1972, *22*, 419-421.

A new restraining device for irradiating monkeys was described. The restraint was of particular use in testing chemical compounds for radio-protective action. The device afforded complete restraint of untrained monkeys during irradiation with little or no local skin irritation. A cage specially designed to transport the monkeys secured in the restraining device was also described.

## TAXONOMY

Systematic reconsideration and a revision of the nomenclature of Kenya baboons. Maples, W. R. (U. Florida, Gainesville, Fla.) *American Journal of Physical Anthropology*, 1972, *36*, 9-20.

Two populations of baboons in Kenya, often given different specific names, *Papio doguera* and *Papio cynocephalus*, were the subject of this investigation. We conducted a field study to determine if these two populations are the same or two different species. We located a zone of contact between the two putative species in the area of Simba Springs and Ithumba Hill. The population in this area was found to represent intergradation on the basis of field observations and detailed metric observations of the morphology. The morphology of this population appears to be intermediate between that of the two populations: the olive baboon, labeled *Papio doguera*, and the yellow baboon, labeled *Papio cynocephalus*. We confirmed the findings by statistical analyses of osteometric data. Since the specific separation of the two taxa studied in this investigation is invalid, both are placed in the prior nomen, *Papio cynocephalus* (Linnaeus, 1766) separating them on the subspecific level, *P. c. doguera* and *P. c. cynocephalus*.

## CONSERVATION

International proposals to regulate trade in non-human primates.

Harrisson, Barbara (Dept. Anthropology, Cornell U., Ithaca, N. Y. 14850) *Primates*, 1972, *13*, 111-114.

The "Draft Convention on the Export, Import and Transit of Certain Species of Wild Animals and Plants" of the International Union for Conservation of Nature and Natural Resources (I.U.C.N.), designed to regulate traffic in threatened and declining species of wild animals and plants and their products, is due for international discussion and acceptance during 1972. A technical meeting to review difficulties, scheduled in Washington, will precede acceptance. The Convention covers all species of non-human primates. The note is an attempt to clarify its intent, content, and significance, as far as non-human primates are concerned.

Notes on the orang-utan rehabilitation project in Sabah. de Silva, G. S. (Office of the Chief Game Warden, P. O. Box 311, Sandakan, E. Malaysia) *Malayan Nature Journal*, 1971, *24*, 50-77.

The aims of the Sabah orang-utan rehabilitation project are to rehabilitate orang-utans into the wild by gradually giving them more freedom in their natural surroundings, to restore their survival instincts and encourage self-reliance in the forest, so that they may return to the wild or form a semi-wild breeding colony to enhance the depleted stock in the state. As and when they are able to survive on their own they will be released in batches in forests remote from habitation and timber operations. There is a block of several hundred square miles of forest in the Ulu Segama which would be suitable and may be constituted a Game Sanctuary for this and other purposes. This paper describes the project and presents some background information. Behavior of orang-utans in the wild and in the semi-wild state is also discussed.

On the problems of conservation of the chimpanzees in East Africa and of the preservation of their environment. Suzuki, A. (Primate Res. Inst., Kyoto U., Inuyama, Aichi, Japan) *Primates*, 1971, *12*, 415-418.

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