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POLICY STATEMENT

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

The *Newsletter* appears quarterly and is intended primarily for persons doing research with nonhuman primates. Back issues may be purchased for $2.00 each. (Please make checks payable to Brown University.)

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

PREPARATION OF ARTICLES FOR THE *NEWSLETTER*.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the References section should be referred to in the text by author(s) and date of publication, as for example: Smith (1960) or (Smith & Jones, 1962). Names of journals should be spelled out completely in the References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *NEWSLETTER* (see Editor's Notes, July, 1966 issue), the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967]. For an introduction to and review of primate nomenclature see the chapter by Maryeva Terry in A. M. Schrier (Ed.), *Behavioral Primatology: Advances in Research and Theory* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

All correspondence concerning the *Newsletter* should be addressed to:
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The cover photograph is of a gray gibbon (*Hylobates moloch*)
and is used with the permission of the San Diego Zoo.

Managing Editor: Helen Janis Shuman

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HYPERVITAMINOSIS D_3 IN THE SQUIRREL MONKEY (*SAIMIRI SCIUREUS*)

Jayne Smiley

Downstate Medical Center, State University of New York

Recently, a number of unexpected deaths occurred within a three-week period in the squirrel monkey colony of the Primate Laboratory of the Downstate Medical Center. Six animals, five males and one female, were afflicted. Symptoms included sudden weight loss, dehydration, and lethargy culminating in shock syndrome and death. In four of the six cases, death occurred within 6-12 hours after initial observation of these symptoms. The two remaining cases progressed at a slower rate and were maintained 4-7 days before death occurred. Treatment of all cases consisted of Ringer's solution with 5% dextrose (20 cc/lb. body weight) twice daily to counteract dehydration, corticosteroids (Azium, Schering) (1.0 cc/lb. body weight), and antibiotics (Bicillin, Wyeth Laboratories) (100,000-150,000 units per animal) as a prophylactic measure.

Histopathology revealed nephrocalcinosis in three of four specimens. These findings prompted an investigation of calcium metabolism and calcium intake in the squirrel monkey colony diet as they implicated possible hypervitaminosis of Vitamin D. This condition has been reported in other mammals (Benirschke, Garner, & Jones, 1978) and birds (Petrak, 1969).

All squirrel monkeys are fed High Protein Purina Monkey Chow (25% Protein) (Ralston-Purina Co., St. Louis, MO) and water ad lib. Supplemental diet consisted of chow soaked in a mixture of approximately 1/2 cup condensed milk, 1 1/2 cup water, 1 tablespoon Gevral Protein Nutritional Supplement (Lederle Laboratories, Pearl River, NY), and 1/8 teaspoon Vitamin D_3 Powder (cat. #103280, Nutritional Biochemicals, Cleveland, OH) daily, as well as fresh lettuce and carrots 3-5 times weekly.

The Vitamin D_3 Powder proved to be in a very concentrated form, 400,000 IU/gram. The recommended dosage of Vitamin D_3 for squirrel monkeys is 1.25 IU/gram of diet (Lang, 1968; Whitney, Johnson, & Cole, 1973). Group size in the colony averages 10 animals per group, requiring approximately 350 IU of Vitamin D_3 per group. One-eighth teaspoon of the powder by weight is approximately 30 mg, and thus is 365 times in excess of the recommended daily requirement. This estimate does not include the Vitamin D_3 additive already in the chow.

In examining the behavioral histories of the animals afflicted, we found them to have relatively high dominance status in their respective groups. It is conceivable that these animals would feed first from

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the supplemental food mixture and consume excessively high doses of the Vitamin D_3, particularly if the powder was not distributed uniformly.

We have previously supplemented the squirrel monkey colony with Vitamin D_3 as recommended by various authorities (Lang, 1968; Whitney, Johnson, & Cole, 1973), without ill effect. The aforementioned form of D_3 was a new addition to the supplemental diet included just prior to the outbreak of the deaths, further confirming our suspicions of hypervitaminosis.

A caveat concerning the possible danger of lethal hypervitaminosis of Vitamin D_3 is lacking in sources for the care of these primates (Lang, 1968; Whitney, Johnson, & Cole, 1973), and would be an important addendum for future maintenance of captive squirrel monkey populations.

References

Benirschke, K. B., Garner, F. M., & Jones, T. C. *Pathology of Laboratory Animals*. Berlin: Springer-Verlag, 1978.

Lang, C. M. The laboratory care and clinical management of *Saimiri*. In L. Rosenblum and R. Cooper (Eds.), *The Squirrel Monkey*. New York: Academic Press, 1968.

Petrak, M. L. *Diseases of Cage and Aviary Birds*. Philadelphia: Lea & Febiger, 1969.

Whitney, R., Johnson, D., & Cole, W. *Laboratory Primate Handbook*. New York: Academic Press, 1973.

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PRIMATE CAGES FOR SALE

The University of Saskatchewan has the following individual primate cages for sale, suitable for baboons or other medium-sized primates: Four ShorLine Model No. 6280 stainless steel cages, outside dimensions 30 in wide × 40 in deep × 61 in high, with pull squeeze back. Also two ShorLine Model No. 6230 stainless steel cages, overall dimensions 33 in wide × 36 in deep × 58 in high, with chain and ratchet squeeze back. Price $850.00 each; purchaser to bear shipping costs. Contact: Dr. Ernest Olfert, Director, Animal Resources Centre, University of Saskatchewan, Saskatoon, Saskatchewan, S7N OWO, Canada (Phone: 306-343-2469).

* * *

AN EXERCISE CAGE FOR MONKEYS

James C. Tolan, Daniel R. Malone, and Charles M. Rogers

Auburn University

Monkeys tested on a daily basis in behavioral and other types of experiments are often individually housed in relatively small cages between test sessions. Therefore, it may be desirable to provide them with an opportunity for more exercise. However, securing funds and space for larger cages can be a formidable obstacle for many laboratories. We describe here an exercise program which provides monkeys, housed in the smaller cages in our laboratory, with access to a large cage on a daily basis.

Figure 1 is a diagram of the exercise cage. The basic cage (2.1 ×

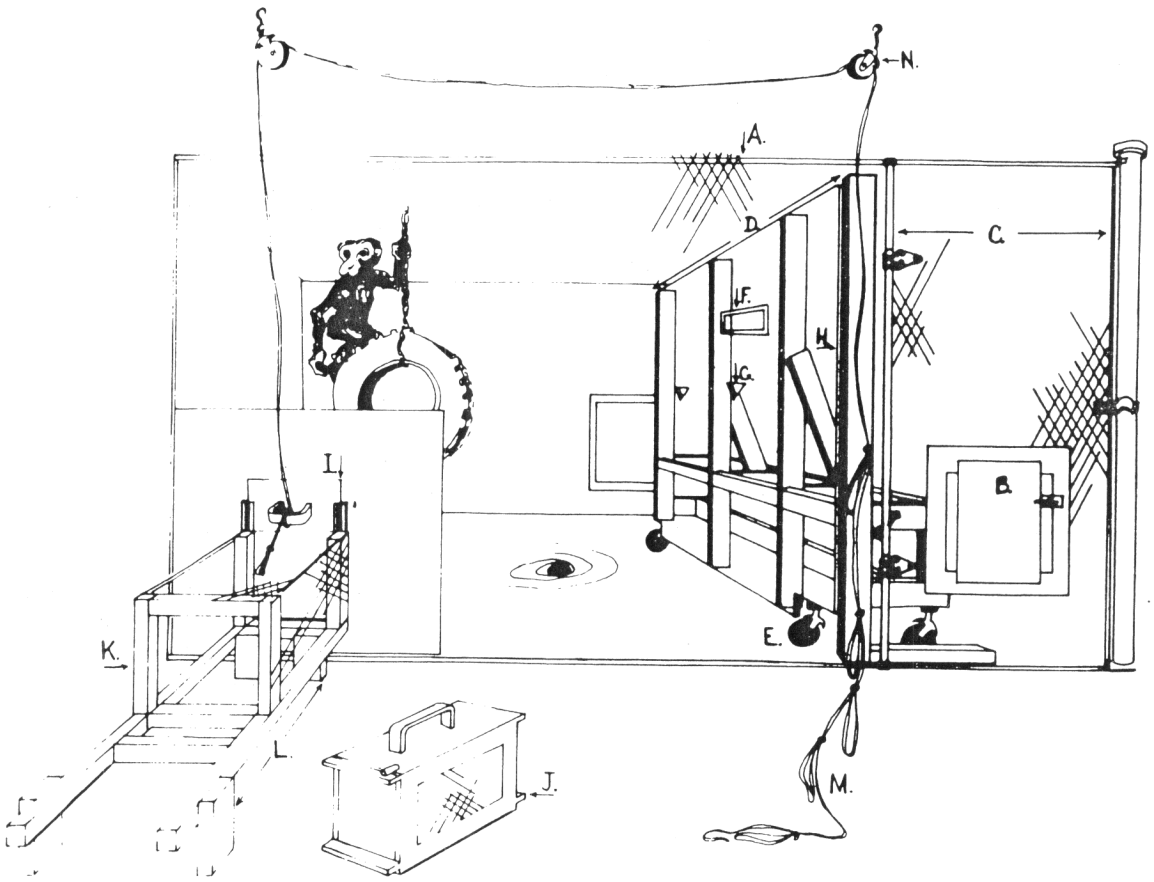

Figure 1. Diagram of the exercise cage.

Authors' address: Psychology Research and Training Clinic, Auburn University, Auburn, AL 36830.

2.7 × 2.1 m) had been previously constructed in the corner of a room with cinder-block walls. The walls served as two sides of the cage, while the remaining two sides and ceiling consisted of steel fencing secured to a metal frame (A). The floor was concrete and sloped towards a drain. A guillotine-type door (B) for the monkeys was located on a larger hinged door (C). The cage had received limited use because of the extreme difficulty in getting monkeys to exit from the cage into a small transport box. Many of our lab personnel were short-term student research assistants, and they were not trained to net and handle monkeys, especially since many of the animals were large adult males. Consequently, the cage was modified to circumvent these problems. A mobile wall (D) was constructed of plywood using lumber for the frame. The frame of the wall fit almost flush with the front and back walls, and with the ceiling of the cage. The wall was secured to a lumber frame that rode on four wheels (E). A plexiglass window (F) was placed in the wall and two small holes (G) were added in the event that use of a prod would be necessary to prompt exit from the cage. The wall could be latched to a stationary lumber frame (H) to prevent an animal in the cage from moving it. A second guillotine-type exit door (I) was constructed at the end of the cage away from the mobile wall. An animal is brought to the cage in a transport box (J), which is placed opposite a runway consisting of steel fencing (K). The transport box is kept in place by a wood frame (L). The animal is allowed into the cage via the exit door (I), which runs along steel tracks bolted to the cage fencing.

Animals are trained to leave the exercise cage by using the least obtrusive prompt necessary to engender entrance into the runway. Initially the trainer enters the cage (behind the mobile wall) via the door (C) and pulls on a rope (M) attached to the exit door (I) via two pulleys (N). If the animal remains in the cage after opening the exit door, the hooks securing the mobile wall are unlocked and the wall slowly moved inwards. If the animals remain in the cage after the wall is positioned as close to the exit door as possible without overlapping it, a prod is used to guide the animals into the runway. Once the animal is in the runway, the exit door is lowered by releasing the rope. The weight and construction of the exit door discourages the monkey from lifting it up. After the monkey is trapped in the runway, it is easily directed to enter the transport box (baited with food) if it has not already done so.

The exercise cage has been used on a daily basis with 10 rhesus monkeys. To our great surprise and delight, a majority of the animals were trained to reliably exit from the cage without ever moving the wall, perhaps because they had the opportunity to observe the others. Again, it should be noted that prior to the addition of the mobile wall extreme difficulty was encountered in getting any animals to exit from the cage. One or two trials with the mobile wall was sufficient to establish a reliable exit response from all of the monkeys. Thereafter only the

exit door had to be opened to prompt an exit response.

Laboratory personnel had little difficulty learning to use the procedure. Eventually only a few minutes of their time was required to rotate animals before and after testing sessions. With a sufficient number of research assistants, we have been able to schedule each animal for at least an hour (often much longer) in the exercise cage five days per week. Compatible monkeys can be exercised together. The procedure proved safe for both the animals and the staff. If deemed necessary, large cages could be converted to operant test chambers. Programs could be designed to increase the amount of exercise by delivering food reinforcers on schedules requiring alternate responses on two widely separated manipulanda in a short period of time. While few labs may have a large cage comparable to ours, it should not be difficult to implement a similar exercise program for animals housed in small cages.

* * *

COMPARATIVE PATHOLOGY CONTINUING EDUCATION COURSE

The 7th annual Comparative Pathology Course will be presented May 5-7, 1980, at the Armed Forces Institute of Pathology, Washington DC. Military and federal service employees in the medical, veterinary, and other medical fields are requested to consult respective agency regulations for appropriate application procedures. Civilian physicians, veterinarians, and allied scientists are invited to apply and will be considered on a space available basis. This Course is specially designed to bring attention to disease processes in animals for which a similar entity occurs in man. Differences and similarities of pathologic lesions, as well as the biological behavior of specific entities will be compared in animals and man. Application forms to attend this Course may be obtained by contacting: The Director, Armed Forces Institute of Pathology, (AFIP-EDE), Washington, DC 20306. Completed application forms should be returned by 7 April 1980. Non-federal civilians and foreign nationals are required to submit a $75.00 fee, payable to the Treasurer of the United States.

* * *

ACUTE GASTRIC DILATATION IN A SQUIRREL MONKEY

Philip T. Johnson

School of Medicine, University of North Carolina

There have been a number of reports of acute gastric dilatation (AGD) in a variety of species of Old World monkeys (Chapman, 1967; Migaki et al., 1971; Newton et al., 1971; Soave, 1978; Van Krunningen et al., 1974), but few reports of this disorder in New World monkeys. Soave (1978) mentions some instances of acute gastric dilatation in squirrel and owl monkeys. This note is concerned with AGD in a single Bolivian squirrel monkey (*Saimiri sciureus*) being utilized in behavioral research. Various causal factors have been associated with AGD such as over-eating, previously administered drugs, stress, etc., but this particular animal experienced none of these. For 10 months it had been given 10 monkey biscuits (Purina 25) per day at 2 p.m., with water ad lib. One day the monkey was fed the same amount of biscuits in mid-morning and due to this irregularity in scheduling no water bottle was available. Two hours later a full bottle (250 cc) was mounted on the cage. Nothing abnormal was observed during the afternoon, yet the animal was found dead the next morning with a severely distended stomach, a gas filled bowel, and extensive subcutaneous emphysema of the chest and shoulders. At necropsy, 110 cc of a food-water mixture was removed from the stomach with only a small amount (approx. 25 cc) of gas present. No cultures were taken of the extracted contents. The delay in presenting water probably caused a sudden and excessive water intake. This and the resulting swelling of the dry biscuits could have triggered AGD and eventually resulted in death.

References

Chapman, W. J., Jr. Acute gastric dilatation in *Macaca mulatta* and *Macaca speciosa* monkeys. *Laboratory Animal Care*, 1967, *17*, 130-136.

Migaki, G., Seibold, H. R., Wolf, H. R., & Garner, F. M. Pathologic conditions in the Patas monkey. *Journal of the American Veterinary Medical Association*, 1971, *159*, 549-556.

Newton, W. M., Beaver, P. D., Rhoades, H. E. Acute bloat syndrome in stumptailed macaques. A report of 4 cases. *Laboratory Animal Science*, 1971, *21*, 193-196.

Soave, O. A. Observations on acute gastric dilatation in non-human primates. *Laboratory Animal Science*, 1978, *28*, 331-334.

Van Krunningen, H. J., Gregoire, K., & Menton, D. J. Acute gastric dilatation: A review of comparative aspects by species and a study in dogs and monkeys. *Journal of the American Animal Hospital Association*, 1974, *10*, 293-324.

NOTE ON ANATRICHOSOMA IN PRIMATES AND REQUEST FOR INFORMATION

An excellent article by Swift and co-workers in 1922 (*J. of Exp. Med., 35*, 599-620) described creeping eruption lesions in the palms and soles of rhesus monkeys caused by the parasite *Anatrichosoma*. It is known (Karr, Henrickson, & Else, *Lab. Anim. Sci.*, 1979, *29*, 789-790) that this parasite is often found buried in the nasal mucosa of some macaques and African monkeys, but no other published reports of the cutaneous form of the disease have been found.

Within the past several months, lesions of the type described by Swift and co-workers caused by *Anatrichosoma* have been found on the palms and soles of 12 species of nonhuman primates in two facilities (Houston Zoological Gardens and Hazleton Laboratories). The species represented include lemurs, marmosets, langurs, macaques, siamangs, and orangutans. Newly imported or high-stress animals have been more commonly affected than animals in stable colonies.

As the female parasite burrows beneath the superficial layers of the skin, double operculated embryonated eggs are deposited in the tract. The skin overlying these tracts dies and sloughs. Often the mild peeling of skin from these tracts with no obvious inflammation is the only clinical evidence of the disease. Tracts commonly extend from the nail bed down the digit and continue onto the skin of the palm or sole in an irregular serpentine pattern. In other cases, a very intense generalized irritation of the entire palm or sole is seen with marked concurrent regional lymphadenopathy. In at least three colonies, this condition was mistakenly attributed to irritating chemicals (disinfectants, cleaning and descaling solutions). The diagnosis can often be made by simply placing portions of the peeling skin and/or fluid expressed from tracts on a slide and examining it for the eggs.

The wide range of species which have been infected by this parasite causes considerable concern about the possible transmission to humans. Unfortunately, very little is known about the life cycle, distribution, method of transmission, or therapy. It is not known whether this condition has existed, but gone undiagnosed, since its original description in 1922 or whether there is a resurgence of the disease.

In an attempt to collect additional information on this condition, we ask that you carefully examine the animals in your colony for evidence of this form of the disease. We offer to serve as a clearinghouse to collect, digest, and disseminate information which might be of assistance in expanding our knowledge of this parasitic manifestation. Address all correspondence to: Dr. Dan Dalgard, Hazleton Laboratories, 9200 Leesburg Pike, Vienna, VA 22180 (Phone: 703-893-5400).

* * *

INFORMATION ON PRIMATE TRAPPING AND TRADE WANTED

This concerns a chapter on the effects of live-trapping and trade on primate populations that will appear in the forthcoming book *Primate Conservation in Tropical Rain Forest*, edited by J. S. Gartlan, C. W. Marsh, and R. A. Mittermeier. The book will review the trade from trap-site to laboratory, home, zoo, or eating-table, with analyses of import and export statistics. The chapter will deal with questions on the following topics:

1. In supplier countries, are there any indigenous uses of primates that create a demand (e.g., pets, food, coconut-pickers)? How are they regulated?
2. How are the animals trapped, held, and shipped? What are the conditions like at each stage? What health checks and veterinary treatment are applied? What is the mortality at each stage? Of what causes did they die?
3. How many animals of each species are trapped and exported? Is there a bias towards any particular age-sex class? How reliable do you consider these figures to be?
4. Which people and organizations operate the trapping and export? How has the trade developed over the years? Who started it and when?
5. Where does the information on trapping and trade originate? Are there any particular difficulties in getting this information?
6. How is the trapping and export regulated? What laws have applied in the past and what laws now apply? Are they effective? In what ways are they broken? What is the future prospect for legislation on trapping, holding, and export?
7. Has there been any research into the effects of the trade on the wild populations? How was that research funded? What further research is necessary and how could it be funded?
8. What is the effect of the trade on the wild populations? How reliable is this information?
9. From the point of view of the supplier country, what are the destinations of the primates in terms both of country and use? How has the pattern changed over the years and how is it likely to change in the future? Statistics are particularly important here.
10. What effect do conservation and protection societies have on the trade and on the use of primates?
11. How is the import, sale, and use of primates regulated? What laws have applied in the past and what laws now apply? Are they effective? In what ways are they broken? What future legislation is likely or possible.
12. From the point of view of the user country, what (in detail) happens to the primates in terms of their arrival, health-checks and conditioning, holding facilities, sale, and ultimate use? What are the mortality rates? Has the pattern changed over the years?
13. Is the maximum use made of each animal? Are animals wasted in ways that could easily be avoided? Are alternatives to the use of

primates vigorously pursued?

14. What support or opposition do the users and their agencies give to conservation legislation and research in supplier countries?

15. Is the captive breeding of any species feasible? If so, give details of the numbers involved, the investment required, and the actual or potential location of the breeding colony.

16. Is the sustained-yield harvesting of any species feasible? If so, give details of the numbers and habitat involved and the investment and legislation that would be necessary.

In order even to begin to answer these questions, I need the help of conservationists, traders, users of primates, government wildlife officers, primatologists, protection societies, customs officials and so on. I would be grateful to everyone who would go through the above and give as detailed answers as possible about those aspects of trapping and trade of which they have any knowledge.--Contact: Michael Kavanagh, Department of Animal Sciences, Universiti Pertanian Malaysia, Serdang, Selangor, Malaysia.

* * *

LITTON BIONETICS TO ESTABLISH A NEW RHESUS BREEDING CENTER

The U. S. Food and Drug Administration has awarded the Litton Bionetics division of Litton Industries a $2.3 million, five-year contract to establish and operate a major primate breeding center to supply rhesus monkeys for testing polio vaccine. Under the contract, Litton will develop Morgan Island in St. Helena Sound near Beaufort, South Carolina to accommodate approximately 1,200 breeder monkeys that will be provided by the FDA. The contract calls for production and shipment to the FDA of at least 500 monkeys annually within two years. The monkeys will range free on the island's several hundred heavily-forested acres. Litton will build docking facilities, feeding and watering stations, storage sheds, and a small operations building for five full-time employees.

The new breeding site is one of several regional centers operated for the FDA and the National Institutes of Health. Litton Bionetics, one of the largest primate breeders in the United States, will manage the Morgan Island facility as an operation of its Yemassee Primate Center some 25 miles inland from Morgan Island. The Yemassee Center, also with approximately 1,200 breeders, produces about 500 monkeys each year. Additional primate breeding operations are carried on at Litton Bionetics' headquarters in Kensington, MD.

The monkeys being delivered to Litton's new primate center are prime FDA breeding stock. They and their offspring will be under the direct care of a primate behaviorist, Dr. David Taub, who recently joined Litton from the Bowman Gray Medical College of Wake Forest University in Winston-Salem, NC. Litton Bionetics' Yemassee Primate Center is under the overall direction of Dr. Arthur Hall. [From a Litton Industries News Release.]

BABOON BREEDING COLONY ESTABLISHED AT SOUTHWEST FOUNDATION

The largest baboon breeding colony in the United States was put in operation November, 1979 at the Southwest Foundation for Research and Education (SFRE) in San Antonio, Texas upon completion of a 6-acre semi-free-ranging corral. Approximately 325 baboons were placed in the new corral, the most spacious primate outdoor enclosure in the country. The project will help ensure future supplies of laboratory baboons for biomedical researchers.

The funds for colony maintenance and part of the initial facility costs come from the Animal Resources Program of NIH's Division of Research Resources.

Twelve-sided in shape, the new corral will contain an observation tower with a food storage section below, a catch and holding area, a work area, a vehicle entrance, and feeding and watering devices in the holding area as well as around the perimeter of the wall. An irrigation system has also been installed to cover a portion of the area.

SFRE, which has been conducting research with baboons for many years, has been importing several hundred baboons annually from Kenya, East Africa. The Foundation, as well as the University of Texas Health Sciences Center at San Antonio, are currently heavily committed to projects using baboons as experimental animals.

The most popular Old World Species used at SFRE is the yellow baboon (*Papio cynocephalus*). The body size is probably one of the major advantages in using the baboon, averaging 30 kg (66 lbs) for males and 21 kg (46.2 lbs) for females. The baboon, which is easily maintained and reproduces well in captive colonies, has an average gestation period of 175 days.

Physiologically, the baboon is considered the right size for implant research, as well as for fetal investigations. The baboon fetus is approximately twice as large as that of the rhesus monkey. Newborns average about 750 grams (1.65 lbs). Major studies conducted with baboons at SFRE include cardiovascular disease with emphasis on atherosclerosis, hypertension, and hyperlipidemia; pulmonary diseases; fetal and perinatal physiology; infectious viral diseases; and behavior.

NIH researchers have been using SFRE baboons in the past and anticipate increased usage in the future. Among the NIH institutes involved are the National Cancer Institute, the National Institute of Allergy and Infectious Diseases, the National Institute of Child Health and Human Development, and the National Heart, Lung, and Blood Institute.

The starting ratio for the nucleus of the breeding colony will be 10 females to 1 male. It is anticipated that there will be approximately

150 newborn baboons annually. The yearly harvesting of offspring will begin two years after the initiation of the project. The colony will serve as a national resource for the scientific community with concentrated use by NIH biomedical researchers in the field.

The breeding stocks, obtained from primate importers, have been carefully processed through a five-week quarantine period during which comprehensive health evaluations were carried out.

A regular health care program, supervised by Dr. Gary Moore, principal investigator for the new SFRE baboon breeding colony, has been established, including daily observation, treatment as required, annual physicals, and a disease monitoring program. The data will be computerized and will contain blood, genetic, and microbiological profiles as well as clinical chemistry of each animal. [Information supplied by the Office of Science & Health Reports, Division of Research Resources, National Institutes of Health.]

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BRANCHES OF AALAS TO HOLD SYMPOSIUM IN NEW JERSEY

The Delaware Valley and Metropolitan Branches of the American Association for Laboratory Animal Science will present their twelfth annual joint symposium titled, "Relevant Factors Affecting Today's Laboratory Animal Research," to be held at the Cherry Hill Inn, Cherry Hill, NJ, June 12th and 13th, 1980.

For additional information, contact Charles F. Kammer, Wahmann Manufacturing Company, Timonium, MD 21093 (301) 252-2000, or Nick Franchini, Merck, Sharp and Dohme, West Point, PA (215) 699-5311, X-5482, or Michael Nolan, Primate Imports, Port Washington, NY (516) 883-1800.

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REMINDER OF UPCOMING PRIMATE MEETINGS

Third Meeting of the American Society of Primatologists, Winston-Salem, NC, June 3-5, 1980. For information: Dr. David M. Taub, Dept. of Comparative Medicine, Bowman Gray School of Medicine, Winston-Salem, NC 27103.

VIIIth Congress of the International Primatological Society, Florence, Italy, July 7-12, 1980. For information: Dr. B. Chiarelli, Istituto di Antropologia, Università di Firenze, Via del Proconsolo, 12, 50122 Firenze, Italy.

* * *

LABORATORY PRIMATE NEWSLETTER QUARTERLY SURVEY: THIRD QUARTER 1978

The present report is one of a series summarizing data from the quarterly surveys being conducted by the *Laboratory Primate Newsletter*. The data in Tables 1 and 2 are based on reports from the following facilities: California, Washington (including the Field Station), Wisconsin, and Yerkes Regional Primate Research Centers, Laboratory for Experimental Medicine and Surgery in Primates (LEMSIP), National Institutes of Health (includes both the Primate Quarantine Unit and the Primate Research Units), and the Southwest Foundation for Research and Education. (See the July, 1979 issue for the previous survey report.)

TABLE 1. MORTALITY SUMMARY BY SYSTEM: JULY 1-SEPT. 30, 1978

SPECIES	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Pan troglodytes				1						1	1	2
Pongo pygmaeus				1								
Macaca arctoides						2						1
M. fascicularis	1			10		1					5	2
M. mulatta	4			6[b]		4	4	1		1	18	10
M. nemestrina	1			8	3	30	2	1			17	1
M. radiata				1		1						1
Papio spp.	3			5		2	1				2	30
P. cynocephalus	1							2				
Saimiri sciureus	1											
Aotus trivirgatus	1											
Saguinus spp.	8			1							1	18
TOTALS	20	0	0	33	3	40	7	4	0	2	44	65

[a]Includes 3 TB positive cases

TABLE 2. CENSUS, NUMBER OF BIRTHS, AND MORBIDITY SUMMARY BY SYSTEM: JULY 1-SEPT. 30, 1978

SPECIES	Census	Births	Generalized	Integumentary	Musculoskeletal	Respiratory	Cardiovascular	Digestive	Urogenital	Nervous	Endocrine	Neoplasia	Trauma	Unspecified
Gorilla gorilla	17							1						
Pan troglodytes	354	5	1			2	2	8		2			1	
Pongo pygmaeus	34					2		16	1					1
Macaca arctoides	72	2		1	2	1	1	13	3				2	
M. fascicularis	336	8	3	6	1	5	1	66	9	2			31	1
M. mulatta	4815	76	12	69	50	14[b]	11	181	34	6		1	84	19
M. nemestrina	1180	78	15	1		29	45	102	7	1			124	2
M. nigra[a]	25							2						
M. radiata	328	14		5	6	2	2	45	2	3			8	2
M. hybrids								3					1	
Erythrocebus patas	53													
Cercocebus atys	56													
Cercopithecus aethiops													2	
Papio cynocephalus	271	5	2	2	2	4		8	2				15	1
P. papio	31	1		1	1			2		1			1	
P. spp.	1692	47	19					5					70	1
P. hamadryas	110													
Saimiri sciureus	137	4	1	5	2			12	2	1		1	8	
Cebus spp.	32													
Aotus trivirgatus	75													
Callicebus moloch	45	1		1	1	1		1					1	
Saguinus oedipus	42													
S. spp.	89	8												
TOTALS	9794	259	53	91	65	60	62	465	60	15	0	2	348	27

[a] also referred to as *Cynopithecus niger*

[b] Includes 3 TB positive cases

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

Books

Primates in Nutritional Research. K. C. Hayes (Ed.) New York: Academic Press, 1979. 371 pp. [Price: $29.50]

This volume includes papers presented at a workshop hosted by the Oregon Regional Primate Research Center, October 23-24, 1978. The workshop was sponsored by the Animal Resources Branch of the Division of Research Resources, NIH, and the Nutrition Study Section of the Division of Research Grants, NIH. The objectives of the workshop were to present information on nutrient requirements and various techniques of feeding monkeys and provide in-depth reviews of currently investigated aspects of nutritional research in which nonhuman primates are the preferred model of human disease. Contents: Indication/consideration for nonhuman primates as research models, by C. W. McPherson; Dietary allowances for nutrients in nonhuman primates, by R. J. Nicolosi & R. D. Hunt; Liquid formulas and protein requirements of nonhuman primates, by L. M. Ausman & D. L. Gallina; Caloric intake and weight changes in adult rhesus monkeys, by B. C. Hansen & K. C. Jen; Folic acid needs for breeding and growth of nonhuman primates, by K. M. Rasmussen; Semipurified diets for nonhuman primates, by P. M. Newberne & K. C. Hayes; Open formula natural ingredient diets for nonhuman primates, by J. J. Knapka & M. L. Morin; Role of diet in normal biliary physiology and gallstone formation, by O. W. Portman, M. Alexander, N. Tanaka, & T. Osuga; Diet and atherosclerosis in nonhuman primates, by K. C. Hayes; Important considerations for nonhuman primate models of diet-induced atherosclerosis, by M. R. Malinow; Effects of dietary fat on plasma lipids in normal and spontaneously diabetic *Macaca nigra*, by C. F. Howard, Jr.; Selected aspects of the metabolic behavior of the squirrel monkey, by D. L. Gallina & L. M. Ausman; Acute and chronic effects of ethanol in nonhuman primates, by A. E. Rogers, J. G. Fox, K. Whitney, G. Lenhart, A. Wallstrom, & L. S. Gottlieb; Induction of obesity in nonhuman primate models of human obesity, by B. C. Hansen; Nutrition and infection interrelationships in monkeys, by R. W. Wannemacher, Jr., C. L. Hadick, Jr., & W. R. Beisel; Primates in nutritional and developmental research, by A. J. Riopelle.

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

Aging in Nonhuman Primates. Douglas M. Bowden (Ed.) New York: Van Nostrand Reinhold, 1979. 416 pp. [Price: $27.50]

This volume deals with both the biology and pathology of aging for the major physiological systems--nervous, immune, reproductive, cardiovascular, pulmonary, renal, and digestive. Contents: 1. Aging research in nonhuman primates, by D. M. Bowden & M. L. Jones. 2. Observations from Sukhumi, by B. A. Lapin, R. I. Krilova, G. M. Cherkovich, & N. S. Asanov. 3. The *Macaca nemestrina* project '77; Design and procedures, by D. M. Bowden, P. H. Blake, C. Teets, & G. H. Knitter. NERVOUS SYSTEM, IMMUNE SYSTEM AND BEHAVIOR. 4. Cognition, by D. Cohen, C. Eisdorfer, & D. M. Bowden. 5. Social behavior, by P. E. Maxim. 6. Gene expression in brain, by M. N. Farquhar, K. J. Kosky, & G. S. Omenn. 7. Monoamine and neurophysin systems, by J. R. Sladek, Jr., T. H. McNeill, P. Walker, & C. D. Sladek. 8. Serotonin uptake by platelets and brain synaptosomes, by G. S. Omenn, L. T. Smith, & D. R. Hanson. 9. Pineal taurine content, by J. C. Krusz, Z. V. Kendrick, & S. I. Baskin. 10. Autoimmune antibodies and other immunological characteristics, by W. H. Stone & K. Nandy. 11. Cerebral microcirculation, by E. M. Burns, T. W. Kruckeberg, & L. E. Comerford. 12. Cerebellar cell populations, lipofuscin pigment, and acetylcholinesterase activity, by K. Nandy & V. K. Vijayan. 13. Survey of changes in the eye, by E. Torczynski. 14. Peripheral tactile innervation, by J. Witkin. ENDOCRINE SYSTEMS: REPRODUCTION AND STRESS RESPONSE. 15. Ultrastructure of the adenohypophysis, by J. E. Aschenbrenner. 16. Reproductive senescence in female nonhuman primates, by C. E. Graham, O. R. Kling, & R. A. Steiner. 17. Mammary gland responsivity to prolactin stimulation, by D. L. Kleinberg, J. Todd, & P. Chin. 18. Mammary pathology, by M. R. Warner. 19. Adrenocortical structure and function, by R. N. Moore, H. Schiller, & D. M. Bowden. CARDIOVASCULAR, PULMONARY AND RENAL SYSTEMS. 20. Cardiac and coronary pathology, by N. Baba, J. J. Quattrochi, P. B. Baker, & C. F. Mueller. 21. Replicative potential of various aortic cell types, by C. E. Ogburn, B. K. Kariya, R. Ross, & G. M. Martin. 22. Plasma lipid, lipoproteins and lecithin: Cholesterol acyltransferase (LCAT), by A. G. Lacko & W. R. Hazzard. 23. The effect of digitalis on sodium, potassium-ATPase of myocardial and neural tissue, by S. I. Baskin, Z. V. Kendrick, T. Akera, S. Yamamoto, & T. M. Brody. 24. Pulmonary function, morphology and morphometrics, by E. S. Boatman, P. Arce, D. Luchtel, K. K. Pump, & C. J. Martin. 25. Pulmonary extravascular albumin, by B. E. Marshall, R. T. Geer, L. A. Litvin, & G. R. Neufeld. 26. Renal disease, by W. E. Giddens, Jr., R. A. Seifert, & J. T. Boyce. SKELETAL SYSTEM. 27. Long bone calcification and morphology, by D. M. Bowden, C. Teets, J. Witkin, & D. M. Young. 28. Mineral content of bone and other tissues, by K. Y. Lei & L. C. Young. 29. Craniofacial sutures, by V. G. Kokich, P. A. Shapiro, B. C. Moffett, & E. W. Retzlaff. 30. Modeling of the cranial base, by R. N. Moore & P. E. Lestrel.

The Phylogeny of Human Chromosomes. Héctor N. Seúanez. Berlin: Springer-Verlag, 1979. Soft cover. 189 pp. [Price: $22.80]

Contents: SECTION I. THE ORIGIN OF MAN. 1. Man, the most intelligent ape. 2. The fossil record and the emergence of modern man. 3. Man and his classification. 4. The theory of evolution, genes, and chromosomes. SECTION II. CYTOTAXONOMY AND THE EVOLUTION OF MAN AND THE GREAT APES. 5. The chromosomes of man and the Great Apes. The inference of interspecific homology. 6. Chromosome hetermorphisms in man and the Great Apes as a source of chromosome variation within species. 7. Chromosome rearrangement and the phylogeny of the hominidae. 8. Chromosome variation versus chromosome fixation. SECTION III. COMPARATIVE GENE MAPPING AND MOLECULAR CYTOGENETICS. A NEW APPROACH TO CYTOTAXONOMY. 9. Composition of the human genome. 10. Evolution of non-repetitive DNA sequences in man and the Great Apes. 11. Evolution of structural gene sequences. 12. Comparative gene mapping in man and other primates. 13. Evolution of repetitive DNA sequences in man and other primates. 14. The chromosome distribution of homologous sequences to the four human satellite DNAs in the hominidae. 15. DNA composition of constitutive heterochromatin in the chromosome complement of man and the Great Apes. 16. The chromosomal distribution of ribosomal genes in man and the Great Apes. 17. Late DNA replicating patterns in the chromosomes of man and the Great Apes. 18. Evolution of genome size in man and the Great Apes.

Animal Models for Research on Contraception and Fertility. Nancy J. Alexander (Ed.) Hagerstown, MD: Harper & Row, 1979. 607 pp. [Price: $22.50]

The Proceedings of a Symposium on Animal Models for Research on Contraception and Fertility held May 8-10, 1978, at the National Academy of Sciences, Washington, DC, sponsored by the Institute of Laboratory Animal Resources, National Research Council. This symposium was supported by the Program for Applied Research on Fertility Regulation, Northwestern University, Chicago, IL. Contents: PART I. FACTORS THAT AFFECT STUDIES IN REPRODUCTION. Obtaining and caring for research animals, by C. McPherson; Potential sources of variation affecting studies on pituitary-gonad function, by C. Desjardins; Circadian mechanisms in reproduction, by A. H. Meier & N. D. Horseman; Control of reproduction in natural populations, by J. J. Christian; Animal models in the endocrinology of reproductive behavior, by J. M. Davidson, G. D. Gray, & E. R. Smith. PART II. COMPARATIVE ASPECTS OF REPRODUCTIVE PROCESSES. Comparative aspects of the organization of the testis and spermatogenesis, by D. W. Fawcett; Accessory sex organs and fluids of the male reproductive tract, by I. G. White; Animal models in the study of the central nervous system regulation of gonadotropin secretion in the female, by C. A. Barraclough & P. M. Wise; *In vivo* determination of progesterone production rates, by R. B. Thau; Comparative study of mammalian glycoprotein hormones, by D. N. Ward & W. T. Moore, Jr.; The *in vivo* metabolism of progestins: VI. Species differences in the metabolic clearance rate of medroxyprogesterone acetate and 6α-methylprogesterone; by C. W. Bardin, N. A. Musto, P. D. Feil, & L. P. Bullock; Comparative aspects of antral follicular development during the menstrual and

estrous cycle, by G. S. Greenwald; Folliculogenesis in primates: Process of maturation and atresia, by M. J. Koering; Comparative aspects of gamete transport in mammalian oviducts, by R. J. Blandau; Fertilization and blastocyst formation, by J. D. Biggers; Implantation, by H. M. Weitlauf. PART III. USE OF ANIMAL MODELS FOR RESEARCH ON CONTRACEPTION AND REPRODUCTION. *In vitro* assessment of sperm fertilizing ability, by B. G. Brackett; Some caveats of mammalian gamete research, by J. M. Bedford; Fertility regulation with hormonal antigens: Models for evaluating immunologic methods, by V. C. Stevens; Immunobiology of reproduction, by J. E. Castro; Studies on the antigenicity in the zona pellucida, by C. A. Shivers; The effects of chemicals on spermatogenesis and epididymal maturation of spermatozoa: Experimental principles, by L. L. Ewing, R. J. Adams & R. C. Cochran. PART IV. ANIMAL MODELS FOR SPECIFIC RESEARCH QUESTIONS. Nonmammalian models in reproduction research, by I. P. Callard, G. V. Callard, & V. Lance; Prolactin-deficient mice, by A. Bartke; Androgen insensitivity (testicular feminization) in mice and rats, by L. P. Bullock; The H^{re} rat: A model for late onset seminiferous tubule failure in man; by N. A. Musto, R. J. Santen, C. Huckins, & C. W. Bardin; Studies on mammalian spermatogenesis: The baboon--A model for the study of human spermatogenesis, by A. K. Chowdhury; Changes in the cervical mucus of the bonnet monkey (*Macaca radiata*) during the menstrual cycle, by N. Din, J. W. McArthur, & R. W. Jeanloz; Models for cervical transport of spermatozoa, by B. K. Gustafsson & M. A. Memon; Swine for *in vivo* studies on capacitation, by E. D. Clegg; A comparison of lemur ovarian cycles, by B. L. Lasley, M. H. Bogard, & S. E. Shideler; Primate models for pregnancy hormone secretion in man: Fetal, maternal, and placental factors, by G. D. Hodgen; Bats as models in studies on folliculogenesis, menstruation, early pregnancy, and sperm survival, by J. J. Rasweiler IV; Armadillos for studies of delayed implantation, quadruplets, uterus simplex, and fetal adrenal physiology, by B. L. Lasley, N. M. Czekala, K. C. Nakakura, S. G. Amara, & K. Benirschke; Endocrine and morphologic effects of pinealectomy in white-tailed deer; by E. D. Plotka, U. S. Seal, M. A. Letellier, L. J. Verme, & J. J. Ozoga; Animal model for fallopian tube blockade, by R. M. Richart & R. S. Neuwirth; Choice of animal models for oral contraceptive research, by R. A. Edgren; Models for vasectomy, by L. L. Kosuda. PART V. TECHNIQUES APPLIED TO REPRODUCTION. Cannulation techniques for collection of blood and other body fluids, by M. J. Free & R. A. Jaffe; The determination of blood flow in reproductive organs, by R. A. Jaffe & M. J. Free; Methods of semen collection, by G. E. Seidel, Jr.; Freezing of spermatozoa, by B. G. Crabo & E. F. Graham; Preservation of mammalian germ plasma by freezing, by P. Mazur; Techniques for the prospective and retrospective diagnosis of ovulation, by C. J. Mahoney; Ovarian function as measured by milk steroid assays, by E. C. Mather. PART VI. APPENDIX, by E. C. Mather & R. A. Rushmer.

Contributions to Primatology. Vol. 14. *Functional Morphology of Forelimb Joints in the Wooly Monkey* Lagothrix lagothricha. Linda K. Ziemer. Basel:

Karger, 1978. Soft cover. 130 pp. [Price: DM 93. Approx. $47]

Contributions to Primatology. Vol. 15. *External Neuroanatomy of Old World Monkeys (Cercopithecoidea).* D. Falk. Basel: Karger, 1978. Soft cover. 96 pp. [Price: DM 71. Approx. $36]

Directories

Animals for Research: A Directory of Sources. (19th ed.) Washington, DC: National Academy of Sciences, 1979.

This directory was prepared by the Institute of Laboratory Animal Resources of the National Academy of Sciences. It is available for purchase for $6.25 from the Office of Publications, National Academy of Sciences, 2101 Constitution Ave., NW, Washington, DC 20418.

Bibliographies

Language Capacity in the Great Apes. Jean Balch Williams. Seattle: Primate Information Center, 1979. 122 Citations. [Price: $5.00. Send orders to: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195]

Colony Breeding of Macaques: A Bibliography. Benella Caminiti. Seattle: Primate Information Center, 1979. 255 Citations with Species Index. [Price: $6.00. Order information same as in previous reference.]

Disease

Chylothorax in rhesus monkeys with intravenous catheters. Olson, L. C. & Anver, M. R. (Univ. of Michigan Med. Sch., Unit for Lab. Animal Med., Ann Arbor, MI 48109) *Laboratory Animal Science,* 1979, *29,* 791-796.

Chylothorax associated with the use of indwelling intravenous catheters was diagnosed in 13 *Macaca mulatta.* Clinical signs were marked respiratory embarrassment or sudden death. Lesions at necropsy included large quantities of sterile pleural fluid, pulmonary atelectasis and chronic fibrinous pleuritis. Lipid was present in the effusion and in tissue sections of visceral pleura.

Ureaplasmas in the marmoset (*Callithrix jacchus*): Transmission and elimination. Furr, P. M., Hetherington, C. M., & Taylor-Robinson, D. (Div. of Comm. Dis., Clin. Res. Ctr., Watford Rd., Harrow HA1 3UJ, England) *Journal of Medical Primatology,* 1979, *8,* 321-326.

All adult marmosets tested had ureaplasmas in their throats but not in the lower respiratory tract, and rarely in the genital tract. Ureaplasmas persisted in the throat of a marmoset separated from the colony for 44 days. They could not be recovered from the animals for at least nine weeks after a course of minocycline. Airborne reinfection did not occur when these animals were surrounded by, but separate from, infected marmosets. It occurred when the minocycline-treated

animals were caged with the infected marmosets or were inoculated. The genital tract was more difficult to infect than the oropharynx.

A survey for *Anatrichosoma* (Nematoda: Trichinellida) in wild-caught *Macaca mulatta*. Karr, S. L., Jr., Henrickson, R. V., & Else, J. G. (California Primate Res. Ctr., Univ. of Calif., Davis, CA 95616) *Laboratory Animal Science*, 1979, *29*, 789-790.

100 rhesus monkeys which were captured from two geographical sites were tested for *Anatrichosoma*, a nematode that lives in the nasal passages. The monkeys were tested using both fecal examinations and nasal swabs. 3% of the monkeys from one site were positive, and 68% from the other site were positive. 21% of the animals tested by fecal examination were positive and 48% were positive using nasal swab examination.

Prevalence of ocular disease in a colony of tamarins and marmosets. Buyukmihci, N. & Richter, C. B. (Dept. of Urban Practice, College of Vet. Med., Univ. of Tenn., Knoxville, TN 37916) *Laboratory Animal Science*, 1979, *29*, 800-804.

In a large tamarin and marmoset experimental colony, 526 animals were examined by biomicroscopy and ophthalmoscopy for the presence of ocular disease. In 109 animals, there were 147 abnormalities involving the eyelids, cornea, iris, lens, retina, or optic nerve. Most abnormalities were unimportant in terms of ocular function, but a few did cause loss of vision and included diffuse, progressive retinal atrophy and a severely traumatized globe. The survey indicated that while usually minor, ocular disease in the tamarin and marmoset was widespread.

Virus detection in monkeys with diarrhea: The association of adenoviruses with diarrhea and the possible role of rotaviruses. Stuker, G., Oshiro, L. S., Schmidt, N. J., Holmberg, C. A., Anderson, J. H., Glaser, C. A., & Henrickson, R. V. (Viral & Rickettsial Dis. Lab., State of Calif. Dept. of Hlth. Serv., 2151 Berkeley Way, Berkeley, CA 94704) *Laboratory Animal Science*, 1979, *29*, 610-616.

To explore the role of viruses in the etiology of diarrhea in colony-reared monkeys, direct electron microscopy, the fluorescent virus precipitin test and cell culture inoculation were used to examine the stools of monkeys with and without diarrhea. The animals were predominantly rhesus with a few macaques of other species, and included infants, juveniles, and adults. Adenoviruses were isolated from a higher proportion of specimens from rhesus monkeys with diarrhea (73% of specimens from infants and 78% of specimens from juveniles and adults) than from control monkeys without diarrhea (22% of specimens from infants and 26% of specimens from juveniles and adults). SV 20 was the most frequently isolated simian adenovirus type; SV 17 and SV 32 also were recovered. Noncultivable adenoviruses detectable only by electron microscopy were not seen. Although adenovirus excretion was associated with diarrhea, the causal role of adenoviruses was

difficult to assess. When serial specimens from animals with chronic or intermittent episodes of diarrhea were examined, sequential infections with different viruses were found to be common. Rotaviruses were detected by electron microscopy and isolated in cell cultures from two infant rhesus monkeys with diarrhea. However, the low detection rate, together with negative serologic data of 40% of infant monkeys with diarrhea, suggested that rotaviruses were not the major cause of gastroenteritis in the monkeys under study.

A spontaneous outbreak of polychlorinated biphenyl (PCB) toxicity in rhesus monkeys (*Macaca mulatta)*: Clinical observations. Altman, N. H., New, A. E., McConnell, E. E., & Ferrell, T. L. (Perrine Primate Ctr., Papanicolaou Cancer Res. Inst., 1155 NW 14th St., Miami, FL 33136) *Laboratory Animal Science*, 1979, *29*, 661-665.

A spontaneous, progressive disease occurred in a large domestic breeding colony of rhesus monkeys. The disease was characterized by slow but continuous weight loss, alopecia, acne, facial edema, diarrhea, and trauma from other monkeys. Breeding efficiency was impaired with a high incidence of abortions and stillbirths. Live offspring were small and unthrifty contributing to a high infant mortality rate. The cause of this disease was polychlorinated biphenyls which were present in the concrete sealant on the cage floors. Removing the sealant and resurfacing the floors alleviated the problem.

A spontaneous outbreak of polycholorinated biphenyl (PCB) toxicity in rhesus monkeys (*Macaca mulatta*): Toxicopathology. McConnell, E. E., Hass, J. R., Altman, N., & Moore, J. A. (Env. Biol. Br., Nat. Inst. of Env. Hlth. Sci., PO Box 12233, Research Triangle Park, NC 27709. *Laboratory Animal Science*, 1979, *29*, 666-673.

Polychlorinated biphenyls (PCBs) were shown to be the cause of a wasting syndrome and reproductive dysfunction in a group of rhesus monkeys. The PCBs were found by gas chromatographic analysis in high amounts in the superficial layers of the concrete slab floors in the housing facility. The concrete sealant was suspected as the original source although it is not known whether it contained polychlorinated biphenyls before it was applied or if it was contaminated later. Histopathologic findings for the most part were confined to epithelial tissues where squamous metaplasia of several glandular tissues were observed. A striking finding was severe hypertrophy of the glandular stomach and a similar but less severe lesion in the colon. The lesions may be related in part to impaired vitamin A metabolism, but not to a dietary deficiency.

Crab-eating macaque (*Macaca fascicularis*): A substitute for the rhesus (*Macaca mulatta*) epileptic monkey model. Lockard, J. S. & Harris, A. B. (Dept. of Neurological Surgery, Univ. of Wash., Seattle, WA 98195) *Epilepsia*, 1979, *20*, 425-430.

The crab-eating monkey (*Macaca fascicularis*) is an alternative to the rhesus monkey (*Macaca mulatta*) in the epileptic model of focal

motor and secondarily generalized tonic-clonic seizures. EEG, interictal sharp activity, and spontaneous, recurring seizures developed within 3 months of the cortical injections of alumina gel. EEG spikes and stable baseline frequencies of seizures were manifested between 4 and 6 months. Phenytoin, phenobarbital, primidone, and valproic acid were efficacious in the new model at plasma concentrations similar to those of rhesus and man. The recent embargo by the Indian Government on rhesus monkeys and their subsequent scarcity and cost necessitate using another research species.

Tularemia in a group of nonhuman primates. Nayar, G. P. S., Crawshaw, G. J., & Neufelt, J. L. (Vet. Lab., Agric. Serv. Complex, Univ. of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2) *Journal of the Veterinary Medical Association*, 1979, *175*, 962-963.

In an episode of tularemia in a Canadian zoologic garden, three black and red tamarins (*Saguinus nigricollis*) and one talapoin (*Cercopithecus talapoin*) died. A second talapoin developed abscesses in the tongue and submandibular area; this animal recovered with treatment. *Francisella tularensis* was isolated from lung, liver, and spleen from each dead monkey and from pus collected from the tongue abscess of the sick talapoin. The attending veterinarian contracted the disease from a tamarin bite. The source of the disease was identified as wild ground squirrels, and the causative organism was recovered from the liver and spleen of one squirrel and from fleas found on it.

Physiology

The normal microbial flora of the baboon vagina. Skangalis, M., Swenson, C. E., Mahoney, C. J., & O'Leary, W. M. (Dept. of Microbiol., Cornell Univ. Med. Coll., 1300 York Av., NY, NY 10021) *Journal of Medical Primatology*, 1979, *8*, 289-297.

The microbial flora of the upper vagina and cervix was examined in 38 adult baboons at various stages of the menstrual cycle. The mean number of different species isolated from each baboon was 9.5, with species of *Bacteroides*, *Corynebacterium* and group D streptococci predominating. Lactobacilli and mycoplasmas were found in 47.4 and 44.7% of the animals, respectively. No ureaplasmas were isolated. Cyclical variations in the microbial flora were minimal.

Reproductive and hormonal patterns in the African green monkey (*Cercopithecus aethiops*). Hess, D. L., Hendrickx, A. G., & Stabenfeldt, G. H. (Oregon Reg. Pri. Res. Ctr., 505 NW 185th Av., Beaverton, OR 97005) *Journal of Medical Primatology*, 1979, *8*, 273-281.

The results of breeding *Cercopithecus aethiops* under time-mated laboratory conditions and analysis of total estrogen, progesterone, and LH concentrations in plasma during the menstrual cycle and plasma estrogen and progesterone concentrations during pregnancy indicate that this species is a suitable alternative for the rhesus monkey as a model for investigations of reproductive function in man.

Serum electrophoretic patterns of karyotypically defined owl monkeys (*Aotus trivirgatus*). Reardon, M. J., Hall, R. D., & Davidson, C. E. (Dept. of Comp. Path., Div. of Path., Walter Reed Army Inst. of Res., Wash., DC 20012) *Laboratory Animal Science*, 1979, *29*, 617-620.

Sera were electrophoretically separated and examined from 238 karyotyped *Aotus trivirgatus* and 29 unkaryotyped offspring. Albumin polymorphism was observed with high frequency and found to conform to a co-dominant allele mode of transmission. A unique alpha globulin was identified in Karyotypes I, VII and unkaryotyped offspring, of which one parent was a Karyotype I. This alpha globulin phenotype appears to be a dominant characteristic.

Chromosome studies in the orang utan. Seúanez, H. & Fletcher, J. (Dept. of Genetics, Federal Univ. of Rio de Janeiro, Rio de Janeiro, Brazil) *The Dodo*, Number 15, 1978, 77-79.

Findings are discussed which lead to the conclusion that the Bornean and Sumatran orangutans are chromosomally distinct.

Behavior

Contact and separation in adult monkeys. Anderson, J. R. & Chamove, A. S. (Psychology Primate Unit, Univ. of Stirling, Stirling FK9 4LA, Scotland, U.K.) *South African Journal of Psychology*, 1979, *9*, 49-53.

To assess the hypothesis that individual space may reflect differential levels of attachment and, if so, grooming and huddling may both be good measures of attachment, each of 10 adult female *Macaca arctoides* experienced a 23-hour separation from a stable group of 33 monkeys. On return, grooming and receipt of grooming increased over pre-separation levels whereas huddling, except for ventro-ventral huddling, decreased. Surprisingly, while there was no significant increase in grooming or huddling with the preferred pre-separation partners, overall partner preferences for grooming and ventro-ventral huddling remained stable. This suggests that grooming and at least one type of huddling are potentially useful measures of attachment.

Abnormal behaviour patterns developing in chimpanzee infants during nursery care--A note. Dienske, H. & Griffen, R. (Primate Ctr. TNO, 151 Lange Kleiweg, Rijswijk, The Netherlands) *Journal of Child Psychology and Psychiatry*, 1978, *19*, 387-391.

During mildly understimulating nursery care, chimpanzee babies and infants developed various abnormal behavior patterns. These patterns were nearly always lacking during care by a chimpanzee mother. The abnormalities closely resembled those known in human infants. Their development was attributed to a restricted possibility of showing behavior directed to the caretaker. Redirected clasping could be attributed to a lack of clinging to an adult. Body-rocking developed when locomotion was hampered. The etiology of digit-sucking was inconclusive, but compatible with the hypothesis that it arose if babies fell asleep while alone. It is suggested that these infantile deviant behavior

patterns can be used as indications for an optimal adjustment of parental behavior to the needs of a particular infant.

Facilities and Care

Indoor-outdoor housing systems for a self-sustaining marmoset breeding colony. Stein, F. J., Sis, R. R., & Levy, B. M. (Dept. of Vet. Anatomy, Coll. of Vet. Med., Texas A&M Univ., College Station, TX 77843) *Laboratory Animal Science*, 1979, *29*, 805-808.

Indoor-outdoor housing of three types was designed, constructed, used, and evaluated for housing a breeding colony of common (*Callithrix jacchus*) and cottontop (*Saguinus oedipus*) marmosets. All types were relatively inexpensive to construct, required minimal care, simulated a natural environment, and allowed for some isolation between units and between individual runs within units.

Resocialization of chimpanzees: Ten years of experience at the Primate Foundation of Arizona. Fritz, P. & Fritz, J. (Primate Found. of Arizona, PO Box 86, Tempe, AZ 85281) *Journal of Medical Primatology*, 1979, *8*, 202-221.

61 chimpanzees (*Pan troglodytes*) from various sources and backgrounds have been resocialized in a cage setting and integrated into social unit groupings. Rehabilitated animals have been temporarily recycled into non-destructive research and breeding projects.

Food adaptations of a transplanted Japanese macaque troop (Arashiyama West). Clark, T. W. (Box 2705, Jackson, WY 83001) *Primates*, 1979, *20*, 399-410.

In 1972 an Arashiyama West troop of Japanese macaques was transplanted to the southcentral United States and kept in a semi-free ranging condition. The new environment provided an opportunity to assess aspects of the species' adaptive potential. About 1,500 feeding observations were made monthly over 6.5 months. Unlimited provisioned food was available, but the monkeys utilized native plants immediately and use increased until it provided 50 + % of the diet by weight. Shrubs provided 75% of foods in the first month and 32% thereafter. Sorghum comprised 25% in May-July. Soil, arthropods, fungi, bulbs, and roots each comprised less than 5%. Between 21 and 37 foods were utilized monthly. Monthly food uses corresponded to availability. Many food plants required unique handling by monkeys. Four general adaptive responses to potential foods are described. Evolution has clearly shaped the Japanese macaque into a highly omnivorous and behaviorally flexible animal.

The growth and development of the squirrel monkey (*Saimiri sciureus*). Kaack, B., Walker, L., & Brizzee, K. R. (Delta Reg. Pri. Res. Ctr., Tulane Univ., Covington, LA 70433) *Growth*, 1979, *43*, 116-135.

Squirrel monkeys of 2 subspecies, Bolivian and Colombian, were removed from their mothers on the day of birth and nursery reared up to 2 years of age. Infants were tested, weekly for 12 weeks, then

monthly for 1 year, and at 2 years of age. Tests included morphology (body weight, crown-rump length, and head measurements), behavior (reflexes, activity, reaction to the surrogate), and physiology (heart rate, respiratory rate, temperature, and optokinetic nystagmus). Data show some likenesses and some differences between the 2 subspecies.

Breeding

Breeding and pelage development of black and white colobus monkey *Colobus polykomos polykomos* (Zimmerman, 1780) at the Jersey Zoological Park. Mearns, C. S. & Pidgeon, M. S. (Jersey Wildlife Preservation Trust, Jersey, Channel Island, UK) *The Dodo*, Number 15, 1978, 61-69.

The data for this report were derived from the last five infants of this colobus species to be born at the Jersey Zoo. The stages of pelage development from birth to completion of development (which took a mean of 112 days) are described.

'Cocktail' orang utans and the need to preserve pure-bred stock. Mallinson, J. J. C. (Address same as in previous reference.) *The Dodo*, Number 15, 1978, 69-77.

It is well recognized that the establishment of viable, self-sustaining populations of endangered species in captivity relies heavily on international zoo cooperation with the 'farming' of the stock available in the best interest of the species concerned. The responsibility of the zoological community to ensure that a particular species is perpetuated with as great a genetic variance as possible within its specific or subspecific form must not be underestimated; and while the opportunity still presents itself, every measure must be taken to prevent hybridization, either at specific or subspecific levels. This paper goes through the relevant data which led to the decision to carry out a vasectomy on the Jersey bred hybrid, *Pongo p. pygmaeus* × *Pongo pygmaeus*.

Intrauterine infections in nonhuman primates. Kaplan, C. G. (San Diego Zoo Res. Dept., PO Box 551, San Diego, CA 92112) *Journal of Medical Primatology*, 1979, *8*, 233-243.

Examination of the placenta is essential in determining the causes of fetal perinatal morbidity and mortality in both human beings and domestic animals. Gross and histologic examination of five nonhuman primate placentas revealed inflammatory processes, either of the ascending type, with chorioamnionitis and fetal vasculities, or of the hematogenous type with villitis. These reactions were similar to those occurring in man, with known implications for perinatal outcome.

Amniocentesis and antenatal sex determination in the rhesus monkey (*Macaca mulatta*). Hess, D. L., Matayoshi, K., Baker, C. A., & Hendrickx, A. G. (Oregon Reg. Pri. Res. Ctr., 505 NW 185th Av., Beaverton, OR 97005) *Journal of Medical Primatology*, 1979, *8*, 244-251.

Antenatal sex was correctly identified in 87.5% of the rhesus monkeys

studied by evaluation of sex chromatin bodies in the exfoliated cells present in amniotic fluid. Fluid samples were obtained by either amniocentesis, amnioscopy, or by Cesarean section at 80-120 days of gestation. Amniotic fluid concentrations of progesterone, total estrogen, and testosterone were not correlated with fetal sex. Concentrations of these hormones decreased over the time period examined. Amniocentesis is a simple procedure which provides for routine fetal sex determinations.

Artificial insemination and a note on pregnancy detection in the non-human primate. Hendrickx, A. G., Thompson, R. S., Hess, D. L., & Prahalada, S. (Calif. Pri. Res. Ctr., Univ. of Calif., Davis, CA 95616) *Symposia of the Zoological Society of London*, 1978, No. 43, 219-240.

Semen intended for artificial insemination (AI) of nonhuman primates is normally collected by electroejaculation with either penile or rectal stimulation (e.g., macaques) or by masturbation (e.g., chimpanzee). Although detailed comparative experiments have not been done, the penile method is considered to produce the best quality semen when electroejaculation is used and therefore may be preferred when dilution of semen is required. Vaginal, intracervical, intrauterine, and intraperitoneal insemination are four methods previously used in nonhuman primates. While substantial data are not yet available, the conception rate for each of the four methods appears to be equal to, or greater than, that with natural mating. An important aspect of all AI trials is an accurate means of determining optimal mating time. Although simian semen may be successfully frozen with recovery of near pre-treatment motility, no term pregnancies have been reported using frozen semen, in contradistinction to the well documented success for similar techniques in domestic animals and man. The literature indicates that failure to achieve successful pregnancy beyond the first trimester is probably due to acrosomal damage of spermatozoa. Consequently, to maximize benefits from AI, techniques for semen preservation in nonhuman primates must be further developed. A valuable adjunct to a simian AI program would be a rapid and reliable index of early pregnancy. Various methods of pregnancy detection are briefly reviewed and preliminary data are presented which suggest that previously described elevations in serum progesterone and/or estrogen may prove useful in detecting pregnancy immediately following implantation (i.e., 12-17 days post-mating).

Sexual maturation among members of a transported troop of Japanese macaques (*Macaca fuscata*). Wolfe, L. (811 Ector, Denton, TX 76201) *Primates*, 1979, *20*, 411-418.

Data on the sexual maturation of a transported troop of Japanese macaques were collected during the 1973-74 and 1974-75 breeding seasons. Analysis of the data revealed that the sexual maturation of many monkeys was delayed one to two years. It is suggested that the delay of sexual maturation is related to a failure of the pubescent-aged monkeys to attain appropriate weight levels after transportation.

Female reproductive cycles and birth data from an Old World monkey colony. Hadidian, J. & Bernstein, I. S. (Dept. of Anthro., 409 Carpenter Bldg., Penn. St. U., Univ. Park, PA 16802) *Primates*, 1979, *20*, 429-442.

Observations on reproductive cycles and births for a variety of captive Old World monkey species are reported. The majority of the subjects have been group living animals, housed with conspecifics in large outdoor compounds. Reproductive cycles were measured by notation of changes in the degree of female sex skin swellings. Three types of cycles are distinguished: estrus, intrapregnancy, and pubertal. Cycle length periods and the duration of the period of swelling are described for each cycle type. Birth distributions are analyzed for the occurrence of seasonality, and a marked seasonal effect tied to the onset of cycling in pubescent females is noted. The influence of a group formation effect on the timing of the reproductive season in one species is discussed.

Breeding and pregnancy control of stumptailed macaques (*Macaca arctoides*). Janssen, F. G. J. & Peters, A. M. (Cent. Anim. Lab., Catholic Univ. Nijmegan, Nijmegen, The Netherlands) *Z. Versuchstierk.*, 1979, *21*, 107-111.

A description is given of an intensive breeding system with stumptailed monkeys housed in individual cages. For purposes of the research program the pregnancy time of the animals had to be known. Early pregnancy was detected by a urine test on MCG, which was performed from day 18 of the mating period. This test was only clearly positive on day 20-22 after conception. During 15 months, 28 pregnancies were detected in 33 females, 13 young were born, 12 pregnant monkeys were used for prenatal obstetric studies, and there were 3 stillbirths.

Sexual compatibility in rhesus monkeys: Predicting sexual performance of oppositely sexed pairs of adults. Goy, R. W. (Wisconsin Reg. Pri. Res. Ctr., 1223 Capitol Court, Madison, WI 53706) *Ciba Foundation Symposium*, 1979, *62*, 227-255.

Data are presented that suggest that latency to ejaculation can be used as an index of pair compatibility in rhesus monkeys. Relationships between the concept of pair compatibility and current concepts of sexual attractiveness, proceptivity, and receptivity are discussed.

Ecology and Field Studies

A sazonalidade do processo reprodutivo em *Leontopithecus rosalia* (Linnaeus, 1766) (Callitrichidae, Primates). Coimbra-Filho, A. F. & Maia, A. de A. (Rua Artur Araripe 60/902, Gavea, Guanabara, Brazil) *Rev. Brasil. Biol.*, 1979, *39*, 643-651.

Seasonality of reproduction in *L. rosalia* in the State of Rio de Janeiro is discussed in this paper. The methodology used to obtain data relative to breeding and bearing seasons of the 3 *Leontopithecus* subspecies and some of their hybrids is discussed.

Current primate field studies. Chivers, D. J. (Sub-Dept. of Vet. Anatomy, Univ. of Cambridge, Cambridge CB2 1QS, England) *Primate Eye*, 1979, *12*, (Suppl.), 1-17. ($5.00 or £2.50 Payable in advance.)

Taxonomy

The species of sakis, genus *Pithecia* (Cebifae, Primates), with notes on sexual dichromatism. Hershkovitz, P. (Fld. Museum of Nat. Hist. Mammal Div., Roosevelt Rd. at Lake Shore Dr., Chicago, IL 60605) *Folia Primatologica*, 1979, *31*, 1-22.

Recognized species of sakis, South American monkeys of genus *Pithecia* (Cebidae), are *P. hirsuta* Spix, *P. monoachus* E. Geoffroy, *P. Albicans* Gray, *P. pithecia* Linnaeus. Evolutionary stages in sexual dichromatism in sakis and other primates are noted.

Serum albumin and erythrocyte adenosine deaminase polymorphisms in Asian macaques with special reference to taxonomic relationships among *Macaca assamensis*, *M. radiata*, and *M. mulatta*. Shotake, T. (Prim. Res. Inst., Kyoto U., Inuyama, Aichi, 484 Japan) *Primates*, 1979, *20*, 443-451.

Serum albumin (Alb) and erythrocyte adenosine deaminase (ADA) polymorphisms in Asian macaques were investigated by means of starch gel electrophoresis. The materials comprise a total of 2,323 blood samples from eight species, namely, *Macaca fuscata*, *M. mulatta*, *M. cyclopis*, *M. fascicularis*, *M. nemestrina*, *M. speciosa*, *M. radiata*, and *M. assamensis*. It was observed that three Alb phenotypes were controlled by two co-dominant alleles, $Alb_{mac}A$ and $Alb_{mac}B$ and six ADA phenotypes by four co-dominant alleles, $ADA_{mac}{}^{1}$, $ADA_{mac}{}^{2}$, $ADA_{mac}{}^{3}$, and $ADA_{mac}{}^{4}$. The taxonomic relationships among *M. assamensis*, *M. radiata*, and *M. mulatta* were analyzed by measuring the Nei's (1975) genetic distance. The result supported Hill and Bernstein's (1969) postulation that *M. assamensis* was more closely related phylogenetically to *M. radiata* than to *M. mulatta*.

Instruments and Techniques

A rapid procedure for shortening canine teeth of nonhuman primates. Reynolds, J. A. & Hall, A. S. (Dept. of Comp. Med., Bowman Gray Sch. of Med., Winston-Salem, NC 27103) *Laboratory Animal Science*, 1979, *29*, 521-524.

A modified pulp cap procedure was utilized to shorten canine teeth of nonhuman primates. A temporary cap was made by cutting the tooth with a diamond-faced cutting disc, making a conical cavity in the tooth with a carbide dental burr, and filling the cavity with a rapid hardening filler material. A permanent pulp cap was made by repeating the above technique, making three anchor holes, connecting the holes with a furrow, and capping with quick-setting dental restorative material or amalgam. These procedures provided a simple, rapid, and uncomplicated alternative to canine tooth extraction.

A note on a vasectomy and an orchidectomy carried out on a hybrid orang utan *Pongo pygmaeus pygmaeus* × *Pongo pygmaeus abelii*. Birt, St. J. *The Dodo*, Number 15, 1978, 79-81.

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FUNDS FOR TRAVEL TO IPS CONGRESS IN ITALY

The International Primatological Society has been awarded funds from the National Science Foundation, through its International Travel Grant Program, to help support travel expenses of U. S. participants in the IPS's VIIIth Congress scheduled for July, 1980 in Florence, Italy. Two types of awards will be made. The first type will cover the full cost of the round-trip super-APEX fare from the recipient's city of residence to Florence. Only a very limited number of these awards will be made. The second type will be for $400 (approximately half the round-trip super-APEX airfare to Florence); a larger number of these $400 awards will be made. Use of U. S. carriers is stipulated for both types of awards.

Individuals wishing to be considered for these travel awards should prepare an application that contains (a) their name, Social Security number, title, institutional affiliation, and address; (b) a brief outline, NOT TO EXCEED ONE PAGE, of their proposed participation in the Congress (and/or in Pre- and Post-Congress activities that are part of the Congress's overall scheduled program) and of their qualifications for such participation; (c) whether they would be willing to accept a $400 award rather than one covering the full round-trip airfare; and (d) when an NSF travel grant was last received. These applications should be sent to: Dr. Stephen J. Suomi, Secretary for the Americas, IPS, Primate Laboratory, University of Wisconsin-Madison, Madison, WI 53706.

The DEADLINE for receipt of applications is March 15, 1980.

All applications will be reviewed by an Ad Hoc Committee of IPS, and all awards will be made primarily on the basis of proposed participation in the Congress's overall scheduled program. Decisions regarding awards will be made in accordance with the Civil Rights Act of 1964 and the implementing regulations prohibiting discrimination against any person on the grounds of race, color, religion, or national origin.

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CHANGES IN *CURRENT PRIMATE REFERENCES*

According to Mrs. Maryeva Terry of the Primate Information Center (PIC), after more than 800 issues, the PIC's second eldest service, *Current Primate References*, will finally come of age in 1980. In January, this publication will acquire general subject headings and a primate index. The Publication frequency will change from weekly to monthly.

Current Primate References is the last of the four fundamental services derived from the PIC's unique data base of literature on nonhuman primates to show the effects of improved computer capabilities. The preparation of Custom Retrospective Bibliographies, which can cover periods as long as 40 years, and of Custom Bi-Weekly Bibliographies was transferred to the new system in 1978. The preparation of published bibliographies on special topics in primate research became automated in mid-1979.

A list of bibliographies now in print, the subscription rates to *Current Primate References*, and the schedule of fees for the PIC's other services can be obtained by writing: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195, U.S.A.

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