LABORATORY PRIMATE NEWSLETTER

Volume 6, Number 2

April, 1967

Edited by

Allan M. Schrier

Consulting Editor: Morris L. Povar

Psychology Department
Brown University
Providence, Rhode Island

POLICY STATEMENT
(Revised January, 1967)

The primary purpose of the Laboratory Primate Newsletter is to provide information on maintenance, breeding, and procurement of nonhuman primates for laboratory studies. A secondary purpose is to disseminate general information about the world of primate research. Requests for information, for special equipment, or for animal tissues or animals with special characteristics will be included in the Newsletter. As a rule, the only research articles or summaries that will be accepted for the Newsletter are those that have some practical implications or that provide general information likely to be of interest to investigators in a variety of areas of primate research. However, special consideration will be given to articles containing data on primates not conveniently publishable elsewhere. General descriptions of current research projects on primates will also be welcome.

It should be kept in mind that the Newsletter is not a formal publication and it is not obtainable in most libraries. Therefore citation of Newsletter notes or articles should be limited to special circumstances. This also means that inclusion of material in the Newsletter does not preclude its publication in a journal. As a rule, authors of longer articles will receive two extra copies of the issue in which the article appears; reprints will not be supplied under any circumstances.

The Newsletter appears quarterly, and the mailing list is open to anyone in the primate field expressing an interest. There is no charge for new issues and back issues for the current year. Back volumes will be furnished free of charge to any library operated by a nonprofit organization with the understanding that they will be kept in the library. Individuals may purchase Volumes 1, 2, and 3 for $4.00 per volume, and Volumes 4 and 5 for $2.00 per volume. (Please make checks payable to Brown University.)

Preparation of articles for the Newsletter.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the reference 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 reference 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 Fiedler [In H. Hofer, A. H. Schultz, & D. Starck (Eds.), Primatologia. Vol. 1. Basel, Switzerland: Karger, 1956. Pp. 1-266].

All correspondence concerning the Newsletter should be addressed to:

Allan M. Schrier
Psychology Department
Brown University
Providence, Rhode Island 02912

Acknowledgment

The Newsletter is supported in part by U. S. Public Health Service Grant MH-07136 from the National Institute of Mental Health.

EDITOR'S NOTES

The March, 1967, issue of the American Journal of Physical Anthropology consists entirely of the papers presented at the Symposium on Primate Locomotion, which took place at the University of California at Davis in 1965, and which was organized by Warren Kinzey. Extra copies have been printed in order to meet anticipated demand of primatologists who do not subscribe to the Journal.

Bartol Matanic's note, "Possible sensitivity of squirrel monkeys to Combiotic," which appeared in the January, 1967, issue of the Newsletter has brought him nine replies thus far. Eight letters described similar observations when streptomycin or formulas containing streptomycin were given parenterally to a variety of other animals (rats, rhesus monkeys, and spider monkeys). One reply mentioned a paper by D. R. Justesen, L. L. Lewis, J. Zimmerman, & J. E. Stell (read at the Annual Meeting of the Animal Care Panel, Philadelphia, 1965) which reported that streptomycin in large doses causes immediate respiratory arrest in most primates.

CONTENTS

NONHUMAN PRIMATE FIELD RESEARCH IN SOUTH AMERICA: EXPERIENCES AT A FIELD LABORATORY[1]

Charles C. Middleton[2]

Department of Laboratory Animal Medicine
The Bowman Gray School of Medicine of Wake Forest College

and Jorge E. Rosal[3]

Department of Pathology
Louisiana State University School of Medicine

Naturally occurring atherosclerosis was described in Saimiri sciureus (squirrel monkeys) which had been laboratory conditioned for periods of from 6 to 8 months (Middleton, Clarkson, Lofland, & Prichard, 1964). Although these animals had been fed Purina Monkey Chow and fruit, it was not known if the change from natural environment and diet influenced the disease process. Cebus albifrons (ringtail or cinnamon ringtail monkeys) on atherogenic diets were found to have some aortic atherosclerosis in a cholesterol-fed group and a lesser extent in a control group of animals (Clarkson, Middleton, Lofland, & Bullock, 1965).

No baseline information was available as to the extent of aortic and coronary atherosclerosis in S. sciureus or C. albifrons in their natural habitat. It seemed important to obtain information on this as well as on the serum lipid levels. The study was extended to include Lagothrix species (woolly monkeys), Ateles species (spider monkeys), Cebus apella, and Leontocebus nigricollis (white lipped marmosets) to see what their usefulness might be for the study of atherosclerosis. Because of the importance of diet in experimental atherosclerosis in animals, it seemed imperative to study these animals in a field laboratory.

Method of Procedure

The Tarpon Zoo, Tarpon Springs, Florida, which maintains compounds in Barranquilla on the coast of Northern Colombia and in Leticia on the

---

[1]This study was supported in part by a grant from the United Health Foundations, Inc., and grants from the National Institutes of Health (FR 00180-01 and 2 GM TI 2G-266-05), United States Public Health Service.

[2]Present address--Sinclair Comparative Medicine Research Farm, University of Missouri, Columbia, Missouri

[3]Present address--Institute of Nutrition of Central America and Panama.

Amazon River in Southern Colombia, was contacted and engaged to construct a field laboratory to our specifications and to supply the animals which were desired for study. Leticia was selected as the site for construction of a laboratory because one of the co-owners of the Tarpon Zoo lives there. The other reason for selecting Leticia was that the S. sciureus, Lagothrix species, C. apella, and L. nigricollis are native in this area, thus making it necessary to transport only the Ateles species and C. albifrons from Barranquilla to Leticia.

Leticia is located on the Amazon River about 2,500 miles from its mouth, at a point four degrees latitude and seventy degrees longitude. Brazil, Peru, and Colombia, border at this point. Leticia, a town of 5,000 inhabitants, is in the territory of Amazonas, and is the only town in Colombia on the Amazon River. The dry season in Leticia is the summer and fall months, and, at this time, the river recedes to its lowest level of the year. It is during this time that monkeys are caught in greatest numbers. Leticia has air service three days per week. These flights originate and return the same day to Bogota, Colombia. The town has a water system, but it is available for only an hour each day, so that reservoir tanks must be filled to supply water throughout the day. The city operates a diesel-powered electrical plant from 6:00 p.m. to 11:00 p.m. This electrical plant is overloaded, which results in 80 volts rather than the usual 110 volts. A continual 110-volt electrical supply was furnished by the power plant of the Tarpon Zoo compound. Sterilization of gloves for necropsy was provided by the local hospital in Leticia. Professional associations in Colombia were on a personal, rather than formal, basis.

Complete necropsies were needed on all animals because of the importance of indigenous diseases and parasites in maintaining laboratory primates and evaluating experimental results. The parasites and tissues were preserved in formalin and brought to the United States for identification and histopathological study.

All materials and supplies for which use was anticipated had to be taken to Leticia since none of the items were available there. Necropsy instruments, precision balance, triple beam balance, microscope, centrifuge, surgical gloves, microscopic slides, stains and other consumable supplies were taken from the United States to Colombia. Such items as formalin, specimen bottles, and dry ice were purchased in Bogota, Colombia, and flown to Leticia as needed. The laboratory is shown in Figures 1, 2, 3, and 4. All animals and services supplied by the Tarpon Zoo were paid for by purchase order to their office in the United States. This eliminated the problem of taking a large sum of money into South America and the problem of money exchange.

Results

During the summers of 1964 and 1965, 393 animals were necropsied. The number of animals necropsied by species were S. sciureus, 220;

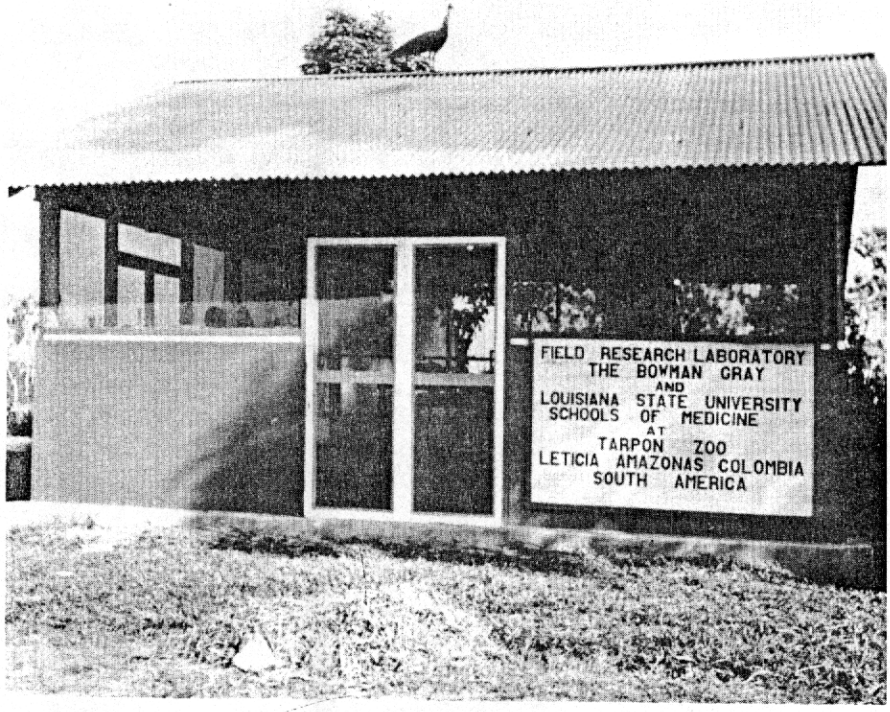

Figure 1. Field research laboratory in Leticia, Colombia.

L. nigricollis, 40; C. albifrons, 53; Lagothrix species, 20; Ateles species, 40; and C. apella, 20.

The results of the survey are being prepared for publication by category and will include the atherosclerosis and serum lipid studies, information on parasites and gross histopathology, and normative data which will include organ and body weights, anthropologic measurements, etc.

Conclusions

S. sciureus are available in large numbers and no problem was encountered in acquiring the desired number of animals. All of the other species used are available on a much more limited scale. For example, we were unable to obtain any adult Lagothrix monkeys during the course of the two summers in Leticia. C. apella monkeys are also available in very limited numbers, and only three adults of this species were obtained. The Ateles in the Leticia area are available in very limited numbers and for this reason the Ateles from the area of Barranquilla were used. Again difficulty was encountered in acquiring adults, and, of the adults obtained, all were females. Fifty-three C. albifrons were used but it took two summers to acquire this number.

Figure 2. Laboratory equipment and safari coolers used for transporting equipment and tissues.

Baby and juvenile C. apella, Ateles species, and Lagothrix species are available in fairly large numbers. This is explained by the fact that the females are killed for food by the natives, leaving the young that they are carrying to be sold to animal dealers. Another factor is that the juveniles are more easily trapped than are the adults, and when trapped are not capable of tearing up the traps and escaping as are the adults.

The field laboratory was constructed according to our specifications and equipped by us. It was very satisfactory for conducting this study.

There are a number of advantages and disadvantages to field laboratory research. Some of the advantages are as follows: 1. The

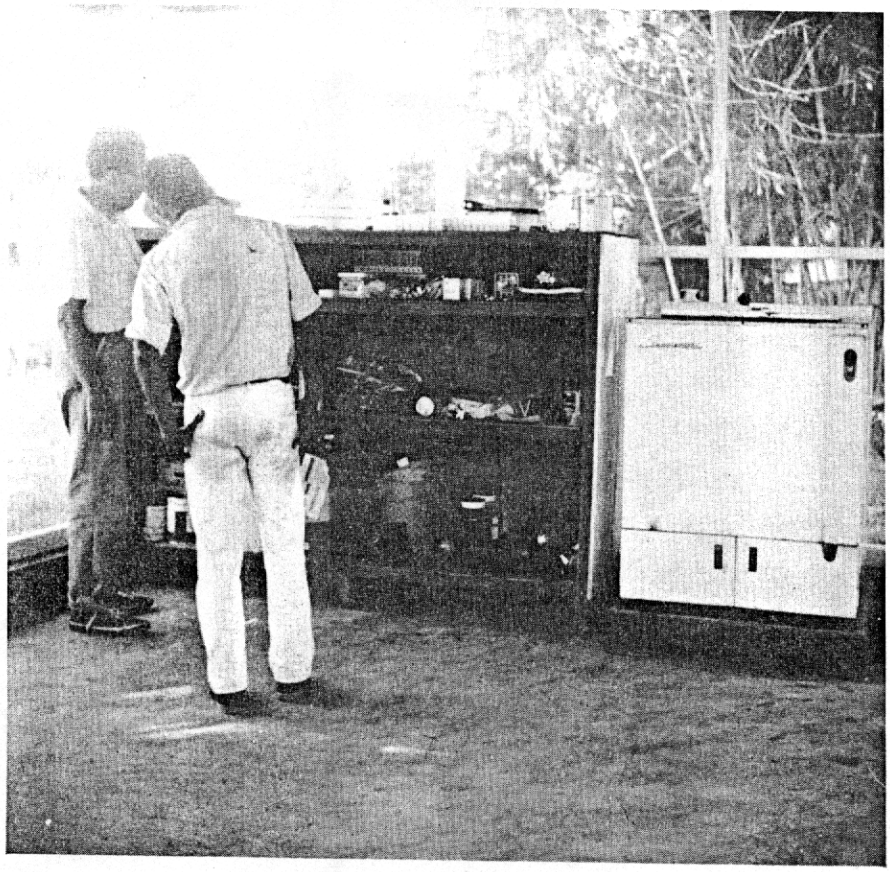

Figure 3. Storage cabinet and kerosene-operated freezer.

animal is nearest its natural habitat. 2. Origin of animals can be determined. 3. Time of captivity can be estimated. 4. The condition of the animals closely reflects their condition in the natural state. 5. Cost of the animals is about one-third to one-half the cost in the United States.

Some of the problems or disadvantages are: 1. The difficulty of transportation of scientific equipment to the field. 2. Uncertainty regarding the local supply of animals. 3. Health hazards for field personnel. 4. Customs and language barriers. 5. Unreliable water and electrical supplies. 6. Construction of a facility in which to work. 7. Unstable political and economic situation.

The type of information that was desired could only be obtained from this type of field laboratory endeavor and for this reason it was judged to be invaluable.

The laboratory in Leticia is a permanent structure and is available for use should other field studies be indicated at a future date.

Figure 4. Necropsy table with necropsy in progress.

Before any such study is undertaken it should be established whether special permission must be obtained from the country where the work is to be conducted. This can prevent problems with customs officials and more nearly assure that the necessary equipment can be taken into and out of the country.

Contact with professional people in the country where the study is to be conducted is a valuable asset. This proved to be most helpful in the study reported here. A working knowledge of Spanish is necessary for adequate communication. This was no problem for us because one of the investigators on this trip is a native of Guatemala.

References

Middleton, C. C., Clarkson, T. B., Lofland, H. B., & Prichard, R. W.

Atherosclerosis in the squirrel monkey. Archives of Pathology, 1964, 78, 16-23.

Clarkson, T. B., Middleton, C. C., Lofland, H. B., & Bullock, B. C. Effect of age on cholesterol-induced atherosclerosis in Cebus monkeys. Federation Proceedings, 1965, 24, 310. (Abstract.)

* * *

MYCOBACTERIUM CULTURING SERVICE

The National Cancer Institute is considering the feasibility and value of a national culture service for acid-fast organisms from laboratory primates. This could be done under contract to NCI. The laboratory would accept granulomatous lesions, especially those shown to contain acid-fast bacilli, culture the material, issue a report, and compile the findings. The purpose would be to (1) encourage autopsy and definitive diagnosis of tuberculin reactors, and (2) compile information on the extent and etiology of simian tuberculosis.

This service would be free to any qualified veterinarian or research worker in the U.S.A. We would like to receive encouragement or comments, opinions on the need or usefulness of this service, and estimates of numbers of specimens you might submit.--Roy Kinard, National Cancer Institute, National Institutes of Health, Wiscon Building, Room 5A-14, Bethesda, Maryland 20014.

ASPECTS OF PRIMATE RESTRAINT AND PRACTICE

T. C. Ruch

University of Washington Regional Primate Research Center

Criticism has been leveled against the keeping of primates for extended periods in a Baby-Tenda type of restraining chair and is likely to be intensified soon. It is believed that chairing can be better defended if it is practiced only when it is essential, rather than for convenience. In experiments utilizing certain types of brain electrodes, flow meters on blood vessels with protruding wires, gastric fistulae, and chronic cannulations of various types, residence in chairs is clearly a necessity. On the other hand, experiments in which these technical problems are not a factor should not employ chairs simply to avoid catching or for other convenience. A transfer cage may be used to efficiently remove animals from the home cage to a test unit. With adolescents and young adults of the common laboratory species, use of transfer cages is well within the capabilities of even female testers. If a procedure such as recurrent blood sampling rather than an experiment is the reason for chairing, the use of a transfer cage modified as a squeeze cage or a home cage equipped with a squeeze feature obviates the need for chairing.

There is a wide range of experiments in which it is expedient to chair animals in order to position their head or arms in standard or desired fashion. It is not necessary for such animals to be permanently chaired.

A few months ago a method of chairing which does not require hand capturing was begun by three graduate students--Susan Barrow, Erich Luschei, and Carol Saslow. Using operant conditioning techniques, they have trained Macaca mulatta, up to 7 kg, to chair themselves from home cages. By offering preferred fruit the investigators have been able to shape some animals within a day; others have taken four or five days. Reduction of food intake was not necessary.

Conditioning was begun as an experimental procedure following observations of the daily chairing of squirrel monkeys by another investigator, Marc Nathan. These animals do not take well to restraining chairs and thus had to be manually placed in chairs every day for testing. Although they were used in a program of avoidance procedure involving mild shock rather than food reinforcement, they became less resistive to handling as the experiment progressed. This suggested that on programs involving food reinforcement, monkeys could be trained to chair themselves. A report on this procedure has been published (Barrow, Luschei, Nathan, & Saslow, 1966). The training of another rhesus with a visual defect was facilitated by manually placing the monkey in the chair a few times. Since this animal was fed immediately upon chairing, manual assistance became unnecessary in four or five days.

Even if some aversive element is necessary to the experiment, it is believed that monkey could, with proper training procedures, be shaped to chair themselves, provided they are reinforced immediately and the use of aversive stimuli delayed.

Operant conditioning techniques have also been used in another area by Gordon Jensen and Ruth Bobbitt. They have been studying a group of Macaca nemestrina structured to resemble a natural troop in one of the Center's compounds. In this connection, they have trained four large males, each about 10 kg with fully developed canines, to enter single trapping cages on bell and light cues so the compound can be safely cleaned or entered for other purposes. Each male has his own visual and auditory code. Fruit is offered in the cages and only monkey chow in the main compound. In this confined group situation, pigtailed macaque males will freely attack humans, apparently in their role as guardians of the social group. The trapping system has worked successfully during the past several months; though it has been found necessary even after this period to adhere constantly to the formal training procedure.

There remains a residuum of cases in which long continued chair restraint is justified. Some were listed above. Others involve animals of an age or disposition in which biting or scratching is a problem. That apparently healthy monkeys can carry disease transmitted by bites and fatal to man (B virus which caused the recent death of psychologist K. R. L. Hall) is well known. As Doty (1965) trenchantly points out, the danger to man must be weighed against the discomfort of the monkey.

Continuous efforts are being made and should be accelerated to see that the chair produces no more than restraint. This calls for improvement in the design of chairs to suit the body conformation of various ages and species, increased skill in chairing, exercise features for the legs, and better visibility of pressure points. Different mechanical approaches to the restraint and biting problems should be investigated, and psychological approaches as described above, which are just beginning, should be continued.

References

Barrow, Susan, Luschei, E., Nathan, M., & Saslow, Carol. A training technique for the daily chairing of monkeys. Journal of the Experimental Analysis of Behavior, 1966, 9, 680.

Doty, R. W. Conditioned reflexes elicited by electrical stimulation of the brain in macaques. Journal of Neurophysiology, 1965, 28, 623-640.

THE SHIPMENT OF TREE SHREWS (TUPAIA GLIS) TO THE UNITED STATES FROM MALAYA[1]

Orville Elliot

Department of Anthropology, Harvard University

and Richard Thorington, Jr.

New England Regional Primate Research Center

During 1964 and 1965 we shipped 162 tree shrews and 12 slow loris from Kuala Lumpur to Boston. The animals were trapped in Malaya. Some were maintained in captivity there for as long as 20 months before shipment, while others were shipped shortly after they were caught. The crates used for shipping were made of wood and screening, and divided into compartments, each containing one animal. A tube in each compartment provided a dark hiding place for the tree shrews. Ripe and unripe bananas and apples were placed in each compartment in sufficient quantity for the trip. The following documents were affixed to each crate: 1. A certification of inspection by the Malayan Government Veterinary Department. 2. Malayan custom and game export permits. 3. Pertinent pages of U.S. health requirements. 4. Instructions telling how to water the animals without opening the cages.

All shipments were made by air freight. As soon as they were received in Boston, the animals were provided with fresh food and an electrolyte solution. Animals which appeared to be weak were force-fed banana and electrolyte solution.

The results of these shipments are summarized in Table I. It was difficult to determine the reasons why shipments 1 and 3 were so unsuccessful. However, the following facts seem pertinent.

---

[1]We wish to thank Professor W. W. Howells for valuable help throughout the shipments. Thanks are also due Drs. Albert Damon, E. E. Hunt, and the staff of the New England Regional Primate Research Center. The first shipment was supported by funds from the Primate Center and shipments 2 through 6 were supported by a National Science Foundation Grant (GB 1895) to Professor W. W. Howells, Department of Anthropology, Harvard University. Successful shipment of the animals from Malaya is due in large part to the generous assistance of Marjorie Elliot, Mr. Chooi Hock Weng and Mr. Wong Chin Yat.

Table I

Tupaia glis Shipments

Shipment No.	Flight Date	Arrival Date	No. Sent	Trip Survivors No.	Trip Survivors %	9-1-65 Survivors No.	9-1-65 Survivors %
1	4-24-64	4-27-64	24	2	8	2	8
2	8-8-64	8-9&10-64	12	12	100	9	75
3	4-30-65	5-3-65	36	17	47	15	42
4	5-14-65	5-15-65	36	36	100	24	67
5	5-21-65	5-24-65	24	23	96	23	96
6	6-18-65	6-19-65	23	22	96	16	70
Total			155	112	72	89	57

All vegetable matter must be removed from cages as soon as they enter the United States. Shipment 1 entered the U.S. in Hawaii where both the bamboo tubes and the food in the cages were removed. This seems to have permitted the escape of some animals and a delay in transfer to the connecting flight. Some animals had also escaped in Bangkok but we could not tell how this happened.

To minimize problems of delay and mismanagement resulting during transfers between connecting flights, shipments 2 through 6 were sent via London. This route entailed only one transfer and the animals entered the U.S. in Boston, where vegetable matter was removed from the cages. Tubes of metal lined with cloth, instead of bamboo, were used, and their removal was not required.

Shipment 3 was not transferred to its connecting flight in London. Unforseen events at the airport, such as a labor strike (in effect at the time of arrival in London), could have caused the delay in shipment.

Additional animals sent in the last two shipments were 12 slow loris (Nycticebus coucang), 6 lesser tree shrews (Tupaia minor), and one pen-tailed tree shrew (Ptilocercus lowii). All of the slow loris survived the trip and 10 (83%) are still living. Five of the lesser tree shrews survived the trip (83%), but only one is still living (at University of Missouri). The one pen-tailed tree shrew survived the trip, but died one month later.

Our experiences suggest that to maximize the number of animals surviving the trip, the most direct and quickest route to the U.S. should be used. Alternate routes should be programmed into the shipping instructions, in the event that connections are missed. The re-

ceiver should await the animals at their port of entry into the U.S. and remove all foreign vegetable matter for the U.S. Department of Agriculture. A commercial monkey chow should be shipped to the source of the animals and included in each compartment, along with bananas and apples, in case unexpected delays occur.

* * *

A NEW JOURNAL: LABORATORY ANIMALS

This new journal is the official publication of the Laboratory Animal Science Association (L.A.S.A.). The journal will publish research papers, reviews, commentaries, technical and other short communications on all aspects of laboratory animal science. It is hoped that the journal will be of particular interest to all scientists using laboratory animals for research and those responsible for the supply, care, and maintenance of such animals.

The members of the editorial board are: M. E. Coates, C. R. Coid, F. C. Chesterman, A. W. Gledhill, L. G. Goodwin, E. V. Hulse, M. F. Lyon, P. N. O'Donoghue, J. S. Paterson, P. R. Payne, G. Porter, F. J. C. Roe, P. P. Scott, J. Seamer, P. C. Williams, D. P. Woodnott, P. A. Young.

The contents of Vol. 1, No. 1 (April, 1967), are: I. A. T. Walker and W. R. A. Poppleton, "The establishment of a specific-pathogen-free (SPF) rodent breeding unit"; J. D. Fulton, "Toxoplasmosis"; T. E. Gibson, "Parasites of laboratory animals transmissible to man"; C. R. Coid, "A system of caging monkeys"; L. E. Mawdesley-Thomas, "A polymorphic-cell sarcoma of the rat spinal cord"; H. M. Darlow, "Safety in the animal house"; R. J. Fallon, "Mycoplasmas and their role as rodent pathogens"; R. J. Fallon and D. K. Jackson, "The relationship between a rodent mycoplasma, Mycoplasma pulmonis, and certain mycoplasmas isolated from tissue cultures inoculated with material from patients with leukaemia"; L. Cohen, "The histology of the oral mucosa of Macaca irus"; A. W. Gledhill, "Rat-bite fever in laboratory personnel".

Initially there will be two issues each year, one in April and one in October, comprising one volume. The subscription rate is 50/- or U.S. $7.50 per volume (post free). Single numbers 30/- or U.S. $4.50 (post free).

Subscriptions should be sent by cheque or banker's order (payable to Laboratory Animals Ltd., A/c. No. 3481115) to the Subscription Manager: Dr. F. C. Chesterman, Imperial Cancer Research Fund, Burtonhole Lane, Mill Hill, London, N.W.7.

PRIMATE MATERIAL REQUESTED

A continuing research project in the Neurosurgery Research Laboratory of University of Utah College of Medicine concerns a little known anatomical area in the human brain seemingly related to deep venous blood flow. Because there appears to be pertinent anatomical variations of deep venous circulation of the brain in infrahuman primates, it is necessary to have comprehensive comparative anatomical knowledge of the area under question.

The Laboratory is therefore eager to obtain heads of the following species: chimpanzee, gorilla, orangutan, and gibbon. Should any such specimen become available, this laboratory would pay expenses for shipping the specimen plus additional expenses which might be incurred for preparing the specimen. Preferably, the head should be fresh frozen and shipped in dry ice; if this is not possible, formalin fixation would suffice.

Any consideration given this project would be most gratefully received. Inquiries regarding shipping, payments, or other information should be addressed to: Mrs. Arlene D. Hopfenbeck, Neurosurgery Research Laboratory, Room 3C-340, University of Utah Medical Center, Salt Lake City, Utah 84112; or telephone 801 (area code), 322-6908.--Theodore S. Roberts, Chairman, Division of Neurological Surgery.

MEETING ANNOUNCEMENTS: SECOND INTERNATIONAL CONGRESS OF PRIMATOLOGY

A Memorial Congress in Honor of Dr. Robert M. Yerkes

Yerkes Regional Primate Research Center
Emory University, Atlanta, Georgia, U.S.A.

June 30-July 3, 1968

Papers will be accepted in the following areas of research on nonhuman primates: behavior, paleontology, anatomy, neuroanatomy, neurophysiology, immunology, endocrinology, and medicine. There will be an invited symposium on behavior of nonhuman primates.

Authors should send the title of the paper and an abstract not longer than 250 words to: Geoffrey H. Bourne, Director, Yerkes Regional Primate Research Center, Emory University, Atlanta, Georgia 30322, U.S.A. Abstracts should be received by January 1, 1968. Since the Congress will be in honor of Dr. Yerkes, papers on Great Apes will be given priority. Applications for registration forms should be sent to the same address.

It is planned to have the abstracts duplicated for the Congress. Two copies should be forwarded with the title of the paper and must be in perfect condition for photographic reproduction. No proofs of abstracts can be sent to the authors. All abstracts must be in English, and all papers must be presented in English since there are no facilities for simultaneous translation. Time allotted for presentation of each paper will be fifteen minutes (including discussion). The papers presented at the Congress will be published. Completed papers should be sent to the above address one month prior to the Congress. It is hoped to pre-record the papers of non-English speaking authors who may prefer to have the recording played rather than read the paper themselves.

The headquarters hotel will be the Biltmore Hotel, West Peachtree Street, Atlanta, Georgia. Requests for accommodations should be made directly to the Sales Manager of the hotel. Rates are $10 per day for a single room and $16 per day for a double room, exclusive of food. The registration fee will be $25 and should accompany the returned registration form. Details of the Congress will also be circularized to members of the International Primatological Society. The American Express Company will handle arrangements for travel.

NEW PRODUCTS AND SERVICES

Sernylan (phencyclidine hydrochloride) now available commercially. It is supplied as a solution "for intramuscular injection only" in 10-cc Steri-Vials (rubber-diaphragm-capped), each cc containing either 20 or 100 mg of phencyclidine hydrochloride. Sernylan is for veterinary use in primates only, and produces incapacitation ranging from diminished response to surgical anesthesia by acting on the central nervous system. The degree of response depends upon the dose employed and the species treated. List prices are $2.34 for the 20 mg per cc package and $7.00 for the 100 mg per cc package.--Parke, Davis & Company.

Woodard Asiatic Corporation is the new name of Asiatic Animal Imports, Inc., which has changed ownership. The address is the same as before: P. O. Box 8125, International Airport, San Francisco, Calif. 94128.

International Primates Inc. is a new supplier of research primates. The address is: Route 114, Middleton, Mass.

* * *

ONSET OF SEXUAL BEHAVIOR OF A FEMALE CHIMPANZEE[1]

A female chimpanzee, approximately 6 years, 11 months of age and weighing 28.4 kg, was housed in a large compound (designated the DPS Chimpanzee Consortium) with 23 other chimpanzees. She was observed sexually presenting to males within the compound and copulating with the mature males for a period of 34 days prior to the development of her first sexual swelling. This behavioral change is contrary to Goodall [Chimpanzees of the Gombe Stream Reserve. In I. Devore (Ed.), Primate Behavior, New York: Holt, Rinehart & Winston, 1965. Pp. 425-473], who reports the following about adolescent female chimpanzees (i.e., chimpanzees 7-9 to 10-11 years): "Smaller than mature chimpanzees. Menstruates and develops sexual swellings, but copulation is not observed" (p. 433). During the six months prior to the initiation of mating behavior, this animal was housed in this facility, and she spent most of her waking hours alone, usually about 30 feet away from the other animals. Since that time she has often been observed interacting with the other animals, particularly the largest and most dominant male of the group.--Lillian Bobkowski, CIC, on-site Research Unit, Department of Psychiatry, U.C.L.A., 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico 88330.

---

[1]These observations were made during a study made possible by funds provided by United States Air Force Contract AF 29(600)-4720 and conducted at the 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico.

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

Books

Some recent developments in comparative medicine. T-W-Fiennes, R. N. (Ed.) (Nuffield Institute of Comparative Medicine, The Zoological Society, London) London: Academic Press, 1966.

Papers reproduced in this book were presented at the symposium held by The Zoological Society of London in conjunction with the World Health Organization, June 15 and 16, 1965. (See Laboratory Primate Newsletter, 1965, 4 [Nos. 2 and 4]). The symposium was concerned with various aspects of research in comparative medicine using primates. The papers deal with problems of care of primates as well as research results. Included are papers on the following topics: Scientific and administrative concepts behind the establishment of the U.S. Primate Centers; Prosimians as laboratory animals; L'elevage des Lemuriens malgaches et leur pathologie en captivité; Distribution and adaptations of baboons; The care and use of baboons in the laboratory; A survey of the breeding performance of rhesus monkeys in the laboratory; The care and breeding of anthropoids; The use of platyrrhine monkeys in medical research; Comparative studies of spontaneous and experimental atherosclerosis in primates; Some aspects of spontaneous and experimental cardiovascular disease in Old World monkeys and Pongidae; Use of nonhuman primates in medical research, especially in the study of cardiovascular pathology and oncology; Preliminary report of studies on platelet aggregation, blood coagulation, and fibrinolysis in nonhuman primates; Viral oncogenesis in the rhesus monkey: miscellaneous studies; The special virus-leukemia program of the National Cancer Institute: scientific aspects and program logic; Adenovirus 12 inoculations of immature baboons; Effect of adenovirus type 12 and Rous sarcoma virus on foetal rhesus monkeys; The dangers of cross-infection in tumour virus laboratories; Experiments with Burkitt's lymphoma: attempted transmission to monkeys in relation to virological findings; South American primate disease. Soft organ lesions and their significance;

---

*References in this section without summaries have in many cases been taken directly from the Current Primate References prepared by The Primate Information Center, Regional Primate Research Center, University of Washington.

Chemical carcinogenesis in primates. Induction of hepatic cell carcinomas with N,N-nitrosodiethylamine; A disorder of lipid metabolism associated with experimental hyperhistidinemia in Macaca mulatta; A latent herpes-T infection in Saimiri sciureus (squirrel monkey); Suitability of macaques and baboons for plastic tooth implants; Nephritis and brain atrophy in monkeys receiving chicken sarcoma virus; Introduction to the Cercopithecoidea, with notes on their use as laboratory animals.

The primate thalamus. (2nd ed.) Walker, A. E. (Div. Neurol. Surgery, Johns Hopkins U., Sch. of Med., Baltimore, Md.) Chicago: Univ. Chicago Press, 1966.

Disease

Major zoonoses of primates. Mattingly, S. F. (Dept. Lab. Anim. Med., U. Cincinnati Med. Cen., Cincinnati, Ohio) Journal of the American Veterinary Medical Association, 1966, 149, 1677-1680.

Scientific studies are needed to acquire a basic understanding of zoonotic diseases of simian primates for the betterment of the biological model and the safety of involved research workers. Until the research community has developed sufficient knowledge of these diseases to provide absolute control of the pathogens, a management system must be employed to reduce exposure by means of (1) a sound personnel health program; (2) use of clothing, housing, and equipment which reduce exposure to pathogens; and (3) maintaining a sanitation program in simian primate quarters that minimizes the number of pathogens. Although the number of deaths resulting from these diseases is fortunately limited, members of research teams using simian primates should value the lives of their colleagues and themselves sufficiently to continuously wage the battle of controlling these diseases.

Distribution area and natural hosts of latent viruses of monkeys. Occurrence of Simian vacuolating virus (SV40) and Herpesvirus simiae in cynomolgus monkeys in Indonesia. Zeitlyonok, N. A., Chumakova, M. Y., Ralph, N. M., & Goen, L. A. (Acad. Med. Sci., Moscow, USSR) Acta virol., 1966, 10, 537-541.

Dental caries in experimental monkeys. Cohen, B. (Dept. Dental Sci., Royal Coll. Surg. England, Lincoln's Inn Fields, London, W.C.2, England) British Dental Journal, 1966, 121, 269-276.

A colony of 22 monkeys (M. irus) has been maintained for periods of 2 to 4 years on a diet rich in fermentable carbohydrate and largely devoid of fibrous elements. All

constituents of the diet were normally used for human consumption. The sequence of eruption of deciduous and permanent teeth has been recorded, together with the incidence of dental caries. The distribution of lesions, as well as their clinical, radiological and microscopic appearance, closely resembles that seen in humans.

Bacterial infections among monkeys used as experimental animals in N. I. H. Ogawa, H., & Takasaka, M. (Dept. Vet. Sci., Nat. Inst. Health, Tokyo, Japan) Japanese Journal of Medical Science and Biology, 1966, 19, 219.

Natural infection of measles virus in laboratory monkeys. Shishido, A. (Dept. Virol., Nat. Inst. Health, Tokyo, Japan) Japanese Journal of Medical Science and Biology, 1966, 19, 221-222.

Pathologic changes of the heart in free-ranging howler monkeys (Alouatta caraya, Humboldt, 1812). Maruffo, C. A., & Malinow, M. R. (Depts. Pathol. & Cardiovascular Physiol., Oregon Reg. Primate Res. Center, Beaverton, Ore. 97006) American Journal of Veterinary Research, 1967, 28, 237-243.

Of 280 free-ranging howler monkeys (Alouatta caraya, Humboldt, 1812) studied, pericarditis was found in 20, myocarditis in 19, and endocarditis in 2. The pathologic changes of the heart were generally mild. Early coronary lesions were rarely observed, whereas lipofuscin in myocells was a common occurrence in the older monkeys. These findings differed from other reports. Lack of human contact during their life span was thought to account possibly for the uncommon occurrence of infective pathologic changes in these monkeys.

Physiology and Behavior

Depression in infant monkeys separated from their mothers. Kaufman, I. C., & Rosenblum, L. A. (Dept. of Psychiatry, Coll. Med., State U. N. Y., 450 Clarkson Ave., Brooklyn, N. Y.) Science, 1967, 155, 1030-1031.

The behavior of Ateles geoffroyi and related species. Eisenberg, J. F., & Kuehn, R. E. (Dept. Zoology, U. Maryland, College Park, Md.) Smithsonian Miscellaneous Collections, 1966, 151, 1-63.

The behavior of Ateles geoffroyi was studied in a laboratory, zoological garden, and field setting. In addition captive studies were conducted with A. belzebuth, A. paniscus, and A. fusciceps. Expressions, postures, and vocalizations were described in detail. Insofar as possible the functional role of these communication patterns was

determined. Lip-smacking, tongue protrusion, and ritualized presenting so common in macaque and baboon expressive repertoires, are lacking or nonritualized in Ateles. The following conclusions were drawn concerning the social structure of Ateles geoffroyi: (1) The social groupings are loosely organized; however, females with infants and juveniles may form a cohesive group. (2) Overt sexual behavior and aggressive behaviors are reduced when compared with macaques and baboons. (3) A loose dominance order is present within a group, but it is subtle and not as strictly delineated as is the case with groups of macaques and baboons. (4) Grooming relationships in a captive group reflect a rank order within a social group since high ranking animals groom more individuals but receive grooming from only a few animals. (5) Females with young are in some respects outside the normal dominance relationships. (6) In contrast to macaque and baboon groups, the adult males do not serve as a focus for social activity. (7) Tolerance and a reduced aggressive tendency permit the formation of large, loosely organized troops; however, the troops vary in numerical composition. The cohesive units are the small subgroups of females, infants, and juveniles that compose a troop dwelling in a given home range. (8) Adult males may dominate and attach themselves semi-exclusively to adult female subgroups. (9) All-male subgroups are common in a loosely organized troop. The Cebidae, Cercopithecidae, and Pongidae are generally extremely social mammals, although differences among the social organizations of different species indicate a spectrum of social types. No sharp break in the form of primate social organizations appears to set them apart from the social organizations of some ungulates, cetaceans, and carnivores.

Comparative observations on Macaca speciosa and Macaca mulatta as laboratory subjects. Symmes, D., & Anderson, K. V. (Yale U. Sch. Med., New Haven, Conn.) Psychonomic Science, 1967, 7, 89-90.

Quantitative immunochemistry and the evolution of primate albumins: micro-complement fixation. Sarich, V. M., & Wilson, A. C. (Depts. Anthropol. & Biochem., U. Calif., Berkeley, Calif.) Science, 1966, 154, 1563-1566.

Physiologic adaptation of cynomolgus monkeys to the alteration of environmental conditions. Significance of the pre-experimental conditioning period. Honjo, S. (Dept. Vet. Sci., Nat. Inst. Health, Tokyo, Japan) Japanese Journal of Medical Science and Biology, 1966, 19, 224-225.

Birth weight, gestational age, and type of delivery in rhesus monkeys. Fujikura, T., & Niemann, W. H. (Nat. Inst. Neurol. Dis. & Blindness, Nat. Inst. Health, San Juan, Puerto Rico) Obstetrics and Gynecology, 1967, 97, 76-80.

The annual reproductive cycle of the Barbary Ape (Macaca sylvana) in Gibraltar. MacRoberts, M. H., & MacRoberts, B. R. (Dept. Anthropol., U. Calif., Berkeley, Calif.) American Journal of Physical Anthropology, 1966, 25, 299-304.

Data collected in Gibraltar demonstrate that Macaca sylvana has both a sharply demarcated mating and a sharply demarcated birth season. The mating season begins in November and may last until March. Births occur between May and September, gestation being of 5 or 6 months' duration. The annual reproductive cycle of the Japanese macaque is strikingly similar to that of the Barbary Ape. Matings occur in both areas in the fall, a period of decreased daily temperature and day length. The mating season begins with an increase in rainfall in Gibraltar and with a decrease in rainfall in Japan. From the data presented it seems probable that decreasing day length is the most important ecological factor in the timing of the onset of mating in Barbary Apes and in Japanese macaques.

Hematology of the pig-tailed monkey, Macaca nemestrina. Rahlmann, D. F., Pace, N., & Barnstein, N. J. (Dept. Physiol., U. Calif., Berkeley, Calif.) Folia Primatologica, 1967, 5, 280-284.

Hematological values were determined for 26 male and 4 female pig-tailed monkeys (Macaca nemestrina). In general, the values are similar to those in other macaques and in man. A noteworthy exception is the smaller diameter and greater number of the erythrocytes, each containing less hemoglobin, in the pig-tailed monkey as compared to man.

A behavioral taxonomy for Macaca nemestrina and Macaca radiata: Based on longitudinal observation of family groups in the laboratory. Kaufman, I. C., & Rosenblum, L. A. (Dept. Psychiat., State U. New York, New York City). Primates, 1966, 7, 205-258.

Facilities, Care and Breeding

Comfortable quarters for laboratory animals. (2nd ed.) New York: Animal Welfare Institute, 1967. (Available to scientific institutions on specific request from: Animal Welfare Institute, P. O. Box 3492, Grand Central Station, New York, N. Y. 10017.)

Induced ovulation and artificial insemination in a rhesus colony. Dede, J. A., & Plentl, A. A. (Dept. Obstet. & Gyn., Coll. Phys. & Surg., Columbia U., New York, N. Y.) Fertility and Sterility, 1966, 17, 757-764.

(1) Thirty-five laboratory domiciled rhesus monkeys were subjected to a variety of trials of impregnation after spontaneous or induced ovulation. (2) A total of 36 pregnancies was recorded in the colony; the over-all pregnancy rate was 12.8% during the period Jan. 1, 1964, through Dec. 31, 1965. (3) There was no statistically significant difference between the trials in which an induction of ovulation was followed by coitus or artificial insemination and those of spontaneous ovulation and copulation or spontaneous ovulation followed by artificial insemination. (4) Some recommendations for the establishment of a primate breeding program are offered on the basis of the experience gained in this study.

Breeding of cynomolgus monkeys as an experimental animal. Fujiwara, T., & Imanichi, T. (Nat. Inst. Health, Dept. Vet. Sci., Tokyo, Japan) Japanese Journal of Medical Science and Biology, 1966, 19, 225-226.

Laboratory breeding, behavioural development and relations of the talapoin (Miopithecus talapoin). Osman Hill, W. C. (Yerkes Reg. Primate Res. Center, Emory U., Atlanta, Ga. 30322) Mammalia, 1966, 30, 353-370.

(1) What is believed to be the first laboratory breeding of the talapoin (Miopithecus talapoin) is reported. (2) Details of the conditions under which the adults were kept are stated. (3) Mating and gestation are described, but labour was not observed as it occurred during the night. (4) Detailed protocols of the infant's progress are provided. (5) Reactions between mother and infant are discussed. (6) Precocity of the infant compared with other species reported in the literature is discussed and tabulated.

Fertility of the colony-born male macaque. van Wagenen, G. (Dept. Obstet. & Gyn., Yale U. Sch. Med., New Haven, Conn.) Folia Primatologica, 1967, 5, 241-246.

Records from an indoor colony of monkeys (Macaca mulatta) show that mating with delivery of sperm continues throughout the year. The males were born and raised within the laboratory and were of ages from 3 to 12 years.

A case of unseasonable birth in Japanese monkeys. Kawai, M. (Japan Monkey Centre, Aichi, Japan) Primates, 1966, 7, 391-392.

Ecology, Field Studies, and Taxonomy

Naturally occurring primate hybrid. Bernstein, I. S. (Yerkes Reg. Primate Res. Center, Emory U., Atlanta, Ga.) Science, 1966, 154, 1559-1560.

Two members of a troop of wild Macaca irus in Malaysia have been tentatively identified as hybrids of M. irus and M. nemestrina. Mechanisms prohibiting such hybridization in the natural habitat may have broken down under heavy predation pressure which finally resulted in the local extermination of M. nemestrina.

The relationships of the tree shrews: the evidence of the nervous system. Campbell, C. B. G. (Dept. Neurophysiol., Walter Reed Army Inst. Res., Washington, D. C.) Evolution, 1966, 20, 276-281.

The evidence for tupaiid-primate affinity based on studies of the central nervous system is re-examined. Morphological trends in this system shared by tupaiids and primates are either not well established or are also found in animals of several other groups such as marsupials, rodents, lagomorphs, carnivores, and insectivores. Recent evidence on the morphology of the corticospinal tracts and the subcortical optic system is inconsistent with a close tupaiid-primate relationship. It is concluded that the central nervous system of tupaiids contributes no evidence which establishes their proposed affinity with the primates.

Population changes of rhesus monkeys (Macaca mulatta) in India, 1959 to 1965. Southwick, C. H., & Siddiqi, M. R. (Dept. Pathobiol., Johns Hopkins U., Baltimore, Md.) Primates, 1966, 7, 303-314.

Comparisons of roadside survey data between 1964-65 and 1959-60 indicate a 26.6% decline in the numbers of groups found, and a 15.9% decline in average group size. We feel this reflects true population decline. Ninety per cent of all roadside groups in 1964-65 had an average group size of 10.68 ± 0.51 individuals with only 0.65 ± 0.09 juveniles per group (juveniles composed 6.1% of this population sample). Ten per cent of all roadside groups in 1964-65 had an average group size of 30.25 ± 4.54 with 8.67 ± 2.14 juveniles per group (juveniles composed 28.6% of this sample). Trapping pressure for rhesus in India has declined due to reduced export demand, but harassment continues from most villagers who do not tolerate crop depredations by rhesus. Certain rhesus groups remain well protected by local people, but the majority of groups are not protected. We anticipate that population decline will continue in unprotected groups.

Instruments and Techniques

Confirmation of the chimpanzee stereotaxic atlas: electrode placements in one animal. Buxton, D. F., & Reite, M. L. (6571st Aeromed. Res. Lab., Holloman AFB, New Mexico) Technical Report No. ARL-TR-67-5, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico.

Histological localization of 9 electrode implantations in a chimpanzee tends to confirm the accuracy of A stereotaxic atlas of the chimpanzee brain (DeLucchi, M. R., Dennis, B. J., & Adey, W. R., Berkeley and Los Angeles: U. Calif. Press, 1965). Sources of error resulting in inaccurate placement are discussed.

Anatomy

On the neonatus of Callimico goeldii (Thomas). Osman Hill, W. C. (Yerkes Reg. Primate Res. Center, Emory U., Atlanta, Ga. 30322) Proceedings of the Royal Society of Edinburgh, Section B (Biology), 1966, 69, 321-333.

An account is provided of the external and skeletal features of a 4-days old Callimico goeldii, one of twins born in captivity. Bodily proportions are compared with those of other newborn marmosets and tamarins. Differences in pelage from the adult are outlined. Data are provided on the regional external anatomy. The state of skeletal ossification and dental development are discussed. The taxonomic position of Callimico within the Hapalidae is confirmed.

Bibliographies

The chimpanzee. A topical bibliography. Second addenda. Rohles, F. H., Jr. (Inst. Environmental Res., Kansas State U., Manhattan, Kansas) Technical Report No. ARL-TR-67-4, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico.

In June, 1962, "The chimpanzee, a topical bibliography" was published as Aeromedical Research Laboratory Technical Documentary Report No. 62-9. The first addenda was published in October, 1963, as Report No. 63-27. This report is published as the second addenda and lists 477 new references in chimpanzee research and methodology.

Bibliography of the studies on non-human primates in Japan up to 1964: Laboratory animal medicine. Primates, 1966, 7, 289-299.

Laboratory animal science: A review of the literature for April, May, and June 1966. Flynn, R. J. (Ed.) Argonne, Illinois: Laboratory Animal Information Center, Biological and Medical

Research Division, Argonne National Laboratory (ANL-7300, Issue No. 2), 1966.

Abstracts of 345 articles in the field of laboratory animal medicine and technology are provided. This second issue of the series includes an author index. For further information about this publication write to: Technical Publications Dept., Argonne National Laboratory, 9700 South Cass Ave., Argonne, Illinois 60439.

ADDRESS CHANGES

Beverly J. Blake
Dept. Pharm. & Toxicol.
Astra Pharm. Products, Inc.
7-1/2 Neponset St., Rm. 222
Worcester, Mass. 01606

M. Nelly Golarz de Bourne
Yerkes Regional Primate
Research Center
Emory University
Atlanta, Ga. 30322

Martin Gilman
Dept. 761 (W44-2)
Merck Sharp & Dohme
Research Laboratories
West Point, Pa. 19486

Tom Harrisson
Dept. of Anthropology
Cornell University
Ithaca, New York 14850

G. A. Kelly
General Science Branch
Dept. Education & Sci.
Curzon Street
London, W.1, England

Maxim Lebeaux
Lab. Biological Res.
Astra Pharm. Products Inc.
7-1/2 Neponset St.
Worcester, Mass. 01606

Charles A. Spezia
Dept. Pharmacology
U.C.L.A.
School of Medicine
Los Angeles, Calif. 90024

Stanley N. Wampler
c/o Federated Medical
Resources
P. O. Box 156
Honey Brook, Pa. 19344