LABORATORY PRIMATE NEWSLETTER

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Edited by
Allan M. Schrier
and
Judith E. Schrier
Psychology Department

Consulting Editor: Morris L. Povar
Institute for Health Sciences

Brown University
Providence 12, Rhode Island

POLICY STATEMENT
(Revised October 1962)

The primary purpose of the Newsletter is to provide information on maintenance and procurement of non-human primates for laboratory studies. A secondary purpose is dissemination of general information about the world of primate research. Examples of the kind of practical information that would be useful are as follows: new drugs; novel aspects of cage design; new products; evaluations of various products; references to or short summaries of articles, off-beat or other, of general interest; experiences in connection with the procurement of monkeys. The Newsletter will also publish offers to exchange monkeys (for example, older monkeys for young or infant monkeys) and requests for monkeys with special characteristics (for example, good breeders or pregnant females). If someone has a special problem, he might want to request help through the Newsletter.

As a rule, only research articles or summaries which have some practical implications or which provide general information likely to be of interest to investigators in a variety of areas of primate research will be accepted for inclusion in the Newsletter. Descriptions of current research projects will also be welcome. It should be kept in mind that the Newsletter is not a formal publication and that it is not likely to be obtainable in libraries. Therefore, citation of Newsletter notes or articles in publications is not recommended.

Information for the Newsletter will be welcome from anyone in any research area who is using monkeys. The Newsletter will appear quarterly and will continue so long as people are interested enough to contribute items of information. The mailing list is open to anyone expressing an interest. There is no subscription charge. However, only new issues and back issues for the current year will be mailed to new subscribers free of charge. Volume 1 of the Newsletter may be purchased for $1.00.

All correspondence concerning the Newsletter should be addressed to:

Allan M. Schrier
Psychology Department
Brown University
Providence 12, Rhode Island

Acknowledgement

Financial support for the Newsletter is provided by the Psychology Department, Brown University.

EDITORS' NOTES

There seems to be some disagreement about the formal taxonomic species name of the squirrel monkey. Is it Saimiri sciureus or Saimiri sciurea? The former version has been used frequently in research articles in recent years. Various written works that we could peruse immediately and conveniently were about evenly split in their choice of gender for the genus modifier. For example, Sanderson, in The Monkey Kingdom, uses the "ea" ending, whereas Fiedler, in his chapter in Primatologia (Vol. I), uses the "eus" ending. Now, the rules for scientific zoological names adopted by taxonomists include the principle of priority. An animal must be called by the name given it, if valid, by Linnaeus in his Systema Naturae (ed. x), published in 1758, or by the first name given it thereafter which is not invalidated by some other rule. We checked the appropriate reference and found that a South American monkey the size of a squirrel, which is fairly clearly the present-day squirrel monkey, was called by Linnaeus "Simia sciurea". The use of "Simia" as a genus name for monkeys or apes was banned by taxonomists in 1929. Linnaeus used it as the genus name for most monkeys and apes, and, by 1929, it was still applied to a number of species of different genera. Voigt in 1831 was the first to provide the squirrel monkey with the valid genus name, "Saimiri". It seems then that of the two choices of an ending for the species name, the "ea" is the correct one. But perhaps we should mention that, very technically speaking, there is the possibility that everyone is wrong. Hill, in his Primates: Comparative Anatomy and Taxonomy (Vol. IV, Part A), points out that Linnaeus' "Simia morta" is actually the squirrel monkey, and, since it is mentioned earlier in Systema Naturae than "Simia sciurea", according to the rules "morta" should be the species name.

The editors, H. Hofer, A. H. Schultz, and D. Starck, and the publisher, S. Karger, of Primatologia have announced a new journal, Folia Primatologica, which will appear quarterly beginning this year. It will cover all phases of primate research with original papers in German, French or English. It will also contain brief notes about significant news and lists of current relevant publications with occasional reviews. Subscription orders can be placed with any book store, directly with the publisher: S. Karger, A. G., Arnold-Bocklin-Strasse 25, Basel, Switzerland, or local publisher's representative, which, in the U.S.A. is Albert J. Phiebig, P. O. Box 352, White Plains, New York.

We mentioned in the October, 1962, Editors' Notes the temporary lifting of the ban by India on shipment of rhesus monkeys by jet. Mr. Stanford Gluck of Asiatic Animal Imports, Inc., has now informed us that the three-month trial period has proved successful and that the Indian Government has given formal, permanent approval to the airlines to ship 100 rhesus per flight by jet. A petition to have the number increased to 200 per flight has been introduced, since other countries now permit up to 500 monkeys per flight with "excellent" results.

CONTENTS

LABORATORY NOTE ON *SAIMIRI SCIUREA*

from

Merck Institute for Therapeutic Research: West Point, Pennsylvania

The squirrel monkey, *Saimiri sciurea*, because of its small size, inexpensiveness (9 to 10 dollars) and ready availability, would appear to be an ideal primate for laboratory use. During our earliest experiences, 75% or more of all animals received died within the first two weeks following arrival. After a series of modifications of our treatment and handling procedures, our mortality has dropped to less than 2 to 3% of all animals received. At present we maintain a mixed primate colony of 125 animals with more than 75 squirrel monkeys. During the past 2-1/2 years, we have had experience with more than 500 animals of this species.

We have tried to identify the important aspects of our treatment and handling procedures which are listed below under the headings of *Early Care* and *Maintenance*. It is possible that many things we do are superstitious, but the over-all result is success.

Early Care. Animals are routinely shipped by air express, and efforts are made to ensure rapid pick-up and delivery. Upon arrival in the colony quarters (ideally a separate quarantine room should be used), the following treatment is given as the animals are removed from the shipping crate and before they are placed in individual living cages.

1. Intramuscular administration of injectable vitamin B complex and vitamin C.

2. Intramuscular administration of oxytetracycline, 'terramycin' intramuscular solution, Pfizer, 25 mg./kg.

3. Oral administration of thiabendazole, "Thibenzole', Merck, 100 mg./kg.

4. Oral administration of first of 7 daily doses of diethylcarbamazine, 'Hetrazan', Lederle, 4-6 mg./kg. daily for seven days.

5. Soluble tetracycline, 'Polyotic', American Cyanamid Co., Veterinary Professional Service Department, in drinking water, first through seventh day; 6 tablespoonfuls per gallon; renew daily.

6. Hydration by gavage of animals showing signs of dehydration. Severe cases given *warm* saline intraperitoneally, as dehydrated animals cannot be depended on to drink enough water to replace their fluid deficit.

7. T.B. test by the injection of tuberculin serum intrapalpebrally.

Maintenance.

1. Animals housed in individual living cages. We use the cage equipped with automatic watering devices previously reported on by Creamer and Buchanan (1960) sold by Harford Metal Products, Aberdeen, Maryland, allowing each animal slightly less than 1 cubic foot of living space.

2. Room temperature is maintained at a constant 85°F with high humidity. Drops in room temperature of 10 degrees have resulted in the decimation of the colony.

3. Single daily feedings of a high fat, high protein mash (formula given below) with absolutely no fruit, lettuce, etc. offered at any time.

4. Ad lib. water through a self-watering device. During the first seven days a supplementary cup is placed in the cage filled with the tetracycline solution as on the first day.

5. Diethylcarbamizine given daily in food for seven days; repeated bimonthly or whenever new animals enter the colony.

6. T.B. testing done by intrapalpebral injection at least once each year for all resident animals.

7. Bimonthly administration of thiabendazole or whenever new stock is added to the colony.

8. Routine use of nontoxic aerosol insecticide in colony quarters biweekly to eliminate mosquitos.

There are two major identifiable medical problems directing the general husbandry of the colony. First, animals received from commercial sources are heavily infected with intestinal parasites, particularly Strongyloides--we have had counts up to 3-4 K ova per gram of feces. Thiabendazole would appear to be a specific for this infection in squirrel monkeys, reducing these levels to zero following the administration of a single dose. Other parasites infesting the squirrel monkey also seem sensitive to thiabendazole with essentially complete absence of ova in the feces, lasting for over 28 days following a single oral dose. Secondly, and much more serious, all animals must be suspect of suffering from filariasis--we have routinely identified adult filaria in numbers of our animals upon laparotomy preceding treatment. The microfilaria can be identified by a somewhat complicated test, requiring the collection of a blood sample, which unfortunately yields only assurance of a positive diagnosis. However, the doses of diethylcarbamazine and other treatment recommended have proven sufficient to eliminate the adult filaria from our animals and in all probability have also eliminated the microfilaria from the blood. This disease, which is a serious one, is transmissible to man, the insect vector being the common mosquito. Other than irradication of the infection in the animals, transmission can also be controlled by the elimination of these insects from the colony, which we attempt

to do by the use of aerosol insecticide. Bimonthly treatment with a seven-day course of diethylcarbamazine, as well as a course of treatment whenever a new group of animals is added to the colony, is designed to further insure that the disease would not be transmitted. Likewise, all injections are done with disposable needles to prevent cross infection.

Within these conditions the squirrel monkey has proven to be an adaptable animal in a variety of behavioral, pharmacological and physiological experiments.

Diet.

600 cc. sweetened condensed milk (2 cans, Borden's Eagle Brand)

600 cc. water

75 cc. cooking oil (Wesson)

750 gm. Eschelman "Red Rose Monkey Feed 718"

300 gm. "Delmor" MS&D Nutrient Powder (50% protein) or a like amount of any protein supplement

1 gm. ascorbic acid

yields 2.3 kg. of mash adequate for approximately 40 squirrel monkeys. All the liquid components are first mixed in a blendor and then combined with the dry components. The wet mash is then allowed to stand for 30 minutes to an hour, at which time it has "set" sufficiently to allow small "meat balls" to be formed for individual feedings. Any protein source could be substituted for the "Delmor" powder.

Medication is added directly to the mash when it is desirable to treat the entire colony; for example, for the periodic course of diethylcarbamazine.

REFERENCE

Creamer, A. A. and Buchanan, R. S. Influence of crowding on monkey health. Ann. N. Y. Acad. Sci. 85: May 12, 1960

(Submitted by Harley M. Hanson)

NOTES ON SAIMIRI SCIUREA AS AN EXPERIMENTAL ANIMAL

by

L. S. Woodburne

Department of Psychology: University of Washington

Introduction. The vogue of the rhesus monkey has postponed extensive use of other species. Recently, however, other species have become increasingly popular, one of these being the squirrel monkey, Saimiri sciurea. The squirrel monkey is small in size, ranging from approximately 400 to 1000 grams in weight, and standing a bit over a foot in height when at full stretch. They are tamable, as is evident from the fact that pet stores stock them. If handled considerately, they will jump onto the experimenter's gloved hand when it is put into the cage. In general, then, it appears that they are more predictable and less irritable than the rhesus monkey.

Maintenance. The General Animal Quarters reports that squirrel monkeys do very well on a diet of Purina Monkey Chow, and on this diet are less fussy about their food than if fed a carefully compounded one of vegetables, eggs, etc. They are, in addition, regularly given some fruit. There is some indication that they eat bananas in preference to oranges or apples, and prefer apples to raw potatoes. Because of their small bulk they do not eat a substantial amount of food. For instance, one bag of Purina monkey pellets will usually feed 5 to 8 squirrel monkeys for a month. This means that an animal can maintain body weight on from 8 to 10 pellets a day. The cost of maintaining a colony of squirrel monkeys is in this regard then not much different from that of rat maintenance.

One of the things which our experience indicates needs constant watching is the supply of fresh water. The body volume of the squirrel is so small that what seems like a small reduction in water intake may result in serious dehydration. Several animals were lost initially because the water in the cans was not changed over the week-end. The cans with rubber stoppers show film in less than 24 hours, and the squirrel apparently will not take enough stale water for his needs.

They are very gregarious, and we feel are best caged two or three together, rather than alone.

Diseases. In comparison to some other laboratory animals, the squirrel monkey is a very healthy animal. The General Animal Quarters has not found any specimen with T.B. They are quite free from disease generally and do not seem to pick up colds, etc., nearly as easily as cats. Coming from Brazil, Ecuador and Peru, they can tolerate a reasonable range of temperatures. From the experience of two or three experimenters, there seems little likelihood of finding a squirrel monkey with

virus diseases of the nervous system.

Neurophysiological Operations. As a subject for neurological operations, the small squirrel monkey has several advantages. First and foremost, it has a primate brain, with reasonably separable sensory and motor cortex. The brain is unconvoluted, or lissencephalic, and hence is a more favorable surgical area for ablations than one with many and deep fissures. The Wisconsin group of Benjamin, Welker, Woolsey, et al. has worked out the sensory and motor areas. One of the real advantages of this animal is that, although it is of small size, it will fit into the standard stereotaxic instruments, such as La Precision Cinematographique. The monkey's external auditory meatus fits the ear bars easily, but its small mouth makes it advisable to angle the tooth bar across its mouth and out the other side, just behind the prominent canines. Long tooth bars would extend down the throat.

There is some individual variation in tolerance for Nembutal, but the animal responds extraordinarily well to a combination of tranquilizer and Nembutal. If the tranquilizer (Largon, for example, works very well) is given IM one-half hour before the barbiturate, the dose of Nembutal can be reduced by 50%. For a 0.5-kilogram squirrel monkey the dosage is 0.5 cc. of Largon (equal to 10 mg.) followed by 0.15 cc. of Nembutal. Since the tranquilizer allows such a marked reduction in the amount of Nembutal, one need not worry about respiratory depression. In ten operated animals, there was no evidence of depressed respiration with this combination.

The brain of Saimiri sciurea is very large in proportion to body size. The upper skull contains nothing but eyes and brain. The squirrel monkey's brain weighs about 26 g.; that of the young cat, about 28 g. For anyone interested in studying behavioral effects of operations on brain tissue, the advantages of the combination of small size, relatively easy maintenance, and relatively large brain are obvious.

Upon making an incision in the scalp of the squirrel monkey, one finds that the skin is loose and easily pulled away from the skull. There is almost no connective tissue to get in the way, and the periosteum is very thin. The skull itself is quite thin, and in a young animal may not exceed 2 mm. in thickness. Anything except delicate pressure with a trephine will obviously cause much damage. For this reason, a saline-cooled mastoid burr and bone engine allow a more controlled entry to the dura and the brain. The operator can tease through the last few micra with bone tweezers and lift off the remaining bits of bone.

During cortical ablations and stereotaxic lesions there is very little bleeding if an electric cautery is used. In comparison with other animals, the squirrel monkey cannot lose much blood and still survive. A loss of blood which would be of no concern in a cat may take the squirrel below the level for recovery. The temporal muscles are attached well down on the lateral surfaces of the skull and do not require separation from the skull and suturing as they do in the dog and cat. Even in a temporal

ablation there is very little interference as the temporal muscles attach just above the base of the ears. In contrast again to the carnivores, and perhaps to all the animals that travel on four legs, there are no muscle attachments to get in the way at the occipital pole of the skull. As a matter of fact, the skin can be peeled down over the occipital pole of the skull to allow unobstructed entry for occipital ablations. It should be noted that, unlike the rhesus, the stripe of Gennari is deeply buried inside the infolded section of the calcarine fissure.

The cerebellum, when viewed from the dorsal aspect, is quite buried under the posterior extension of the occipital pole of the cerebrum, and operations involving the cerebellum would have to pass through the supervening cortex. The only alternative would involve an almost impossible reflection of the occipital pole of the cerebrum to get at the cerebellum beneath. There are no olfactory lobes to speak of, and the eyes are set in the skull just beneath, rather than anterior to, the tip of the frontal lobes. As a consequence, the optic nerves course at right angles upward and inward as soon as they enter the skull, in order to meet at the optic chiasm.

Recovery from operations when the Largon-Nembutal combination is used is excellent. The monkeys are usually moving about normally and eating slightly on the morning after an operation, even when the operation lasts until 4 or 5 p.m. Since dehydration is one of the major problems, water should be available as soon as they come out of the anesthetic. In order to encourage the removal of the barbiturate from the body, it is wise to inject, IV or IP, 3 to 5 cc. dextrose-saline for every 1 cc. of Nembutal, at the conclusion of the operation. As the animals are relatively resistant to infection, an injection of 0.2 cc. of Bicillin at the end of the operation is all that seems to be needed.

Behavioral Aspects. Anyone considering using the squirrel monkey as a behavioral subject would have to keep in mind both its capabilities and its limitations. It is reported by Miles (1957) to be substantially below the rhesus in its ability to develop learning sets, but above the marmoset. According to Miles (1958), the squirrel's color vision is deficient at the red end, requiring more red for matching than does the rhesus. This information can be useful for problems in which visual cues must be eliminated.

As a behavioral subject, the squirrel is quite curious and will work to satisfy his curiosity. In terms of other motivation, such as food deprivation, one has to be careful not to deprive the animal below 80 to 85% of normal body weight. Several animals were food deprived down to 65 to 70% of body weight. These could not be brought back and eventually, perhaps because of dehydration also, died.

The squirrel monkey will work well for food rewards, and raisins are customarily used. But 15 to 20 raisins will satiate the animal, so they have to be cut up. They will also work well for small dried currants which are about the desired size and not as sticky as raisins. Recently CIBA Pharmaceutical Co. has developed a small banana-flavored food pellet.

which most of them accept readily.

Squirrel monkeys of about 450 g. or larger will easily fit into the small restraining chair manufactured by Foringer & Co., which is a modified Lilly primate chair. This chair may have to be modified for some problems involving manual manipulation. A narrow neck piece allows greater freedom of arm movement. An added shelf between the waist and neck aids in the presentation of discrimination problems for manual examination. We have not tried to find out how long they will tolerate life in a chair.

Brain Atlas. A stereotaxic atlas of the brain of the squirrel monkey, prepared by Emmers and Akert, has recently been published by the University of Wisconsin Press. Paul MacLean and John Gergen of N.I.H. have prepared the plates for another atlas and this is now in the hands of the Government Printing Office. This atlas should be available in a few months.

BIBLIOGRAPHY

The following is a partial bibliography on the squirrel monkey:

Benjamin, R. M. & Welker, W. I. Somatic receiving areas of cerebral cortex of squirrel monkey (saimiri sciureus). J. Neurophysiol., 1957, 20, 286-299.

Carmichael, M. & MacLean, P. D. Use of squirrel monkey for brain research, with description of the restraining chair. EEG clin. Neurophysiol., 1961, 13, 128-129.

French, G. M. Performance of squirrel monkeys on variants of delayed response. J. comp. physiol. Psychol., 1959, 52, 741-745.

Miles, R. C. Learning-set formation in the squirrel monkey. J. comp. physiol. Psychol., 1957, 50, 356-357.

Miles, R. C. Color vision in the squirrel monkey. J. comp. physiol. Psychol., 1958, 51, 328-331.

Miles, R. C. & Blomquist, A. J. Frontal lesions and behavioral deficits in monkeys. J. Neurophysiol., 1960, 23, 471-484.

Welker, W. I., Benjamin, R. M., Miles, R. C., & Woolsey, C. N. Motor effects of stimulation of cerebral cortex of squirrel monkey (Saimiri sciureus). J. Neurophysiol., 1957, 20, 347-364.

SYMPOSIUM HELD

From August 15 to 18 an International Symposium on Bone Marrow Therapy and Chemical Protection in Irradiated Primates was held in Rijswijk, the Netherlands. The symposium was sponsored by the Organization for Health Research T. N. O. of the Netherlands. The Radiobiological Institute T.N.O. acted as host for the meetings. There were 32 participants from France, the Netherlands, the United Kingdom and the United States, of whom 22 presented papers.

The main object of the symposium was to exchange ideas as to the causes of difficulties in the treatment of irradiated primates including human patients and to discuss future research plans to overcome these difficulties.

There were sessions on bone marrow transplantation in monkeys, the immunological activity of the primate foetus, human applications of bone marrow transplantation, chemical protection of primates, and monkey colony management.

The proceedings of the conference including the discussions have been published by the Radiobiological Institute T.N.O., 151 Lange Kleiweg, Rijswijk (Z.H.) The Netherlands, and may be obtained at that address (Dfls.15,-) or from Dr. R. R. Overman, University of Tennessee Medical Units, Memphis, Tennessee, U.S.A. at the price of 4 U.S. dollars.

* * *

AD LIB WATER DISPENSING

To eliminate the problems associated with gravity-feed-capillary-tube water dispensers our Laboratory has been employing the straw sucking principle for dispensing water. A container is mounted outside of the cage. A metal nipple is inserted through the cage wall just above the container. Polyethylene tubing is attached to the part of the nipple that is outside of the cage and is extended down into the water container. Chimpanzees and monkeys are readily conditioned to suck on the nipple in order to obtain water. A 24 to 36 hour water deprivation period followed by gravity dripping of the water from the nipple will be adequate to institute the sucking response on the nipple. When the sucking response occurs the polyethylene tube can be quickly switched from the gravity feed container to the container requiring suction. One training session is usually all that is required. This method can also be employed with restraint chairs.

The advantages of this technique are: accurate measurement of water consumption, dry area beneath the water nipple and reduction of objects that can be manipulated or broken by the subject.

Marvin S. Grunzke and Frederick H. Robles, Jr.
6571st Aeromedical Research Laboratory
Holloman A.F.B., New Mexico

RECENT ARTICLES AND BOOKS

Books

A stereotaxic atlas of the brain of the squirrel monkey. Emmers, R. & Akert, K. Madison: Univer Wisconsin Press, 1962.

A new atlas of 95 plates showing step-by-step dissection of the brain with stereotaxic coordinates.

International zoo yearbook. Vol. III Jarvis, Caroline & Morris, D. (Ed.) Published for the Zoological Society of London by Hutchinson, 1962.

The Yearbook is divided into three main sections. Section I deals with a special zoo topic, with this year's subject the keeping of small mammals in captivity. Section II contains a wide variety of articles recording new developments in the zoo world. Section III, the Reference Section, provides information about the zoos of the world, animal breeding successes during 1961, recent zoological research undertaken by zoos, etc. Special features include a census of rare mammals living in zoos and aquaria, a survey of breeding seasons of mammals in captivity and a series of articles on quarantine regulations in relation to transmission of animal diseases.

Disease symptoms and treatment

Intestinal mucormycosis in the monkey. Gisler, D.B., & Pitcock, J. A. (Brooks Air Force Base, Texas) Amer. J. Vet. Res., 1962, 23, 365-366.

A rare disease, which should be included in the differential diagnosis of colonic diseases of Macaca mulatta, is described.

Physiology and Behavior

Phonocardiograms of young adult Macaca mulatta. Robinson, F. R. Report No. MRL-TDR-62, June, 1962, Aerospace Medical Division, 6570th Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio.

Phonocardiograms were recorded and analyzed for 13 healthy Macaca mulatta. Lead aVF electrocardiograms and phonocardiograms were recorded simultaneously.

Food motivation and delayed response in gibbons. Berkson, G. (Yerkes Laboratories of Primate Biology, Orange Park, Florida). J. comp. physiol. Psychol., 1962, 55, 1040-1043.

Drugs

Phencyclidine anesthesia in monkeys. Rutty, D. A., and Thurley, D.

. Vet. Rec., 1962, 74, 883.

Effects of various doses of Phencyclindine (Parke-Davis) on rhesus monkeys are described.

Primate for Laboratory Use

The stump-tailed macaque: A promising laboratory primate. Kling, A. & Orbach, J. (Institute for Psychosomatic and Psychiatric Research and Training, Michael Reese Hospital, Chicago, Illinois). Science, 1963, 139, 45-46.

Members of Macaca speciosa have, the authors report, characteristics that make them suitable primates for neuropsychological investigation. They work well in discrimination training, have a varied behavioral repertoire and social interaction, and seem to be as intelligent as M. mulatta. They are docile and submit readily to laboratory routine.

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RECENT AND CURRENT FIELD STUDIES OF PRIMATES

AND

ADDRESS LIST OF PRIMATE FIELD WORKERS

Irven DeVore and Richard Lee

Center for Advanced Study in the Behavioral Sciences

In the past five years there has been an enormous increase in the ... of field studies on nonhuman primates. The following list is ... to facilitate communication between laboratory and field workers, ... promote coordinated research.

This list was compiled by us, with suggestions and additions by ... Emlen and Hiroki Mizuhara. In preliminary form, it was circu... to all field workers who could be located in March, 1962, and to ... them again in September. The following information is as cor... it was possible for us to obtain, but we know that it contains ... and omissions. We would appreciate receiving corrections and ...ditions; when these have accumulated, an addendum will be sent to ... Laboratory Primate Newsletter.

Recent and Current Field Studies of Primates

	Published	Completed	In Progress	Planned
Prosimians				
lemurs:				
Bishop				x
Bolwig	x			
Petters & Bourliere	x			
tree shrews:				
Howells & Elliott			x	
several spp:				
Buettner-Janusch				x
New World Monkeys				
Boro Colorado Island howlers:				
Altmann	x			
Bernstein			x	
Carpenter et al.	x			
Collias & Southwick	x			
howlers & spiders:				
Moynihan			x	
several spp:				
J.M.C. - Tokuda (Columbia)			x	
Langurs				
J.M.C.-Kawamura et al. (India)				x x
Jay (India)		x		
Ripley (Ceylon)				x x
Baboons				
Altmann & Ellefson (E.Afr.)				x
Bolwig (chacma)		x		
Hall (chacma)		x		
Kummer & Kurt (hamadryas)			x	
Rowell (E. Afr.)				x
Starck & Frick (gelada & ham.)		x		
Washburn & DeVore (E. Afr.		x		

	Published	Completed	In Progress	Planned
Macaques				
Cayo Santiago Island rhesus colony:				
Altmann	x			
Chandler			x	
Conaway			x	
Koford			x	
Kaufmann			x	
Layne			x	
Sade			x	
J.M.C. (Japanese mac.)	x		x	
Simonds (bonnet, India)		x		
Southwick et al. (rhesus, India)	x			
Furuya (crab-eating, Malaya)		x		
East African Species				
Booth			x	
Haddow, et al.	x			
Hall (patas)				x
Schenkel				x
Struhsacker (patas)				x
Ullrich (colobus)	x			
Apes				
gorilla:				
Emlen & Schaller	x			
J. M. C. (Uganda)	x			
chimpanzee:				
Goodall (Tanganyika)				x
J.M.C.-Azuma et al. (Tanganyika)				x
Kortland (Congo)	x			
Reynolds (Afr.)				x
orangutan:				
Harrisson				x
Schaller	x			
gibbon:				
Kawamura			x	

Japan Monkey Center - field workers*

Japan Monkey Center
55 Kurisu
Inuyama-Shi
Aichi-Ken
Japan
(scientists in residence 1962-63)

M. Kawai	gorilla (Uganda)
K. Tokuda	New World Monkeys (Columbia)
Y. Furuya	crab-eating macaque (Malaya)
M. Yamada	

K. Imanishi	gorilla, chimp (Africa)
J. Itani	gorilla, chimp (Africa)

Institute of Physical Anthropology
Faculty of Science
Kyoto University
Kyoto, Japan

S. Kawamura	gibbons (Thailand), langurs (Ind
E. Yoshiba	langurs (India)
Y. Sugiyama	langurs (India)

Primates Research Station
P. O. Box 30
Dhawar, Mysore State
India

H. Mizuhara	gorilla (Uganda)

Center for Advanced Study in the
Behavioral Sciences
202 Junipero Serra Boulevard
Stanford, California

S. Azuma	chimp (Tanganyika)

c/o Japan Monkey Center

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*All workers listed have studied the Japanese macaque; species listed refer to field studies outside Japan.

Stuart A. Altmann Dept. of Zoology Univ. of Alberta Edmonton, Alberta Canada	rhesus (C.S.I.)* howlers** baboons (planned)
Mirza Asher Beg (with Southwick) M. Rafiq Siddiqi Dept. of Zoology Aligarh Muslim Univ. Aligarh, India	rhesus (India)
Irwin Bernstein Yerkes Laboratories of Primate Biology Orange Park, Florida	howlers**
Alison Bishop Dept. of Zoology Yale Univ. New Haven, Conn.	lemurs
Niels Bolwig Dept. of Zoology Univ. College Ibadan, Nigeria	chacma baboons lemurs
Cynthia Booth Tigoni Primate Center Limuru, Kenya	Cercopithecus spp. (E. Africa)
François Bourlière (with Petters) Faculté de Médecine de Paris Lab. de Physiologie 45 Rue des Saints-Pères Paris 6e, France	lemurs
John Buettner-Janusch Dept. of Anthropology Yale Univ. New Haven, Conn.	prosimians (E. Africa and Madagascar)
C. R. Carpenter The Pennsylvania State Univ. University Park, Penn.	howlers rhesus (C.S.I.)* } previous studies gibbons (Thailand) } previous studies

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*Cayo Santiago Island, Puerto Rico

**All howler studies listed have been conducted on Barro Colorado Island, Panama Canal Zone.

Kirby Chandler Dept. of Anthropology Univ. of Washington Seattle 5, Wash.	rhesus (C.S.I.)
Nicholas E. Collias Dept. of Zoology Univ. of California Los Angeles 24, Calif.	howlers
Clinton Conaway Dept. of Zoology Univ. of Missouri Columbia, Mo.	rhesus (C.S.I.)
Irven DeVore (with Washburn) C.A.S.B.S.* Stanford, Calif. -after Sept. 1, 1963- Dept. of Anthropology Univ. of California Berkeley 4, Calif.	baboons (E. Africa)
John Ellefson (with Altmann) Dept. of Anthropology Univ. of California Berkeley 4, Calif.	baboons (planned)
Orville Elliott (with Howells) Dept. of Anthropology Harvard Univ. Cambridge, Mass.	tree shrews (Java)
John T. Emlen (with Schaller) Dept. of Zoology Univ. of Wisconsin Madison 6, Wis.	gorillas (E. Congo)
Jane Goodall c/o District Commissioner Kigoma, Tanganyika -after Mar. 1, 1963- C.A.S.B.S. Stanford, Calif.	chimps (E. Africa)
A. J. Haddow (et al.) Virus Research Institute Entebbe, Uganda	Cercopithecus spp. (E. Africa)

*Center for the Advanced Study in the Behavioral Sciences, 202 Junipero Serra Boulevard, Stanford, Calif.

K.R.L. Hall C.A.S.B.S. Stanford, Calif. -and- Dept. of Psychology Univ. of Bristol Bristol 8, England	chacma baboons (S. Africa) patas (E. Africa) (planned)
Barbara Harrisson Sarawak Museum Kuching, Sarawak	orangs (Borneo)
Phyllis Jay C.A.S.B.S Stanford, California -after June 1, 1963- Dept. of Anthropology Univ. of California Berkeley 4, Calif.	langurs (India)
John Kaufmann P. O. Box 101 Playa Humacao Puerto Rico	rhesus (C.S.I.)
Carl Koford P. O. Box 101 Playa Humacao Puerto Rico	rhesus (C.S.I.)
A. Kortlandt Zoologisch Laboratorium Universiteit van Amsterdam Plantage Doklaan 44 Amsterdam-C Netherlands	chimps (Congo)
Hans Kummer (with Kurt) Gartendörfli #8 Langnau am Albis Switzerland	hamadryas baboons (Ethiopia)
Fred Kurt (with Kummer) Zoologisches Institut der Universität Zürich Künstlergasse 16 Zürich Switzerland	hamadryas baboons (Ethiopia)

James Layne Dept. of Biology Univ. of Florida Gainesville, Fla.	rhesus (C.S.I.)
Martin Moynihan Smithsonian Institution Biol. Sta. Barro Colorado Island Panama Canal Zone	howlers spiders
M. et Mme. Jean-Jacques Petter (with Bourliere) Muséum National d'Histoire Naturelle Écologie et Protection de la Nature Brunoy, France	lemurs
Vernon Reynolds c/o Game Department Entebbe, Uganda -and- Dept. of Anthropology Univ. of London London W1, England	chimps (E. Africa)
Suzanne Ripley c/o American Embassy Columbo, Ceylon -and- Dept. of Anthropology Univ. of California Berkeley 4, Calif.	langurs (Ceylon)
Thelma Rowell c/o Dept. of Zoology Makerere College Kampala, Uganda	baboons (E. Africa)
George Schaller C.A.S.B.S. Stanford, Calif. -after July 1, 1963- The Johns Hopkins Univ. School of Hygiene and Public Health 615 N. Wolfe St. Baltimore 5, Md.	gorillas (E. Congo) orangs (Borneo)
Rudolph Schenkel Zoological Garden Basel, Switzerland	E. African spp. (planned)

Paul Simonds Dept. of Anthropology Univ. of Oregon Eugene, Oregon	bonnet macaque (India)
Charles Southwick The Johns Hopkins Univ. School of Hygiene and Public Health 615 N. Wolfe St. Baltimore 5, Md.	howlers rhesus (India)
D. Starck H. Frick Anatomy Institute Univ. of Frankfurt Ludwig Rehn-Strasse 14 Frankfurt/Main Germany	hamadryas baboons and gelada (Ethiopia)
Tom Struhsacker Dept. of Zoology Univ. of California Berkeley 4, Calif.	patas (E. Africa) (planned)
Wolfgang Ullrich, Direktor Zoologischer Garten Tiergartenstrasse 1 Dresden A 20, East Germany	colobus (E. Africa)
Sherwood L. Washburn (with DeVore) Dept. of Anthropology Univ. of California Berkeley 4, Calif. -and- C.A.S.B.S. Stanford, Calif.	baboons (E. Africa, Rhodesia)

ADDITIONS TO MAILING LIST

Dr. Douglas Anger
Pharmacology Research
The Upjohn Company
Kalamazoo, Michigan

Dr. Paul E. Ayres
Parkedale Biological Div.
Parke, Davis & Co.
Joseph Campau Ave. at the River
Detroit 22, Michigan

Dr. D. D. Blanchard, Jr.
U. S. Naval Radiolog. Defense Lab.
Code 920C
San Francisco 24, California

Dr. Frank P. Brooks
Gastro-Intestinal Sect. Med. Clinic
Hospital of Univ. of Pennsylvania
36th and Spruce Streets
Philadelphia 4, Pa.

Centre de Selection des Animaux
de Laboratoire
5, rue Gustave-Vatonne
GIF-surYVETTE (S. & O.)
France

Prof. B. Cohen
Dept. of Dental Science
Royal Coll. of Surgeons of England
Lincoln's Inn Fields
London, W. C. 2, England

Dr. George Collier
Dept. of Psychology
Rutgers University
New Brunswick, New Jersey

Dr. J. C. Dacre
Toxicology Research Dept.
Univ. of Otago Med. School
Great King Street
Dunedin, C. 1, New Zealand

Malcolm Davis
242 Grant Street
Herndon, Virginia

Dr. Jose M. R. Delgado
Laboratory of Physiology
Yale University School of Med.
333 Cedar Street
New Haven 11, Conn.

Dr. Rafael N. Garcia
University Medical Center
University of Mississippi
Jackson, Mississippi

Dr. John A. Gergen
Dept. of Physiology & Pharmacology
The Bowman Gray School of Med.
Wake Forest College
Winston-Salem, North Carolina

Robert L. Gossette
Dept. of Psychology
Hofstra College
Hempstead, New York

Mr. H. A. Graff
Ralston Purina Co.
835 South Eighth Street
St. Louis 2, Missouri

Dr. Edward J. Gralla
Medical Research Laboratories
Chas. Pfizer & Co., Inc.
Groton, Conn.

Dr. William E. Greer
Asiatic Animal Import, Inc.
P. O. Box 8125, S.F. Int. Airport
San Francisco, 28, Calif.

Dr. R. K. Haddad
Psychology and Physiology Section
Bur. Res., c/o NJNPI
Box 1000
Princeton, New Jersey

Dr. Leslie H. Hicks
Psychology Dept.
Howard University
Washington, D. C.

Dr. R. A. Hinde
Sub-Dept. of Animal Behaviour
High Street Madingley
Cambridge, England

Prof. Dr. H. Hofer
Max-Planck-Instut für Hirnforsch.
Deutschordenstrasse 46
6 Frankfurt a.M-Niederrad
Germany

Raymond C. Kesel
Dept. of Radiation Biology
U. of R. School of Med. & Dent.
Post Office Box 287, Station 3
Rochester 20, New York

Dr. Hans-Jurg Kuhn
Anatomisches Inst. der Universität
Ludwig Rehn Strasse 14
Frankfurt am Main
Germany

Dr. Laurence L. Layton
Pharmacology Laboratory
U. S. Dept. of Agriculture
800 Buchanan Street
Albany 10, California

Dr. Nissim Levy
Scripps Clinic and Res. Foundation
Section of Medical Psychology
476 Prospect Street
La Jolla, California

Dr. Edward C. Melby, Jr.
The Johns Hopkins University
School of Medicine
725 North Washington Street
Baltimore 5, Maryland

Dr. S. M. Michaelson
Dept. of Radiation Biol.
U. of R. School of Med. & Dent.
P. O. Box 287, Station 3
Rochester 20, New York

Donald E. Mintz
Dept. of Psychology
Princeton University
Princeton, New Jersey

Mr. Andrew A. Monjan
Dept. of Psychology
University of Rochester
Rochester 20, New York

Dr. Joseph M. Notterman
Dept. of Psychology
Princeton University
Princeton, New Jersey

Mr. Marshall Parrot
Radiobiology
NASA
Ames Research Center
Moffet Field, California

Dr. Harry Plymale
San Diego State College
San Diego, California

John P. Prytherch
Section of Pathology
The Norwich Pharmacal Co. Labs
Norwich, New York

Dr. John M. Rhodes
Space Biology Laboratory
Brain Research Institute
Medical Center, UCLA
Los Angeles 24, California

Dr. Leon Roizin
New York State Psychiatric Inst.
Columbia University
New York, New York

Dr. Leonard A. Rosenblum
Primate Behavior Laboratory
Downstate Medical Center
State University of New York
450 Clarkson Avenue
Brooklyn 3, New York

Walter B. Sapanski, Jr.
The Public Health Res. Inst. of
City of New York, Inc.
Foot of East 16th Street
New York 9, New York

Dr. James C. Savoy
Columbus Municipal Zoo
Rt. 1
Powell, Ohio

Dr. Albert Schaffer
Central Animal Service
Downstate Medical Center
State University of New York
450 Clarkson Avenue
Brooklyn 3, New York

Dr. Edwin W. Schultz
Oregon Primate Research Center
Beaverton, Oregon

Dr. J. Sidowski
Dept. of Psychology
University of California
Los Angeles 24, California

Capt. Gerard Smith
Dept. of Neuroendocrinology
Walter Reed Army Inst. of Research
Washington 12, D. C.

Dr. H. Sprankel
Max-Planck-Instut für Hirnforsch.
Deutschordenstrasse 46
6 Frankfurt a.M-Niederrad
Germany

Richard W. Sroges
Dept. of Psychology
University of California
Los Angeles 24, California

Dr. L. W. Tuttle
Dept. of Radiation Biology
U. of R. School of Med. & Dent.
P. O. Box 287, Station 3
Rochester 20, New York

Dr. Willis K. Webb
Dept. of Chem. Pharmacology and
Safety Evaluation
Mead Johnson Research Center
Evansville 21, Indiana

Dr. Ozro B. Wiswell
The Univer. Texas Dental Branch
P. O. Box 20068
Houston 25, Texas

ADDRESS CHANGES

Fernando de Avila-Pires
Museu Nacional, Rio de Janeiro
Quinta da Boa Vista, Gb.
Brasil

Dr. Alfred Baumeister
Psychology Dept.
Central Michigan University
Mount Pleasant, Michigan

Dr. N. R. Brewer
5738 Ellis Avenue
Chicago 37, Illinois

Dr. Henry J. De Haan
8618 Victoria Road West
Kings Park
Springfield, Virginia

Dr. Charles B. Ferster
Institute of Behavioral Research
Bldg. D.D.
University of Maryland
College Park, Maryland