

LABORATORY PRIMATE NEWSLETTER

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with the assistance of
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and
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POLICY STATEMENT
(Revised April, 1963)

The primary purpose of the Newsletter is to provide information on maintenance and procurement of nonhuman 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 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 or apes. 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. (Please make checks payable to Brown University.)

All correspondence concerning the Newsletter should be addressed to:
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Acknowledgments

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EDITOR'S NOTES

In the October, 1962, issue, we mentioned that 10-mg. orange-flavored Isoniazid tablets are available, and gave the source of the tablets. We recently learned of a cheaper source, the David Yellen Co., Inc., Canton, Massachusetts. The price is \$11.95 per thousand.

Although the number of contributions is not increasing, the length of our mailing list is, as a glance at the back of each issue of the Newsletter would suggest. The Newsletter is currently being sent to 568 individuals or organizations.

We have gotten several letters from dealers recently inquiring about our advertising policy. The answer is that we do not accept advertising. We try to distinguish between outright advertising and useful information about various products and services. We are willing to publish, free of charge, anything that falls into the latter category, although the distinction is difficult to make at times.

If you have been deluged with circulars about products and services having to do with nonhuman primates, you can, as you probably have guessed, blame the Newsletter mailing list. We expected this outcome, which was one of the reasons for our publishing the mailing list. We assume that mailed advertising might inform you of products or services of which you were not aware. As a matter of fact, you may notice that we have included the Editor's name and address in the current Additions to Mailing List. We found that we were being left out; for example, apparently everybody but us got the first issue of Folia Primatologica.

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LABORATORY MAINTENANCE OF THE TREE SHREW

(Tupaia glis Diard 1820)

William A. Draper

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Several characteristics of the tree shrew make it of considerable interest as a laboratory animal. It is one of the most primitive of primates; it has a short gestation period (43 to 46 days) and as many as eight litters of one to three animals per year irrespective of season; it is sexually mature at approximately 6 mo.; and at maturity it is still a relatively small animal--about the size of an adult female albino rat. An excellent review of the behavior and breeding of the tree shrew is provided by Sprankel (1961).

During 1962, the Yerkes Laboratories obtained 13 tree shrews. Tigges (in press) has tested some of these animals for learning capacity and retention, and I have been investigating discrimination-reversal learning with them. However, we have had great difficulty with maintenance and now only 3 survive of the original 13. Thus, it may be important to consider some of the techniques we used and the problems we encountered in maintaining these animals in captivity.

The first shipment of tree shrews (three adults, four subadults) was housed as a group in a wire mesh cage (90 cm x 90 cm x 75 cm). At one end was a tier of six small cages (23 cm x 23 cm x 28 cm), each having an entrance hole. Sticks were placed horizontally and vertically in the large cage to permit climbing, and nesting materials (paper, twigs) were provided. It was possible to view the animals in the small cages through clear plexiglas which formed the end of the cage. Throughout, the tree shrews all crowded into one of the small cages and remained there except during feeding and rare forays into the open. The nesting materials were seldom used. They were caged in this manner for about 3 mo., during which the adult animals killed and ate the younger ones. In a fight between two adult males, one was killed but not subsequently eaten.

To decrease fighting and also to facilitate testing of single animals, the remaining animals and six adults were placed in individual wire mesh cages (60 cm x 60 cm x 70 cm). Each cage was equipped with overhead neon lights operating on a 12-hr. daily cycle (7:00 a.m. to 7:00 p.m.). Again, climbing sticks were provided and a small home box was placed in each cage to enable the animals to retreat into a darkened area. A drip pan was installed beneath the floor of each wire cage.

Since their arrival the tree shrews have been given a variety of fresh fruit (oranges, apples, bananas, grapes), meat (liver, hamburger, chicken), and vegetables (lettuce, beans) daily, and cottage cheese once a week. Animals differ in their food preferences and it takes only a

few days to discover the diet preferred by each. Most eating takes place within the first hour following presentation of the food. Fresh water is available ad libitum and a liquid vitamin supplement (Vita Mates, Rexall Drugs) is added weekly. Delvex (Lilly) is also added approximately every 3 weeks to control intestinal parasites.

Death in the present caging arrangement results from three types of causes: (1) minor changes in the maintenance schedule which may increase susceptibility to disease (e.g., food or water presentation delayed 6 to 12 hr., water untouched because of animals' distaste for certain vitamin supplements, temporary removal of the animal from the cage during cleaning); (2) intestinal parasites; (3) fighting as a result of inappropriate pairing of male and female adults. When the animals become ill they lose their hair, lose weight, stop eating, stay in their home boxes, and show signs of diarrhea. They frequently die within 48 hr. regardless of treatment. No births have occurred. However, one female aborted and the fetus was eaten.

It has been our experience that the tree shrew is a very delicate animal and requires constant and skilled care. The optimum laboratory conditions are not yet worked out to our satisfaction.

Bibliography

1. Sprankel, H. On the behavior and breeding of Tupaia glis (Diard 1820) in captivity. Zeitschr. Zool., 1961, 165, 186-220.
Translated by the Translating Section, Library Branch, Division of Research Services, National Institutes of Health, Bethesda, Maryland.
2. Tigges, J. On learning capacity, retention and memory in Tupaia glis (Diard 1820). Folia Primatologica, in press.

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REQUEST FOR INFORMATION

Under the direction of Dr. K. R. L. Hall, we are establishing a program of behavioral study of Erythrocebus patas. The patas monkey is a little known, well nigh rare species of terrestrial primates, which roams the grassland and veldt of western Central Africa.

As far as I have been able to determine, there has been no prior behavioral work done on the patas, and to my knowledge the physiology, pathology, and medicinal treatment of patas diseases is unknown. Therefore, I should very greatly appreciate any bits or scraps of information which might be forthcoming from readers of the Newsletter.

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MORE NOTES ON SAIMIRI SCIUREUS

Barbara A. Brooks

Yerkes Regional Primate Research Center of Emory University

Orange Park, Florida

Squirrel monkeys have been kept successfully in the Yerkes Laboratories on an ad-lib diet of bananas, apples, oranges, and Purina Monkey Chow. A flavored vitamin supplement (trade name Vi-Syneral, Arlington Funk Labs.) placed in the water supply noticeably improves the condition of the skin and coat.

The monkeys were heavily infested with hookworm on first arriving at the Laboratories but responded well to treatment with powdered dithiazanine iodide (Delvex, Lilly) which was mixed with banana or sprinkled on chow biscuits.

Stool analyses on the most recent shipment of monkeys revealed the presence of Trichuris (whipworm), Strongyloides, Trichomonas, and Macrocanthorhynchus hirudinaceus (thorny-headed worm). Powdered thiabendazole (Merck) was immediately and thoroughly effective against Strongyloides. We could find no recommended medication for the thorny-headed worm, but it disappeared while the animals were being treated with Delvex for whipworm, and diiodoquin (Searle) for Trichomonas. Whipworm has been the most persistent parasite, but gradually reduces under extended treatment with Delvex.

On arrival the squirrel monkeys were placed in small quarantine cages (24 in. by 18 in. by 22 in.) in pairs or trios. Tails were rubbed raw on the cage floors and occasionally the animals bit each other severely when excited. Removal to large vertical cages (36 in. by 23 in. by 85 in.) with adequate perches and hutches eliminated both problems, and the animals appear to be cleaner and more active.

Minimum air temperatures of 55° F do not appear to cause discomfort to the animals housed in our outdoor cages, nor produce any health problems. It is necessary to provide the monkeys with heat if temperatures persist below this level.

If maintained on a deprivation diet these monkeys work eagerly for monkey chow. Optimal health and work motivation were obtained under the following daily diet per individual: 1/6 orange, 1/6 apple, 1-in. section of banana, and 6 pieces of monkey chow. Two working animals have been maintained on this diet for 5 months, others for shorter periods. Behavioral test performance dropped when the animals were returned to an ad-lib diet. Our animals refused a commercial banana-flavored pellet and took few "new" foods, such as raisins, even when hungry.

Gross electrodes were permanently implanted in the brains of several animals. We found the combination tranquilizer (Largon) and

Nembutal anesthetic recommended by Woodburne (LPN, 2, #1) to be completely satisfactory. Postoperative care included an IM injection of 250,000 units of Bicillin, and 10 cc (IP) of 5% dextrose in saline. Animals were placed in a recovery cage and wrapped in towels to keep them warm until they could be returned to the home cage. Apparent recovery was observed in all cases within 10 to 18 hr.

Some monkeys have been placed in a restraining chair for two to three hours daily over a period of several weeks. A good deal of stress and difficulty is avoided by administering an anesthetic dose of nitrous oxide just prior to placing the animal in the chair. This is done while the monkey is in a small airtight wooden "gas box" fitted with a plastic window for observation. The animal can be removed and locked into the restraining chair within the 30 or 40 sec. required for recovery and there are no ill effects.

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OFFER TO EXCHANGE MONKEYS

Quite often we get calls for large monkeys. From a weight standpoint alone, these animals are not economical to bring in as the cost of air transportation is quite high. For this reason, we are willing to exchange small monkeys for large monkeys of any kind. We are also interested in obtaining good breeders or pregnant females.

V. D. Rider, Jr.
Rider Animal Co.
Box 229
Warrenton, Virginia

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PRIMATE SOCIAL BEHAVIOR: LIBRARY CHECKLIST

A checklist was recently compiled as a supplement to our "Recent Additions" list, which might be of interest to some readers of the Newsletter. The checklist is not intended to be a comprehensive bibliography; rather, it is a list of those items found to be most useful as assigned or recommended reading in a new field of inquiry whose basic theory and procedures are only now beginning to be formed.

Postcard requests for the checklist are preferred. There is no charge. Requests should be sent to:

Robert E. Pfeiffer, Librarian
Anthropology Library
230 Kroeber Hall
University of California
Berkeley 4, California

SYMPOSIUM ANNOUNCEMENT

First International Symposium
on the Baboon and
Its Use as an Experimental Animal
November 5 - 8, 1963

Sponsored by
SOUTHWEST FOUNDATION FOR RESEARCH AND EDUCATION
San Antonio 6, Texas

The use of the baboon as an experimental animal is increasing very rapidly. There has been an increasing awareness of the need to share present knowledge and chart future research.

Authors and Titles
(as of August 2, 1963)

Leonard R. Axelrod, Ph.D., Chairman, Department of Biochemistry, Southwest Foundation for Research and Education, San Antonio, Texas

"Investigations Concerning the Metabolism of Estrogens in both Cardiac and Peripheral Skeletal Muscle of the Baboon"

*"Studies on the Biosynthesis of the Steroid Hormones in the Testes and Adrenals of Baboons"

David H. Baeder, Ph.D., Director, Biological Sciences, Mallinckrodt Pharmaceuticals, St. Louis, Missouri

"A Comparison of Blood Lipid Fractions of Various Experimental Animals including the Baboon"

Nigel A. Barnicot, Ph.D., Professor of Anthropology, University College, London, England

"Serum and Red Cell Protein Variants in Baboons"

John Buettner-Janusch, Ph.D., Associate Professor, Yale University, New Haven, Connecticut

"The Baboon as a Laboratory Subject for Serological and Biochemical Work"

*These subjects will be presented at the Symposium by title and included, along with papers that are read, in a book to be entitled, "The Baboon."

Garman H. Daron, Ph.D., Professor of Anatomy, The University of Oklahoma Medical Center, Oklahoma City, Oklahoma

"A Morphological Study of the Nucleus Dentatus of the Baboon"

Irven DeVore, Ph.D., Harvard University, Cambridge, Massachusetts
"Changes in the Population Structure of Nairobi Park Baboons, 1959-1963"

Joseph Gillman, M.D., and Christine Gilbert, M.D., National Institute of Health & Medical Research, Accra, Ghana, Africa
"The Endocrine and Lipid Metabolism in the Baboon--(a) Physiological (b) Experimental"

M. E. Groover, Jr., M.D., University of Oklahoma Medical Center, Oklahoma City, Oklahoma

"Experimental Arterial Lesions in the Baboon"

*"Myocardial Necrosis without Atherosclerosis and Produced by Vagus Stimulation in the Wild Kenya Baboon"

John J. Haglin, M.D., Assistant Director, Department of Surgery, Minneapolis General Hospital & MGH Research Foundation, Inc., Minneapolis, Minnesota

"Function Studies of the Autografted Baboon Lung: Comparison with the Dog"

George R. Herrmann, M.D., Professor of Medicine, the University of Texas Medical Branch, Galveston, Texas

"An Electrocardiographic Study of Domestic and African Baboons of the San Antonio Colony"

Claude R. Hitchcock, M.D., Ph.D., Joseph C. Kiser, M.D., Robert L. Telander, M.D., Edward L. Seljeskog, M.D., and James F. Bascom, M.D., Chief of Surgery (Hitchcock), Minneapolis General Hospital & MGH Research Foundation, Inc., Minneapolis, Minnesota

"Successful Replantation of the Baboon Kidney Following 22 Hour Extracorporeal Refrigeration"

F. W. Hoffbauer, M.D., Professor of Medicine, Minneapolis General Hospital, Minneapolis, Minnesota

"Nutritional Liver Injury (choline-deficiency fatty liver) in the Baboon"

A. N. Howard, Ph.D., Professor of Pathology, University of Cambridge, Cambridge, England

"Serum Proteins, Lipoproteins and Lipids in the Baboon's Normal and Atherosclerotic Diets"

S. S. Kalter, Ph.D., Chairman, Department of Microbiology, Southwest Foundation for Research and Education, San Antonio, Texas

"Virological Studies on the Normal Baboon (Papio doguera)"

David Kritchevsky, Ph.D., and Irwin L. Shapiro, Ph.D., The Wistar Institute, Philadelphia, Pennsylvania

"Biosynthesis and Transport of Cholesterol in the Baboon"

*"Experimental Atherosclerosis"

Hans Kummer, Ph.D., Hirnanatomisches Institute, Waldau-Bern, Switzerland

"The Relevance of Studies on Social Behavior in Captive Hamadryas

Baboons as Compared with Field Results"

Robert H. LePere, M.D., P. E. Benoid, Ph.D., R. C. Hardy, M.D., and J. W. Goldzieher, M. D., Affiliate Member (LePere), Southwest Foundation for Research and Education, San Antonio, Texas

"The Origin and Function of the Ovarian Nerve Supply in the Baboon"

Henry C. McGill, Jr., M.D., and Jack P. Strong, M. D., Professor and Chairman, Department of Pathology (McGill), Louisiana State University School of Medicine, New Orleans, Louisiana

"Spontaneous Arterial Lesions in Baboons"

*"Serum Cholesterol in Baboons"

*"Naturally Occurring Parasitic and other Lesions in Baboons"

Donald H. Masters, D.D.S., Research Associate, Southwest Foundation for Research and Education, San Antonio, Texas

"Studies on the Periodontium and Periodontal Disease in Baboons of the San Antonio Colony"

Joseph L. Melnick, Ph.D., Baylor University College of Medicine, Houston, Texas

"The Use of the Baboon for the Preparation of Antiserum for Virus Identification"

J. Moor-Jankowski, M.D., Human Genetics Branch, National Institute of Health, Bethesda, Maryland

"The Baboon as a Laboratory Animal in Immunohematology"

*"The Use of 1-(1-Phenylcyclohexyl) Piperidine Monochloride ("Sernylan" Parke, Davis & Co.) for Handling and Anesthesia in the Baboon" (J. Moor-Jankowski & Arthur Rodriguez)

*"Normal Blood Values, Blood Groups, Serum Specificities, and Preservation of Blood of the Baboon" (J. Moor-Jankowski, H. J. Huser, Alexander S. Wiener, and Arthur J. Pallotta)

John Moossy, M.D., Professor of Pathology and Neurology, Louisiana State University School of Medicine, New Orleans, Louisiana

"Central Nervous System Lesions in the Kenya Baboon"

G. S. Nelson, M.D., London School of Hygiene & Tropical Medicine, London, England

"The Parasitic Helminths of Baboons"

Arthur J. Pallotta, Ph.D., Director of Research, Bionetics Research Laboratories, Inc., Falls Church, Virginia

"Care and Maintenance of a Small Baboon Colony"

I. A. Ratner, M.D., Research Associate, Southwest Foundation for Research and Education, San Antonio, Texas

"Observations of Lower Urinary Tract Function in the Baboons"

O. M. Reed, D.D.S., Research Associate, Southwest Foundation for Research and Education, San Antonio, Texas

"Studies on the Dentition and Eruption Pattern in the San Antonio Baboon Colony"

T. W. Roth, D.V.M., General Curator, National Zoological Park, Washington, D.C.

"The Taxonomy of the Baboon and its Position in the Order of Primates"

Edward L. Seljeskog, M.D., Claude R. Hitchcock, M.D., Ph.D., M. E. Groover, Jr., M.D., Claire J. A. Strobel, M.D., and John J. Haglin, M.D. (Seljeskog) Minneapolis General Hospital Research Foundation, Inc., Minneapolis, Minnesota

"Coronary Artery Studies in the Baboon Versus the Dog Utilizing Surgically Induced Myocardial Infarctions"

Dietrich Starck, M.D., Anatomisches Institut, Frankfurt Am Main, Germany

"Some Remarks on Morphological Problems of the Baboon Skull (Skull-base, Development of Skull, Brain-size and Skull Form)"

Robert Telander, M.D., and Claude R. Hitchcock, M.D., Ph.D., Minneapolis General Hospital Research Foundation, Inc., Minneapolis, Minnesota

"Successful Replantation of the Baboon Kidney Following Prolonged Extracorporeal Perfusion at Normal Temperature and with Normal Function"

Robert L. Van Citters, M.D., and Dean L. Franklin, University of Washington School of Medicine (Van Citters), Seattle, Washington

"Hemodynamic Studies in Ambulatory Baboons"

Thomas E. Vice, D.V.M., and A. Rodriguez, Staff Veterinarian, Southwest Foundation for Research and Education, San Antonio, Texas

"Care and Maintenance of the San Antonio Baboon Colony"

*"Clinical and Physiological Observations in the Baboon"

S. L. Washburn, Ph.D., Professor of Anthropology, University of California, Berkeley, California

"The Behavior and the Ecology of Baboons in their Natural Habitat"

N. T. Werthessen, Ph.D., Associate Research Professor, The University of Oklahoma Medical Center, Oklahoma City, Oklahoma

"The Baboon as a Laboratory Animal for Studies Related to Atherosclerosis"

ADDITIONS TO LIST OF MONKEY IMPORTERS
(See January, 1962, issue for original list)

International Animals Exchange, Inc., 22041 Woodward Ave., Ferndale
20, Michigan

G. van den Brink, N.V., P. O. Box 15, Soest, Holland

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NEWSPAPER CLIPPINGS

SAYS MONKEYS TRAINED TO TRAIN THEMSELVES

A Yale University scientist has trained monkeys to train themselves. He completed an intricate experiment in which the subordinate members of a monkey colony learned to turn the usually nasty boss monkey into a sweet-natured peer.

Yale officials said last night that Dr. Jose M. R. Delgado, associate professor of physiology, outlined the experiment at the second international pharmacological meeting at the University of Prague, Czechoslovakia. Dr. Delgado said the behavior patterns of the normally ill-tempered macaca rhesus could be changed by electrical charges carried to various areas of the brain by electrodes. He also noted that the entire colony could be conditioned socially by stimulating only one of its members.

In his experiment, Dr. Delgado said, he equipped a boss monkey named Ali with electrodes. The apparatus was set up so that a tone sounded two seconds before the stimulation and continued through it. The professor said that Ali was first stimulated remotely. Then a lever was attached to the colony cage near the feeding tray. When it was pressed, the tone sounded, followed by a five-second stimulation of Ali.

The other three monkeys used in the experiment soon learned that by pressing the lever they made Ali less aggressive and more docile, Dr. Delgado said.

The Providence Evening Bulletin, Providence, R. I., August 21, 1963

RECENT ARTICLES AND BOOKS

The bibliography below is not intended to be comprehensive. It includes titles that we could obtain conveniently from such sources as "Current Contents," from receipt of reprints, and from perusal of some of the journals in the Brown University Library.

Psychology: Behavioral and Physiological

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Zakher, Y. Ya. (Sechenov Inst. Evolutionary Physiol., Acad. Sci., Leningrad, USSR.) Conditioned reflexes to relative and absolute properties of stimuli under conditions of their simultaneous and successive presentation to monkeys. (In Russian) J. higher nerv. Activity--Pavlov, 1963, 13, 26.

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Stewart, C. N. The effects of lysergic acid diethylamide and chlorpromazine on learning and social behavior in the monkey. Diss. Abstr., 1963, 24 (63-4263, 136 pp.).

Sandler, J., and Stone, W. F. (V.A. Hospital, Coral Gables, Florida). Laboratory observations of two sub-species of marmosets. Psychol. Rep., 1963, 13, 139.

The results of over two years of observations on Hapale jacchus (common marmoset) and Tamarinus nigricollis (white-lipped tamarin) are summarized. The authors conclude that, while problems in the maintenance and use of marmosets continue to exist, there is good reason to believe that the establishment of such a primate colony could represent an important addition to many psychological laboratories.

Pathology

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