LABORATORY PRIMATE NEWSLETTER

Volume 7, Number 3

July, 1968

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POLICY STATEMENT
(Revised January, 1968)

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.

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 Volume 1, 2, 3, and 4 for $4.00 per volume, and Volumes 5 and 6 for $2.00 per volume. (Please make checks payable to Brown University.)

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

Preparation of articles for the Newsletter.--Articles and notes should be submitted in duplicate and all copy should be double spaced. Articles in the 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].

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Acknowledgment

The Newsletter is supported in part by U. S. Public Health Service Grant FR-00419 from the Division of Research Facilities and Resources, N. I. H.

EDITOR'S NOTES

In many instances, when nonhuman primates have fulfilled their usefulness for some types of research, they may be quite useful for other types. For example, animals used in behavioral studies can readily be used for many types of medical and physiological experiments. Such animals, especially if they have been used in long-term studies, will often be exceptionally well-stabilized for laboratory use. It is our impression that investigators are not always taking advantage of the availability of such animals. We feel that this is a pity and that the situation should be corrected.

Recently, Mr. Michael A. Nolan, of Primate Imports Corporation, has acted as an intermediary in the sale of such animals and has offered to continue to do so. He cannot take these animals into his facilities, but has arranged for their transfer from the supplying laboratory directly to the receiving laboratory. He has then taken care of the necessary paper work, which includes billing the receiving laboratory and either crediting the account of the supplying laboratory or replacing the animals sold with an equivalent number of new wild-caught animals. There is a 5-percent bookkeeping charge. Anyone who has animals available could notify Mr. Nolan at Primate Imports Corporation (34 Munson Street, Port Washington, L. I., N. Y. 11050). Mr. Nolan will then notify other laboratories of the availability of the animals.

The response to the Newsletter has, since its inception seven years ago, been just short of overwhelming. This is attested to by the rapid and sustained growth of the Newsletter audience. (It is now being mailed to over 1380 persons and institutions all over the world.) In addition, we continually receive letters of praise and encouragement for our efforts and expressions of hope that we will continue. We greatly appreciate this response and, in fact, it does help to compensate for the time and effort involved in the preparation of the Newsletter. However, the inflow of expressions of enthusiasm for the Newsletter is not nearly matched by contributions to the Newsletter. We are willing to do a certain amount of arm-twisting to obtain material, and more than the usual amount of work to get material in shape for publication, but we still need help. There are many things that readers may do to insure the continued success of the Newsletter. Some of these are rather simple and would really take only a few moments of time. A few examples should illustrate the kind of things that can be done. First, the speed of dissemination of practical information about primate care or of information of general interest to primate researchers can be greatly increased by sending abstracts (or preprints) of articles that will appear in a professional journal to the Newsletter at the time that they have been accepted for for publication. This would also save us a good deal of time and effort, since we now have to search for titles and summaries for most of the articles which appear in the "Recent Books and Articles" section. Of course, if you have the time, a more detailed summary of the article would be very helpful. Second, send us any odds and ends of information

that you think could be of general interest. Don't be conservative (we'll provide that) and don't be formal. A few scribblings on a postal card will do. We could start a special section for one- or two-line questions or brief descriptions of a good way of doing things. Third, you might simply want to suggest to us a good source of material and let us do the rest. Perhaps you have been to a meeting that we are not aware of or visited a laboratory and obtained some useful information.

By all means, keep the articles, notes, and announcements coming.

CONTENTS

HERPES-T INFECTION IN MAN?

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Man is susceptible to several herpes viruses, the most well-known being Herpes simplex and Herpes zoster or varicellae. Another agent, variously referred to as B virus, herpes-B, or Herpes simiae is one of the most lethal of all viral diseases of man. Herpes-B occurs as a natural disease in Old World monkeys of the Macaca genus, particularly in the rhesus monkey (Macaca mulatta). In this species herpes-B rarely produces a disease with clinical symptomatology. The disease when it occurs is characterized by the presence of vesicles and ulcers in the lips and/or tongue. Man contracts infection from infected monkeys (usually after a bite) or contact with another source of the virus (i.e., tissue culture) and following a variable incubation period develops an encephalitis which is nearly 100% fatal.

Herpes B is not known to infect New World monkeys. These animals are, however, infected by another member of the herpesvirus group known as herpes-T (Holmes et al., 1964; Hunt & Melendez, 1966; Melendez et al., 1966; Daniel et al., 1967). Herpes-T is carried as a latent infection in the squirrel monkey (Saimiri sciureus) and the disease is essentially analogous to Herpes simplex in man and herpes-B in the rhesus monkey. Herpes-T produces a fatal infection in certain other New World monkeys such as marmosets and owl monkeys. The virulence of the disease in these animals can be compared to that of herpes-B infection in man.

There is currently no evidence available to indicate that man may be susceptible to herpes-T infection. However, we have observed a rising titre of serum antibodies for this virus in a patient with an undiagnosed disease of the central nervous system.

In January, 1966 we were informed that a scientist who had worked with squirrel monkeys developed an encephalitis in October, 1965. By January, 1966 this individual had, for the most part, recovered. However, the cause of the encephalitis had not been determined.

The disease was characterized by a maculo-papular rash, headache, lethargy, nausea and fever which were followed by a mental syndrome consisting of poor memory, marked disorientation, amnesia, irritability, blurring of vision, cutaneous hypersensitivity and grand-mal seizure. This was associated with abnormal EEG. Recovery followed with persistence of some amnesia and disorientation.

At no time during his illness was virus isolation attempted; however, in October, 1965, it was considered that the group of 5 squirrel monkeys

with which the patient was working might have been the source of his disease. These animals were sacrificed at that time, and representative tissue samples were frozen in a household freezer. These tissues were made available to us in February, 1966, together with two sera samples: one aliquot obtained at the period of acute illness (October, 1965) and another obtained on February, 1966.

The serum taken in October, 1965, did not reveal the presence of antibodies to the virus; however, the serum samples collected in February, 1966, diluted 1:6 inhibited the cytopathogenic effect of 100 ID_{50} of herpes-T virus. Tissue samples prepared with liver, lung, kidney, spleen, brain and heart of the 5 squirrel monkeys did not provoke cytopathogenic effect in rabbit cultures during an observation period of 15 days.

Without isolation of herpes-T virus it is not possible to incriminate this virus as the causal agent of the disease of this patient. However, the presence of herpes-T antibodies in the February serum sample and their absence in the October sample is adequate immunological evidence for contact with this virus.

This is in no way an indication that this individual was really infected by herpes-T, but it is highly suggestive, especially because of the fact that sera from laboratory personnel working with this virus and with squirrel monkeys have not revealed the presence of herpes-T antibodies.

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COLLABORATING CENTER FOR COMPARATIVE MEDICINE AND SIMIAN VIRUS REFERENCE CENTER

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It is now apparent that the use of nonhuman primates in biomedical research has reached unanticipated proportions. Hopefully, the use of animals phylogenetically close to man will establish biomedical systems which will allow evaluation of different zoonoses and yield information on human disease. However, introduction of a new group or species of such animals into research activities initiates a number of problems and situations potentially dangerous for animal colonies as well as for investigators. Although most interspecies exchanges of organisms will result in inapparent and latent infections, overt human and nonhuman illness is possible, as is apparent from such incidents as: Herpes simiae disease, Yaba-like disease, hemorrhagic disease, the outbreak in Germany associated with African green monkeys, and a number of bacterial-induced infections. The importance of these incidents is emphasized by the fact that various simians are derived from diverse geographic areas. A possibility exists, therefore, that new and exotic agents may be transported internationally, introducing an unrecognized clinical syndrome into the colony and perhaps into the human population as well. Thus, while the use of nonhuman primates in such experimental studies, especially as may be related to man, is to be commended, disregard for or ignorance of the potential problems would be foolhardy indeed.

Numerous viruses have been recovered from the feces, throats, and tissues or tissue cell cultures of rhesus, cynomolgus, and African green monkeys (Heberling & Cheever, 1960; Hoffert et al., 1958; Hsiung & Melnick, 1958; Hull et al., 1956, 1957, 1958; Kalter, 1960; Malherbe & Harwin, 1957). More recently, isolates have been made from New World simians as well as baboons, chimpanzees, and gorillas (Coulston & Soike, 1966; Fuentes-Marins et al., 1963; Heberling & Cheever, 1966; Hsiung & Atoynatan, 1966; Kalter et al., 1967a; Kim et al., 1967; Morris et al., 1956). These viruses are all "new" in the sense of showing no demonstrable antigenic relationship to previously-described agents. Needless to say, a number of human agents have been recovered from these simians. Viruses capable of producing disease in man have been reported in various nonhuman primates (Anon., 1967; Hall & McNulty, 1967; Held, 1962; Sabin, 1934; also see various articles in Deutsche Medizinische Wochenschrift, 1968, No. 12). Epidemiologic aspects of the exchange of human and simian viruses, however, are not under consideration at this time.

The need for reagents, that is reference seed viruses and specific antisera, necessary for identifying and characterizing the aforementioned isolates is obvious. Steps have been taken by various governmental agencies as well as commercial sources to satisfy this need. It should be mentioned that reference reagents to many viruses, other than those of simian origin, have been prepared and are available to qualified investigators.

With the expanded use of primates has come the realization that many investigators employing such experimental animals will not wish to become involved in various virologic studies because of established programs in other areas and lack of interest or capability in diagnostic virology.

With the recognition of the importance of this total problem, plus a basic interest in simian virology, a program for the collection and comparison of specimens obtained from primates maintained in primate facilities all over the world was initiated at the Southwest Foundation for Research and Education (SFRE) in San Antonio, Texas. Initially, studies were limited to a serologic survey endeavoring to provide an antibody profile of various primates to viruses of human and simian origin (Kalter et al., 1963, 1967b). In addition, viruses common to the baboon as it exists in its native habitat in Kenya and in captivity were isolated. Limited attempts were made to isolate viruses from other species of simians as well. Development of this capability soon led a number of investigators to request assistance in the identification of isolates or for general information pertaining to their colonies of animals.

As a result, an "unofficial" reference center was established in primate virology offering modest assistance whenever possible. Two years ago, in cooperation with the World Health Organization[1] (WHO), this study was expanded to an international level and last year support was also provided by the U.S. National Institutes of Health[2] (NIH). The specific aims of this center, which we are now calling the Simian Virus Reference Center, are: (a) development of a working repository for simian viruses; (b) provision of a source of reagents: i.e. certified reference seed virus strains, specific antisera to these viruses, etc.; (c) consultation services, including serum survey data on the existence of antibodies to various viruses of human and simian origin in various species of primates; (d) provision of diagnostic services, including identification and characterization of viruses for primate users unable to identify or "work-up" an isolate obtained from their primates (this would also include screening for human agents); (e) provision for a source of information and organism exchange between primate laboratories

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[1]Collaborating Center of Comparative Medicine--Simian Viruses (Grant No. Z2/181/27).

[2]Grant No. FR-00361.

and other health organizations in the U.S., WHO, and elsewhere; and (f) training of interested students in virologic laboratory procedures associated with primate investigations. The general philosophy and approach to the establishment of this Center are as follows:

1. Laboratory survey.--A listing of major laboratories, primarily American and some foreign, involved in nonhuman primate research was compiled. (These were identified through the courtesy of Dr. D. Hersey as well as through other sources.) An informational letter and card were then sent to these laboratories. Information from these laboratories is being recorded and includes: sources of animals (methods involved in obtaining the animals, trapping, how held prior to shipping, facilities of animal importer), numbers, methods of holding animals, length of time in captivity, vaccination data, history of illness, age, weight, sex, etc. This information is kept on a permanent recording system similar to that currently in use for animals maintained at SFRE. Any change that may influence the animals' virus status is recorded when provided.

2. Repository.--Recognized prototype simian viruses are currently under study in this laboratory. These viruses were obtained from the American Type Culture Collection (ATCC) and from a number of the original investigators such as Drs. Hull, Johnston, Malherbe, Menner and other responsible sources. Whenever possible, new prototype organisms isolated from primates have been obtained from the original investigators. This will continue as new isolates are made in order to maintain a constant working reference group of primate organisms. Permanent records are being kept on all isolates indicating, among other things, the simian species from which the virus was derived, the specimen yielding the organism, the history of the agent, the clinical relationship (if any), and whether reference antiserum is being prepared and tested. If a new isolate is not purified when received, attempts are made to purify and biologically characterize it. These characterized organisms are then stored under the most appropriate conditions (in certain instances this may need investigation)--freezing (-20°, -70°, liquid nitrogen), lyophilization, routine transfers, etc. Once an agent is characterized, seed stock and homologous antiserum are prepared. Storage of the "new" organism eventually will be at the ATCC or other suitable site (with permission of the laboratory where the original isolation was made).

While there is no intention to compete with ATCC in stocking these isolates, certain exceptions may initially occur. A new isolate will be first completely characterized at this facility. When the agent is accepted as a new prototype, it will then be made available to ATCC along with an aliquot of antiserum.

In view of a need for a reference serum, participants in the program are strongly urged to collect and store serum samples on all primates when they arrive at the laboratory. These sera are used in determining the immune status of each animal in any subsequent outbreak

of disease, or as an indication of the species that may be responsible for the outbreak. In addition, antibody profiles are being obtained to determine to what viruses the various nonhuman primates are naturally exposed.

3. Reagents.--Representative working stocks and homologous Antisera for the various viruses are being prepared and tested. Distribution of these reagents will be through NIH, WHO, or at their direction. Obviously, certain limitations must be imposed upon the recipients of this material as it will be impossible to produce sufficient amounts for indiscriminate distribution. Reference reagents also have been prepared in this laboratory as well as other cooperating laboratories under the auspices of the Research Reference Reagents Branch and the National Cancer Institute, NIH, for many of the prototype human and, to a more limited extent, simian viruses. Reagents prepared against newly recognized simian viruses will be distributed only to recognized investigators working in the area of primate research. These reagents will be used primarily for identification and characterization of isolates obtained in the cooperating laboratories and in need of such processing. Preparation of these reagents will be, in general, by procedures described and published by the original investigators, or as outlined in publications prepared by the American Public Health Association, this laboratory, and other acceptable organizations. As other laboratories become proficient with one or another of the virus groups, these laboratories will be invited to join this program. Eventually a system, perhaps like that currently used by WHO with influenza and enteroviruses, may be established.

4. Diagnostic, Identification and Characterization Service.--This service is not intended to be a routine diagnostic laboratory for identification of all the agents obtained by primate investigators but is designed to be the final stage of characterization of agents previously screened by the original investigator. Then, when it is felt that the characteristics of an organism justify additional study it may be submitted to this laboratory for further study. It might be added that the original investigators may request and obtain reagents from this center in order to adequately perform the preliminary screening. Currently this center does function in a limited diagnostic capacity. Once reagents are made available, however, the primary function of the laboratory will become more specialized. Also, other laboratories specializing in one or another simian virus, as suggested above, will enter into this program allowing for a distribution of work effort.

In this regard, when an agent is finally characterized and is considered as unique or worthy of reporting, this will be done as a cooperative study involving all interested persons and laboratories.

5. Consulation, Information, and Materials Exchange.--The service based upon developing competency in the various disciplines will be made available for other laboratories to use either in the form of information (for example, laboratory and other technical procedures), checklists, source of reference reagents, center for national and inter-

national communication, organism distribution, advice, etc. In addition, epidemiological and laboratory assistance will be offered those centers in which outbreaks occur and which desire such assistance. Workshops and conferences are to be programmed in an effort to maintain a comprehensive understanding of current laboratory trends. Information relating to findings obtained by studies such as these will be disseminated through existing channels. A compilation of the known literature on various primates is maintained; for example, an annotated bibliography on baboons is available, and one is being prepared on the chimpanzee. As new species are introduced to laboratory usage, information pertinent to them can be developed.

Through WHO channels, materials from outside the U.S. are obtained, compared, and coordinated into this program. Various cooperative projects may then be instituted to supplement the primary study. As indicated above, an international center for the study of primate zoonoses and comparative medicine has been established at SFRE in the Division of Microbiology and Infectious Diseases under the auspices of WHO. The scope of this WHO program has already been outlined in connection with the studies described above.

While these services are primarily for simian agents, comparison with viruses from other animals is frequently required in attempting to characterize those from simians. This will entail a certain amount of programming with other investigators working with other viruses, as well as the maintenance of a rather extensive repository of organisms. Careful screening of nonhuman primates for evidence of infection with human agents must be considered at all times. The converse is also an important consideration. Thus, cooperation between this center and investigators with special interests or competencies in primate virology will assist in developing and expanding the total program into an all-inclusive study with interchange of materials, ideas, and capabilities.

Arrangements initially have been made with the established major primate facilities for sampling (blood, stools, throat swabs, etc.) of representative animals, and a routine system of animal sampling has been instituted with selected laboratories. Also, as illness or death among animals occurs, procedures (previously standardized and sent to participating laboratories) for collecting and shipping appropriate specimens will be followed. Arrangements will be made for studies on representative nonhuman primates at their source of capture in order to provide microbiologic information on these animals as they exist in their native habitat. This is to be done by representatives of the various primate resources assisted by a member of the SFRE staff if desired.

Initially, a "check-list" of existing viruses common to nonhuman primates will be provided. As additional information becomes available or is found in the literature, this original check-list will be updated. This listing of organisms common to each primate will be developed from existing information and from agents submitted to this laboratory and as obtained by an isolation and serologic survey. It is suggested

that the animals of each primate laboratory be sampled initially using procedures standard for the Simian Virus Reference Center and these samples serve as a source of reference. These procedures may then be adapted by representatives at each of the participating laboratories for subsequent collection and handling of materials. Obviously, the aim is to standardize such procedures as well as to orient all participants regarding available methodology and type of assistance offered.

Routinely, blood (for serum), throat, and stool samples should be obtained for serology and for isolation of viruses. At times of illness or death of animals, samples should also be obtained. These should be appropriately preserved or handled in a manner to insure maximal survival of any agents therein. Those laboratories capable of initiating their own studies will do so; otherwise, these studies can be performed at SFRE. The agent obtained will be coded and a permanent record made. If work is performed at SFRE, then a copy of the results will be returned to the submitting laboratory.

The identification of the agent will be placed on the animal's permanent record. This card will also contain as much of the following kind of information as possible: primate facility, species, age, sex, length of time in captivity, source of animal, site of capture, how received, immunizations, illnesses, therapy received (in course of captivity as well as during illness), etc.

Serologic surveys using various standard procedures--neutralization, hemagglutination, precipitation, complement-fixation, fluorescent microscopy, gel diffusion, etc.--will indicate the past antigenic experiences of the animals. Such data will then provide, among other things, information about the susceptibility of the animals involved, the geographic distribution of agents common to man and other animals, and the interrelationship of various infectious agents. This information will also be recorded on the animal's permanent record and disseminated through prearranged channels.

Semi-annual reports and/or a newsletter will keep all participating laboratories posted as to routine findings. Individual diagnostic reports will be submitted as rapidly as work permits.

It is hoped that the various research laboratories involved or interested in this type study will exchange specimens. Continued liaison with investigators involved in similar studies on nonprimates is of great importance.

Cooperation with investigators using primates in cancer studies is currently underway and is to be continued. An attempt will be made by either a newsletter or other form of communication to coordinate the efforts of primate users at the Regional Primate Research Centers, as well as at other institutions, to avoid duplication wherever possible and allow for an exchange of materials and information.

Perhaps it should be emphasized at this time that there is a very practical, important aspect to this program. Recent outbreaks of human and simian disease in several facilities handling simians indicate that these animals are responsible for the transmission of the etiologic agents. It is highly probable that more such incidents can be expected. The recommendations suggested above will do much to evaluate and elucidate the situation. This center may be called upon for assistance.

Procedures for the Collection of Specimens for Virus Studies

Collection of Serum

1. Collect by venipuncture, using sterile syringe and needle or vacutainer. For routine purposes, collect 10-20 ml as a minimum.

2. Allow the blood to stand at room temperature for several hours, rimming clot with sterile applicator when vacutainers are not used.

3. Place clotted blood in refrigerator ($4^{o}C$) and allow to stand overnight.

4. Remove clot to minimize hemolysis and lightly centrifuge tube at approximately 1500 rpm for 10 minutes.

5. Remove serum from cells under aseptic conditions, and place in sterile vial or ampule.

6. Seal to prevent leakage and label appropriately.

Collection of Stool Samples and Rectal Swab

1. Place small sample of stool (approximately 1 gm) in a sterile, dry, leak-proof container.

2. Seal and label appropriately.

3. Obtain rectal swabs by careful insertion and rotation of swab to ensure contact.

4. Immerse swab in approximately 1-2 ml Hank's Balanced Salt Solution (other buffered preparations are satisfactory), rotate vigorously in the fluid, express excess fluid against side of container, and discard swab.

5. Seal tube to ensure against leakage and label appropriately.

Collection of Throat Swabs

Because several respiratory viruses are extremely labile, special precautions must be taken in order to ensure maximum recovery of agent. Usually it is best to inoculate various test systems immediately after obtaining a specimen from the animal. However, this frequently is neither feasible nor practical. Therefore, the following procedure is recommended when specimens are to be shipped to the laboratory.

1. Obtain throat swab by swabbing carefully the posterior pharynx with a swab moistened with Hanks's Balanced Salt Solution.

2. Immediately place the swab in either Hanks's Balanced Salt Solution containing 0.5% bovine serum albumin or phosphate buffered solution containing 0.5% bovine serum albumin. 10% inactivated horse serum in Hank's BSS or PBS also may be used.

3. Then handle the swab as described for rectal swab.

Holding and Shipping of Specimens

Serum

Serum, when sent alone, need not be frozen, but must be sealed and wrapped carefully to prevent leakage and breakage and shipped in the fastest manner possible (usually by air mail).

Specimens for Virus Isolation

Unless the specimens can be in the laboratory in 2-3 hours, materials to be shipped must be frozen immediately following collection and kept frozen until delivery to the receiving laboratory. This is done best by placing the specimen in its appropriately-labeled container in a package containing dry ice so wrapped as to minimize evaporation of the ice. It should be remembered that dry ice does evaporate; therefore, no empty space should be present in the container. Space may be filled with crushed newspaper or styrofoam chips. Vacuum containers or styrofoam boxes are excellent as shipping containers. Send to the Reference Center by the fastest means of transportation available. Sufficient dry ice must be used to ensure safe arrival.

Collection of Autopsy Materials

Obtain all specimens under aseptic conditions from the anatomical area suggesting pathology and place in sterile dry container. Seal containers and label appropriately. Ship specimens to the Reference Center in the frozen state (see section on Specimens for Virus Isolation above) by the fastest means available.

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ABSTRACTS OF PAPERS PRESENTED AT INTERNATIONAL CONGRESS OF PRIMATOLOGY AVAILABLE

A limited number of printed copies of the abstracts of the papers presented at the Second International Congress of Primatology in Atlanta July 1-3, 1968, are still available. These can be obtained on payment of $2.00 each. Please send check or money order to the Director, Yerkes Regional Primate Research Center, Emory University, Atlanta, Georgia 30322.

DEVELOPMENT OF A LOW RESIDUE DIET FOR SMALL PRIMATES*

Ralph Shapiro

Schwarz BioResearch, Inc.

Orangeburg, New York

Preliminary studies were conducted to determine the nutritional efficacy of chemically defined, low residue liquid diets for squirrel monkeys (Saimiri sciureus). Although budgetary limitations restricted the scope and duration of the program, we were able to demonstrate that squirrel monkeys can be maintained in a healthy condition when a chemically defined liquid diet is their sole source of nutrition.

Twenty male squirrel monkeys participated in a 3-phase transition program in which they were to be switched from a standard stock diet to several synthetic, chemically defined powder diets, and then to a liquid diet. Eight monkeys successfully passed through each phase. In the course of transition, one monkey died from unknown causes and eleven rejected each of the powdered diets offered. As a result of diet rejection six monkeys died of malnutrition. The other five were returned to the stock diet and eventually recovered.

At present four squirrel monkeys have been maintained on a 50% (w/v) chemically defined liquid diet for 28 weeks and three have been maintained for 16 weeks. The eighth monkey was on liquid diet for 4 weeks when it died from acute heart failure not related to diet. All the animals on liquid diet have either gained or maintained weight and appear active and healthy. There are no signs of hair loss, dermatitis, emaciation, or malnutrition. Diet consumption averaged 76 ml/day. On a daily basis this provided 136 calories, 6.9 g protein, 0.15 g fat as ethyl linoleate, 0.19 g calcium, and 0.15 g phosphorus. Water consumption averaged 129 ml/day. The monkeys are presently being continued solely on liquid diet and drinking water to determine whether they can sustain a good state of health for one year.

The success or failure of the liquid regime was found to be dependent upon diet acceptance. This proved to be the chief problem in the present series of experiments. Once diet acceptance was accomplished, nutritional adequacy could be demonstrated. Two dietary manipulations

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*This is an abstract of an annual report to the U.S. National Aeronautics and Space Administration. Copies of the full report may be purchased from the Department of Commerce Clearing House either in bound form or as microfilms. The Clearing House number is N68-16061 and the address is U.S. Department of Commerce, Clearing House for Federal Scientific and Technical Information, Springfield, Virginia 22151.

proved useful for expediting the transition to liquid diet and enhancing diet consumption. One entailed diluting the diet to 30% (w/v) with distilled water and providing it as the sole source of water and nutrients. The other was based on the monkeys' preference for apples and involved the addition of apple juice to the diet in place of water. Both procedures helped the monkeys overcome the initial lag in consumption when they were switched to liquid diet.

Metabolism studies with a limited number of animals showed that monkeys ingesting liquid diet were in positive nitrogen, calcium, and phosphorus balance at daily intakes of 1.5, 0.3, and 0.2 g/k of body weight (B.W.), respectively. Their retention of nitrogen and calcium was less than when they consumed the stock diet or when compared with control animals maintained on the stock diet throughout the metabolic period. Phosphorus balance was highest for monkeys ingesting the liquid diet.

The metabolism data showed that the calcium content of the liquid diet should be increased to provide around 0.5 g calcium/kg-B.W./day (equivalent to about 0.4 g/day) and that calcium glycerophosphate should be replaced by a different source of dietary calcium to yield a 2:1 Ca:P ratio. The data also showed that the amino acid pattern of the liquid diet requires modification.

Nutrient absorption (nitrogen, calcium, and phosphorus) was much greater when the monkeys consumed liquid diet. Total fecal output was reduced by more than 80% and total fecal solids were reduced by more than 90%. The average daily fecal output on the stock diet was 15.3 g wet and 5.7 g dry. On the liquid regime the average daily fecal excretion was 2.6 g wet and 0.4 g dry.

Urine volume was not determined in these studies. The aerosol nature of the urine from male squirrel monkeys resulted in rapid evaporation and prevented quantitative measurements. However, continuous observations indicated that urine output was very small regardless of the diet consumed, and that insensible water loss is probably a major route of water elimination by the squirrel monkey.

During the metabolism studies the intestinal flora were monitored by means of rectal swabs. Definite changes were observed when the monkeys were switched from a stock diet to synthetic diets. The same alterations occurred when diets of the same composition were fed in powder or liquid form. The alterations which occurred when the monkeys were switched to the synthetic diets were not deleterious and did not appear to influence the monkeys' performance. Individual data from a monkey which remained on stock diet throughout the experiment showed a relatively stable microbial population.

SOUTHWEST FOUNDATION FOR RESEARCH AND EDUCATION: VISITING SCIENTISTS PROGRAM

Robt. L. Hummer*

Southwest Foundation for Research and Education

San Antonio, Texas

The Southwest Foundation for Research and Education (SFRE), San Antonio, Texas, has conducted a "Visiting Scientists Program" for the past five years, partially supported by the National Institutes of Health. This program has assisted investigators whose institutions could not provide the laboratory capability of the SFRE, or the baboon as a research model, and/or funds to carry out the research.

Since the SFRE Visiting Scientist Program is funded on a limited basis, it has become necessary to screen program applicants very carefully. Consequently, a Visiting Scientists Advisory Committee has been appointed from members of the scientific community not associated with SFRE to review proposed projects.

Scientists interested in participating in this program should submit an application using the following as a guide: (1) Curriculum Vitae including list of publications, (2) Institutional affiliation, (3) History of proposed project, (4) Research protocol and desired objectives, (5) Requirements from SFRE for equipment, animals, and technical support, if any.

The above information should be submitted in sufficient detail to enable the advisory committee to evaluate the qualifications of the investigator and the research proposal. It should be forwarded to: Dr. Harold Vagtborg, President, Southwest Foundation for Research and Education, P. O. Box 2296, San Antonio, Texas 78206.

Southwest Foundation has a capability in depth in the areas of Biochemistry, Embryology, Endocrinology, Experimental Surgery, Microbiology and Infectious Diseases, and Reproductive Physiology. The scope of the program is illustrated by the following examples of the studies that have been conducted in this program:

1. Heart Transplant Studies. Dr. R. C. Hanlon and Dr. V. L. Willman, St. Louis University School of Medicine, St. Louis, Missouri.-- During the past four years these investigators using baboons and the facilities at the SFRE have collected sufficient data and have perfected their technique to the degree of refinement necessary to enable them to secure funds to construct a complete surgical research unit to pursue open heart surgery.

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*Director, Animal Resources and Facilities

2. Long Range Fate of Autologous Tissue at the Site of the Mitral Valve. Dr. Jacob Zimmerman, St. Barnabas Hospital for Chronic Diseases, New York, New York.--Recently the third and final series of operations was performed on this project. The initial series was performed to determine the suitability of the baboon for studies of this type, and the final series to determine the long range effect of the procedures. It is planned to observe these animals for a period of two years.

3. Comparative and Functional Anatomy of Monkey and Ape Hands. Dr. Russell H. Tuttle, Department of Anatomy, University of Chicago, Chicago, Illinois.--This study involved observing the functional and anatomical bases of digitigrade hand postures of the baboon. The findings will be compared with similar observations made using other species of nonhuman primates. It involves such areas as: a. Types of adaptation and selective pressure presented by terrestrial environments. b. Adaptive radiation in locomotion and terrestrial adaptations which might have been important in human evolution.

4. An Analytic Study of the Somatic and Meiotic Chromosomes of the Different Species of Baboons. Dr. Brunetto Chiarelli, Centro di Primatologica, University di Torino, Torino, Italy.--The protocol for this study included the definition of the chromosome pattern of the three species of baboons present in the SFRE colony. To accomplish this task, considerable tissue culture work was required and thus the facilities and staff of the Division of Microbiology and Infectious Diseases were utilized extensively.

5. Permeability of Dental Enamel. Lt. Col. Vincent A. Segreto, U.S.A.F. School of Aerospace Medicine, Brooks AFB, Texas.--The objectives of this study are to determine the permeability of dental tissues, especially the enamel, and to determine where in the tooth the property of permeability exists. This protocol provides for the use of isotopes at the molecular level. They will be injected intravenously and the surface of the teeth, previously isolated from the other teeth as well as from saliva, will be sampled to determine if any of the test material can be recovered from the tooth surface.

6. Maruspilization and Neural Surgical Investigation of the Baboon Fetuses. Dr. Joseph Berman, Jewish Hospital, Brooklyn, New York.--This was a pilot study to investigate the feasibility of using the baboon fetus for the study of neurological diseases of children.

Scientists are encouraged to submit proposals. It is the desire of SFRE to make its facilities available to qualified investigators to the maximum extent possible compatible with the in-house workload.

MEETING REPORTS: MEETING OF ANGLO-FRENCH SPECIALISTS IN FIELD PRIMATOLOGY

The recent rapid growth in British and French field studies in primatology, notably in Africa, has revealed a number of common interests and methodological problems. Correspondence suggested that the time was ripe for an interchange of views and information between those primarily engaged in field work. A meeting was therefore arranged at which information derived from current research in such differing areas as the Ivory Coast, Gabon, Cameroons, Uganda, and Ethiopia could be exchanged. Organized by F. Bourlière (Paris) and J. H. Crook (Bristol) the meeting took place at the Psychology Department, Bristol, May 9-12, 1968.

Abbreviated titles of contributions were as follows: French field studies of primate ecology and behaviour by F. Bourlière. Madagascan lemurs by J. J. Petter with the Discussion opened by A. Jolly. Methodological problems in studying dispersion of forest primates by P. Aldrich-Blake. Dispersion in howling monkeys by D. Chivers. Theoretical problems in studying social systems in primates by J. H. Crook. Vocal repertoire of stump-tailed and Japanese macaques by M. Bertrand. Laboratory studies on stump-tailed macaques by N. Blurton Jones. The Barbary Ape in Africa by John Deag. Discussion of primate behaviour in relation to African ecology led by F. Bourlière.

Apart from contributors the following persons attended the meeting: Barbara Dickson, John Goss-Custard, Richard Michael, A. Petter-Rousseaux, Vernon Reynolds, Henri Tajfel, and a number of students from Bristol, Cambridge, and London.

The meeting produced a most valuable exchange of fact and opinion and did much to overcome the linguistic and political barrier that had led the two sides of the Channel to orient their research primarily to United States' work without knowledge of their respective contributions. A more rational situation now emerges and continuing contacts with periodic meetings are proposed. Membership and participation at such gatherings will not be restricted.--John Hurrell Crook, Dept. of Psychology, University of Bristol, Bristol, 8, England.

* * *

REQUEST FOR PRIMATE MATERIAL: NEWBORN GIBBON

An urgent need for newborn Hylobates lar exists. This can be either a still-born fetus or an infant who has died immediately after birth. Standard formalin fixation is satisfactory. I would be happy to correspond with anyone who is in possession of such material.--Malcolm D. Jones, M.D., Department of Radiology, University of California Hospital, 3rd and Parnassus Ave., San Francisco, California 94122.

MEETING ANNOUNCEMENTS: SYMPOSIUM ON DEFINING THE LABORATORY ANIMAL IN THE SEARCH FOR HEALTH

An international symposium on "Defining the Laboratory Animal in the Search for Health" will be held in Washington, D. C., April 8-11, 1969, at the invitation of the National Academy of Sciences--National Research Council of the United States.

The symposium is the fourth to be sponsored by the International Committee on Laboratory Animals (ICLA), and the first to be held in the New World. The Institute of Laboratory Animal Resources (ILAR) of the National Research Council will be host to the symposium. Its chairman, Dr. Howard A. Schneider, is the U.S.A. national member of ICLA. General chairman of the organization committee is Berton F. Hill, Brown University, Providence, Rhode Island, U.S.A.

In a departure from previous ICLA symposia, the present one will be open to all interested persons. There will be an open worldwide competition for placement on the program, which will be limited to about 30 papers with time limits of 30-40 minutes. The title of the symposium is broad in nature, and papers from all areas of laboratory animal medicine will be considered for inclusion on the program.

No personal invitations requesting abstracts will be issued for this meeting. This required procedural change differs from previous ICLA meetings where only invitational abstracts were considered. Abstracts of papers for consideration should be submitted by September 1, 1968, to the chairman of the scientific program committee, Dr. William I. Gay, Chief, Research Grants Branch, National Institute of General Medical Sciences, National Institutes of Health Bethesda, Maryland 20014, U.S.A. Abstracts should be limited to a single page (8 x 10-1/2) including name and address of the author.

Other members of the scientific program committee who will review the abstracts are: Dr. W. Heine, Zentralinstitut für Versuchstierzucht, Hannover, Germany; Dr. W. Lane-Petter, Carworth Europe, Huntingdon, England; Dr. Stian Erichsen, Statens Instituut for Folkehelse, Oslo, Norway; Dr. Thomas B. Clarkson, Bowman Gray School of Medicine, Winston-Salem, North Carolina, U.S.A.; Dr. Tatsuji Nomura, Central Laboratories for Experimental Animals, Tokyo, Japan; Dr. Henry L. Foster, The Charles River Breeding Laboratories, Wilmington, Massachusetts, U.S.A.; and Dr. B. K. Batra, Laboratory Animals Information Service, Bombay, India.

Sponsoring Organizations

ICLA is an independent organization established in December, 1956 with funds from the United Nations Education, Scientific, and Cultural Organization. Its primary goals are to help biological scientists throughout the world obtain laboratory animals of the species, strain, quality, and quantity required, and to foster the dissemination of in-

formation about laboratory animals and their care.

ILAR, formed in 1952 under the National Research Council Division of Biology and Agriculture, is concerned with quality and scope of animal stocks for research in the United States. ILAR is a center and forum for information about all aspects of laboratory animals.

General Information

Official Headquarters

The Shoreham Hotel, Connecticut Avenue at Calvert Street, Washington, D. C., is the headquarters hotel for the Fourth ICLA Symposium. The scientific sessions, exhibit areas, and other meeting functions will all be at the hotel, which is one of the most commodious in the U.S. national capital.

Registration

Preregistration is desirable but not mandatory. The registration fee is $25.00 (U.S.A. currency). Checks or money orders must accompany advance registration. Make checks or money orders payable to the "National Academy of Sciences" and forward with completed registration forms to ILAR, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D. C. 20418, U.S.A. Those who desire to register at the symposium may do so at the symposium registration desk.

Registration badges will be required for admission to scientific sessions, exhibit areas, and to all other meeting functions. Badges for advance registrants will be available at the symposium registration desk.

Hotel Reservations

Hotel reservations may be made on forms obtained from ILAR and mailed directly to the hotel.

Exhibits

The exhibit area will be open from 9:30 a.m. to 5:00 p.m., April 8, 9, and 10. Exhibitor information and registration forms can be obtained by writing to ILAR.

Social Events

A complete program of social activities and entertainment is being planned for registrants and their families. Included will be private tours of embassies, government installations and points of historical interest. The ICLA banquet will be held April 10 at the Shoreham Hotel.

Travel Grants

Financial support will be provided to speakers by the ILAR.

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183RD GREAT APE BORN AT YERKES

The Yerkes Regional Primate Research Center announces the birth of the 183rd Great Ape in its Colony on July 6, 1968. This is a female chimpanzee, called "Jama," in honor of the Japan-American Seminar which was being held in the Center at the time of the birth. Six of the 183 Great Apes born at Yerkes were orangutans and the remainder were chimpanzees. So far this year, six chimpanzees have been born at the Center and additional chimpanzees and orangutans are expected during the remaining months of 1968. The apes born at Yerkes over the years do not represent the results of an intensive breeding program, but simply the production of animals necessary for current experiments. There is little doubt that the Center has a significant potential for breeding Great Apes on a greatly enlarged scale if it was ever required to do so.

* * *

NEW OFFICERS OF THE INTERNATIONAL PRIMATOLOGICAL SOCIETY

President	Dr. D. Starck (West Germany)
Vice Presidents	Dr. K. Imanishi (Japan) Dr. G. H. Bourne (U.S.A.)
Secretary General	Dr. H. O. Hofer (U.S.A.)
Treasurer	Dr. H. Sprankel (West Germany)
Secretary (European Hemisphere)	Dr. H. Preuschoft (West Germany)
Secretary (Western Hemisphere)	Dr. A. Riopelle (U.S.A.)
Secretary (Asia & Japan)	Dr. S. Kondo (Japan)

PARASITIC DISEASE DRUG SERVICE*

On November 13, 1967 David J. Sencer, Director, National Communicable Disease Center (NCDC), announced the formation of the Parasitic Disease Drug Service. This new service was organized by NCDC to satisfy the growing demand for antiparasitic agents, many of which are unlicensed or not readily available in this country. With increasing involvement of Americans in tropical areas and more sophisticated medical diagnosis, it is likely that the number of requests for antiparasitic drugs will continue to increase in the future.

The first drug sponsored by the Parasitic Disease Drug Service was Pentamidine isethionate. This is indicated in the treatment of Pneumocystis carinii pneumonia and the early stages of sleeping sickness due to Trypanosoma gambiense. The following drugs are now also available through Parasitic Disease Drug Service sponsorship:

Niclosamide (Yomesan)--for cestode infections due to Taenia saginata, Hymenolepis nana and Diphylobothrium latum. At the present time it is not advocated for the treatment of Taenia solium, Hymenolepsis diminuta or Dipylidium caninum (in man). The main advantages of this drug are that it can by given to ambulatory patients and is relatively non-toxic. Niclosamide (Yomesan) is available on an investigational basis.

Parenteral Chloroquine and Parenteral Quinine--licensed and commercially available in the United States but sometimes difficult to obtain rapidly. Although it is preferable that they be obtained through commercial channels, a supply of both is stocked by the Parasitic Disease Drug Service for emergency use. Parenteral chloroquine is indicated in pernicious P. falciparum malaria in which the strain is sensitive to chloroquine. No investigational protocol is necessary for these two drugs.

The Parasitic Disease Drug Service is managed by Myron G. Schultz, M.D., D.V.M., Chief, Parasitic Diseases Section and Karl A. Western, M.D., E.I.S. Officer, Parasitic Diseases Section, Epidemiology Program. Requests for a drug or drug information should be directed to them. Their telephone numbers: Day Telephone: 404, 633-3311, ext. 3676-3677; Night Telephones: Dr. Schultz--404, 872-8767; Dr. Western--404, 634-1839.

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*From CDC Veterinary Public Health Notes, April, 1968, prepared by the Veterinary Public Health Section of Epidemiology Program of the National Communicable Disease Center, Atlanta, Georgia.

CORRESPONDENCE

A Note on Maternal Behavior of Squirrel Monkeys (Saimiri sciureus)

Sir: Some observations of maternal behavior in Saimiri sciureus (Peruvian-type) from recent births in our breeding colony might be of value to investigators interested in maintaining viable Saimiri infants.

Female No. 37 was found with a newborn infant clinging to her back on the morning of May 6, 1968. The infant was observed to be dry, nursing, and healthy in every respect. The mother, typically passive about her new acquisition (Rosenblum, 1968), did not show the immediate signs of rejecting her infant that have sometimes been observed in these animals (R. W. Cooper, personal communication, 1968). Approximately 26 hours after this initial observation, both mother and infant were removed from the colony and brought indoors. The mother was placed in a cage by herself and was given her infant immediately after it was weighed, which she excitedly accepted. However, as soon as the infant tried to nurse she pushed it away from her breast but showed no overt aggressiveness. Later that day the infant was found on the cage floor, its face slightly bruised, while the mother sat on a shelf ignoring its cries. Although the mother became quite excited when the infant was removed from the cage, she gave no indication of trying to retrieve it. The following day (May 8, 1968) the mother was returned to her colony pen and her infant was placed on the pen floor. She immediately approached her infant and postured herself in a retrieval position permitting the infant to climb onto her back. Although very weak, the infant managed to climb onto its mother's back, but died the following day.

This acceptance-rejection-acceptance pattern coinciding with removal from and then return to the colony environment suggests the importance of a familiar and stable environment for maintaining normal maternal behavior. It is unlikely that separation from her infant while it was briefly being weighed caused the mother's rejection, since we have removed infants for longer periods before returning them to their mothers without any deleterious consequences.

Another birth occurred in our colony on May 21, 1968 in the same pen as the previous one. Fifteen days after this birth, during which period the infant had always been observed on its mother's back, the infant was found on the back of female No. 37 who had lost her infant four weeks previously. Although there have been reports of aunt-infant relationships in Saimiri sciureus (Ploog, Hopf, & Winter, 1967; Rosenblum, 1968), where one female may occasionally carry another's infant for short periods, it was quite obvious that it was highly unlikely that female No. 37 would return the infant on her back to its biological mother. Each time the mother tried to retrieve her infant she was pushed away and bitten by No. 37 along with a few other females. Peace was restored to the colony when No. 37 was removed from the pen and the

infant returned to its rightful mother. This observation should therefore caution those interested in maintaining viable Saimiri infants of the consequences that may occur in colony quarters that contain a mother-infant pair along with females that have recently lost their own infants.

References

Ploog, D. W., Hopf, S., & Winter, P. Ontotogenese des Sozialverhaltens von Totenkopfaffen (Saimiri sciureus). Psychologishe Forschung, 1967, 31, 1-41.

Rosenblum, L. A. Mother-infant relations and early behavioral development in the squirrel monkey. In L. A. Rosenblum and R. W. Cooper (Eds.), The squirrel monkey. New York: Academic Press, in press.

Joel Kaplan
Department of Biobehavioral Sciences
Stanford Research Institute
Menlo Park, California

On Drekopf

Sir: The Laboratory Primate Newsletter has distinguished itself in the past with many informative and valuable articles concerning the varied aspects of primate research.

However, I was extremely disappointed in finding an article such as the one you published in the April, 1968 issue, entitled "Man Makes Himself?", by N. A. Drekopf. I can only hope that this article was published in jest.

The only intelligent statement Mr. Drekopf had to offer was that squirrel monkeys probably do not live on knishes in their natural habitat. After reading the description of Kornbluth's Katskill Kongo I would venture to say that the closing of this establishment was a great step forward rather than a loss to primatological research, and that Mr. Drekopf would have had more to offer in his "edge-cutting" research in primatology if he had limited his observations to the two stuffed owls in the Kornbluth collection.

James O. Long, Supervisor
NIH Primate Research Colony
Zoological Society of San Diego
San Diego, California 92112

TB Surveillance: Koch's O.T. vs. P.P.D.

Sir: This concerns an article published in the April, 1968 issue of the Laboratory Primate Newsletter, entitled "Laboratory for Experimental Medicine and Surgery: Design and Operation," by Joseph H. Davis et al., as it relates to tuberculosis surveillance in laboratory primates.

I believe it is generally agreed that Koch's Old Tuberculin is preferred over Purified Protein Derivative (P.P.D.) for tuberculin testing of macaques. The regimen adopted by the authors of the article (see p. 10) as a standard procedure for tuberculosis surveillance in laboratory primates may lead to a great deal of misinformation about the animal health status. Indeed, the product recommended by the authors (Parke Davis P.P.D.) is not used in the manufacturer's tuberculosis surveillance program, but rather their Standard Tuberculin, Old (Bio. 491) is employed for such purposes.

Published standards for breeding, care and management of laboratory primates (Macaca mulatta) developed by the National Academy of Science--National Research Council (ILAR) recommends the use of Koch's Old Tuberculin of 15-25 mg per 0.1 ml injected into the upper eyelid.

Kenneth F. Burns, Chairman
Dept. of Vivarial Science & Research
School of Medicine
Tulane University
New Orleans, La. 70112

EDITOR'S NOTE: The procedure being followed at the Laboratory for Experimental Medicine and Surgery in Primates is in accord with recommendations made recently by at least one authority on the topic, Dr. Leon Schmidt, Director of the National Center for Primate Biology. Dr. Schmidt stated at the European Symposium on Use of Nonhuman Primates in Medical Research, which was held in December, 1967, at Lyon, that multiple intradermal injections into the abdominal wall with P.P.D. was a more accurate diagnostic technique than the Old Tuberculin intrapalpebral method. Based on his recommendations at that conference, some of those attending the conference have changed the procedure at their own laboratories to follow his latest recommendations. We are aware that this is not in accordance with previous experiences and recommendations, but we hope that the results of Dr. Schmidt's work may eliminate some of the vagaries of testing with Old Tuberculin. We are continuing to use Old Tuberculin intrapalpebrally at the Brown University Primate Behavior Laboratory. We have used this technique for the last ten years and have found it to be accurate.

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

Books

Primates: Studies in adaptation and variability. Jay, Phyllis C. (Ed.) New York: Holt, Rinehart, and Winston, 1968.

This book, based on a symposium of primate social behavior, and which is dedicated to the late K. R. L. Hall, is primarily oriented toward field studies, though some of the contributors work primarily in the laboratory. The book is divided into 3 parts. The first part contains a memoir of K. R. L. Hall and five papers which were selected as his most important and representative. The second part is devoted to seven field studies demonstrating the variability of primate behavior. The third part consists of seven chapters dealing with problems in the analysis of primate behavior.

Yearbook of physical anthropology: 1966 (Vol. 14). Genovés, S. T. (Ed.). Published by The American Association of Physical Anthropologists, National University of Mexico, and the Mexican National Institute of Anthropology and History, 1967.

The Yearbook was established to reprint, yearly, some of the more significant articles in the field of physical anthropology. This year's issue includes: Affection in primates by M. K. and H. F. Harlow; Patterns of parasitism in primates: Phylogenetic and ecological interpretations, with particular reference to Hominoidea by F. L. Dunn; and The relationships of the tree shrews: The evidence of the nervous system by C. B. Campbell. Copies are available at $4.50 each from: Dr. Santiago Genovés, Instituto Nacional de Antropologic e Historia, Cordoba 45, Mexico 7, D. F., Mexico.

Disease

Treatment of pulmonary acariasis in rhesus monkeys with an organic phosphate. Finegold, M. J., Seaquist, M. E., & Doherty, M. J. (Dept. Pathology, Sch. Med., N. Y. University, 550 First Ave., N. Y., N. Y. 10016) Laboratory Animal Care, 1968, 18 [2, Part I], 127-130.

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*In many cases, the original source of references in the following section has been the Current Primate References prepared by The Primate Information Center, Regional Primate Research Center, University of Washington. Because of this excellent source of references, the emphasis here has been shifted to presentation of abstracts of articles of practical or of general interest, rather than simply listing them.

The use of rhesus monkeys for studies of pulmonary infections is complicated by a high incidence of acariasis due to Pneumonyssus simicola in the lungs of imported animals. Treatment of this infestation with the organic phosphate compound, ronnel (Ectoral, Pitman-Moore) intragastrically for 3 months significantly reduced the number of active mite lesions in animals sacrificed 3 months after the end of treatment.

Dental deposits and their control: an important aspect of the preventative medical program for laboratory primates. Chase, J. E., & Cooper, R. W. (Primate Res. Colony, Inst. Comp. Biol., Zoological Soc. San Diego, San Diego, Calif. 92112) Laboratory Animal Care, 1968, 18 [2, Part I], 186-191.

Dental deposits occur either as uncalcified or calcified masses adhering to the teeth in subgingival and supragingival areas. They are recognized as being primary etiological agents or aggravating factors in periodontal disease. In captive primates maintained on a commercial primate diet, dental deposits have been observed in high incidence and in many individuals have tended to recur rapidly after removal. If dental deposits are not removed, gingivitis and periodontitis are the sequelae usually observed, often leading to the loss of involved teeth. These facts make such deposits a condition of clinical importance in captive primates. Removal of dental deposits as part of a routine preventive medical program can do much to avoid associated oral pathology and thus help insure continued adequate dietary intake. The maintenance of healthy teeth is desirable in all experimental animals, but particularly so in captive primates on long term studies or where it is desired that full potential life span be achieved.

Agent of disease contracted from green monkeys. Kissling, R. E., Robinson, Roslyn Q., Murphy, F. A., & Whitfield, Sylvia G. (Virology Sec., Nat. Communicable Dis. Cen., Atlanta, Ga. 30333) Science, 1968, 160, 888-890.

Accumulated evidence indicates that the disease is caused by a true virus similar to viruses of the Stomatoviridae or rhabdovirus family (vesicular stomatitis virus).

Vervet monkey disease: experimental infection of monkeys with the causative agent, and antibody studies in wild-caught monkeys. Simpson, D. I. H., Bowen, E. T. W., & Bright, W. F. (Microbiological Res. Establishment, Porton, Salisbury, Wiltshire, England) Laboratory Animals, 1968, 2, 75-81.

The experimental infection of rhesus and vervet monkeys with the causative agent of a fatal disease in German and Yugoslav laboratory workers is described. All the monkeys developed a uniformly fatal illness irrespective of the

dose or route of inoculation. The agent was detected in the monkeys' blood, tissues, saliva, and urine. No complement-fixing antibodies to the agent were detected in any of the 201 mostly vervet monkey sera collected in Uganda in areas from which the incriminated batches came, nor in the serum of one langur monkey which had been in contact with these batches at London. The hazards of handling recently-captured wild primates and their tissues are pointed out.

An apparently new herpesvirus from primary kidney cultures of the squirrel monkey (Saimiri sciureus). Melendez, L. V., Daniel, M. D., Hunt, R. D., & Garcia, F. G. (New England Reg. Primate Res. Center, Harvard Med. Sch., Southborough, Mass.) Laboratory Animal Care, 1968, 18, 374-381.

Six indigenous viral agents (SMKI-83, SMKI-89, SMKI-105, SMKI-115, SMKI-124, and SMKI-129) have been obtained from 10 different squirrel monkey kidney cultures. One of these agents (squirrel monkey kidney isolate-83) has been identified as a herpes-virus. The cytopathogenicity of this virus was not neutralized by Herpes-T, Herpes simplex, Herpes suis, Infectious Bovine Rhinotracheitis, Sand Rat Nuclear Inclusion Agent, and B virus antisera. Squirrel monkey kidney isolate-83 provoked cytopathogenicity in squirrel monkey kidney cells, but not in human amnion, Hela, rabbit kidney, and African green monkey kidney cell lines, nor in rabbit kidney, chick fibroblast, and chorio-allantoic membrane primary cultures. The biological and physico-chemical characteristics of squirrel monkey kidney isolate-83 suggest that this virus may be considered as a cytomegalovirus in the herpes family group.

Bordetella bronchiseptica isolated from a fatal case of bronchopneumonia in an African green monkey. Graves, I. L. (Dept. Epidemiology, Sch. Public Health, U. Mich., Ann Arbor, Mich.) Laboratory Animal Care, 1968, 18, 405-406.

The isolation of Bordetella bronchiseptica from a fatal case of pneumonia in an African green monkey is reported. The histopathological diagnosis was acute, purulent bronchopneumonia.

Physiology and Behavior

Weight and tooth development during the first year in Macaca irus. Berkson, G. (Delta Reg. Primate Res. Center, Covington, La. 70433) Laboratory Animal Care, 1968, 18, 352-355.

Weight and tooth eruption data in the first year of life are presented for crab-eating macaques (Macaca irus) separated from mothers at 0, 1, 2, 4, and 6 mo. of age.

Group differences in weight were not significant. The data permit assessment of age accurate to approximately 1 mo.

Facilities and Care

An outdoor monkey nesting-box. Day, P. W., Derwelis, S. K., Fineg, J., & Van Riper, D. C. (6571st Aeromed. Res. Lab., Holloman Air Force Base, N.M.) Laboratory Animal Care, 1968, 18 [2, Part I], 206-209.

The housing of primates such as the Macaca mulatta for long-term projects, with only periodic utilization of the animals, is a chronic problem in primate colony management. In an attempt to move research primates of this type at the 6571st Aeromedical Research Laboratory from individual caging to an outdoor, year-around group housing situation, a heated nesting-box was designed and fabricated.

Small species of primates in biomedical research. Cooper, R. W. (Primate Res. Colony, Inst. Comp. Biol., San Diego Zool. Soc., San Diego, Calif.) Laboratory Animal Care, 1968, 18 [2, Part II], 267-279.

The growing use of the squirrel monkey and several marmoset species in biomedical research is described. As near relatives of man but with size more akin to that of conventional laboratory animals, these small primates are gaining acceptance among investigators. Because the present supply of squireel monkeys and marmosets is entirely wild-caught, the potential laboratory utility of these species will not be fully realized until more extensive biological baseline values are established as a means of defining the normative state. It is important, for the same reason, to obtain successful reproduction of these species in captivity to provide a source of research quality animals of known age and history.

An experimental space combining individual and social performances. Ferster, C. B., Hammer, C., & Randolph, J. (3rd author's address: Dept. Pharmacology, Abbott Laboratories, North Chicago, Ill.) Journal of Experimental Analysis of Behavior, 1968, 11, 209-220.

An automated experimental and living environment for primates is described. A similar environment was described in the July, 1967, issue of this Newsletter.

Breeding

The reproductive cycle of the New World monkey: Gynecologic problems in a breeding colony. Castellanos, H., & McCombs, H. L. (Dept. Obstet., Temple U. Sch. Med., 3400 N. Broad,

Philadelphia, Pa. 19140) Fertility and Sterility, 1968, 19, 213-227.

(1) The menstrual cycles of three species of New World monkeys were investigated by presence or absence of menstrual flow, urinary gonadotropin levels, and vaginal cytology. Saimiri sciureus (squirrel monkey) menstrual cycles had a mean and standard deviation of 12 ± 2.7 days in 108 cycles studied. Cebus albifrons (cinnamon ringtail monkey) menstrual cycles varied markedly from 9 to 42 days. However, in 58% the duration varied from 17 to 20 days, in 130 cycles studied. Lagothrix lagotricha (woolly monkey) menstrual cycles varied markedly from 12 to 49 days. In 56% the length varied from 23 to 26 days in 25 cycles studied. (2) Swelling of the external genitalia was observed in the Saimiri and Cebus species and occurred simultaneously with or several hours after peak estrogenic activity. (3) Normal pituitary gonadotropin levels were determined for the three species. In the Saimiri they varied from 5 M.U. (mouse units) in 69% to 20 M.U. in 9% of 91 determinations. In the Cebus they varied from 10 M.U. in 41% to 50 M.U. in 18% of 100 determinations. In the Lagothrix they varied from 10 to 20 M.U. in one female and from 20 to 100 M.U. in the other female in a total of 15 determinations. (4) Mating behavior was observed closely. It varied considerably among the 3 species. (5) Incidence of pregnancy was evaluated by urinary gonadotropin levels, vaginal smear changes, evidence of uterine growth, and development of amenorrhea. (6) Gynecologic problems encountered during breeding are documented in detail and their possible significance is discussed.

Reproduction characteristics in a colony of laboratory confined mulatta macaque monkeys. Pickering, D. E. (Labs. of Human Development, U. Nevada, Reno, Nevada 89507) Folia Primatologica, 1968, 8, 169-179.

(1) Reproduction characteristics for 250 pregnancies in a laboratory-confined colony of mulatta macaque monkeys are summarized. (2) Base time was controlled through planned matings. (3) Menarche occurred at 1200 ± 100 days and females were fecund at 1400 days following conception. (4) Menstrual cycles averaged 29 ± 3 days and vaginal flow lasted 4 ± one day. (5) Patterns of vaginal flow of pregnancy and body weight changes with pregnancy were recorded along with data pertaining to the duration of pregnancy and fetal survival. (6) Pregnancies typically lasted 167 ± 7 days following conception, and prolonged gestation and prematurity each occurred in 6% of pregnancies, respectively. (7) Cesarean section was complicated by subsequent endometriosis with a surprising frequency when performed in mid-gestation.

Treatment of infertility in Macaca mulatta with clomiphene citrate. Valerio, D. A., & Courtney, K. Diane. (Bionetics Res. Labs., Inc. Falls Church, Virginia) Laboratory Animal Care, 1968, 18, 339-345.

Clomiphene citrate was orally administered to 27 infertile female Macaca mulatta during a 6-mo. period at a dose of 3 mg/kg for 3 consecutive days each month. 50% of the treated animals conceived after an average of 2.3 monthly treatments. This is significantly greater than the 15% incidence of pregnancy among the 30 infertile nontreated controls. 30 fertile females selected from the breeding colony and bred concurrently with the infertile females had a 93% incidence of pregnancy.

Reproductive parameters of the baboon. Kriewaldt, F. H., & Hendrickx, A. G. (Dept. Animal Resources, Southwest Foundation Res. & Educ., San Antonio, Texas) Laboratory Animal Care, 1968, 18, 361-370.

133 female baboons and 14 male baboons were used in the present study. They were housed in outdoor community cages and indoor individual cages. Recordings of changes in the sex skin were used to determine optimal mating time, pregnancy, and the period of secondary amenorrhea. The female baboon is receptive to mating only during the period of maximum tumescence, thus providing a more accurate means of determining conception age. The optimum time for conception is near the end of the maximum tumescent phase. The gestation period for the baboon is 175 $\pm$ 11 days. Term birth weights range from 750 to 1050 g. Transabdominal transverse skull measurements serve as a convenient diagnostic adjunct in estimating fetal weight and corroborating conception age. Transabdominal transverse skull measurements of 700-g viable fetuses near term were at least 60 mm. Digital palpation was utilized to confirm early pregnancies. Fecundity in the baboon cannot be established by clinical examination or on the basis of age. The duration of secondary amenorrhea serves as a convenient early diagnostic parameter of the fecundity of a female. The mean period of secondary amenorrhea in early conceivers (conception with 6 mo. of arrival) is 46.2 days. 50% of the animals can be expected to conceive within the first year of importation from Africa. 15% of the animals may be barren. It is suggested that culling or treatment for infertility be accomplished after one year's observation. Productive females will normally have completed an average of 5 menstrual cycles prior to initial conception. For programming purposes, 18 mo. should be allowed for 50% of the animals to provide a term infant. The interval between subsequent births varied from 6-1/2 mo. to 12 mo. (277 $\pm$ 80 days). The embryo yield varied from 1.54 to 3.78 embryos per female during the 2-yr. study.

Instruments and Techniques

Physiological instrumentation for free ranging chimpanzees. Russell, R. H. (Biomed. Instrumentation Dept., Measurements System Div., Electro-Optical Systems, Inc., Pasadena, Calif. 94301) Technical Report No. ARL-TR-68-1, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico, 1968.

A chronically implantable telemetering instrument for chimpanzees is described. The complete instrument comprises conditioning for low level biopotential signals, temperature sensing, two sub-carrier oscillators (IRIG Channels No. 9 and 10), a VHF transmitter using FM/FM multiplexing with a range of 1200 feet, and a saturated mercury battery of 500 mAH capacity. In addition, an electromagnetic switch was developed as part of the implant circuitry to allow power to the instrument to be turned on and off from a distance of several feet. Such a switch has not been available in the past and may have general applicability. The VHF receiving station, including the antenna, was supplied as part of the program. Prime design goals were met such as transmitting range, and IRIG and FCC compatability; the design goal for power consumption was bettered by more than two times to give a powered lifetime of more than 30 days.

Backpack for free-ranging primates. Watson, N. W., Franklin, D. L., & Van Citters, R. L. (Reg. Primate Res. Center, U. Washington, Seattle, Wash. 98105) Journal of Applied Physiology, 1968, 24, 252-253.

A backpack has been designed to house and carry apparatus used in telemetry studies of cardiovascular responses in free-ranging primates. The device consists of a formfitting chassis on which electronic circuits are mounted, a Fiberglas cover box, and plastic harness with shoulder straps to secure the apparatus to the animal's back. These packs have been used to study cardiovascular responses of wild baboons ranging freely in Africa, and are also worn by baboons living together in a laboratory compound. Baboons readily tolerate such packs and have worn them continuously for periods of months.

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