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POLICY STATEMENT

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 or the current issue. Back volumes will be furnished free of charge to any library operated by a nonprofit organization with the understanding that they will be kept in the library. Individuals may purchase Volumes 1, 2, 3, and 4 for $4.00 per volume, Volumes 5, 6, and 7 for $2.50 per volume, and back issues for the current year for $0.50 each. (Please make checks payable to Brown University.)

The publication lag is typically no longer than the 3 months between issues and can be as short as a few weeks. The deadline for inclusion of a note or article in any given issue of the *Newsletter* has in practice been somewhat flexible, but is technically the fifteenth of December, March, June, or September, depending on which issue is scheduled to appear next. 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 publications, 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), beginning with the April, 1969 issue, the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967].

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Managing Editor: Kathryn M. Huntington

CONTENTS

A POSSIBLE CHANGE IN THE BEHAVIOR OF IMPORTED RHESUS MONKEYS

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In recent years, we have been encountering great difficulty completing the pretraining necessary to carry out behavioral experiments with new groups of rhesus monkeys (*Macaca mulatta*). This contrasts with our past experience with rhesus monkeys and our current experience with other kinds of monkeys. From the standpoint of current behavioral research technology, the pretraining in question is rather elementary and ordinarily fairly routine. Nevertheless, we have had to eliminate up to 50 percent of new groups (ranging in size up to 24 animals) of rhesus monkeys during pretraining or at the beginning of experimental training.

Our new monkeys are housed individually in an isolation room for from two to three months and then transferred to individual cages in one of our colony rooms where they remain for at least a month before pretraining is begun. They are first trained to enter the small aluminum cages in which they are carried from their home cages to the various test apparatuses. Small sugar pellets are used for rewards. This transfer-cage training usually lasts about two weeks. The animals are then trained in a Wisconsin General Test Apparatus (WGTA) to displace an object to obtain a sugar pellet in a well beneath the object. The apparatus and step-wise pretraining procedure have been described in detail elsewhere (Schrier, 1961, 1965).

We had solid evidence as long as five years ago that rhesus monkeys were less adaptable to our test situations than were other kinds of monkeys, notably stump-tailed macaques (*M. arctoides*; formerly *M. speciosa*), but, at the time, the problem did not seem as severe as it does now. In an experiment conducted about five years ago (Schrier, 1965), pretraining in the WGTA was made the vehicle for a formal comparison of the adaptability of rhesus, stump-tailed, and Philippine cynomolgus (*M. fascicularis*; formerly *M. irus*) macaques. This pretraining was carried out during the summer of 1965, shortly after we moved into our new laboratory. It was found, as Orbach and Kling (1964) had predicted, that the stumptails were not only more docile than rhesus monkeys, but that they completed pretraining in significantly fewer trials than did either the rhesus or Philippine macaques. At that time, there appeared to be little difference between the latter two types of animals.

We recently conducted WGTA pretraining of a new group of 8 rhesus monkeys and 8 stumptails (1969 animals) under conditions that were quite similar to those used earlier (1965 animals). The rhesus monkeys had a mean weight of 10.5 lb. and were estimated, on the basis of their dentition, to be 2-1/2 to 3 years of age. The stumptails had a mean weight of 10.7 lb. and were estimated to be the same age. Unfortunately, it was not possible to keep the ratios of males and females the same

over the various groups, but our experience, admittedly not extensive in this respect, has been that the two sexes pretrain at about the same rate. In the earlier study, of 14 stumptails, 3 were female, and of 10 rhesus, 5 were female. Half of the new stumptails and all of the new rhesus monkeys were male.

The results confirmed the earlier finding (Schrier, 1965) that stumptails can be pretrained more readily than rhesus. It also appeared that the performance of the new group of rhesus was somewhat worse than that of the earlier group, but the data were not absolutely clear-cut on this point. For example, Table I shows the performance of the animals tested in 1965 and those tested recently on each of the first three steps of pretraining[1]. Only the data for the

Table I

Number of Days Taken by Rhesus and Stumped-Tailed Macaques To Complete First Three Steps of WGTA Pretraining

	Number of Animals	Step 1	Step 2	Step 3
1965 Rhesus	8	76	16	14
1969 Rhesus	6	79	32	20
1965 Stumptails	15	33	11	11
1969 Stumptails	8	32	11	11

animals completing all three steps are included in the table. Two rhesus (one male and one female) from the 1965 group and two from the 1969 group did not complete either the first or second steps within at least 15 test sessions[2]. The results for these steps are of particular interest because the procedures involved were almost identical for the 1965 and 1969 animals. The difference between the stumptails and rhesus is quite clear on all three steps and is statistically significant for the new animals as well as the animals tested in 1965. The similarity

[1]To complete Step 1 an animal had simply to pick up a sugar pellet from the test tray of the WGTA within 20 seconds on 20 consecutive trials. To complete Step 2, the animal had to do this on 10 consecutive trials with one of the motor-operated screens between the animal's restraining cage and the test tray being raised at the beginning of each trial and lowered at the end. Step 3 was similar to Step 2, except that an additional motor-operated screen was put into use.

[2]The fact that 2 rhesus failed to complete the initial steps of pretraining was not mentioned in the earlier report (Schrier, 1965). Although this fact should not have been omitted, it does not alter the conclusion that stumptails pretrain more readily than rhesus; rather, of course, it reinforces such a conclusion.

in the performance of the 1965 and 1969 stumptails is very impressive and suggests that we can have confidence in our comparisons. The 1969 rhesus monkeys completed the first step in about the same number of trials as those tested earlier, but required more trials to complete the next two steps; however, none of these differences was statistically significant.

As for the results for the entire pretraining procedure, all the stumptails completed pretraining, with the 1965 animals having required a mean of 9.4 test days and the new animals a mean of 14.4 test days or 53 percent more test days. The increase is accounted for almost completely by the addition of steps to the pretraining procedure which increased the minimum number of days for completion of pretraining from 7 to 12. In addition to the two rhesus from the 1969 group that were dropped early in pretraining, as already mentioned, an additional two animals failed to complete later steps of pretraining. The 8 rhesus monkeys from the 1965 group that completed pretraining did so in a mean of 10.2 days, and the four new ones in a mean of 20.2 days, or almost twice as many more days. The results with this new group of 8 rhesus monkeys reflect pretty well our experience during the past three years with about 75 rhesus.

Occasionally, an animal that successfully completes the early steps but fails on the later steps of WGTA pretraining will turn out to be useful in other test situations with additional training. Recently, one such animal adapted quite well to a restraining chair and is performing a lever-pressing task under this restraint. It is doubtful that much can be done at all with those that fail to complete the early steps, though they might prove useful with further very intensive training. We tried additional training in a different situation with two such animals and got nowhere.

Of course, stump-tailed macaques are especially docile and easy to train, but the rhesus seem to suffer in comparison with other monkeys, too, though we have not got enough data to draw as firm a conclusion about this as in the case of rhesus and stumptails. A group of 8 young adult female pig-tailed macaques (*M. nemestrina*) were pretrained at the same time that the 1969 rhesus and stump-tailed macaques were. Although their pretraining was not carried to completion, it appeared that they were roughly intermediate to the rhesus and stumptails in ease of pretraining. Talapoin monkeys (*Cercopithecus talapoin*) may also be somewhat more adaptable in the WGTA than are rhesus. Not too long ago, we pretrained a group of 10 talapoins and 17 rhesus under identical conditions. This pretraining was terminated at the end of 40 test days for the rhesus. By that time only 10 of these animals had completed pretraining and had taken a mean of 24.4 days. Nine talapoins completed the pretraining in a mean of 16.5 days. The tenth talapoin was found to be pregnant and was eliminated from the study.

It is our strong suspicion that not only is the rhesus monkey harder to train than some other monkeys, but that the magnitude of the

problem has increased in recent years. Unfortunately, it is not easy to confirm this, experimentally. The comparison of the 1965 and 1969 rhesus suggests such a change, but a formal comparison of current rhesus monkeys with rhesus trained before 1965 would be more critical. Dissimilarity of procedures, however, makes this impossible. Our impression is that before 1965, we could expect at most 10 to 15 percent of our new animals to fail to complete pretraining, although another investigator with long experience in behavioral testing of rhesus monkeys recalls the figure to be as high as 25 percent.

Granting a change in behavior of rhesus monkeys, we considered the possibility that our procedures have changed rather than the monkeys. This does not seem to be a likely explanation for several reasons. One is the continuing relative ease of training other kinds of monkeys. Initially, we thought that the age of the monkeys might be making a difference because, at about the same time that we began experiencing increased difficulties in pretraining, we began receiving new monkeys that were older (3-1/2 to 4 years of age) than the new monkeys we had used earlier (1-1/2 to 2 years). However, we found no change when we returned to the use of the younger animals. We used peanuts and raisins in earlier years in contrast to the somewhat less preferred sucrose pellets in current use, but substitution of raisins for sugar pellets seems to have at best only a temporary effect on pretraining performance. Another obvious variable, the person doing the testing, can probably be ruled out because many different persons have been involved in this testing over the years. The most reasonable guess is that animals who do poorly in pretraining are simply extremely frightened of the test situation and the experimenters.

If the rhesus monkey has changed, other investigators should be sharing our experience. At least two investigators with long experience in behavioral testing of monkeys have indicated that they are having or have had similar problems in pretraining and training of rhesus. Somewhat to our surprise, a large number of laboratories engaged in part in behavioral work could provide no information one way or the other. One reason is that many of these laboratories are no longer using rhesus monkeys for behavioral research as extensively as in previous years. Another reason why difficulties with rhesus monkeys may be going unnoticed is that experimenters are simply taking for granted the loss of animals or the amount of time required for adapting the animals to testing. Also, it is possible that, in the case of the larger multi-disciplinary laboratories, animals that perform poorly are simply returned to the relatively large pool of available animals and replaced with new animals.

Supposing there has been a change in the behavior of rhesus monkeys, what might account for it? An article just published in *Scientific American* by Singh (1969) suggests one possibility. Singh reports his observations of the behavior of two disparate rhesus monkey societies in India--urban and forest. Singh found striking differences in the

behavior of animals from the two societies. Forest monkeys are less aggressive, more fearful of humans, and less prone to explore and manipulate novel aspects of the environment than are urban monkeys, though their learning abilities seem to be about the same. We contacted two of the largest American suppliers of rhesus monkeys and both indicated that the majority of Indian rhesus monkeys now being imported are trapped in the forests and hills. Furthermore, it appears that, over the course of at least the past four or five years, the trapping areas (which are designated by the Indian government) have been located further and further away from urban areas. If, as seems likely, we are now receiving more non-urban monkeys than in the past, this could account for our increased trouble with rhesus monkeys in recent years.

For the reasons outlined above, somewhat reluctantly, we have abandoned regular use of rhesus monkeys in our behavioral research in favor of stump-tailed monkeys. It should be emphasized (Schrier, 1965) that stumptails have their drawbacks: They have a strong odor and tend to smear themselves and their cages with feces; also, they are somewhat more mischievous and destructive in the WGTA and generally more vocal than are other Old World monkeys. Furthermore, they may persist in making old, inappropriate learned responses considerably longer than other monkeys (Schrier, 1969). Nevertheless, at the moment, such drawbacks seem to be a small price to pay for the assurance that practically all the animals received will not only complete pretraining, but will do so exceedingly quickly.

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A NOTE ON HIGH RESPONSE RATES IN *PERODICTICUS POTTO*

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The gross body movements of the prosimian, *Perodicticus potto*, are typically slow and deliberate. Although somewhat more active in the evening hours than during the day, its home cage behavior is characterized by a marked lassitude. In order to study the operant behavior of this species it was necessary to determine which response of its repertoire is most suitable for this purpose. A suitable response is one which is readily performed by the animal and which can be emitted steadily and rapidly over an extended period. This is a report of the successful identification of such a response in one potto.

A rather large testing apparatus, a 2 by 2 by 2 ft. plexiglas box with a grid floor, was available. This box was equipped with a 1/4-in. diameter rod mounted horizontally two inches above floor level and extending seven inches into the box. A drinkometer circuit (Grason-Stadler, West Concord, Mass.) connected the bar and the grid floor. Other species (including *Galago senegalensis* and *Tupaia glis*) readily learn to touch the bar with their noses completing the circuit which results in delivery of a small amount of water into a well adjacent to the bar. It seemed expedient to attempt to train the potto to nose the bar also, since the tempo of its gross movements did not seem compatible with the high rate of response found in the typical bar-pressing situation used with other animals.

Despite the fact that its flexed posture when seated brought the potto's nose within easy range of the bar, it did not touch the bar with its nose. It was noted during the early attempts to shape a nosing response that the left hand of the potto fell rather naturally on and around the bar. Thus, the shaping procedure was directed toward the hand rather than the nose. This resulted in the development of a most satisfactory response.

Seated between the water well and the bar, mouth directly over the well, the potto places its hand over, but not on, the bar and responds with a fine lateral movement of the hand. This lateral motion of the hand is the result of a slight rotation of the wrist and forearm and does not involve gross movement of the entire limb. The result is that one response is recorded as the hand swings back and the fingers make contact with the bar. This lateral hand movement is quite rapid and has the appearance of fine tremor. This "fine tremor" of the extremities has been frequently observed in the home cage locomotion of the potto in this laboratory.

With this unique movement, the potto is able to generate from five to six responses per second and averages about four responses per second

over an extended period. Not only is the potto able to achieve and maintain high rates of responding, but since the animal is able to drink and respond simultaneously, the response record is uninterrupted by pauses during reinforcement. This feature of the response makes it particularly attractive for many experimental paradigms.

The potto has performed successfully on both variable ratio (VR) and fixed ratio (FR) schedules of reinforcement and performs with facility on either schedule. For example, on a VR or FR 20 schedule, (one in 20 responses is reinforced) the animal is able to obtain a daily water ration of 18 cc in 15 minutes. This is supplemented by the moisture in one-half apple and ad lib cat chow which forms its staple diet. The animal has been maintained in good health on a water deprivation regimen for five months.

Thus with the identification of an appropriate response the behavior of the potto is as readily available to manipulation as that of other primates. This particular response utilizes the 180° rotation of the thumb with respect to the fingers which is characteristic of the potto and several other prosimians (Napier & Napier, 1967). Noting that interest has recently been shown in the experimental manipulation of prosimian behavior (Ehrlich, 1968; Jolly, 1964), it is suggested that this type of response might be useful in studying the operant behavior of other members of Lorisidae that have structural and behavioral similarities to *P. potto*.

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AN ATTEMPT AT HAND-REARING A SQUIRREL MONKEY*

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During November and December, 1966, a male squirrel monkey (*Saimiri sciureus*) was hand-reared from its 19th day of life, shortly after his mother had died, until his death at the age of 61 days.

Pelargon (Nestle, 3% of protein), prepared according to directions and mixed with small quantities of mashed banana and glucose, was offered by means of a syringe and later by a doll bottle and rubber nipple every 2-3 hours from 8 a.m. to 10 p.m. However, the infant did not gain weight and repeatedly suffered from digestive disorders. Therefore a diet change seemed necessary. Esbilac (Borden, 5% protein) and later human milk were used but the infant's condition did not improve. He died after a period of progressive weakness. No clear cause of death could be determined.

An analysis of squirrel monkey milk performed later revealed that the protein content of both formulas used was sufficient (see Table I). The carbohydrate content might have been too high. Though fruit supplement is common in rearing primates it might have been unfavorable for squirrel monkeys (H. Klüver, personal communication, 1966). The lack of night feeding might also have been important.

Two attempts were made to have the infant adopted by lactating squirrel monkeys which had lost their own babies. The first attempt was begun the same day the infant's mother had died and continued the next day. The female did not let the infant ride on her back or nurse, both of which are essential maternal behavior patterns in the squirrel monkey (Ploog, Hopf, & Winter, 1967). The second attempt was begun 31 days later and continued for 10 days. With this female there was some mutual friendly behavior, such as mutual visual interest, approach, sniffing, gently touching, but there was also "genital display" toward the infant indicating agonistic behavior ("genital display", Ploog and MacLean, 1963). She also did not allow riding and nursing.

Three days after onset of hand-feeding the infant started regularly sucking his left thumb (and no other part of his body or substitute), a behavior never seen in mother-reared squirrel monkeys.

Many motor, social, and object-directed behavior patterns appeared either at the same age as, or earlier than, in mother-reared squirrel

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*Abstract of a paper which will be published in *Zeitschrift für Tierpsychologie*.

Table I

Chemical Analysis of Squirrel Monkey Milk

Sample	Female	Total Protein (g/l)	G (mg/l)	L (mg/l)	Gl (mg/l)	C (mg/l)	Total Lip. (g/l)	P (g/l)	T (g/l)
1	#427[a]		199	530	499				
2			447	374	426				
3		52.9	398	341	499	6.5	41.05	2.6	30.85
4		57.4	298	473	544	6.8	24.96	1.8	17.8
5		43.1	477	399	566				
6	#103[b]	30.0	300	290	498				
7		32.5	254	220	472				

[a]This animal had been in our laboratory for 3 months; her infant was 5 months old, and took solid food.
[b]This animal had been in our laboratory for 6 years; her infant was about 2 months old and was not yet taking solid food.
Code.--G = Galactose, L = Lactose, Gl = Glucose, C = Cholesterol, Lip. = Lipides, P = Phosphate-Lipides, T = Triglycerides.

monkeys. It is remarkable that behavioral development continued after physical development (weight gain, growth) had stopped and general condition had greatly worsened.

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SOOTY MANGABEY AVAILABLE

One adult male sooty mangabey (*Cercocebus atys*) is available to any interested investigator for the cost of the air freight charges.--Dr. Ronald DiGiacomo, Laboratory of Perinatal Physiology, P. O. Box 5095, Puerta de Tierra Station, San Juan, Puerto Rico 00906.

PRELIMINARY OBSERVATIONS: SPONTANEOUS EPILEPTIFORM SEIZURES IN BABOONS BORN AND BRED IN CAPTIVITY*

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Ruch (1959, pp. 396-403, 436-442) and Van Bogaert and Innes (1962) have reviewed the literature and described various epileptiform syndromes reported in nonhuman primates, both of a spontaneous and experimentally induced nature. Since that time, Killam, Killam, and Naquet (1966, 1967) and Killam, Naquet, and Bert (1966) have also shown that intermittent light stimulation induces paroxysmal EEG motor responses and self-sustained epileptiform seizures in the baboon (*Papio papio*, *P. cynocephalus*, and *P. anubis*).

During the last six years, we have developed and maintained a colony of baboons (*P. anubis* and *P. cynocephalus*) that have been inoculated at birth or *in utero* with test materials from patients with leukemia or other immunoproliferative disorders, as well as with known oncogenic viruses. The colony now totals approximately 500 animals, ranging in age from newborns to mature adults.

Within the last two years, the occurrence of a neurological syndrome characterized by epileptiform seizures was observed in 15 of the baboons in the colony. The seizures have been of a generalized (grand mal) nature, occurring at irregular intervals, and lasting from 30 to 120 seconds. The animals involved, 10 females and 5 males, ranged in age from 5 months to 2 years when first showing seizures. All but one of these baboons were derived by cesarean section. All were bottle-fed and caged individually since birth.

One of the animals had not received test inocula, three had been inoculated *in utero* and 11 after birth. However, no correlation could be found between the type of inoculum, route of inoculation or any additional treatment (x-ray, imuran, etc.) and development of seizures.

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Seven of the animals appeared to have a partial or total visual impairment since birth. Six animals showed a complete but reversible paraplegia following the first seizure. They recovered from these paralytic symptoms after about a three-month period, during which time very intensive care was necessary to maintain the animals' nutritional requirements and to avoid complications from ensuing pressure-sore lesions. Various anticonvulsive drugs were administered, none of which were totally effective in controlling seizures.

Intensive hematological monitoring failed to demonstrate any significant blood changes before, during, or after the onset of seizures.

Gross pathological examinations of 6 animals, (3 of which died and 3 of which were euthanized) showed no significant abnormal pathology at necropsy. Preliminary microscopic examinations revealed pyknosis of individual neurones in the cortex and brain stem of two baboons. The remaining animals showed no lesions in the brain substance, vessels, or meninges.

Bacteriological and virological examinations of specimens collected during necropsy have yet to reveal any known pathogenic agent. Virological studies are continuing, including *in vivo* passage of brain suspensions from acutely involved animals which were sacrificed.

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COLLABORATING CENTER FOR COMPARATIVE MEDICINE AND SIMIAN VIRUS REFERENCE CENTER: PROGRESS REPORT*

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The services rendered by the Collaborating Center for Comparative Medicine and Simian Virus Reference Center (Kalter & Heberling, 1968) have been basically of two types: (1) screening sera for the presence of antibodies against a battery of simian and human viral, rickettsial, and bacterial antigens (a pilot study employing parasite antigens has been completed) and (2) isolation and identification of viruses from a variety of specimens from sick or apparently healthy anmmals. These services were designed to give information to the cooperating laboratories regarding the immune status of their primates and possible cause of outbreaks of overt disease.

In addition to the general survey studies performed for the various facilities, special studies of an urgent nature were carried out on sera from various primates. These included the incidence of antibody to Marburg virus and Simian Hemorrhagic Fever virus (SHF). Data from these studies have been submitted for publication (Kalter, Ratner, & Heberling, 1969) or are in press. Briefly, Marburg virus antibody was limited primarily to African species and was especially high in *Cercopithecus talapoin*. None of the sera tested positive for SHF contained antibodies. The full significance of these data cannot be explained but may be a reflection of the geographic source of Marburg virus (or possibly other factors) and fatal nature of simian hemorrhagic fever. Investigations are continuing regarding these virus infections as well as the serologic results. Extensive studies concerning the relationship of monkeypox virus to other poxviruses are now in progress.

The present status of work is summarized in Table I in which is listed the laboratories participating in the program, the sera made available by these laboratories, the number of sera tested, and the approximate number of tests completed. In some instances representative samples were taken from a facility, therefore, not all of the sera have been tested. Not all of the tested sera were assayed for the same kinds of antibody, since the species and geographic origin of the animals determined what antigens should be studied. Finally, some sera were not suitable for certain tests because of non-specific or toxic reactions. The data, therefore, simply reflect an approximation of the work per-

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formed. Extracts of these data have been made to compile information on specific viruses for publication.

STATUS OF SIMIAN VIRUS REAGENTS

During the past year work has continued on the preparation and testing of simian virus reference reagents. There are now 16 adenoviruses, 10 enteroviruses, 3 reoviruses, 4 herpesviruses, 2 cytomegaloviruses, 9 paramyxoviruses, 1 papovavirus, 3 poxviruses and 6 unclassified viruses and, in most instances, reference antiserum in the repository.

Adenovirus reagents.--Viruses and antiserum are now available and tested for 16 of the 20 simian adenoviruses. SV38, C-1 (Bertha) and SA18 are currently being prepared. A squirrel monkey (*Saimiri sciureus*) adenovirus isolate was tested and shown to be distinct from the prototype simian adenoviruses. A seed pool of this virus has been prepared and antiserum has been made in rabbits. The virtual completion of reagents for this group of viruses has enabled us to serotype over 150 isolates from throat and rectal swabs and organ specimens from baboons (*Papio* spp), African greens (*Cercopithecus aethiops*), rhesus (*Macaca mulatta*), and chimpanzees (*Pan*).

Of the eleven different serotypes identified, the following incidence of isolation was found: SV1, 4%; SV15, 17%; SV17, 9%; SV23, 27%; SV25, 1%; SV31, 1%; SV32, 3%; SV37, 2%; SA7, 5%; and V340, 32%. SV15, 17, and 23, associated with respiratory disease, have been frequently isolated from rhesus and cynomolgus monkeys by other investigators in the past. In addition, V340, previously implicated in pneumoenteritis in African green monkeys, has been shown to be the most common isolate from baboons and African greens, especially African greens showing symptoms of respiratory disease. These observations, first made at Southwest Foundation for Research and Education, were extended by the isolation of this virus from a group of sick African green monkeys at the San Diego Zoo. Serum surveys of various primate species have shown the presence of natural antibody for V340 in wild baboons and baboons in captivity for a short time. This antibody disappears with time. On the other hand, African green monkeys appear to be infected after capture since no antibodies were found in the sera of newly captured animals and the incidence increased after they were in captivity. Rhesus monkeys showed little antibody to V340 but a high incidence of SV15 and SV23 antibody. The opposite appears to be true of baboons and African green monkeys. These data indicate that V340 is an African baboon virus, whereas, SV15 and 23 are agents of Asian monkeys. Our isolation data indicate that an exchange can be made when these animals meet in captivity, thus giving further evidence for the need to keep various primate species separated as much as possible.

Enteroviruses.--The preparation and heterologous testing of simian enterovirus seed pools and antisera have continued. Seed pools

Table I

Cooperating Facilities and Sera Received and Tested

Facility*	Animal Species	No. Sera Received	No. Sera Tested	Approx. No. Tests
Yerkes R.P.R.C.	Chimpanzee	332	147	13,000
	Gorilla	28	28	2,500
	Orangutan	185	72	6,500
	Gibbon	25	6	500
Holloman A.F.B.	Chimpanzee	59	48	4,000
Brooks S.A.M.	Rhesus	302	25	2,000
Delta R.P.R.C.	Chimpanzee	152	54	5,000
	Baboon	8	7	700
	Gibbon	8	8	700
	Rhesus	66	27	2,500
	Patas	93	31	3,000
	Stumptail	4	2	200
	Mangabey	2	1	100
Institute Merieux, Lyon France	Baboon	87	24	2,000
	Patas	187	24	2,000
	African green	26	23	2,000
	Cynomolgus	495	117	1,500
Gorgas Memorial Institute	Howler	16	16	1,500
	Capuchin	28	24	2,000
	Black Spider	49	25	2,000
	Red Spider	10	10	1,000
	Mantled Howler	40	14	1,000
N.I.N.D.S.	Chimpanzee	24	24	2,000
	Gibbon	9	9	800
Presbyterian-St. Lukes Hosp.	Marmoset	46	25	2,000
Auburn Univ.	Rhesus	32	27	2,500
	Cynomolgus	4	4	400
Fort Detrick	Rhesus	103	27	2,500
Inst. Comp. Biol., San Diego	Talapoin	62	21	1,800
	African green	30	21	1,800
	Marmoset	41	23	2,000
	Galago	36		
	Human	10	10	1,000

Facility*	Animal Species	No. Sera Received	No. Sera Tested	Approx. No. Tests
Univ. Texas Dental School	Marmoset	94	60	3,000
L.E.M.S.I.P.	Unknown	10	10	400
Univ. of Taiwan	Formosan macaque	25	25	800
Japanese Primate Center	Japanese macaque	26	26	1,300
New England R.P.R.C.	Squirrel	26	26	1,300
	Cebus	7	7	350
	Woolly	6	6	300
	Owl	10	10	500
	Spider	1	1	50
	Stumptail	1	1	50
	Bonnet	1	1	50
	Marmoset	6	6	300
Oregon R.P.R.C.	Rhesus	43	43	550
	Human	3	3	150
Univ. of Calif. San Francisco	Rhesus	12	12	600
	Cynomolgus	13	13	650
	Slender Loris	1	1	50
N.C.D.C.	Spider	9	7	350
	Squirrel	5	5	250
	White Faced Capuchin	5	5	350
Naval Aerospace Med. Center	Rhesus	20	20	1,000
	Squirrel	23	20	1,000
Hazleton Labs.	Cynomolgus	25	0	50
Polio Res. Fdn., Johannesburg	African green	50	0	200
	Baboon	44	0	200

*Abbreviations used in listing facilities: R.P.R.C. = Regional Primate Research Center; N.I.N.D.S. = National Institute of Neurological Disease and Stroke; L.E.M.S.I.P. = Laboratory for Experimental Medicine and Surgery in Primates, N.Y.; N.C.D.C. = National Communicable Disease Center; S.A.M. = School of Aerospace Medicine.

for 17 enteroviruses have been prepared and identity neutralization testing with homologous and heterologous sera have confirmed the quality of SV2, 6, 16, 18, 19, 42, 45, 46, 48, and 49. Some questions have been raised regarding SV26, 35, 43, 44, and 47. SV26 has been shown to be very closely related to SV48 (confirmed by Dr. R. N. Hull, Eli Lilly & Co.), although it is not clear that these two strains are identical. SV48 serum appears to be broader in its reactivity in that it neutralizes SV19 as well as SV26 and SV48 viruses. SV19 serum does not neutralize SV26 and SV48, however. SV48, therefore, appears to be a prime strain of SV19 and SV26. Further studies will be done to determine the exact serological relationship of these 3 viruses so that they may be retrained or discarded as prototype reference strains.

Evidence was obtained that the SV35 stock being worked with was contaminated with another virus (reovirus?) prior to shipment to this laboratory. Attempts are now being made to identify this virus. A different passage received directly from the original isolator (Dr. R. N. Hull) is now being studied and purified for inclusion in our repository.

Testing of SV43, 44, and 47 has been unsatisfactory because of the poor quality of available antisera. Therefore, the identity of the seed stocks for these viruses remains in question. New sera are being made for further evaluation.

Antiserum preparation for SA5 was completed and is being tested for heterologous reactivity. Similar work will be done with A13.

While high quality sera are not available for all of the prototype enteroviruses the quality of SV2, 6, 16, 18, 19, 42, 45, and 49 sera was considered good enough to use for identification of unknown viruses. Therefore, work has been initiated on the serotyping of enterovirus isolates. At this writing 30 viruses have been tested. Four of these were shown to be SV6 and one SV19. This work is continuing.

Reoviruses.--Seed pools for SV12, 59, and SA3 have been prepared and tested for identity. Virus and antiserum are now available for use.

Herpesviruses: Group A.--SA8 and *Herpesvirus platyrrhinae* (*Herpesvirus tamarinus*) seed virus and serum were previously available in our repository. During the past year Herpesvirus B and antiserum were obtained from Research Reference Reagents Branch, National Institute of Allergy and Infectious Diseases (RRRB, NIAID) and a small seed pool of virus was made. Spider Monkey Herpesvirus (SMV) was obtained from Dr. E. Lennette (California Dept. Public Health) and a seed pool prepared. This virus was tested and shown to be distinct from SA8, *Herpesvirus platyrrhinae* and a marmoset (*Callithrix*) herpesvirus obtained from Dr. Lennette. This latter virus has also been tested by heterologous neutralization and appears to be a new virus. Serum for it and SMV will be prepared in rabbits.

Herpesvirus: Group B.--SA6, a simian cytomegalovirus, is being studied for growth in WI38 and baboon kidney cell cultures for the preparation of antiserum in baboons. The observed growth has been poor but pools of virus are now available in both cells and baboons have been immunized. Despite our hopes to the contrary, CF antibody against the cell culture antigens rises quickly and obscures results with the viral antigen. Serum neutralization testing of the hyper-immune baboon sera is now being done but the results to date have been disappointingly low with extensive virus breakthrough. Further attempts are being made to obtain specific CF serum by infecting baboons with the virus. More sensitive testing procedures, such as plaque reduction, are being developed.

Simian paramyxoviruses.--Seed stocks of SV5 and 41 have been obtained from the National Communicable Disease Center (NCDC) and virus pools prepared for our repository. Sera were obtained from the same source and RRRB, NIAID. Homologous and heterologous hemadsorption inhibition testing confirmed the identity of these viruses.

Foamy virus types 1 through 7, along with antisera, were recently obtained from Dr. Paul B. Johnston (Univ. of Louisville Medical School). The seed stocks are now being tested for growth in primary rabbit kidney and MA-111 cell cultures. Only types 1-4 have been observed to grow in MA-111 cells to date. Pools of these viruses will be made for our repository and homologous and heterologous serum neutralization testing will be performed.

Papovavirus.--A pool of SV40 has been prepared and tested for identity. Virus and serum are now available in our repository. A pool of SA12, a suspected papovavirus, has been prepared and antiserum is being made in rabbits.

Simian poxviruses.--Monkeypox virus was obtained from the American Type Culture Collection (ATCC) and a pool made for testing with rabbit antiserum from Dr. James Prier (Div. Laboratories, Pennsylvania Dept. Health). Testing was satisfactory and more antiserum is now being prepared in rabbits.

Yaba and Yaba-like viruses were obtained from Dr. D. S. Yohn (Roswell Park Memorial Hospital, Buffalo, N.Y.). Small pools of these viruses have been prepared in BSC-1 but no serum is currently available for testing.

Unclassified picornaviruses.--Virus seed and antiserum for SV4, 28 and SA4 are now tested and available in our repository.

Unclassified viruses.--Seed pools of SA10 and 11 have been prepared and are currently being tested prior to inoculation of rabbits for the preparation of antiserum.

The stimulus for the averaged evoked response was a light flash of approximately 10 microsec. duration from a Grass Model PS3 Photostimulator at an intensity setting described by the manufacturer as being approximately 750,000 candlepower. The stimulus lamp was situated approximately 15 in. directly in front of the monkey's eyes. The evoked potentials reported here resulted from 75 light flashes at irregular intervals of approximately one flash per sec. The averaged response was recorded with a system that consisted of the Grass electroencephalograph, a computer of average transients (the CAT 1000, Technical Measurement Corporation, North Haven, Conn.), and an X-Y plotter (Moseley Division, Hewlett-Packard, Palo Alto, Calif.)

Figure 1 shows the spontaneous EEG and the averaged visually evoked

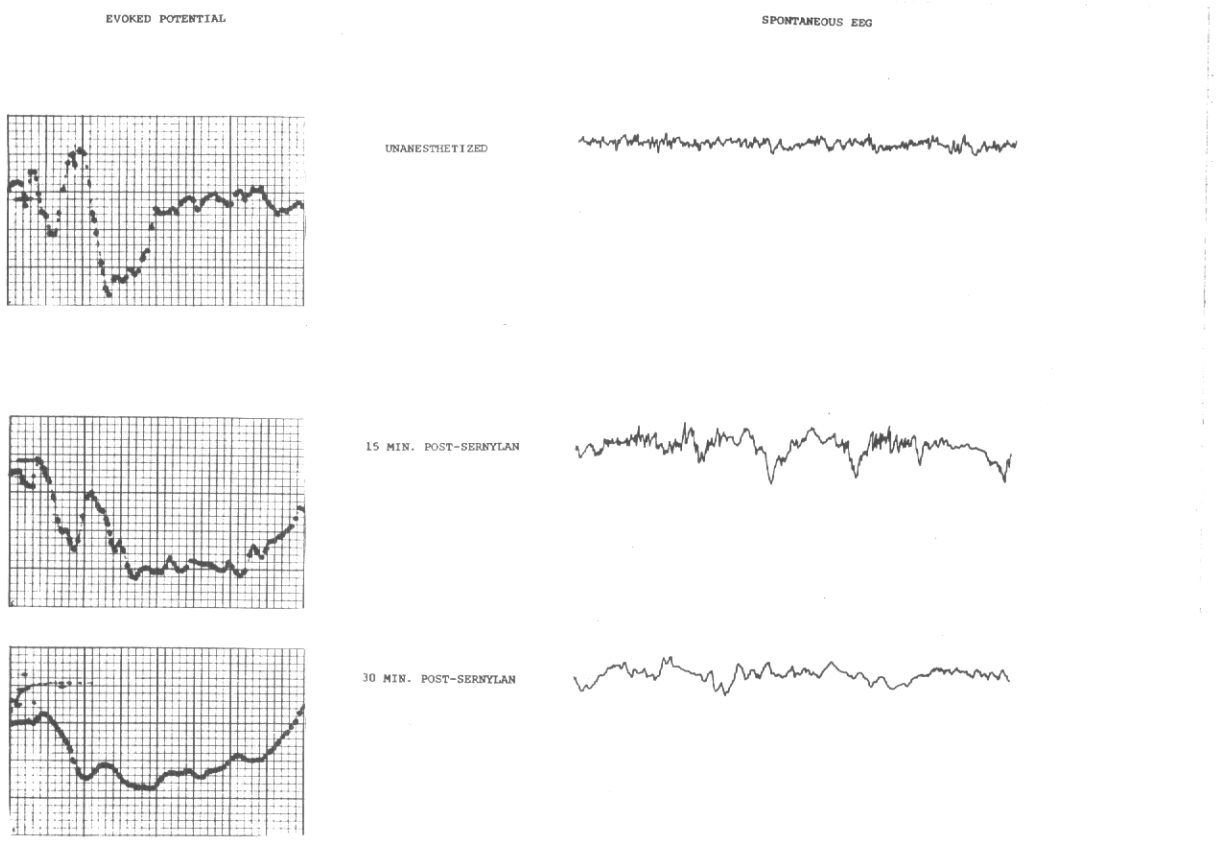

Figure 1. Evoked potentials and spontaneous EEG of a squirrel monkey before and after Sernylan. Evoked potential records are approximately 0.3 sec. duration with the unanesthetized trace representing an amplitude of approximately 150 microvolts. The spontaneous EEG is 5.0 sec. duration, and the unanesthetized trace represents an amplitude of approximately 25-50 microvolts.

response of a squirrel monkey (left occipital location) prior to the administration of Sernylan, 15 min. after administration, and 30 min. after administration of the drug. As may be seen in the figure, there is increased slow wave activity as well as a general increase in amplitude in the EEG 15 min. after the administration of the drug, and 30 min. post-Sernylan, the EEG is not unlike that of the sleeping human (Gergen, 1967, has reported cortical synchronization in the squirrel monkey during drowsiness).

It is apparent from Figure 1 that the evoked potential seen in the unanesthetized monkey is well defined, but the evoked potential is sharply reduced in amplitude 15 min. post-Sernylan, and the amplitude of the evoked potential is further reduced in the 30 min. post-Sernylan record. Similar results were obtained with the five monkeys that were tested.

The squirrel monkey shows many of the pharmacological symptoms described in the opening paragraph (patellar and palpebral reflexes and respiration and blood pressure were not examined); consequently, the electrophysiological data is a valuable aid in estimating the level of anesthesia following the administration of Sernylan.

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LABORATORY-BRED RHESUS FOR SALE

Sixteen laboratory-bred and -reared *M. mulatta* are available for sale. These animals were suckled and raised by their mothers and, after weaning, have been housed in small compatible groups. The fathers and mothers are long-term residents of our breeding colony. No experimental procedures of any kind have been performed on these youngsters. The sex and date of birth of each animal is as follows: Male: 10-20-67, Female: 11-3-67, Female: 12-27-67, Male: 1-17-68, Female: 1-19-68, Male: 1-24-68, Male: 2-12-68, Female: 4-17-68, Female: 7-15-68, Female: 8-24-68, Male: 8-25-68, Male: 9-14-68, Female: 11-16-68, Male: 11-24-68, Male: 11-25-68, Female: 11-28-68.--Sigmund T. Rich, D.V.M., Animal Facility, School of Medicine, University of California, Los Angeles, California 90024. Telephone: Area Code 213 825-5691.

METHOD OF PROTECTION OF DEVICES IMPLANTED IN SKULLS OF SQUIRREL MONKEYS[1]

Eleanor R. Adair

John B. Pierce Foundation Laboratory, New Haven, Connecticut

Anyone who has ever used or observed squirrel monkeys knows that they are extremely active in their home cages. Whether housed singly or in groups, they seem to spend as much time upside down as right side up and to be almost continuously in motion. This situation poses great problems for the experimenter who wishes to implant chronic electrodes, cannulae, thermodes, etc. in the brain without having to resort to continuous postoperative restraint in order to protect protruding hardware.

I have been implanting 18- and 21-gauge thermode tubes in the hypothalamus and mid-brain of squirrel monkeys. These tubes must protrude enough out of the dental acrylic to make watertight connections (via polyethylene tubing) to a liquid perfusion system, and, without some protection, they are flattened and bent over in a matter of days. One solution would have been to design a plastic or metal protective cap that could be screwed onto the acrylic plug. The cap could then be removed prior to an experimental session to expose the protruding thermode tubes. This note describes an alternative procedure, which has the advantage of requiring no additional hardware on the animal's head.

The procedure requires only a bit of artistry with dental acrylic and is diagrammed in Figure 1. It basically involves molding an open

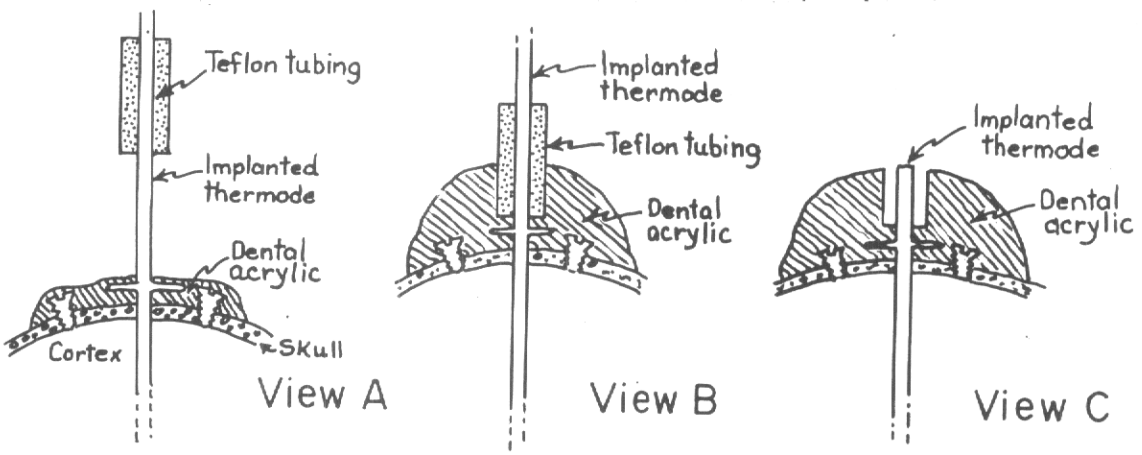

Figure 1. Procedure for molding open "well".

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[1]This work was supported by U.S. Public Health Service Contract No. ES00354-01.

"well" around the protruding tube. View A in Figure 1 shows the thermode tube at the start of cementing to the skull. The thermode is still held tightly in the electrode carrier and a thin layer of dental acrylic is applied first around the screws and the washer on the thermode. Then, as is shown in View B, a piece of teflon tubing is pushed down as far as it will go. This should have an inside diameter such that it slides easily over the thermode and a wall thickness appropriate to the "well width" desired. More acrylic is gradually built up around the teflon-enclosed thermode to the desired height. After the acrylic has hardened completely, the teflon tubing is retracted and the thermode cut off flush with the top surface of the acrylic. The resulting acrylic plug resembles View C. Each implanted tube is surrounded by a circular "well" and is completely protected by the strong, hard acrylic. The entire plug can be painted with fast-set epoxy if additional protection is desired.

The monkeys do not knock off the plug. An acrylic mound as high as half an inch remains intact as long as it has a broad base and 3 or more screws anchor it to the skull.

* * *

REQUEST FOR INFORMATION ON PHOTIC INFLUENCES ON REPRODUCTION

I am interested in photic influences on primate reproduction (specifically the rhesus monkey, *Macaca mulatta*). Although considerable work has been done on photoperiodicity in avian reproduction and some with mink, ferrets and fitches, the literature shows a paucity of information on monkeys. I should be indebted for pertinent bibliographical references. Of particular interest to me are the experiences of other primate facilities regarding the effects of controlled vs. random lighting conditions in their breeding quarters.--Frederick E. Birkner, Animal Quarters, Institute of Rehabilitation Medicine, New York University, 400 E. 34th Street, New York, N. Y. 10016.

* * *

REQUEST FOR PRIMATE MATERIAL: PRESERVED OR FROZEN CARCASSES FOR DISSECTION AND PREPARATION OF SKELETONS

Beginning in the summer of 1969, our department will offer a course in primate anatomy, and would like to obtain a wide selection of prosimians, monkeys, and apes of any age for dissection. After use in the anatomy course, these animals will be used to prepare skeletons for use in our other biological anthropology courses. Carcasses may be frozen or preserved in any suitable manner.--Robert B. Eckhardt, Department of Anthropology, The University of Michigan, Ann Arbor, Michigan 48104.

A NOTE ON THE RUMINANT-LIKE DIGESTION OF LANGURS

Charles E. Oxnard

Department of Anatomy, The University of Chicago

The recent report of Bauchop and Martucci (1968) demonstrated in considerable detail the contribution of gastric microbial fermentation of cellulose to digestion in langurs. The study was carried out by investigation of the bacterial fauna and volatile fatty acid constituents of the gastric contents; the findings are of course related to the anatomical peculiarity (large size and complexity) of the stomach that exists in animals of this subfamily *(Colobinae)* of the *Anthropoidea*.

In addition, however, Bauchop and Martucci suggested in their concluding sentence that "bacterial biosynthetic capacities may...benefit the vitamin and nitrogen economy of the host." This second mechanism may be of specific importance in fulfilling the requirements for these animals of vitamin B_{12}.

Vitamin B_{12} is found in practically all animal tissues and fluids, though the concentrations span a wide range. The substance originates from ingestion in the food or from symbiotic organisms within the animal's own digestive tract. The vitamin in the food may itself result from ingestion of animal products; in addition foods may contain the vitamin through being contaminated with other vitamin B_{12}-containing materials such as soil, excreta, decaying food and possibly contaminated water.

Most animals in which the main source of the vitamin is animal food have similar amounts of the vitamin in the serum; for instance man and the pig possess serum levels that range from 100 to 500 μμgms/ml. Those animals (for example, the cow and rabbit) which are more strictly herbivorous and in which therefore the main source of the vitamin is symbionts, possess serum levels that are often much higher than the foregoing--one to many thousands of μμgms/ml. Since the vitamin appears to be absorbed chiefly in the ileum such animals obtain their supplies either from vitamin manufactured proximal to the ileum (e.g. in the stomach in ruminants) or, if from vitamin synthesized in the colon (as probably occurs in all mammals), through its recirculation by coprophagy.

Most of the *Anthropoidea* resemble the first of these two groups for, although they are traditionally regarded as vegetarian, many recent observations have made it clear that most do ingest a small but (in terms of vitamin B_{12} requirements) significant quantity of animal food. They possess characteristic serum vitamin B_{12} levels: 150 to 500 μμgms/ml (Oxnard, 1966).

One group of the *Anthropoidea*, however, the *Colobinae* to which the langurs belong, seems to differ from the others. Vitamin B_{12} estimations performed in six animals (two specimens of *Presbytis obscurus* and four

of *P. entellus*) show that these forms maintain serum levels that are high (of the order of 1000 to 3000 μμgms/ml) compared with the remainder of the *Anthropoidea*. It is most unlikely that regular coprophagy occurs in these creatures (although coprophilia in individual captive chimpanzees may give rise to abnormally high serum levels: Oxnard, 1966). The possibility is (Oxnard, 1966) that the vitamin is synthesized by symbionts in the ruminant-like multilobed stomach possessed by these forms; the current investigations of Bauchop and Martucci (1968) substantiate that speculation.

In view of the ready appearance of widespread lesions referable to deficiency of vitamin B_{12} that has been demonstrated in rhesus monkeys in captivity (Oxnard & Smith, 1966), and which may well occur in a number of monkeys in a natural habitat (Foy, Kondi, & Mboya, 1965; Oxnard, 1967), the evolution of the ruminating-like adaptations of langurs may have been of considerably greater importance in the survival of the forms than just as an adaptation to leaf-eating. These species presumably avoid the penalties of near-threshold utilization of vitamin B_{12} such as appears to obtain in rhesus monkeys and baboons, and possibly in many other monkeys and apes.

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Oxnard, C. E. Vitamin B_{12} nutrition in some primates in captivity. *Folia Primatologica*, 1966, *4*, 424-431.

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CONFERENCE ANNOUNCEMENTS: SECOND CONFERENCE ON EXPERIMENTAL MEDICINE AND SURGERY IN PRIMATES

This conference, sponsored by New York University School of Medicine, will be held in the auditorium of Hunter College-Bellevue Department of Nursing Education, 440 East 26th Street, New York, New York, on September 7-12, 1969.

Co-chairmen of the conference will be E. I. Goldsmith, Cornell University Medical College, and J. Moor-Jankowski, New York University School of Medicine. Conference coordinator will be R. G. McRitchie, New York University School of Medicine.

The preliminary program is as follows:

Sunday, September 7.--9:00-10:00 a.m., Registration (continuing); 10:00 a.m., Opening remarks (Dr. Edward I. Goldsmith); 10:15-12:30 p.m., Cross-circulation (Chairman, Dr. Keith Reemstma, University of Utah School of Medicine); 2:00-3:30 p.m., Experimental transplantation in primate animals (Chairman, Dr. Gerald P. Murphy, Roswell Park Memorial Institute); 8:00-10:00 p.m., Immunological response between man and non-human primates (Chairman, Dr. N. Raphael Shulman, National Institute of Arthritis and Metabolic Diseases).

Monday, September 8.--9:00-12:30 p.m., Reports from major primate laboratories in the USA (Chairman, Dr. E. I. Goldsmith, Cornell University Medical College); 2:00-5:45 p.m., Reports from major primate laboratories in the USA (Chairman, Dr. Kurt Benirschke, Dartmouth Medical School); 8:00-10:00 p.m., Film session.

Tuesday, September 9.--9:00-12:30 p.m., Reports from major primate laboratories outside the USA (Chairman, Dr. C. H. Kratochvil, USAF); 2:00-5:45 p.m., Comparative biochemical and developmental genetics (Chairman, Dr. Harold A. Hoffman, National Cancer Institute, NIH).

Wednesday, September 10.--The nervous system (Co-chairmen: Dr. A. J. Berman, Brooklyn Jewish Hospital, Dr. Fred Plum, Cornell University Medical College); 9:00-10:30 a.m., Similarities between nonhuman and human primates (Chairman, Dr. Fred Plum); 10:45-12:30 p.m., Perinatal biology and development (Chairman, Dr. A. J. Berman); 2:00-3:30 p.m., Neuroendocrinology (Chairman, Dr. Paul R. McHugh, Cornell University Medical College); 3:45-5:45 p.m., Behavioral physiology (Chairman, Dr. C. H. Kratochvil, USAF); Cocktail reception and dinner (details supplied at a later date).

Thursday, September 11.--9:00-12:30 p.m., Reproduction, perinatal, growth and development studies (Chairman, Dr. Stanley James, Columbia University, College of Physicians and Surgeons); 2:00-5:45 p.m., Reproduction, perinatal, growth and development studies (Chairman, Dr. Wendell H. Niemann, Laboratory for Experimental Medicine and Surgery in Primates [LEMSIP]).

Friday, September 12.--9:00-12:30 p.m., Virology (Chairman, Dr. S. S. Kalter, Southwest Foundation for Research and Education); 2:00-5:45 p.m., Infectious diseases (Chairman, Dr. L. H. Schmidt, Southern Research Institute).

Please address all correspondence to: Dr. J. Moor-Jankowski, New York University Medical Center, 550 First Avenue, New York, New York 10016.

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FEMALE LION-TAILED MACAQUES *(MACACA SILENSUS)* WANTED

I am anxious to obtain a number of female wanderoos, also called lion-tailed or lion-maned macaques *(Macaca silensus)*. These animals are becoming increasingly difficult to obtain and the government of India has placed a ban on their export. The native habitat in the Western Ghat forest is restricted and subject to modification for agricultural development.

This species represents an important link in the genus *Macaca* and as such is of potential research interest in several fields of primatology. These animals are an important logical extension of my own program of behavioral studies and a social group would be highly desirable. I have been able to locate only a few available males at present and am anxious to complete a group which would be used in a long-term behavioral program while maintained in a breeding group. Hopefully, this would be one way to insure the long-term survival and availability of these animals for research.

I would appreciate hearing of the availability of these animals for sale or trade.--Dr. Irwin S. Bernstein, Yerkes Regional Primate Research Center, Field Station--Route 1, Lawrenceville, Georgia 30245.

* * *

REQUEST FOR PRIMATE MATERIAL: NEW WORLD MONKEY CADAVERS

New World monkey cadavers (especially howlers and capuchins) with head and neck intact are wanted for research of the hyoid apparatus. The brain may be removed if so desired.--Dr. R. A. Hilloowala, Department of Anatomy, University of Alabama Medical Center, 1919 Seventh Avenue South, Birmingham, Alabama 35233.

SUPPLY OF SOUTH AMERICAN PRIMATES DISCUSSED*

The Second Symposium on Tropical Amazonian Biology was held in Colombia, South America, early this year. Meetings were held in Florencia and in Leticia on the Amazon in Colombia. At the meeting in Leticia, January 28, 29, and 30, discussions were held on the availability of fauna and also on the possibility of depletion of the fauna through various means, particularly trapping for export.

The subject of conservation necessarily arose, and the approach to the protection of the Amazon region was related seriously to conservation methods and programming. It seemed apparent that biologists were planning severe measures that might restrict all exportation from the region of the Amazon. As a result of preliminary discussions on the subject by conservationists and biologists, both in this country and in South America, considerable concern was raised in the minds of the users of nonhuman primates exported from South America.

Biologists in the United States who were associated with the symposium suggested that no severe steps would be taken in restricting export of primates. On the other hand, evidence coming from South America indicated that strong resolutions were being suggested that would seriously curtail or disrupt exportation of primates to laboratories in the United States.

At the meeting discussions of fauna were conducted by various biologists. Time was also allocated to local primate trapping and compounding personnel to discuss their program. At one point in the meeting a resolution was presented that called for complete cessation of exportation of wildlife, including primates. This resolution was not adopted, however, and subsequent discussions brought about a change in the resolution, placing the matter in the hands of a government agency that would study the situation, highlighting problems and making recommendations based on ecological data. Quite recently, however, word has been received from dealers in Brazil that it is unlawful to export live animals. This confirms the restrictive attitude toward animal trapping and exportation developing in regions of South America.

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*From *ILAR News*, 1969, *12* [4]. The report was made by Alan A. Creamer, Chairman, ILAR Subcommittee on Standards for the Procuring, Compounding, Holding and Transporting of Nonhuman Primates.

NEWSPAPER CLIPPINGS: THE GOATHERD

MIXED IDENTITY DOWN ON THE FARM

Okahandja (South West Africa).--Ahla is convinced that, as goats go, she is a very superior sort. So she arbitrarily assumed leadership of the clan of several score at the Aston farm near here, subjugating even the traditionally masterful billies. This would be of passing interest only to goat watchers except for the obvious fact that Ahla is a large, hairy and long-fanged Chacma baboon. Her coup among the goats of Otjiruse farm burst some myths about baboons (notably that they are inherently vicious to other creatures) and caused a rise of scientific eyebrows. It has also, for nearly 15 years, provided the Astons with a rare servant indeed: an able goatherd who requires neither bed nor board, has no use for payment, and gives little trouble.

She joined the Aston staff in 1954 when an African herder brought to Mrs. Hedwig Aston a baby baboon he found lost in the bush. The baby was given its milk every day among the goats in the small corral where they are penned nightly, and where the very young kids stay while the herd goes out to graze. Soon Ahla was going out with them, riding the back of a she-goat she apparently adopted as mother. From then on her career as a superior goat was set. She took to leading them on their daily excursions and the obsolescent human goatherd was given other tasks. Ahla's solicitude for her flock is remarkable. Only members of the farm may touch her goats. A butcher's mate picked one up one day and promptly got bitten. So one of the farm Africans had to load them into the butcher's truck. In the evenings Ahla makes sure the kids get properly fed. She picks up those bleating for mother, sometimes one under each arm, and delivers them direct--unerringly identifying the parent by scent.

Goats often bear twins and Ahla insists that they share 50-50. She will not allow one twin to start suckling before the other turns up. Some goats have triplets and the extra mouth is passed to a foster-mother with only one kid. This Ahla resents, and she lugs number three back to its rightful mother, where the trio then have to feed in rotation. Occasionally a kid will be left behind, alone in the great outdoors, when the herd comes home. Out goes Ahla to fetch it. Numbers, however, appear to bemuse her. Sometimes she leaves half the herd out there. So her attendant dogs bring them in.

The Astons believe that by day she shoos off jackals and other small predators hungering for young goat. But she cannot cope with the big cats, the leopards and cheetah. Ahla was seen behaving frantically beside a farm road one day and ran across a small hill when people came to investigate. On the other side they found a cheetah devouring one of the goats.

Her one failing, say the Astons, is that she periodically takes leave without notice for a few days, or weeks. Once for two or three months. And then, of an evening, she will casually come in with the

Constitution

Article 1. The seat of the International Primatological Society e.V. is Frankfurt a.M., Federal Republic of Germany.

Article 2. The aims of the Society are to encourage all areas of primate research and to facilitate cooperation between workers of all nationalities who are engaged in such research. The Society will do everything in its power to protect primates and especially those species in danger of extinction and recommends utmost caution in regard to experiments involving such species. The society also will do everything in its power to foster scientifically administered centers for the breeding of primates and especially for endangered species of primates. The Society encourages its members to carefully weigh in every case the potential scientific results of experiments against any possible damage which the experiment might cause to the individual animal.

Article 3. The Society is a membership corporation ("eingetragener Verein" sensu §§ 55 B.G.B.).

Article 4. The Society will undertake to publish a periodical.

Article 5. Any individual or corporation may apply for membership in the Society. Applications should be submitted to a member of the Executive Committee. The Executive Committee as a whole is empowered to decide upon acceptance of applications. In the case of rejection, appeal to a General Assembly of the Society is possible. The Majority decision of those attending the General Assembly is binding and final. No one may be denied membership on grounds of race, religion, nationality, or political beliefs.

Article 6. Members are entitled to attend all functions of the Society and will be informed of such in advance. Each member has a voice and vote in the General Assembly. Members are bound to support the Society and its aims and to conduct themselves in accordance with its constitution.

Article 7. Membership expires

a. upon receipt by the Executive Committee, at least three months before the end of the year, of a written announcement of intention to withdraw from the Society

b. at death

c. through revocation by the Executive Committee, if a member has not paid his dues within one year after receipt of an admonition in the form of a registered letter, or if he has indulged in actions contrary to

the principles and goals of the Society or liable to inflict serious damage to its public image.

Written notification of revocation of membership will be given. The decision of the Executive Committee may be appealed to the General Assembly. The decision of the General Assembly is final. The member affected is not entitled to a refund of his dues for the year in which membership was revoked and has no claims of any kind on the Society's assets.

Article 8. Dues are fixed by the General Assembly of the Society. Dues for one year may not exceed 12.50 US $ as long as no periodical is included.

Article 9. The Executive Committee is responsible for the administration of the Society's affairs. It consists of the President, two Vice-presidents, the Secretary General, the Secretary for America, the Secretary for Asia, the Secretary for Europe, and the Treasurer.

Article 10. At least five members of the Executive Committee must have submitted their votes in person or in writing before the Executive Committee is enpowered to decide on any proposal falling within its jurisdiction.

Article 11. The members of the Executive Committee are elected every four years by the General Assembly. Voting for each office is separate and by means of secret ballot. The candidate receiving the majority of the votes cast is elected. If no candidate receives a majority, a run-off election is held between the two candidates who have received the highest number of votes on the first ballot. Members of the Executive Committee assume their offices on January 1 of the year following the election. The Executive Committee must contain members from at least three nations.

Article 12. The Executive Committee can be removed from office before the elapse of its term by vote of two-thirds of the members attending a General Assembly or casting their votes by letter. A new Executive Committee is then to be elected in accordance with Article 11.

Article 13. The President is the public representative of the Society. The Secretary General deals with the Society's normal business and is its exclusive legal representative. He is internally bound to the decisions of the Executive Committee according to Article 10. A report of each meeting of the General Assembly is to be written and must be signed by the President, the Secretary General and one of the Secretaries. The Treasurer collects the dues of the members and administers the funds of the Society.

Article 14. A regular General Assembly in connection with a scientific congress is to be held once every two years. The Executive

Committee decides the date of the next General Assembly and is required to inform the members by letter at least six months in advance of the date chosen. General Assemblies may also be called upon request of not less than a fourth of all members. The executive Committee may also call irregular General Assemblies.

At least a fourth of the members of the Society must be present before the General Assembly is enpowered to vote upon proposals or elect officers. The General Assembly chooses the site of the next meeting.

Article 15. Amendments of the Constitution must be approved by a two-thirds majority of the General Assembly. Absentee ballots are allowed and must be in the form of written, signed statements.

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REPEAT REQUEST FOR PRIMATE MATERIAL: CHIMPANZEE GENITAL ORGANS

Chimpanzee genital organs are requested for a histological study. The entire genital tract should be fixed in 10% formalin, or preferably Bouins' solution, after opening the testes or uterine corpus and cervix by a longitudinal incision. Ovaries from adult female animals are especially needed, and gifts or loans of histological preparations of such material would be helpful. If available, data on the age, weight, and cause of death of the animal should be supplied with the specimens. All shipments of material will be acknowledged, and copies of publications arising from this study will be sent to donors. Shipping costs will be gladly refunded if requested.--Dr. Charles E. Graham, Yerkes Regional Primate Research Center, Emory University, Atlanta, Ga. 30322.

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

BOOKS

Primates in medicine. Vol. 2. *Using primates in medical research. Part I: Husbandry and technology*. W. I. B. Beveridge (Ed.) Basel: Karger, 1969.

This is the first part of the Proceedings of the European Symposium on the Use of Non-human Primates in Medical Research, held in Lyon, France, December 11-14, 1967. The contents are as follows: Supplying wild primates to the laboratory by W. T. Roth; Comments on primate centers by G. Mahouy; Development of primate centers in Europe by D. W. van Bekkum and H. Balner; Selection of species for various uses by L. H. Schmidt; Macaques and guenons by J. M. Vicaria; Baboons by S. S. Kalter; New World monkeys by B. C. Bullock, N. D. M. Lehner, and T. B. Clarkson; Apes by G. Courtois and J. Mortelmans; Breeding by L. H. Schmidt; Artificial rearing of baboons by P. Dubough; Artificial rearing of macaques by A. J. Pallotta; Telemetry by T. C. Ruch and F. Spelman; Tranquillization and Anaesthesia by J. Mortelmans.

Primates in medicine. Vol. 3. *Using primates in medical research. Part II: Recent comparative research*. W. I. B. Beveridge (Ed.) Basel: Karger, 1969.

This is the second part of the above-mentioned Proceedings. The contents are as follows: Cardiovascular diseases by G. A. Gresham and A. N. Howard; Cancer--A general review by G. T. O'Conor; Experiments in monkeys with human leukaemia by B. A. Lapin; Psychology and psychiatry by A. M. Schrier; The current role of non-human primates in surgical research by E. I. Goldsmith; Transplantations of kidneys from chimpanzees to man by J. Traeger; Tissue typing in primates by H. Balner and D. W. van Bekkum; Blood group antigens in primate animals and their relation to human blood groups by J. Moor-Jankowski and A. S. Wiener; Studies with antilymphocytic serum in monkeys by D. Fries; Monkey cell cultures in virology by R. Sohier and O. G. Gaudin; Communicable diseases: Hazards for man and models for research by R. N. Fiennes and A. J. Riopelle; Preliminary

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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 present section is devoted primarily to presentation of abstracts of articles of practical or of general interest.

note on mycoplasma in primates by M. Davidson and L. Thomas; Control of tuberculosis by L. H. Schmidt; Natural treponematosis of the African primate by A. Fribourg-Blanc and H. H. Mollaret; Smallpox and monkeypox in primates by I. Arita and D. A. Henderson; Quarantine of vervet monkeys by V. I. Chernyshov; also the following pertaining to disease in laboratory personnel associated with vervet monkeys: I. A general report on the outbreak by A. C. Saenz; II. Isolation of the causal agent by D. I. H. Simpson; III. Experimental infections of monkeys by R. Haas, G. Maass, and W. Oehlert; IV. Collection and shipment of vervet monkeys by M. Kaplan.

DISEASE

Pathologic study of the African baboon (*Papio* sp.) in his native habitat. Kim, C. S., Eugster, A. K., & Kalter, S. S. (Div. Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Texas 78206) *Primates*, 1968, *9*, 93-104.

During February 1966, necropsies were performed on 97 baboons of all ages and both sexes in their native habitat at different locations in Kenya, East Africa. Among the selective samples collected for pathologic studies, parasitic conditions such as *Pneumonyssus* (84.5%), *Sarcocytis* (31.3%), *Esophagostomum* (51.0%) and others were the predominant findings followed by pathologic conditions attributable to acute hemorrhagic pneumonia (5.2%) and suppurative pneumonia and pleuritis (4.3%). No positive tuberculosis was found, although one section has been suspected. There were no significant mycotic lesions. Non-suppurative types of nephritis (8.6%), hepatitis (6.7%), myocarditis (6.7%), and progressive pneumonitis (8.6%) were also observed. Although no neoplasia was found, degenerative conditions such as fatty infiltration (12.0%) and cloudy swelling of the liver were frequently observed.

The collection of biomedical specimens from baboons (*Papio* sp.) Kenya, 1966. Kalter, S. S., Kuntz, R. E., Myers, B. J., Eugster, A. K., Rodriguez, A. R., Benke, M., & Kalter, G. V. (Div. Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Texas 78206) *Primates*, 1968, *9*, 123-139.

This report, the second in a series on field trips to Kenya, Africa, provides baseline information on the microbiology and parasitology of the baboon (*Papio* sp.) as this animal exists in its native habitat. Specimens were collected for bacteriology, mycology, parasitology, pathology, and virology as well as for a number of ancillary biomedical purposes from three major geographic areas in Kenya. Preliminary compilations of data and information obtained during the course of field studies indicate varying relationships

between the presence of infective agents and parasites and the areas from which baboons were captured. It has been shown clearly that ecologic factors influence the physical appearance of the animal as well as their microbial flora and parasite fauna. The close spatial relationship of the baboon to man as well as to other animals, both wild and domestic, very probably accounts for an interchange of organisms and exerts influences on potentials for transmission and propagation of parasites. Data collected from such field studies, when integrated with those obtained as a result of longitudinal studies on baboons maintained in captivity over a five year period, plus various taxonomic and basic biomedical considerations, will be of paramount importance for establishing the baboon as a model for studies on human disease.

An outbreak of tuberculosis in a group of experimental baboons. Vice, T. E., Pinkerton, M. E., Fear, F. A., & Kalter, S. S. (Div. Microbiol. & Infect. Dis., Southwest Found. Res. & Educ., San Antonio, Texas 78206) *Primates*, 1968, *9*, 105-122.

A spontaneous outbreak of tuberculosis occurred in an isolated group of 21 baboons being used in an adenovirus type 12 oncogenesis study. Seventeen of the 21 animals were affected. Diagnosis was made by intradermal skin test, chest radiographs, and peripheral blood counts. Confirmation of the diagnosis was by gross and histopathology and culturing of the causative organism. Intradermal tuberculin skin tests were performed simultaneously in the eyelids (intrapalpebral) and abdomens of 16 of the 17 that were infected. Fifteen of these showed significant reactions in the abdominal skin, whereas only 5 had reactions in the eyelid. Infection was respiratory with extensive pathology in the pulmonary viscera. The pathology resembled that of simian tuberculosis, with miliary lesions in the spleen, liver, and in several cases, other abdominal viscera. It was characterized by caseation necrosis and an absence of calcification. Histologically, the lesions resembled the disease described in the great apes rather than the lower monkeys, with numerous Langhans giant cells. The causative organism resembled the human type *Mycobacterium tuberculosis* morphologically and culturally.

Parasites and commensals of the Taiwan macaque (*Macaca cyclopis* Swinhoe, 1862). Kuntz, R. E., Myers, Betty June, Bergner, J. F., Jr., & Armstrong, D. E. *The Formosan Science*, 1968, *22*, 120-136.

Parasites and commensals are listed for the Taiwan macaque (*Macaca cyclopis* Swinhoe, 1862). This compilation is based upon an examination of blood smears, fecal samples, and several collections of helminths, leeches, and ecto-parasites taken during the course of survey-type studies

and obtained incidentally at autopsy of monkeys held from several days to several months in captivity in support of other biomedical investigations. Eight intestinal protozoa plus an *Entamoeba* sp. complex consisting of polymorphic amebae of uncertain identity, *Trypanosoma* sp. from peripheral blood, two cestodes, nine nematodes, two trematodes, one leech, and two species of lice are reported for *M. cyclopis*. Since parasitological history of this mammal has been so limited, most of the parasites and commensals reported constitute new records. The majority of protozoa isolated from the Taiwan macaque are very close to those described for man. Most of the helminths, however, are different. Consequently, a provisional key for recognition of eggs of helminth parasites is included as well as a guide for recognition of the two species of body lice.

Spontaneous toxoplasmosis in *Lemur catta*. Nigi, H., & Itakura, C. (Dept. Lab. Primate Med., Japan Monkey Cen., Inuyama, Aichi, Japan) *Primates*, 1968, *9*, 155-160.

Two cases of spontaneous toxoplasmosis in *Lemur catta* are described and previous reports of this disease in primates are reviewed. The two lemurs died respectively 3 and 4 days after falling ill and showed, histopathologically, the typical features of this disease, although the route of infection was uncertain. These cases are the first reported for this species and for any primate species in Japan.

Diagnosis and handling of B virus in a rhesus monkey (*Macaca mulatta*). Cole, W. C., Bostrom, R. E., & Whitney, R. A., Jr. (Vet. Med. Dept., Med. Res. Lab., Edgewood Arsenal, Md. 21010) *The Journal of the American Veterinary Medical Association*, 1968, *153*, 894-898.

During routine examination of quarantined primates at Edgewood Arsenal Medical Research Laboratory, a rhesus monkey (*Macaca mulatta*) was observed with ulcerative and papillary lesions on the mucocutaneous border of the upper and lower lips and the anterior one-third of the dorsum of the tongue. Microscopic examination of a biopsy specimen of the lower lip disclosed type A intranuclear inclusion bodies in the epithelial cells in and adjacent to the ulcer. Serum samples revealed a marked increase in titer to *Herpesvirus simiae* and herpes simplex virus.

FACILITIES, CARE AND BREEDING

Endocrine coordination in monkeys: male sexual responses to the female. Vandenbergh, J. G. (Lab. Reproductive Behav., Div. Res., N.C. Dept. Mental Health, Raleigh, North Carolina) *Physiology and Behavior*, 1968, *4*, 261-264.

Free-ranging rhesus monkeys on island colonies near

Puerto Rico breed with a distinct seasonal rhythm. Observations on adult monkeys in one such colony, La Parguera, during the non-breeding season showed that sexually quiescent male monkeys can be returned to a sexually active state by exposure to females artificially brought into estrus. Males responded both behaviorally by showing copulatory activities and by increased duration of grooming, and physiologically by showing evidence of increased testicular activity. Such behavioral and endocrine coordination points out: (1) the control hormones exert over primate sexual behavior, (2) that females communicate their endocrine state to males, and (3) the existence of a system for the synchronization of mating activities between the sexes, especially at the onset of the breeding season.

Colony management and proposed alterations in light of existing conditions at the chimpanzee consortium. Wilson, W. L., & Wilson, Carolyn C. (Dept. Psychology, U. Washington, Seattle, Wash.) Technical Report No. ARL-TR-69-8, 6571st Aeromed. Res. Lab., Holloman Air Force Base, New Mexico, 1969.

The behavioral and environmental conditions at the Consortium, a facility at the 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico, are described with respect to the maintenance of healthy, reproducing animals at the lowest possible cost. Reproduction rates and frequency of aggression in the Consortium are compared with those reported for chimpanzees in their natural habitat. Reproduction is slightly lower and aggression more common in the Consortium. The role of laboratory colonies in insuring a future supply of chimpanzees for research without decimating wild populations is discussed. Suggestions for structural and procedural improvements predicted to increase reproduction, reduce aggression, increase the housing capacity, and reduce maintenance costs are made. The authors stress that the manipulative abilities and strength of chimpanzees should be taken into account whenever physical structures are planned. A method of introducing new animals into the Consortium is proposed.

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