

LABORATORY PRIMATE NEWSLETTER

Volume 13, Number 3

July, 1974



ALLAN M. SCHRIER, EDITOR

MORRIS L. POVAR, CONSULTING EDITOR

**Published Quarterly by the Primate Behavior Laboratory
Psychology Department, Brown University
Providence, Rhode Island**

POLICY STATEMENT

The purpose of the *Laboratory Primate Newsletter* is (1) to provide information on care, breeding, and procurement of nonhuman primates for laboratory research, (2) to disseminate general information about the world of primate research (such as announcements of meetings, research projects, nomenclature changes), (3) to help meet the special research needs of individual investigators by publishing requests for research material or for information related to specific research problems, and (4) to serve the cause of conservation of nonhuman primates by publishing information on that topic. 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 is intended primarily for persons doing research with nonhuman primates. New issues are mailed free of charge in the United States. Persons outside of the U. S. A. are requested to pay \$1.50 per year to cover the additional cost of mailing. Back issues may be purchased for \$1.00 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. 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 References 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 References section. Technical names of monkeys should be indicated at least once in each note and article. In general, to avoid inconsistencies within the *Newsletter* the scientific names used will be those of Napier and Napier [*A Handbook of Living Primates*. New York: Academic Press, 1967].

All correspondence concerning the *Newsletter* should be addressed to:
Dr. Allan M. Schrier, Psychology Department, Brown University,
Providence, Rhode Island 02912. (Phone: 401-863-2511)

ACKNOWLEDGMENT

The *Newsletter* is supported by U. S. Public Health Service Grant RR-00419 from the Animal Resources Branch, Division of Research Resources, N.I.H.

Cover drawing compliments of Janet Miyo Kato

Managing Editor: Helen Janis Shuman

CONTENTS

NEW ENGLAND REGIONAL PRIMATE RESEARCH CENTER. Bernard F. Trum.....	1
CALL FOR CONFERENCE EXHIBITS AND FILMS FOR CONFERENCE ON EXPERIMENTAL MEDICINE AND SURGERY IN PRIMATES.....	4
THE WISCONSIN REGIONAL PRIMATE RESEARCH CENTER. John Wolf and Susan Hagen.....	5
PRIMATE MATERIAL WANTED: <i>PAN TROGLODYTES</i> HEADS OR BRAINS.....	12
PERINATAL BEHAVIOR AND PARTURITION OF A COLOBINAE, <i>PRESBYTIS ENTELLUS ENTELLUS</i> (HANUMAN LANGUR). Jim McKenna.....	13
COST ANALYSIS AND RATE SETTING MANUAL FOR ANIMAL FACILITIES	15
TWO CHIMPANZEES FOR SALE.....	15
GIBRALTAR COIN DEPICTS MONKEY.....	16
MORE ON PROPOSED REGULATIONS ON IMPORTATION OF INJURIOUS WILDLIFE.....	16
RECENT BOOKS AND ARTICLES.....	17
ADDRESS CHANGES.....	22

NEW ENGLAND REGIONAL PRIMATE RESEARCH CENTER

Bernard F. Trum

November 8, 1973, was a dreary New England day in Southborough, Massachusetts. The deep blue sky was filled with clouds and only the oaks among the deciduous trees had leaves. I decided to look around and relate what I saw today as our contribution to the *Laboratory Primate Newsletter* upon the invitation of Dr. Allan Schrier.

There were 1,071 monkeys to be fed and cared for at the New England Regional Primate Research Center. There should have been 1,072 for one was on "French leave". Sgt. Foster of the State Police just called to say that "Houdini" was spotted in a tree in Old Road to Nine Acre Corner in Concord. "Houdini" has been missing since early summer and has robbed gardens and orchards in Marlborough, in Framingham and now, in Concord. We hope he will come home before winter and have sent our best out to persuade him, but we know deep down within ourselves it will be a futile attempt to "bring him in"!

The nursery is full. There are 65 infants, mostly macaques (*Macaca cyclopis*, *M. fascicularis*, *M. mulatta*, *M. arctoides*) but one or two bush-babies (*Galago crassicaudatus*), two owl (*Aotus trivirgatus*) and several squirrel monkeys (*Saimiri sciureus*).

The "social showcase", an exhibition area in our front entry, has a rather dull group--if juvenile monkeys can be dull--consisting of 3 *M. mulatta* and 6 *M. fascicularis*. It is in this area, separated by glass from humans and other monkeys, that juveniles (between 3 and 6 months of age) are allowed to socialize thereby losing a great many of the psychological traits heretofore attributed to "hand rearing".

Dr. Felix Garcia, the Clinical Veterinarian, is trying to convince his veterinary assistant, Dr. Flores, that he should cover for Dr. Sehgal this weekend! He is speaking, while gowned and gloved, for he has just come from the operating room where he did a bone infusion of spleen preparation, the result of a splenectomy on a baboon performed by Dr. B. A. Barnes of Tufts University on Wednesday. He is harried and hurried for an *Ateles* is on the table needing some stitches because of a fresh fight wound.

Dr. Prabhat Sehgal took the afternoon off. His wife Nina and little daughter Anupama, whom he is seeing for the first time, just arrived from India.

Dr. Ron Hunt, chief of the Division of Pathology, is on a site visit at Johns Hopkins for the National Institutes of Health. He went there from

Author's address: New England Regional Primate Research Center,
One Pine Hill Drive, Southboro, Massachusetts 01772.

a National Cancer Institute contractors' meeting in Hershey, Pennsylvania, so he'll be glad to get home.

His assistants, Dr. Ray Baggs and Ms. Laura Chalifoux, have had a busy day. They've "posted" a baboon, sacrificed after having spent a long time with us. The female baboon came to us from LEMSIP in New York where she was blood typed in 1971. She was used in a total afferent hepatic experiment by Dr. Maurice Slapak of the Department of Surgery of the University of Cambridge, England, while here as a visiting scientist and she has since been used in immune-response studies. Her uterus went to Lorna Johnson, M.D., a visiting scientist, whose professional interest is in the diseases of the reproductive tract of woman. Dr. Johnson has been very active in identifying a relation between *Herpes simplex* and cervical cancer.

Today the necropsy reports indicated they've also "posted" two owl monkeys with lymphomas as well as a series of rabbits which seemed "clean" after severe reactions, in immunological studies!

Harris Finberg, M.D., a resident in comparative pathology, wasn't in his laboratory. Too bad, he could have told me something of his interesting work on bone growth in tissue culture as a means of characterizing some of the differences in metabolism of vitamin D by various species of simians. Dr. Finberg, however, works each Thursday with Dr. Harry Griffiths in clinical radiology at the Peter Bent Brigham Hospital in Boston.

I found the technicians in the automated chemistry unit "playing with the bubble machine", that huge automatic analyzer, or as another said in the case of the amino-acid analyzer "supervising a machine". The boss, Dr. Wendell Peacock, was watching carefully but his mind was on a meeting he'd just attended in Texas and he talked with me about this Advanced Computer Users Group which was put together by Texas Instruments to exchange information and formulate programs with new systems and methods of instrumentation. He is a member of the governing board and chairman of the subcommittee on communications and has less than a month to put a symposium together!

I missed Dr. Roger Kelleher, professor of psychobiology and head of the division at the Center. Although he'd been around most of the day, he'd just taken off for a departmental meeting at the Harvard Medical School. However, I did find Dr. Larry Byrd of this department helping a technician calibrate an apparatus used in a study by Professor Peter B. Dews of the Harvard Medical School. Larry said he didn't mind since it gave him a break from the preparation of a manuscript. The apparatus was working well, had already measured and recorded the reactions for control of eight squirrel monkeys, a chimpanzee and a baboon, and they were all ready to dose and record the effect of a drug when the apparatus "conked out"! Psychobiology has a very good group of investigators and not the least in the group is a dapper post doctoral fellow, Dr. Fernando A. Gonzalez.

Another member of the group, Dr. Steven R. Goldberg, had requested that

he not be disturbed. He was working on a draft proposal for a conference on "evaluation" of drug abuse programs. I got it second hand but it seems as if this is to be sponsored by ADAMHA. Steve has been working along with visiting scientists such as Professor William H. Morse of the Department of Psychiatry, Harvard Medical School, on the effects of cocaine and morphine as well as morphine antagonists.

This may be as good a time as any to explain that each staff member at the Center holds an appointment in an academic department of Harvard University. Visiting or associated scientists must be members of the Harvard faculty or some other university or research institution.

Dr. Antoinette M. Gentile, on sabbatical from Columbia University, had a visitor today, Professor Ruth Skinner of Adelphi University. Dr. Gentile is collaborating with Dr. Donald Stein from Clark University in Worcester and Dr. Nelson Butters of Boston University (Veterans Administration Hospital). In general, their work concerns changes in function during recovery following serial lesions of the prefrontal cortex in *M. mulatta*.

Dr. Arthur L. Herbst, Associate Professor of Obstetrics and Gynecology at the Massachusetts General Hospital, came in today with the pathologists, Dr. Robert E. Scully and Dr. Stan Robboy, to discuss with Dr. Arthur T. Hertig the histology of the simian primate *cervix uteri*. This group had their pictures on the cover of *Cancer Research* in October for their work on the discovery of vaginal and cervical abnormalities in women following stilbestrol exposure *in utero*. They are testing this phenomenon in simians under controlled conditions and wish to detect the circulating hormones in the fetuses as early in gestation as possible.

Dr. Hertig was working on a manuscript. He had read a paper on the ovary of the *Cebus* monkey, with emphasis on the histogenesis of the *corpora lutei*, at a conference on simian reproduction held in conjunction with the Primate Center Directors' meeting at Yerkes Primate Research Center in October. It was so well received he thought he'd better "polish it up" for publication.

Dr. Robboy wanted to have an opinion on the probability of finding Barr bodies in the injected female fetuses. Since Dr. Nancy Ma and Dr. T. C. Jones were the best qualified to answer this type of a query, we went in search of them. Last time I saw Dr. Jones, he was checking the pedigrees of several monkeys found to have an erythrocytic polymorphism associated with an arginase metabolic variability. However, we found him in the laboratory examining the karyotypes of some *M. fascicularis* and *Saguinus tamarinus* fetuses which had been aborted of unknown causes. Nancy Ma was preparing an abstract of some completed work and I think it would be well to quote it: "Structural homozygosity which occurs in plants and insects is reported herein for the first time in mammalian chromosomes. The addition of a heterochromatic chromosome segment to either one or both homologues are described in autosomes B5 and B12 of *Saimiri sciureus*. This heterochromatin polymorphism probably is another

means of facilitating evolutionary karyotypic variation in *Saimiri sciureus*."

Dr. Luis Melendez had his group in for a research review today. He returned yesterday from an extended lecture tour in South America. He was just checking with Dr. Ovid Fraser on progress made in immune aspects of viral produced cancer, with Dr. M. D. Daniel on the new strains of herpes viruses produced by cloning, and with Dr. Horacio Barahona on the results of challenging several species with five newly discovered but yet unreported adenoviruses from South American monkeys. This group has been exceptionally productive and has become quite well known in cancer circles since they discovered and reported with Dr. Hunt the oncongenicity of *Herpesvirus saimiri* and *Herpesvirus ateles*.

I've reported the work of the professional staff or their associates on the job on 8 November, 1973. I have not attempted to bring into the story the exciting work of many other visiting scientists who were not at the Center that day. Omitted also is any mention of the excellent technical support group or the administration under Col. Edwin D. McMeen (USA - ret) without which the amenities of the Center could not be achieved.

*

*

*

CALL FOR CONFERENCE EXHIBITS AND FILMS FOR
CONFERENCE ON EXPERIMENTAL MEDICINE AND SURGERY IN PRIMATES

The following material is requested:

A. Exhibits: 1. Scientific, depicting: (a) Institutional programs-activities and progress; (b) Research findings; (c) Informational resources, such as would identify ongoing research programs; Libraries and bibliographies containing special collections in medical primatology and general primatology; Abstracting services that include medical and general primatology. 2. Commercial, advertising: (a) Diets; (b) Equipment for husbandry; (c) Supplies; (d) Monitoring and measuring instruments; (e) Handling devices; (f) Books and journals. B. Audiovisual tutorial materials. C. Films and film strips. D. Slide lectures. E. Informative charts and tables which summarize: 1. Significant research findings. 2. Basic biological data such as hematology or biochemistry of one or more species of nonhuman primates. F. Demonstrations.

All information to be sent by October 30, 1974 to: Jules Cass, D.V.M., Program Coordinator, Research Service, Department of Medicine & Surgery, Veterans Administration, Washington, D. C. 20420.

THE WISCONSIN REGIONAL PRIMATE RESEARCH CENTER*

John Wolf and Susan Hagen

The Wisconsin Regional Primate Research Center currently comprises four buildings in Madison. The main Center building on the University of Wisconsin campus and the Breeding Research Facility in nearby Vilas Park Zoo went into operation a decade ago. Since then, some of the Center's activities have expanded to the Primate Laboratory and the Center Annex--both adjacent to the main Center building. In 1971, Dr. Robert W. Goy assumed the directorship of the Center, which today employs about 150 persons. Operation of the Center is funded by the Animal Resources Branch, Division of Research Resources, National Institutes of Health. Research projects are funded by federal grants to individual Center scientists.

The Center's primate colony numbers about 900, mainly rhesus monkeys (*Macaca mulatta*) but also including 90 stump-tails (*M. arctoides*) and a dozen pig-tails (*M. nemestrina*). With the rhesus breeding colony producing about 200 infants a year, the Center is nearing self-sufficiency in primates used for research. Approximately 150 of these infants are obtained from carefully timed matings so that the gestational period can be precisely determined.

The research objectives of the Wisconsin Primate Center concern basic information on behavior and reproduction of nonhuman primates. Studies of the nervous system are now being implemented to help integrate and bring greater depth to these two areas. An attempt has been made to create conditions favorable for investigating a wide variety of interdisciplinary problems while still permitting individual investigators to pursue single-discipline efforts.

In addition to the research units, the Center maintains a support staff providing veterinary, surgical, necropsy, breeding, colony management, caretaking, nursery, shop, storeroom, laboratory, administrative, secretarial, computer, library, public information, photographic, and drafting services.

The following descriptions of the core research units are indicative of the variety of the Center's activities but do not include all the investigations being conducted here by staff scientists and by visiting and affiliate scientists.

*Authors' address: Public Information Office, Wisconsin Regional Primate Research Center, 1223 Capitol Court, Madison, Wisconsin 53706. The Center's Public Information Office produces a research newsletter--*Primate Record*--which is available at no charge to anyone interested in receiving it. Requests to be added to the mailing list should be sent to the above address.

Physiology-Endocrinology

Richard C. Wolf, Unit Chief; Roland K. Meyer, Unit Co-Chief; Donald Dierschke, Associate Scientist; Samuel Sholl, Assistant Scientist.

Studies being performed by scientists in this Unit are directed toward elucidating several fundamental problems in female reproductive biology. These problems include 1) the hormonal control of implantation and maintenance of pregnancy, 2) the factors regulating growth and development of ovarian follicles, and 3) the mechanisms involved in the initiation of puberty. Each of these areas has clinical significance; in addition, data from certain of these studies will contribute to increasing the reproductive potential of nonhuman primates maintained for breeding purposes.

A major ongoing project of this Unit involves the function of the corpus luteum (CL). Previous studies here have demonstrated that the CL in pregnant rhesus monkeys shows a marked resurgence in hormonal activity just prior to parturition. Studies are in progress to determine the luteotropic stimulus causing this increased activity in the CL and to discover the significance of the CL revival.

A study was recently initiated by this Unit to investigate various aspects of placental function, especially the secretion of progesterone, estrogen, and monkey chorionic gonadotropin (MCG) in ovariectomized pregnant animals.

Data from another study by Unit personnel support the hypothesis that the blastocyst is the source of MCG, which prolongs the life of the CL during preimplantation and implantation stages.

Another study by Unit scientists is designed to observe, by means of laparoscopy, the progression of follicular growth and development in a variety of normal and experimentally induced conditions in monkeys. These observations will be correlated with patterns of circulating hormones as determined by radioimmunoassay. The goal is to discover the endocrine mechanisms involved in folliculogenesis.

A long-term project has been started to investigate the endocrine regulation of puberty in rhesus monkeys. Patterns of pituitary and gonadal hormones in the peripheral circulation are being related both to ovarian activity (as determined by laparoscopy) and to the development of external characteristics of puberty. In addition, the effect of placing bilateral lesions in the anterior hypothalamus on inducing sexual precocity in monkeys is being studied.

Physiology of Gonadotropins

William E. Bridson, Unit Chief.

Developmental changes in the synthesis and release of pituitary

hormones related to reproduction are being studied by this Unit. In particular, Unit scientists are trying to find out what causes fluctuations of these hormones--momentary "spikes" as well as periodic changes over circadian (24-hour) and menstrual cycles. The role of pituitary hormones in controlling the onset of puberty is another primary concern.

A number of approaches are being used to solve these problems. At the cellular level, investigators are looking at mechanisms which mediate changes in the pituitary and hypothalamus caused by steroids. The focus here is on proteins inside and outside the cell which act as binding sites for steroids. These receptor proteins, specific for different steroids, may work to maintain a complex equilibrium through feedback control systems.

To determine the broader effect of the central nervous system on pituitary function, Unit scientists are studying the interaction of steroids and neurotransmitters at sites in the hypothalamus. Attempts are being made to influence gonadotropin secretion through steroid implants and lesions in the hypothalamus, and through manipulation of metabolic pathways. Radioimmunoassay and polyacrylamide gel electrophoresis are techniques used to quantify gonadotropins and determine their physical and chemical characteristics at various stages in development.

Neural Ultrastructure

Ann-Judith Silverman, Unit Chief.

This Unit is interested primarily in the structural localization of those neurons which elaborate the hypothalamic hormones, the morphological correlates of release of these hormones, and the neuronal connections which control release and/or synthesis.

Ongoing projects include development of immunocytochemical techniques for the light and electron microscopic localization of neurophysin (a group of proteins made in conjunction with oxytocin and vasopressin in the paraventricular and supraoptic nuclei) and LRF (luteinizing hormone releasing factor) in guinea pigs. It is hoped to combine this technique with a study of the development of the guinea pig median eminence in order to correlate the onset of synthesis of LRF, structural contact of LRF-containing elements with the portal capillaries, and secretion of LH-FSH and gonadal steroids. Unit personnel are currently making and characterizing LRF antibody and also hope to develop a radioimmunoassay for this hormone.

Long-term goals include studies of the role of ependyma in neurosecretion and the mode of influence of catecholamines on LRF release.

Behavioral Endocrinology

Robert W. Goy, Unit Chief; David Goldfoot, Assistant Scientist; Jerry Robinson, Assistant Scientist; Samuel Sholl, Assistant Scientist.

The major objective of this Unit is to investigate endocrinological regulation of reproductive and sexually dimorphic behavior in monkeys and rodents. Secondly, the Unit is concerned with social and experiential factors which override or modify hormonal influences for the expression of dimorphic behavior. The evidence provided by such studies will furnish insights into the biological origins of masculinity and femininity of individuals, regardless of their genetic sex, and into the origins of psychosexual disorders associated with inverted relations between genotype and gender role behavior.

In an ongoing project, the effects of prenatal administration of either testosterone or dihydrotestosterone on the display of dimorphic behavior in female rhesus monkeys during the first few years of life are being observed. Their behavioral patterns are being compared with those displayed by normal males and females as well as those shown by males that are castrated at varying times following birth. The study will yield information about a possible role for estrogens derived from the metabolism of androgens in the establishment of masculine patterns of social and sexual behavior. (Although both testosterone and dihydrotestosterone are potent androgens, only the former can be converted to estrogens by living cells.)

Unit personnel are currently focusing attention on the dramatic effect of early experience on the development of male sexual behavior. Recent studies by this Unit have shown that the vast majority of males reared in a system providing daily contact with peers but in the absence of maternal influence fail to develop normal sexual behavior. These males, unlike those reared in social isolation, do not otherwise display abnormal social behavior or emotional reactions. They also differ from males reared in social isolation in that many of them cease exhibiting any sexual activity, whereas the latter type of socially deranged animals persists in displaying disoriented and inappropriate sexual responses. In short, males reared with frequent peer contact seem to develop strong inhibitions to the display of sexual behavior. The possibility that this inhibition is a result of disturbed dominance and aggressive relations to peers is being investigated.

In a variety of investigations employing biochemical and behavioral techniques, Unit personnel are studying the relationship between cyclical sexual behavior and hormone levels during the menstrual cycle as well as during seasonal changes for both males and females in two macaques species.

Work has also been initiated on the metabolism and biotransformation, during embryological differentiation, of steroids involved in the determination of behavioral sex differences. Particular attention is being paid to

the age at which the fetal male and female gonads develop the capacity to synthesize those steroid hormones characteristic of the adult.

Neurochemistry

Gary Davis, Unit Chief.

The Neurochemistry Unit is investigating the effect of female sex hormones on brain chemistry and behavior. Scientists are trying to find out how hormones affect the synthesis of protein in the brain and how these proteins, in turn, affect behavior. Possible changes in enzymes, a special class of proteins, are also being studied.

One set of experiments is designed to see if estrogen has an effect on protein formation in rat brains. Females whose ovaries have first been removed receive a dose of estradiol benzoate. The hypothalamic portion of the brain is then removed and examined for any change in the rate at which leucine, an amino acid, is taken up to form protein. As measured so far, the influence of estrogen is strong in certain brain areas. Future experiments will focus on the protein fraction thought to control RNA synthesis.

Another approach is to find out whether behavioral changes induced by hormones depend on protein synthesis. Progesterone under some conditions can inhibit the display of lordosis in guinea pigs. Unit scientists have shown, however, that if cycloheximide is injected in the hypothalamus to block the formation of protein, normal estrous behavior again occurs. Progesterone seems to require protein synthesis for at least one of its effects. Scientists are working to pinpoint the proteins involved.

The study of hormone-enzyme interactions is centered on adenylyl cyclase, which may be a receptor for neurotransmitters. Preliminary results suggest that estrogen can alter the sensitivity of this enzyme to both norepinephrine and dopamine and so influence behavior. New assay techniques for cyclase will aid in future experiments.

Primate Communication

Gordon R. Stephenson.

Communication and social control in primate social groups is being investigated by this group. In order to develop a coding scheme for behavior of this kind, scientists have studied courtship in a wild-caught rhesus troop. The result is an elaborate keyboard recording system which permits the observer to break down each event into sender, signal, and receiver. A current study concerns the social use of space during the mating season as a function of rank.

Experimental Pathology

James R. Allen, Unit Chief.

The effects of selected environmental contaminants that are highly toxic and potentially carcinogenic, mutagenic, and teratogenic are being studied. The chlorinated aromatic hydrocarbons--particularly the polychlorinated biphenyls (PCB's), triphenyls (PCT's), and dioxins--have been shown to cause widespread deleterious effects in man and other animals. Research in this Unit is aimed at determining (1) effects on primates of low level exposure to PCB's and dioxins, thereby permitting a more thorough understanding of the lesions that may develop in humans exposed to similar levels of these compounds; (2) how PCB's and dioxins (and/or their metabolites) act on specific tissues and organs, with particular reference to their interaction with cellular macromolecules; (3) the metabolic fate of these compounds; (4) effects of PCB's and dioxins on reproduction, especially on conception, embryogenesis, and fetal development; (5) the rate of recovery of animals that are chronically intoxicated with PCB's once exposure to these compounds has ceased; and (6) the safety of presently accepted maximum levels of PCB's in human food products.

Pyrrrolizidine alkaloids are present in a variety of plants throughout the world and frequently contaminate human food supplies. They have been shown to produce quite diverse effects--including hepatic cirrhosis, veno-occlusive disease, Budd-Chiari syndrome, neoplasia, pulmonary hypertension, and congestive heart failure--on the tissues of man and other animals. The goal of the present pyrrrolizidine alkaloid research being conducted by this Unit is to determine how these alkaloids and their metabolites produce alterations in the hepatic parenchymal cells. These tissue modifications are sufficiently great to cause a near complete inhibition of cell division without altering DNA synthesis and under different circumstances to be capable of causing malignant hepatomas as well as neoplastic changes in other tissues of the body.

Psychochemistry Unit

Robert E. Bowman, Unit Chief; Arthur Flangas, Associate Scientist.

This Unit is conducting studies on (1) brain RNA metabolism related to behavioral experiences, (2) adrenocortical functions related to behavioral parameters in monkeys, (3) effects of stimulant drugs in facilitating discrimination learning, (4) behavioral effects of destroying NE neurons of the brain by 6-hydroxydopamine, (5) behavioral alterations of low levels of lead in monkeys, and (6) biophysics of the brain.

Unit scientists are continuing to investigate alterations in hippocampal RNA metabolism in rats learning spatial reversals. They have found that several successive reversals over an hour--or a single reversal of 15 minutes duration--produce increased incorporation of tritiated precursor

(cytidine) into hippocampal RNA, while other changes suggest that increased RNA synthesis occurs. In this project, studies have begun on RNA synthesis of brain tissue *in vitro*.

The Unit is in the midst of a study of the role of corticotropin in the Kamin effect by manipulating levels of this hormone immediately prior to training and at 2 and 24 hours post-training in hypophysectomized rats receiving replacement injections of corticotropin.

Unit investigators have found that Metrazol (pentylene-tetrazol) in the proper post-trial dose facilitates subsequent pattern-discrimination learning in monkeys. They are currently attempting to determine the optimal injection times after a trial for Metrazol to produce the maximum learning facilitation.

In a study of monkeys injected with 6-hydroxydopamine, 70 percent destruction of NE neuron stores in the brain occurred. The behavioral effects of this treatment included alterations in food appetite, reduced visual exploration, a transient increase in body weight followed by weight loss and maintenance at 80 percent of controls, and an initial decline in locomotor activity followed by a permanent elevation of this parameter above controls.

Infant monkeys fed low levels of lead (below amounts producing overt clinical symptomatology) for the first year of life are being tested on a variety of behavioral measures over the first three years of life. Data to date indicate alterations in motor activity, reversal learning, emotionality, and social behavior.

Another integral goal of this Unit has been development and application of centrifugal procedures for separation of neuronal and glial elements from the brain, thereby permitting identification and elucidation of the metabolism of these two basic cellular types.

Psychology: Learning Unit

John Davenport, Unit Chief.

This Unit is concerned with the behavioral consequences of early hypothyroidism and early hyperthyroidism in monkeys and rats as well as with motivational effects of thyroid alterations in adult animals. In addition, contributions to conventional learning-motivational research have emerged as spinoffs from the Unit's thyroid studies.

Interest in motivational effects of thyroid alterations stems from studies which have correlated adult human hypothyroidism, depressed mood states, and cognitive disturbances on one hand and emotional instability, mental confusion, and hyperthyroidism on the other. This area also merits further research because of recent suggestions that synthetic thyrotropin releasing hormone (TRH) has rapid antidepressant

effects and that triiodothyronine (T_3), thyroxine (T_4), and perhaps TRH interact with catecholamines at brain sites thought to play a role in behavioral arousal, reward systems, affective disorders, and utilization of intelligence.

The Unit has confirmed that thyroid deficiency around the time of birth delays maturation of the affected animal and induces irreversible deficits in learning capacity, and has shown how these enduring deficits depend on such factors as the degree of perinatal thyroid deficiency and the timing (critical period) of the deficiency. Work is thus progressing toward defining a rhesus monkey model of cretinism.

Another analogy to human hypothyroidism is the observation, in early-hypothyroid monkeys and rats, of a tameness seemingly similar to the widely reported "amiability" of cretin children. Animal-human parallels in personality traits, as well as in intellectual functioning, are therefore developing from the investigations of this Unit.

Studies by personnel of this Unit with hyperthyroid neonates, which display early maturational acceleration but subsequent long-term learning deficits, raise new questions about the intellectual fate of human infants rendered temporarily hyperthyroid before and after birth by transplacental passage of long-acting thyroid stimulator.

New Personnel

Recent additions to the research staff include Dr. Ei Terasawa, who has interests in neural correlates of ovulation, pituitary activation, and behavior. As head of the Neurophysiology Unit, Dr. Terasawa will be concerned with studying the control mechanisms of gonadotropin secretion, especially the role of the hypothalamus and limbic structures in reproductive cycles. Also, Dr. J. Stephen Gartlan arrived on June 1 to head the new Primate Ecology Unit. Dr. Gartlan will be doing field work in Africa as well as observing troops at the Center's zoo facility.

*

*

*

PRIMATE MATERIAL WANTED: *PAN TROGLODYTES* HEADS OR BRAINS

Adult male or female heads, or intact brains, of chimpanzees sacrificed in non-neurological experimentation.--Charles D. Laughlin, Jr., Senior Fellow, Institute of Neurological Sciences, School of Medicine, University of Pennsylvania, Philadelphia, Pa. 19104.

PERINATAL BEHAVIOR AND PARTURITION OF A COLOBINAE,
PRESBYTIS ENTELLUS ENTELLUS (HANUMAN LANGUR)

Jim McKenna

University of Oregon

Parturition in nonhuman primates is seldom observed by behavior researchers. Several factors contribute to this problem. As Jolly (1972) points out, proportionately more anthropoid births are nocturnal; in addition, many primate investigators have discovered that during the last stages of labor, females prefer social obscurity from both conspecifics and watchful investigators.

In the sense that animals are within observational range more often than not, enclosed research colonies increase the chances that parturition can be observed and the process documented. Studying a research colony of 17 Hanuman langurs (*Presbytis entellus entellus*) at the San Diego Zoo, I witnessed the diurnal birth of a male to a 9-year old multiparous female. The birth occurred at 8:22 in the morning not eight feet away from me.

Observations of the event commenced just 16 minutes before birth. At that time no discharge substances were observed on the perineum of the pregnant female; nor were any observed on the enclosure floor. In the company of a 2-year old juvenile female, the pregnant female approached slowly on all fours to a point approximately 3 feet from the enclosure mesh, stopped, and while standing on three limbs inserted her left index finger into her vulva; after feeling the region for 3 to 4 seconds she brought the finger to her mouth and sniffed continuously for approximately 5 seconds. While standing in this position, the vulva expanded suddenly while a non-blooded mucous flowed out; the female once again reached back to feel the region placing her left fingers into the opening. While crouching low to the ground, forelimbs abducted and head forward and down, the vulva opened wider while the female bobbed her head, glanced backward and felt the perineum region.

At the conclusion of these behaviors (3 minutes later) the pregnant female layed on her left side, spread her legs far apart and continuously inserted her fingers as if massaging the vulva. A contraction could be seen and only seconds later a brown crest protruded slightly from the opening. While the fetus emerged with its head directed toward the floor of the enclosure the mother held it gently, not so much pulling but gently guiding. During the last contraction three-quarters of the infant could be seen; the mother stood up, crouched low on all fours then reached back to continue to guide the emerging infant. During the last 8 minutes,

Author's address: Department of Anthropology, University of Oregon,
Eugene, Oregon 97403.

blood and mucous covered the infant and the vulva area. Neither the mother nor the infant vocalized or exhibited facial expressions at the moment of birth.

For at least the first three minutes after birth the neonate's eyes were closed. The umbilical cord appeared wrapped around the infant's cervical area. For approximately 15 seconds the infant lay untouched by the mother on the enclosure floor. During the short interim, two juvenile females approached, smelled the infant but were immediately threatened by the mother who quickly snapped the infant to her chest. The infant was held high with two arms, smelled, genitally inspected and licked. Shortly after (1 to 2 minutes) the infant vocalized and began to nurse.

Three minutes following birth the placenta was expelled. The mother examined, handled, smelled, licked, bit and chewed the materials sporadically until it was totally consumed approximately seven hours later. Other individuals of the group licked the placenta but only two juvenile females were seen to taste the substances.

As described by Jay (1962) and Yoshida (1968) infant care-taking or sharing is an important aspect of langur social life. Although seconds following birth the mother denied others social access to the infant, only 15 minutes later an exchange occurred. A three-year old juvenile female held the infant for three minutes before the mother non-coercively retrieved it.

The fact that during the birth process the entire group appeared tense and excited is also of interest. I was continually threatened by juvenile females who approached the mesh squealing and biting the air. Alert facial expressions were observed on individuals of all age and sex groups. Juvenile females fought over favorable sitting positions near to the emerging fetus; juvenile males squawked and grimaced whenever they approached the mother. Adult females intensely observed the process as did the adult male who jerkedly paced from one side of the enclosure to the other.

The comparative behavior and physiological aspects of primate parturition are fascinating and can lead to important insights into the nature of taxonomic similarities and differences. It is hoped that as more cross-specific data is obtained, it will be published speedily.

References

- Jay, P. Aspects of maternal behavior among langurs. *Annals of the N. Y. Academy of Sciences*, 1962, 102(II), 468-476.
- Jolly, Alison, Hour of birth in primates and man. *Folia primatologica*, 1972, 18, 108-121.

Yoshida, K. Local and intertroop variability in ecology and social behavior of Common Indian langurs. In P. Jay (Ed.), *Primates: Studies in Adaptation and Variability*. New York: Holt, Rinehart & Winston, 1968. Pp. 217-242.

*

*

*

COST ANALYSIS AND RATE SETTING MANUAL FOR ANIMAL FACILITIES

A 109-page manual, designed to help improve financial management of animal resource facilities, has been produced by the Animal Resources Branch of the Division of Research Resources, National Institutes of Health (NIH), in cooperation with the Association of American Medical Colleges (AAMC). Entitled *Cost Analysis and Rate Setting Manual for Animal Resource Facilities*, the new publication is intended to aid laboratory animal facility directors and administrators in establishing realistic charge rates for animal care and related services, and justify them to investigators using the facilities and their sponsoring agencies. The manual sets forth procedures by which institutions can analyze animal care costs. In addition to being basic to rate setting, this can be of value in identifying areas where costs might be reduced and also an aid in budget formulations and in the general administrative management of an animal resource. Methods of using the analysis in all of these areas are discussed. Because it was recognized that many animal resource facilities were experiencing difficulties in obtaining the necessary financial support, a committee composed of NIH and AAMC laboratory animal facility and financial management experts was formed to draw up representative guidelines for animal resources. These guidelines were field-tested in nine institutions of different sizes and characteristics, and found to be workable and useful.

Single copies of the manual may be obtained free of charge from the Animal Resources Branch, Division of Research Resources, National Institutes of Health, Bethesda, Md. 20014.

*

*

*

TWO CHIMPANZEES FOR SALE

Two male chimpanzees, approximately 12 years old. The animals have been used only for the raising of antisera against tissues of other chimpanzees. Overcrowding of the primate facilities at this Center necessitates their sale (for any reasonable bid). The animals should not be used for mutilating or terminal experiments.--Contact: Mr. J. E. Brinkert, Primate Center TNO, 151 Lange Kleiweg, Rijswijk (ZH), the Netherlands.

GIBRALTAR COIN DEPICTS MONKEY

Various countries have issued postage stamps depicting apes, monkeys or prosimians. Gibraltar is probably the first country in history to issue a coin commemorating a nonhuman primate. The 1971 twenty-five new pence coin shows on the front a Gibraltar ape, *Macaca sylvana*, seated on rocks. The coin is four centimeters in diameter (about the size of a U.S. silver dollar) and is available in either of two metals. The copper-nickel alloy coin has a silvery appearance and was produced for circulation in the amount of 100,000. The sterling silver proof coin produced as a special presentation edition was limited to 10,000. Price in the U.S. depends upon the metal, of course, with the copper-nickel coin selling at \$3.00 and the sterling silver at \$25.00. Either would be of interest to the coin collectors among the primatologists.--Benella Caminiti, Scientific Literature Analyst, Primate Information Center, Regional Primate Research Center, SJ-50, University of Washington, Seattle, Washington 98195.

*

*

*

MORE ON PROPOSED REGULATIONS ON IMPORTATION OF INJURIOUS WILDLIFE

The Department of Interior has published the Environmental Impact Statement on Importation of Injurious Wildlife in connection with proposed regulations in importation of injurious wildlife. These regulations may affect primate imports for scientific use as discussed in the January 1974 issue (pages 20-21) of this *Newsletter*.

Copies may be obtained by contacting the U.S. Dept. of the Interior, Fish and Wildlife Service at any of the following addresses:

1612 K Street, N.W., Suite 600, Washington, D. C. 20006
P. O. Box 3737, Portland, Oregon 97208
Federal Bldg., Fort Snelling, Twin Cities, Minnesota 55111
U. S. Post Office & Courthouse, Boston, Mass. 02109
4471 N.W. 36th Street, Miami Springs, Fla. 33166
Room 2246, 18th and C Street, Washington, D. C. 20240
P. O. Box 1306, Albuquerque, N. M. 87103
17 Executive Park Dr. N.E., Atlanta, Ga. 30329
10597 West Sixth Ave., Denver, Colorado 80215
450 Golden Gate Ave. #14126, San Francisco, Calif. 94102

Public hearings are being planned for San Francisco, Kansas City, Miami, Fla. and Washington, D. C., probably in mid-July.

If you wish to be notified regarding the hearings and present views, contact: Bureau of Sport Fisheries and Wildlife, Suite 600, 1612 K Street, N.W., Washington, D. C. 20006.

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

Books

The St. Kitts Vervet. (Contributions to Primatology, Vol. 1) M. T. McGuire (Ed.) Basel:Karger, 1974. [Price: \$20.50]

This monograph is the first in a new series which will succeed *Bibliotheca Primatologica*. The monograph attempts a comprehensive discussion of the St. Kitts vervet (*Cercopithecus aethiops*). This vervet was transported from West Africa to the Eastern Caribbean over 300 years ago, where it has been living ever since, isolated from genetic infusion. Its behaviors, habitats, and history have been the topics of 4 years of intensive study by a number of investigators. The data from these investigations are extensive. Many of the behaviors seen in the East African vervet are not seen in St. Kitts. Within St. Kitts, behaviors vary as a function of biotic niche. Theoretical chapters consider these findings in relationship to 'adaptation', genetics, population dynamics, phylogenetic heritage, bi-directional influences of behavior and environment, and observed and non-observed behaviors. The authors believe that the findings from St. Kitts raise serious questions about certain concepts in primatology. Contents: I. Introduction, by M. McGuire, II. Historical, Ecological, and Population Details, by M. McGuire. III. Methods, Niches, and Basic Behaviors, by M. McGuire, M. West, R. Coppinger and D. B. McGuire. IV. Specific Behaviors, by M. McGuire, T. Berg, B. Pettit, J. Vogt, T. Whittimore, M. Stoeckle, L. Koebner, D. B. McGuire and M. West. V. A comparison between the St. Kitts and Amboseli Vervets, by M. McGuire, T. Berg, B. Pettit, J. Vogt, T. Whittimore, M. Stoeckle, L. Koebner, D. B. McGuire and M. West. VI. Population Genetics and Adaptation, by M. McGuire, F. Ervin, R. Coppinger and A. Kling. VII. Aspects of Socialization, by M. McGuire, F. Ervin, R. Coppinger and A. Kling. Conclusion, by M. McGuire.

Primate Behavior. Vol. 3. Monkeys as Perceivers. R. T. Davis. New York/London: Academic Press, 1974. [Price: \$17.00]

This is another volume in the series edited by L. A. Rosenblum. Contents of this monograph are as follows: I. Introduction. II. Attention and Observing. III. Space Perception. IV. Spatial Discontinuity. V. Barriers and Detours. VI. Form Perception.

*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. In most cases, abstracts are those of the authors.

VII. Memory for Form. VIII. Color Perception. IX. Stimulus Combination. X. Some Comments on Perception in Monkeys.

Gibbon and Siamang. Vol. 3. *Natural History, Social Behavior, Reproduction, Vocalizations, Prehension*. D. M. Rumbaugh (Ed.) Basel:Karger, 1974. [Price: \$47.50]

Somewhat more than half of the final volume of this series consists in a chapter by J. O. Ellefson describing the results of a 21-month field study of gibbons that was undertaken in the southern half of the Malayan Peninsula in 1964 and 1965. The first 5 months were spent in a general survey, and the chief aim of this period was to locate a suitable behavior study area. The following 16 months was spent studying a small gibbon population at Tanjong Triang on the east coast of the state of Johore. In addition there are chapters on Social interactions of adult gibbons (*Hylobates lar*) in an experimental Colony, by W. Y. Brockelman, B. A. Ross and S. Pantuwatana; On the thumb of the Hylobatidae, by R. Lorenz; Sound production of *Hylobates* and *Symphalangus*, by G. Tembrock.

Symposia of the Fourth International Congress of Primatology, Portland, Ore., August 1972. Vol. 1. *Precultural Primate Behavior*. E. W.

Menzel, Jr. (Ed.) Basel:Karger; 1973. [Price: \$35.65]

Contents: On the Idea of Protoculture, by E. W. Count; The Study of Infrahuman Culture in Japan: A Review, by J. Itani and A. Nishimura; Testing for Group Specific Communication Patterns in Japanese Macaques, by G. R. Stephenson; Age Changes of the Vocalization in Free-ranging Japanese Monkeys, by A. Nishimura; Influences of Phylogeny and Ecology on Variations in the Group Organization of Primates, by J. S. Gartlan; Play and Art in Apes and Monkeys, by B. Rensch; Pongid Capacity for Language Acquisition. An Evaluation of Recent Studies, by G. W. Hewes; Cultural Elements in a Chimpanzee Community, by J. van Lawick-Goodall; Implications of a Primate Early Rearing Experiment for the Concept of Culture, by C. M. Rogers; Leadership and Communication in Young Chimpanzees, by E. W. Menzel, Jr.; Dominance versus Possession. An Experiment on Hamadryas Baboons, by H. Kummer; Mamalian Social Systems: Are Primate Social Systems Unique?, by J. F. Eisenberg.

Symposia of the Fourth International Congress of Primatology, Portland, Ore., August 1972. Vol. 2. *Primate Reproductive Behavior*. C. H. Phoenix (Ed.) Basel:Karger; 1973. [Price: \$18.00]

Contents: Environmental Influences on Breeding in Rhesus Monkeys, by J. G. Vandenberg; Social and Endocrine Determinants of Sexual Behavior in Simian and Prosimian Females, by G. G. Eaton; Hormonal and Other Determinants of Sexual Attractiveness and Receptivity in Rhesus and Talapoin Monkeys, by A. F. Dixson, B. J. Everitt, J. Herbert, S. M. Rugman and D. M. Scruton; Effects of Ovarian Hormones on the Sexual Skin and Behavior of Ovariectomized Baboons (*Papio ursinus*) under Free-Ranging Conditions, by G. S. Saayman; The Role of Testosterone in the Sexual Behavior of Laboratory Male Rhesus, by C. H. Phoenix.

Symposia of the Fourth International Congress of Primatology, Portland, Ore., August 1972. Vol. 3. Craniofacial Biology of Primates.

M. R. Zingesser (Ed.) Basel:Karger; 1973. [Price: \$35.65]

Contents: The Evolution of the Masticatory System: Molar Wear Facets of Early Tertiary North American Primates, by P. M. Butler; Evolutionary Trends in the Dynamics of Primate Mastication, by K. M. Hiiemäe and R. F. Kay; Evolution of Mastication in Primates, by J. R. E. Mills. Dental Morphology and Systematics: Gorilla Dental Sexual Dimorphism and Early Hominid Taxonomy, by D. L. Greene; Reduction of the Cingulum in Ceboidea, by W. G. Kinzey; Taxonomic and Phylogenetic Uses of the Study of Variability in the Hylobatid Dentition, by J. Kitahara-Frisch; The Position of Proconsul among the Pongids, by G. H. R. von Koenigswald; Dental Variability in the Tree Shrews (Tupaiaidae), by D. G. Steele. Craniofacial Growth, Development, and Functional Anatomy: Remodeling of the Craniofacial Skeleton Produced by Orthodontic Forces, by B. Mofett; A Functional Cranial Analysis of Primate Craniofacial Growth, by M. L. Moss; The Monkey Facial Skeleton after Postnatal Surgical Experimentation, by B. G. Sarnat; A Longitudinal Study of Cephalofacial Growth in *Papio cynocephalus* and *Macaca nemistrina* from Three Months to Three Years, by D. R. Swindler, J. E. Sirianni and L. H. Tarrant; Occluso-facial Morphological Integration (*Homo sapiens*, *Alouatta caraya*, *Cebus capucinus*), by M. R. Zingesser. Appendix: Nonhuman Primates as a Resource in Craniofacial Research, by K. K. Hisaoka.

Symposia of the Fourth International Congress of Primatology, Portland, Ore., August 1972. Vol. 4. Nonhuman Primates and Human Diseases.

W. P. McNulty, Jr. (Ed.) Basel:Karger; 1973. [Price: \$21.10]

Contents: Induction of Leukemia in Monkeys with Human Leukemic Blood, by B. A. Lapin, L. A. Iakovleva, I. A. Bukaeva, L. V. Indzhiia and L. V. Kokosha; Australia Antigen, Hepatitis, and Serum Protein Polymorphisms in Nonhuman Primates, by W. T. London and B. Blumberg; Experimental Kuru in the Chimpanzee, Physical Findings and Clinical Laboratory Studies, by D. M. Asher, C. J. Gibbs, Jr., E. David, M. P. Alpers and D. C. Gajdusek with statistical analyses by D. A. Sadowsky; Nutritional and Toxic Liver Injuries in Nonhuman Primates, by M. G. Deo and V. Ramalingaswami; Experimental Glomerulonephritis, by A. S. Markowitz; Recent Advances in Arteriosclerosis and Cholesterol Metabolism in Primates, by C. B. Taylor, K.-J. Ho and L. B. Liu.

Bibliographies

Reviews and bibliographies on spontaneous neoplasia in nonhuman primates: A selected bibliography (1958-1973). Caminiti, B. B. (Primate Information Ctr., Reg. Prim. Res. Ctr. SJ-50, Univ. of Wash., Seattle, Wash. 98195) Seattle, Primate Information Center, [1974], 2 pp.

Monographs, reviews and symposia on reproduction and breeding in non-human primates: A bibliography (1960-1973) with species index. Morrow,

A. C. (Primate Information Ctr., Reg. Prim. Res. Ctr. SJ-50, Univ. of Wash., Seattle, Wash. 98195) Seattle, Primate Information Center, [1974], 9 pp.

Disease

Aeromedical review: Selected topics in laboratory animal medicine. Vol. XIV. *Zoonoses of primates.* Irving, G. W. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine, May, 1974. (Review 2-74)

Contents: Bacterial Diseases; Mycotic Diseases; Viral Diseases; Parasitic Diseases; Conclusions.

Commensals and parasites of African baboons (*Papio cynocephalus* L. 1766) captured in Rift Valley Province of central Kenya. Kuntz, R. E. & Moore, J. A. (Southwest Found. for Res. & Educ., P. O. Box 28147, San Antonio, Texas 78284) *Journal of Medical Primatology*, 1973, 3-4, 236-241.

A study of commensals and parasites of 127 *Papio cynocephalus* captured in semi-desert habitats of the Rift Valley Province, Kenya, revealed the presence of *Entamoeba histolytica* and eight other intestinal protozoa: *Entopolypoides* sp. in peripheral blood; two species of lung mites (*Pneumonyssus mossambicensis*, *P. santos-diasi*); six nematodes (*Abbreviata caucasia*, *Enterobius brevicauda*, *Oesophagostomum bifurcum*, *Streptopharagus baylisi*, *S. Pigmentatus*, and *Trichostrongylus*); and one cestode (*Bertiella studeri*).

Facilities and Care

Importation of cynomolgus monkeys: A review. Kawanishi, Y. (Res. Prim., Ltd., No. 13-8, 2-chome Matsugaoka, Nakano-ku, Tokyo, Japan) *Experimental Animals (Tokyo)*, 1973, 22, 365-375.

Users in Japan have to quarantine and condition monkeys newly arrived from abroad at their own facilities. Monkeys are imported and distributed by three trading companies and several animal and bird dealers. The number of monkeys imported by these importers was 3,991 in 1962 and 11,075 in 1970. It is not clear how many monkeys of those imported have been used for biomedical purposes, but it is estimated to be only about 2,000 head per year in Japan. Quite a number of monkeys unqualified for biomedical purposes are included in most shipments from abroad and these animals are killed. The nutritional condition of the animals is poor on arrival, and it appears that this is partly the result of treatment during the handling period in exporters' compounds after catching. The biggest problem in securing a supply of good quality cynomolgus and other monkeys for biomedical purposes is that there is no proper system for advancing cooperative relations between all parties--trappers, middlemen and exporters--concerned in the supply of these monkeys. Each party works separately with no cooperation between them.

Breeding

Breeding tupaia (*Tupaia belangeri*) in captivity. Schwaier, A. (Battelle Institute, Am Römerhof 35, 6000 Frankfurt/Main, West Germany) *Zeitschrift Versuchstierkunde*, 1973, 15, 255-271.

Nomenclature and classification of the animals of the author's colony are discussed. The designation as *Tupaia belangeri* (chinensis group, Lyon 1913) was based on the number of chromosomes, nipples, body size and weight and skull measurements. A newly developed pelleted standard diet was fed. Special attention was paid to achieving low environmental and social stress. The size of the cages for each breeding pair was $1/2 \text{ m}^3$. The cages were equipped with a nest and a sleeping box, attached to the cage by tubes 1 m in length. The pairs were left together all the time and developed permanent pair ties. Females were fertilized during post-partum heat. 17 breeding cages were available. 15 females out of 17 became pregnant and had regular births. A 48 h nursing rhythm and a 25% fat content of tupaia milk was confirmed. Within 6 months 55 litters were born with 123 young, 62 animals, i.e. 50% survived to weaning age. The mean number of young per litter was 2.2 and the average weight of young at the age of 30 days was 105 g. The normal gestation period, i.e. 80% of birth intervals, was 41 to 45 days. No birth intervals of 46 to 51 days were found. The data suggested a 10-day estrus cycle. Pronounced individual differences, especially with regard to behavior, permit selection of the most suitable animals for future breeding.

Ecology and Field Studies

The distribution of the white-collared mangabey, *Cercocebus torquatus*, in Nigeria. Schlitter, D. A., Phillips, J. & Kemp, G. E. (African Mammal Project, Div. of Mammals, Smithsonian Institution, Washington, D. C. 20560) *Folia primatologica*, 1973, 19, 380-383.

In spite of the assiduousness of primate studies in Africa, the taxonomy and distribution of many species are poorly known. Specimens from critical areas are lacking and due to the destruction of forests and changes in habitats, prospects for obtaining additional specimens are especially bleak. The distribution of the white-collared mangabey, *Cercocebus torquatus*, is shown to extend westward as far as the Igangan Forest Reserve near the Dahomey border in southwestern Nigeria. Additional Nigerian specimens deposited in the British Museum (Natural History) are reported for the first time. Neither the Cross nor Niger Rivers seem to have any effect on the distribution of *Cercocebus torquatus* in Nigeria.

ADDRESS CHANGES

H. L. Amyx
Frederick Cancer Res. Lab.
NINDS, Bldg. 567
Ft. Detrick
Frederick, Md. 21701

Major Dan J. Craig
WHMC/SGVM
Lackland, AFB, Tex. 78236

Jack C. Dacre
Env. Quality Div.
US Army Med. Bio. Res. & Dev. Lab.
Fort Detrick
Frederick, Md. 21701

Roger Hoppes
1416 Cherrydale Dr.
San Jose, Calif. 95125

S. M. Kruckenberg
2851 Oregon
Manhattan, Ks. 66502

Hans-Jurg Kuhn
Anatomisches Institut
34 Gottingen
Kreuzbergring 36
W-Germany

Luis Melendez
Pan American Hlth. Org.
Dept. of Human & Animal Hlth.
525 23rd St. N.W.
Washington, D. C. 20037

Desmond J. Morris
Dept. of Zoology
Animal Behaviour Res. Grp.
South Parks Rd.
Oxford OX1 3PS England

Melvin Neville
Dept. of Anthropology
Univ. of Calif.
Davis, Calif. 95616

Robert S. Runkle
Dir. of Admin./Fac.
Huntingdon Res. Ctr.
Huntingdon, PE18 6ES
England

Ronald C. Simons
Dept. of Anthropology
Univ. of Calif., Berkeley
Berkeley, Calif. 94720

Euclid O. Smith
Yerkes Reg. Prim. Ctr.
Field Station
2409 Collins Hill Rd.
Lawrenceville, Ga. 30245

Leslie E. Sponsel
166 West Roberts Rd.
Indianapolis, Indiana 46217

Jack T. Stern
Dept. of Anatomical Sciences
Health Sciences Ctr.
SUNY at Stony Brook
Stony Brook, New York 11790