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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. 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* (see Editor's Notes, July, 1966 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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We thank the San Diego Zoo for permission
to reproduce the cover photograph
of a proboscis monkey (*Nasalis larvatus*)

Managing Editor: Helen Janis Shuman

CONTENTS

A NOTE ON SEX DIFFERENCES IN LEARNING OR MOTIVATION IN NONHUMAN PRIMATES

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Several behavioral primatologists, including the present writer, have published articles which have specifically stated or suggested that male nonhuman primates are more vulnerable to adverse early experiences and/or early social deprivation than are female nonhuman primates (Mitchell, 1970; Sackett, 1974). This hypothesis has rarely been questioned since it is in general agreement with findings of greater male vulnerability in other areas of biological development (e.g., in effects of early lesions of the prefrontal orbital cortex [Goldman, 1975]; in incidence of prematurity [Sackett *et al.*, 1974]; in infantile autism [Rimland, 1964]; and in prenatal abnormalities [Macoby & Jacklin, 1974]).

However, because it is linked with greater susceptibility to environmental variables, the greater behavioral vulnerability of male primates has often been used as evidence that they are less "pre-wired" or are more "plastic" than are female primates. Once one accepts such a notion, it is but a short step to an assumption of a greater learning capacity for males than for females. But there is, in fact, little or no evidence to support this. Greater vulnerability does not necessarily mean greater learning capacity.

The present paper is intended to point out what little data there are on sex differences in learning among nonhuman primates. In addition, a plausible alternative to differences in flexibility and learning capacity in males as an explanation of differential vulnerability will be presented.

In searching the recent primate literature for references to sex differences in learning and performance, I was able to find about 25 articles. The behaviors measured included habituation to humans, delayed response and delayed alternation, sand digging, tool use, reversal learning, delayed matching-to-sample, food catching, subculture propagation, learned infant care, use of inanimate objects, learned bipedalism, and visual self-stimulation.

Aarons (1973) briefly mentioned that a female rhesus "showed the least progress" when the experimenter attempted to shape monkey-human contact. However, all other studies involving the learning of new skills, use of tools, etc. found either no differences between males or females or reported that females are superior to males in acquisition or in performance. For example, in an experiment measuring visual

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self-stimulation in a socially-living group of rhesus monkeys, Wilcoxon *et al.* (1968) reported that only five of 22 animals worked consistently at pressing buttons to visually self-stimulate. Of these five, four were "young, mature, middle-status females without infants, and not in estrus" (p. 266). In the Koshima troop of Japanese macaques *(Macaca fuscata)*, Kawai (1967) threw sweet potatoes into the troop and reported that many more females than males learned to catch them before they hit the ground (predominantly left-handed). Kawai explains this difference by saying that the dominant males did not have to learn to catch and that the peripheral males were kept away by the leaders. However, Rose (1976) has reported that female olive baboons *(Papio anubis)* use bipedalism more frequently in feeding than do males, and his study did not involve catching behavior. Thus, it may be that there was more involved than dominance or social inhibition of the males in the sex difference of Kawai's study.

Ellis (1975) found no sex differences in tool use in a very small group of orangutans at the Oklahoma City Zoo and Menzel (1972) found no sex differences in a group of young chimpanzees in regard to "spontaneous invention of ladders". However, McGrew has twice noted that females in general (or a particular female) were more effective than males with tools. In one study (McGrew & Tutin, 1973), he reported that more female chimpanzees than males used a tool to groom another's teeth (dental grooming) and in another study (McGrew, 1974) he noted that an old female was the most effective in using a tool to feed upon driver ants.

Three studies have reported superior performance by females during stringent laboratory learning studies. McDowell *et al.* (1960) found female rhesus monkeys to be better than males at spatial delayed response and Blomquist (1960) reported a similar sex difference for this species. In chimpanzees, a superiority of females over males in delayed matching-to-sample accuracy was established, and this sex difference was exhibited over an extended period of time using 7 females and 10 males under two different retention intervals (Grilly, 1975).

In a task related to delayed response, but observed in the field (Tsumori, 1966), females again performed better than did males. During a sand digging test for Japanese monkeys, in which a reward was buried at different depths (hence with a different delay), almost all adult females showed more enduring attention than the males to the test situation, even when they failed (Tsumori, 1967). This sex difference, however, was not as much in the cue-producing or cue-retaining processes as it was in motivational processes. The female superiority could be generalized to more than one troop.

It is possible that this difference in duration of attentiveness to the more proximal environment evolved because the role of troop protector and guardian, typically a role for the primate male, demands attention to the distal environment for detection of predators or neighboring troops (Ripley, 1967). A task involving a more distant cue

and incentive might produce opposite results.

In social learning, too, female Japanese monkeys have demonstrated an advantage. Kawamura (1963) has reported that males (particularly subordinate peripheral males) are the last to pick up new food eating habits (such as candy eating) during the process of sub-culture propagation. Moreover, if infant-care behavior is as dependent upon experience as some recent researchers have suggested (Arling & Harlow, 1967; Lancaster, 1971; Poirier, 1973; Scollay *et al.*, 1975; Seay, 1966) then the so-called "maternal instinct" may not be as much "instinct" as very facile learning, a behavior more "canalized" (Fishbein, 1976) in females than in males. In any case, the predisposition of females to learn maternal behavior is seen in many research reports.

What does all of this mean as far as the vulnerability differential is concerned? With regard to susceptibility to early deprivation it may mean that females simply adjust faster following deprivation or it may be that females are better at social learning. On the other hand, a differential maturation rate in the central nervous system may be involved in the greater vulnerability of males. The fact that orbital prefrontal lesions affect reversal learning in male rhesus more than females at 50 days of age but that the same lesions in adulthood produce no sex differences suggests that differential maturation rate may indeed be a factor (Goldman, 1975; Kershner & Emanuel, 1976).

In any case, the behavior of captive and (even) isolate-reared female nonhuman primates is, in fact, "closer to that of their wild-living counterparts" (Tutin & McGrew, 1973) than is the behavior of deprived males. Whether this is because "females learn faster than males" or because "males are more plastic than females" can be debated. My own preference is to accept neither of these explanations. While the above somewhat selected studies have shown that a case can be made for superior learning ability in the female nonhuman primate, far too few studies on far too few species have been published to generalize to the entire order.

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INVENTORY OF AGED CHIMPANZEES

Chimpanzees may be useful for the study of aging. For this reason an inventory of aged chimpanzees in the U.S. is being compiled. If your animal collection includes a chimpanzee aged more than 30 years, please send relevant information including known or estimated dates of birth and of acquisition, sex, and name of responsible official and address to: Dr. Charles E. Graham, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322.

CENSUS OF ORANGUTAN BIRTHS IN THE UNITED KINGDOM: 1961-1976

A. P. Verstraete

Croydon, Surrey, England

Pongo pygmaeus abelii (Sumatran)

Bristol: Oscar, 4-22-1971; Henrietta, 8-20-1972; female, 4-29-1975; all mother reared.

Jersey: Tunku, female, 4-6-1972; Timor, female, 11-23-1975; both mother reared.

Total alive five; parent populations pairs in both cases.

Pongo pygmaeus pygmaeus (Bornean)

Belle Vue (Manchester): female, 11-15-1972, mother reared. Another female born previous to this died during hand rearing.

Bristol: James, 6-20-1972, mother reared. Father now dead and mother to Dublin.

Chester: Male, Rajang, 6-14-1968, hand reared, parents now dead. Female, Judi, 2-12-1974, mother reared; male, Sibu, 1-30-1976, hand reared, mother different than Judi's.

Jersey: Male, premature, 3-25-1968; Surabaya, female, 4-15-1971, mother reared. Father of these two died and female paired to a new mate which resulted in a male born 3-17-1975 which was killed by the father.

London: Female, Bulu, 3-12-1961, first surviving orangutan birth in the U. K., parents now dead. Male, born dead, 1-22-1970; male, born dead or killed by another female, 4-25-1970; female, found dead 4-13-1971; one animal, 1-12-1973 died after two weeks during hand rearing. Live births: female, Suka, 6-21-1971; male, Jantan, 5-30-1974; male, Laki, 8-16-1974; male, Anak, 1-26-1973; and female, Betina, 7-10-1975; all mother reared except Suka who was hand reared.

Twycross: Male, Kaya Kaya, 4-21-1973; female, Kupo Kupo, 12-13-1974; female, Lotus, 4-17-1975; male 7-7-1976; all hand reared.

Total alive 16. Parent populations: Belle Vue 1-2, Bristol 1-1, Chester groups 3-4, Jersey 1-1, London five young females but all

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except one birth was sired by same male now dead, the other birth occurred in a group of mixed sexes. Twycross 2-2.

Pongo pygmaeus (Sumatran-Bornean Hybrids)

Dudley: Female, Kumang, 9-12-1969; mother reared; male, Anak, 2-9-1973; mother reared.

Flamingo Park (Malton) Male, Cody, 6-1973; hand reared.

London: Female, Sayang, 12-10-1971; sired by Gambar, male, Sumatran, now at Jersey.

Total alive now four. Parent populations: pairs at Dudley and Flamingo Park, one male and two females at London.

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WORKSHOP ON PRIMATE PARASITES: SERIES I

The Primate Parasite Registry of the California Primate Research Center (CPRC), University of California at Davis, will offer a series of workshops on primate parasites. The workshops are primarily designed for veterinarians and other professional personnel working in primate biology or medicine. The first of these workshops, devoted to nematodes, will be held at the CPRC, Monday through Wednesday, May 2, 3, and 4, 1977. This workshop immediately precedes the Primate Veterinarians' Workshop to be held at Portland, Oregon on Thursday and Friday, May 5 and 6, 1977. Participants who wish to attend both of these workshops could fly from Sacramento, via United Airline flight #792 leaving at 4:05 p.m. and arriving at Portland at 5:20 p.m.

The workshop, conducted by a team of parasitologists and clinicians, will consist of lectures and laboratories, with the opportunity for individual study. Topics will include classification, morphology and life cycle of primate nematodes, as well as clinical manifestations and treatment of infections caused in the host. Attendance will be limited to 10, on a first-come first-serve basis. There are no fees or registration charges for the workshop but the participants will be responsible for their own transportation to Davis and for their living expenses.

For further information and registration, contact the Primate Parasite Registry, California Primate Research Center, University of California, Davis, CA 95616, or phone 916-752-0440 or 916-752-0919.

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OFFICERS OF THE INTERNATIONAL PRIMATOLOGICAL SOCIETY ELECTED

The following were elected officers of the International Primatological Society at the meeting in Cambridge, England, August 23-27, 1976. Their terms run for four years, beginning January 1, 1977.

President:
Dr. William A. Mason
Dept. of Psychology
University of California
Davis, CA 95616, USA

Vice President (Breeding & Supply):
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Regional Primate Res. Ctr.
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Primate Laboratory
22 N. Charter St.
Madison, WI 53706, USA

Secretary for Europe:
Dr. Wolfgang Maier
Zentrum der Morphologie
Theodor Stern Kai 7
6000 Frankfurt a.M., BRD

Applications for membership in the Society should be addressed to the Secretary for Membership and Information.

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CRITERIA FOR RESEARCH PROPOSALS USING NONHUMAN PRIMATES RECOMMENDED BY GOVERNMENT GROUP

Criteria for reviewing or developing research proposals using nonhuman primates, which are in short supply, have been developed by the Interagency Primate Steering Committee, a committee composed of representatives of seven components of the Federal government.

The Interagency Primate Steering Committee, originally established in 1974 by the Assistant Secretary for Health, HEW, coordinates and represents the combined interests of the government in the supply, use, and conservation of nonhuman primates.

The Committee has recommended the following criteria be used by all government agencies that conduct or support bioscientific research using nonhuman primates--animals which are essential in biomedical research, biologics production, and testing compounds for toxicity.

The criteria are that (1) the research proposed can be done best with primates; i.e., that no other known system or other kind of animal could produce comparable results; (2) the species of primate proposed is the most appropriate; and that some other more plentiful species would not be adequate; (3) the number of primates proposed is the minimum that will produce acceptable scientific results; (4) the primates will not be sacrificed during or at the end of the study except in those cases requiring termination as part of the investigation; (5) if sacrifice is deemed necessary, positive action will be taken to share body material when feasible.

Membership on the Committee includes representative from the National Science Foundation, the Department of Defense, and five HEW components: the Alcohol, Drug Abuse, and Mental Health Administration; the Center for Disease Control; the Food and Drug Administration; the Office of International Health; and the National Institutes of Health (NIH), the lead agency. Committee staff is located in Bethesda, Maryland.

Inquiries concerning the activities of the Committee should be addressed to Dr. Benjamin D. Blood, Executive Director, Interagency Primate Steering Committee, Bldg. 14G, NIH, Bethesda, MD 20014.

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SQUIRREL MONKEYS WANTED

I require adult female breeding stock, and also females of any age which are unsuitable for breeding purposes. Animals of Bolivian origin are unacceptable for this study.--Contact: Dr. Charles E. Graham, Yerkes Primate Research Center, Emory University, Atlanta, GA 30322.

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COMPARATIVE PATHOLOGY CONTINUING EDUCATION COURSE

The 4th annual Comparative Pathology Course will be presented May 9-11, 1977, at the Armed Forces Institute of Pathology, Washington, D. C. Military and federal service employees in the medical, veterinary and other medical fields are requested to consult respective agency regulations for appropriate application procedures. Civilian physicians, veterinarians, and allied scientists are invited to apply and will be considered on a space available basis. The course is specially designed to bring attention to disease processes in animals for which a similar entity occurs in man. Differences and similarities of pathologic lesions, as well as the biological behavior of specific entities will be compared in animals and man. Application forms to attend the course may be obtained by contacting: The Director, Armed Forces Institute of Pathology, (AFIP-EDE), Washington, D. C. 20306. Completed application forms should be returned by April 11, 1977. Non-federal civilians and foreign nationals are required to submit a $75.00 fee, payable to the Treasurer of the United States.

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FORMATION OF AMERICAN SOCIETY OF PRIMATOLOGISTS ANNOUNCED

A new scientific society, the American Society of Primatologists, is now being formed. The purposes of the Society are to promote and encourage the discovery and exchange of information regarding primates, including all aspects of their anatomy, behavior, development, ecology, evolution, genetics, nutrition, physiology, reproduction, systematics, conservation, husbandry, and use in biomedical research.

Any person engaged in scientific primatology or interested in supporting the goals of the Society may apply for membership in the Society. Annual dues are $12.00 except for students and those that are retired, for whom the dues are $6.00. Membership may be obtained by sending a check or postal money order, made out to American Society of Primatologists, to W. Richard Dukelow (Acting Treasurer), Endocrine Research Unit, Michigan State University, East Lansing, MI 48824.

The founding meeting of the Society will be held in Seattle, Washington, April 16-19 in the Washington Plaza Hotel and the Seattle Center, immediately after the annual meeting of the American Association of Physical Anthropologists and before the Western Psychological Association meeting. Further details of the meeting will be sent to all members.

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

Books

The New World Primates. Martin Moynihan. Princeton, NJ: Princeton University Press, 1976. 262 pp. [Price: $12.50]

The author, a Senior Scientist at the Smithsonian Tropical Research Institute in Panama, emphasizes natural history, behavior, and ecology in reviewing the New World primates. Topics covered include geographical distributions, habitat preferences, territorial arrangements, activity rhythms, feeding techniques, defense mechanisms, and competition and cooperation among individuals of the same species. Contents: NOTES ON CLASSIFICATION AND HISTORY. The order Primates; The earliest primates; The ceboids. THE SETTING. NATURAL HISTORY. Tamarins (genera *Callimico, Leontopithecus,* and *Saguinus);* Marmosets (*Callithrix* and *Cebuella);* The Night Monkey (*Aotus*); Howler Monkeys (*Alouatta*); Sakis and Uakaris (*Pithecia*); Titi monkeys (*Callicebus*); Spider monkeys and the Wooly monkey (*Ateles* and *Lagothrix*); The Squirrel monkey (*Saimiri*), Capuchin monkeys (*Cebus*). SOCIAL RELATIONS AND ORGANIZATIONS. Intraspecific behavior; Sex and aggression; Interspecific behavior. COMMUNICATION SYSTEMS. Tactile signals; Olfactory signals; Visual signals; Acoustic signals; Summary and implications for the evolution of languages. REVIEW OF CHAPTERS 1-5. COMPARABLE RADIATIONS. Lemuroids of Madagascar; Monkeys and apes of the Old World. THE DEVELOPMENT OF INTELLIGENCE.

Primate Models of Human Neurogenic Disorders. V. G. Startsev. (M. Schweinler, & V. Pahn, Trans.; D. M. Bowden, Ed. Eng. translation) Hillsdale, NJ: Lawrence Erlbaum Associates, 1976. (Distributed by Halsted Press Division of Wiley.) 198 pp. [Price; $19.50]

This book, translated from the Russian, attempts to deal both experimentally and theoretically with the question of symptom specificity in psychosomatic diseases. Why do some individuals respond to psychological stress with gastric disorders, others with high blood pressure, and so on? The experimental data on the modeling of neurogenic diseases dealt with in the book were gathered between 1961 and 1967 at the Institute of Experimental Pathology and Therapy of the Academy of Medical Sciences of the USSR in Sukhumi. Contents; I. EXPERIMENTAL NEUROSES IN MONKEYS-A REVIEW. II. IMMOBILIZATION NEUROSIS IN HAMADRYAS BABOONS. Methods; Neurotic changes in higher

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In many cases, the original source of reference in this 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. Any author wishing to have a published paper abstracted in this section may do so by sending the Editor a copy of the reprint with a summary or abstract and indicating his desire on the reprint.

nervous activity. III. AN EXPERIMENTAL MODEL OF NEUROGENIC GASTRIC ACHYLIA IN THE HAMADRYAS BABOON. Functional gastric achylia in man; Spontaneous gastric achylia in monkeys; Experimental neurogenic gastric achylia in Hamadryas baboons. IV. PRECANCEROUS GASTRIC LESIONS. Precancerous gastric lesions in man; Role of the nervous system in tumorogenesis; Spontaneous gastric tumors in baboons and monkeys; Dystrophic changes of the gastric mucosa in neurogenic gastric achylia; Adenomatous polyps in experimental neurogenic gastric achylia. V. FUNCTIONAL HYPERKINESIS AND PARALYSIS IN HAMADRYAS BABOONS. Physiological mechanism of hysteria; Spontaneous and experimental motor disorders in Hamadryas baboons. VI. EXPERIMENTAL NEUROGENIC DISORDERS OF THE SEXUAL CYCLE IN HAMADRYAS BABOONS. Normal neurohormonal regulation of the sexual cycle in primates; Relationship of the sexual cycle to other biological functions in Hamadryas baboons; Spontaneous and experimentally induced disturbances of the sexual cycle in baboons; Experimental neurogenic amenorrhea in Hamadryas baboons. VII. A CONDITIONED REFLEX MODEL OF CHRONIC HYPERGLYCEMIA. Neurogenic diabetes mellitus in humans. Spontaneous and experimental diabetes in animals; Hyperglycemic responses to immobilization in cats and baboons; Chronic experimental neurogenic hyperglycemia in Rhesus monkeys. VIII. NEUROGENIC ISCHEMIC HEART DISEASE IN HAMADRYAS BABOONS.

Socioecology and Psychology of Primates. Russell H. Tuttle (Ed.) The Hague: Mouton, 1975. (Distributed in the USA and Canada by Aldine, Chicago.) 474 pp. [Price: $29.50]

This volume contains papers that were prepared for discussion in a session at the IXth International Congress of Anthropological and Ethnological Sciences, September 4, 1973 in Chicago. Contents: SECTION ONE. ECOLOGY, DIET, AND SOCIAL PATTERNING IN MONKEYS AND APES. Ecology, diet, and social patterning in Old and New World primates, by C. M. Hladik; Habitat description and resource utilization: A preliminary report on mantled howling monkey ecology, by K. E. Glander; Social and ecological contrasts between four taxa of neotropical primates, by L. L. Klein, & D. J. Klein; Some ecological, distributional, and group behavioral features of Atelinae in Southern Peru: With comments on interspecific relations, by N. M. Durham; Comparison of the behavior and ecology of Red Colobus and black-and-white Colobus monkeys in Uganda: A summary, by T. T. Struhsaker, & J. F. Oates; Population dynamics of the Toque monkey, *Macaca sinica,* by W. P. J. Dittus; The descent of dominance in *Macaca:* Insights into the structure of human societies, by J. Loy; The influence of hormonal and ecological factors upon sexual behavior and social organization in Old World primates, by G. S. Saayman; Social behavior and ecological considerations of West African baboons (*Papio papio*), by G. K. Boese. SECTION TWO. MEAT-EATING AND BEHAVIORAL ADAPTATIONS TO HUNTING. Meat-eating and hunting in baboons, by R. S. O. Harding; The origin of hominid hunting: A primatological perspective, by A. Suzuki; Behavioral and intellectual adaptations of selected mammalian predators to the problem of hunting large animals, by R. Peters, & L. David Mech. SECTION THREE. SELF-

AWARENESS AND CAPACITIES FOR PERCEPTUAL INTEGRATION ACROSS SENSORY MODALITIES, LEARNING, SYMBOLIZING, AND INTELLIGENCE. Towards an operational definition of self-awareness, by G. G. Gallup, Jr.; Capacities of nonhuman primates for perceptual integration across sensory modalities, by C. M. Rogers, & R. K. Davenport; The learning and symbolizing capacities of apes and monkeys, by D. M. Rumbaugh. SECTION FOUR. LANGUAGE SKILLS OF APES AND THE EVOLUTION OF HUMAN LANGUAGE. Capacities for language in Great Apes, by R. S. Fouts; The language skills of a young chimpanzee in a computer-controlled training situation, by D. M. Rumbaugh, E. C. von Glasersfeld, T. V. Gill, H. Warner, P. Pisani, J. V. Brown, & C. L. Bell. SECTION FIVE. CAPACITIES FOR TOOL BEHAVIOR AND HOMINID EVOLUTION. Primate tool behavior, by B. B. Beck.

International Zoo Yearbook (Vol. 16). P. J. S. Olney (Ed.). London: The Zoological Society of London, 1976. 503 pp. [Price: hardcover--£9; softcover--£2]

The following chapters would be of special interest to primatologists; The establishment and husbandry of a black howler (*Alouatta caraya*) colony at Colombia Zoo, by L. Benton, Jr.; Birth seasons of mammals at Bucharest Zoo, by M. Cocium, & M. Cocium; A note on the captive status of the lion-tailed macaque (*Macaca silenus*) in India and its breeding at Delhi zoo, by J. H. Desai, & A. K. Malhotra; The first year in the new lemur house at Cologne Zoo, by U. Hick; Hand-rearing a ring-tailed lemur (*Lemur catta*) and a crowned lemur (*Lemur mongoz coronatus*) at Cologne Zoo, by U. Hick; Natural social structures and feeding procedures in the acclimisation of South American primates, by S. Lindbergh; Breeding and hand-rearing lowland gorillas (*Gorilla g. gorilla*) at the Jersey Zoo, by J. J. C. Mallinson, P. Coffey, & J. Usher-Smith; Prepared diets for zoo animals in the USA, by M. L. Morris, Jr.; Barrier dimensions for lions, tigers, bears and great apes, by R. T. Reuther; Maintenance and breeding of the common marmoset (*Callithrix jacchus*) with notes on hand rearing, by M. F. Stevenson; The Michael Sobell pavilions for apes and monkeys, by J. Toovey, & M. Brambell. Also of interest are the following: Species of wild animals bred in captivity during 1974 and multiple generation captive births; census of rare animals in captivity; and studbooks and world registers for rare species of wild animals in captivity.

Conditions of Awareness: Subjective Factors in the Social Adaptations of Man and Other Primates. Anthony Shafton. Portland, Oregon: Riverstone Press, 1976. Soft cover, 146 pp. [Price: $10.00 Order from: Riverstone Press, P. O. Box 40068, Portland, OR 97240]

Contents: PART ONE. GENERAL INTRODUCTION. 1. Subjectivity: A biological issue. 2. Man's animal nature: A disavowal of popular anthropomorphisms. PART TWO. PERCEPTION AND BEHAVIOR: CONSIDERATION OF THEORY AND METHOD. 3. Introduction: A critique of the dualism of ethology, which discourages inquiry into consciousness. 4. How to talk about an 'Existential Repertoire': Description of perceptual structure. 5. Hierarchical disjunctions between

perception and detailed physiology. 6. The neuronal model: Unconscious processes of deciding when to be how conscious of what. PART THREE. PERCEPTION AND STATUS. 7. Introduction: Perceptual plasticity in the evolution of higher nonhuman primate and very early hominid social status systems. 8. Social constraints upon the visual orienting response, which is also a threat signal. 9. A rank order is stabilized by effects upon perceptual development due to constraints upon orientation. 10. Primate dominance as a condition of awareness: Overcoming the hazards of change. 11. Awareness of 'Self' in hominid status behavior at the evolutionary grade of chimpanzee. 12. Rank stabilization by self-image conflict: Chimpanzee-grade dominance as a condition of self-awareness. 13. A sketch on pre-Australopithecine hominid status behavior. PART FOUR. LANGUAGE EVOLUTION. 14. Introduction: Armed hunting, the critical selective factor for Australopithecines. 15. Lethal aggression and status uncertainties: Selective pressures toward social language arose earlier than pressures toward environmental language. 16. A habitat compatible with both social language and material culture: Hominid socioecology ameliorated. 17. Specifications for an emergent social language: Culturally acquired, voluntarily emitted audible oral signals, with culture-specific, contextual social meanings. 18. Context and intention: Preadaptations for language in the expression of meaning by voluntary display. 19. From protolinguistic facial expression to audible oral language. PART FIVE. POSTSCRIPT ON THE EVOLUTION OF ART. 20. Specifications for an emergent social art form: Sharing the contextual meaning of troop affiliation, by communal orientation to mimetic stylizations of the cultural reportoire "Within a Frame of Unreality". 21. From protolinguistic, protoartistic humor to art.

Reports

Primate Population Surveys in Guyana and Bolivia. Committee on Conservation of Nonhuman Primates. Washington, D. C.: National Academy of Sciences, 1976. (This 5-page report is available in limited supply from the Institute of Laboratory Animal Resources, National Academy of Sciences, 2101 Constitution Ave., Washington, D. C. 20418)

This report summarizes the results of field surveys of primate populations in Guyana and Bolivia conducted for the Institute of Laboratory Animal Resources' Committee on Conservation of Nonhuman Primates in the summer and fall of 1975. Each field team consisted of three persons from the United States, assisted by citizens within the host country and by an additional short-term scientific advisor from the United States. The surveys were undertaken to provide the first quantitative data on the distribution and abundance of primates in these two countries. Guyana and Bolivia were chosen because they have rapidly become the two major primate exporting countries in South America. Both countries had substantially increased primate export in 1974 while several other South American nations had stopped or limited primate export.

The Jersey Wildlife Preservation Trust Eleventh Annual Report 1974. Issued by the Headquarters of the Trust at the Zoological Park, Les Augres Manor, Trinity, Jersey, Channel Islands, 1975.

This report includes the following articles, among others: Sexual cyclicity in captive orang utans *Pongo pygmaeus* with some notes on sexual behaviour, by P. F. Coffey; Aspects of captive stress as observed in the lesser mouse lemur *Microcebus marinus:* A preliminary report, by A. R. Glatson; The diagnosis of pregnancy in the lowland gorilla *Groilla g. gorilla* and the Sumatran orang utan *Pongo pygmaeus abelli,* by B. Hobson; Feeding and nutrition of the Callitrichidae at the Jersey Zoological Park, by G. King; The design of two marmoset complexes at the Jersey Zoological Park, by J. J. C. Mallinson; Application of urinary hormone determinations in the management of gorillas, by R. D. Martin, B. Seaton, & J. A. Lusty; Breeding Goeldi's monkey (*Callimico goeldii*) at the Jersey Zoological Park, by A. G. Pook; Cognitive, manipulative, and social skills in gorillas: II. The second year, by M. Redshaw; A comparative study of primate breast milk, by J. J. Taylor, & M. Tomkinson.

Bibliographies

"Yerkes--Fifty Years of Publications, 1925-1974", with supplement covering 1975-1976.

Bibliography of reprints from Dr. R. M. Yerkes and others covering a 50 year period. The cost is $2.00. Send order to: Director, Yerkes Primate Research Center, Emory University, Atlanta, GA 3032-. Make check payable to: Yerkes Primate Research Center.

Conservation

Hunting pressure on orang-utans in Sarawak. Lord Medway (Great Glenham House, Saxmundham, Suffolk IP17 1LP, England) *Oryx,* 1976, *13,* 332-333.

In Sarawak a comparatively new development is that orangutans are being hunted for food, often with great cruelty. The government is aware of the threat to the population, and special reserves are being considered. The writer points out that only a change in local sentiment will save the orangutans even in sanctuaries (they already have full legal protection) and suggests an appeal must be made to people to return to traditional ways.

Guereza monkeys: Will they become extinct in Ethiopia? Dunbar, R., & Dunbar, P. (Dept. Psychol., U. of Bristol, 8-10 Berkeley Sq., Bristol, BS8 1HH, G.B.) *Walia,* 1975, *6,* 14-15.

The so-called Abyssinian black-and-white colobus or guereza (*Colobus guereza*; formerly incorrectly known as *Colobus abyssinicus*) is found throughout eastern Africa. Regrettably, these monkeys have been extensively exploited in order to make the now famous colobus monkey rugs with which every tourist and resident in Ethiopia is familiar. The numbers being killed each year to satisfy the ever-increasing demand gives serious cause for concern for the survival of the species, not only in Ethiopia but also in East

Africa. This article outlines something of the life of guereza monkeys based on the authors' research carried out in the Bole Valley and other areas in Ethiopia, and concludes with an examination of the status of this species and its conservation prospects.

Supply

Federal regulations pertaining to collection, import, export and transport of scientific specimens of mammals. Genoways, H. H., & Choate, J. R. (The Museum, Texas Tech. University, Lubbock, TX 79409) *Journal of Mammalogy*, 1977, *57*, (Suppl. 2) 1-9.

The routine tasks of mammalogists whose research or curatorial activities include collecting, importing, processing, exporting, or interstate transporting of living or dead scientific specimens of mammals have become increasingly subject to Federal regulations. The purpose of this article is to inform the members of the American Society of Mammalogists what they need to do in order to insure that their activities are lawful. To this end, all relevant laws were consulted and summarized and the summaries were sent to the respective Federal agencies for confirmation. The comments and suggestions of personnel representing the agencies that responded were incorporated into the resulting manuscript.

Disease

Epizootic staphylococcal infections in subhuman primates after surgical operations. Blouse, L. E., Brockett, R. M., Homme, P. J., & Jones, E. F. (Div. of Epidemiology, Disease Surveillance Branch, USAF Sch. of Aerospace Med., Brooks Air Force Base, TX 78235) *American Journal of Veterinary Research*, 1976, *37*, 731-733.

In late October, 1974, *Staphylococcus aureus* postoperative wound infection was recorded in a *Macaca mulatta* which had recently undergone surgical operation. Infection in a second monkey appeared approximately 2 weeks later, and a clustering of 6 cases appeared over the next 3-week period. The clinical spectrum included septicemia in 2 monkeys and skin infection at the surgical incision site of several others. Investigation revealed a uniform and consistent association of a phage group II *S. aureus* strain characterized as 3A/55/71. This strain was also found to be enzootic among other postoperative monkeys sharing or having shared a common postsurgical care unit with infected monkeys. Epizootiologic studies indicated that this unusually virulent *S. aureus* strain probably was introduced by an infected monkey which underwent surgery earlier in the month and that additional monkeys became infected by animal-to-animal transmission. After appropriate control sanitary measures were instituted, no new infections occurred.

Nonenteric shigella infections in nonhuman primates. Stull, P. A., & Anderson, M. P. (Dayton, OH 45459) *Journal of the American Veterinary Medical Association*, 1976, *169*, 938-939.

Enteric shigellosis is a common disease of nonhuman primates. Non-enteric shigella infection has been reported only 1 time in a non-human primate, although such infections have been recorded with some frequency in man. In this report, 16 additional cases of non-enteric shigella infections that occurred during a 5-year period in a colony of nonhuman primates are described. The cases include gingivitis in 14 rhesus monkeys, abortion in a rhesus monkey, and air sac infection in an orangutan. *Shigella flexneri* was isolated from all of these animals except the one with air sac infection, which was due to *Shigella sonnei*.

Physiology

Oral glucose tolerance test in the cynomolgus monkey (*Macaca fascicularis*). Honjo, S., Kondo, Y., & Cho, F. (Div. of Experimental Animals II, Dept. of Vet. Sci., NIH, 3260 Nakato, Murashi-Murayama, Tokyo 190-12, Japan) *Laboratory Animal Science*, 1976, *26*, 771-776.

The glucose tolerance test was simplified so that it could be performed on more than one cynomolgus monkey (*Macaca fascicularis*) at a time. Glucose was administered orally in a dose of 2 g/kg body weight as a 50% aqueous solution, and blood samples were taken just before and 30 min and 150 min after glucose administration. The simplified test was conducted on a total of 93 cynomolgus monkeys. Glucose tolerance curves obtained by this method were classified into three patterns with regard to the increasing rate of serum glucose concentration per min and the decreasing rate. 71 monkeys showed the first pattern characterized by an increasing rate of 1.0 mg/min or more and a decreasing rate of 0.2 mg/min or more. The second pattern showing an increasing rate of 1.0 mg/min or more and a decreasing rate of less than 0.2 mg/min was obtained with 10 monkeys. The remaining 12 monkeys exhibited the third pattern in which the increasing rate and the decreasing rate were less than 1.0 mg/min and 0.2 mg/min, respectively. The first pattern is considered to be normal glucose tolerance, while the second and third patterns are regarded as abnormal ones. The incidence of the abnormal patterns was significantly higher in wild-imported cynomolgus monkeys than in laboratory bred monkeys.

Pharmacology & Anesthesia

Effect of halothane and halothane nitrous oxide on hematocrit and plasma protein concentration in dog and monkey. Steffey, E. P. *et al.* (Dept. of Surgery, Univ. of CA, Sch. of Vet. Med., Davis, CA 95616) *American Journal of Veterinary Research*, 1976, *37*, 959-962.

Hematocrit and plasma protein concentration in healthy dogs and monkeys (*Macaca arctoides*) awake and anesthetized with halothane-oxygen and halothane-nitrous oxide oxygen were compared during conditions of spontaneous and controlled ventilation. Both hematocrit and plasma protein concentration decreased within 15 minutes following anesthetic induction. This decrease persisted throughout con-

stant- or variable-depth anesthesia and did not vary appreciably with ventilation, anesthetic dose, or introduction of nitrous oxide. Plasma volume, determined by a dye-dilution technique, concomitantly increased. This increase is compatible with the directional changes in hematocrit and plasma protein.

Failure of commercially prepared isoniazid diet to produce isoniazid serum concentration in rhesus monkeys. Ringler, D. H. *et al.* (Unit for Laboratory Animal Medicine, The University of Michigan, Ann Arbor, MI 48104) *Laboratory Animal Science*, 1976, *26*, 581-585.

A comparison was made of serum isoniazid concentrations and the time course of isoniazid elimination in rhesus monkeys given the drug i.m., orally on sugar cubes, or in a commercially medicated diet. When the drug was administered orally on sugar cubes or i.m., peak serum concentrations were usually reached within 2 hr. A three-fold individual variation in the rate of elimination was noted, and in most animals the serum concentration at 6 hr approached zero. Isoniazid was not detected in the serum of any animal receiving the commercially medicated diet. Others using this medicated food in their tuberculosis prophylaxis programs should be aware that the diet probably does not provide therapeutically effective dosage to the animals.

Care & Breeding

Abortion and cannibalism in squirrel monkeys (*Saimiri sciureus*) associated with experimental protein deficiency during gestation. Manocha, S. L. (Yerkes Regional Primate Res. Ctr., Emory Univ., Atlanta, GA 30322) *Laboratory Animal Science*, 1976, *26*, 649.

Stillbirths, abortions, and frequency of eating of the extruded fetus were higher in a high protein (25% calories derived from proteins) breeding group of squirrel monkeys than in a low protein group (8% calories from proteins).

Check-list of the data on the gestation length of primates. Ardito, G. (Inst. of Anthropology, Univ. of Turin, 10123 Turin, Italy) *Journal of Human Evolution*, 1976, *5*, 213-222.

A list of the primate gestation lengths available in the literature.

Evaluation of the sub-human primate tube test for pregnancy in primates. Hobson, B. M. (Dept. of Obs., & Gyn., Hormone Lab., Simpson Mem. Maternity Pavilion, Royal Infirmary, Edinburgh, EH3 9YW, Scotland) *Laboratory Animals*, 1976, *10*, 87-91.

A haemagglutination inhibition test, developed specifically for primates, diagnoses early pregnancy in the chimpanzee, gorilla, orangutan, and baboon. The test was sensitive and reacted positively when the concentration of gonadotrophin in urine was equivalent to 0.03 i.u. human chorionic gonadotrophin per ml. This degree of sensitivity and the certitude that cross-reacts with primate luteinizing hormone probably accounts for most of the false positive results.

An age assessment technique for the baboon (*Papio cynocephalus*) Beattie, I. A. (Dept. of Zoology, Univ. College North Wales, Bangor) *Journal of the Institute of Animal Technicians*, 1974, *25*, 21-42.

Advantage has been taken of the increasing availability of known age baboons and the early works of Vogt and Vickers to establish an age assessment technique using the rate of epiphyseal fusion of the phalanges. The formulae for accurate age prediction are based on a non linear regression analysis.

Twinning in prosimians. Pasztor, L. M., & Van Horn, R. N. (Oregon Regional Primate Research Ctr., Beaverton, OR 97005) *Journal of Human Evolution*, 1976, *5*, 333-337.

Twinning pedigrees for *Lemur catta* and *Galago crassicaudatus argentatus* colonies at the Oregon Regional Primate Research Center have been constructed. Unlike-sexed twin pairs were more numerous than like-sexed twin pairs in both species. Evidence is presented which supports the hypothesis that twinning in prosimians, as in man, is genetically controlled.

Instruments and Techniques

Endoscopy in Primate and Other Experimental Animals. Harrison, R. M. (Ed.), *Journal of Medical Primatology*, 1976, *5*, 69-147.

This issue of the journal is devoted entirely to reports stemming from a symposium and workshop held at the Delta Regional Primate Research Center, April 28-30, 1975. Contents: Introduction to the symposium workshop, by Harrison, R. M. (Dept. of Rep. Phys., Delta Reg. Pri. Res. Ctr., Covington, LA 70433). The development of modern endoscopy, by Harrison, R. M. Laparoscopic techniques for biomedical research, by Dukelow, W. R., & Ariga, S. (Endocrine Res. Unit, Michigan State Univ., East Lansing, MI 48824). Laparoscopy in *Macaca mulatta:* Specialized equipment employed and initial observations, by Dierschke, D. J., & Clark, J. R. (Wisconsin Reg. Pri. Res. Ctr., 1223 Capitol Court, Madison, WI 53706). Technique of laparoscopy in the chimpanzee, by Graham, C. E. (Yerkes Pri. Ctr., Emory Univ., Atlanta, GA 30322). Retroperitoneal endoscopy, by Roberts, J. A. (Delta Reg. Pri. Res. Ctr., Tulane Univ., Covington, LA 70433). Cystoscopy in nonhuman primates, by Roberts, J. A. Optical principles of endoscopy, by Prescott, R. (Dyonics, Inc., 71 Pine St., Woburn, MA 01801).

A chest harness and pole-leash for routine transfer of rhesus monkeys from home cage to behavioral test apparatus and back. Mattisson, J. L., Alligood, J. P., & Robertson, L. F. (The Behavioral Sciences Dept., Armed Forces Radiobiology Res. Inst., Bethesda, MD 20014) *Laboratory Animal Science*, 1976, *26*, 626-629.

A chest harness and pole-leash method to transfer rhesus monkeys weighing up to 16 kg from home cage to primate restraint chair was designed. The harness was made of leather straps that crossed the chest in an X-fashion, and created a V-neck. The V-neck

eliminated the strangulation hazard of neck collars, and minimized interference between the harness and neck hole of restraint chairs. Two pole-leashes attached to 2 points on the harness gave the handler considerable control over the posture of the monkey, making it easier to teach the monkey to walk with a leash and to climb into its restraint chair or test apparatus. During transfer the rigid pole prevented escape and protected the handler from attack. Quick release mechanisms on the pole-leash allowed prompt, complete separation from the animal when it re-entered its home cage.

A urine collection device for use with the male pigtail macaque (*Macaca nemestrina*). Rahlmann, D. F., Mains, R. C., & Kodama, A. M. (Environmental Physiology Lab., Bldg T-2251, Univ. of CA, Berkeley, CA 94720) *Laboratory Animal Science*, 1976, *26*, 829-831.

Methods for collection of urine samples for biochemical analyses from the unanesthetized male nonhuman primate have varied from the use of screens or baffle devices for separation of urine and feces to surgical preparations involving the ureters, urethra, or urinary bladder. This report describes a new method which involves a collection device which is a thin-walled silicone tube open at both ends and of sufficient internal diameter to be placed over the glans penis of a restrained adult monkey.

A simple restraining device for use with neonatal and small nonhuman primates. Sorensen, C. A. *et al.* Research Animal Facility, John A. Burns Sch. of Med., Univ. of Hawaii, Honolulu, HI 96822) *Laboratory Animal Science*, 1976, *26*, 622-625.

A simple and inexpensive restraining device was designed for use with neonatal and small nonhuman primates weighing less than 2 kg. With this device a technician working alone can collect blood samples, fecal or vaginal smears, nasal or oral swabs, or perform a variety of routine procedures including physical examination and administration of medication.

A miniature, readily available electrode pedastal for recording cerebral and other electrophysiological activity from several species. Shearer, D. E. *et al.* (Neuropsychology Res. Labs. (151 A), Vets. Admin. Hosp., Salt Lake City, UT 84113) *Laboratory Animal Science*, 1976, *26*, 630-632.

A miniature, commercially available electrode pedestal with prewired and prenumbered leads was designed. It possesses long-term electrical reliability and can be applied to a wide range of animal species, including cats, rats, snakes, stumptailed macaques, and squirrel monkeys. It can be easily modified to record electroencephalograms, evoked responses, and related physiological measurements. The device is relatively small, with keyed and lock-down parts, and is resistant to damage.

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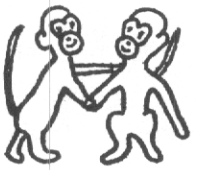
* * *

A Primate Zodiac

ARIES

TAURUS

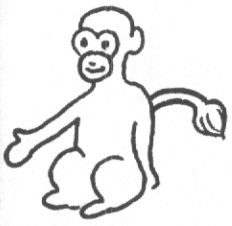
GEMINI



CANCER

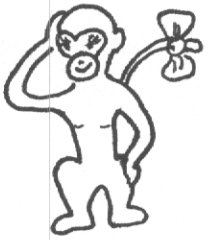
"Macaca Fascicularis"

LEO



"Macaca Silenus"

VIRGO



LIBRA

SCORPIO

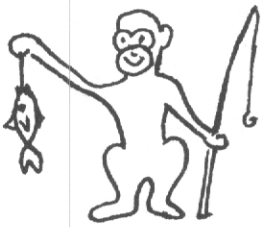
SAGITTARIUS

CAPRICORN

"PAN"

AQUARIUS

PISCES



Happy New Year