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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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PRIMATE RESEARCH INSTITUTE, KYOTO UNIVERSITY

Wataru Ohsawa

Primate Research Institute

The Primate Research Institute, Kyoto University, was established in 1967 as Japan's only national research center for primate biology. The main purpose of the Institute is to understand various biological, behavioral, and socioecological aspects of the primate, and to illuminate the origin and evolution of man.

The Institute currently consists of eight research departments and two attached laboratories. It has a five-story main building for the research staff, an animal care laboratory, and a dormitory for visiting scientists. These are located in Inuyama City, Aichi Prefecture, 120 km away from the main university campus in Kyoto. In addition, the Institute operates Koshima field laboratory on a small island in Kyushu, southern Japan. Since this Institute is the only national primate center, it has a special program to provide monkeys, laboratories and research expenses for scientists, both in Japan and abroad. This is called the Cooperative Research Program (Kyodo Riyo Kenkyu Seido). Each year, about 50 scientists outside the Institute have benefited from this system (those interested in the Program should write to the Director of the Institute).

Staff

The 36 members of the permanent scientific staff are specialists in one of the following departments or laboratories: Morphology, Neurophysiology, Physiology, Psychology, Sociology, Ecology, Variation Research, Biochemistry, Animal Care Laboratory and Koshima Field Laboratory. A director is selected every two years from the professors of the Institute by a vote of all members of the permanent staff. At present, Dr. W. Ohsawa has accepted this responsibility. Included below is a complete list of present members of the staff and a brief description of their ongoing research projects written by themselves.

Department of Morphology

Shiro Kondo, Ph.D., Professor, and Morihiko Okada, Ph.D., Instructor, have been conducting functional morphological studies on locomotion with an evolutionary perspective. Their research has concentrated on biomechanical analysis of the gait of human and nonhuman primates in order to assess the adaptive significance of bipedalism. Current projects include kinesiological approaches to bipedal level walking employing high-speed motion pictures, electromyography, and three-dimensional dynamic force transduction. Well-

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trained chimpanzees, gibbons, baboons, Japanese macaques, and spider monkeys are used, as well as human subjects. Comparative and integrative evaluation of individual parameters in these species seems to suggest the importance of an arboreal heritage for emergence of human bipedalism.

Drs. Kondo and Okada have also been concerned with climatic adaptation of primates. They compared the cold tolerance of the fingers of several Asian macaques adopting as an index the "hunting" response or cold-induced vasodilatation response, and found that the local cold tolerance was fairly well correlated with the climatic condition of their habitats.

Mitsuo Iwamoto, Ph.D., Associate Professor, is interested in the phylogenetic characteristics and relationships among the primates and their classification mainly from a morphological point of view, and thus has proceeded with comparative studies on physical growth, dermatoglyphics, dental eruptions, fossil and subfossil remains, gait and locomotion, so far laying stress on the macaques, especially the Japanese macaque.

Tsuyoshi Watanabe, Instructor, is investigating the structure of the pelvic girdle, grossly observing the morphology of muscles such as *M. pubocaudalis*, *M. iliocaudalis* and *M. ischiocaudalis*. Observations of the growth of Japanese macaques using somatometric methods, and studies of the distribution of the New World monkeys by field observation are also conducted. Field observations of 11 species of 10 genera of New World monkeys were made in 1973 and will be made in 1975 in the area of Rio Caquetá, Upper Amazonian Basin, Colombia.

Department of Neurophysiology

Kisou Kubota, M.D., Ph.D., Professor, is interested in understanding the functioning of the cerebral cortex in the control of behavior and/or voluntary movement. Temporal correlations between single neuron activity of the prefrontal cortex and performance on delayed-response-type tasks are being studied in collaboration with S. Kojima of the Institute. Neuron activity possibly related to a spatial short-term memory function has been suggested and evidence for it has been presented. Studies are in progress to analyze prefrontal neuronal organization with reference to the previous studies. As for studies on motor control, neuron activity related to muscle spindle activity is analyzed in Area 3a of the sensory cortex and in the mesencephalic nucleus of the 5th nerve.

Ken'ichi Matsunami, M.D., Ph.D., Associate Professor, is interested in studying the function of neuronal populations (motor cortex and cerebellum) involved with control of movement. As a first step in this analysis, neocortical Areas 4 and 6 will be reversibly cooled to observe the effect on neuronal activity related to sensory-motor integration.

Masaki Sakai, Ph.D., Instructor, is attempting to determine the functional role of the premotor cortex during voluntary movement. While the activity of premotor cortex is cryogenically depressed, the deficit in the monkey's learned motor performance and modifications of neuronal activity of the motor cortex are being investigated.

Akichika Mikami, M.D., Instructor, is interested in understanding the neural mechanisms by which a short-term memory is executed. In collaboration with N. Ibuka, he is analyzing discharge patterns of single neurons of the inferotemporal cortex during a delayed matching to sample task.

Department of Psychology

Kiyoko Murofushi, Ph.D., Associate Professor, is attempting to analyze the attentional processes which are active during performance of learned sensory motor tasks. At present she is investigating operant control of reaction time to visual stimuli in intact and split-brain monkeys.

Nobuko Ibuka, Instructor, is interested in the behavioral and neural bases of memory. Currently projects are proceeding to determine the area within the inferotemporal cortex for which a delayed matching to sample task is essential.

Toshio Asano, Instructor, is conducting experiments to get psychophysical data on time estimation in monkeys, and to investigate the essential factors which change a neutral stimulus event into a conditioned reinforcer.

Shozo Kojima, Instructor, has been concerned with self-stimulation in the monkey in order to determine the relationship between stimulus intensity and such dependent variables as response rate and preferred stimulus duration. The effect of amphetamine on both elicited feeding and self-stimulation has also been investigated. He is also collaborating with Dr. Kubota as mentioned earlier.

Department of Sociology

Syunzo Kawamura, Ph.D., Professor, has become interested in the development and propagation of cultural phenomena in troops of the Japanese monkey and the inter-troop variability of social structure and behavior. He has spent several years in Southeast Asia making extensive field surveys on gibbons, siamangs, pigtail macaques, hanuman langurs, etc. Although his interest essentially lies in the comparative sociology of primates and other mammalian forms, much of his time is now devoted to complicated problems of the conservation of living primates.

Masao Kawai, Ph.D., Professor, is interested in social and

ecological evolution of primates. The following studies have been conducted. (1) Since 1953 a longitudinal sociological study based on genealogical records of all troop members of Koshima Island has been carried out. Social structure, dominance rank order, role and status, social changes, social development and pre-cultural behavior have been observed. (2) Comparative studies of social structure and ecology between forest-living primates and ground sympatric primates: In 1969-1970, an ecological study of five species of monkeys was conducted in the tropical forest of Uganda using radio-telemetry techniques. Quantitative data of the animals' activities (time spent moving, feeding and resting), moving area, sleeping places, etc. were collected. (3) Ecological and sociological studies of the gelada baboon: All individuals in four herds in the Ethiopian highlands were identified in 1973-1974. Herd structure, inter-herd relationships, relationships between one-male units, social organization of units, social relations, role and status of leader and non-leader males, communication and spacing were studied. Their activities and moving patterns were also studied and a quantitative analysis of feeding habits was also carried out.

Shigeru Azuma, Instructor, is concerned with ecological biogeography of different primate species, particularly with the ecology of primates in tropical forests and of Japanese macaques in Shimokita Peninsula. Various aspects such as population structure, population dynamics, habitat utilization, and subgrouping phenomena are studied. The ecological impact of forest management upon the behavior of Japanese macaque populations and other large mammals is also being studied. In Shimokita four troops live in broad-leaved forest, half of which habitat is almost destroyed, and three (or four) troops in the mixed forest of less altered environments.

Akira Suzuki, Ph.D., Instructor, is studying primate sociology and ecology. He has performed field surveys of chimpanzees and forest-living monkeys (black and white colobus monkeys, red-tailed monkey, blue monkey, etc.) in East Africa since 1964, and is especially interested in comparative ecology of the wild-living chimpanzees in savanna woodlands and forests. He is also conducting ecological studies of snow-living monkeys in Shiga Heights. Their social structure is studied from the viewpoint of inter-troop relationships in the field.

Department of Variation Research

This department deals with problems of variation from the genetical, morphological, physiological, ecological and other points of view. Ken Nozawa, Ph.D., Professor, and Takayoshi Shotake, Instructor, are conducting ecological- and population-genetic studies of the Japanese macaque and other *Macaca* species. Genetic variations of the enzymatic and non-enzymatic blood proteins are examined by starch- and agar-gel electrophoresis in order to clarify the genetic variability and population structure of Japanese macaques, and further to quantify the molecular

divergence and phylogenetic interrelationships among the Asian species of the genus *Macaca*. Statistical methods are also used for estimating such population-genetic parameters as the effective troop-size, migration rate between troops, and effective distance of gene dispersion from a troop. On the basis of these studies gene-dynamics and evolutionary process of the macaque species will be inferred. Moreover, causes of the congenital anomalies of extremities which occur frequently in several troops of the Japanese macaque are being analyzed genetically through mating experiments.

Akiyoshi Ehara, Ph.D., Associate Professor, is conducting two major projects. One involves a morphological analysis of the skulls of human and non-human primates. Functional relationships between the brain-skull and the facial-jaw-skull are comparative-morphologically analyzed. The mechanical cause of pro- and subgnathia among the various classification groups of the primates, pre-basic and basic kyphosis of the skull, kyphosis of the brain to decide the skull form, morphological features and its functional importance around the orbita, the functional meaning of the zygomatic arch, etc., have been studied. The second project is a field study of the Japanese macaque from the morphological standpoint. Manipulation, posture, head balance and its movement, locomotion pattern, chewing apparatus and its movement in relation to diet, and so on, will be observed in the field as well as in the laboratory.

Kazuo Wada, Ph.D., Instructor, is surveying ecological and morphological characteristics of Japanese macaques inhabiting snowy districts, such as Shimokita Peninsula and Shiga Heights, in an attempt to approach the origin of this species on the basis of its variability and adaptability. He is also interested in the phylogeny of monkeys, and has performed ecological and morphological studies of rhesus monkeys in India.

Akisato Nishimura, Instructor, is interested in the behavior and ecology of the primate and has been observing Japanese macaques at Takasakiyama since 1964. He is trying to understand the development and group dynamics of Takasakiyama troops and also to know a whole history of each monkey extending over its life span. In the years 1973 and 1974, he conducted field studies of New World monkeys, especially woolly monkeys, in the upper Amazonian basin.

Department of Ecology

Yukimaru Sugiyama, Ph.D., Associate Professor, is carrying out field studies on population ecology and social structure of Old World monkeys and apes with special reference to their environmental conditions. The first of his present projects is a long term demography of the Japanese macaque population in collaboration with H. Ohsawa, A. Nishimura and K. Masui (Anthropology Dept., Kyoto Univ.). A small population of Japanese macaques at Ryozenyama, central Japan, has been

observed since 1969 with behavioral records of all individuals in their natural habitat. In addition, the large population of Takasakiyama, in southern Japan, has been identified by marking sample individuals. The second project is the eco-zoogeography of Indian macaques and langurs in collaboration with Indian colleagues. Ecological, sociological, and behavioral variations of those animals are being studied.

Naoki Koyama, Ph.D., Instructor, has been working on socio-ecological aspects of Japanese macaques since 1964 at Arashiyama, Kyoto. Through long-term observations, life histories of individual members in a troop are traced. He has done field studies of nonhuman primates in India (1962-63; 1972-73) and in Malaysia (1967-68).

Jiro Tanaka, Ph.D., Instructor, is conducting field studies at Botswana, southern Africa, on the social structure of Bushmen with special reference to the geographical condition of their habitat, food resources, hunting and gathering habits, grouping pattern, and other kinds of social behavior. He is also studying ecological questions related to environmental conditions and life styles in a small Japanese population on an isolated island.

Department of Physiology

Wataru Ohsawa, Ph.D., Professor, and Funio Mekata, Ph.D., Instructor, have adaptational physiology as their major research area, with the emphasis on thermoregulatory mechanisms and cardiovascular properties. Thermal and metabolic responses at varied temperatures have been compared among several species; studies at the cellular level on relationships between posture and viscerocardiovascular activities are also being carried out from adaptational and evolutionary points of view.

Kiyoshi Oshima, M.D., Ph.D., Associate Professor, is concerned with the reproductive physiology of female Japanese monkeys. Seasonal reproductive variations of peripheral plasma levels of gonadotropin and steroid hormone, fine structural features of the hypothalamo-pituitary-gonadal system, electrophysiological changes of the genital tract, and smooth muscle action potentials of the pregnant monkey uterus from fibers in various sites are studied.

Motoharu Hayashi, Instructor, is also working on the reproductive physiology of the female Japanese macaque. By radioimmunoassay methods, hormones in the peripheral serum, such as gonadotropin and steroids, are measured during breeding and nonbreeding seasons. Interactions between LH-RH and prostaglandin and serum LH levels are traced. The biochemistry of a steroid hormone receptor in the monkey uterus is also studied at various stages of the estrous cycle.

Department of Biochemistry

Kenji Takahashi, Ph.D., Professor, is concerned with purification, characterization, primary structure determination and structure-function studies of various proteins, especially of enzymes involved in protein, nucleic acid, and drug metabolism, including specific proteins in the nervous system. The objective is to elucidate the physiological roles of these proteins and also to obtain information on their molecular evolution.

Osamu Takenaka, Ph.D., Associate Professor, is studying the ontogenesis of blood proteins such as hemoglobin, blood clotting enzymes and some major plasma proteins. He wants to shed light on the construction of blood from the standpoint of its ontogenesis. Studies to determine functional properties of major fetal plasma proteins (primarily hemoglobin) of the Japanese macaque and their postnatal decay are now in progress.

Takashi Kageyama, Ph.D., Instructor, is interested in protein chemistry and enzymology. He is analyzing pepsinogens and pepsins of *Macaca* monkeys to determine primary structures. Purification and kinetic studies of these enzymes are performed.

Koshima Field Laboratory

Akio Mori, Instructor, is interested in the social behavior and social structure of primates. He is studying communication in the Koshima and Takasakiyama troops of Japanese macaques. Among individuals of the Koshima troop, general data, such as the development of individuals, population dynamics, social relationships, pre-cultural behavior and ecological conditions are also collected.

Monkey Care Laboratory

Toshiro Tiba, D.V.M., Ph.D., Associate Professor and chief of the Laboratory, is conducting studies on the kinetics of spermatogenesis in primates, especially from the viewpoint of reproductive evolution. Currently, the cycle of the seminiferous epithelium in free-ranging Japanese macaques is being histologically studied. One cycle was classified into 7 stages, but this is not easy because, in most cases, the seminiferous epithelium is very irregularly constructed, and typical germ cell associations are frequently observed. These findings are not entirely in agreement with those obtained from other macaque species.

Kiyoaki Matsubayashi, D.V.M., Instructor, has specialized in the reproductive physiology of male macaques. Endocrinological reactions of the reproductive systems to factors affecting sexual capacity of the monkeys, such as season, temperature, dominance, ranking, and restraint are analyzed. To evaluate an androgenic response to some environmental changes, urinary 17-hydroxycortico-steroids, urinary 17-ketosteroids,

seminal fructose and hematologic values are examined in the Japanese macaque.

Shunji Gotoh, D.V.M., Instructor, is interested in variations in the ocular fundus of primates and is examining morphological changes of this structure in the Japanese macaque in relation to diseases and other physical conditions.

Koshima Field Laboratory

Koshima Field Laboratory is located at Koshima Island, 200 meters away from Kushima City, Miyazaki Prefecture on the mainland of Kyushu. Its circumference is 4 km. In addition to the office and laboratories on the mainland there is a small cottage on the island where researchers can stay overnight. The island is preserved as a natural habitat for the Japanese macaque. The main objectives of this field laboratory are: (1) to provide conveniences for scientists studying a Japanese macaque troop in its natural habitat and (2) to keep longitudinal records of various socio-ecological studies of Japanese macaques. A troop of macaques consisting of 98 individuals and 15 solitary males live near the field laboratory. This troop has been studied since 1948, and genealogical records have been preserved since then.

The staff includes, Dr. Masao Kawai, Chief of the Laboratory and also Professor of Bio-sociology and Mr. Akio Mori, Instructor. In the past many studies on the social structure and social behavior of the Japanese macaques in this troop were conducted. Among them, studies on rank order, basic and dependent rank, and on pre-cultural behavior were conducted by M. Kawai on the basis of genealogical records. These studies have made best use of the fact that the troop is provided with food and can be observed very closely in its natural habitat.

Recently many scientists have been conducting projects in this laboratory. Some examples include: quantitative study of activities of monkeys, using radio-telemetric techniques, by M. Kawai and analysis of feeding behavior and amount of food intake by T. Iwamoto (Kyushu Univ.). In addition, the distribution of food resources and their utilization were studied by M. Kimura (Japan Monkey Centre). The social structure of the troop, its changes, pre-cultural behavior and the development of individuals have been studied by M. Kawai and A. Mori. A short distance communication system has been studied by A. Mori. Development of social relationships through play from infant stage to juvenile stage has been studied by U. Mori (Primate Research Institute). Solitarization of young male monkeys has been studied by K. Sugawara (Primate Research Institute). Parasites of the monkeys of the troop have been studied by T. Tiba (Primate Research Institute), M. Machida (National Museum of Science) and J. Araki (Teikyo Univ.).

Monkey Care Laboratory

The Monkey Care Laboratory was founded in 1968 as a facility to provide healthy nonhuman primates to scientists for studies to be conducted in the Institute. All monkeys coming in are guaranteed and rigorously checked. The staff is currently three DVM's, seven technicians and three assistants. A building consisting chiefly of laboratories and animal cage rooms (capable of keeping about 300 animals), a quarantine ward (180 m², capable of receiving about 100 animals annually) and two open enclosures (1,650 m² and 1,296 m², respectively) have been constructed. Feeding the animals, washing and cleaning animal cage rooms, and performing many of the routine examining procedures such as blood collection, tuberculin testing, bacteriological examination for shigellosis and salmonellosis, and quarantine management are performed by six animal technicians. Currently the Institute maintains over 430 animals. These include two large colonies of Japanese (*Macaca fuscata*) and rhesus macaques (*Macaca mulatta*) and small colonies of Formosan macaques (*Macaca cyclopis*), common squirrel monkeys (*Saimiri sciureus*) and others. The majority of the animals are kept in "squeeze cages" to facilitate handling of individual monkeys. The open enclosures are served by auxiliary structures which provide indoor animal quarters and observation points for study.

So far, the Institute has not been raising a sufficient number of monkeys. To meet the ever increasing demand for animals, especially for pregnant females, fetal material, and animals for reproductive physiology research, a plan was developed last year to establish a special breeding colony of our own.

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APPEAL FOR INFORMATION ON *MACACA SYLVANUS*

To assist in assembling data for an article on the conservation of Barbary Macaques (common names: Gibraltar ape, Barbary ape, le Magot) information is requested of zoos, parks and laboratories who keep or use this primate (or have done so). Second-hand information welcome. Contact: Dr. John M. Deag, University of Edinburgh, Department of Zoology, West Mains Road, Edinburgh, EH9 3JT, Scotland.

NORMAL SPERM PARAMETERS IN *MACACA MULATTA*

Richard M. Harrison

Delta Regional Primate Research Center

The selection of males as subjects for vasectomy and breeding contracts required that we determine the normal range of sperm concentration and motility in adult male *Macaca mulatta*. When the literature is examined one finds a wide range of "average" values; frequently, these values are based on data from a small group of males. This report presents the data accumulated on 182 ejaculates from 44 male rhesus monkeys collected over a one-year interval. All monkeys were housed in outdoor cages with no light control and only moderate heating in the winter. All monkeys were at the Delta Regional Primate Research Center for at least three months prior to the semen collections.

Semen samples were collected by electroejaculation using the rectal probe method described by Roussel and Austin (1968). The monkeys were tranquilized with phencyclidine hydrochloride (Sernylan) to facilitate handling. Motility was measured in terms of the percentage of sperm showing progressive forward movement and was either estimated by two experienced individuals or determined by counting the number of motile sperm in a total count of 200 sperm. Sperm concentration was determined following dilution in a red blood cell diluting pipet and by counting either 2 or 4 sq. mm on a standard hemacytometer. Sperm were immobilized during the dilution step by using cold saline or cold distilled water; only sperm heads were counted. If a coagulum was present, it was allowed to autolyse or was liquified using 1% Pronase (Sigma Chemical Co., St. Louis, Mo.) 1:1 with the total ejaculate.

The average motility was determined for all ejaculates and for five classes of ejaculates based on concentration. Similarly, the average concentration was determined for all ejaculates and for seven classes of ejaculates based on motility groupings. These findings are presented in Tables 1 and 2.

The Spearman rank-order correlation between sperm concentration and percent motility was 0.97 and was highly significant ($p < .02$). The mean concentration and motility values (\pm S.E.) for the 182 ejaculates were $415 \pm 41 \times 10^6/\text{ml}$ and $58 \pm 2\%$, respectively. In 18 of 19 males where more than two ejaculates were collected from the same monkey (a total of 144 ejaculates) the motility varied less than the concentration (S.E. 2% of the mean compared to 10% of the mean). This would indicate that, of the two parameters, motility shows the less variability and

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TABLE 1
PERCENT MOTILITY FOR 5 CLASSES OF CONCENTRATION

	SPERM CONCENTRATION ($\times 10^6$ /ml)					All
	≤ 100	101-300	301-500	501-1000	> 1000	
Mean	43.9	56.0	61.4	66.4	75.2	58.0
S.E.	3.6	2.8	4.8	3.4	1.5	2.0
Range	0-80	0-90	5-90	10-90	60-80	0-90

TABLE 2
MEAN CONCENTRATION ($\times 10^6$ /ml) FOR 7 CLASSES OF MOTILITY

	PERCENT MOTILE							All
	≤ 20	30	40	50	60	70	≥ 80	
Mean	182	116	188	201	314	517	678	415
S.E.	40.3	44.5	50.6	40.5	81.2	97.0	98.4	41.0
Range	1-900	6-338	23-608	1-801	38-1125	24-3424	22-3706	1-3706

would be more predictive of the quality of semen samples collected from an individual over a period of time.

Based on the data above, I conclude that motility values should be given more weight than sperm concentrations in predicting future reproductive value of a rhesus monkey. Using the rank values listed in Table 3 and the formula for Predicted Reproductive Value (PRV) given below the table, we find that a monkey with a sperm concentration of 350×10^6 /ml and a motility of 60% has a PRV of 6.7. Monkeys with these semen characteristics have been good breeders in the past. An animal with values of 250×10^6 /ml and 70% (PRV = 7.3) would be selected over one with values of 400×10^6 /ml and 30% (PRV = 4.3) for breeding purposes. The former animal would be expected to have a mean sperm concentration in excess of 500×10^6 /ml throughout the year, while the

TABLE 3

RANK VALUES FOR SEMEN PARAMETERS

Rank value	0	1	2	3	4	5	6	7	8	9	10
Motility - %	0	10	20	30	40	50	60 ^a		70 ^a		80+
Concentration × 10 ⁶ /ml	0	50	100	150	200	250	300	350	500	750	1000

^aSamples with 60% motility are given a rank value of 6.5--those with 70% motility receive 8.5. Samples with motility values and/or concentrations between values listed in the table should receive the lower rank value.

$$PRV = \frac{2(\text{motility rank value}) + \text{concentration rank value}}{3}$$

latter would be expected to average less than $150 \times 10^6/\text{ml}$, based on the linear relationship shown in Tables 1 and 2 and the average concentrations for those motility values. As indicated previously, the motility value will show less variation during the year than the concentration value and should be the value with greatest predictive weight.

Our results agree well with those reported by Valerio *et al.* (1970). They reported concentrations of $410 \times 10^6/\text{ml}$ and $484 \times 10^6/\text{ml}$ for the periods of October to December and January to July, respectively; and motility values of 2.96 and 2.59 (scale of 0 to 4) for these same periods. These values compare with our values averaged over the entire year of $415 \times 10^6/\text{ml}$ and 58%.

If one has the time, the more ejaculates evaluated from each monkey and the more characteristics examined, the more likely one is to select the best animals. Short of this extensive evaluation, I feel one can use the procedure described in this report and obtain monkeys that will provide good reproductive efficiency. The report by Valerio *et al.* (1970) on monkeys housed indoors and the present report should provide sufficient data for those interested in the "average" sperm values of the adult rhesus monkey.

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HAND RADIOGRAPHS OF APES NEEDED

This is a request for information about the location and availability of hand radiographs of any species of apes. The radiographs are needed for a project concerning the origin and function of the metacarpophalangeal sesamoids in humans. The success of this work depends on knowledge of the distribution and positions of these bones in other primates, including apes. While radiographs of the hands of adult members of lower primate species are numerous, radiographs of the hands of adult apes of any sex or species are scarce. I have found 60 different combinations of these bones in humans. If there is as much variability of these bones in apes, a very large sample size will be needed to verify the fact. Even single radiographs from zoos or other institutions would be very helpful. Contact: Terry P. Calhoun, The University of Michigan, Dept. of Anthropology, 221 Angell Hall, Ann Arbor, Michigan 48104. (Phone: 313-764-7274)

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THREE RHESUS AVAILABLE

Three rhesus monkeys available on request to any research institution. Two are males, approximately 2 and 3 years old, respectively, and one, a female, approximately 4 years old. Shipping charges and crate must be paid by receiver. Contact: Mrs. Betty Woten, El Paso Zoological Park, El Paso, Texas 79905. (Phone: 915-543-6023)

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"IN FACT, I THINK IT'S
QUITE APT TO SAY
THAT MAN HAS DESCENDED
FROM MONKEYS."

A STRATEGY FOR GORILLA CONSERVATION EFFORTS

J. Stephen Gartlan

Wisconsin Regional Primate Research Center

Ensuring the continued survival both of the Great Apes and of their natural habitats are top priority concerns of both the International Primatological Society and of the International Union for the Conservation of Nature (IUCN). This aim is reflected in the list of priorities adopted by the Joint Conservation Committee of the two bodies at their meeting at Carshalton, England in November 1973 (see Thorington, 1974).

Subsequent to this meeting the Primate Specialist Group was formed. Each member was assigned a particular area of responsibility, in my case gorillas. Members of the Specialist Group are expected to solicit the help of consultants in their areas of responsibility and to promote and review conservation projects which may then be submitted to the IUCN for partial funding by the World Wildlife Fund (WWF).

The gorilla is distributed in separate eastern and western races north of the Congo River. The western (or lowland) race is geographically the most widespread, extending south from near the Cameroon-Nigeria border to the mouth of the Congo River and east as far as the Ubangi; an area roughly triangular in shape extending some 1000 miles along the coast and 700 miles inland. The northern limits of distribution of the western race in Nigeria, Cameroon, and Central African Republic (C.A.R.) have to be established, as well as the eastern limits in C.A.R. and Congo Brazzaville, and the southern limits in Congo Brazzaville and Gabon. The possibility that an isolated population exists near the Cameroon-Nigeria border in the Takamanda area also needs to be investigated. Countries in which the western gorilla occurs include Cameroon, Rio Muni, Gabon, Congo Brazzaville, and the C.A.R., and possibly Nigeria. The eastern gorilla races occur in eastern Zaire, Uganda, Rwanda, and Burundi.

The western gorilla is the most common in captivity, with the bulk of exports apparently originating from Cameroon, Rio Muni, and Gabon. The majority of gorilla field studies, however, have concentrated on the eastern races (e.g., Fossey, 1974; Schaller, 1963) with the result that the distribution and dispersion in the east are relatively well-known.

As far as the western gorilla is concerned, the only area for which there are firm data on population size are for Rio Muni, where Jones and Sabater Pi (1971) provide data indicating a total population

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of some 500 individuals. Using this figure to estimate the likely maximum size of the remaining population in areas where it is known to exist indicate that there are probably fewer than 10,000 individuals remaining in the wild.

The urgent need for data on distribution and habitat combined with the rapid rate of destruction of the west and central African forests make it imperative that data collection and conservation measures be undertaken by a number of projects which should commence as soon as possible. In order to ensure the maximum efficiency of data collection and comparability of results, it is proposed that standard field techniques and census methods be used by the separate projects. These are being developed. It may be a condition of awarding funds by WWF that these standard techniques are followed.

A specific project would need to select a geographic area and estimate the population size, habitat preferences, distribution of the animals, hunting pressures, land-use changes, and the suitability of specific areas as potential gorilla sanctuaries.

Certain projects have already been screened and submitted to IUCN/WWF for funding. Information on these projects and assistance and advice in drawing up projects, and the standard form of application may be obtained from the author. It should be emphasized that the major interests of IUCN/WWF is in direct conservation; projects which are essentially research projects have a low priority. Proposals should indicate the possibility of conservation measures such as gorilla sanctuaries or national parks which will result from the successful completion of the project.

At the conclusion of the separate projects, or as many of them as seem feasible, it is intended to produce a report on the present status and distribution of the western gorilla, habitat preferences, and probable changes in the population consequent on actual and proposed land-use changes. Specific recommendations on conservation will be made.

This document, which will be made available in both English and French, will be distributed to all governments and agencies concerned. The facilities of the Wisconsin Regional Primate Research Center will be used for the preparation of this report.

Further information on projects already under way, or specific requirements, possible study sites, etc., may be obtained from the author.

A similar program for the eastern races of the gorilla is in preparation.

References

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NEW DIRECTOR OF THE CARIBBEAN PRIMATE RESEARCH CENTER

William T. Kerber, D. V. M., has been named Scientific Director of the Caribbean Primate Research Center at the University of Puerto Rico's Medical Sciences Campus. Dr. Kerber, 38, was moved into the directorship of the Center from his former position as Staff Veterinarian. He succeeds Clinton Conaway, Ph.D., who resigned to accept another appointment.

As Scientific Director, Dr. Kerber will oversee all operations and research conducted at the Center, which is supported by the Research Resources Division of the National Institutes of Health. Facilities under his responsibility include three off-shore islands occupied by free-ranging rhesus and other monkey species in intact social groups, plus laboratories and administrative headquarters near the city of San Juan.

A native of Council Bluffs, Iowa, Dr. Kerber received his doctorate in veterinary medicine at Iowa State University in 1960. Following service as a Captain in the U. S. Army Chemical Corps at Fort Detrick, Maryland, he was employed by Hazleton Laboratories, Inc., Falls Church, Virginia, as Research Coordinator and Staff Veterinarian in the Pharmacology Division. Subsequent appointments included an assistant professorship with the Sinclair Comparative Medicine Research Farm at the University of Missouri, Columbia, and a position as Head of the Medicine Section at the National Center for Primate Biology, University of California, Davis. He joined the Caribbean Primate Research Center in 1972.

Dr. Kerber's current research activities are centered on reproduction in the squirrel monkey.

COMPOSITION OF MILK FROM A GOLDEN LION MARMOSET

David H. Buss

Southwest Foundation for Research and Education

There has been growing interest in breeding golden lion marmosets in captivity in an attempt to prevent their extinction (Bridgwater, 1972). As successful raising of the infants may depend on the use of an adequate milk formula, the following results of an analysis of a single sample of milk from *Leontopithecus rosalia rosalia* may prove useful. The analytical methods have been described (Buss and Cooper, 1970).

Major constituents (g/100 ml): lipids 5.8; protein (N × 6.38) 5.7; lactose 6.9; ash 0.78.

Major minerals (mg/100 ml): sodium 47; potassium 30; calcium 170; phosphorus 120.

Fatty acids (wt. %): C_{8:0} 2.2; C_{10:0} 22.2; C_{12:0} 17.5; C_{14:0} 9.9; C_{16:0} 14.7; C_{18:0} 2.0; C_{18:1} 15.5; C_{18:2} 15.9.

The sample was taken 3 days postpartum and 1 day after the infant had died from dystocia. It was very white and rich-looking and was rich in protein and ash compared with other simian milks (Buss, 1971), but the high calcium and phosphorus and low sodium levels suggest that the sample was not colostrum. Lactose was essentially the only carbohydrate present, as shown by paper chromatography. The very high levels of medium-chain fatty acids are similar to those found in milk from *Saguinus oedipus* (Glass and Jenness, 1971).

Milk from *Leontopithecus rosalia rosalia* thus appears similar to milks from those other New World monkeys which have been investigated, and similar methods of hand-raising should prove appropriate.

References

- Bridgwater, D. D. (Ed.) *Saving the lion marmoset: Proceedings of the Wild Animal Propagation Trust Golden Lion Marmoset Conference*. Wheeling, West Virginia: Wild Animal Propagation Trust, 1972.

Supported by Grant RR-00451 from the U. S. Public Health Service. Dr. R. W. Cooper of the Institute for Comparative Biology, and now of the California State University, San Diego, generously provided the sample.

Author's address: Ministry of Agriculture, Fisheries and Food, London S.W.1, England.

- Buss, D. H. Mammary glands and lactation. In E. S. E. Hafez (Ed.), *Comparative Reproduction of Nonhuman Primates*. Springfield: C. C. Thomas, 1971. Pp. 315-333.
- Buss, D. H., & Cooper, R. W. Composition of milk from talapoin monkeys. *Folia Primatologica*, 1970, 13, 196-206.
- Glass, R. L., & Jenness, R. Comparative biochemical studies of milks. VI. Constituent fatty acids of milk fats of additional species. *Comparative Biochemistry and Physiology*, 1971, 38, 353-359.

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SIXTH INTERNATIONAL CONGRESS OF PRIMATOLOGY

The next International Congress of Primatology will be held in Cambridge, England, August 24-27, 1976. The Organizing Committee has now embarked on the lengthy process of arranging this meeting. This will be complicated by the uncertain economic situation and associated difficulties in obtaining funds. It is hoped to keep the costs to delegates as low as possible, but this is likely to become increasingly difficult. Nevertheless, a program will be compiled to attract as many delegates as possible so that the meeting will be truly international.

Working parties have been established to investigate the feasibility and value of organizing sessions on the following topics:

(1) Medicine: Diseases transmissible between man and other primates; Stress and arterial disease in primates; Primates in contraceptive research. (2) Behavior: Predictive science in primate sociology; Brains, hormones, and behavior; Brain lesions and visual behavior in primates. (3) Evolution: Hominid evolution; Evolution of nonhuman primates. (4) Miscellaneous: Economics of primate conservation; Primate trade and supply; Breeding of primates; "Barro Colorado Island revisited"; Education in primate biology; Primate visual systems; Feeding behavior and nutrition in primates; Data organization; Recent developments in prosimian research; Terminological issues in behavior studies with special reference to macaques; Field studies of chimpanzees; Field studies of orangutans.

Comments, suggestions, and offers of contribution to specific topics will be welcomed as soon as possible, so as to help in the final selection of symposia and seminars. Contact: David J. Chivers, Secretary, Organizing Committee, c/o Laundry Farm, Barton Road, Cambridge CB3 9LH, U.K.

TWO PRIMATE CHAIRS FOR SALE

Two primate chairs on stands. Type: Rhesus Monkey, BRS/LVE Catalogue No. PC-001. \$300 each or best offer.--Contact: Miss B. Stinson, Administrative Assistant, Psychology Department, University of Toronto, 100 St. George Street, Toronto, Ontario, Canada M5S 1A1 (Phone: 416-928-3400).

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NEW PRODUCTS AND SERVICES

(All information in this section has been abstracted from material supplied by the vendor)

LITTON BIONETICS, INC., COMMERCIAL PRIMATOLOGY is promoting capabilities applicable to specific research programs in the field of primatology. Some technics which may be applicable to your specific needs are the following: Laparoscopy for use in Contraception, Reproductive toxicology, Teratology, Timing conception to ± 12 hours, Harvesting ova, Determining regulatory and/or stimulatory effects of experimental fertility agents; In-utero surgery for the study of Embryology and Alteration of the fetal nervous system for behavioral studies; and Experimental Surgery. Available experimental models include *Macaca mulatta*, *Macaca fascicularis*, *Macaca arctoides*, and *Cercopithecus aethiops*. Litton Bionetics also maintains complete laboratory animal medicine and consulting services. Direct inquiries to: Mr. Michael Abbaticchio, Litton Bionetics, Inc., 5516 Nicholson Lane, Kensington, Md. 20795. (Phone: 301-881-5600, Ext. 241, 269)

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FRESH FROZEN MONKEY BRAINS WANTED

Fresh frozen monkey brains wanted (used as controls) in small or large quantity. Please indicate if there is any cost involved. Contact: Dr. N. C. Sun, Dept. of Pathology, USC-John Wesley Hospital, 2826 So. Hope St., Los Angeles, Calif. 90007.

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SAIMIRI SCIUREUS WANTED

Six to 10 squirrel monkeys (*Saimiri sciureus*) males and females are needed for educational studies of animal behavior. Non-naive animals can be used. Contact either Tom Hershberger or Carolyn Serfass, Chatham College, Psychology Dept., Woodland Rd., Pittsburgh, Pa. 15232. (Phone: 412-441-8200)

TROOP OF JAPANESE MACAQUES FOR SALE

An intact, natural troop of Japanese macaques (*Macaca fuscata*) was transported from its home near Kyoto, Japan, to a ranch near Laredo, Texas, in February 1972. The project's goal was to maintain the integrity of the troop and continue the collection of data on the social behavior of the monkeys (which have been studied in Japan since 1954), and at the same time, set up a breeding colony which at some time in the future would provide monkeys for research to institutions in this country.

The recent death of the owner of the project, Mr. E. J. Dryden, Jr., of Laredo, has placed the entire responsibility of continuing the project on his family. Because of this, the decision has been made to sell the troop of monkeys, now numbering 154, to an institution or individual interested in continuing the project. To preserve the integrity of the troop for behavioral research, individual monkeys will not be sold. For information contact: Mrs. E. J. Dryden, Jr., P. O. Box 1968, Laredo, Texas 78040.

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ORANGUTAN MATERIAL AVAILABLE

Pongo p. pygmaeus. Female age 22 years, frozen, intact except for abdominal incision. Male premature but near term, frozen intact. U.S.D.I. letter will accompany specimens. Contact: Dudley Brown, Assistant Director, Fort Worth Zoological Park, 2727 Zoological Park Drive, Fort Worth, Texas 76110.

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TEACHING WORKSHOP IN ENDOSCOPY

We are planning a teaching workshop on endoscopy techniques in primate and other laboratory animals. The workshop will be held at the Delta Primate Center on April 28, 29, and 30, 1975. There will be presentations and demonstrations by individuals skilled in the techniques, discussions and demonstrations by representatives of instrument companies, and opportunities for individuals to use the techniques in live animal subjects. Fees, housing, and meals will be less than \$100. The number attending will be limited. Contact: Dr. Richard M. Harrison, Tulane University, Delta Regional Primate Research Center, Covington, Louisiana 70433.

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

Books

Primate Aggression, Territoriality, and Xenophobia. A Comparative Perspective. Ralph L. Holloway (Ed.) New York/London: Academic Press, 1974. 524 pp. [Price: \$29.50]

A comparative account of primate aggression. The book covers the aggressive behavior of all primate taxa from tree shrews to man, and incorporates social, behavioral, and physiological data. Contents: Introduction, by R. L. Holloway. Comparative Behavioral Data: A review of aggressive behavior in the tree shrews, by M. W. Sorenson; Aggression and territoriality in nocturnal prosimians, by P. Charles-Dominique; The role of aggression among diurnal prosimians, by R. W. Sussman and A. Reichard; Agonistic behavior in neotropical primates, by L. L. Klein; Colobine aggression: A review, by F. E. Poirier; Variation in cercopithecoid aggressive behavior, by U. Nagel and H. Kummer; Xenophobia among free ranging rhesus groups in India, by C. H. Southwick, M. F. Siddiqi, M. Y. Farooqui, and B. C. Pal; Factors influencing the expression of aggression during introductions to rhesus monkey groups, by I. S. Bernstein, T. P. Gordon, and R. M. Rose; Aggression in natural groups of pongids, by T. K. Kitcain. Comparative Physiological Data: Androgens and aggression: A review and recent findings in primates, by R. M. Rose, I. S. Bernstein, T. P. Gordon, and S. F. Catlin; Comparative primate neuroanatomy of structures relating to aggressive behavior, by O. J. Andy and H. Stephan; Problems in the analysis of agonistic behavior in the squirrel monkey: An attempt at a solution by means of telestimulation technique, telemetry, and statistical methods, by M. Maurus; Alterations of social behavior with neural lesions in non-human primates, by A. Kling and R. Mass. Comparative Approaches. Brain stimulation and aggression: Monkeys, apes, and humans, by R. Plotnick; Agonistic behavior of primates: A comparative perspective, by J. P. Scott; The myth of the aggression-free hunter and gatherer society, by I. Eibl-Eibesfeldt; Aggressive behavioral systems, by C.R. Carpenter.

*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. Any author wishing to have a published paper abstracted in this section may do so by sending the Editor a copy of the reprint or abstract and indicating his desire on the reprint.

The Siamang in Malaya: A Field Study of a Primate in Tropical Rain Forest. David J. Chivers. (*Contributions to Primatology*. Vol. 4). Basel: Karger, 1974. 236 pp. [Price: \$69.15]

This detailed description of the ecology and behavior of the siamang has been prepared so as to facilitate a direct comparison with other rain forest mammals, particularly primates. The primary aim of the book is to illustrate the way the siamang utilizes its habitat and social organization, within and between groups. The emphasis is on quantitative description and behavior patterns are therefore described qualitatively only where the siamang differs from the white-handed gibbon, which has already been the subject of detailed studies. Included are an analysis of ranging behavior, a study of the relation between the siamang and its habitat in terms of diet and feeding behavior, and a review of daily activity patterns for the group as well as for each age and sex class. Social organization is discussed in terms of the synchronous activity and spatial relations of group members, individual behavior during travel and grooming, the maturation of young siamang, sexual behavior, aggression, and possible processes of group formation. Vocalizations are presented in terms of individual and group calling patterns; the determination of distribution and estimates of population size of the siamang and gibbons in the Malay Peninsula are largely based on calling behavior, thereby initiating a detailed comparison of related species. There is, finally, a discussion of the position of the siamang in tropical rain forest ecology.

Primate Odyssey. G. H. Bourne. New York: Putnam, 1974. 479 pp. [Price: \$9.95]

A nontechnical account of the nonhuman primates from prosimians to apes, showing where and how they live, what they look like (there are over 250 photographs and drawings), how they behave and procreate, and how they relate to our times. The book attempts to view man from the evolutionary perspective of his nonhuman primate ancestors.

Reports

The Jersey Wildlife Preservation Trust Tenth Annual Report 1973. Issued by the Headquarters of the Trust at the Zoological Park, Les Augres Manor, Trinity, Jersey, Channel Islands, 1974.

Among others, this report includes articles on Comparison of baby gorillas with human infants at birth and during post-natal period, by F. S. Carter; Maintenance, breeding and hand-rearing of lowland gorilla, by J. J. C. Mallinson, P. Coffey, and J. Usher-Smith; and The psychological development of two infant gorillas: A preliminary report, by J. Hughes and M. Redshaw.

Bibliographies

Bibliography primates: Books and monographs. Metress, J. F. (Dept. of

Soc., Univ. of Toledo, Toledo, Ohio 43606) *Bioscience*, 1973, 23, 655-658.
Lists approximately 200 books and monographs.

Films

Ecology and Behavior of The Patas Monkey (Erythrocebus patas). (16mm color, sound, 18 min.) Gartlan, J. S., Box 72, 1230 York Ave., New York 10021. [Rental price: \$18; Sale price: \$180]

The patas monkey is a predominantly terrestrial species adapted both physically and socially for life in the dry thorn savanna that extends around the southern periphery of the Sahara from Senegal to the Sudan. This film highlights field studies of the patas monkey carried out at Waza, 100 miles south of Lake Chad. Included are sequences on environment, social groups, age-sex classes, infant development and maternal behavior, feeding behavior, grooming, and interaction with other species.

Behavior

Behavior of the tree shrew, *Tupaia chinensis*, in captivity. Hasler, J. F. & Sorenson, M. W. (Dept. of Zoology, Univ. of Ill., Urbana, Ill. 61801) *The American Midland Naturalist*, 1974, 91, 294-314.

A colony of *Tupaia chinensis* (initially 24 animals) was observed daily for 10 months. Additional studies were made for 1 month on smaller groups of animals in outdoor cages. The tree shrews were fed a varied diet and their cages were arranged to simulate a natural habitat. Data were based on 245 hr of observation. The tree shrews exhibited a bimodal activity cycle; most activity occurred about 5:00 P.M. when 65% of the colony was active. Intermittent periods of rest and activity occurred throughout the day and activity varied with temperature.

Only females established a linear dominance hierarchy. One male was dominant and males were not social among themselves. Females maintained their linear ranking with chases and threatening postures but seldom with biting. The dominant male bit other males and most subordinate males died during the study. The dominant male marked areas in the cage with anal and gular gland secretions. Marking occurred during aggressive and reproductive episodes.

Only the dominant male copulated with females. Females exhibited estrous cycles of 8-9 days, 22-23 days, and 32-39 days, as well as a 43-46 day gestation period followed by postpartum estrus. Nine litters of two offspring each were born and eight of the young were cannibalized. No seasonality of copulations or births was evident. Ovulation seemingly was induced by copulation.

Sonagrams were made of five distinctive calls. Some vocalizations accompanied specific behavior patterns; others were emitted in generalized situations. Varied types of grooming were observed. Allogrooming seldom occurred and reciprocal grooming was observed only between two females.

A quantitative method for studying behaviour in small groups of monkeys

in captivity. Box, H. O., & Pook, A. G. (Dept. of Psychology Bldg. 3, Univ. of Reading, Reading RG6 2AL, England) *Primates*, 1974, 15, 101-105.

A method is described in which the behavior of individual animals is recorded to minimize order effects and observer differences in studying a small group of captive monkeys. Gross activity profiles were obtained using time sampling and a modified event recording technique. The application of this simple and relatively unambiguous recording method to the study of social behavior is indicated.

A new primate social behaviour category system. Chamove, A. S. (Primate Res. Lab., Dept. of Psychology, Univ. of Stirling, Stirling FK9 4LA, Scotland) *Primates*, 1974, 15, 85-99.

A brief critical review of some primate behavioral recording techniques is presented. A new device and scoring system, from which frequency, duration, duration/frequency, and modified frequency data of a large number of behaviors can be obtained, is described using an adding machine and printout counter. Data collected using this system is illustrated. The system, factorially arranged, differentiates five behavior types, six directions, mobility, contact, and reciprocity. Four types of reliability are estimated using films; intercorrelations and factor analyses are presented.

A reliable method for continuously monitoring motor activity in unrestrained squirrel monkeys. Love, W. S., & Houser, V. P. (Veterans Admin. Hosp., Perry Point, Md. 21902) *Behavior Research Methods and Instrumentation*, 1974, 6, 325-326.

A simple, reliable, and inexpensive method for measuring spontaneous motor activity in unrestrained squirrel monkeys is described. In this method, the home cage is suspended within a wooden enclosure in a way that allows the cage to swing in any lateral direction. This movement is recorded by two brass cylinders connected to the home cage and to the fixed wooden enclosure, respectively. The brass cylinders act as electrical contacts that serve to trigger an electronic recording device. The method is extremely sensitive.

Drugs

General anesthesia for surgery in the infant pigtail monkey, *Macaca nemestrina*. Bowden, D. M., Holm, R., & Morgan, M. K. (Regional Prim. Res. Ctr. SJ-50 & Dept. of Psychiatry, Univ. of Wash., Seattle, Wash. 98195) *Laboratory Animal Science*, 1974, 24, 675-678.

A high mortality rate among infant monkeys undergoing major surgery led to several modifications of operative procedure. Most of the modifications were directed at maintaining body temperature, hydration, and respiration during surgery and the immediate postoperative period. Subsequently, 13 infants underwent surgery consecutively without a fatality. The infants ranged in age from 19-35 days and in weight from 450-865 g. The operation (fixation of a platform to the skull and chronic implantation of intracranial electrodes) re-

quired that general anesthesia be maintained for 3-4 hr. Most of the procedural modifications which contributed to the reduced surgical risk did not require highly trained personnel or complex equipment for implementation. The technics and rationale for modifications of procedure, are described in detail.

Breeding

A ten-year summary of reproductive data for free-ranging *Macaca mulatta*. Drickamer, L. C. (Biol. Dept., Williams College, Williamstown, Ma. 02167) *Folia Primatologica*, 1974, 21, 61-80.

Analyses were made of population statistics and reproduction parameters covering a ten-year period at the free-ranging rhesus monkey colony at La Parguera, Puerto Rico. The mean annual rate of population increase was 13%. Young females gave birth to their first infant at four years of age on the average. More than 60% of the births occurred during May and June with an annual median birth date (1966-72) ranging from May 30 to June 8. Females not having an infant one year gave birth earlier than the median date the next year, while a large percentage of females giving birth late in a birth season did not produce an infant the next year. Between 40 and 50% of the infants born first or second to a female did not survive their first year, but by the fourth infant born to the same female only 9% died during the first 12 months. The social rank of adult females affected several parameters; infants born to high-ranking females had a higher rate of survival than young of low-ranking females; a larger percentage of high-ranking females gave birth each year than low-ranking females and daughters of high-ranking females produced their first infants at an earlier age than daughters of low-ranking females. Both males and females survived in equal proportions until four years of age, after which males had higher mortality rates and the death rate for females remained very low and constant.

Progress of a breeding project for non-human primates in Colombia. Bailey, R. C., Baker, R. S., Brown, D. S., von Hildebrand, P., Mittermeier, R. A., Sponsel, L. E., & Wolf, K. E. (Leticia, Amazonas, Colombia) *Nature (Lond.)*, 1974, 248, 453-455.

Between 1967 and 1970, 5,690 squirrel monkeys were released on a 1,000 acre island in the Amazon River near Leticia, Colombia. A population survey conducted in 1972 indicated the population to be between 850 and 966 animals. The single most important lesson to be learned from the Santa Sofia experiment is that controlled breeding of nonhuman primates on a large scale cannot be accomplished without considerable basic biological data to support careful planning and management, even when such projects are conducted in an apparently representative habitat within the natural range of a species. The successful breeding of *Saimiri* in the enriched tropical hammock of the Monkey Jungle, Miami, Florida, has indicated that controlled breeding of certain nonhuman primates in a natural or semi-natural

environment is possible, when careful management, including daily dietary supplementation, is provided.

Ecology and Field Studies

Current Primate Field Studies. Chivers, D. J. (Sub-dept. Vet. Anat., Tennis Court Rd., Cambridge, England) *Primate Eye*, 1974, No. 3 (Suppl.), 1-16.

This is the second issue of this supplement to the *Primate Eye*, the newsletter of the Primate Society of Great Britain. It is a listing of current field studies arranged by countries and includes a summary of such information as species studied, habitat type, dates, and address of investigators. 110 projects are reported, only 30 of which were among the 146 listed in the first supplement. The cost of the supplement is \$2.50.

The red crowned mangabey, *Cercocebus torquatus*, in Western Nigeria. Happold, D. C. D. (Dept. of Zoology, Univ. of Ibadan, Ibadan, Nigeria) *Folia Primatologica*, 1973, 20, 423-428.

New records from the high forest zone of western Nigeria extend the known distribution of the red crowned mangabey, *Cercocebus torquatus torquatus*, as far west as the Dahomey Gap. The zoogeography of *C. torquatus* is discussed.

Instruments and Techniques

An age assessment technique for the baboon (*Papio cynocephalus*). Beattie, I. A. (Dept. of Zoology, Univ. Coll. of North Wales, Bangor, Caernarvonshire, Wales) *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.

Evaluations of Primates for Research

Studies on *Tupaia glis* Diard as an experimental animal: Its breeding and growth. Shimada, A. (Mishima Gakuen Women's Coll., 3 Shimizukoji, Sendai-shi, Japan) *Experimental Animals (Tokyo)*, 1973, 22, (Suppl.), 351-358.

It was not difficult to breed *Tupaia glis* under proper laboratory conditions when well adapted. *Tupaia glis* was adaptable to many kinds of diets, such as apples and solid food suitable for monkeys and dogs. A litter consisted usually of two to three individuals and the period of gestation was about 43 to 45 days. The animal reached sexual maturity 90 to 100 days after birth. It was suggested that ovulation was induced by the stimulation of copulation.

ADDRESS CHANGES

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