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POLICY STATEMENT

The purpose of the *Newsletter* is to provide a central source of information about nonhuman primates and related matters, which will be of use both to the community of scientists who use these animals in their research and to those persons whose work supports such research. Accordingly, the *Newsletter* (1) provides information on care, breeding, and procurement of nonhuman primates for laboratory research, (2) disseminates general information and news about the world of primate research (such as announcements of meetings, research projects, sources of information, nomenclature changes), (3) helps meet the special research needs of individual investigators by publishing requests for research material or for information related to specific research problems, and (4) serves 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 $2.00 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, notes, and announcements 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 publication, 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]. For an introduction to and review of primate nomenclature see the chapter by Maryeva Terry in A. M. Schrier (Ed.), *Behavioral Primatology: Advances in Research and Theory* (Vol. 1). Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.

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the cover drawing of an orangutan.

Managing Editor: Helen Janis Shuman

CONTENTS

THE COST OF DOMESTIC BREEDING OF RHESUS MONKEYS

Orland A. Soave

Interagency Primate Steering Committee, NIH

Restrictions on the export of rhesus monkeys in 1974 and the complete ban by India on the export of this species in 1978 stimulated an increase in domestic breeding of these animals in the United States. Recent economic problems of inflation and personnel, equipment, and supply costs have influenced the development of the production of rhesus monkeys in this country. An examination of what it costs to produce a macaque at today's prices will indicate how economics have influenced the domestic breeding of monkeys.

Table 1 shows the total number of nonhuman primates imported into the United States for the years 1969-1980. Note the almost steady decline in the number of animals brought into this country. Although it is true that the elimination of the pet trade in nonhuman primates helped to reduce the numbers of animals imported, the decline has nevertheless continued in recent years. Table 2 gives the species and numbers of nonhuman primates born in the United States in 1980. The first two tables are presented for information and to give readers some knowledge of the numbers of animals currently involved for biomedical research.

Table 1. Numbers of Primates Imported Annually Into the U.S., 1969-1980. (U.S. Department of Commerce figures.)

Year	No. Animals
1969	108,974
1970	78,375
1971	79,887
1972	75,784
1973	69,548
1974	46,581
1975	40,814
1976	33,539
1977	28,559
1978	28,778
1979	22,801
1980	22,371

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Table 2. United States Production of Nonhuman Primates, 1980. (RH = Rhesus, MAC = Other Macaques, SQ = Squirrel Monkeys, MAR = Marmosets.)

	Species							
Producer	RH	MAC	*PAPIO*	*PAN*	*AOTUS*	SQ	MAR	Other
Primate Centers	1,289	635	33	15	14	128	63	136
Contracts	3,500	150	100	2		75		
Government	550	50			47	20	60	
Other	350	50	200		4	110	75	
Species Totals	5,689	885	333	17	65	333	198	136
Overall Totals	7,656							

It is a relatively easy matter to arrive at the costs for breeding nonhuman primates where things are done on a contract basis. For instance, if a $400,000 contract exists and 400 young animals are born per year--they are worth $1,000 each. This is a simple mathematical exercise and Table 3 is an example of doing this for five different institutions breeding rhesus monkeys. As the number of animals produced rises the costs declines. In a few cases where 500 young are born annually the production cost is about $1,000. Table 4 presents costs by type of housing.

Table 3. Nonhuman Primate Breeding Costs at Different Institutions.

INSTITUTION	BUDGET	ANIMALS PRODUCED	COST PER ANIMAL
A	415,802	200	$2079
B	387,124	150	$2580
C	120,509	50	$2410
D	424,646	300	$1415
E	521,086	300	$1737

Table 4. Nonhuman Primate Breeding Cost by Type of Housing For Production of 300-400 Young/Year.

Free-ranging	$1054	Corrals	$ 894
Free-ranging	$ 996	Pens (10 animals)	$1415
Corn cribs	$1067	Indoor cages	$1845

The different types of personnel categories included in the breeding programs referred to in Table 3 are shown next, in Table 5, with the percentage of time spent by each person on the project. There is a significant amount of variation in job titles and this may be due to differences in institutional job descriptions. The various cost categories used by these institutions is presented in Table 6. Most of these are self-explanatory and not unusual.

Table 5. Nonhuman Primate Breeding Types of Personnel Utilized

PERSONNEL	PERCENT OF TIME				
	A	B	C	D	E
Director	10	10	16	50	50
Veterinarian	18	27	--	100	75
Facil. Mgr. (Sup)	18	12	20	100	--
Maint. Engr.	--	25	--	100	100
Secretary	--	27	--	--	75
Lab Tech	--	13	--	--	175
Anim Health Tech	5	90	17	--	150
Coord Asst	50	32	--	120	--
Progr Asst	10	--	25	--	75
Data Tech	--	--	--	--	50
Animal Techs	400	350	175	750	600
Behaviorist	--	23	--	--	--
Behav Tech	--	23	--	--	--
Animals/Year	200	150	50	300	300

Table 6. Nonhuman Primate Breeding Cost Categories Used

Operating Supplies	Vehicle
Office Supplies	Freight, Shipping
Laboratory Supplies	Leases, Office Equip.
Serology (B virus)	Travel
Medical Supplies	Alterations, Renovations
Animal Feed	Utilities
Maintenance & Supplies	Field Supplies, Crates
Cleaning	Outside Lab Tests
Surgery Supplies	Telephone
Books, Journals	Postage
Clothes, Laundry	

Finally, if one attempts to pare costs of breeding rhesus monkeys to a base minimum, as illustrated in Table 7, it might be possible to do this for about $700 for each animal born, based on raising 300 per year. Examined from a different approach, if per diem for adult monkeys is $1.25 to $1.50 per day and the breeding colony contains 600 breeding females producing 400 young each year, production cost would be about $700 to $800 for each animal born.

The cost of breeding rhesus monkeys is high and this may be a primary factor in the declining use for research of not only this species, but others as well.

Table 7. Nonhuman Primate Breeding Minimal Costs

Personnel		
Veterinarian-Director	50%	21,250
Supervisor	50%	11,500
Maintenance	50%	8,000
Secretary	25%	3,000
Animal Technicians (4)	400%	44,000
		87,750
	Fringe Benefits (21%)	18,428
	Indirect Costs (57%S&W)	50,018
	Subtotal	156,196
Supplies		
Operating, Maintenance Supplies		7,000
Office Supplies		700
Laboratory		3,000
Medical Supplies, Drugs		3,500
Animal Feed		30,000
	Subtotal	44,200
	Total Budget	200,396

Note. Cost per animal born = $668 for 300 young per year.

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LACTOSE INTOLERANCE IN *PERODICTICUS:* A CASE STUDY

U. M. Cowgill and S. J. States

University of Pittsburgh

This communication describes a case of lactose intolerance that developed in *Perodicticus potto ibeanus* Thomas, 1910 after 18 years of captivity. It is hoped that the solution to this problem will help other primatologists whose animals develop this metabolic anomaly.

Observations

Dietary Background. Two pairs of *P. potto* arrived at Yale University from Central Africa in December 1959 (Cowgill & Zeman, 1980) and were housed together in a single large cage (12 feet long, 8 feet wide and 6 feet high). These animals were fed bananas, mealworms, embryonic mice, hard boiled eggs and a high protein porridge mixture whose base was whole, pasteurized, homogenized milk supplemented with vitamin A palmitate and D_3. In addition, the animals were offered water that contained terramycin (44-66 mg/kg body weight; No. 6791 Merck Index 9th Ed., 1976). This was added as a precaution in an attempt to prevent infection resulting from a change in habitat. This antibiotic treatment was continued for a year and then abandoned. During this period no diarrhea was noted.

Calcium Deficiency. By 1971 one pair of *P. potto* had died and the remaining female bore twins (Cowgill, 1974). At that time it was noted that both adult animals were suffering from an acute calcium deficiency. In order to resolve this problem, their drinking water was supplemented daily with 5 g calcium lactate. The amount was arrived at by analyzing the animals' fecal material for calcium. When 100 mg/kg of calcium was thus excreted it was concluded that the calcium intake was sufficient. It was discovered over time that calcium consumed in this way was rather different than calcium uptake from milk. The calcium lactate was excreted very rapidly. Usually the first bowel movement had the largest amount of calcium while the subsequent feces contained no detectable amounts of calcium. Calcium derived from milk was excreted in a more uniform fashion. The reason for supplementing the water was to increase the calcium intake rapidly in order to overcome the deficiency. In 1971 daily consumption of water containing calcium lactate for each animal was 30 g (corrected

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This work was supported by the Department of Biological Sciences of the University of Pittsburgh. The authors are grateful for the assistance provided by Dr. Alan E. Kligerman of the SugarLo Company of Atlantic City, New Jersey. Dr. Kligerman also provided us with lactase enzyme (LactAid) as well as tinned milk (LactAid) with 70% of the lactose hydrolyzed.

for natural loss). Milk (homogenized, pasteurized, whole, supplemented with vitamins A and D) was served every other day. Every 48 hours each animal consumed 50 g of milk (corrected for natural loss).

Intestinal Disturbance. In 1977 the male *P. potto* who was then 19 years old developed acute diarrhea. At this time lactose intolerance was suspected. His fecal material was examined microbiologically and found to be sterile. Nothing was done at this time since it was presumed that in the course of grooming with his mate, who exhibited no such problems, his intestines would again become colonized with enteric bacteria. The situation persisted for 18 months. During this time fecal material was examined regularly and always found to be sterile. His mate's fecal material contained *Escherichia coli* throughout the whole of her life. It was clear that the male's intestines were not going to become recolonized with enteric bacteria. Furthermore, the extent of the problem required identification. Therefore the animals were fed only milk for two days. The feces from both animals were collected immediately after production.

Materials and Methods

Lactose intolerance may be ascertained by measuring the pH of the feces. Lactose tolerance is indicated by a pH of 7-8 which was exhibited by the female *P. potto's* fecal material. That of the male's fecal material was 5.4. This acidity results from the ultimate bacterial breakdown of lactose within the colon into lactic acid and other short chain fatty acids. Lactose intolerance produces an acid stool with a pH of about 5.5. It is possible to purchase a "urine dipstick" at any pharmacy. This dipstick is inserted into the specimen. After removal followed by a one-minute rest, the paper is quickly rinsed and the color of the dipstick examined.

The stool should also be examined for the presence of glucose. Lactose, commonly called "milk sugar", is hydrolyzed by the enzyme lactase into glucose and galactose. This process normally occurs in the jejunum and the proximal ileum. The enzyme is synthesized in the brush border of the epithelial cells of the villi. The products of this hydrolysis are absorbed by the intestine, passing eventually into the blood stream. Lactose intolerance may be indicated by the presence of glucose in the stool, since, though it may have been hydrolized in the colon, it was not absorbed and hence may be detected in the fecal material. A glucose dipstick inserted into a fecal specimen should provide a reading of one-plus or more to indicate lactose intolerance.

The female produced fecal material that gave an indication of detectable glucose by this method. The microbiologically sterile fecal material of the male produced a reading of three-plus on the glucose-indicating dipstick, confirming the suggestion that he was suffering from lactose intolerance.

All milk ever fed to the animals had been homogenized, pasteurized milk, supplemented with vitamins A and D_3 such that consumption of 227 g would supply 10% and 25%, respectively, of the human daily requirement. The types of milk utilized are enumerated in Table 1.

Having identified the problem as one of lactose intolerance, initially it was decided to employ lactase enzyme (LactAid) to hydrolyze the lactose. Seventy percent reduction of lactose may be obtained by adding 5 drops of lactase to one liter of milk. To assure complete mixing, the milk is magnetically stirred for 30 minutes and then stored in a refrigerator for 24 hours before use. Fifteen drops of lactase assures complete lactose reduction. The lactose content of milk is about 5%. Complete hydrolysis produces 2.5% glucose and 2.5% galactose. The quantity of glucose can be detected with a glucose dipstick up to 2% glucose. Beyond this point it is necessary to dilute the milk with water. This procedure was used to ascertain the extent of lactose reduction.

Acidophilus milk was also used in these experiments. This milk contains a culture of *Lactobacillus acidophilus* which hydrolyzes all the lactose in milk to glucose and galactose. This preparation contains 2% milk fat.

Results and Discussion

Results are depicted in Table 1. The most successful dairy products

Table 1. Dairy products fed Perodicticus during 21 years of captivity. Results are expressed in degrees of diarrhea: none 0; slight +; moderate ++; pronounced +++; acute ++++. (Whl mlk = Whole milk.)

Dairy Product	Percent Lactose Hydrolized	Period Used	Degree of Diarrhea
1. Whl mlk in cereal	0	12/59-10/77	0
2. Whl mlk	0	12/71-10/77	0
3. Whl mlk; mlk in cereal	0	10/77-4/79	++++
4. 2% mlk; mlk in cereal	0	5/79-11/80	++++
5. Whl mlk; mlk in cereal	70	10/10/80-1/2/81	++++
6. Whl mlk; mlk in cereal	100	1/3/81-2/1/81	+++
7. 2% mlk; mlk in cereal	70	2/2/81-2/15/81	++
8. 2% mlk; mlk in cereal	100	2/16/81-3/1/81	+
9. Canned 2% mlk (LactAid)	70	3/2/81-3/7/81	++
10. Canned 2% mlk (LactAid)	100	3/8/81-3/15/81	0
11. Acidophilus mlk	100	3/15/81-present	0

used were those that had undergone 100% lactose reduction and had a low fat content, i.e., canned 2% LactAid and acidophilus milk (No. 10 and No. 11 in Table 1). It is now possible to feed the male *P. potto* milk every day with no evidence of any diarrhea. Since this problem has been resolved his appetite has improved noticeably and his degree of activity has increased.

It is interesting that this animal's blood chemistry has remained normal throughout this study. His glucose range has been 68-155 mg/dl. The latter figure refers to non-fasting conditions. It is now possible to detect an increase of blood glucose three hours after consuming low fat milk with 100% lactose reduction.

These results are especially interesting since the male's *E. coli* have never reappeared. It has been noted recently that fungal spores are prevalent in the male's feces. These have been sent to a medical mycology laboratory where identification will be attempted. It is presently thought that a permanent fungal infection has been responsible for the continued absence of the *E. coli*. Furthermore, it is also possible that this infection has affected adversely the brush border region where lactase is produced. In closing this discussion it is important to note that this animal is a good model for this affliction in man since this male potto can tolerate all sugars except lactose.

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TWO RESEARCH POSITIONS AT WISCONSIN CENTER

Two research positions are open in primate behavior: (1) psychopharmacology and neurochemical aspects of emotion and motivation; (2) social behavior. Send vita and names of references to R. W. Goy, Director, Wisconsin Regional Primate Research Center, 1223 Capitol Court, Madison, WI 53706. Start date and level negotiable. (Equal opportunity/affirmative action employer.)

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TRENDS IN PRIMATE EXPORTS FROM MALAYSIA

M. Nordin

University Kebangsaan Malaysia

There is increasing international concern over the provision of primates to meet human health-related needs. Nonhuman primates are indispensable for biomedical research, biologics production and testing for safety and toxicity. The ban by India on the export of rhesus macaques (*Macaca mulatta*) has meant that there is greater demand for its conspecific the cynomolgus or long-tailed macaque (*Macaca fascicularis*). However, bans on export by countries such as Thailand and Malaysia have reduced the availability of the cynomolgus macaque. For example, imports into the United States from Thailand and Malaysia dropped by 71 and 31 percent respectively in 1979 (Greenhouse, 1980). The purpose of this note is to present data on trends in primate exports (largely of cynomolgus macaques) from Malaysia from 1974 until 1980.

Malaysia began exporting cynomolgus macaques to consuming countries in the early fifties. The trade has been conducted by pet shop owners and animal dealers since then. Table 1 shows the number of macaques exported over the period of 1974-1980. Export level was a steady 10,000 animals per year in 1974-1977 but it jumped to about 14,000 animals in 1978. This increased export may have been the result of India's ban on

Table 1. Numbers of Macaques Exported Over Time.

Year	1974	1975	1976	1977	1978	1979	1980
Nos. of macaques exported	9,271	9,899	9,674	10,583	13,997	12,199	3,194

the export of rhesus macaques. In 1979, over the first six months, trends in export indicated that the export level would equal that of 1978. However, the government of Malaysia introduced a temporary export ban beginning in July that year and the number of macaques exported during that year fell to 12,199. In 1980 the full effect of the ban was felt although primates were allowed to be exported to *bona fide* biomedical users. During that year, only 3,194 animals were exported. Mean monthly averages of animals exported fell from 1,000 animals per month during the period of 1974-1979, to only 266 animals per month in 1980.

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Export from Malaysia went to 23 countries (Table 2). Of these, the major importers were the USA, UK, Japan and Taiwan. More macaques are exported during the months of April to August than during the northern winter months of September to March (Table 3).

Table 2. Number of Macaques Exported Over the Years According to Importing Countries.

Importing Country	Year						
	1974	1975	1976	1977	1978	1979 Jan.-June	1980
USA	1,853	3,242	3,718	3,518	5,842	2,304	1,120
UK	3,123	3,683	2,695	3,402	2,541	1,504	760
Japan	1,085	1,145	926	1,076	1,276	722	378
Taiwan	392	320	540	836	1,680	1,210	200
Belgium	301	-	464	220	838	480	60
Germany	106	144	144	-	204	491	-
Yugoslavia	350	365	320	380	640	150	230
Australia	70	182	230	524	440	47	175
Italy	539	265	252	262	256	120	-
Iran	-	-	-	140	135	-	-
Singapore	210	82	110	96	51	28	20
Hong Kong	-	-	60	52	82	40	-
Switzerland	-	21	24	58	24	14	-
Greece	-	-	-	-	50	100	19
Thailand	-	-	-	-	19	10	-
Iraq	-	-	-	-	20	-	-
Holland	72	90	15	15	-	-	-
Lebanon	-	-	-	6	-	-	-
Russia	93	75	86	-	-	-	80
France	50	-	62	-	-	-	-
Denmark	-	-	30	-	-	-	-
Romania	23	100	-	-	-	-	150
Sweden	4	182	-	-	-	-	2

Table 3. Number of Macaques Exported By Months of the Year.

	1974	1975	1976	1977	1978	1979	Means: 1974-1979	1980	1981
Jan.	519	956	877	414	803	1,346	714	202	387
Feb.	412	457	961	935	582	1,088	669	120	-
Mar.	791	1,199	531	1,130	1,011	1,480	932	239	-
Apr.	942	866	1,127	990	1,239	1,430	1,033	194	-
May	989	959	663	1,198	1,676	1,147	1,097	139	-
June	700	1,411	1,130	1,095	1,762	1,062	1,220	180	-
July	1,122	765	1,091	811	1,310	1,257	1,020	80	-
Aug.	1,197	845	892	1,087	1,147	1,094	1,034	210	-
Sept.	978	723	549	810	1,258	794	864	360	-
Oct.	531	665	480	648	836	609	632	400	-
Nov.	511	406	792	648	1,056	440	642	650	-
Dec.	579	647	581	817	1,317	452	732	420	-

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Greenhouse, D. G. Trends in primate imports into the United States. 1979. *ILAR News*, 1979, *23*, 27.

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POSTDOCTORAL FELLOWSHIP IN BEHAVIORAL MEDICINE

The Department of Comparative Medicine, Bowman Gray School of Medicine, is offering postdoctoral training in comparative and experimental atherosclerosis with a specialization in behavioral medicine (3 yr. maximum). The training grant is funded by the National Heart, Lung and Blood Institute (NIH). For details write to: Dr. Jay R. Kaplan, Atherosclerosis Research Center and Department of Comparative Medicine, Bowman Gray School of Medicine, Winston-Salem, NC 27103.

* * *

"SIABON" OR "GIBBANG"?

Adriaan Kortlandt

University of Amsterdam

Hybrids of a gibbon ♂ and a siamang ♀ (*Hylobates muelleri abotti* × *Symphalangus syndactylus*) have recently been termed "siabons" (Rumbaugh et al., 1976, Wolkin & Myers, 1980).

This designation is a misnomer because it is current zoo practice to name hybrids by combining the first part of the species name of the father with the second part of the species name of the mother. For instance, "liger" means lion ♂ × tiger ♀ and "tion" means tiger ♂× lion ♀. Many similar examples can be found in the annual issues of the *International Zoo Yearbook*. The only exception known to me is "mule" and "hinny". The aforementioned hybrids should therefore be called "gibbangs". Not following this rule causes both confusion and a loss of factual information.

Conceivably, this terminological issue could in some cases have far-reaching implications. For instance, according to the law in most countries, a "chiman" would enjoy human status, civil rights, welfare benefits etc., whereas a "manzee" would be protected only by the cruelty to animals legislation, CITES, IPPL and Animal Lib. Whether this is fiction or the future, let us face the facts and distinguish the difference.

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"SIABON" OR "GIBBANG"?: A REPLY

Duane M. Rumbaugh

Georgia State University and Yerkes Regional Primate Research Center

By the rule of convention, we should have named the hybrid a "gibbang"; however, we live in a day when conventions do not necessarily prevail, particularly when they apply to priorities pertaining to sex. Why should the male's common species name determine the prefix for a hybrid? Why not chance? Or aesthetics? "Siabon" is in our estimation much more aesthetic than is "gibbang".

The rule of convention which Dr. Kortlandt lends support seems to sustain male chauvinism through biologic nomenclature.

On the other hand, long live chauvinism!

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POSITION WANTED: REPRODUCTIVE PHYSIOLOGY BACKGROUND

I received a B.S. in biomedical science (1978) and a M.S. in veterinary anatomy (1981). My advanced degree concentration was in the area of primate reproductive anatomy and physiology. While conducting my thesis investigation at Texas A&M University, I devised and implemented a male fertility evaluation program based on electroejaculation and clinical analysis. This program is currently being used by the Texas A&M marmoset breeding facility as an additional tool to increase overall reproduction. I plan to continue on, increasing my education as well as experience in the area of primate reproduction.--Leo J. Busch Jr., Texas A&M Veterinary College, F-211-D Front St., College Station, TX 77840 (Phone: 713-845-2828).

* * *

INTERNATIONAL LION-TAILED MACAQUE SYMPOSIUM

The lion-tailed macaque (*Macaca silenus*) is a critically endangered species of primate with a discontinuous, very localized distribution within high evergreen rainforest in southwest India. Loss of habitat is the primary cause of population decline. Fewer than 300 individuals are believed to exist in the wild.

Zoos have recognized the conservation needs of this species and several zoological institutions have initiated active captive breeding programs. At the end of 1979, a total of 289 individuals (134 males, 151 females, and 4 unsexed juveniles) existed in 61 collections around the world. Of these 289 animals, 193 were born in zoos. These figures clearly indicate that zoos are essential to the continuation of the species.

Despite the fact that this species is on the brink of extinction in the wild and has received important conservation attention in captivity, much of its basic biology and captive management remain unknown. The existing literature on *Macaca silenus* is relatively meager (for a primate), and much of our understanding of this animal has not been shared or collated. An international symposium of wildlife biologists and zoological experts will do a great deal to further our efforts to protect and preserve this animal.

All scientific sessions will be held at the Baltimore Zoo, May 19-22, 1982. Field trips are planned to the National Zoo (Washington, DC), the Front Royal Conservation Center, and the Patuxent Conservation Center on Saturday, May 22, 1982.

Presentations will focus on the field biology and captive management of the lion-tailed macaque. The major topic headings include: Status and biology of the lion-tailed macaque in its native habitat; Demography and status of captive populations; Aspects of captive husbandry, health care, and nutrition; Social and reproductive behavior of the lion-tailed macaque; The future of conservation of endangered primates. In addition, smaller workshops on particular topics are planned to allow participants to discuss special topics of concern and to make firm commitments and arrangements between institutions in order to coordinate conservation efforts for this primate.

The Baltimore Zoological Society is inviting speakers from zoological institutions, biomedical research facilities, governmental conservation programs, and the academic community. Delegates from all over the world, but especially India and North America, will speak on the problems of this primate. Additional papers (to be included in the printed proceedings) will be contributed from experts unable to attend.

The Baltimore Zoo and the Baltimore Zoological Society have made

significant financial commitments to the Symposium. We are seeking individual sponsors and additional organizational sponsors from the academic, financial, and conservation communities. Additional funding from federal sources is being investigated since *Macaca silenus* is included on the U.S. endangered species list. A symposium registration fee will provide the balance of needed funds.

All arrangements for publicity, lodging, local travel, food, etc. will be handled by the staff of the Baltimore Zoological Society and the Baltimore Zoo.

For more information please contact: Dr. Paul G. Heltne, Division of Comparative Medicine, Johns Hopkins University, 720 North Rutland St., Baltimore, MD 21205 (301-955-3273); or Robert H. Johnson, c/o Baltimore Zoological Society, Druid Hill Park, Baltimore MD 21217 (301-467-4387).

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POSTDOCTORAL POSITIONS AT YERKES CENTER

Postdoctoral positions are available in a recently established NIMH research training program in Behavioral Biology of Primates at Emory University, the Yerkes Primate Research Center, and the Georgia Mental Health Institute. The goal of the program is to train scientists to investigate the biological mechanisms of behavior in infrahuman primates. Successful applicants will demonstrate a serious commitment to a multidisciplinary research approach. Areas of emphasis include social behavior, ethology, endocrinology, psychopharmacology, and several aspects of neurobiology. Participating faculty are from the Departments of Anatomy, Anthropology, Biochemistry, Biology, Medicine, Pharmacology, Physiology, Psychiatry, Psychology, and Sociology, as well as the Georgia Mental Health Institute and the Yerkes Regional Primate Research Center at Emory University. Eligibility is limited by federal regulations to U.S. citizens or aliens holding permanent residency visas. Send curriculum vitae, statement of research and training goals, three letters of reference, and other supporting documents to Chairman, Postdoctoral Training Committee, Yerkes Regional Primate Research Center, Emory University, Atlanta, GA 30322. Deadline for application is September 1, 1981 for fellowships with an earliest possible starting date of December 1, 1981. An affirmative action/equal opportunity employer.

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NEWS BRIEFS

Actions on Nonhuman Primates at CITES Meeting

The actions indicated below on U.S. proposals regarding listing of nonhuman primates were taken at the Third Biennial Meeting of the parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) held in New Delhi, February 25 through March 8, 1981.

Species	U.S. Proposal	Action
Preuss red colobus	Transfer from Appendix II to Appendix I of the population of the United Republic of Cameron	Withdrawn
Black colobus	Transfer from Appendix II to Appendix I	Withdrawn
Yellow-tailed woolly monkey	Transfer from Appendix II to Appendix I	Withdrawn
Diana monkey	Transfer from Appendix II to Appendix I	Adopted
Drill	Transfer from Appendix II to Appendix I	Adopted
Mandrill	Transfer from Appendix II to Appendix I	Adopted

[Negotiated in 1973, the Convention essentially prohibits commercial import and export of species listed under its Appendix I (those critically jeopardized by trade) and restricts export of those listed under Appendix II (potentially threatened species). Working together, a scientific and management authority in each nation must approve import and export permits for trade in species protected under the international treaty.]

Primate Research Laboratory at University of South Alabama Dedicated

On May 15, the University dedicated its new Primate Research Laboratory. The 10,000 square-foot research laboratory was designed specifically for housing a large primate breeding colony for multi-disciplinary studies aimed at improving reproduction in captivity. The facility is constructed with an indoor-outdoor animal housing area with walls that open to take advantage of mild weather and reduce energy costs. This facility is designed to meet the housing requirements of most primate species used in research. A colony of 200 Bolivian squirrel monkeys (*Saimiri sciureus*) is currently housed in the facility. The establishment

of this squirrel monkey colony has been made possible through a $1 million grant from the Division of Research Resources, National Institutes of Health. This grant represents one of the largest research-related grants in the history of the University of South Alabama.

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SYMPOSIUM ON THE USE OF NONHUMAN PRIMATES IN EXOTIC VIRAL AND IMMUNOLOGIC DISEASES

This symposium will be held February 28-March 3, 1982 in San Antonio, Texas. It is sponsored by The Southwest Foundation Forum, World Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases and the World Health Organization.

Sessions will include: General Considerations (husbandry, spontaneous diseases, primate viruses, methodologies--alternative methods, germfree and SPF nonhuman primates), Immunology and Immunologic Alterations (including blood diseases and genetic aspects, viral diseases), Comparative Medicine (animals other than simians for the study of disease), and Biohazards.

Attendance will be limited to 250 persons, and short current reports (10-15 minutes) are welcome. Abstracts will be required. All reports will be published.

Organizing Secretary: Dr. S. S. Kalter, Southwest Foundation for Research and Education, PO Box 28147, San Antonio, TX 78284, (512-674-1410).

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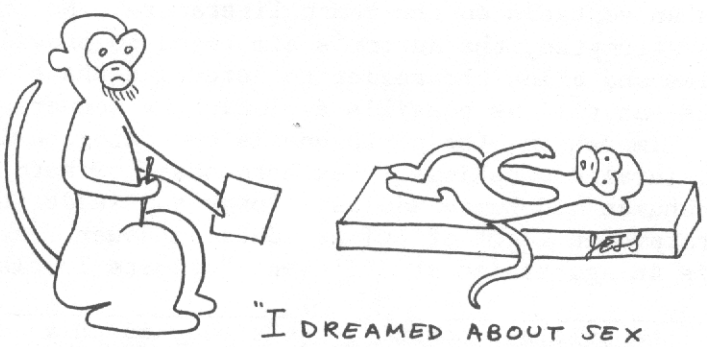

RECENT BOOKS AND ARTICLES
(Addresses are those of first authors)

Books

Auditory Regions of Primate and Eutherian Insectivores: Morphology, Ontogeny, and Character Analysis (Contributions to Primatology, Vol. 18). R. D. E. MacPhee. Basel: Karger, 1981. Soft cover. 284 pp. [Price: SFr. 66. Approx. $39.75]

This volume offers anatomical and developmental analyses of a large number of otic features commonly employed in mammalian systematics. "The...treatment of developmental relations distinguishes this work from similar systematically-oriented studies solely concerned with adult morphology." The results of the author's developmental and micro-anatomical investigation of otic structures found in strepsirhine primates and an assortment of eutherian insectivores are presented. The features selected for examination are those which are emphasized in primate systematics and related fields and chiefly include the soft and hard tissues of the middle ear. Special effort is made to relate observations and analyses to existing anatomical, developmental and paleontological literature. The monograph includes a detailed regional anatomy of the eutherian posterior basicranium, a glossary of basicranial terminology, a large number of line illustrations and photographs, and serial-section reconstructions.

Human Sex Differences: A Primatologist's Perspective. G. Mitchell. New York: Van Nostrand Reinhold, 1981. 256 pp. [Price: $18.95]

A review of investigations of sex differences in both human and nonhuman primate behavior. The book interweaves information about the psychology of women and behavioral primatology. It contains material on many aspects of sex differences, covering a large variety of species, but with an emphasis on the human literature. No theoretical orientation is attempted, the author's aim being to provide findings for each species and allow the reader to determine the similarities and differences--as well as possible evolutionary scenarios. Topics included are: Dimorphism--the phylogenesis and ontogenesis of structural and behavioral dimorphisms. Sex hormones--how hormones affect behavior in nonhuman and human adults. Power and leadership--women's movement literature in light of primate data on power. Aggression--sex differences in aggression at different "primate levels". Psycho-

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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 SJ-50, University of Washington, Seattle, WA 98195. 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.

analysis and sexism--psychoanalytic theories vs. ethological and sociobiological theories. Infant care--mothering and fathering in humans and in other primates. Culture--"protocultures" and "tradition drifts" in primates and humans. Ability and achievement--Nonhuman primate sex differences in learning ability vs. human sex differences in specific abilities. The self--cross-species comparisons of self-awareness and its relation to sex differences.

Neurobiology of Social Communication in Primates: An Evolutionary Perspective. Horst D. Steklis & Michael J. Raleigh (Eds.). New York: Academic Press, 1979. 336 pp. [Price: $26.50]

Nocturnal Malagasy Primates: Ecology, Physiology, and Behavior. P. Charles-Dominique et al. New York: Academic Press, 1980. 224 pp. [Price: $27.50]

Bibliographies

Biological aspects of circadian rhythms in nonhuman primates: A bibliography (2nd Edition). Benella Caminiti. Seattle: Primate Information Center, 1981. 278 Citations with Primate Index. [Price: $6.00. Send orders to: Primate Information Center, Regional Primate Research Center SJ-50, University of Washington, Seattle, WA 98195]

Behavior of the group, mother, and infant during the perinatal period. Studies related to parturition in nonhuman primate: A bibliography (2nd Edition. Benella Caminiti. Seattle: Primate Information Center, 1981. 162 Citations with Primate Index. [Price: $6.00. Ordering information same as in previous reference.]

Bibliography of kinship behavior in nonhuman primates (3rd Edition). Jean Balch Williams. Seattle: Primate Information Center, 1981. 380 Citations with Primate and Subject Indexes. [Price: $7.00. Ordering information same as in previous reference.]

*Behavioral observations of feral and free-ranging guenons and vervets (*Cercopithecus*): A bibliography.* Jean Balch Williams. Seattle: Primate Information Center, 1981. 168 Citations with Species Index. [Price: $6.00. Ordering information same as in previous reference.]

Social behavior of the squirrel monkey (Saimiri sciureus)*: A bibliography.* Jean Balch Williams. Seattle: Primate Information Center, 1981. 201 Citations. [Price: $6.00. Ordering information same as in previous reference.]

Adult male-infant interaction in nonhuman primates, 1940-1974: A bibliography. Jean Balch Williams. Seattle: Primate Information Center, 1981. 166 Citations with Primate Index. [Price: $6.00.

Ordering information same as in previous reference.]

Spontaneous neoplasia in nonhuman primates: A bibliography of reviews, surveys and recent cases. Benella Caminiti. Seattle: Primate Information Center, 1981. 146 Citations with Species and Organ Indexes. [Price: $6.00. Ordering information same as in previous reference.]

Disease

Simian haemorrhagic fever (SHF): New virus isolate from a chronically infected patas monkey. Gravell, M., London, W. T., Rodriguez, M., Palmer, A. E., & Hamilton, R. S. (Inf. Dis. Br., Nat. Inst. of Neurol. & Comm. Disorders & Stroke, NIH, Bethesda, MD 20205) *Journal of General Virology,* 1980, *51*, 99-106.

A new strain of simian haemorrhagic fever (SHF) virus was isolated from chronically infected patas monkey no. 248 (P-248) in USU-104 cells. The P-248 isolate had the same size, morphology and cytoplasmic site of replication as the prototype LVR strain. However, the P-248 isolate caused a persistent infection without noticeable cytopathology in USU-104 cells rather than the strongly lytic infection produced by prototype LVR virus. The capacity of P-248 virus to produce a persistent, non-lytic infection of USU-104 cells was a very stable characteristic of the isolate.

A survey for intestinal helminths in recently wild-caught *Macaca mulatta* and results of treatment with mebendazole and thiabendazole. Karr, S. L., Jr., Henrickson, R. V., & Else, J. G. (Calif. Prim. Res. Ctr., Univ. of Calif., Davis, CA 95616) *Journal of Medical Primatology,* 1980, *9*, 200-204.

One hundred *Macaca mulatta,* trapped in India and transported directly to the California Primate Research Center, were surveyed for the prevalence of gastrointestinal helminths. *Trichostrongylus* sp. was found in 86% of the animals, followed by *Strongyloides fulleborni* (63%), *Streptopharagus* sp. (38%), *Oesophagostomum* sp. (23%) and *Anatrichosoma* sp. (21%). Treatment with mebandazole and thiabendazole was efficacious against all the intestinal nematodes, with the exception of mebendazole versus *Streptopharagus* sp.

Detection of antibodies to *Herpesvirus simiae* and *Herpesvirus hominis* in nonhuman primates. Hutt, R., Guajardo, J. E., & Kalter, S. S. (Dept. of Microbiol. & Infect. Dis., Southwest Found. for Res. & Ed., PO Box 28147, San Antonio, TX 78284) *Laboratory Animal Science,* 1981, *31*, 184-189.

Sera from nonhuman primates, predominantly *Macaca* species, were assayed by a serum neutralization test for antibodies to antigenically related *Herpesvirus simiae* (B virus) and *Herpesvirus hominis* type 1. The data indicate that there would have been approximately a 50% error in the diagnosis of *Herpesvirus simiae* infection if these sera had been tested only against *Herpesvirus*

hominis antigen. The role of active guinea pig complement in the serum neutralization test was also evaluated and found to be required by many of the sera for reproducible and enhanced virus neutralization, particularly for B virus antibody determination. A plaque reduction assay was found to be highly sensitive, especially when complement (2.5-5.0 hemolytic units) was added, but impractical for large-scale serum surveys.

Facilities and Care

Nutritional implications of *ad libitum* versus limited feeding in baboons. Phillips, A. B., & Clemens, E. (Dept. of Vet. Physiol., Univ. of Nairobi, PO Box 30197, Nairobi, Kenya) *Laboratory Animal Science*, 1981, *31*, 192-193.

Significant differences in food consumption and digestibility were not observed in baboons provided a natural ingredient diet by limit feeding or *ad libitum* feeding methods. The 85% fecal recovery interval for 2-mm and 10-mm particulate markers was significantly shorter in *ad libitum* fed baboons; however, there was no significant difference in this recovery interval for 5-mm particulate markers.

Breeding

Blood groups as genetic markers in chimpanzees: Their importance for the national chimpanzee breeding program. Socha, W. W. (New York Univ. Med. Ctr., 550 First Av., NY, NY 10016) *American Journal of Primatology*, 1981, *1*, 3-13.

Severe restrictions on the importation of chimpanzees emphasize the importance and urgency of domestic breeding as a sole means to assure an uninterrupted supply of animals for medical research. An insight into the genetic structure of the self-sustained captive population of animals is indispensable to prevent the effects of inbreeding and to preserve the animals' reproductive capacity. This can be achieved by study of sets of genetic markers in the form of heritable molecular or antigenic variations detectable by relatively simple methods. Among chimpanzee blood components so far identified as possible genetic markers, red cell antigens appear to be the most useful and most readily available. The amount of information concerning blood groups of chimpanzees, their serology and genetics, number of polymorphic types, etc., surpasses data on other heritable traits in this species. A concise review of the present status of knowledge of chimpanzee blood groups and, particularly, of serology and genetics of two complex blood group systems, V-A-B-D and R-C-E-F, is given together with a few examples of their application in cases of disputed parentage. Finally, a list of practical steps is suggested dealing with introduction and use of genetic markers as elements of the national chimpanzee breeding program.

Supplemental feeding of marmoset (*Callithrix jacchus*) triplets. Ziegler, T. E., Stein, F. J., Sis, R. F., Coleman, M. S., & Green, J. H. (Dept.

of Vet. Anat., Coll. of Vet. Med., Texas A&M Univ., College Station, TX 77843) *Laboratory Animal Science*, 1981, *31*, 194-195.

In a colony of marmosets, all 15 infants from 5 sets of triplet births were successfully reared with their parents. Two supplemental feedings were given each infant daily. As an alternative to hand-rearing or foster rearing, the supplemental feeding method eliminated the time-consuming process of hand caring for an infant on a 24-hour per day basis.

Chimpanzee triplets born in captivity. Rosenthal, M. A. (Lincoln Park Zool. Gardens, 2200 N. Cannon Dr., Chicago, IL 60614) *Primates*, 1981, *22*, 137-138.

A female chimpanzee (*Pan troglodytes*) gave birth to triplets at the Lincoln Park Zoological Gardens, Chicago, Illinois. Of the 3 infants born, only one survived. The other two, both males, were dead when they were discovered. Aside from being underweight, 930 g and 630 g, respectively, the 2 animals had never developed a brain. The female nursed the surviving male infant for 6 days till it was taken for hand-rearing. The infant was in a weakened condition and weighed 890 g. He died on the next day. This is possibly the first birth of triplet chimpanzees in a North American zoological garden.

The reproductive history of a hybrid female (*Macaca mulatta* × *Macaca fuscata*). Wolfe, L. D. (Dept. Anthropology, Univ. of Florida, Gainesville, FL 32611) *Primates*, 1981, *22*, 131-134.

In 1968 a female hybrid was born into the free-ranging Arashiyama B troop of Japanese macaques (*Macaca fuscata*). At the age of 4 years this hybrid had her first offspring and by 1978 had accumulated eight descendants (five daughters, one son and two grandchildren). In this report the reproductive history of the hybrid is discussed and compared to the other non-hybrid members of the troop.

A preliminary report on the first mother-reared lowland gorillas *Gorilla g. gorilla* at the Jersey Wildlife Preservation Trust, Arnold, P. (Jersey Wildlife Pres. Trust, Trinity, Jersey, Channel Islands) *Dodo: Journal of the Jersey Wildlife Preservation Trust*, 1979, *Number 16*, 60-64.

This paper outlines the development of the first 2 mother-reared infants, with reference to previous gorilla births at the Trust.

Ecology and Field Studies

Summary of current primate field studies. Chivers, D. J. (Sub-Dept. Vet. Anatomy, Tennis Court Rd., Cambridge, CB2 1QS UK) *Primate Eye*, 1980, *15* (Suppl.), 1-15.

The distribution and conservation status of colobus monkeys in Tanzania. Rodgers, W. A. (Dept. Zoology, Univ. of Dar es Salaam, PO Box 35064, Dar es Salaam, Tanzania) *Primates*, 1981, *22*, 33-45.

Some problems of the subspecific taxonomy of both the black and

white and the red colobus are discussed. New distribution data are given which effectively close the gap between *C. angolensis sharpei* and *C. angolensis palliatus* ranges. The distribution of *C. badius gordonorum* is described. Brief details of the conservation status of 54 populations of colobus are given and a call made for the increased protection of *C. a. adolfi-friederici*, *C. a. palliatus* (s. l.) and *C. b. gordonorum* populations.

Taxonomy

Sequences of dental ontogeny and callitrichid taxonomy. Byrd, K. E. (Dept. of Biol. Structure & Physiol. & Biophysics, Univ. of Wash., Sch. Med., Seattle, WA 98195) *Primates*, 1981, *22*, 103-118.

Sequences of dental development and eruption radiographically determined for 160 immature callitrichids were combined with nonontogenetic criteria in an investigation of callitrichid affinities. Marmosets (*Callithrix* and *Cebuella*) are distinct from tamarins (*Leontopithecus* and *Saguinus*) in both sequences of dental ontogeny and nonontogenetic characters. *Callimico* presents a tamarin-like pattern in its dental ontogeny and overall appearance. A new callitrichid classification which separates marmosets and tamarins into different subfamilies (Callitrichinae, Leontopithecinae and Callimiconinae) is proposed. Dental ontogenetic data suggest that callitrichids are derived platyrrhine taxa.

Instruments and Techniques

Pattern recognition of behavioral events in the nonhuman primate. Kernan, W. J., Jr., Higby, W. J., Hopper, D. L., Cunningham, W., Lloyd, W. E., & Reiter, L. (Energy & Mineral Resources Res. Inst., Iowa St. Univ., Ames, IO 50010) *Behavior Research Methods & Instrumentation*, 1980, *12*, 524-534.

A computerized pattern recognition system has been developed that is capable of identifying 40 separate spontaneously occurring behavioral acts of the primate *Macaca fascicularis*. The system, called PROBE (pattern recognition of behavioral events), is described in detail. In its present stage of development, PROBE classifies behavioral activity with a reliability comparable to trained human observers. The potential applications for and improvements to the PROBE system are discussed.

Urine collection from vervet monkeys by instrumental conditioning. Kelley, T. M., & Bramblett, C. A. (C. A. Bramblett, Dept. of Anthropol., Univ. of Texas, Austin, TX 78712) *American Journal of Primatology*, 1981, *1*, 95-97.

Gang-caged adult male vervet monkeys were trained to urinate on demand into a plastic beaker by positive reinforcement (peanut rewards). The animals were not separated from their social group during training or sampling.

A low-cost lightweight jacket for the protection of chronically indwelling jugular catheters in rhesus monkeys. Turner, J. J., & Herndon, J. G. (Div. of Neurobiol., Yerkes Reg. Prim. Res. Ctr., Emory Univ., Atlanta, GA 30322) *Behavior Research Methods & Instrumentation*, 1980, *12*, 521-523.

A jacket for long-term protection of chronically indwelling jugular catheters in rhesus monkeys is described. The jacket is made of lightweight, durable, and inexpensive material and is easily modidied to fit animals of different sizes. It has been used successfully on over 25 animals.

Conservation

Range extension for an endangered marmoset. Mittermeier, R. A., Coimbra-Filho, A. F., Constable, I. D. (Dept. of Anat. Sci., Hlth. Sci. Ctr., Stony Brook, NY 11794) *Oryx*, 1980, *15*, 380-383. (A longer version of this report also appeared in *Rev. Brasil. Biol.*, 1981, *41*, 141-147 under the title "*Callithrix flaviceps* (Thomas, 1903) recorded from Minas Gerais, Brazil (Callitrichidae, Primates)")

During a field expedition in eastern Brazil the authors found a new population of the endangered buffy-headed marmoset *Callithrix flaviceps* in the state of Minas Gerais where it was not previously known. This was in a privately protected forest that also has an important population of the endangered woolly spider monkey *Brachyteles arachnoides* and other monkeys.

The railway and a rare colobus monkey. Rodgers, W. A., Homewood, K. M., & Hall, J. B. (University of Dar es Salaam, Tanzania) *Oryx*, 1980, *15*, 491-495.

The Tanzania-Zambia railway now bisects the Magombera Forest Reserve in Tanzania, and as a result the most viable surviving population of the rare endemic Iringa red colobus is seriously threatened. The railway has facilitated tree-felling, settlement and cultivation, and the colobus habitat is already seriously damaged. The authors conducted a survey of the forest in 1979, and recommended that the southern part, which has a viable colobus population, be included in the neighboring Selous Game Reserve, thus giving that part the stronger protection of a game reserve, and that the local people be compensated by the release to them of a small area of the Selous.

The Mountain Gorilla Project: Progress Report 3. Harcourt, A. H. *Oryx*, 1980, *15*, 324-325.

The author, Project Coordinator of the Mountain Gorilla Fund, initiated by The Fauna Preservation Society and the People's Trust for Endangered Species, describes the progress of this project. The Mountain Gorilla Project started with four main programs for the conservation of the gorilla in Rwanda's Parc National des Volcans: the Training and Equipping of a Park Guard Force; Conservation Education; Tourism Development; and a Building Program of offices and housing for the park guards. Two of these, the Conservation Education and Tourism Development

Programs, have been very successful. Progress on the others has been slow due to probably almost inevitable bureaucratic delays. Nevertheless, the training and equipping program is now under way, and only the building project remains to be started. [If you would like to support the Mountain Gorilla Project please send your gift c/o FFPS, The Zoo, Regent's Park, London NW1 4RY.]

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