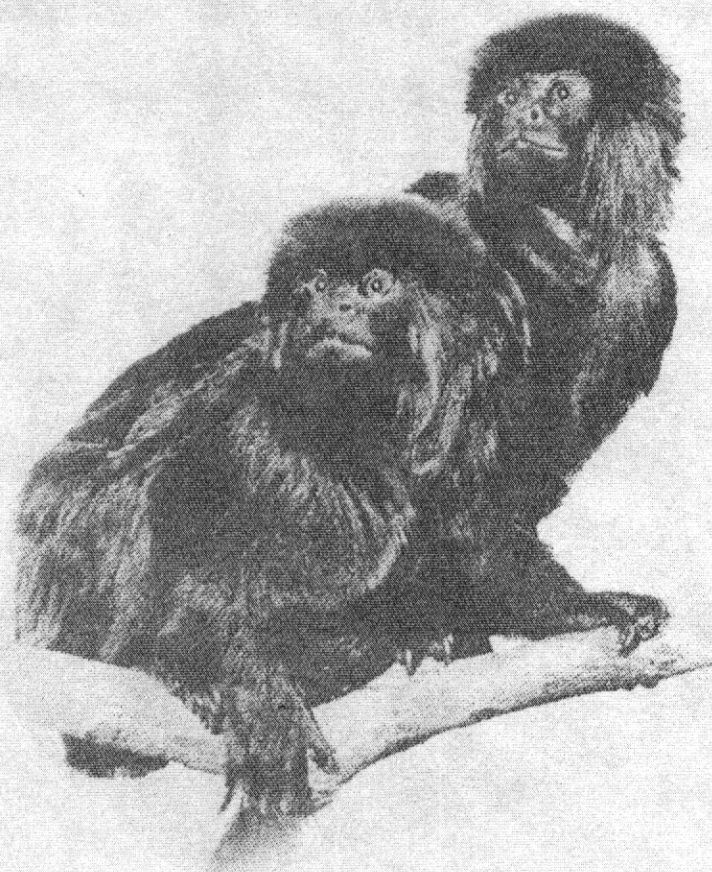


# LABORATORY PRIMATE NEWSLETTER

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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 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 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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# MINDING, MEDDLING, AND MUDDLING THROUGH

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The invitation to speak to you was accompanied by the suggestion that I address the problems of primate conservation and supply. I accepted without much hesitation, because this is an issue that concerns us all, and because it is an issue that needs to be examined thoroughly, from every point of view.

Later, as I pondered the formidable complexities of this question, and asked myself what I really knew about the problems of primate conservation and supply, and what I had to contribute, I found myself in a peculiar and uncomfortable position. I had to conclude that I had no special knowledge of these matters, no original insights to offer you, nor even a few practical suggestions that have not been made many times before.

What, then, does my own experience qualify me to say? For more than twenty years I have been involved in behavioral research with non-human primates. I have worked with many different primate species. And I have worked in many different places: I have worked in laboratories in Wisconsin, Florida, Louisiana, and California; and I have worked in various field sites in Central and South America. I am fond of monkeys and apes; I have on several occasions kept monkeys in my home, and I have always derived great pleasure and esthetic satisfaction from seeing these animals healthy and active in situations where they are free to be themselves. I have also been fascinated with understanding why they do what they do.

This is not a remarkable history. I am sure that the attitudes and experiences of many of you are similar to mine. In any event, you will agree that it does not provide me with obvious credentials for dealing with the knotty problems of primate conservation and supply. In reviewing my experience, however, it seemed to me to touch upon a related issue that has now become a matter of lively concern to large sectors of the scientific community and to the general public. A problem which I had always regarded as personal and private has entered the political realm and become the focus of a host of special interest groups. And like all matters political, it originates in a moral question.

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This article was presented as the keynote address at the Meeting of the American Society of Primatologists, Atlanta, Georgia, September 6-9, 1978.

## A Moral Dilemma

It is this question that I propose to explore with you this evening. I see it as a dilemma, and I believe it is a fundamental and inevitable consequence of being human. Since we are stuck with the dilemma, it seems the most reasonable course is to admit it exists, to become familiar with its source and structure, and to do our best to live with it.

First, let me try to describe the dilemma as I have experienced it. As I have said, I am fond of monkeys and apes. I respect their natural beauty and grace, and I enjoy the spectacle of seeing them living free. At the same time, I am curious about what causes them to behave as they do, and I am persuaded by the history of science that the information we obtain from them can play a very significant part in human affairs. In order to get such information, however, it is often necessary to treat them as the means to an end, and to act in ways that I cannot convince myself are in the best interests of the individual animal subjects (though the results may benefit the species), and which I do not believe they would choose for themselves if they were given the opportunity.

That is the dilemma. It is the age-old conflict between what is and what should be. The realities of my everyday conduct are difficult to reconcile with my ideas of what I believe is morally desirable in an ideal world. It is a common experience, by no means peculiar to scientists working with animals, nor to any other special interest group. On the contrary, it is a universal feature of human experience. We confront it daily, as employers or employees, as teachers or students, as parents or children, as partners, friends, or lovers. And it has its roots deep in the nature of the human psyche, in minding as a human activity.

### Minding

If we look for the source of this dilemma, I believe we will find that it derives from some very primitive facets of human minding. One of these is the ability to distinguish between the knower and the known. For the adult human being in Western society it is not only perfectly obvious that there is a separate external reality that has a solidity, permanence, and a structure all its own, it is impossible for him to entertain seriously any other view. Nevertheless, in other cultures, in the very young, and presumably in other animals, this distinction between the self as knower and the object which is known is not nearly as firm as it is in modern man. The point, then, is that the separation between the agent who perceives and acts from the object that produces that perception and is acted upon is an achievement of the human mind, and the firmness of this distinction varies with one's age, culture, and specific educational experiences.

Granted, however, that some such distinction between the knower and the known exists, how do we arrive at an understanding of that

external reality? At a primitive and personal level, I think an important part of the answer lies in a process that Michael Polanyi has called *indwelling*. To put Polanyi's concept in simple terms, indwelling is a kind of unconscious projection of our own attitudes, feelings, and assumptions into the objects and events of the external world (Polanyi, 1959; 1964). Child psychologists are quite familiar with this phenomenon, and perhaps you can recall examples from your own childhood in which a plant, let's say, or an inanimate object looked threatening, or "tried" to do something to you, such as a rock that tripped you, a chair that "grabbed" you as you passed. The same phenomenon is present in adults in some non-Western societies. Streams, trees, animals, specific places, are given motives, purposes, feelings, ideas, and souls (Werner, 1948). However, you may regard such attributions, I submit that this tendency is also an indispensable element in the process of ordinary human understanding in all societies, including our own. Western man relies on it far more than he realizes. To understand the behavior of another being to the point where we can begin to approach it scientifically requires first that we understand it in a simple, intuitive, noncritical way (Margolis, 1976; Rapoport, 1976). Thus, by watching a monkey and putting ourselves in its "shoes," we judge that it wants something, that it is hungry, that it knows that a banana tastes good, or that it perceives a snake and is frightened by it, or that it is unhappy, bored, in pain, or depressed. This tendency toward indwelling is at once the starting point of our understanding of why the animal behaves as it does, our ideas about causes and effects, and of the compassion we feel for it, our ideas of what should be.

That this personal and uncritical approach to understanding and moral judgment is limiting is obvious. And so these primitive tendencies become socialized and shaped by convention. The attitudes and methods of science, after all, are in large part a way of controlling the intrusion of these personal, subjective, idiosyncratic elements into what we report as fact. So, too, the conventions of ethics and right conduct take us beyond a morality based on personification and empathy by establishing social sanctions and "external" rules, by creating *thou shalt*s and *thou shalt not*s.

What I wish to emphasize here, however, is the suggestion that our ability to develop factual ideas or beliefs about objects and other beings that we perceive as separate from ourselves, and our ability to create values and moral precepts governing our conduct toward these entities, both stem from a basic characteristic of human minding. To be able to stand apart from and to objectify, and to be able to empathize and to feel with, are different aspects of a primitive mode of comprehending. The dilemma between what is and what should be arises from the discrepancy between these facets of minding, and the tensions this produces.

## Meddling

Man is obviously a meddler, and it is equally obvious that meddling is what minding is all about. Mental activity is about actions planned and taken. It is about accommodating to circumstances we cannot change and altering circumstances that are amenable to control so that they come closer to meeting our desires and fulfilling our ideals.

In animals other than ourselves, knowledge and value are closely linked, and both are rather directly tied to personal utilitarian concerns--to such matters as getting food, finding a mate, caring for young, avoiding predators, and so on. That this connection is seemingly more remote in man does not alter the fact that our knowledge and our moral precepts are also closely tied to each other and to action. We are in and of this world, and we can no more refrain from meddling with it than we can refrain from creating a distinction between the knower and the known, or making moral evaluations of our acts. They are inescapable features of our creaturehood, and of our humanity.

Even those who believe that they seek nothing more than to preserve nature as it is are required to act in behalf of their beliefs. Remember that old verse:

Woodman, spare that tree!  
Touch not a single bough!  
In youth it sheltered me,  
And I'll protect it now.

George Pope Morris, 1830

The Woodman's reply was never recorded for posterity, but the sense of it is not difficult to imagine.

Whatever success we have enjoyed as a species has been based on action. Even our current ideas that knowledge is desirable "for its own sake" and that nature is inherently valuable and worth preserving, do not enjoin us not to meddle. In fact, we have always acted on our understanding of nature, and our values about it. We have no choice, really. We are the supreme doers of this world, whether we like it or not. We now appreciate more clearly than ever before, however, that even our most noble aims and thoughtful actions have ways of producing consequences that we did not anticipate and do not want. At the very least, our recent experiences might be expected to engender a certain humility, a willingness to admit that the simple and obvious solution may not always prove the best or most desirable one.

## Muddling Through

If I may return to the more personal tenor of my opening remarks, I have never been able to reconcile fully the conflict between my interest

in understanding the world as it is--that is to say, in science--and my feelings and moral attitudes toward the animals that I work with. Moreover, I do not expect ever to be able to resolve it completely. On the one hand, I believe implicitly in the value of the scientific approach. It is in many respects the most noble, effective, and progressive institution that man has yet evolved. On the other hand, I believe just as firmly in the inherent value of the animals I work with and their right to a free and independent existence. Even if I were absolutely sure that my particular research would improve the human condition, I would find it very difficult to attach a specific *moral value* to my findings that could persuade me completely that the end justified the means.

My personal response to the problem has been to muddle through. By that I mean that I accept the moral and ethical responsibility for my meddling, knowing full well that the moral justification for it will never be totally free of ambiguity and doubt. As I see it, that is an inescapable consequence of being human. Each individual must accept personal responsibility for his actions, whether as a scientist or in any other walk of life. To deny this responsibility, or rely implicitly on some "code of conduct" handed down from above, is to deny an essential part of one's own humanity.

This is not to say that any individual can or should try to operate independently of the social context and the moral climate of his times. It is clear that the material for moral reflection and choice are derived chiefly from our personal experiences in society, including the views of our contemporaries. The point is not to deny this influence but to recognize that the need for intelligent and critical personal reflection is just as great in the moral domain as in the realm of matters of fact. After all, moral values and facts are both living creations of the human mind, and ever subject to change.

That our ideas about matters of fact are in a very dynamic state has always been evident to scientists in the modern era. And if it was not evident before that the same can be said of our ethical beliefs, it is clearly so now. I need not remind you that dramatic changes are occurring in all aspects of our moral life and at an unprecedented rate.

As participants in the contemporary social scene, we have contributed to these changes, and as participants we are also confronted with them in the form of new attitudes, new values, new customs, new facts about the human enterprise, that we must come to terms with.

It is for this reason, I think, that scientists in growing numbers are attempting the disciplined and critical application of intelligence, characteristic of science, to the problems of value and morality. (For example: Ackoff and Emery, 1972; Calhoun, 1970; Dubos, 1976; Glass, 1977; Green, 1977; Hardin, 1974; Odum, 1971; Potter, 1977; Simpson, 1966; Skinner, 1971; Sperry, 1977; Waddington, 1960.)



A few of these individuals believe that in this way we will eventually arrive at a "naturalistic" ethical system in which our knowledge of what is will tell us what should be. I grant that this approach can be enormously useful in helping us to identify values, to become more sensitive to the ethical consequences of our actions, and to deal more effectively with moral conflicts. However, I do not see this scientific approach as ever being able to prescribe what the values of humanity ought to be, for science lacks this kind of authority. I believe that moral decisions will always be personal, and the problems must be identified, agonized over, and resolved in some fashion by each of us individually.

Another symptom of the rapid changes we are currently undergoing in our moral attitudes bears directly on the use of animals in biomedical research, and on our treatment of animals generally. I am speaking, of course, of the growing concern with "animal rights" and animal welfare. Much of this effort has been directed toward increasing our general awareness of the moral implications of our use of animals, with conservation, and with finding alternatives to animal models in research.

As part of the general trend toward enhancing modern man's appreciation of his place in the global ecosystem, and increasing his awareness of his essential kinship with the other creatures of the earth, these developments are to be welcomed.

Furthermore, the issues are often so complex as to require the kind of detailed knowledge and intensive deliberation that only a specialist is likely to provide. Consider, for example, the recent case in which a proposal was made to capture and import 125 chimpanzees to be used to safety test a vaccine that may save several thousand human lives each year. How would you decide? In his report in *Science* magazine, Nicholas Wade concluded: "The world has a growing population of 4 billion people and a dwindling population of some 50,000 chimpanzees. Since the vaccine seems unusually innocuous, and since the disease is only rarely fatal, it would perhaps be more just if the larger population could find some way of solving its problem that was not to the detriment of the smaller" (Wade, 1978). I agree. But what are the available options?

Conflicts of this sort are not uncommon. And there is every reason to suppose that they will become more frequent. We need humane, and reasonable, and enlightened people who are willing to dedicate their time and talent to grappling with such issues. And there are such individuals available.

Unfortunately, however, there are also those who reject this type of muddling through in favor of more direct and dramatic solutions. I have in mind particularly a "league," which apparently speaks with (or through) one voice, and its tone often puts one in mind of another age and a more primitive and punitive approach to morality. Scientists

are castigated, their motives and integrity are impugned, their very competence is called into question, all in behalf of a "higher" morality, whose principles are implied but never made explicit. Facts, allegations, suppositions, and innuendo are presented in a caustic melange that seems to have as its main purpose to produce moral outrage in the reader. The voice of sweet reason, alas, has been supplemented by the shriller notes of dogmatism and contempt.

And I wonder why. I wonder why the moral commitment of scientists, and their efforts to facilitate conservation and to improve the lot of primates in captivity seem to count for so little. I wonder why the actors must be cast in the roles of saints or sinners, when the modern moral drama so seldom includes these parts. And most of all, I wonder why a movement dedicated to a worthy cause would adopt an approach which can only erode goodwill, compromise its credibility, undermine its effectiveness, and very likely jeopardize the long-range goal toward which it strives--the protection of primates throughout the world.

And none of us wants to see this happen. We share this goal. As primatologists we have contributed to the problem. And as primatologists we have contributed and are contributing to its solution.

Obviously, we have no reason to be complacent. The issues are complex and our resources are limited. Nevertheless, we have no choice as primatologists but to continue our collective efforts to ameliorate the problem, just as we have no choice as individuals but to recognize our personal responsibility to deal with it as intelligently and humanely as we know how. No doubt our collective resolve and our individual wishes will not always agree. No doubt the individual will continue to be confronted with the discrepancy between his deeds and his ideals, and with choices between conflicting values.

Perhaps that is a hallmark of our era. Even so, none of this is really new on the human scene. And it is not too much to hope that our uniquely human combination of Prometheus' compassion and courage with Pandora's irrepressible curiosity will once again enable us to muddle through.

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REPORT ON REPLIES TO A QUESTIONNAIRE CONCERNING THE  
EXPERIENCES OF RECENT GRADUATES AND OTHERS  
CONDUCTING FIELD STUDIES ABROAD

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With some types of research, a high proportion of new knowledge is acquired by men and women working in the field soon after taking their first degree. Their work may take them to remote places and unfamiliar cultures. The experience is often of crucial importance to their lives. Those responsible for such students have a difficult task. They must select among individuals whose capacities for coping are difficult to predict. They often have responsibilities to funding agencies to ensure that resources are used effectively. They must provide people, who see themselves as independent adults, with the support and training appropriate to the task in hand, and they must attempt to ensure that their experience is a positive one. The successful discharge of these responsibilities may be aided by an understanding of the nature of the student's experiences. One way to assess those experiences is to ask the students.

This report is based on answers to a questionnaire from four groups of workers. The first, for which the questionnaire was primarily designed, consisted of 30 primatologists. Approximately 36 questionnaires had been sent out. The students came from two universities in the U.K., one in Switzerland, five in the U.S.A. and one in Canada. They had worked in sites in Central and South America, West, Central and Southern Africa, and South-east Asia. Six were research assistants, the rest graduate students. 19 were male and 11 female.

In part because the problems of field work are not limited to primatologists, questionnaires were sent also to three other groups. Here the proportion of replies was much lower, but this was in part due to postal problems, a number being returned as undelivered. One group consisted of social anthropologists. 3 men and 4 women replied to the 34 questionnaires distributed. All were graduate students at one U.K. university, who had done field work in U.K. (2) or in South America, West Africa, or the far North. A third group consisted of five modern linguists (out of 8 questionnaires distributed). Three were male graduate students of one U.K. university and two were still undergraduates. They had worked in U.S.S.R. (3), France and Germany. Finally, questionnaires were sent to 84 men and women who had been working in underdeveloped countries with Voluntary Service Overseas (V.S.O.; an organization for sending individuals to technical posts in Third World

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Countries). Replies were received from 10 men and 11 women. All were graduates or had a professional qualification, and had been in the West Indies or East Africa. 15 had been teaching while abroad.

All respondents completed the questionnaire more than three and, with a few exceptions, less than 24 months after returning to this country. Since it was necessary to cover a wide range of experiences, and since it was by no means clear what to look for, no attempt was made to formulate questions which would elicit precise and statistically assessable answers. Rather, the questions were mostly open-ended and, by intention, some overlapped with others.

## Results

### General

The responses to the questionnaires produced a wealth of material. Most respondents sent 3 or 4 closely written or typed pages, many replied at even greater length. The extent of their replies in itself testified to the importance of the experience they had had.

As expected, summarizing the replies has proved to be a difficult task. The respondents differed enormously in personality and introspectiveness, their experiences had been diverse, and some responded more fully than others. It seemed best to group the material under a limited number of headings, to use the proportion of respondents mentioning the more important issues as an indication of their prevalence, and to rely on extensive and unedited quotations from the letters to convey qualities of experience. Naturally, this report focusses primarily on issues with some degree of generality.

A few of the students had been abroad more than once. The data discussed refers to their first trip as a graduate student, research assistant, or V.S.O. worker except where otherwise stated.

Certain shortcomings in the data must be borne in mind. Since the proportion of replies received was rather small in two of the groups, it must be remembered that those to whom field work was especially enjoyable or distasteful might be most likely to answer. However, since over eighty percent of the primatologists replied, their data are likely to be fairly representative. It must also be noted that no questionnaires were sent to students who worked only at their home base, so that no controls for normal maturation independent of field experience were available. However, the nature of the replies make it unlikely that this was important in many of the issues mentioned.

Finally, within each group, the diversity of experience was large in relation to the sample size. A much larger sample would be necessary to tease apart the effects of the various factors which seem to be im-

portant, and to assess the relations between them.

### Living Conditions

It is first necessary to summarize the living conditions of these groups.

The primatologists and anthropologists had spent from 5 months to over two years in the field (median about 1 year), nearly always far removed from urban centers. The modern linguists were all abroad for about 1 year, living in cities. Most V.S.O. workers had been abroad for longer (mostly just over 2 years), but most were in or near towns of some sort.

Only 6 of the primatologists and one anthropologist lived in a house with a water supply; most lived in tents or in prefabricated or grass huts. All of the V.S.O. workers and modern linguists lived in houses, or good quality huts, though 5 of the former seem to have had no running water. Supplies, physical dangers, and ill-health presented problems to nearly all the primatologists and anthropologists; in some cases they were acute (e.g., living on fish and meal, dangers from large animals and tropical diseases), and in others relatively mild. These were at most minor issues for the other groups.

Eleven primatologists, 4 anthropologists, and one V.S.O. respondent were more or less continuously accompanied by a spouse or other family member. Unmarried respondents were not necessarily explicit about the presence of close friends of the opposite sex, but such companionship was probably available occasionally for at most 2 of the primatologists, three V.S.O. workers and one modern linguist.

While two primatologists worked alone apart from a local helper, and several others were alone for most of the time, the majority lived in small groups of from 2 to about 20 colleagues. Some had other friends who they saw from time to time. The anthropologists were usually without colleagues (apart from those accompanied by a spouse). The modern linguists had varying degrees of contact with other students, not always of the same nationality. All V.S.O. workers except 5 had one or more colleagues from their own culture, and all had colleagues and friends whom they met locally.

### Field Experience--Positive Aspects

Since this report is concerned primarily with the problems of field work, it is necessary to emphasize first that for most, the time in the field was not only an important but also a positive experience. This was especially so with the primatologists, many of whom mentioned the beauty of the country, the contact with new aspects of natural history, the attraction of a simple life style, the stimulating effect of the personal challenge of completing their research and overcoming local difficulties, and the feeling of unity with their co-workers.

Similar themes were frequently mentioned by the V.S.O. workers, who emphasized also the local friends they made and the positive aspects of carrying responsibility.

"I especially appreciated the beauty and solitude of our study area, and the richness and diversity of life in the tropics.... there were numerous unfamiliar and exotic habitats and life forms, which held a special enchantment for me. The onset of the rains, with all the dizzying resurgence of life which they called forth, was a spectacle I shall never forget": "The camp was a beautiful place, full of wild birds and animals.... The land, for many miles around, was completely unspoilt.... The nearest town was more than 100 miles away. The feeling of quietness and isolation was very pleasant indeed"; "There was a strong sense of physical well-being which came from merely working. Most people felt happy with their bodies, and this gave them increased personal confidence": "Encounters with dangerous animals..., emergencies..., discovery of novel places, concepts... could be shared with others who received them and gave back, in a spirit of uncompetitive enquiry": "The longer I stayed in the field the more my experience was a source of help to others. This provided an extraordinarily rewarding area of personal contact, which was quite new to me": "I can only say that it was extremely gratifying to feel that your talents and achievements were recognised and appreciated": "I can frankly say that the team-work... was the most exciting and rewarding experience I could make in science".

Only three of the anthropologists made positive comments, all concerned with the way of life; the positive aspects were overshadowed by the negative ones. Similarly, only two of the modern linguists made strongly positive comments: one had been more fortunate in both academic and social contacts than the others, and the other was especially stimulated by discussions with a group of other students.

#### Difficulties While in the Field/Abroad

General.--While for the great majority the positive aspects of the experience outweighed the negative, there were a few who felt otherwise. Often the early months were the worst: "I found almost all aspects of living in the field extremely hard at first. Almost total physical, linguistic and cultural inadequacy and alienation combined with a lot of homesickness made me extremely unhappy for several months": "The worst period was the first three months. I remember vividly the first Christmas day, when the school was empty, the sun hot, myself alone in the house and thinking of the family at home...".

For those who were alone, or in small communities in isolated places, troubles had a way of multiplying: "I believe that field workers face a series of impediments, which affect one in a cumulative fashion. Because one is confined spatially and psychologically to a small area, problems and disruptions can not be dealt with and then left behind. A residue of each problem attaches itself to the next, and problems then

form part of a sequence that becomes more and more difficult to deal with."

Just because problem issues affect each other, in any particular case they cannot be considered independently. But for the purpose of assessing the incidence of issues of different types, it is necessary to consider them under a number of headings.

In assessing the responses to the questionnaires, it should be remembered that individuals accept certain difficulties. Thus, when asked about the difficulties they encountered, respondents probably tended to mention only those that, because of their nature or intensity, were not fully acceptable to them. For example, many mentioned considerable physical dangers in reply to one question, but did not refer to them when discussing their difficulties. This summary must thus be seen as concerned with *respondents' perceptions* of their difficulties,

Personal difficulties with co-workers.--These were mentioned by 18 primatologists, and must be regarded as one of the major problems for people living in small isolated groups. In at least five of these cases the immediate problem was professional, and arose from overlapping research projects or professional jealousy. Such issues are of crucial importance among graduate students who feel that their future depends on the data they collect. In other cases difficulties arose through the formation or dissolving of heterosexual couples, or through feelings of exclusion by individuals not paired. While such tensions arise in any laboratory, at a field site there is no escape from any tension present. Several respondents noted that research difficulties could affect social ones, and vice versa: one research worker depressed about his research could produce tensions through the group. When research workers formed a closely knit group newcomers could find difficulties in becoming assimilated, and the arrival of newcomers could cause tensions among those already there. Some research workers described how other people's tensions tended to be taken personally and made others feel themselves to be inadequate or evil.

Personal difficulties were undoubtedly exacerbated by local hazards: one respondent commented that the dangers under which they were living caused everyone to withdraw into themselves, and left them with no energy for comforting each other.

11 of the 15 V.S.O. workers with colleagues mentioned inter-personal friction as a cause of difficulty. Here most difficulties seemed to arise from personal incompatibilities, though sometimes lack of unanimity over the sharing of duties or local rules was an issue.

Marital issues.--Among the primatologists and anthropologists accompanied by their spouses, one couple commented that the experience strengthened their relationship, while in another case the field trip contributed to its dissolution. Several couples found it a strain--especially when living with another couple who were under tension.



Having separate living arrangements could help in such circumstances, but this would be hard on unattached persons. Major difficulties were experienced by two research workers accompanied by spouses to whom their work was uninteresting or the life style it required was uncongenial. Married persons not accompanied by their spouses suffered from uncertainties and jealousies while in the field, and tended to have difficulties in picking up their roles again on return. Not unexpectedly, difficulties could emerge when a group was composed of both couples and single individuals.

Other social problems in social living.--The answers also indicated a number of other social issues which, while normally not leading to difficulties with specific co-workers, had a considerable impact on the quality of life of workers in small isolated communities. In such a group it is easy to plunge into relationships too deeply or too fast, or to feel excluded by the relationships which others seem to be forming. Awareness of these dangers can lead to a hesitancy to enter or intensify inter-individual relationships.

"The problem was that all were (quite rightly) afraid of making mistakes, because in the small network the most difficult thing to live with would be a bad relationship. It was better to be safe, it seemed..." Such sentiments can be one cause of loneliness even within a group, and feelings of loneliness can be self-perpetuating: "After my first 6 months, when a new researcher arrived I shook his hand. It was the first person I had touched since the week I'd arrived, and I had become acutely aware of this, so much so that I felt afraid to approach anyone in case they showed signs of rejecting me in a situation where I might touch them".

Loneliness, feelings of isolation.--These were mentioned by many primatologists and anthropologists. They were probably exacerbated by local hazards, and in turn responsible for feelings of vulnerability and inadequacy. Such feelings could have long-term repercussions: "One of the most potentially dangerous aspects of spending long periods more or less alone is that small and unimportant things can be magnified out of proportion with their real significance, and lead to behaviour or letters which have long-term repercussions".

For some the experience of being much alone had many positive aspects; they felt they came to know themselves and their limitations better, or that there was a positive value in learning to cope with loneliness. Loneliness was not in general a problem for V.S.O. workers or for the modern linguists.

Lack of privacy.--This was mentioned by three V.S.O. workers, two primatologists, two anthropologists, and one modern linguist. Most primatologist's bases, where this could have been a problem, seem to have been sensibly designed with private accommodation and communal areas.

Difficulties with local people.--Seven primatologists referred to considerable difficulties with local bureaucratic officials over visas, work permits, or research clearance. This was a major problem for all three modern linguists in the U.S.S.R. Pestering by small boys or beggars was a problem for two workers in India. One anthropologist and one modern linguist were the objects of political suspicion and in danger therefrom. Two suffered major setbacks through local political strife. Anti-white color prejudice was an issue for one anthropologist and one V.S.O. worker. Three women reported unwelcome sexual attentions (one in India, two in the West Indies), all in or near urban areas. Several primatologists and 4 V.S.O. workers who used local labor found it difficult to adjust to their "laziness" or lack of expertise.

Difficulties or misunderstandings with home supervisor, advisor or headquarters.--It is desirable, but usually not possible, for research supervisors to visit research students in the field--if possible in the early phases of their study. If that is not possible, it is an asset to have a supervisor who knows the study area, and who keeps in as close touch as possible by correspondence. "I feel it's vitally important to keep a dialogue going between student in the field and advisor at home. This dialogue should exist on as many levels as possible, including theoretical approach to research methods, work accomplished, problems encountered, personal problems, motivations and desires".

Of course mail delays make this difficult, and several respondents commented that a home supervisor could not be much help since replies to queries were bound to be out of date. Among the primatologists only four made strong complaints about their home supervisor, two individuals being involved. In one case the charge was indifference, in the other it involved ignorance of local conditions, active interference, and insistence that the students should spend a high proportion of their time collecting data for the supervisor: "Many of the problems stemmed from disagreements over whose project was to take precedence when time was limited, who was to receive credit for what, etc.,--disagreements which could largely have been avoided if things had been spelled out more clearly before we started": "Having spent only a brief time in (location) during the dry season... he could not understand how much the tall grass in the wet season hindered data collection".

Only one of the anthropologists and none of the modern linguists felt themselves to have substantial problems with their supervisor while in the field.

Some research students had local supervisors or contacts, and with the research assistants this was usual. With the primatologists, one camp director was seen as cold and unsympathetic, and as demanding that excessive general camp records be kept in a form which, the assistant felt, would subsequently be useless. Another was criticized as having goals different from the home supervisor. A third was seen by research assistants as incompetent, organizing record keeping badly, and providing inadequate feedback on the course of the research. The only two anthro-

pologists to have local supervisors had negative experiences with them. Among the modern linguists, one had a very satisfactory relationship with a local supervisor and one a very unsatisfactory one.

With the V.S.O. workers the problems were, of course, rather different. The proportion experiencing difficulties with either the home headquarters or with those under whom they were working locally was about the same as with the research students. The nature of these difficulties have been communicated to the V.S.O. office.

Academic isolation.--This was very much an issue with 4 anthropologists and 7 primatologists and a lesser problem for others. In two research camps where small reprint collections were available, they seem to have been much appreciated. One respondent felt it was better to approach his research more or less naively, and a few felt reprints would have been undesirable in exaggerating the contrast between the reality of the life they were studying and academic abstractions. But the advantages of having literature available certainly far outweigh the disadvantages. Academic isolation was also a problem for 4 V.S.O. workers. Most of these were using a skill which could get out of date.

#### Aspects of Preparation for the Field Trip

The generalizations here are based on answers to questions about what in the student's training had been useful, and a request for suggestions about what could be done better. It was clear that a number of aspects of preparation for the field, such as logistical planning and medical preparations, were taken for granted by most respondents.

A very few primatologists took the view that preparations were easily overdone: "We should regain the courage to send students into the field with a few open ideas and some theoretical assumptions in the back of their minds, instead of trying to work out every possible alternative and to anticipate any possible problem".

The great majority, however, took primarily the opposite view: "I wish that I had defined more specifically and in greater detail the precise objectives of my study, in terms of how the data would be collected and analysed, before entering the field": "The study...was not terribly well organized when I arrived. Many of the data we collected are now useless...".

Among primatologists, two issues stood out. Eleven valued their previous field experience and two regretted its absence. 7 valued their previous training in methods of data collection, and 8 regretted its absence. Other issues mentioned by a number of respondents included previous study of caged primates (5), a previous thorough grasp of the research literature (6), though two expressed a contrary view, clearer definition of the research problem (5), training in survival, first aid, car-repairs, etc. (7), and learning the local language (2).

Rather similar issues arose with the anthropologists. Most voiced some discontent with their preparation for the field. Two valued previous field experience, and one regretted its absence. Shortcomings of training in practical aspects of language learning, methods of data collection, the research worker's moral and political position, and in medical matters were noted by several. In general, it seemed that this sample of anthropologists entered the field with less clearly formulated problems than the primatologists, and problems of methodology were either evaded or faced rather late in the enterprise. Most of them seemed to have both expected and obtained less direction or help from their supervisor. But some would have liked it: "...there is a turning point at the beginning of fieldwork (more specifically anthropological fieldwork, which depends upon variables which cannot be known until one is actually there) when the focus of research is decided and a 'thesis' or at least working hypotheses begin to emerge: at this stage discussion, backing and confirmation that one is on the right track seem essential for success": "Anthropologists are sent off to areas of the world which are politically usually both unstable and unpleasant at the local and national levels, with not so much as a word of advice about how to handle such situations...."

And some realized their own partial culpability in not obtaining it first: "I appreciate enormously the fact that the choices were mine, that my opinions and decisions were respected, but sometimes I would have wished more positive advice and discussion in depth of the rationale of my project... I wish some realistic advice had been given to me with regards to the fact that I was not particularly making the right decision...."

The modern linguists had less to say about their pre-training, though deficiencies in the colloquial language and in training in research techniques were mentioned. Those V.S.O. workers who mentioned their previous training were almost equally divided in emphasizing its merits and deficiencies: training inappropriate to the job to be done was as much an issue as training inadequacy.

Frustrations in work.--Individuals who undertake research or other work of this sort are usually very highly motivated to make a success of it. Anything that hindered the attainment of goals was therefore seen as of crucial importance. Among primatologists, difficulty in locating the animals they were studying was a major problem for at least ten respondents. Some of the research assistants in primatology felt dissatisfied by inadequately formulated research goals or the absence of feedback on the results of their endeavors. A comparable issue arose with several of the V.S.O. respondents--lack of a challenging work load, the difficulty of making any real impact on their work, inadequate briefing from predecessors, and in two cases differences in values from their (ecclesiastical) local bosses.

Work schedule.--Fourteen of the primatologists thought that they had worked too hard. This was a problem of their own self-imposed work

schedule or of the nature of their work, and not (with one possible exception) a consequence of supervisor's demands. Their own strong motivation and fears that they might miss important observations, feelings that they were having a unique experience which would never be repeated, actual difficulties in leaving the study site, and a growing unwillingness to gather the energy to make a move, all contributed to this.

"The field worker has to work flat out all the time because (a) the time is limited and usually he will not be able to return to the field site again, so the maximum amount of data has to be collected in the minimum time, (b) there are continual seasonal ecological changes which affected the behaviour of the animals I was studying; if I was to monitor these changes I could not afford to take time off"; "So much happened in my study group that I would have been miserable trying to take time off".

In retrospect, however, many came to feel that they would have obtained more or better data had they paced themselves more lightly, perhaps with a regular day off or weekend away. This would have been valuable not only for relaxation, but for analysis or reflection based on data collected, and for planning for the future. A number of students clearly felt that, once in the field, they had been swept along on the tide of their own schedule of data collection, and had not *thought* enough.

Five of the anthropologists and one modern linguist thought likewise: "If one is living in an isolated social situation, with only a few other people, it would be helpful to take frequent short breaks away from those people to alleviate the unavoidable social tensions": "One independent researcher at our study site (and only one) engaged in the singularly sane practice of taking Sundays off... That person is a remarkably well adjusted individual for whom I have the utmost respect and admiration. He also conducted a highly commendable study": "I tended to work *much* too long before taking a break, almost entirely because of the anxiety about data collection described above. This has consequences both scientific and psychological. On the scientific side, not enough data got analyzed in the early stages of field work, and I made less attempt than I ought to have toward improving data collection.... On the psychological side, I flew off the handle occasionally, threw furniture, and experienced severe eye strain two-thirds of the way through".

"I feel...that one should *analyze* data regularly, and prepare reports in which the data are used to document ideas that one is testing out in one's head.... If I had been made to write such reports I would have *hated* it all at the time, but I would be grateful now". Once again, with the V.S.O. workers the problem was different: only one complained of over-work, but several indicated that they could have done with less leisure time.

Many thought that a break after 3-6 months would be advisable, especially if it provided an opportunity to analyze data and discuss them with their supervisor (12 primatologists, 4 anthropologists). Of course there are practical difficulties in the way of this, such as the gap in observations and the expense of travel: in U.K. research councils normally provide only return fare. There is also another point of view--one anthropologist and one primatologist argued against such a view in that it would have diminished their gradually acquired empathy with their subjects and surroundings.

Other problem areas.--Of other issues raised, climatic or local physical factors were mentioned by 4 primatologists and 2 anthropologists. Physical dangers, either from large animals, snakes, or the terrain, were mentioned by a number of workers: "It is difficult to do good research while constantly worried about safety". At some sites, health was a problem--another issue which interacted with the high motivation of the research workers: "Malaria drains away one's strength, which means that one should rest for a while after each attack. But the impatient field worker often returns to work before he has fully regained his strength. He then becomes quickly run down and again becomes susceptible to this insidious and debilitating disease". Other issues raised were mostly either specific to one site, or are considered elsewhere in this report.

Differences between field conditions and expectations about it.--Many respondents noted marked differences, others none, and others deliberately inhibited expectations. Generalizations are thus hard to make. In any case, it is by no means clear that a precise correspondence between expectations and reality is desirable, and difficulties may arise through misconceptions in either direction: "I expected X to be far more isolated, far more physically rigorous, and much less interesting than it turned out to be. I think that this was important because I was continually surprised and delighted. Many people came with the opposite expectations, and complained about practical and logistic issues, like food shortages and health problems." Several argued that it was better to have no preconceptions: "Expectations and preconceptions can lead to bitterness, confusion, and disappointment, and generally poison the time in the field, not to mention disrupt research. I saw several researchers succumb to the feeling of 'this is not the way things were supposed to be, not how I planned them, therefore I am unhappy and want to get out'".

Several V.S.O. workers seem to have been disappointed to find that they were to work under conditions more civilized than they had expected.

#### Selection of Field Workers

Many respondents had comments to make on the qualities needed for success in the field. Some of these referred to particular skills or past experiences that were or would have been valuable in their own project. Among primatologists and anthropologists strong motivation

related to the task in hand was held to be crucial by many. Several primatologists commented that the popularization of field research, though it has done much good for nature conservation, has as a by-product tended to attract some of the wrong people into research. Among personal qualities, tolerance, adaptability and a sense of humor came at the top of the list. Two primatologists argued that the competitiveness that is often selected for in university environments is often incompatible with trust, teamwork or tact. Perhaps a degree of academic success or intelligence was assumed: they were not mentioned.

#### Return From the Field

The most interesting feature of the answers was the frequency with which some form of disorientation or alienation was felt on return home. This was mentioned by 23 primatologists, all 8 anthropologists, 3 modern linguists and 13 V.S.O. workers. "The return from the first trip was dreadful: I felt I had little in common with those in college and didn't know where to begin to analyse my data. I was highly critical of much of British society, particularly materialism and concern for 'things', which struck me. Concentration with respect to reading and taking things in was at an all time low": "I found returning home far more difficult than going. I found it very difficult to talk to people and be social. University life seemed rather hollow. I could not sit still to work and it took several months before I did any useful work on my thesis": "We feel 'different' now and find it difficult to make friends because other people don't understand what we talk about and are not interested in the same things as us. We seem to see life differently and, we think, more clearly now--this means there are many things in Britain which we dislike, disagree with or just cannot understand".

The symptoms of this "re-entry syndrome", as one respondent described it, can be considered in three groups.

Culture shock.--This took a number of forms. The most common was shock at the noise and dirt of cities: "It was as though I had been in contact with the basics of life and found this noisy and ugly superstructure not only irrelevant but irreverant".

Others emphasized their dismay at the apparent intolerance, selfishness and triviality of urban life, the ignorance of the third world, or the general artificiality of civilization (6 primatologists, 2 anthropologists, 1 modern linguist, 7 V.S.O. workers): "It made me...feel acute depression about the progress of 'civilization', 'consumer society'. Since fieldwork I have not lost this depression although I've come to live with it better": "I am much more critical of the consumer society, and have tried to retain as much as possible the simplified life to which I grew accustomed in the field": "I felt I had suddenly been deprived of genuine truth and beauty and had to conform to life in an ugly and highly ordered fantasy".

Others just found the general complexity of life daunting: "One feels threatened by an overwhelming abundance in every aspect of life, by the speed at which life travels, and by the divergent paths people have taken in pursuing their ambitions": "I could not walk into a crowded department store or cope with the pace of living".

Difficulties in social interaction.--A high proportion of respondents reported social difficulties on return home (21 primatologists, 7 anthropologists, 3 modern linguists and 11 V.S.O. workers). There seem to be a number of different issues here.

Many returning workers felt themselves to have had an experience of enormous importance, and were dismayed to discover great difficulty in sharing their experience to others, who appeared indifferent to it (8 primatologists, 4 anthropologists, 1 modern linguist and 3 V.S.O. workers): "I felt a barrier between me and others when I tried to describe what life had been like in the field--as if they didn't believe me because things *couldn't be* like that. This, at worst times, made me start to doubt all my own impressions and judgements in every area of life".

Some came to hate talking about their experiences except to others who had shared them. Indeed the difficulty was often exacerbated by a desire to maintain emotional and psychological ties with the field experience. Many found that comparability of experience determined and dominated their relationships. While many found that very close ties persisted with their former field workers, others noted that these were temporarily strained if one was seen to adjust to home life more quickly than the other. Some who had enjoyed membership of a small mutually supportive group were jarred by the transition to an alien and fast-paced city. Loneliness on return home was a problem almost as often as in the field. Many found themselves much more interested in a few close relationships than on a larger circle of acquaintanceships. Perhaps a preoccupation "with profound reassessments of basic values and philosophies" was present in more respondents than realized it.

In view of this complexity, it seems that no one factor was primary in the marked changes in social functioning that these returning workers noted in themselves. While about a third of the returning field workers noted a decrease in social confidence, this could have been a cause or a consequence of other effects. But it does seem clear that these changes were related to the time spent alone or in a small group. They were much less common and less marked among the V.S.O. workers, most of whom, although abroad for longer, had experienced less social isolation. Indeed while 11 primatologists noted loss of social confidence on return home, only 2 V.S.O. workers did so, and 5 reported an increase. Since loss in social confidence was about as frequent among primatologist research assistants as among those involved in a research degree, it is unlikely to be due to thesis preoccupations.



Of course, in addition to these direct effects of field experience, there were a number of issues that arose purely as a result of absence from home--students found that their old friends had left the university and they had little in common with the new generation, V.S.O. workers were forced to settle in a new part of their home country.

Work difficulties.--Many of the students had difficulties in settling down to work on return (16 primatologists, 7 anthropologists and 2 modern linguists). However, the difficulties encountered by the modern linguists were only slight, and only 5 V.S.O. workers reported problems. It is here that the absence of control data from a group of students who completed all their thesis work in their home university is most to be regretted. Many students find their last year as a graduate student stressful. There is a thesis to be written, often against a deadline, and a job to be got. All that can be said is that return from the field, with the switch from data collecting to the realities of preparing a thesis, might well be likely to exacerbate these difficulties.

Once again, the issues were multiple. In some cases the cause was reported as a continuation of the apathy, fatigue, depression or general intellectual low gear which had set in in the field. Others found they simply couldn't concentrate, were restless, or had no academic confidence. Some suffered from the same sort of difficulty in communication with academic colleagues as others had reported in their social life: "The social change was university specific and I think partly due to the fact that my colleagues were related to me through my work. Yet this work (field work) was so far removed from their professional experience (mostly experimental psychology) that it was difficult to fit into their framework. I think I could not convey to them the significance of the work".

In most cases, however, the factors were not clearly specified, and the work problems may have been secondary to social ones. Anthropologists, and to a much lesser extent primatologists, seem to have a special problem in reducing the richness and humanity of field experience to an academic thesis. "A recurrent problem has been to accept the academic restraints imposed on two years of very rich experience which then have to be transposed into a doctoral dissertation".

General.--This separation of symptoms into culture-shock, social, and work problems is, of course, artificial. Problems of one sort were certainly exacerbated, and may have had their roots in, those of another.

Of course, the severity of the effects varied greatly. They were clearly milder and less frequent in the last two groups than in those who had been in less civilized places. Indeed a high proportion of the V.S.O. workers and modern linguists commented on the pleasures of returning home, but this was very rare in the other groups.

It is difficult to assess how long the effects lasted. Most re-

spondents would probably agree that in some ways their experiences had changed them permanently. Most said the major effects wore off in a few months, but some commented that they learned to live with them: "Difficulties in fitting into British life still continue although not so much as in the first few months. Since they are caused by deep changes in us, I expect the difficulties to continue".

One of the most perceptive remarks about the return home came from an anthropologist: "Successful adaptation depended upon becoming involved again in activities here... One has to rekindle an interest in this environment, rather than withdrawing to daydream of the field life-style".

There were also indications that responses to the return home habituated with successive trips: "After my first field experience it was difficult to get back into the groups that I had established beforehand. I was used to relating to a different type of people, and the sophistication and fast pace of the activities in North America were somewhat disconcerting for about one or two months. After several field trips, however, my feeling in returning from the field is one of relief, being pleased to find a change in the speed and efficiency in which things get done and rather fatigued by the slow pace of life in tropical countries in which I have done my field work".

#### Afterthoughts

This summary does scant justice to the richness of the material furnished by these questionnaires. For instance, no attempt has been made to discuss the changes in personality which many respondents felt themselves to have undergone--changes perhaps not wholly unexpected to an outsider, but of great importance to the individuals concerned.

What lessons are to be learned? Most are implicit in the preceding discussion, but perhaps five issues should be emphasized.

(a) Selection of field workers. This material tells us little about how this should be achieved, but it does indicate that qualities in addition to academic excellence or professional proficiency may be crucial for success. Furthermore those qualities will vary with the nature of the project--social characteristics may be important in one context, pig-headedness in another.

(b) Social aspects of field work. These can be crucial. Those responsible for directing camps should make physical arrangements that permit privacy but combat loneliness, select their party with an eye to compatibility, try to arrange that individuals do not become excluded, and take care to incorporate newcomers.

(c) Preparation for field work. So far as primatology is concerned--and I am not competent to speak about the other areas mentioned--

the days when it was possible to gather useful data by wandering round the jungle with a notebook and pencil are long gone. Proper preparation is crucial. Problems must be formulated, data collection methods outlined and practiced, and the field worker trained in the skills necessary for his project.

(d) Supervisor-student relations. Students are adults, and must be allowed a degree of independence. Their motivation is almost invariably very high. At the same time they may need all the support and advice a supervisor can provide, both academic and personal. Supervisors should arrange research so that inter-personal jealousies among highly motivated students are minimized. While it is reasonable in some circumstances to expect students to contribute data to a central pool as well as to pursue their own projects, it is essential that the demands should not be heavy and that the contributions should *be seen to be useful*. Research assistants, especially, should be shown the results of the analysis of the data they have collected--it is soul-destroying to collect data that is merely filed. At least some graduate students profit from being asked for reports. In small group situations, the role of the camp director can be crucial.

(e) Return home. These data establish that one must expect a proportion of students to be disorientated in some degree on return home. Understanding is certainly called for. In the case of graduate students, special measures may sometimes be possible.

Finally, it is perhaps important not only for the returning field worker, but also for those at home, that the "re-entry syndrome" should not be seen as aberrations. There is food for thought not only in the fact that so many of these young men and women felt a degree of repulsion for the civilization to which they returned, but also in the fact that their feelings waned in the ensuing months. It is appropriate that an individual's values and way of life should accommodate in some degree to the society in which he is living, but it is also essential that lessons learned in other environments should not be entirely forgotten.

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#### PRIMATE SKELETAL MATERIAL NEEDED

A new service is planned that will offer professional quality cast material in epoxy resin through the custom molding and casting of primate skeletal material. For this purpose, specimens from all the primate families are being sought. Parties interested in supplying specimens or in exchanging molding-for-casts should contact: R. Steven Gumbay, P. O. Box 19246, Denver, CO 80219. Telephone: 303-455-5566.

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## PREDATORY BEHAVIOR IN A CAPTIVE RHESUS MONKEY

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A review of the recent literature reveals that there are an increasing number of reports of predatory behavior by nonhuman primates. Moreover, the conception of hunting as being *primarily* a male activity in all primate species is being challenged. Estrada and his coworkers (Estrada & Estrada, 1977; Estrada, Sandoval, & Manzanillo, 1978), for example, have reported that, among free-ranging stump-tail monkeys (*Macaca arctoides*), adult females conduct up to 70% of the hunting of birds, reptiles, etc. Harding and Strum (1976) found that, in their study group, olive baboon males (*Papio anubis*) started the "tradition" of hunting, but that adult females and immatures rapidly acquired the behavior.

Opportunity for predatory behavior in captivity is, of course, limited. However, some predation has been observed in several of the outdoor enclosures at the California Primate Research Center (CPRC). Toads, snakes, and birds have been the principal victims. Given the current interest in the topic of predation, it seemed worthwhile to report, in some detail, an incident of predation upon a bird (*Passer domesticus*) by an adult female rhesus monkey (*M. mulatta*) at the CPRC. This female, "Lucy", was eight and one-half years old and was laboratory born. She was caged in a 3.4 x 3.4 x 2.1 m enclosure (No. OC-10) with an adult male rhesus, "Julius". Julius was also laboratory born and was eight and one-half years of age. The animals were part of a breeding study funded by the CPRC.

Although the actual capture of the bird, a house sparrow, was not witnessed, the attention of two observers was drawn to the cage immediately after the capture due to a great deal of disturbance (huffing, cage shaking, etc.) created by the monkeys. Presumably the excitement was a response to Lucy's successful attempt to capture the bird. Lucy had previously been observed to snatch at birds who flew through the cage (which was made of chain link fence); a successful capture had never before been witnessed, however.

Lucy immediately began to chew and shred the bird, devouring feathers, body, etc. Julius avoided watching Lucy, but was notably tense and submissive (note that Lucy was *not* in estrus at the time). When the bird was finally dropped, half eaten, to the floor, Julius quickly grabbed the carcass and proceeded to chew and apparently

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swallow it. After perhaps an hour, only some pieces of intestine remained on the cage floor. Twenty-four hours later a keeper reported finding a more or less intact bird carcass in enclosure OC-10. Because Julius and Lucy almost certainly ingested most, if not all, of the bird captured the previous morning, this carcass may have been the result of the capture of a second prey. Observational learning may have been involved in the capture of the latter bird; learning appears to be important in the transmission of baboon hunting habits (e.g., Harding & Strum, 1976).

In response to informal questions, various researchers and staff at the CPRC reported that carcasses of birds and toads are occasionally discovered in outdoor cages; sometimes only feathers are found, indicating that the monkeys consume their prey on at least some occasions. Capture does not necessarily lead to ingestion, however.

If our understanding of predation in primates is to be made more complete, incidents such as the one reported above should be made available, even if in anecdotal form, to those interested in the study of primate predation and ecology, gender differences, or the evolution of carnivorousness in the primate order.

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#### SYMPOSIUM: "QUALITY ASSURANCE: EFFECTS OF DISEASE AND ENVIRONMENT ON LABORATORY ANIMAL RESEARCH"

The Metropolitan New York and Delaware Valley Branches of the American Association for Laboratory Animal Science will present their eleventh annual joint symposium, entitled "Quality Assurance: Effects of Disease and Environment on Laboratory Animal Research", to be held at the Governor Morris Inn, Morristown, N.J., June 14-15, 1979.-- Contact: Dr. Jerald Silverman, American Health Foundation, Valhalla, New York 10595. (Phone: 914-592-2600)

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## YELLOW FEVER IN MONKEYS

On November 7, 1978, the Ministry of Health (MIH) for Trinidad and Tobago received reports that monkeys were dying in the Guayaguayare Forest in southeastern Trinidad. Investigations following a similar report in 1959 led to the discovery of an epizootic of yellow fever in monkeys and a single case in man.

Officials of the MIH, Ministry of Agriculture, and Caribbean Epidemiology Center (CAREC) visited the area on November 9 and verified the reports. They arranged for the collection of *Haemogogus* mosquitoes and for the capture of sick or dying monkeys. Viral studies have shown that the *Haemogogus* mosquitoes were infected with yellow fever virus. An incompletely identified viral specimen in the brain of a dead monkey is still under study. The MIH immediately began to intensify vaccination, surveillance, and efforts to control *Aedes aegypti*.

Armed forces and forest workers had previously been vaccinated. The expanded program will include school children and residents who live near forested areas and all MIH personnel. Intensified surveillance for sick and dying monkeys has revealed no substantiated reports of sick monkeys in any other area than the Guayaguayare Forest, and since November 18 there have been no reports of sick monkeys from the Guayaguayare Forest itself. *Haemogogus* mosquitoes are being collected from the Chaguaramas Forest, located in northern Trinidad, because of the large adjacent urban areas. Although surveillance for clinical cases of yellow fever in humans has been intensified, no human cases have been found. Efforts to control *A. aegypti* have been increased in the residential areas bordering the forests, and in all hospitals and their immediate environs.--Reported by the Ministry of Health, Trinidad and Tobago, in the Caribbean Surveillance Report, December, 1978. Editorial Note: The forested areas of Trinidad should now be considered enzootic for yellow fever. Travelers to Trinidad who plan to visit the forested areas should be vaccinated for yellow fever. Although *A. aegypti*, the mosquito vector of urban yellow fever, is present in urban areas of Trinidad, these areas are uninfected. Thus, those who limit their travel to Port of Spain and other urban areas need not be vaccinated. [From *Morbidity and Mortality Weekly Report*, December 15, 1978, p. 509.]

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## PRIMATE BREEDING AT THE PRIMATE CENTER IN SUKHUMI\*

The Institute of Experimental Pathology and Therapy in Sukhumi, Georgia (the "Sukhumi Monkey Center") has a 60-bed hospital, research buildings, and primate colonies spread over 100 acres. In addition, the Institute recently acquired 22,000 acres for expansion of breeding colonies, and is currently constructing a 40-million ruble (\$50 million) addition to its laboratory space. At Sukhumi, primate production is an integral part of research design. Breeding colonies at Sukhumi must provide virtually all of the Institute's animal model needs. Primate breeding has been carried out at the Institute since its inception. Currently there are some *Papio hamadryas* in the ninth generation of animals whose lineage can be traced to the original colony established in 1927. Furthermore, the Directorate at Sukhumi plans to expand the production colonies to include 12,000 animals.

Whereas, in the USA, much research in reproduction has been concerned with understanding the reproductive process to create more effective means of contraception and to prevent birth defects, in the USSR much of the research has focused on increasing primate production. The Soviets have made a special effort to learn about hormone levels, nutritional requirements, and environmental factors related to increased productivity of their breeding colonies.

One area of experimentation is different methods of caging. Most of the primates at Sukhumi have been moved into large outdoor cages about 4 m square and 3 m high. This type of caging has iron bars and occasionally has shelter for the animals. Another variety of this cubicle is attached to buildings. Some groups of primates are housed in large outdoor compounds on the southern slope of the colony grounds. These compounds are about 3/4-acre, are surrounded by 8 m high concrete walls, and usually have small shelters.

Experimentation at Sukhumi has shown that primates living outdoors are sturdier and more vigorous than those confined in pens or cages. As a further experiment in primate production, the Institute has released a colony of 105 baboons to live out-of-doors in the mountains about 20 km from Sukhumi. The site is isolated by a 20 m wide stream and a vegetated mountain embankment that is very steep and more than 100 m high. Although harvesting of the outdoor colony has been limited, the animals are doing well in the environment. All these baboons have remained at this site, and nearly all have survived a winter there and are reproducing well. When baboons become ill, they are removed and are not returned to the mountain colony.

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\*The information presented here was gathered by Drs. William I. Gay and Joe R. Held of the National Institutes of Health during a trip to the USSR in 1977.

This report is based on a note in the *Journal of the American Veterinary Medical Association*, 1978, 173, 1063-1064.

Since Soviet research institutions must depend on their own limited production for all their primate needs, there is a great effort to obtain optimum use from each animal. After an experiment is terminated, the animals which remain "normal" are maintained for use in a breeding colony. The cost of maintaining animals in laboratories in the USSR is not computed on a daily basis as in most institutions in the USA. When animals cannot be replaced from an outside source, even experimental animals become important breeding stock. In the USA, there also is a trend to place experimental stock into breeding colonies as imported primates become more difficult to obtain.

Another unique feature of the Institute is a public exhibit. The Institute traditionally has had a policy of openness, allowing visits to the laboratories and breeding colonies. However, since Sukhumi is a semitropic port on the Black Sea, the large numbers of visitors interfered with the Institute's work. Therefore, a 4-acre public display was opened in 1961. Approximately half the area consists of 2 large *Papio hamadryas* breeding compounds with an adjacent observation platform. Various Old World species housed in zoo-type cages occupy the remainder of the exhibit area. The exhibit has become a major public attraction in Sukhumi, and on a busy summer day when cruise ships are in port, there often are as many as 8,000 visitors. Some 800,000 Soviets and 40,000 foreigners visit the exhibit annually.

A staff of 30 full-time guides give group tours, including a brief lecture on the Institute's history and the importance of using primates in medical research.

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#### INTERNATIONAL PRIMATOLOGICAL SOCIETY ELECTS TREASURER AND SETS SITE OF VIIIth CONGRESS

The General Assembly of the International Primatological Society, which met on January 12, 1979, during the VIIth Congress of the Society in Bangalore, India, elected Dr. W. Richard Dukelow Treasurer of the Society. He replaces Mrs. Maryeva Terry who was serving as Acting Treasurer as well as Secretary for Membership Information.

The General Assembly also voted to accept Dr. A. B. Chiarelli's invitation to hold the VIIIth Congress in Florence, Italy during the summer of 1980. The exact dates will be announced shortly.

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## COMPARATIVE PRIMATE RESEARCH PROGRAM IN MALAYSIA ANNOUNCED

Universiti Pertanian Malaysia and Universiti Kebangsaan Malaysia have embarked upon a collaborative program of primatological research in conjunction with the University of Cambridge, England. The objective of the program is to develop the study of primate biology in Malaysia so as to (1) advance the scientific understanding of the biology of prosimians, monkeys and apes native to Peninsular Malaysia as an endeavor in its own right; (2) provide information that is essential for the conservation of these animals in both natural and disturbed habitats; and (3) ensure the humane and efficient use of primates in the laboratory by developing small breeding colonies for research within Malaysia under captive conditions.

During the first three years of the program, which commenced in July, 1978, material and financial support is coming from Universiti Kebangsaan Malaysia, Universiti Pertanian Malaysia, the University of Cambridge, the United States Department of Health, Education and Welfare, the Royal Society (of London), and the L. S. B. Leakey Foundation. It is intended that the program should contribute to the long-term involvement of Malaysian institutions in research that is orientated towards the conservation and efficient use of primates.

Participants in the program are seeking a balance between the conservation that is in the interests of both man and nonhuman primates and the use of the latter in scientific research. The aim is to aid the development of long-term policies at a time when the demands of mankind for land and other natural resources are seriously threatening wild animal communities throughout the world.

During the next three years, small primate colonies will be established at Universiti Pertanian Malaysia at Serdang and Universiti Kebangsaan Malaysia at Bangi, and studies of behavior, nutrition, energetics, reproduction, respiratory and cardiovascular physiology and anatomy will be initiated. Concurrently, systematic field studies are already underway to provide comprehensive census information on Peninsular Malaysian primates, and to investigate the socio-ecology of particular species and the effects of various kinds of habitat disturbance.

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2ND INTER-AMERICAN CONFERENCE ON CONSERVATION AND  
UTILIZATION OF AMERICAN NON-HUMAN PRIMATES  
IN BIOMEDICAL RESEARCH HELD IN BRAZIL

The Conference was organized by the Pan-American Health Organization (PAHO) and held in Belem, Brazil from the 24th to the 27th of October, 1978. The aims were to survey the joint research projects by PAHO and some South-American Governments on the distribution and status, on the ecological requirements and population dynamics of the platyrrhine monkeys. The results will form the basis for a more careful utilization of free-living populations and for the breeding of South-American monkeys in captivity.

As a first national project, Peru has started a breeding colony (*Saimiri sciureus*, *Saguinus mystax*) in Iquitos. Other national projects are being planned by Brazil and Colombia.

At the Conference, papers on the problems of housing, of nutrition and of health in breeding many species were presented. There were papers on *Saimiri* by Kingston and Málaga; *Saguinus mystax* by Wolf, Kingston, Málaga, and Knapka; *Leontopithecus (Leontocebus) rosalia* by Coimbra-Filho; *Saguinus oedipus* by Thomas; *Aotus* by Hunt and Heltne; and *Alouatta*, *Cebus*, and *Callithrix* by Colillas.

National American Primatological Programs were outlined (Peru: Castro; Colombia: Hernandez). Techniques and strategies of censusing and of conservation were discussed (Thorington, Heltne). The Conference ended with an all day long discussion of the actual situation of each neotropical species (Mittermeier). Hopefully, the proceedings will be published within a short time. [From a note by Hans-Jürg Kuhn (Göttingen) for *Primate Report*, No. 3, November, 1978, p. 82.]

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## INTERNATIONAL NOTES ON PRIMATE SUPPLY

Sierra Leone banned all exports of chimpanzees in August, 1978, thus bringing the country in line with all other African countries (IUCN-Bulletin, Vol. 9, No. 9). The ban is only provisional and the Government of Sierra Leone might prefer to see chimpanzee exports continue on a reduced scale and only gradually phased out.

On August 17, 1978, Panama ratified the Convention on International Trade in Endangered Species (CITES). Although primates originating from Panama never contributed sizably to the international market, primates from other South American countries were exported through Panama in recent years. Similarly, Thailand exports primates originating from other South Asian countries. Thailand is considering stopping this practice.

Belgium intends to ratify CITES at the end of the year. This means that imports of primates and controlled transfer to other members of the Common Market will be stopped. These developments will make imported chimpanzees unavailable within the foreseeable future and will eventually deplete the gray market of South American and South Asian primates. [From a letter by Prof. Dr. H.-J. Kuhn (Anatomisches Institut, Kreuzberggring 36, D - Göttingen) in *Primate Report*, No. 3, November, 1978, p. 81.]

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## COMPARATIVE PATHOLOGY CONTINUING EDUCATION COURSE

The 6th annual Comparative Pathology Course will be presented May 7-9, 1979, at the Armed Forces Institute of Pathology, Washington, DC. Military and federal service employees in the medical, veterinary and other medical fields are requested to consult respective agency regulations for appropriate application procedures. Civilian physicians, veterinarians and allied scientists are invited to apply and will be considered on a space available basis. This Course is specially designed to bring attention to disease processes in animals for which a similar entity occurs in man. Differences and similarities of pathologic lesions, as well as the biological behavior of specific entities will be compared in animals and man. Application forms to attend this Course may be obtained by contacting: The Director, Armed Forces Institute of Pathology, (AFIP-EDE), Washington, DC 20306. Completed application forms should be returned by April 6, 1979. Non-federal civilians and foreign nationals are required to submit a \$75.00 fee, payable to the Treasurer of the United States.

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

Books

*Recent Advances in Primatology. Volume 2. Conservation.* D. J. Chivers and W. Lane-Petter (Eds.). London: Academic Press, 1978. 312 pp.  
[Price: £10.50]

This is the second of four volumes containing the proceedings of the VIth Congress of the International Primatological Society held in Cambridge, England, August 22-28, 1976. Contents: CURRENT PROBLEMS OF PRIMATE CONSERVATION, Chairman and Section Editor: R. W. Thorington, Jr.; Conservation and primatology: A glum view of the future, by R. W. Thorington, Jr.; The future of primate research, by G. H. Bourne; Current problems of primate conservation in Brasil, by P. E. Vanzolini; The status of primates in Guyana and ecological correlations for neotropical primates, by N. A. Muckenhirn & J. F. Eisenberg; Nature conservation in Indonesia and its problems with special reference to primates, by E. Brotoisworo; Man's impact on the primates of Peninsular Malaysia, by Mohammed Khan bin Momin Khan; The conservation of nonhuman primates in India, by S. M. Mohnot; Primate conservation in Ghana, by E. O. A. Asibey; The conservation of primates in the United Republic of Cameroon, by J. Awunti; On habitat and home range in eastern gorillas in relation to conservation, by A. G. Goodall; Problems of primate conservation in a patchy environment along the lower Tana river, Kenya, by C. Marsh; Bioeconomic reasons for conserving tropical rainforests, by T. T. Struhsaker; The viewpoint of a conservationist, by R. S. R. Fitter; Summary remarks on primate conservation, by R. W. Thorington, Jr.; Round-table discussion on rehabilitation, summarized by M. Borner & P. Gittins. TRADE AND SUPPLY OF PRIMATES, Chairman and Section Editor: R. E. Hackett; Introduction, by R. E. Hackett; The supply of monkeys from Peninsular Malaysia, by A. C. Laursen; The trapping and export of macaques in Indonesia, by C. L. Darsono; Rhesus monkey supply and supply lines from trapper to user (quarantine facility), by D. A. Valerio; International traffic in primates from Thailand, by A. A. Eudey; Transport of primates by air, by G. E. Joss; Primate imports into the United Kingdom 1965-1975, by J. A. Burton; Economics and disease in imported simian primates, by G. W. Tribe & D. A. Bassett; Cost analysis and rate setting in a

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

primate animal laboratory, by T. A. Fitzgerald. BREEDING PRIMATES IN CAPTIVITY, Chairman and Section Editors: W. R. Dukelow & W. Lane-Petter; *Tupaia belangeri* bias, an outbred stock of tree shrews, by A. Schwaier; The production of the common marmoset, *Callithrix jacchus* as a laboratory animal, by W. A. Hiddleston; Breeding marmosets for medical research, by S. F. Lunn & J. P. Hearn; An artificial milk for hand-rearing specified pathogen free marmosets, *Callithrix jacchus*, and the growth of animals on the preparation, by J. A. Turton, K. R. Hobbs, D. J. Ford, J. Bleby, & B. M. Hall; Reproduction in the squirrel monkey (*Saimiri sciureus*), by W. R. Dukelow; Breeding *Alouatta caraya* in Centro Argentino de Primates, by O. Colillas & J. Coppo; On the keeping, feeding and breeding of leaf monkeys in the Thüringer Zoopark of Erfurt, by D. Altmann; Breeding baboons in Uganda and Cambridge, by B. A. Baker, G. F. Morris, & T. D. Cowan; The financial implications of breeding rhesus monkeys for biomedical research, by R. Korte; Reproduction in a closed colony of *Macaca arcetoides*, by J. Trollope; Key Lois Island primate breeding project: A 5-year progress report, by J. Pucak; A programme of prepartum care for the rhesus monkey, *Macaca mulatta*: Results of the first two years of study, by C. J. Mahoney & S. Eisele; Breeding statistics of *Macaca fascicularis* in Basel Zoo, by W. Angst; The influence of changed photic conditions on the breeding performance of laboratory primates (*Macaca mulatta*), by F. E. Birkner; Breeding of macaques and chimpanzees at the Dutch primate centre, by W. von Vreeswijk & H. Koning; Adaptation of monkeys to extreme conditions, by V. I. Chernyshev; The economics of nonhuman primate conservation, by L. B. Cummins, G. T. Moore, & S. S. Kalter; The breeding of nonhuman primates for biomedical research, by J. Blevy; Research management of a primate animal laboratory for medical experimentation by clinicians, by J. Moor-Jankowski & E. I. Goldsmith; Blood groups of apes and monkeys: Their use and value in experimentation and breeding of primate animals, by W. W. Socha, A. S. Wiener, & J. Moor-Jankowski; Buy or breed?, by W. Lane-Petter.

*Recent Advances in Primatology*. Volume 3. *Evolution*. D. J. Chivers and K. A. Joysey (Eds.). London: Academic Press, 1978. 509 pp. [Price: £14.80]

This is the third of four volumes containing the proceedings of the VIth Congress of the International Primatological Society held in Cambridge, England, August 22-28, 1976. Contents: PRIMATE EVOLUTION, Chairmen and Section Editors: R. D. Martin & K. A. Joysey; Major features of prosimian evolution: A discussion in the light of chromosomal evidence, by R. D. Martin; Candidates for anthropoid ancestry: Some morphological and palaeozoogeographical considerations, by G. C. Conroy; Discussion; Taxonomy and relationships of fossil apes, by P. J. Andrews; An appraisal of molecular sequence data as a phylogenetic tool, based on the evidence of myoglobin, by K. A. Joysey; Relative growth in primates, by B. A. Wood; Dento-facial relationships in sexually dimorphic populations, by M. I. Siegel; Functional morphology of hominoid metacarpals, by R. L. Susman; Allometry and encephalization, by H. J. Jerison; Brain size and

intelligence in primates, by R. E. Passingham; Fossil evidence for primate vocalizations?, by J. Wind; Laryngeal pre-adaptation to articulated language, by B. R. Fink & E. L. Frederickson; Can evolutionary knowledge lead to stable classification? Application of new hypothesis to the study of Sulawesian monkeys, by H. Khajuria. BEHAVIOURAL FACTORS IN PROSIMIAN EVOLUTION, Chairman and Section Editor: G. A. Doyle. Influences on the structure of vocalizations of three Malagasy lemurs, by L. W. McGeorge; Olfactory communication, *Galago crassicaudatus* and the social life of prosimians, by A. B. Clark; Nectar-feeding by prosimians and its evolutionary and ecological implications, by R. W. Sussman; Behavioural variation in *Lemur mongoz*, by I. Tattersall; Functional anatomy of the hip and thigh of the Lorisidae: Correlations with behaviour and ecology, by J. E. McArdle; Solitary and gregarious prosimians: Evolution of social structure in primates, by P. Charles-Dominique; Discussion of behavioural factors in prosimian evolution, by G. A. Doyle. SOME OTHER ASPECTS OF PROSIMIAN BIOLOGY, Section Editors: D. J. Chivers & K. A. Joysey; Lorisiform hands and their phylogenetic implications: A preliminary report, by H.-U. F. Etter; Home range, behaviour and tactile communication in a nocturnal Malagasy lemur *Microcebus coquerli*, by E. Pages; Physiological aspects of *Perodicticus potto*, by M. Goffart; Thermoregulation and behaviour in two sympatric galagos: An evolutionary factor, by F. Vincent; The effect of thalidomide on the greater galago (*Galago senegalensis*), by H. Butler. PHYLOGENY OF TARSIIUS, Chairman and Section Editor: M. Cartmill; Phylogeny of *Tarsius*: Introduction, by M. Cartmill; If *Tarsius* is not a prosimian, is it a haplorhine?, by J. H. Schwartz; Discussion; Cranio-dental morphology, tarsier affinities and primate sub-orders, by M. Cartmill & R. F. Kay; Discussion; Molecular evidence on the phylogenetic relationships of *Tarsius*, by M. Goodman, D. Hewett-Emmett, & J. M. Beard; Discussion; Clades versus grades in primate phylogeny, by W. P. Luckett & F. S. Szalay; Discussion; The problem of convergence and the place of *Tarsius* in primate phylogeny, by C. E. Oxnard; Discussion; Phylogeny reconstruction and the phylogenetic position of *Tarsius*, by P. D. Gingerich. MOLECULAR AND CHROMOSOMAL EVOLUTION, Chairman and Section Editor: A. E. Romero-Herrera; Blood groups of nonhuman primates: New concepts, their applications and conclusions of forty years of research, by J. Moor-Jankowski, W. W. Socha, & A. S. Wiener; Karyology of the genus *Cercopithecus*, B. Chiarelli; Nuclear cytochemistry as an approach to primate taxonomy and evolution, by M. G. Manfredi-Romanini & G. F. De Stefano; Seroprimateology: Serological reactions as a taxonomic tool, by J. Moor-Jankowski, W. W. Socha, & A. S. Wiener; Serum proteins in the Cebidae, by T. Schwegler; Serum proteins in the Callitrichidae, by W. Scheffrahn; Isozymes and plasma proteins in eight troops of golden mantled howling monkeys (*Alouatta palliata*), by L. A. Malmgren & A. H. Brush; Primate higher taxa: The molecular view, by J. E. Cronin & V. M. Sarich; Atypical evolution of papionine  $\alpha$ -haemoglobins and indication that *Cercocebus* may not be a monophyletic genus, by D. Hewett-Emmett & C. N. Cook; Concluding remarks, by A. E. Romero-Herrera. METHODS OF PHYLOGENETIC

INFERENCE: ROUND-TABLE DISCUSSION, Chairman and Section Editor: M. Cartmill; Methods of phylogenetic inference: Introduction, by M. Cartmill; Discussion. ECOLOGY AND DISTRIBUTION OF SOUTH-EAST ASIAN PRIMATES, Chairman and Section Editor: J. R. MacKinnon; Ecology and distribution of South-East Asian primates: Introduction, by J. R. MacKinnon; Variation among primate populations in Sumatra, by W. L. Wilson; Preliminary report on relations between the gibbons *Hylobates lar* and *H. pileatus* in Thailand, by W. Y. Brockelman; The species range of the gibbon *Hylobates agilis*, by S. P. Gittens; The evolution of recent Asian Colobinae, by D. Brandon-Jones; Summary of discussion, by J. R. MacKinnon. HOMINID EVOLUTION, Chairman and Section Editors: M. H. Day & P. V. Tobias; Introduction, by M. H. Day; Some aspects of mosaic evolution in hominids, by A. Bilsborough; Classification and phylogeny of East African hominids, by B. A. Wood; The place of *Australopithecus africanus* in hominid evolution, by P. V. Tobias; Some problems in Middle and Upper Pleistocene hominid relationships, by C. B. Stringer: *Homo erectus* or *Homo sapiens?*, J. Jelinek; A preliminary description of the Shanidar 5 Neandertal partial skeleton, by E. Trinkaus; Recent results concerning the biomechanics of man's acquisition of bipedality, by H. Preuschoft; Activities of hindlimb muscles in bipedal gibbons, by H. Ishida, M. Okada, R. H. Tuttle, & T. Kimura; Electromyography of pongid gluteal muscles and hominid evolution, by R. H. Tuttle, J. V. Basmajian, & H. Ishida; A mechanical analysis of bipedal walking of primates by mathematical model, by T. Kimura, M. Okada, N. Yamazaki, & H. Ishida; Cervico-cephalic anatomical sets, head carriage and hominid evolution: Phylogenetic inferences on *Australopithecus*, by M. Sakka; Sexual dimorphism in pygmy chimpanzees, *Pan paniscus*, by D. L. Cramer & A. L. Zihlman; Deciduous and permanent tooth size correlations in *Macaca nemestrina* and in *Homo sapiens*: A comparative study, by J. E. Sirianni; Observations on the genus *Ramapithecus*, by K. N. Prasad; Hunting behaviour in hominids: Some ethological aspects, by H. D. Rijkssen; The ecosystem in which the incipient hominines could have evolved, by A. Kortlandt; Primatology, palaeoanthropology and reticulate evolution: Concluding remarks, by P. V. Tobias.

*Recent Advances in Primatology*. Volume 4. *Medicine*. D. J. Chivers and E. H. R. Ford (Eds.) London: Academic Press, 1978. 227 pp.

[Price: £7.80]

This is the fourth of four volumes containing the proceedings of the VIth Congress of the International Primatological Society held in Cambridge, England, August 22-28, 1976. Contents: INFECTIOUS DISEASES OF PRIMATES, INCLUDING ZOONOSES, Chairman and Section Editor: W. I. B. Beveridge, Co-Chairman: R. A. Whitney; Primate zoonoses: The relationship of simian and human disease patterns, by R. N. T.-W. Fiennes; Health hazards associated with newly imported primates and how to avoid them, by S. S. Kalter & R. L. Heberling; Epidemic diseases of primate colonies, by J. R. Held & R. A. Whitney; Bio-hazard surveillance at a primate colony for medical research, by E. Muchmore & N. S. Swack; The danger to man of amoebiasis from

laboratory primates, by J. Remfry; Discussion; Nonhuman primates as reservoir of zoonotic disease with special reference to Brugian filariasis in peninsular Malaysia, by L. B. Liat & M. J. Wah; Prevention of fatal Herpes infections in owl and marmoset monkeys by vaccination, by M. D. Daniel, H. Barahona, L. V. Melendez, R. D. Hunt, & M. Forbes; Macaque varicella infection in a primate colony, by M. C. van den Ende; Herpesvirus encephalitis experimentally produced in baboons (*Papio cynocephalus*); by M. Brack; Studies on simian hemorrhagic fever, by W. E. Giddens, Jr., L. A. Mayer, D. Jessup, & G. Schmer; A survey of lung lesions in nonhuman primates using correlative histological and x-ray techniques, by J. E. Cooper, G. Slavin, L. Kreel, & I. F. Keymer; Discussion; Chairman's summing up, by W. I. B. Beveridge. USE OF PRIMATES IN RESEARCH ON TRANSMISSIBLE CANCER. Co-Chairmen and Section Editors: R. N. T.-W. Fiennes & S. S. Kalter; Chairman's opening remarks, by R. N. T.-W. Fiennes; Endogenous RNA oncornaviruses of nonhuman primates, by R. L. Heberling & S. S. Kalter; Discussion; Studies in nonhuman primates with exogenous type-C and type-D oncornaviruses, by H. Rabin; Herpesvirus oncogenesis in New World monkeys; History of herpesvirus oncogenesis and overview of *Herpesvirus saimiri*, by R. D. Hunt; Chairman's closing remarks, by S. S. Kalter. USE OF PRIMATES IN RESEARCH ON HUMAN REPRODUCTION INCLUDING FERTILITY CONTROL. Co-Chairmen and Section Editors: R. Heywood & C. R. Austin; Experimental designs for the use of nonhuman primates in fertility research, by A. A. Shaikh, J. W. Goldzieher, D. C. Kraemer, & T. Dozier; Discussion; Immunological suppression of fertility in primates, by J. P. Hearn; The use of female baboons for evaluation of immunological methods of fertility control, by V. C. Stevens; Discussion; Pregnancy termination in the rhesus monkey and baboon with novel non-hormonal compounds, by L. J. Lerner; Discussion; Nasal sprays for controlling ovulation in rhesus monkeys, by T. C. Anand Kumar, G. F. X. David, & V. Puri; Discussion; Toxicology of ethinyl oestradiol in rhesus monkeys, by P. F. Wadsworth & R. Heywood; Discussion, and comment, by C. E. Graham; Recovery of pre-implantation embryos in *Macaca mulatta*, by P. R. Hurst, K. Jefferies, P. Eckstein, & A. G. Wheeler; An approach to the control of male fertility using intravasal copper implant in rhesus monkeys, by K. R. Laumas, R. K. Ahsan, A. Farooq, & M. M. Kapur; Discussion; Some studies on the biology of monkey testis, by M. Arslan, M. H. Qasi, & A. A. Zaidi; Immunisation against luteinising hormone (LH-RH) in the marmoset monkey, by J. K. Hodges; Luteal estrogen secretion and decidualization in the chimpanzee, by C. E. Graham, K. G. Gould, K. Wright, & D. C. Collins; The menstrual cycle and ovulation in the Indian hanuman langur, by L. S. Ramaswami; Monitoring of body temperature in the Japanese macaque and squirrel monkey following the intravenous and intrahypothalamic administration of progesterone, by D. J. Cunningham, T. Nakayama, M. Suzuki, & H. Tokura; The use of nonhuman primates as models for research on human problems, by C. R. Austin.

Addendum: In the October, 1978, issue of this *Newsletter*, we omitted



mention of the title of Volume 1 of the series of volumes referred to above. The full title is *Recent Advances in Primatology. Volume 1. Behaviour.*

### Proceedings

*Laboratory Animal Housing.* Washington, DC: National Academy of Sciences, 1978. Paperbound. 220 pp. [Price: \$12.00 prepaid. Order from Office of Publications, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington, DC 20418]

This volume contains the prepared papers and discussions of a National Academy of Sciences-National Research Council (NAS-NRC) Symposium on Laboratory Animal Housing. It was held at the Hunt Valley Inn, Hunt Valley, Maryland, on September 22-23, 1976. The Symposium was organized by a committee of the Academy's Institute of Laboratory Animal Resources. The committee was comprised of an engineer, an architect-engineer, directors of laboratory animal facilities, and investigators in laboratory animal science and medicine. The purpose of the Symposium was to update and disseminate information on criteria for various aspects of laboratory animal housing. Contents: ANIMAL FACILITY MANAGEMENT AND DESIGN IN TERMS OF PERFORMANCE--UPDATE OF 1963 SYMPOSIUM. Have animal research facilities served the purpose for which they were designed?, by A. F. Moreland; Does management of animal facilities complement design considerations?, by C. M. Lang; Centralized versus dispersed animal care facilities, by A. M. Jonas; A theory of architecture: The orchestration of information, by S. J. Goldstein; Discussion. THE ANIMAL ENVIRONMENT. Physical, chemical, and microbial factors affecting biologic response, by J. R. Lindsey, M. W. Conner, & H. J. Baker; Social behavior in a laboratory environment, by D. E. Davis; Discussion; Interactions between primary (cage) and secondary (room) enclosures, by J. E. Woods; Engineering objectives for laboratory animal housing, by A. L. Windman & A. L. Zigas; Integrating psychosocial objectives into design, by D. J. Conway; Discussion. CONTAINMENT OF HAZARDOUS AGENTS. Introduction, by D. G. Fox; The need for hazard containment, by D. Vredevoe; Hazards associated with infected laboratory animals, by P. J. Gerone; Chemicals and toxins in the animal facility, by P. M. Newberne & J. G. Fox; Discussion; Design criteria for animal facilities, by C. B. Henke; Abilities and limitations of architectural and engineering features in controlling biohazards in animal facilities, by W. E. Barkley; Training and surveillance, by D. Vesley; Discussion. COST-EFFECTIVENESS. Opportunities for energy conservation in animal laboratories, by L. G. Spielvogel; Discussion; Energy conservation in water heating and HVAC systems, by R. L. Gorton; Energy sources and costs for building systems, by F. H. Kohloss; Automated systems, by T. E. Hickey; Materials and materials function, by A. G. H. Dietz; Discussion. SUMMARY AND CHALLENGES FOR THE FUTURE. Summary and challenges for the future, by T. B. Clarkson.

## Reports, Directories, and Guides

*Nutrient Requirements of Domestic Animals*. Number 14. *Nutrient Requirements of Nonhuman Primates*. Washington, DC: National Academy of Sciences, 1978. Paperbound. 83 pp. [Price: \$5.00. See previous reference for ordering information.]

A report prepared by the Panel on Nonhuman Primate Nutrition of the Subcommittee on Laboratory Animal Nutrition of the Committee on Animal Nutrition, National Research Council. The objective of this report on the nutrient requirements of nonhuman primates is to provide information concerning animal nutrition and nutrition practices useful to the biomedical research community. A section on general aspects of nutrition is included since factors such as diet preparation, stability, and storage can have profound effects on animal performance. Nutrient requirements of the monkey were previously considered in a section of *Nutrient Requirements of Laboratory Animals* (NRC, 1972), and this revision updates and expands the data contained in that report. Contents: INTRODUCTION. GENERAL ASPECTS OF NUTRITION. REQUIREMENTS FOR FOOD. Nutrients in food; Nutrient requirements; Diet in natural habitat. LABORATORY DIETS. Diets for newly imported animals; Natural ingredient diets; Commercial diets; Diets for newborn and infant monkeys; Purified diets. REQUIREMENTS FOR SPECIFIC NUTRIENTS. Energy; Protein; Fat and fatty acids; Fat soluble vitamins; Water soluble vitamins; Minerals; Water.

*Guide for the Care and Use of Laboratory Animals*. Bethesda, MD: U. S. Department of Health, Education, and Welfare (DHEW Publication No. (NIH) 78-23) Revised 1978. 70 pp. [For a single free copy write to: Office of Science and Health Reports, Division of Research Resources, National Institutes of Health, Bethesda, MD 20014. Bulk orders may be placed with the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402. Stock number #017-040-00427-3. The price per copy is \$2.20.]

The purpose of this completely revised *Guide* is to assist scientific institutions in using and caring for laboratory animals in ways judged to be professionally appropriate. The recommendations contained in the booklet were compiled by a committee appointed by the Institute of Laboratory Animal Resources of the National Research Council. The *Guide* was first published in 1963 under the title *Guide for Laboratory Animal Facilities and Care*. It was revised in 1965, 1968, and 1972. More than 250,000 copies of this publication have been distributed, and it is generally accepted as a primary reference on standards of animal care in scientific institutions. Included among the subjects treated in detail are laboratory animal management, laboratory animal quality and health, institutional policies, and physical plant recommendations. The National Institutes of Health guidelines for the use of experimental animals are also contained in this new edition.

*Animal Resources: A Research Resources Directory*. Bethesda, MD: Department of Health, Education, and Welfare (DHEW Publication No. (NIH) 79-1431),

Revised 1978. 57 pp. [For a single free copy write to: Research Resources Information Center, 1776 East Jefferson St., Rockville, MD 20852; or to the Office of Science & Health Reports, Division of Research Resources, National Institutes of Health, Bethesda, MD 20014.]

This directory, describing the animal resources of NIH's Division of Research Resources (DRR), has been completely revised and is now available free of charge. It is designed to aid scientists seeking resource assistance and collaboration involving animals in biomedical research. The directory identifies animal diagnostic laboratories, animal information projects, animal reference centers, special colony and model study centers, and NIH's major Primate Research Centers currently supported by DRR. Specific examples of resources provided by the program are animal surgery, x-ray and clinical pathology units; special animal research facilities such as radiation sources, scanning and transmission electron microscopes, and pollution exposure chambers; animal disease diagnostic services; reference reagents and antisera; germfree animals; and a great variety of invertebrate and vertebrate species, including domestically bred non-human primates and specific genetic strains and models in development. The directory identifies the resources provided, research emphasis or application, the principal investigator or director, and address and telephone number. A contact person is indicated for each resource. Included is a geographic index listing the resources by state and within each state. A map shows the locations of the Primate Research Centers and Animal Diagnostic Laboratories throughout the country.

*NIH Primate Research Centers: A Major Scientific Resource.* Bethesda, MD: Department of Health, Education, and Welfare (DHEW Publication No. (NIH) 78-772). Revised 1978. 64 pp.

This booklet, originally published in 1971, has been totally revised and is available free of charge. It describes in detail the history, principal research emphases, administration, research teams, research facilities, primate colonies, and services of the seven NIH national primate centers which are supported by the Division of Research Resources. A single free copy of *NIH Primate Research Centers: A Major Scientific Resource* may be secured by writing to the Office of Science and Health Reports, Division of Research Resources, National Institutes of Health, Bethesda, MD 20014.

#### Bibliographies

*Adult Male-Infant Interaction in Nonhuman Primates.* 2nd ed. *A Bibliography with Primate Index.* Jean Balch Williams. Seattle: Primate Information Center, 1978. 234 Citations with Species Index. [Price: \$4.00. Send orders to: Primate Information Center, Regional Primate Research Center (SJ-50), University of Washington, Seattle, WA 98195.]

*The Pharmacology and Toxicology of Halo-hydrocarbons in the Nonhuman Primate. A Bibliography on Biocides, Industrial Chemicals and Anesthetics.* Benella Caminiti. Seattle: Primate Information Center, 1978. 214 Cita-

tions with Chemical and Species Indices. [Price: \$5.00. Order information same as in previous reference.]

#### Disease

Hepatitis B outbreak among chimpanzees at London Zoo. Zukerman, A. J., et al. (Dept. of Med. Microbiol., London Sch. of Hyg. & Trop. Med., London WC1E 7HT England) *Lancet*, 1978, 2, 652-654.

Persistent carriage of hepatitis B virus in extremely high titre was identified in 5 out of 9 chimpanzees kept at the London Zoo. Antibody to this virus was present in the other 4 chimpanzees. Serological survey of the other primates in the Regent's Park collection did not reveal the presence of the surface antigen in 2 gorillas, 11 orangutans, and 2 gibbons, although surface antibody was present in the serum of 1 gorilla and 2 orangutans. 3 of the carrier chimpanzees were born at the Zoo and were the offspring of either a carrier mother or a carrier father, and perinatal transmission may have occurred. A strict safety code of practice was introduced and hepatitis B immunoglobulin was given at intervals to designated staff members. Sero-conversion did not occur in any of the 38 staff members under surveillance for more than 2 years. Treatment of the carrier state in the chimpanzees was attempted with human leucocyte interferon, with and without ribavirin ('Virazole'), and with adenine arabinoside, but the effects were mostly temporary.

The course of development of glucose intolerance in the monkey (*Macaca mulatta*). Hamilton, C. L., & Ciaccia, P. (Med. Res. Serv. (151), Vet. Admin. Hosp., Univ. & Woodland Aves., Phil., PA 19104) *Journal of Medical Primatology*, 1978, 7, 165-173.

Longitudinal studies of the rhesus monkey reveal a syndrome of diabetes mellitus in those that become middle-aged and obese. The sequence of events in the development of the disease progresses from normoinsulinemia with normoglycemia through stages of hyperinsulinemia followed by below normal insulin levels with hyperglycemia and glycosuria. The authors believe the rhesus to be an excellent non-human primate model for maturity-onset diabetes in humans.

#### Physiology

Hematological data of the laboratory-maintained bonnet (*Macaca radiata*) and the langur (*Presbytis entellus entellus*) monkeys. Jayaraman, S., Hurkadli, K., & Rao, S. S. (Primatol. Unit, Inst. for Res. in Repro., Jehangir Merwanji St., Parel, Bombay 400012, India) *Folia Primatologica*, 1978, 29, 98-102.

The various hematological parameters of laboratory-maintained bonnet and langur monkeys are presented. Hematologic values obtained in the bonnet monkeys were similar to those reported for other macaques. In contrast to various other reports, comparatively smaller ranges of the various parameters were found, probably because the animals have been maintained under the similar conditions for a long time. The data

on langurs are the first to be reported on these animals, according to the authors.

Growth and hematologic development of the patas monkey (*Erythrocebus patas*) to one year of age. Sly, D. L., London, W. T., Palmer, A. E., & Rice, J. M. (Meloy Labs., Inc., 2501 Res. Blvd., Rockville, MD 20850) *Journal of Medical Primatology*, 1978, 7, 156-164.

Data from 338 blood samples of 31 patas monkeys is presented to show the normal hematologic development from birth to one year of age, and is compared to 120 samples from normal adults. Marked changes in hematocrit, hemoglobin, red cell numbers, and leukocyte distribution which occurred during the first month were followed by a slow progression to adult values. Body weight data is also presented which shows a linear growth rate during the first year of life.

#### Behavior

Zoos worldwide as settings for psychological research: A survey. Maroldo, G. K. (Georgette K. Maroldo, Dept. of Psychol., Texas Lutheran Coll., Seguin, TX 78155) *American Psychologist*, 1978, 33, 1000-1004.

Ongoing and future possibilities for comparative psychological research at overseas zoos were surveyed by questionnaire. In 52 countries, 277 zoos were selected; of these, 122 (44.04%) of the zoos in 27 (51.96%) of the countries responded. The results indicate that 92 (75.41%) of the zoos in 19 (70.73%) of the countries responding would welcome sound proposals for comparative psychological research. In addition to formal answers to the survey, various zoo personnel offered valuable comments and information concerning their sites. The Discussion section lists several preconditions for potential investigators.

A survey of bites and other injuries inflicted by rhesus macaque *Macaca mulatta* on man in Maroth village (Rajasthan, India). Ojha, P. R. (Zoology Dept., Government Coll., Nagaur 341001 (Rajasthan), India) *Journal of the Bombay Natural History Society*, 1976, 73, 518-521.

From 1968 to 1971, the author carried out a survey of bites and nail scratches caused by a small free-living population in and around Maroth village c. 27° 15'N., 75° 15'E., Nagaur district, Rajasthan. The nature of the wounds and the circumstances surrounding them are summarized for a total of 90 victims who had received a total of 104 wounds.

Is the concept of "control group" valid? A quantitative comparison of behavior of caged baboon groups. Bramblett, C. A. (Dept. of Anthropol., Univ. of Texas, Austin, TX 78712) *American Journal of Physical Anthropology*, 1978, 49, 217-226.

Behavioral comparisons between six caged baboon groups indicate that the groups have consistent and similar behavioral attributes. At the same time it is possible to distinguish between classes of animals in each group such as males versus females and high status versus low

status rank. This investigation supports the assumption that baboon groups exhibit behaviors that are both consistent and predictable where environment and group composition are controlled. Thus, there appears to be a strong species-appropriate set of behaviors. Behavioral plasticity and group variability might be due largely to a combination of environmental stimuli and the particular history of that group. Differential individual histories or idiosyncracies do not invalidate experimental designs which rely on randomization to structure control groups.

#### Pharmacology and Anesthesia

Anesthetic agents in the nonhuman primates. Bartels, K. E. (Vet. Hosp., Colorado St. Univ., Ft. Collins, CO 80521) *Veterinary Anesthesia*, 1977, 4, 1977.

Anesthetic and restraining agents as applied to nonhuman primates for clinical and research purposes are reviewed. Included are phencyclidine, ketamine tiletamine, succinylcholine, "innovar-vet", barbiturates, inhalation anesthetics and the new drug CT-1341 or "Saffan". Dosages for nonhuman primates and a discussion of some species peculiarities are included.

#### Facilities and Care

Woodchip litter in macaque groups. Chamove, A. S., & Anderson, J. R. (Prim. Res. Lab., Psychol. Dept., Univ. of Stirling, Stirling, Scotland) *Journal of the Institute of Animal Technicians*, 1979, in press.

The effects of the presence of woodchips as a floor covering were assessed in two pens housing 28 monkeys. We found that the presence of woodchips has no detrimental effects and has several beneficial ones, including the reduction of fighting, less smell, improved appearance, and more equal feeding rates. We also noticed an improved cleanliness of the monkeys' coats, cleaner windows, and some noise attenuation. After the study was completed and when grain was given 2 to 3 times a week, we noticed that the animals spent a considerable time foraging through the chips, in fact 30 times as much as when chips were first introduced and had no food in it. This probably contributes towards decreased fighting among the animals. We have concluded that in a stable, disease free colony, living under cover, woodchips are a preferable floor covering over a bare floor. Furthermore, it is an easily reversible flooring condition.

Comparative feeding and nutrition in captive, non-human primates. King, G. J. (Staddon Hse., No. Tawton, Devon EX20 2DP, England) *British Journal of Nutrition*, 1978, 40, 55-62.

Food intake studies were carried out at the Wildlife Preservation Trust, Jersey, on three groups of captive primates, anthropoid apes, lemurs, and marmosets. Determination and analysis of the nutrient intakes were carried out by calculations based on food tables. The results from all groups were compared. Marmosets were found to have

higher intakes of energy and many other nutrients than the apes and lemurs. The results suggest that there is a tendency towards over use of dietary supplements and foods of higher nutrient density for captive primates. Some of the nutritional problems now occurring may be due not so much to malnutrition as to the tendency towards 'over-nutrition', resulting from attempts to ensure the best possible diets for captive nonhuman primates in the absence of any real knowledge as to their true nutritional needs.

### Breeding

Heterosexual interactions in laboratory-housed stumptail macaques (*Macaca arctoides*): Observations during the menstrual cycle and after ovariectomy. Slob, A. K., Wiegand, S. J., Goy, R. W., & Robinson, J. A. (Dr. R. W. Goy, Wisconsin Reg. Prim. Res. Ctr., 1233 Capitol Court, Madison, WI 53706) *Hormone Behavior*, 1978, 10, 193-211.

The pattern of copulatory behavior observed in stumptail macaques over the cycle of the female partner and subsequent to ovariectomy differs from that observed in other macaque species studied in the laboratory. It was concluded that cyclical fluctuations in the level of ovarian hormones are not significantly related to measures of sexual interactions in laboratory tests of this species, although the maintenance of copulation and associated behaviors at high levels depends to some degree upon the ovary. Cyclical variation of copulatory behaviors seems to be neither a general primate or a general macaque characteristic, and even in those macaque species in which it has been described as a general trait individual exceptions exist.

Some reproductive abnormalities of laboratory primates. Phillips, I. R. (Royal Coll. of Surgeons, Res. Estab., Down, Orpington BR6 7JJ, England) *Journal of Institute of Animal Technicians*, 1978, 29, 17-27.

The intensive demand for laboratory primates in many forms of research and the increased restrictions on their export has led to increased attempts to breed these species in captivity. In the past, rigorous culling eliminated those individuals which failed to achieve a satisfactory level of reproductive performance. However, further investigation of the causes of reproductive loss is now necessary on both ethical and economic grounds. Spontaneous infertilities and pregnancy wastage in captive simians are frequently high and should not be dismissed lightly. Mahoney (1975) gave an account of some of the spontaneous infertilities affecting captive macaques. The author points out that equally important, however, are the abnormalities of reproductive performance which result in pregnancy wastage. Pregnancy wastage in this context is defined as the failure of a conception to result in a viable offspring which may be reared to maturity. This paper considers some of the causes of pregnancy wastage that have been observed in breeding colonies of *Macaca fascicularis* and *Callithrix jacchus*.

A note on the birth of a baboon (*Papio anubis*). Love, J. A. (Animal

Care Ctr., Dalhousie Univ., Halifax, Nova Scotia B3H 4H7, Canada)  
*Folia Primatologica*, 1978, 20, 303-306.

Parturition in a baboon was observed, videotaped and described.  
Early signs of parturition were noted as was the behavior of the animal as she delivered the infant.

Breeding of cynomolgus monkeys through successive generations by indoor cage system. Honjo, S., Cho, F., Fujiwara, T., Yoshioka, Y., Masuko, K., Kurihara, K., Yabe, M., & Noguchi, Y. (Dept. of Vet. Sci., Nat. Inst. of Hlth., Musashi-Muyayama, Tokyo 190-12, Japan) *Japanese Journal of Medical Science and Biology*, 1978, 31, 301-310.

Vital statistics on breeding through successive generations are presented for the cynomolgus monkey colony of NIH, Tokyo. The results of this retrospective survey clearly demonstrated the third (F<sub>2</sub>) and the fourth (F<sub>3</sub>) generations could be bred and reared successfully by the indoor caged-breeding system in which either individual timed-mating or group mating procedure was adopted. Several important and difficult problems involved in the production of successive generations of the cynomolgus monkey by our breeding system are discussed from the standpoint of laboratory animal science.

The annual reproductive cycle of captive *Macaca sylvana*. Roberts, M. S. (Office of Anim. Management, Nat. Zool. Pk., Washington, DC 20008) *Folia Primatologica*, 1978, 29, 229-235.

The annual reproductive cycle of a captive colony of Barbary apes (*Macaca sylvana*) was examined for the 26-year period from 1950 to 1976 and then compared with the annual reproductive cycle of semi-free ranging *M. sylvana* in Gibraltar. Mating and birthing seasons for the two populations were similar although birth synchrony was more pronounced in the Gibraltar colony. The environmental factors influencing the maintenance of the annual cycles in both localities are examined.

Prospects for coordinated research into breeding of great apes in zoological collections. Martin, R. D., Kingsley, S. R., & Stavy, M. (Wellcome Labs. of Comp. Physiol., Zool. Soc. of London) *The Dodo*, Number 14, 1977, 45-55.

For a number of years now, preliminary research into basic reproductive processes in great apes maintained in Zoological Collections in the United Kingdom has been conducted at the Wellcome Laboratories of Comparative Physiology and at the Hormone Laboratory, Department of Obstetrics and Gynaecology of the University of Edinburgh. This preliminary work (primarily based on analysis of urine samples) has already yielded a number of results of scientific interest and several practical benefits for the breeding management of great apes in captivity. With the formation of a coordinating panel to streamline the breeding of great apes in Zoological Collections in the United Kingdom, we now have an opportunity to consolidate and expand such research. Obviously, the value and reliability of future research will be directly proportional to the number of Zoological



Collections cooperating. It is therefore hoped that a significant number of additional organizations will be willing to participate in at least some of the ways set out in this paper. An enormous amount can be achieved on the basis of urine samples collected with very little disturbance to the animals themselves and without adding greatly to the workload of the keeper staff, though for reasons outlined it would be useful to obtain at some time a small blood sample from as many of the great apes as possible. Other specimens (e.g., placenta) can be of great interest. This is not really something that can be done by half measures. If the research effort necessary to support a coordinating scheme is to be justified, it is essential that any particular project (e.g., collection of urine samples to determine whether a female is exhibiting regular menstrual cycles) should be carried out systematically according to the guidelines given.

Early mother-infant behaviour in two species of great ape *Gorilla gorilla gorilla* and *Pongo pygmaeus pygmaeus*. Kingsley, S. (Wellcome Labs. of Comp. Physiol., Inst. of Zool., Zool. Soc. of London) *The Dodo*, Number 14, 1977, 55-65.

The data presented in this paper are from part of a larger study of reproduction in great apes. The behavior exhibited by two ape mother-infant pairs at the Jersey Zoo is similar to that found in wild apes, and in some cases, wild and captive monkeys. The observations on the Jersey animals will continue until the infants are 18 months old, so that information on the next stages of development can be gathered.

The maintenance and breeding of the silvery marmoset *Callithrix argentata* at the Jersey Zoological Park. Carroll, J. B. (Jersey Wildlife Preservation Trust, Jersey, Channel Island, UK) *The Dodo*, Number 14, 1977, 41-45.

Keeping *C. argentata* presents no special problems within the regime of marmoset husbandry at the Jersey Zoo. The maintenance of captive breeding groups ensures not only the survival of the species but also contributes to knowledge of the general problems of callitrichid husbandry and behavior. This knowledge can then be applied to the more severely threatened species.

Acclimatisation of tropical mammals in the Northern Hemisphere with special reference to the family Callitrichidae. Mallinson, J. C. (Jersey Wildlife Preservation Trust, Jersey, Channel Islands, UK) *The Dodo*, Number 14, 1977, 34-40.

In order to initiate captive breeding programs in Jersey and provide the animals with sufficient space to live a more natural life, it has been necessary to acclimatise the animals to the temperature latitudes of the Northern Hemisphere. This paper describes the type of climatic conditions provided for certain of these species from tropical zones which have been satisfactorily acclimatised, and also draws attention to the provision of optimum accommodation for long-term breeding programs through several generations. It appears that

many tropical animals are able to comfortably withstand much colder temperatures than they would normally experience in their native environments. The animals' exposure to the elements not only enhances their general physical condition, but due to the additional space that is able to be afforded them, they are provided with the opportunity to exhibit more of their natural behavior patterns; subsequently we are able to maintain a captive stock which can benefit from an environment more in keeping with conditions that they would experience in the wild state.

A post mortem examination carried out on a stillborn ♂ lowland gorilla *Gorilla g. gorilla* at the Jersey Zoological Park. Spencer, D. (Jersey Wildlife Preservation Trust, Jersey, Channel Islands, UK) *The Dodo*, Number 14, 1977, 96-98.

The body was that of a male infant gorilla. The data indicates that the infant was certainly at full-term and possibly slightly beyond. It is likely because of the obstructive delivery, 2 and possibly even 3 potential fatal processes were initiated.

Notes on the taxonomic status and breeding of the ruffed lemur *Lemur (Varaecia) variegatus*. Lindsay, N. B. D. (Jersey Wildlife Preservation Trust, Jersey, Channel Islands, UK) *The Dodo*, Number 14, 1977, 65-69.

The writer supports the suggestion previously made by Petter, that the ruffed lemurs belong to a distinct genus (*Varecia*). He further describes the regime that has led to the successful breeding of the pair of ruffed lemurs at the Jersey Zoo.

Semen preservation in *Macaca fascicularis*. Mahone, J. P. & Dukelow, W. R. (Endocrine Res. Unit, Michigan St. Univ., E. Lansing, MI 48824) *Laboratory Animal Science*, 1978, 28, 556-561.

Semen was collected from adult male *Macaca fascicularis* using a rectal probe for electroejaculation. The effect on sperm motility of varying semen extender egg yolk concentration, pH, glycerol concentration, and equilibration times of sperm with glycerol was examined. No significant difference was observed between motilities at extender egg yolk concentrations of 10% to 40%. Progressive motility was significantly greater at pH 7.2 and 8.0 than at 5.8, 6.5, and 8.7 ( $p < 0.05$ ). Glycerol concentrations of 7% and 10% yielded optimum progressive motility after freezing. A 1-minute equilibration of semen in extender containing glycerol resulted in greater sperm motility after freezing than did equilibration for 25 to 45 minutes.

Reproductive performance in a breeding colony of Brazilian squirrel monkeys (*Saimiri sciureus*). Taub, D. M., Adams, M. R., & Auerbach, K. G. (Dept. of Comp. Med., Bowman Gray Sch. of Med. of Wake Forest Univ., Winston-Salem, NC 27103) *Laboratory Animal Science*, 1978, 28, 562-566.

In a captive colony of Brazilian squirrel monkeys a discrete birth season has been retained for 5 years although its duration increased from 3 months in 1972 to 6 months in 1976. The ages of breeder females

in this colony ranged from 3 to 14 years, and within this range reproductive performance was not affected by age, although it was significantly better in feral than in colony-born females. The latter had a lower pregnancy rate and a higher incidence of neonatal and fetal deaths than did the feral monkeys. It is our belief that the reproductive and maternal capabilities of the colony-born females were adversely affected by the practice of removing neonates from their mothers at weaning and raising them with age-mates.

Reproductive performance in *Macaca fascicularis* following repeated laparoscopy. Mahone, J. P. & Dukelow, W. R. (Endocrine Res. Unit, Michigan St. Univ., E. Lansing, MI 48824) *Journal of Medical Primatology*, 1978, 7, 185-188.

Mating trials were conducted with 16 adult female *M. fascicularis* that had been repeatedly laparoscoped. Eight of the females in this study conceived. Of these, 6 delivered live full-term infants after having had between 38 and 67 laparoscopies prior to conception.

The establishment of a chimpanzee breeding colony for hepatitis research. Klein, H. G. (Div. of Blood Dis. & Res., National Heart & Lung Inst., NIH, Bldg. 31, Rm 4A04, Bethesda, MD 20014) *Journal of Medical Primatology*, 1978, 7, 182-184.

The chimpanzee is the most appropriate animal model for hepatitis B research. Because these primates are scarce and expensive it is important that optimum use be made of available animals and facilities. The establishment of a chimpanzee breeding colony is described and a model for providing primates for research is outlined.

#### Ecology and Field Studies

The diet and feeding behavior of *Cercopithecus aethiops tantalus*. Kavanagh, M. (Faculty of Vet. Med. & Ani. Sci., Univ. Pertanian Malaysia, Serdang, Selangor, Malaysia) *Folia Primatologica*, 1978, 30, 30-63.

The feeding behavior of representative groups of tantalus monkeys was observed during 1974-75 in three habitats in Cameroon. Observations took place during the wet and dry seasons in sahelian savannah, guinea savannah and farmed forest. The tantalus monkeys were similar to the other races of *C. aethiops* that have been studied in that they were omnivorous and lacked any narrow specializations of either diet or feeding techniques. The dietary range was similar in all three habitats, although considerable seasonal variation occurred. About one third of all feeding took place on the ground.

#### Taxonomy

Possible errors in identification of squirrel monkeys (*Saimiri sciureus*) from different South American points of export. Ariga, S., Dukelow, W. R., Emley, G. S., & Hutchinson, R. R. (Endocrine Res. Unit, Michigan St. Univ., E. Lansing, MI 48824) *Journal of Medical Primatology*, 1978, 7, 129-135.

Karyological studies were conducted on one colony consisting of 12 Colombian and 34 Bolivian squirrel monkeys and a second colony of 47 monkeys imported into the United States between 1968 and 1974 through six importers. All animals in the first colony showed 6 acrocentric pairs of chromosomes. Bolivian monkeys were phenotypically distinguishable by their large size and coloration. In the second colony, 19 Peruvian, 7 Colombian, 5 Bolivian and 6 Guyanan monkeys were correctly identified phenotypically and had 5, 6, 6, and 7 acrocentric pairs of chromosomes, respectively. Among Peruvian monkeys, 34.5% of the phenotypic classifications were in error.



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