

# THE L.S.B. LEAKEY FOUNDATION NEWS

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## AMBRONA

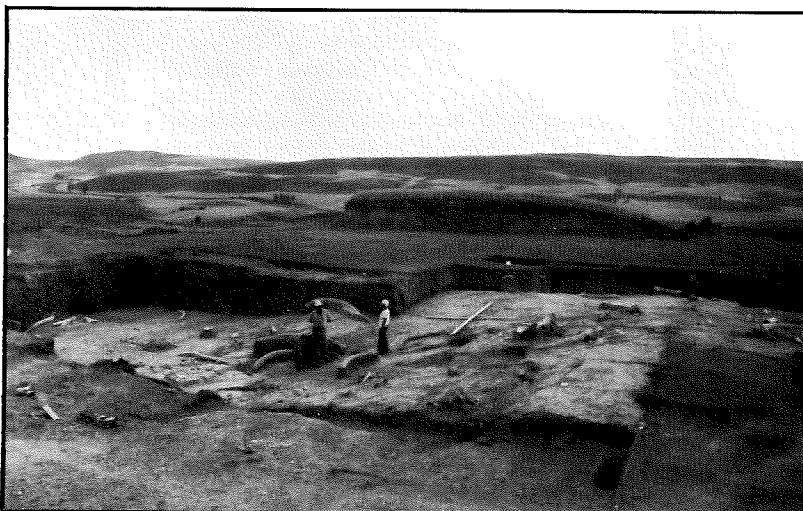
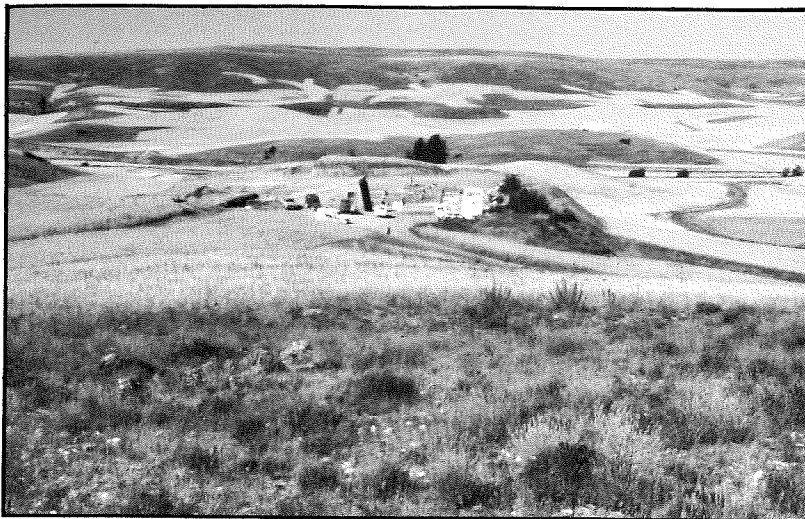
### AN EARLY STONE AGE SITE ON THE SPANISH MESETA

*By F. Clark Howell, University of California, Berkeley, and Leslie G. Freeman, University of Chicago*

When did humanity, whose early evolution has been well documented in tropical and subtropical latitudes, successfully penetrate and exploit the more inclement northerly latitudes of Eurasia? To what extent did that human dispersal occur during the initial repetitive ice ages of the northern hemisphere? what were the past environmental settings to which those ancient folk adapted and can their lifeways be more fully revealed?

These are questions of major importance for a fuller understanding of human biological and cultural evolution. A diversity of scientists has become increasingly concerned with them, both in Europe and Asia.

A series of human occupations having an age in excess of a million years are now well documented at the rift valley site of 'Ubeidiya near Lake Kinneret in Israel. In several distinctive paleoenvironmental situations, western Europe sites attest to human occupation rather less than a million years ago, as at the small cave of Vallonet on the Mediterranean Côte d'Azur, at the lake edge site of Soleilhac in the highlands of the Cen-



*Ambrona, 1980. top: Site viewed from the east, looking across to the valley below. Excavation in progress at center of site; museum building in left mid-ground. bottom: End of excavations with elephant fossils in place before removal. Clark Howell, left, and Dolores Echaide, excavation supervisor.*

tral Massif of France, and at the newly recognized locality of Isernia La Pineta in a once active volcanic setting in central Italy. These studies, and also the results of investigations of ancient cave fillings in eastern Europe, afford a new perspective on the problem of the early dispersal of humanity into temperate latitudes. At the same time they have raised problems which can only be resolved through the discovery and intensive study of other sites both more extensive and minimally disturbed by subsequent geological processes.

One such effort at understanding early human adaptations is underway in central Spain. Here, on the Spanish central meseta about 150 kilometers northeast of Madrid, are preserved two of Europe's oldest and largest Early Stone Age sites, Torralba and Ambrona. Torralba was partially excavated early in this century by a Spanish nobleman, the Marqués de Cerralbo, and more fully investigated by a team under the direction of Prof. Clark Howell in the early 1960s. A substantial part of the Torralba site had been re-

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## the L.S.B. leakey foundation

The L.S.B. Leakey Foundation was established in 1968 by a group of eminent scientists and informed lay people who recognized a critical need to strengthen financial support for new multi-disciplined research into human origins, our evolving nature and environmental future. It was named in honor of the man who had become known as "the Darwin of pre-history," Dr. Louis S.B. Leakey.

The Foundation sponsors:

International research programs related to the biological and cultural development of humankind.

Long-term primate research projects which may help us to understand how we evolved as a species.

The training and education of students in these fields.

Conferences, publications of scientific papers, and educational programs designed to disseminate knowledge relevant to man's changing view of his place in nature.

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## the L.S.B. leakey foundation news

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# PRESIDENT'S MEMO

## MILLION DOLLAR CHALLENGE

The L.S.B. Leakey Foundation Trustees have put forward a million dollar challenge gift. In the face of drastically reduced federal funding for the sciences, this gift, when matched by contributions from the private sector, will assure the continuity of vital anthropological field studies and collaborative research into human origins, behavior and survival.

Foundation-sponsored research projects probe the mysteries of the past — seeking to understand the forces which shaped modern humankind — hoping to resolve the complex problems facing our species today.

Modern research projects in anthropology, often in remote corners of the globe, can no longer be conducted on a shoestring budget. Archeological expeditions, primate behavioral observations and ethnographic studies involve interdisciplinary teams of scientific specialists with

access to the latest technological equipment in both field and laboratory. Leakey Foundation support of critical research will be a timely response to federal funding agency cutbacks.

The million dollar challenge gift will be held in a separate endowment fund until it has been fully matched by a second million dollars from the general public. During this period, annual earnings from the gift will be available to augment the Leakey Foundation grant awards which total over \$300,000 each year.

L.S.B. Leakey Foundation Trustees believe that their challenge will encourage new support from corporations and from individual donors. They remind potential contributors that the Leakey Foundation is one of the few grant-making public foundations in the world which is totally devoted to the support of anthropological research. As such, it is a vital investor in the future.

—The Board of Trustees

## MESSAGE FROM MARY LEAKEY

A news conference to announce the Million Dollar Challenge Gift was held on March 1 at the Los Angeles University Club. Dr. Mary Leakey, here from Kenya, gratefully acknowledged the substantial benefits to science that the Leakey Foundation has made through its research grants.

"I, myself," she said, "have had a great amount of help, particularly in the work at Laetoli, which has developed into one of the most interdisciplinary sites anywhere in the world.

"But before talking about my own work, I would like to pay tribute to the founding president, Allen O'Brien, whose early recognition of the scientists' needs enabled him to conceive the idea of the Leakey Foundation and to formulate its goals of helping scientists and research workers to finance their work. Allen was led to this idea when he watched my husband Louis going around lecturing for ridiculously small fees in order to sustain our work at Olduvai Gorge. He felt this was a complete waste of time and, because of his concern, he established the L.S.B. Leakey Foundation.



*The Foundation's youngest Fellow, David Hollander, presents his check for \$100 to Dr. Mary Leakey as the first gift to the Trustees' Million Dollar Challenge.*

"The Foundation has helped me directly with funding for my work at Laetoli and has supported overseas scientists to come out from Europe and the United States to contribute their special skills to the Laetoli research. We have been able to reconstruct Laetoli's 3.5 million year old past from the work of Dr. Richard Hay of the University of California at Berkeley

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# NOW OR NEVER...

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The intrinsic fascination of the quest for human origins has been heightened by remarkable discoveries in recent years. Our endless curiosity about the roots of human nature has been stimulated by unprecedented scientific advances, involving not only a revitalization of traditional lines of inquiry (such as stones and bones), but a mobilization of physical, biological, and behavioral sciences over a wide front.

During the past few years there have been major discoveries pertinent to human origins in molecular biology, geology, and methods of measuring time. Molecular biology provides objective, quantitative methods of assessing the relations among animals. Plate tectonics gives a new geological background for evolutionary research. Radiometric methods accurately determine the age of many of the rocks in which the fossils are found; magnetic reversals determine the age of others. Biochemical research shows that chimpanzees, gorillas, and human beings are closely related, differing in only a small fraction of their genetic material. This recent information, together with research on behavior of great apes, suggests a recent ape-human separa-

tion and a long period of common ancestry for ape and human. Other notable discoveries on human ancestors include the fact that there were bipedal humans as early as four million years ago, revealed by remarkably preserved footprints. Their hands were quite human, but retained some ape-like characteristics. Their brains were no larger than those of the contemporary apes. The recent dramatic enrichment of the hominid fossil record is well known.

Despite centuries of fascination with monkeys and apes, reflecting intuitive recognition of their close biological relationship to man, until recently very little was known about the behavior of non-human primates in their natural habitats. In the past two decades, the study of the behavior of nonhuman primates has rapidly developed into one of the most sophisticated and productive areas of research at the interface between the biological and social sciences. Major advances have occurred in primate behavioral biology, social behavior and development, social organization, ecology and life history patterns, and intelligence. Such research faces formidable obstacles, but they have largely been overcome with ingenuity and determination when adequate support has been available. Some of the most significant scientific opportunities for insight into human origins are unfortunately transient in nature. The tropical forests are disappearing rapidly, as a recent study by the

National Research Council documents. With these forests will go the natural habitats of most primate species, including all the great apes. Similarly, the few remaining hunter-gatherer human species are rapidly being transformed. In a short time, that way of life will have disappeared from the earth. So, research on crucial elements of the road that led to humankind is truly in an urgent category: now or never.

In view of such powerful incentives, it would seem self-evident that support for research on human origins would be increasing to take advantage of these great opportunities before it is too late. But paradoxically government support is declining sharply, and some of the modest foundation support formerly available is also diminishing. The brightest light on the horizon is the new infusion of support from the L.S.B. Leakey Foundation under the guidance of its far-sighted chairman, Gordon Getty. Today's announcement (President's Memo) will send a message of hope and renewed commitment to scientists throughout the world. The results of the research supported by these funds will intellectually enrich all mankind.

David Hamburg

*Dr. Hamburg, co-chairman of the L.S.B. Leakey Foundation's Science and Grants Committee, is director of Harvard University's Division of Health Policy Research and Education.*

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## OPTIMISM: NOSTALGIA FOR THE FUTURE

By Lionel Tiger

*Professor of Anthropology, Graduate School of Rutgers University.*

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*The following remarks are excerpts from a talk given by Dr. Lionel Tiger at the Leakey seminar, "On Becoming Human: Pathways in the Search for Ourselves," at Caltech, November 15, 1981.*

Essentially I'm interested in contemporary society more than industrial society, and talk about things which may seem soft because they are so general, but which are often hard in their effect — political events, economic events, psychological and finally even physiological events within our bodies.

We've had a great deal of discussion about the physical structure of human evolution and the evolution of cognition or intelligence and rather less on the emotions or feelings an organism has when it is engaging in some sort of oceanic response which orients its body and behavior in a certain way.

Why do we have feelings? Where do they come from? What is their function in our lives? Did we evolve emotions the way we evolved cognition? What stimulates emotions? What are the inter-emotional contacts which we make?

Some years ago I got interested in the whole question of male relationships and the hunting/gathering ecology and what it might have meant to the social structure of a primate. The data base is skewed in the favor of reporting on males, a situation which is fortunately being rectified, if slowly. I was interested in what kind of relationship would have to exist between these males in order to permit them to engage in the frequently dangerous and always demanding process of cooperative hunting. I was interested in what emotional scheme would be needed for the structural cooperation involved in the work of catch-

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*"When I started this work I was convinced that just as the psychiatrists had found the substrate for depression, we'd have to find the substrate for its opposite which I call optimism . . ."*

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ing the animals. It seemed to me that if we knew something about how we got the way

we are, where our emotions came from, perhaps the turbulence and the uncertainty and the energy that goes into conducting our current emotional lives might have some explanation. Then, possibly, we would have a better basis for controlling our lives. And so I looked at how an evolving animal living in the circumstances it did — relatively frail physically, having to make its weapons, having to conduct its social behavior without reference to strong weapons or tools or large buildings and so on — and asked how it would feel when it got up in the morning. What would affect its life emotionally to permit it to conduct a hunting/gathering way of life?

Following the thoughts of Claude Lévi-Strauss I began to play with the notion that, for example, ideas might be tasty the way that foods are. I was interested in the possibility that there were certain ideas that were good to think. One has to be impressed by looking at the record of what humans do. There are certain things that affect us in a way that makes us feel better. The entire history of human symbolism — political, economic and so on — indicates that the connection between the brain and



Dr. Lionel Tiger

the body is, of course, a total connection and that ideas are as real as material culture. And so it is intriguing that humans might create ideas which make them feel good.

We are living in a very exotic period in the industrial system. The system is just a couple of hundred years old and yet most of us take for granted the general pattern within which we live. It may be worthwhile to bear in mind that particularly our emotional, if not also our cognitive, evolution may have been directed against the kind of rigid articulation that the industrial

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*"... one way of looking at this is to translate Romer's law in biology which says that animals mutate in order to remain the same ..."*

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system demands. In which case, what kind of ideas in this system would make us feel good? We are an old animal in a new system and yet we are trying to live in ways that maintain the old structures, it frequently seems to me.

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We now have a big brain. We developed it for reasons which are not entirely clear and there will be many arguments about whether it is to sustain bipedalism or to engage in monogamy or to do better hunting or to have bigger hats. Nevertheless, we have it and it is an enormously powerful instrument. It is possible with it to conceive of endless scenarios of disaster, decrepitude and incompetence. Most of us try to pause at increasing improvement of our circumstances. We consistently try to,

as Jimmy Durante, that important philosopher, once said, "accentuate the positive." I think that that is what you would expect — you would expect an animal with a large brain, subject to the rigors and often the torments of reality, to somehow try to mitigate that reality by a series of interposed mediating structures. Some of them are obvious, such as religion. Some of them are less obvious, such as the lottery. Some of them are totally obscure, such as impossibly difficult love affairs. But organisms make decisions which seem to mitigate the harsh contact with harsh reality.

Now that we have this brain, what do we actually do with it? We are constantly exercising it or, as in more traditional societies, trying to discipline it through, for

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*"I don't want to engage in the nauseating process of assuring you that we have a gene for optimism and that the power of positive thinking should be the next step on your progress to perfection. . ."*

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example, strong religious programs. I don't think that it is at all accidental that many, many human societies — perhaps the majority who have ever lived — have had some belief in an external force which mediated against the clear possibility that life was empty, that it was barren, that it ended in death, that there were no externalized meanings, that there was no force beyond the obvious. Anyone who has had the fortune to go into some of the caves in the Périgord region of France will know that nothing was being done there that was casual. There was some important statement being made, some assertion about life and about the animals with whom one interacted or just about the nature of the walls of the cave. It is quite possible to say that the people were trying to deal with the awareness they had of their own frailty and so they produced something bigger or mightier or at least different from what they could physically see with their eyes and understand with their brains. So they made something up; they made something new. It has occurred to me that optimism as a phenomenon was a kind of socio-hormone, a substance which went through the social system and that in its absence things happened which might in fact be arguably destructive to that social structure.

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I would like to speak of optimism in two forms, big optimism and little optimism. The big optimism problem has to do with the management of society. The management of a large scale society is a new problem. The kind we live in is 10,000

to 12,000 years old; before then we lived in relatively smaller groups and it may have been a lot easier. Today the problem of statesmanship or leadership is profoundly difficult psychologically because we have been evolved for an intimate sphere. Our skills are often incalculably sensitive to the local or small scale and not as easily to the large scale and so we try to find what is going on in the small scale. We take opinion polls and go out and interview individual organizations. We try to intimate, if I may coin an instantly degenerated word. We try to intimate our public lives because our skills are for acting on an intimate level in some sense.

The general management of the sense of the future is not a casual business. I think it is immensely serious as a problem for large scale societies and it becomes the more so when the individuals who are selected to produce public optimism are themselves frail and vulnerable and inadequate mortals. That is a problem that I don't think we can easily face.

I would like to talk a bit more about the little optimism problem. All of us seem to be hunter/gatherers interested in getting out there and getting in from the environment what we need and possibly even a bit more. We reside in the industrial system and we keep bringing to it the emotional responses that are probably not appropriate any more. There is an emotional need, it is possible to say, that human organisms have for feeling some prosperity in both the productive system and the reproductive system. There is an endless zest for self-improvement, for taking advantage of the relatively pitiful artifacts the culture can produce, such as self-help books that allow individuals to feel that they can somehow improve their circumstances. Twenty-three percent of all the households in this country are now composed of single people. It is quite possible that there is a vacuum of interaction and a decline in the socio-hormonal interaction between people based simply on loneliness, forcing people to look to commercially made store-bought artifacts, such as "How to Make Love to a Man" and "How to Flatten Your Stomach" or whatever it is that one is particularly interested in achieving that month.

There are other more interesting things that happen such as, for example, the relationship which we now begin to understand between physical health or exercise and the neuro-transmitters. It is possible to feel better by running around and doing things that are more appropriate to what a hunter/gatherer animal would do than sitting behind a desk. Many of the things that we realize that we should do — the present craze for natural things — are not trivial and are not to be scorned. Perhaps they represent an effort of an organism caught in the system to try to return to some kinds of behavior, some kinds of nutritional and other inputs, which are in greater accord with what that organism was

evolved to use. It does seem that understanding evolution, understanding the evolution of our emotions, understanding the relationship between these emotions and their social patterns may have some impact on how we conduct ourselves in the future or in the present.

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There may be crisis for many in the productive system, but I suspect there is much greater crisis for many more in the reproductive system. That great biologist George Bernard Shaw said that love consists in overestimating the difference between one woman and another. While this is a somewhat cunning formulation, nevertheless it does reflect the fact that, in order for the reproductive process to go on with some measure of force and energy, individuals have to make cognitive overestimates about the relative merits of a particular partner as opposed to other possible candidates. That is something that I think has become a much greater and more difficult cognitive overestimate to make just in the past fifteen or twenty years. As we know,

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*“... the industrial revolution has hit us in a new way because it's now in the body.”*

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about half the marriages now contracted in this country end in divorce. It is clear that we are dealing here with something which is not trivial in terms of its overall implication. I think that one of the reasons is that we are still reeling from the impact of the industrial system.

With the advent of good female-controlled contraception, one sex can control who gets born for the first time in an important way in the history of the mammals. One sex in this community now has an enormously different form of control over the reproductive process. It is, it seems to me, a relatively new phenomenon in biological terms because what it does is potentially de-socialize what is the most social of actions — namely, deciding who gets born.

I'd like to do an unpopular thing for a moment and look at the impact of this on males. We are beginning to see how males may also take part in the business of raising the young and what that may mean in terms of how they dispose of their lives, resources and energies. Again it is clear that what has been called paternity certainly is not a trivial matter — certainly not for complex animals who may spend a great deal of their time and resources raising children or offspring. I think the males in some social circles and some social classes in our industrial society have become alienated from the means of reproduction

because the final control is the females'. In moral terms this might be appropriate because it is the female who will have the burden of a child if it is a burden should it be born. But I am saying that in terms of that extraordinarily important evolutionary process which is the source of so much of our emotion — the sexual element, there is something new going on and I don't think we have the beginning of an understanding of either its scope, its impact, or

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*“We know that good zoos have animals that reproduce, bad zoos do not... our zoo at the moment is in a curious kind of non-reproductivity.”*

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what will happen in the long run. What we do know is that the birth rate in this country is below replacement. I am convinced that this has got to have an impact on how people living in this society feel about their own lives because we know how important sexuality is and what it is related to.

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I make the point again that the connection between the productive and the reproductive systems remains and that we have tried in the industrial system to somehow disentangle it, at frequently great cost to the emotional circumstances within which we must live, I suspect. It is now against the law, for example, for an employer to ask a potential employee if he or she is married, has children, or has responsibilities to other people. It is against the civil liberties of the population to do so and perhaps it should be but the result does constitute a departure from the primatological way of taking into account all information known about an organism in order to know how to deal with that organism. What we have somehow done, in an almost obsessive and perhaps legally appropriate but nonetheless probably unprecedentedly complex manner, is disassociate the productive from the reproductive sphere, resulting in a decline in reproductive optimism.

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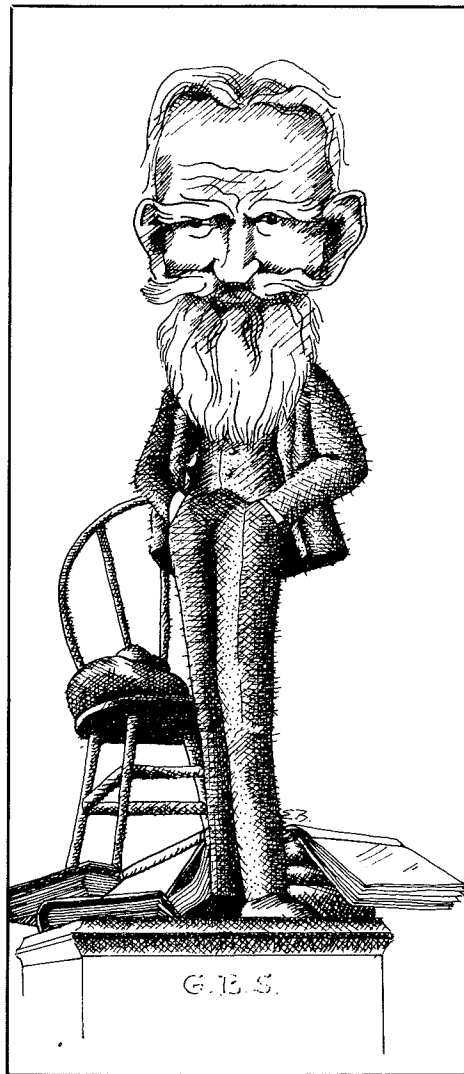
*“... I would, if I had a shaving mirror, put on that mirror 'freedom is the recognition of necessity'.”*

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If we can understand that we are an organism with a disciplinable muscle called

the brain, an organ that wants some sense of participation in the future and of getting beyond the immediate present, then we may have some sense of the obligation we have to ourselves.

*Dr. Tiger is Research Director of the Harry Frank Guggenheim Foundation in New York. He is the author of several books, among them Optimism: the Biology of Hope, The Imperial Animal, and Men in Groups.* □



*Big-headed G.B. Shaw with hat.*

Illustration by Lissa Brady

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*“What made this brain of mine, do you think? Not the need to move my limbs; for a rat with half my brains moves as well as I. Not merely the need to do, but the need to know what I do, lest in my blind efforts to live I should be slaying myself.”*

*George Bernard Shaw*

# FIELD REPORTS

Excerpts from reports by Leakey Foundation grantees on their work in progress.

## GILGIL BABOON CROP RAIDING PROJECT, KENYA

Shirley C. Strum  
Dept. of Anthropology,  
University of California,  
San Diego

The Gilgil Baboon Crop Raiding Project should provide information important in resolving the conflict between agriculturalists and primates in areas of settlement where rainfall makes agriculture marginal.

Toward this end, data on feeding strategies of two troops of baboons in the Gilgil population of Kenya have been collected since January, 1981. Ecological monitoring begun then is now established to the point that it can provide data for the assessment of food choices made by the baboons. Three troops are now included in this study, one of the troops having recently split, probably in response to shifts in foraging strategies. Activity budgets for different age-sex classes and a comparison of raiding animals with non-raiding animals in terms of time spent in different activities and choice of foods will be determined from the foraging data.

Several experiments were made during the last crop season which went from late August until mid-October, 1981:

1. Playback of alarm vocalizations of the baboons while the troop was feeding on uncultivated foods produced ambiguous results. Some animals responded with alarm while others did not. However, other animals did respond to the alarmed individuals. During one of the four trials, no reaction was apparent.

2. Maize was sprayed with oleo capsicum (essence of chili pepper). This project will provide an assessment of whether the treatment is a deterrent.

3. Local people were hired to chase the baboons away from the farms. This was successful if there were enough people; however, key raiders either waited until fewer people were on duty or detached themselves from the rest of the troop and approached the farms using "sneaky" methods so that they would not be detected.

4. Lithium chloride taste aversion experiments are being conducted by Debra Forthman of UCLA. She is still working on the appropriate dosage and method of delivery but has collected baseline feeding data in the field during the last crop raiding season.

The qualitative data suggest that there may be a natural solution to the problem of baboon crop raiding at Gilgil if the farms remain at their current density. This

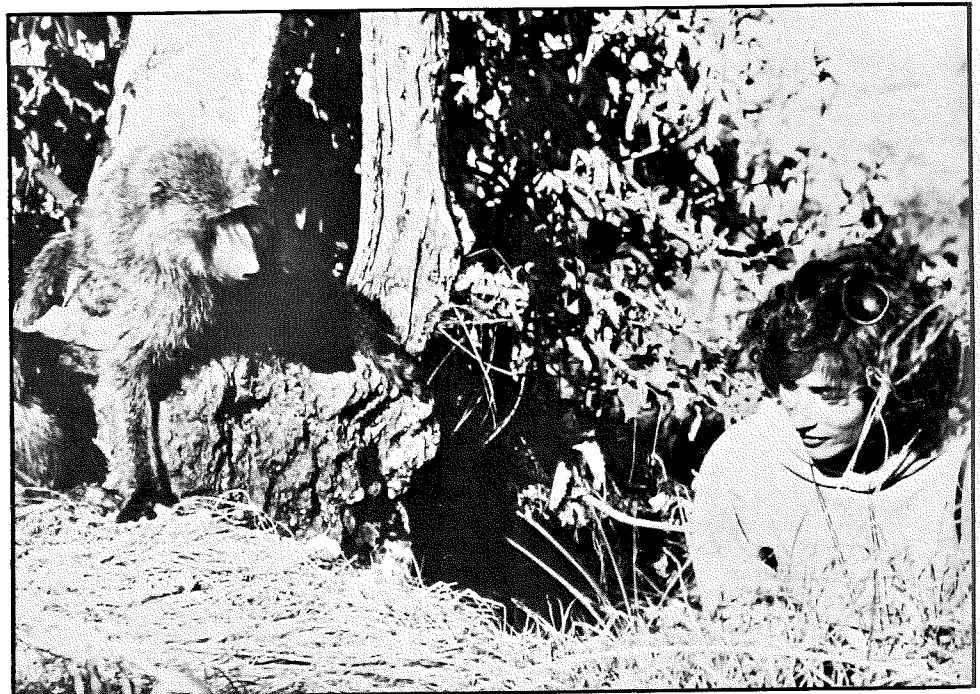
year the troops fed extensively on corms and seemed to place less value on crops. Corms are a high quality food produced as the result of periods of low rainfall. When years of good rainfall alternate with dry years, corms will be plentiful. During dry years, crops at Gilgil will fail and the economic consequence of baboon crop damage will be insignificant. If properly communicated to and understood by the farmers, this pattern may provide a *modus vivendi* for the baboons and the farmers.

Palatability of crops to the baboons may also be an important factor in baboon raiding. Beans were harvested throughout the area with little baboon damage. Beans are clearly less palatable to baboons than maize (nutritional analysis is presently in progress) and may represent a good alternative crop for the farmers. Beans and maize are both staple foods for humans but maize is increasingly preferred. However, it would be possible to purchase maize with profits made from selling beans. The cash value of one crop of beans grown on a ten acre farm last season was about \$4,000, far in excess of profits obtained from maize production. It may be possible to shift the crops grown on local farms to those less palatable to baboons and wildlife in general, thereby allowing the farmer to realize a larger harvest and use the profits to supply other necessities.

Current changes in the Pumphouse baboon troop also suggest that crop raiding is more important to some individuals than

to others. The troop has split into two parts, one containing most of the active raiders. The other part rarely engaged in raiding last season. If crop raiding is a foraging strategy, then the current evidence suggests that it is more important for certain classes of individuals. It may be that eating crops does not provide better nutrition so much as it reduces the time it takes to meet the daily nutritional requirement. If so, males (especially adolescent males), who have the greatest energy demands because of size and growth and also have the greatest conflicts in time budgets between feeding and reproductive activities, should be the main raiders. However, many young females also joined the raiding males to form the new troop. These females may be pursuing their own social and reproductive strategies. A comparison of the two parts of the troop during this year should be revealing.

Several educational and rural development projects were initiated last year and others continued with the local farmers and governmental and conservation organizations. To date, the baboon project has raised money to help build a local primary school and has initiated a project to build a cattle dip that the farmers need. The local people have come to view the baboon project as essential to their own future and have shifted toward a more favorable position on wildlife, the baboons especially. Farmers who were included in educational activities in the previous year, last year actively tried to protect their crops from the baboons and were usually successful. The formerly most ardent and hostile of the farmers is now anxious that the baboons remain, even if some crops are damaged. He now openly discusses the value of the wildlife with the farmers and government officials.



Dr. Shirley Strum

(photo: Anglia Television, Inc.)

## BABOONS AT WINDHOEK, NAMIBIA

*Gisela Mittendorf,  
team member from  
the University Center  
in Namibia*

For at least the last ten years the now closed refuse dump north of Eros Park was visited fairly regularly by baboons. Over the years these baboons, the Chacma baboons or *Papio ursinus*, apparently lost at least partially their fear of people, as baboons and humans could be seen sitting side by side on the refuse dump amid the rubbish, searching for food or any useful things.

A group of six to ten people undertook the task of observing the baboons over a period of several weeks last year. Continuous observations during the first four weeks revealed that baboons came regularly every day, usually early in the morning just after sunrise and again in the afternoon. They stayed on the dump for at least twenty minutes; quite often they remained there for up to two or even three hours. A correlation between length of stay and the availability of food stuff in the refuse could not be traced, but disturbances by humans, especially in army uniform, who chased the baboons and threw stones at them, definitely made them leave the site. The baboons seemed to know and remember the vehicles of these persons who chased them. Before one of these cars arrived, they disappeared, dashing into the veld and not returning until the next day.

After the Windhoek Municipality announced the closure of the refuse dump, the emphasis in the baboon project was put on keeping exact record of the baboons' behavior during the transitional stage of closing the dump. In the first weeks the baboons continued to visit while people left refuse unlawfully in the vicinity. Later an earthen wall was built around the whole area so that cars no longer had access. The illegal dumping gradually lessened with the result that the baboons, too, stopped going there. But during subsequent weeks of spot check observations and even now, the two troops, comprising more than a hundred animals, remained in the surrounding area.

It was most interesting and surprising to watch the baboons' varying reaction to people on the dump itself and in the veld nearby. On the dump the observer could approach them to within three to five meters. People searching for anything of use in the garbage were often seen sitting, standing or moving right next to the baboons, almost touching them. Once a woman even snatched a piece of bread from a baboon's grasp. Baboons and people were obviously unconcerned about each other's presence, seldom interfering with one another and more or less ignoring each other. The baboons hardly ever showed any aggressive behavior. Even threatening gestures rarely occurred. Anything edible,



*People and baboons on the dump were unconcerned with each other's presence.*

such as pieces of bread, apples, watermelons, red beets, maize, grapes and so on, was usually taken a few meters away to be consumed. Then the baboons returned to the dump.

In the field, about ten meters away from the refuse dump, their reaction to people was completely different. It was not possible to approach them closely. When the observer sat down to watch, they also stopped moving. When they had become accustomed to the observer's presence, some of the juveniles might venture to come closer out of curiosity. But the usual reaction of the baboons while being followed in the veld was that of fear, resulting in their running away.

Baboons have also been living in the area of the new refuse dump south of Windhoek. But these baboons are still very timid, wild and unaccustomed to the presence of people. They go to the dump only in the early morning or late evening hours when there are no humans visible in the area. It will be interesting both to assess the range of their movements and to keep a record of their reactions to people. It can be anticipated that in the long run they will also overcome their fear.

## ARCHEOLOGICAL RESEARCH IN INNER MONGOLIA

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For the past nine years, since the beginning of my undergraduate studies, I have concentrated on acquiring the linguistic and methodological skills necessary for me to conduct investigations into the prehistory of China. To my great delight, I have been able to take a major step toward that goal as a result of an invitation issued to me by colleagues in the People's Republic of China to visit the Inner Mongolia Autonomous Region during the summer of 1981 in order to participate in the investigation of a series of Late Pleistocene archeological sites.

I spent the first ten days of the trip in Beijing contacting colleagues at the Institute of Vertebrate Paleontology and Paleoanthropology (IVPP), a branch of the Chinese Academy of Sciences or Academia Sinica. Dr. Wu Rukang, the co-director,

permitted me to examine a variety of fossil hominids in the institute's collections, including the 1966 *Homo erectus* cranium from Zhoukoudian, the *H. erectus* calvarium from Gongwangling, near Lantian, Shaanxi, *H. sapiens* fossils from Maba, Guangdong and Ziyang, Sichuan, as well as *Gigantopithecus* remains from south China. I also had the opportunity to see the recently discovered fossils of *Ramapithecus* and *Sivapithecus* from the lignite deposits of Lufeng, Yunnan.

Professor Jia Lanpo and his colleague at the IVPP, Chen Chun, discussed with me their analysis of a large Middle Paleolithic assemblage of stone and bone artifacts excavated recently at Xujiayao, Shanxi. An excursion was made to the famous Middle and Late Pleistocene fossiliferous deposits at Zhoukoudian, southwest of Beijing, where new excavations initiated by the IVPP are attempting to uncover the original entrance to the limestone fissure inhabited by *H. erectus*, known as Locality 1.

I departed Beijing on the overnight train to Huhehot, Inner Mongolia, which lies some 700 km. northwest of the Chinese capital. Following the course of the Great Wall north to Zhangjiakou and then east to the Inner Mongolian Plateau, I arrived in Huhehot shortly after dawn. I was met at the station by members of the Inner Mongolian Science and Technology Committee and the Inner Mongolian Museum, my sponsors, who saw that I was immediately settled into my room at the Xincheng Binguan (New City Guest House) which was to be my home for the weeks to come.

I accompanied the museum's archeologists to several important Paleolithic localities. Our first destination was the extensive quarry-workshop site of Dayao, situated about 35 km. east of Huhehot on the Baoheshao commune. This Upper Paleolithic locality has been studied since 1973 by Professor Wang Yuping of the Inner Mongolian Museum who has amassed a large collection of lithic artifacts from sections of eroded loess south of the village of Dayao. Importantly, artifacts occur *in situ* here, blanketed under a thick deposit of aeolian silt known as the Malan Loess, so that their designation as Upper Paleolithic rests on stratigraphic as well as typological evidence.

The major portion of our fieldwork was concentrated in the steppe region north of the Daqing Mountains which form a major physiographic barrier between the semi-arid grasslands and the fertile agricultural lands of the Yellow River Valley to the south. Traveling in two Chinese-built field vehicles, we were able to visit a number of isolated Paleolithic localities in spite of the fact that heavy late rains had turned vast expanses of the steppe into a sea of mud thinly veiled with grass.

Herd of sheep, horses, and Bactrian camels are still to be seen grazing in these grasslands, although today they are principally under the management of large communes rather than nomadic pastoralists.

The traditional Mongolian dwelling, the yurt or ger, made of thick felt covering a wooden frame, still persists as a popular alternative in warmer weather to the adobe houses introduced by the Han Chinese. While visiting the site of Zhongnanshan, we camped in yurts erected in the forecourt of a Buddhist temple built in the Tibetan style popular in the mid-Nineteenth Century in Mongolia.

Upon our return to Huhehot, I was asked to give a public lecture at the Inner Mongolian Museum on my recent research in Egypt. I was gratified by the large turnout of local government representatives involved to varying degrees in archeological research. A long and informative discussion followed my lecture in which we compared American and Chinese archeology, the role of archeology in the university curriculum in America, and a range of other related topics.

I was invited to the industrial city of Baotou, about 125 km. west of Huhehot, to view the excavations being conducted by the Institute of Mongolian History at the multi-component Neolithic site of A-shan. The site is located in the foothills of the Daqing Mountains, overlooking the Yellow River and the Ordos Desert beyond. Revealing evidence of both Yangshao and Longshan culture occupations, the excavations at A-shan have produced a large array of material culture in addition to well preserved faunal remains that are currently undergoing analysis.

Just prior to my departure from Huhehot, I was informed that I had been elected the first foreign member of the Inner Mongolian Archeological Society, an honor which was certainly unexpected and one for which I am extremely grateful. I was also presented with a representative collection of Paleolithic and Neolithic artifacts to be used in conjunction with my teaching here at the University of Arizona.

I departed Huhehot by train for Taiyuan, Shanxi, where I was pleased to spend a day with Professor Wang Jian at the Shanxi Provincial Museum, examining the important new Lower Paleolithic materials from Xihoudu and a Late Pleistocene microlithic assemblage from Xiachuan, both in southern Shanxi Province. Preliminary analyses of the Xihoudu finds and their stratigraphic context suggest they are between one and two million years old, establishing them, quite possibly, as the earliest archeological materials in East Asia.

After flying from Taiyuan to Xi'an in the Wei River valley of Shaanxi Province, I was met by colleagues from the provincial museum and Xibeí University. Four days were spent in the vicinity of the ancient capital, visiting archeological research facilities, the Neolithic village of Banpo, and the tomb of China's legendary First Emperor, Qin Shihuangdi.

My last stop in China was at Shanghai to see the unparalleled collections of Bronze Age materials in the History Museum. I also met with colleagues at the Natural

History Museum, where Dr. Tan Zhi, Director, and Cao Keqing, vertebrate paleontologist, permitted me to examine their museum's impressive holdings of vertebrate fossils.

Since my return to the United States, I have been in frequent contact with my Chinese colleagues and am in the planning stages of a long-term cooperative research project which may be initiated as early as this year. Students from the Inner Mongolian University have begun to arrive at the University of Arizona as part of this cooperative agreement and I anticipate continued interaction on this level for some time to come.

The Paleolithic archeology of China is a field which promises to produce important new information on Pleistocene human behavior in future decades. I am looking forward to the continued expansion of the scholarly ties that exist between the two nations.

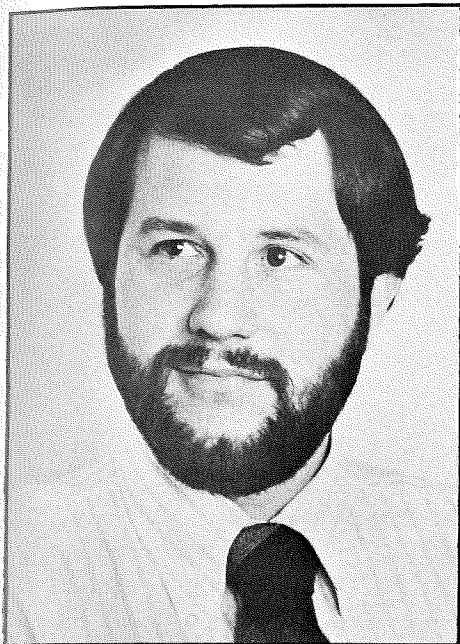
## PALEOANTHROPOLOGICAL RESEARCH IN ASIA

Russell L. Ciochon  
University of North Carolina,  
Charlotte

Donald E. Savage and I returned to Burma for a seven week period in November and December, 1979. Our discoveries included several new Late Eocene Pondaung Formation localities, along with a productive Early Pleistocene Irrawaddy Formation locality. These new sites yielded important vertebrate faunal assemblages including additional dental remains of *Ampipithecus* and *Pondaungia*, the earliest known anthropoid primates.

One of the high points of the 1979 Burma expedition was the inauguration of a paleoanthropological research laboratory in Mandalay. This centralized research facility is dedicated to the documentation of human evolution in Burma. Modeled after the famed Cenozoic Research Laboratory of Peking (now Beijing) so important to the analysis of the Peking Man fossils, it is planned that the Mandalay Laboratory will bring together scientists representing the fields of geochronology, stratigraphy, paleontology and anthropology who will work together in an interdisciplinary approach to human evolutionary studies. The laboratory is located near Mandalay Arts and Sciences University in a structure that belongs to geologist Tin Maung Oo who lives year-round in the downstairs portion with his wife. The upstairs functions as a meeting room with attached temporary living quarters and storage facilities. It is planned that a portion of the upstairs will serve as a fossil preparation area in the future.





Dr. Russell Ciochon

With the aid of financial support from the Smithsonian Foreign Currency Program and the L.S.B. Leakey Foundation, I plan to return to Burma for several weeks' field research in March, 1982. This brief stop-over will occur after a two month visit to India for 1) work on a dental epidemiology project near Chandigarh under the direction of Robert S. Corruccini; 2) a short field visit accompanied by Indian scientists to the site of Haritalyangar, the type locality of *Ramapithecus*; 3) continued talks with S.R.K. Chopra, R.S. Corruccini and other scientists regarding the possible development of a collaborative paleoanthropological project in the Siwalik Hills of north India; and 4) a visit to the Geological Survey in Calcutta to continue work on the Pilgrim/Cotter type Pondaung fauna housed there as well as the important Siwalik Miocene hominoid collection.

Savage and I plan to return to Burma together, probably in December, 1982, for another series of short field excursions. This trip will occur after the completion of a three month exchange visit to the People's Republic of China tentatively scheduled for the Fall. Our visit to China will take place under the auspices of the U.S.-China Cooperative Science Program, a recently signed agreement between the U.S. National Science Foundation and the Chinese Academy of Sciences. We will journey to Beijing to the Institute of Vertebrate Paleontology and Paleoanthropology to work with Chinese scientists Zhai Ren-jie and Chow Minchen in a joint comparative study of Burmese and Chinese Late Eocene mammalian faunas. We hope to make a field excursion to the important fossil-bearing Tertiary sites in the southern provinces of Yunnan and Guangxi. Yunnan Province shares a 1200 mile common border with Burma and contains Late Eocene localities that have yielded faunas exceedingly similar to those of Burmese Pondaung

sites, as well as the Late Miocene locality of Lufeng which recently produced the first known skull of *Ramapithecus*. Finally, in 1983, Zhai Ren-jie will complete the exchange by visiting the U.S. to continue the joint research on Late Eocene faunas begun during our visit to China.

A final note on Burma. It should be stated that plans for both continued and expanded fieldwork in this southeast Asian country should remain guarded at the present time due to the perennial lack of official, ministerial level, government approval. This state of affairs has not, however, severely lessened the scientific and cultural exchange between Burmese and American scientists.

### EARLY MAN ON SANTA ROSA ISLAND: A REASSESSMENT

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University of California,  
Berkeley

Located only a few miles off the California coast, Santa Rosa Island is one of the most controversial early human sites in the Americas. In the coastal cliffs and arroyos of Santa Rosa are hundreds of red fire features that have been interpreted as man-made hearths. They are often cited as evidence of man's early arrival in the Americas. Varying in size and shape, their color ranges from brilliant red orange to dull brick red; usually the reddened soil is bordered with bands of black carbon. Charcoal often occurs in flecks or chunks within the reddened soil. Were the red features hearths or were they caused by natural fires?

Carbon 14 dates on charcoal associated with several red fire features range from 10,000 years to more than 40,000 years, indicating that they were made throughout the Late Pleistocene. If they were indeed hearths, then humans have been in the Americas for 50,000 years or more. The purpose of our research was to find the cause of the red fire features and to identify evidence of early humans on Santa Rosa Island.

The fire features are impressive in their size, number, and brilliant red color. Most are basin shaped and one or two meters in length, but some are fist sized marks and others several meters long. These features, which number several hundred on Santa Rosa Island alone, also have been found on San Miguel and Santa Cruz islands and on the adjacent California mainland near Point Conception and Vandenburg.

The variation in size and shape immediately suggested that a natural phenomenon

could have caused the fire features. Man-made objects, such as Acheulean handaxes, tend to have a uniform size and shape, while natural objects, such as rocks and boulders, are often variable. Discussions with foresters and fire fighters disclosed one possible cause of the features: burned stumps and roots. When burned, dead and dried tree stumps can be completely consumed by fire, leaving a reddened basin or pit that can be extremely hearthlike. Often the roots will burn their full length, leaving long, reddened channels underground. Pine stumps are said to be especially prone to burn in the ground but almost any tree stump could burn completely.

When several burned tree stumps were examined and excavated, they were found to leave depressions similar to Late Pleistocene fire features. Because the islands and the adjacent mainland were forested with pine and Douglas fir during the Late Pleistocene, it is likely that the fire features were caused by burned tree stumps.

Several of the fire features contain charred bones of the island dwarf mammoth (*Mammuthus exilis*), a small form of the Columbian mammoth (*M. columbi*). The dwarf mammoth had an adult height of 1.2 to 2.1 meters at the shoulders. How might charred mammoth bones come to be associated if the features were caused by burned tree stumps? Could some of them be hearths?

A promising one, possibly associated with mammoth bone, was found by John Woolley, a geologist, near the mouth of Wreck Canyon on Santa Rosa Island. When first excavated by R. Berger of UCLA, it yielded seven possible stone tools and several mammoth bones. Associated charcoal was C14 dated at more than 40,000 years. Renewed excavations at the site, financed by the Leakey Foundation, yielded no additional artifacts or mammoth bone. Moreover, several reddened root-like extensions were noted, suggesting that the feature could have been caused by a burned tree stump.

Because several gravel lenses, some containing chipped cobbles, were common throughout the Wreck Canyon deposit, it is possible that the stone tools could have been naturally flaked. The associated mammoth bone could have been deposited before the hypothesized fire burned into the ground, charring the bone.

Though no evidence of early humans was found on Santa Rosa Island, much remains to be researched. The Wreck Canyon feature should be examined more closely, and several other fire features, especially on San Miguel Island, should be excavated. The numerous interior drainages and valleys on Santa Rosa should be surveyed for evidence of camp sites and kill sites that may have been deeply buried. The presence of early humans on Santa Rosa Island is yet a possibility.

## FOLLOW THE ZAMBEZI: IRON AGE RESEARCH ON THE UPPER ZAMBEZI RIVER

N. M. Katanekwa  
Director, Zambia National  
Monuments Commission

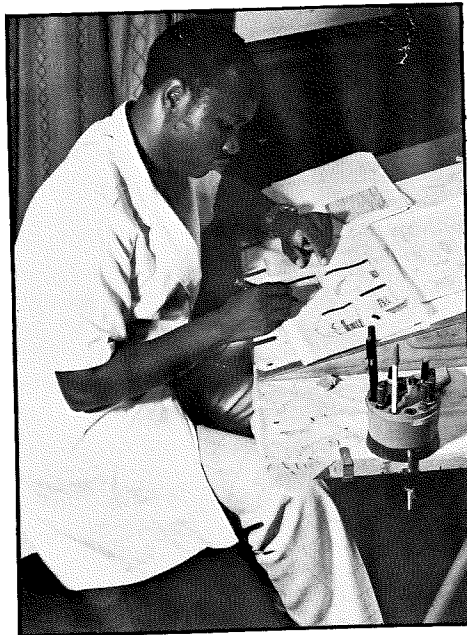
Five to ten years ago, the Iron Age in Zambia was regarded as having originated south of the Zambezi, as the Carbon 14 dates seemed to imply.

Today, however, these origins are more in doubt due to recent evidence. Work by the National Monuments Commission in central Zambia has revealed very early Iron Age sites dating to circa 250 A.D. On the Upper Zambezi, I have excavated no less than five sites. Two of these yielded what was in the past termed "Channelled Ware" or "Situmpa Ware" with dates that could rightly be placed soon after 300 B.C. My further work on the Upper Zambezi has revealed a boundary of two pottery traditions — one known as the "Western Stream" and the other the "Eastern Stream." The latter tradition seems to have been confined to the Zambezi Valley from 60 km. north of Sesheke down into Malawi and Mozambique. Until my recent research, the earliest dates for the Eastern Stream Early Iron Age Tradition in Zambia were around the Fifth to Sixth Century A.D. My excavation at Lusu, however, points to the possibility of early B.C. dates for this pottery.

The Western Stream of the Early Iron Age remained the least studied, but recent work has shed some light on this tradition. It may well date as early as 250 to 400 A.D. It extended from Sioma in western Zambia to Lusaka in central Zambia to Kalomo in southern Zambia, and covered northwestern Zambia, Copperbelt, part of Luapula and northern Zambia. This tradition, however, is still less known.

Excavations were carried out in 1981, with the help of Leakey Foundation funds, at Kalongola in western Zambia and another site at Senanga Boma. The main dig yielded possibly the largest assemblage of pottery ever excavated from any Early Iron Age site. Over 10,000 potsherds and numerous bones were collected from only limited excavation. Preliminary analysis seems to indicate the existence of possibly three phases of the Early Iron Age. The first phase seems to be similar to what was found down stream at Lusu and could date to late B.C. or early A.D. The second phase, however, seems to be an early part of the Western Stream of the Early Iron Age. The third phase is pure Western Stream Early Iron Age Tradition. The importance of this site may lie in its indication of a possible ancestral pottery similar to that at Lusu. In other words, if dates from this site are very early, the origin of the Early Iron Age would be further extended. Movement from East Africa down to Mozambique and Malawi into Zimbabwe and then Zambia as previously

interpreted is now very questionable. The Upper Zambezi should provide us with the answers. What is now required is to obtain more 14C dates for some of these Upper Zambezi sites. Detailed analysis of the finds from Kalongola has been initiated.



N.M. Katanekwa

## LAKE NATRON ARCHEOLOGICAL RESEARCH PROJECT, TANZANIA

A.A. Mturi  
University of York, England  
Franklin Mosher Baldwin Fellow

The Lake Natron Research Project in Tanzania is a joint venture between American, French and Tanzanian researchers. The project, conceived during 1978, involves the reinvestigation of the Lake Natron Pleistocene deposits which are an important repository of archeological, geological and paleoenvironmental materials. Previous investigations by R. E. Leakey and Glynn Isaac revealed the presence of lacustrine deposits dated to between one and two million years of age on the western side of the lake. Initial survey work and limited excavations led to the recovery of a mandible of *Australopithecus (Zinjanthropus) boisei*, vertebrate faunal materials and two major archeological occurrences of the Early Acheulean Industrial complexes in sites dated to between 1.3 to 1.6 m.y.

The participants during the 1981 research season were Glynn Isaac of the University of California at Berkeley and myself (archeology), Maurice Taieb of the C.N.R.S., France, G. Poupeau, N. Page, Z. Kafulu and B. Walter (geological and environmental studies), Ezra M. Chacha of the Tanzanian Antiquities Department and P. Ndesolia (paleontology).

The paleontological team concentrated

on a general survey and documentation of areas in the Humbu Formation of the Peninj group on the western side of the lake. Several localities with fragmentary faunal remains were located, two with a marked concentration of faunal materials either *in situ* or eroding from nearby deposits. E. M. Chacha, who is now a student at Berkeley, is undertaking the detailed study and analysis of these materials.

The geology team concentrated on the general structure of the area including tectonics and volcanism, the elucidation of the stratigraphy and sedimentology of the Peninj group, mapping, and collection of samples for paleomagnetism and radiometric dating.

The archeology team concentrated on the reinvestigation of the MHS (Bayasi) Site which included the survey, documentation, and mapping of faunal and artifactual remains exposed there since the 1964 excavations, reexcavation of the trenches to obtain microenvironmental data, and the survey and exploration of the area to locate more archeological occurrences. Several areas with scatters of surface artifacts which might be termed mini sites were located, while two major archeological occurrences were found during a survey undertaken by me.

In July, I made an intensive survey of the Peninj and Musonik (Moinik) areas with the objective of locating and identifying archeological and paleontological occurrences in the Humbu and Moinik formations. In the Peninj area two major sites were discovered and have provisionally been designated as Kamare Site and Kipalagu I Site. Kamare is situated in the area where the Moinik Formation is exposed. The artifacts were found eroded and resting on the gully bottoms, embedded in sandy clays on the stream beds or on slopes of the ridges. Those on the surface of the gullies are fairly fresh and unrolled while those in the stream beds or slopes of ridges are *in situ*. The scatter of artifacts indicates that the site is an extensive one. Tools found are made of volcanic rocks, mostly basalt and fine-grained lava. Bifaces — hand axes and cleavers — predominate, though big flakes and scrapers were also found.

Kipalagu I Site is situated to the south of Kamare on a series of ridges separated by gullies between the main exposures of the Humbu and Moinik formations. Artifacts and faunal materials were found on the slopes of the hills or embedded in sandy clays. The faunal materials include two well preserved bones of a big bovid or a rhino. The artifacts are made from volcanic rocks and include bifaces.

The two archeological occurrences, with a possible third one, discovered during the survey are probably an indication that early humans utilized the lake shore or the banks of streams draining into the lake very extensively. It is therefore likely that more archeological occurrences will be located during future surveys.

# PROFILE

## F. CLARK HOWELL

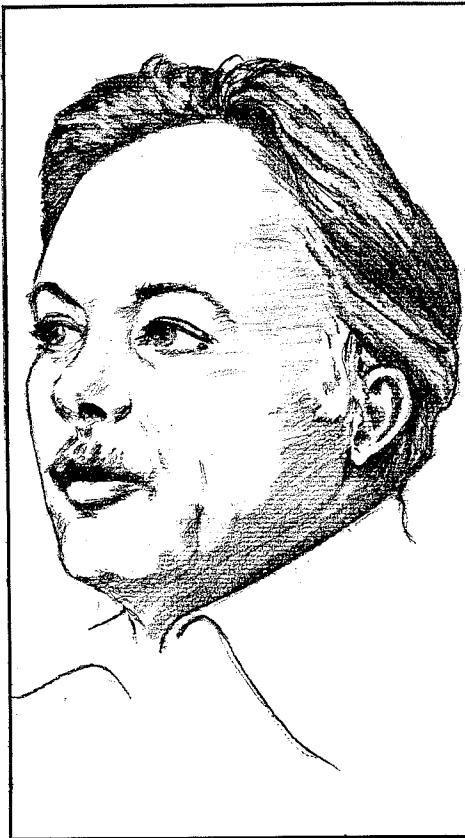
*Chairman, Science and  
Grants Committee*

If there were a computer center built to store the large and growing body of information on early man, surely the lead programmer would have to be Clark Howell. His mind already boards, in computer-like order, an incredible array of facts on the entire range of studies pertaining to human origins and development.

It is no small advantage to have such a man as the chairman of the Leakey Foundation Science and Grants Committee. Grant proposals made to the Foundation filter through a network of scientists chosen for their excellence in a variety of disciplines related to the study of man. Dr. Howell must then correlate their judgments and communicate them to the Board of Trustees, who, though informed, are non-scientists. The significance and interrelationships among these proposals are so carefully and thoroughly explained by him that the Trustees are able to make confident decisions on often very complex grant requests.

F. Clark Howell is currently professor of anthropology at the University of California at Berkeley. Prior to coming to Berkeley in 1970, he headed the anthropology department at the University of Chicago, where he had received his doctoral degree. His long teaching career has been, of course, interspersed with many field studies, among these, Isimila (Tanzania), Torralba and Ambrona (Spain), and the Omo Basin (Ethiopia).

An unassuming and uncontroversial scientist among colleagues not always remarked for their modesty, Dr. Howell has quietly become dominant and renowned in his profession. He has concentrated on teaching and on rigorous site development, in which he has been given credit for instituting the multidisciplinary approach now widely used, one of the most important contributions to his field. He brought a multidisciplinary team to Ambrona in 1961 where a model site development illuminated many aspects of early human occupation in Europe. In the late 1960s he led another such team in an eight year project in the Omo Basin in southern Ethiopia which made further significant contributions to anthropological lore. He has recently returned to Ambrona for several seasons as director of the on-going project there. Leakey Trustees who have visited the dig wax enthusiastic over the scope and beauty of it, as well as the fascinating and informative data being gathered from this ancient lakeshore site.



Over the years Clark Howell has shown a perceptive eye for those who may contribute to the future of anthropology. He has helped to train and advise many "bright kids," such as Donald Johanson, who gives him much credit for his own success.

Dr. Howell was honored in 1975 by a request from the People's Republic of China to head the first delegation of paleoanthropologists to that country, and more recently he hosted a similar delegation from China visiting the United States. Numbered among his many honors are his membership in the National Academy of Sciences, his presidency of the California Academy of Sciences and his authorship of a major book on human evolution.

No one can know Clark Howell without knowing Betty Howell. He is probably unaware of how often his conversation is filled with references to his wife. She is a remarkable person with a warmth that is irresistible. The Howells live in the Berkeley hills with their two teen-aged children, Brian and Jennifer.

An extremely serious man with a ready sense of humor, Clark Howell is an acknowledged leader in his field. He listens to and admires his colleagues and takes enormous pride in the accomplishments of his students. He commands respect for his grasp of the "state of the science," his many contributions to the arduous building of a body of knowledge and his boundless enthusiasm for knowing and wanting others to know.

—Barbara Newsom

AMBRONA  
continued from page 1

moved by Cerralbo and only some 600 meters were excavated subsequently. Ten successive human occupations were exposed, with an Acheulean stone tool industry and abundant faunal residues.

At that time the Ambrona site was discovered and partially excavated over two summer field seasons. Fieldwork was renewed there in 1980 under the joint direction of Prof. Howell and Prof. Leslie G. Freeman in collaboration with the Museo Arqueológico Nacional in Madrid and its former director, Prof. Martin Almagro. These studies are being financed by the National Science Foundation, the National Geographic Society, the L.S.B. Leakey Foundation, and the Comité Conjunto Hispano-Norteamericano para Asuntos Educativos y Culturales, Madrid. Two field seasons (1980 and 1981) have been devoted to the Ambrona site and another is planned for 1983. The Ambrona Research Project is broadly interdisciplinary and includes participating specialists from a half dozen countries in archeology, geology, geochemistry, isotopic dating, paleobotany, and several aspects of paleontology. The excavations are carried out by some twelve to eighteen workmen under the supervision of American and Spanish students.

The Ambrona site is situated at an elevation of 1140 meters at the margin of a highland valley in a region which forms the watershed between the Ebro and Duero drainage systems. Except at the Torralba site, two kilometers down the valley to the south, all other Pleistocene sediments which must have once infilled the valley have been removed by erosion. The sediments at the Ambrona site are forty meters above the present valley floor, an indication of the magnitude of erosion since their accumulation.

The known extent of the Ambrona site is about 6000 square meters, larger than an American football field. The exact age of the site within the span of Middle Pleistocene time is not yet precisely determined. An estimate based on geological and paleontological evidence is about 500 thousand years. It is now apparent that the sediments, with a maximum thickness of nearly fifteen meters, represent a more complex succession of Middle Pleistocene events than was initially envisioned. How this complexity is to be related to the very complex geological events of this time range has still to be adequately elucidated.

The lowermost deposits at the Ambrona site are stream-laid sediments and slope-derived gravel now cemented into a pavement. They were substantially eroded prior to the deposition of fine sediments which contain vertebrate fossils and stone artifacts. This oldest and most extensive human occupation occurs in gritty, lime-rich silts (or marls) which were accumulated in a moderately shallow lake or pond. Fish and amphibian (frogs, toads) fossils confirm a fresh water inflow into this body

of water, the extent and depth of which is still ill-defined. Fresh water shells and several kinds of algae are informative of water conditions, as are also the remains of floating and emergent plant species which indicate both shallow water and reed swamp conditions. Marsh and land snails also occur in the more marginal reaches of the site. Abundant pollen is preserved in these sediments and testifies to a setting of sub-alpine grassland with scattered stands of pine, a few oaks, birches, alders and willows and a wide diversity of herbaceous species. The pattern of plant communities suggests occupation of the site either during a cool-temperate interval or the still cold phases of a waning glacial stage.

Over 1600 square meters of this initial human occupation have been thus far exposed by excavation. One area, which includes skeletal parts of three different elephants, has been preserved in place and enclosed by a small museum; it is now seen by thousands of visitors each year. Cultural and faunal residues occur throughout the excavated area. Human occupation is documented by the presence of stone artifacts, worked elephant ivory, traces of fire, broken, fractured and cut animal bones, and emplacements of large natural stones.

The prey of the Old Stone Age hunters at this time were an extinct species of Asian-related elephant, an extinct wild ox species related to the aurochs, wild horse, three species of deer, and a steppe-adapted rhino. Rhinos are always very rare. Wild boar, elsewhere an ubiquitous species, has never been found at the site. The number of wild oxen, deer and horse probably equals or even exceeds the total number of elephant individuals.

Elephant skeletal parts, merely by their imposing size, are rather awesome. The minimum number of elephants, although still to be accurately determined, surely exceeds forty individuals. Interestingly, there is an underrepresentation of both very young and very old individuals. This suggests a "catastrophic" rather than an "attritional" mortality pattern; it evidently reflects the hunting preferences and successes of these ancient hunting and gathering peoples.

Unquestionable marks of cutting, hacking, scraping and other forms of cultural alteration have been noted on a significant proportion of Ambrona animal bones. A relatively small number appears to show traces of carnivore gnawing. However, the remains of carnivores themselves are also extremely rare; only a large lion and an extinct subspecies of wolf are definitely represented. A few remains of a macaque monkey are also known; these monkeys, related to the living Barbary macaque, persisted into this time range elsewhere in Europe as well. Other vertebrates include at least four species of birds, including duck and wildfowl, several reptiles and small mammals. The diversity of small mammals is low, comprising only a shrew, rabbit and three rodent species (two voles and the common field mouse). These latter



*Bottom specimen, worked elephant tusk point from Torralba; all others from Ambrona.*

suggest a moderately cool-temperate rather than a full glacial climate at the time of this human occupation.

Large natural limestones appear throughout the known extent of this site, sometimes in distinctly circumscribed concentrations. These stones are foreign to the fine sediments in which they occur and must therefore have been emplaced by the early humans.

The stone artifacts from this initial human occupation represent an early expression of an Acheulean industry. Five principal classes of stone were used — quartzite and limestone (both less commonly utilized) were apparently then as now locally available; chalcedony (most commonly utilized), and flint and chert are foreign to the area and must have been imported from some distance. The limited number of cores, the limited quantity of waste flakes and chipping debris, and the rarity of conjoinable pieces suggest that stone artifacts were hardly ever manufactured at Ambrona but were instead brought in. The most reasonable explanation is that Ambrona represents a kill and butchery site of these earlier Acheulean hunting and gathering peoples.

In all, over 1100 stone artifacts are known from this initial occupation. The assemblage includes large cutting edge tools (both handaxes and cleavers), a diversity of flake tools, retouched/utilized pieces, other flakes and waste products, and a few cores. The mean density of artifacts is almost always low and in fact the density of animal body parts is always higher. The analysis of patterns of distribution and the associations and co-occurrences of stone tool classes and animal body parts should ultimately throw considerable light on the uses to which artifacts were put and on the nature and range of early human activities

at the site. Most were probably used in various aspects of butchery and meat processing.

Ambrona and Torralba are the first sites of their age to afford evidence of the fashioning of elephant tusk ivory into artifacts. Several specimens are known from Torralba but the bulk of the total of forty specimens derives from the initial occupation at Ambrona. These artifacts were fashioned from the tips of permanent tusks of sub-adult elephants. They represent a form of stemmed point. A process of fracture and abrasion produced a terminal point — represented by the more or less conical tip of the tusk — and a thin, spatulate basal projection or stem which departs from the underside of the point. These artifacts differ in size and their terminal ends vary from sharp to rather blunt; all exhibit various grooves, scratches, incisions and dents from utilization. Although all were made in a similar fashion, it is probable that they were employed for diverse functions. Many were fashioned in a manner which can only be interpreted as facilitating hafting, a procedure heretofore unsuspected in this time range.

Another human occupation is now known to be preserved in sediments which outcrop on a steep hillslope a half kilometer north of the main Ambrona site. Surface occurrences of bone fragments and Acheulean artifacts were noted in 1963 and a short test trench revealed elephant remains in place. Future excavations here may expose the residues of early human activities in a contrastive micro-paleoenvironmental setting useful for comparison with those at Ambrona proper.

There is another, still poorly known human occupation at the Ambrona site, representing a different drainage pattern and setting. Animal residues include deer

and aurochs limb bones, a complete aurochs skull, as well as fragmentary elephant body parts with signs of cut marks and breakage. Stone artifacts are rare but include three bifaces of more elaborate manufacture than those in the initial occupation.

A third Acheulean human occupation is preserved in the eastern reaches of the Ambrona site, tentatively dated from the next to last major ice age (the Saale or Riss Glacial), probably between 400-300 thousand years ago. The site differs in very important ways from the earlier occupations in respect to both animal and cultural residues. The animal remains are overwhelmingly those of horse. Skeletal parts of deer and aurochs are uncommon and those of rhino rarer still. The mean density of stone artifacts is very high, and the number of artifacts substantially exceeds that of bone features, in marked contrast to the earliest human occupation.

In all, the assemblage from this site includes just over 2000 stone artifacts. It differs in several ways from that obtained from the earlier occupation. A diversity of siliceous rocks, including several varieties of chalcedony and flint, was extensively employed for tool manufacture. Quartzite and limestone were less often used than before. Flake tools are more abundant and of a great diversity of types. Various scrapers, denticulates and notched pieces still predominate but there is a greater elaboration, refinement and repetition in comparison with their counterparts in the earliest occupation. Bifaces are few in number but may be well fashioned, more refined and symmetrical in shape and exhibit extensive use of a "soft hammer" technique and consequent elaborate, fine secondary trimming. However, the waste flakes from their manufacture are rarely present, indicating again that these artifacts were initially manufactured elsewhere and brought to the site for use. Many are in remarkably fresh, almost pristine condition. Microscopic traces of use wear are frequently visible on their edges. Most use polish can be shown experimentally to result from cutting and slicing meat. These artifacts closely resemble the so-called Middle Acheulean industry of western Europe.

The earlier occupation at Ambrona, as well as the successive occupations at the nearby site of Torralba, have previously suggested deliberate game drives and the killing of large herbivores by Acheulean hunting peoples. This interpretation would seem to be confirmed by the "catastrophic" mortality profiles of elephants at Ambrona and elephants and horses at Torralba. It is also compatible with the generally disarticulated and fractured condition of skeletal parts of horse and deer in these occupations. Moreover, no large predator could have killed so many prime age elephants and no other natural catastrophe of the magnitude necessary to explain the mortality profile, without invoking human intervention, is evidenced at either site.

Thus, the human element looms large in accounting for the faunal and cultural residues at both sites.

Curiously, neither the Torralba nor the Ambrona localities have as yet yielded skeletal remains of the actual hominids who so intensively occupied these sites on successive occasions. It is almost inconceivable that no human being died there. Moreover, human remains should be very well preserved at the Ambrona site. It might be surmised that either human mortality was extremely low or that any human dead were removed to another site in the vicinity, or even exposed or treated so as to leave no durable trace. Human remains may still be recovered in the unexcavated part of the Ambrona locality. Elsewhere in Europe some localities of broadly comparable geological age have afforded human skeletal remains — now generally considered to represent an early subspecies of our own genus, *Homo sapiens*.

Knowledge of the human condition during mid Pleistocene times, particularly in Europe, has traditionally been very much colored by the incompleteness of the geological record. Recent investigations at Ambrona and other open air and cave sites in Europe are now revealing a much fuller record of human cultural complexity and adaptation to past environments than was ever envisioned previously. As a consequence, paleoanthropologists are having to reexamine many of their former ideas about human lifeways in those ancient times. □

## BALDWIN GRANTS AWARDED

*The Franklin Mosher Baldwin Fellowships, instituted in 1977, provide funds for the Third World that are available from very few other sources.*

*The following Baldwin Fellowships were recently awarded:*

**Dr. Steven Andrew Brandt,**

of the Department of Anthropology, University of Georgia, has received a Baldwin grant of \$2,777 for research in Late Quaternary paleoanthropology in north-eastern Somalia. Part of the funds will provide field training of two Somali post-graduate students. The project should indicate if the Midhisho-Xamaas Valley holds any promise for developing a long-term program into Late Quaternary environmental change and human cultural heterogeneity in the Horn of Africa.

**Dovi Andre Kuevi,**

a Togolese, has been awarded \$6,000 to continue his studies in anthropology and archeology at the University of California, Los Angeles.

**Ahmed Dualeh Jama,**

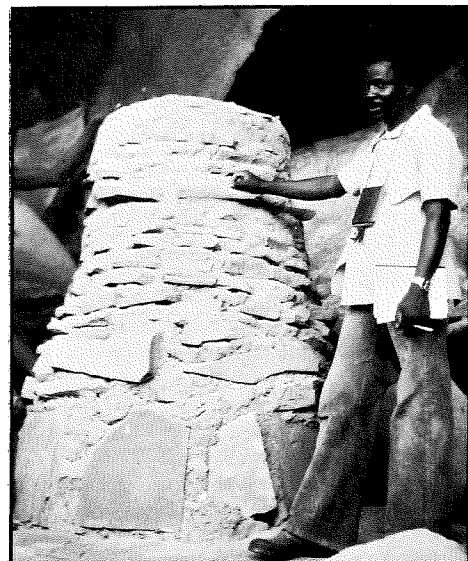
will receive a grant of \$2,850 to enable him to take advanced archeological courses at the University of California, Los Angeles, preparatory to teaching the first regular courses in African archeology and prehistory at the National University of Somalia.

**Dr. Daniel N. Stiles,**

of the National Museum, Nairobi, Kenya, has been awarded a \$4,000 Franklin Mosher Baldwin Fellowship to study the origins and socioeconomic history of pastoralism in northern Kenya. Among the specific objectives of the project are to establish the process by which domestic animals were introduced in the area and to compare and contrast prehistoric pastoral systems to those of today in terms of economy, demography, diet and nutrition, and settlement patterns.

**Tadesse Terfa,**

Head of the Center for Research and Conservation of Cultural Heritage in Ethiopia, has been awarded \$2,500 to enable him to meet with U.S. scientists at the National Science Foundation in Washington, D.C. Mr. Terfa will also talk with Ethiopian students training in the U.S. and confer with members of the Afar Expedition at the University of California in Berkeley before returning to Addis Ababa, where he is presently preparing an international exhibition on the preservation of Ethiopian antiquities. □



*Dovi Kuevi and granary, Togo.*

# GRANT SPOTLIGHT

The Grant program of the L.S.B. Leakey Foundation, under the guidance of the distinguished Science and Grants Committee, depends upon public support for its success. Every penny of your contribution dollar directly supports the grant awards. Members and donors are invited to designate their gifts in support of specific research projects.

Won't you take this opportunity to direct your contribution to the grant project of your choice?

S. Mahmood Raza \$2,000 needed

## CHINJI TAPHONOMY AND PALEOECOLOGY, PAKISTAN

Mr. Raza, a Ph.D. candidate at Yale University, requests funds to continue research during the summer of 1982 for completion of his doctoral dissertation. The primary objective of his research is to reconstruct the paleoecology of vertebrate faunas that occur in the fluvialite hominoid-bearing Chinji Formation rocks of the Siwalik Group of Pakistan. Hominoids' first known occurrences in South Asia are from the Chinji Formation. Mr. Raza plans to complete his graduate work in the Fall and then return to his homeland where he works in the Geological Survey of Pakistan and the Pakistan Museum of Natural History.

Dr. Mary Ellen Morbeck \$3,350 needed

## JOINT SURFACE AREA, MOVEMENT AND BODY WEIGHT IN MIOCENE HOMINOIDAE

Dr. Morbeck, of the anthropology department at the University of Arizona, plans to study the newly recovered postcranial skeleton of *Proconsul africanus*, the nearly complete foot of *Proconsul nyanzae*, and to review previously studied Miocene *Hominoidae* postcranial fossils and nonhuman primate skeletons housed in the National Museums of Kenya in Nairobi. Explaining the morphological variation observed in the Miocene *Hominoidae* fossil record in relation to inferred movement capabilities, body size and proportions and body weight is important in reconstructing a model or baseline for evolutionary history.

Dr. B. A. Wood \$2,500 needed

## FOOD ACQUISITION AND PROCESSING IN PRIMATES

Dr. Wood, of the Middlesex Hospital Medical School, requests support for an international symposium and workshop held at Cambridge University. The aims are to review and synthesize recent developments in the study of the primate feeding strategies and relate these to adaptive changes in dentition, jaw and intestine. The workshops should provide a forum to discuss the important collection of fossil hominids from Hadar, Laetoli, Omo, Koobi Fora and South Africa.

Dr. John W. Hillhouse \$3,500 needed

## PALEOMAGNETIC STRATIGRAPHY, KOOBI FORA, KENYA

Dr. Hillhouse, a geophysicist with the U.S. Geological Survey, wishes to use magnetostratigraphy to enhance and update the geochronology of the hominid-bearing Koobi Fora Formation, east of Lake Turkana, Kenya. After additional sampling is completed in the lower part of the formation, it will be possible to make a direct comparison with the well-dated Shungura Formation along the Omo River. The net result should be a superbly calibrated stratigraphic framework for Pliocene evolution in East Africa.

Lisa Tauxe \$2,971 needed

## PALEOMAGNETIC STRATIGRAPHY OF HOMINID-BEARING LOCALITIES OF THE BARINGO BASIN, KENYA

The dating and correlation of mammalian faunas has been greatly facilitated by the use of paleomagnetic stratigraphy. A new project in this field has been initiated in Africa by Dr. D. R. Pilbeam of Harvard University in cooperation with the Kenya National Museum. Ms. Tauxe, a Ph.D. candidate at Columbia University, asks for funds to take part in this study. One of its objectives is to document the timing of faunal migrations between Africa and South Asia. Understanding these movements is deemed critical to understanding hominoid evolution. Paleomagnetic sampling will be done at Ngororo and the analyses at the Lamont-Doherty Geological Observatory, which is fully equipped to handle all aspects of the proposed project.

Mark G. Birchette \$4,760 needed

## POSTCRANIAL ADAPTATIONS OF PLIO-PLEISTOCENE PRIMATES FROM EARLY HUMAN FOSSIL SITES, KENYA

Mr. Birchette, a Ph.D. candidate at Harvard University and an instructor in the Dept. of Cell Biology and Anatomy at Johns Hopkins University, asks for financial support for his ongoing research on the functional anatomy of Plio-Pleistocene primates. The project focuses on non-human primate fossil postcrania from Koobi Fora. Because of a remarkably incomplete fossil record, the evolutionary history of cercopithecids is not clearly delineated nor are the functional implications of their varied skeletal morphologies well understood. Detailed analysis of new fossil specimens from Koobi Fora will make a substantial contribution to our understanding of Old World monkey phylogeny, relevant as well to the study of human evolution.

Julio M. Vidal \$1,700 needed

## MORPHOMETRICAL AND TYPOLOGICAL PATTERNS OF EAST AFRICAN HOMO ERECTUS LITHIC ASSEMBLAGES

Mr. Vidal, a graduate student at the University of Bordeaux, plans to study the metrical and morphological characteristics of Acheulean assemblages from Olduvai and other sites of East Africa. He will try to compare "African patterns" with those of Acheulean assemblages from Spain, France and England, to determine whether or not distinct patterns exist in terms of biface morphology. It is generally accepted that the "Southern Acheulean" of Europe shows many techno-morphological parallels with the African Acheulean. Mr. Vidal wishes to test this parallelism in Nairobi.

Dr. Anne Pusey/  
Dr. Stuart Altmann \$1,480 needed

## ACQUISITION OF RANGE BY ADOLESCENT CHIMPANZEES

Dr. Pusey will attempt to determine the factors that influence juvenile chimpanzees in establishing a living area in a broader geographic range. A key consideration will be the extent to which males and females are influenced by place of birth in selecting a living area. Dr. Pusey will visit the Gombe Stream Reserve to confirm current data collection techniques and to spend several weeks in Dar es Salaam with Dr. Jane

Goodall examining data. The data will be microfilmed for detailed analysis at the University of Chicago, the institution with which both Dr. Pusey and Dr. Altmann are associated.

leading to more accurate interpretation of currently available fossil hand bones is important at this time.

Dr. Mary Walpole Marzke \$3,673 needed

**FUNCTIONAL MORPHOLOGY OF PRIMATE CARPO-METACARPAL AND INTERMETACARPAL JOINTS**

The purpose of Dr. Walpole's research is to provide a basis for understanding the structure of the carpo-metacarpal region of fossil hominoid hands by obtaining data on the form and functions of such joints in living primates. The project was stimulated by the discovery of many fossil bones of this part of the *Australopithecus afarensis* hand. Because of the crucial role played by the hand in both locomotion and tool use among human ancestors, a detailed study

J. M. Yarrow Robertson \$4,360 needed

**EVOLUTION OF THE SOCIAL ORGANIZATION OF PIG-TAIL MONKEYS**

The aim of the project is to measure aspects of the behavioral ecology of *Macaca n. nemestrina* of Indonesia which are relevant to understanding the evolution of their social organization. It is becoming clear that their social organization is not typical of that of other macaques. In only a few more years of logging and encroaching agriculture there will be no areas left in southeast Asia where the ranging patterns of pig-tail monkeys are naturally unrestricted or unaffected by man.

Mr. Robertson is a doctoral candidate at the University of Cambridge.

**NEW FELLOWS**

The L.S.B. Leakey Foundation is proud to welcome to its Fellows' roster:

Dr. Diana Everett Barbolla, San Diego, California; Mr. and Mrs. Albert Venger, Temple City, California; Dr. and Mrs. Joseph Ford, Northridge, California; Mrs. Bridget Emerson, Pasadena, California; Mr. and Mrs. Rex Whitaker Allen, San Francisco, California; Dr. Elizabeth McCown Langstroth, Carmel, California; Dr. and Mrs. R. Wilbur Melbye, Los Angeles, California; Dr. Ernest B. Wright, Palm Beach, Florida; Mr. and Mrs. George Mateljan, Montebello, California; Dr. and Mrs. Ben E. Eisenstein, Los Angeles, California; and Mr. and Mrs. John Edwards, La Crescenta, California.

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# CALENDAR

## DR. DIAN FOSSEY

- May 7 — Morris Museum, Convent, New Jersey
- May 8 — Chicago Academy of Sciences, Illinois
- May 12 — Philadelphia Academy of Natural Sciences, Pennsylvania
- May 15 — American Museum of Natural History, New York City

## DR. BIRUTÉ GALDIKAS

- May 8 — Chicago Academy of Sciences, Illinois
- May 15 — American Museum of Natural History, New York City

## DR. JANE GOODALL

- May 4 — Caltech, Pasadena, California

- May 6 — San Diego State University Extension, California
- May 8 — Chicago Academy of Sciences, Illinois
- May 11 — School of American Research, Santa Fe, New Mexico
- May 15 — American Museum of Natural History, New York City

## DR. DONALD JOHANSON

- May 4 — Fort Steilecoom Community College, Tacoma, Washington
- May 8 — Chicago Academy of Sciences, Illinois
- May 15 — American Museum of Natural History, New York City

## DR. ROGER PAYNE

- May 28 — National Aquarium, Baltimore, Maryland

## LETTER FROM MARY LEAKEY continued from page 2

and of Drs. Garniss Curtis and Robert Drake.

"Probably the most important contribution that Laetoli has made to the story of human evolution is that it has shown that our ancestors were walking bipedally upright, with a gait very similar to our own, some 3.5 million years ago.

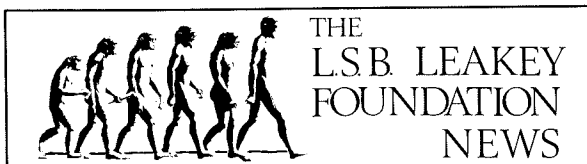
"In addition to our finds of some hominid jaws and teeth, Laetoli has produced many different lines of evidence and glimpses into the past — so many that are normally not found at any one given site. We have hundreds of fossil termite nests,

where the hives and ventilation shafts are preserved. These have proved to be the earliest known termitaries of what are known as the 'higher termites', which have fungus gardens and ventilation shafts. Now this seems to be a long way from archeology, but it just goes to prove that once you start at any given site you don't know what is going to turn up next. You have to be prepared for all eventualities.

"We have pollen. In fact, we have found pollen in the galleries of termite nests when we could not find it anywhere else in the volcanic ash, only in one small lense of clay. And the pollen belongs to a different

ecology than today. It shows that the climate was warmer and it goes on as a natural sequence that the scarp that lies east of Laetoli is subsequent to the Laetolil Beds. In other words, the whole region where Laetoli is today has risen about 2,000 feet. This demonstrates that a site which began as an archeological project may end as a paleontological and even an entomological undertaking."

It is only by the interdisciplinary cooperation of various scientific fields that the past can be reconstructed. It is for this that the Leakey Foundation asks your support. □



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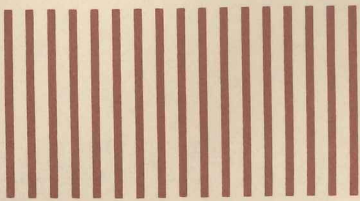
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