

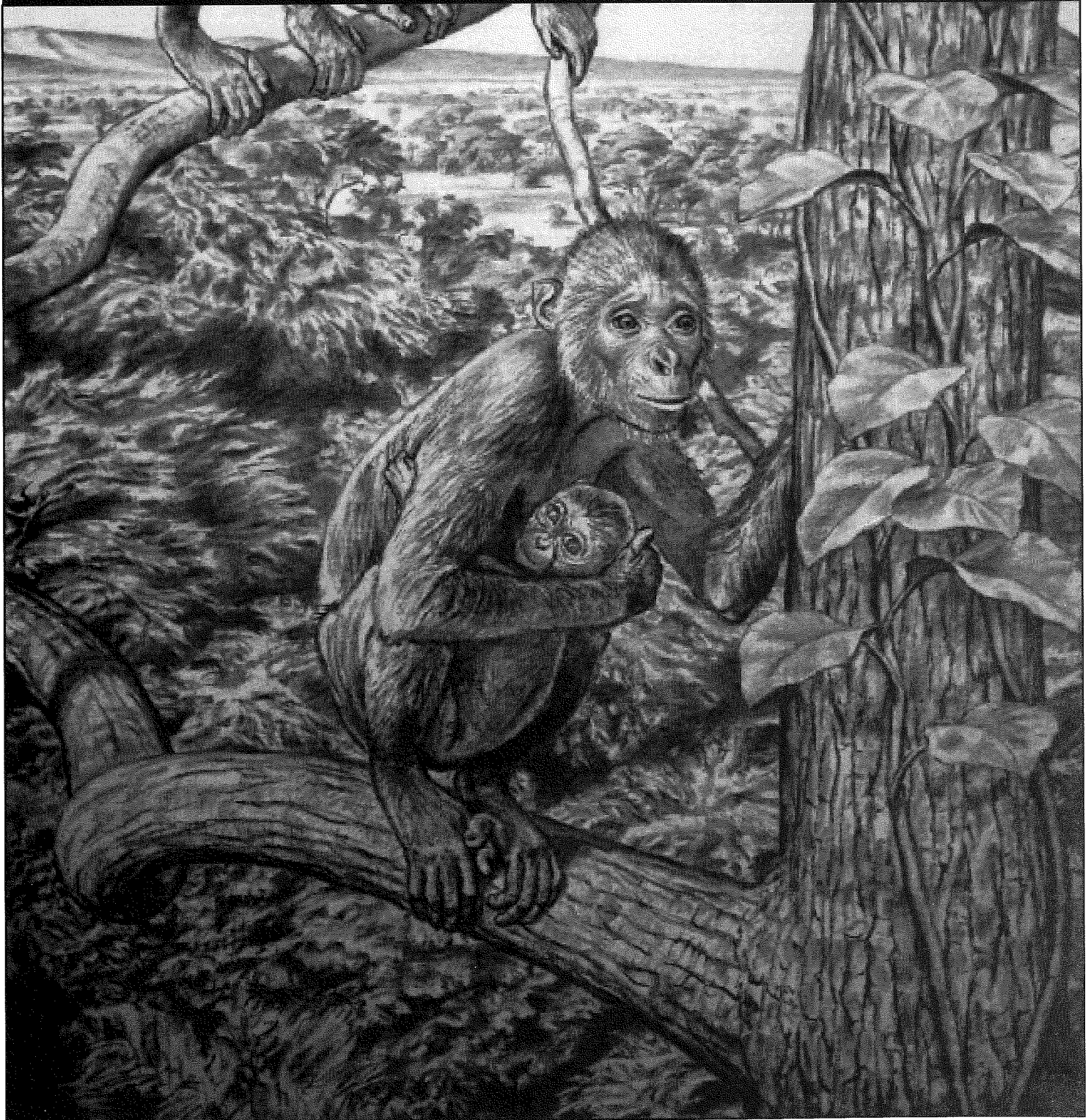
# ANTHROQUEST

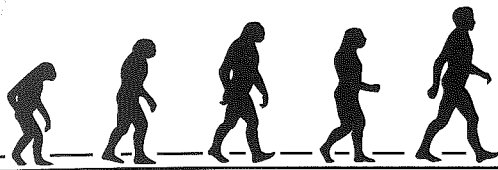
*Research Related to Human Origins, Behavior and Survival.*

Number 46

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Fall 1992





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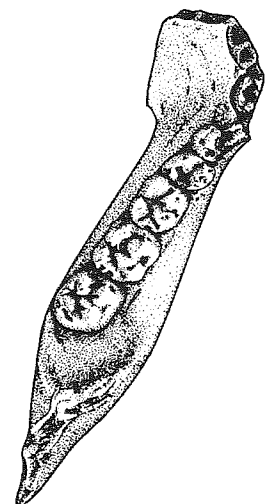
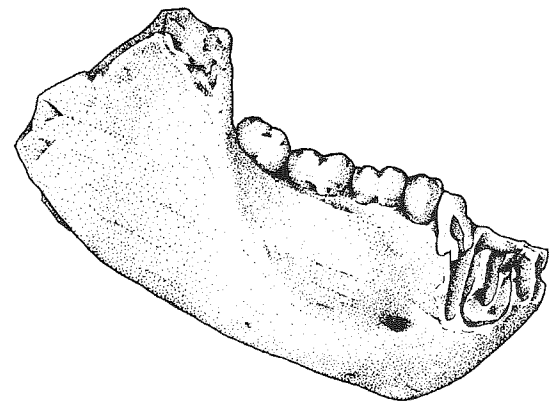
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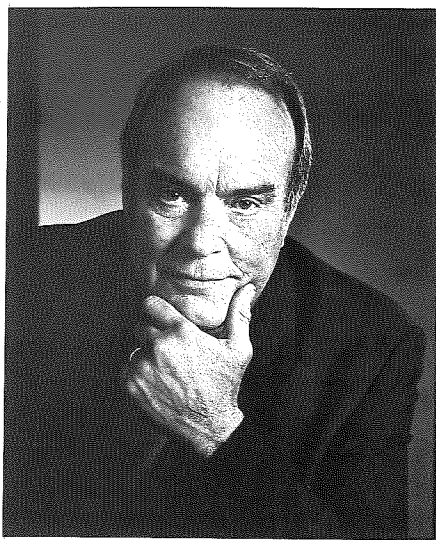
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**Cover Illustration:** Possible life-appearance of an adult female *Proconsul africanus* with young in a mid-Miocene gallery forest habitat at Rusinga. Fragment of a mural for exhibit in May 1993 in the new Hall of Human Biology and Evolution at the American Museum of Natural History, New York. Illustration by Jay H. Matternes. © 1991

# President's Message



"Back to square one" say some forward thinking scientists in the field of paleo-anthropology. They want to know more about the evolutionary links that took place before true hominids

walked the planet. They seek answers to the baffling similarities between great apes and mankind, hoping to trace divergent lines reaching from a common and remote ancestor.

Their target is the Miocene epoch, the long period of five to twenty-five million years before the present which in recent times has yielded fossils of a fascinating variety of ape-like creatures.

The basic challenges are: What kinds of hominoids lived during the Miocene in what sort of environments, and why did this or that particular primate succeed, or fail — and how does all this connect to our own emergence as a species?

This past year our financing helped make possible an important conference on Miocene apes that brought together specialists for a forum of exchange that has provided spin-off benefits for scholars worldwide.

When we fund field work a typical grantee spending list might include items that might appear at first to be minor items—tools, radios, vehicles, tents, medical supplies and computers. Frills they are not. These are the hidden costs of research, vital for the job to be done by people of extraordinary dedication. A reading of Rebecca Ham's dramatic

encounter with a wounded buffalo in a West African forest drives home the point: courage, training, emergency equipment and a walkie-talkie may well be the difference between survival and tragedy. The safety of scientists in the field should be a first priority.

Our record of cash support reached a peak this past academic year of over \$350,000. Even so, we know that the the level of new requests will run high, as much as \$1.5 million. The needs of each case, the breakthrough possibilities, the risk, and many other factors are always taken into account. Allow me to express appreciation to all who have participated in making our programs the vital source they are in the cause of research related to human origins.

With your help the next year will continue our upward climb. Meanwhile we can take pride in having played a role in opening wide the lens of prehistory, illuminating the distant past and sharpening the image of ourselves, our primate relatives, and remnant cultures that are fast disappearing. Finally, while we may never know the full story of how we came to be, the Leakey Foundation has surely advanced our understanding of how we came to inherit the earth and of the obligations we owe to safeguarding its future.

Thank you,

A handwritten signature in black ink, appearing to read "Mason Phelps". The signature is fluid and cursive, with a long horizontal stroke extending to the left.

Mason Phelps

# The Muddle in the Miocene

It's not often that fossils make the headlines. But this spring, the *New York Times*, *Science* and *New Scientist* magazines, and National Public Radio all homed in on an unpretentious little jaw, the first known specimen of *Otavipithecus namibiensis*.

The leader of the team that found the jaw, Glenn Conroy, described the expedition's work during a March workshop at the American Museum of Natural History where specialists convened to examine the original, 13-million-year-old specimen and casts of other apelike and monkeylike creatures from the Miocene.

## What being an ape is all about

What was all the fuss about? Why is the Miocene so special? And what exactly does this new jaw mean?

The Miocene is a geological period that stretched from 25 to 5 million years ago and is probably the most important interval for understanding our relationship to the apes. *Hominoid* is the technical term used to describe living apes, humans, and their common ancestors; *hominid*, a confusingly similar word, refers only to humans and their ancestors after the divergence of the lineages leading to apes or to humans. It was during the Miocene that the *hominoid* stock began to break up into the various lineages leading to the living higher primates. The first group to split off was the lesser apes, now represented by the gibbons and siamangs of southeast Asia. Next, the lineage that produced the orang-utan, the red-furred great ape of Borneo and Sumatra, separated from the common hominoid stock. Later still, this remaining stock subdivided again, one branch leading to the great African apes (gorillas, chimpanzees, and bonobos) and the other to humans.

One important point about the Miocene, then, is that it was the period during which the adaptations of these various lineages were first evolving and becoming established. The same is true of many other mammalian groups, like the different types of antelopes and carnivores. During the Miocene, the faunas of the Old World began to be transformed from something archaic and primitive into the types of animals that we recognize today, with familiar

adaptations to different habitats and lifestyles. Because of environmental and evolutionary changes, the Miocene is a sort of threshold that marks the beginning of today's world.

This means that studying Miocene apes can show us just what being an ape is about — it may help identify the fundamental and crucial adaptations

of these important animals. Grantee

Lawrence Martin, for example, investigated one important feature: the thickness of the enamel on the teeth of modern and Miocene apes.

It had long been noticed that humans and undisputed

hominids, like *Australopithecus* or

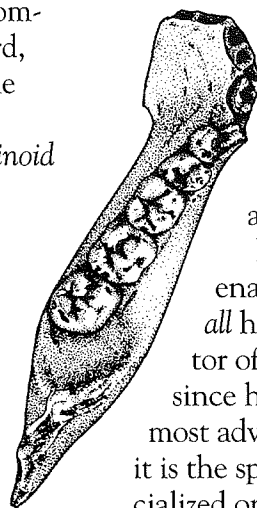
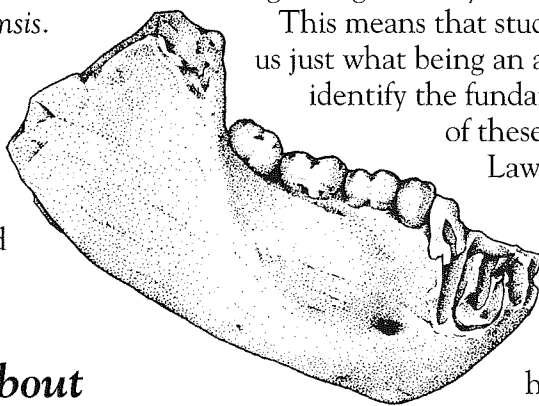
*Homo erectus*, have thick-enamelled teeth; so, too, do orang-utans. In contrast, gorillas, gibbons, and chimps have thin enamel on their teeth. The question was whether enamel thickness was a good indicator of evolutionary relationships. In other words, do species

with thick enamel (such as orangs, humans, and the fossil forms *Sivapithecus* and *Kenyapithecus*) form one evolutionary group and thin-enamelled species (for example, chimps, gorillas, and *Proconsul*, which was once suggested to be their ancestor) another?

Probably not. Martin's work shows that thick enamel is the primitive or ancestral condition in all hominoids, including the last common ancestor of chimps, gorillas and humans. Ironically, since humans tend to think of themselves as the most advanced hominid, Martin's project reveals that it is the species with thin enamel that are the most specialized or evolutionarily advanced while humans are dentally rather primitive. Martin also believes that several different hominoid lineages evolved the tendency to grow thick or thin enamel in slightly different ways, so the simple measure of enamel isn't very useful for reconstructing evolutionary relationships.

## More fossils, more confusion

The story of the ancestry of the higher primates is not so straightforward as was thought. Where once any new fossil could be plugged into one of five





*Anthropologists pondered specimens of many different Miocene apes at the recent meeting sponsored by the Leakey Foundation, the American Museum of Natural History and Wenner Gren. From left: Elwyn Simons, Eric Delson, Louis de Bonis (obscured), Brigitte Senut, Jay Kelley, John Van Couvering, Steve Ward, Mike Rose (obscured), and Andrew Hill. Photo courtesy of the American Museum of Natural History.*

lineages — gibbons/siamangs, orangs, gorillas, chimps, or humans — we now know that the truth is much more complex.

Over the last fifteen years, a plethora of new hominoid specimens has been found all over the Old World. In addition to laboratory analyses of known fossils, the Leakey Foundation has funded enormously successful excavations and field research aimed at discovering new Miocene apes in Kenya, Turkey, Libya, Argentina, Uganda, Nepal, Greece, China, Angola, Zaire, Tanzania, and Hungary.

This is one instance where “more fossils” does not equal “clearer understanding” ...yet. The new fossils have revealed the astonishing diversity of shapes, sizes, and apparent adaptations of Miocene apes — evidence of a major, adaptive radiation of apelike creatures during the Early and Middle Miocene (up to about 10 million years ago). But calling the species of higher primates from the Miocene “apes” implies that they are one of the creatures we know today as apes, but nothing could be farther from the truth.

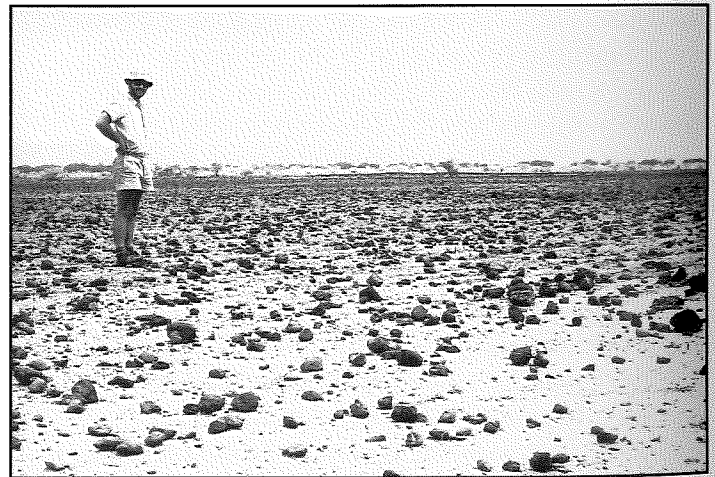
This was something no one had anticipated: there seem to have been literally dozens of apelike primates in the Miocene, each with their own special adaptations, habits, and lifestyles. Out of all of those apelike creatures — natural evolutionary experiments in “being an ape” — only five lineages survived. There were once many more ways to be apes than what we know about today.

As Steve Ward, one of the participants in the *Otaviipithecus* conference, says, “What initially seemed to be a fairly nice, simple progression towards modern species got scuppered by the fossil record.” While the beautiful partial skull of *Sivapithecus* discovered in Pakistan a few years ago demonstrated to most anthropologists’ satisfaction that this genus is closely related to modern orang-utans, few other Miocene-modern links are strong. Every new fossil is a surprise, a chance to revolutionize the consensus of opinion — especially about evolution in the Miocene. Fossil hominoids from the Miocene rarely resist the temptation to turn scientific opinion upside-down.

## **What the jawbone says**

The discovery of *Otaviipithecus* was no exception and pointed up the need for an overall re-assessment of this crucial period in primate evolution. For one thing, Glenn Conroy notes, this single jaw extended the geographic range of Miocene apes enormously. It is now clear that these ancient apes lived in regions well below the southern limits of the range of extant apes.

“If you’d asked people a year ago where the next Miocene hominoid was going to come from,” he observes with a grin, “no one would have said Namibia.” Although apelike fossils from the Miocene are known to range from East Africa, Eurasia, and Spain in the west to China in the east, not one hominoid fossil was previously known from so far south of the equator.



*Dr. Martin Pickford stands at Baringo, Kenya on one of his many fossil-finding expeditions funded by the Foundation. Known for his keen eye when locating fossils, Pickford set an unofficial record when he discovered the newly publicized *Otaviipithecus* jaw within the first 15 minutes of the expedition in Namibia. Photo courtesy of Dr. Martin Pickford.*

Although about 13 million years old, *Otavipithecus* offers us our only glimpse of the evolution of higher primates in southern Africa before the development of australopithecines, the first undoubted hominids, at about 4 million years.

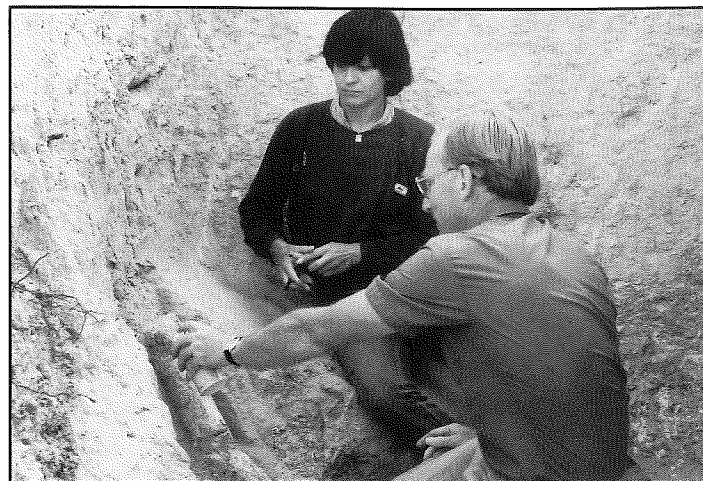
What does this little jaw have to say? For one thing it reveals that *Otavipithecus* was a small animal that had tiny incisors at the front of its jaw — indicating it probably did not eat fruits, which often call for broad incisors for peeling and preparing such foods. Its fairly stout canine teeth suggest it was male, while its unspecialized cheek teeth indicate a rather generalized primate diet: perhaps leaves, berries, seeds, buds and flowers. And, says Conroy, if the jaw is a good indicator of body size, then *Otavipithecus* weighed in at about 14-20 kg (30-45 lbs).

But attempts to agree exactly where *Otavipithecus* belongs in the hominoid family tree (at the recent conference) were unsuccessful. Some participants had prepared diagrams of their points of view before arriving at the meeting and actually seeing the new specimen, using published photographs and lists of anatomical features to make their decisions; others wanted more time to study the original and think the whole problem over. Besides, the Miocene record is growing so complex that unanimity is frequently elusive. As chairman of the Science and Grants Committee, F. Clark Howell, put it at the conference's close: "I'm not surprised. I wouldn't believe there would be a consensus out of the participants in this room in a hundred years."

## The Miocene was different

One of the biggest problems in interpreting the Miocene fossils arises because of the disparity between the richness of the fossil record and the paucity of our modern examples — an ironic twist on the usual condition! Only three genera (*Pongo*, the genus of the orang-utan; *Gorilla*, the gorilla; and *Pan*, the ordinary and pygmy chimpanzees) and four species of great apes persist today. Now, these animals are found only in the fast-vanishing tropical rain-forest or woodland habitats of Africa and Asia. Although we know that their ancestors lie in the "muddle in the Miocene", as some have called it, the question is not just *who is who?* but also *who are all those other guys?*

If only the larger-bodied hominoids known from the fossil record are counted, there are still about a dozen genera and even more species of larger-bodied hominoids known from the Miocene. The litany of names reads like a nightmarish tongue-twister: *Otavipithecus*,



Dr. Peter Andrews and Dr. Berna Alpagut excavating at Pasalar, Turkey, site of *Sivapithecus* (a Middle Miocene ape related to the orang-utan; see *AnthroQuest* #32). Ten years of careful excavations led by Drs. Andrews and Alpagut has revealed much about the fauna and paleoecology of this site—the result of a 15 million-year-old mud slide that entombed a rich variety of animals (see a special edition of the *Journal of Human Evolution*, June/August, 1990). Steady supporters of this project are the Leakey Foundation, the Turkish Directorate of Antiquities and the Department of Paleoanthropology, University of Ankara.

*Afropithecus*, *Proconsul*, *Dryopithecus*, *Ouranopithecus*, *Kenyapithecus*, *Sivapithecus*, *Griphopithecus*, *Turkanapithecus*, *Lufengpithecus*, and *Graecopithecus*, to name but a few. This means that anthropologists are confronted with many ancient apes for which they have no living analogues. Adding to the confusion are additional, smaller-bodied genera and species from the Miocene that appear to be related to monkeys, lesser apes, or species with no living descendants.

A major issue is the scientists' abilities to sort the fossils into their appropriate species. Miocene hominoids used to come in only small, medium and large, with big or small canine teeth that seemed to indicate whether the specimen was male or female. But with so many new species in the running, ranging from extra-petite to jumbo with every combination of teeth and bodies in-between, more and more careful and statistical studies are needed to separate males of a medium-sized species from females of a large-sized species, for example. This is one area in which finding a partial skeleton of one individual may provide a major break-through by linking one particular set of teeth with one particular body. But for most Miocene apes, partial skeletons are non-existent.

(This article continues on page 26)

# PROFILE

## Kamoya Kimeu



Bwana Kamoya Kimeu, Curator of Prehistoric Sites for the National Museums of Kenya, is one of the most important men in paleoanthropology. He is known throughout the world as the leader of the famous Hominid Gang, Richard and Meave Leakey's Kenyan team of ace fossil-finders. His uncanny instinct for finding fossils is valuable, but he contributes, too, through his organizational skills.

In 1985, in recognition of his contributions to science, the National Geographic Society awarded Kimeu the John Oliver LaGorce Medal which was presented to him by Ronald Reagan in a White House ceremony. Previous recipients of the medal include the aviatrix Amelia Earhart and polar explorer Commander Robert Perry.

Left to right: President Reagan, Gilbert Grosvenor (obscured), Meave Leakey, Alan Walker, and Kamoya Kimeu. Photo by Wilbur Garrett.

Kamoya Kimeu is living proof that brains, hard work, and honesty can overcome almost anything. A member of the Wakamba tribe, Kimeu was born into a large family near Ukambani, Kenya, that had little money to spare. "I didn't go to school until I was about 14 years old," Kimeu explains. "Before that, I helped my father with many things, like looking after goats." He only managed to acquire a few years of formal schooling — enough to learn to read and write in English and Kiswahili and to do mathematics. But he learned, too, the importance of pride in himself and working hard.

His first job, after he left school, was working on a dairy farm near home; his task was to bring the cows into the boma, or thorn-fence enclosure, to the milking machines. The European farm manager liked his work and proposed to send him on a course at the Kabete Veterinary College to learn more about treating cows. But, before that could happen, Kimeu got caught up in someone else's dishonesty. One night, as he was sitting talking with the other farm workers, the manager came up suddenly and discovered a container full of milk that one of the others had stolen. Everyone else fled, leaving Kimeu alone with the milk and the angry manager. Even though he was innocent, Kimeu feared the possible punishments for

stealing: either three months' work without pay, or six months in jail, or 25 lashes with a hippo-skin whip. He ran off into the dark and refused to return, even when the manager offered him his job back.

But the teenager needed work and, when his uncle Mutevu came looking for people to go work in Tanzania, Kimeu said he would go. Mutevu said the work was "digging bones." Kimeu, and everyone else, thought it meant grave-digging — an idea his mother didn't like at all. But the family needed money and a teen-aged boy eats a lot of food. Mutevu assured her it was alright; he knew the people from his job in Nairobi. That same day, Kimeu met Louis Leakey and found that he was now part of an expedition going to Olduvai Gorge. Digging bones meant finding fossils: a career Kimeu had never envisioned. Leakey provided food, blankets, equipment and pay; all he asked in return was hard work, loyalty, and intelligence. Kimeu's career as a fossil-finder was started. He began to learn the field and scientific skills — excavating and mapping techniques, or recognizing dozens of different species of animals from tiny fragments of bone or chips of teeth — that have made his career such a success. In addition, he can mend a Land Rover, put up a tent, provision ten people for two months, catch enough fish for dinner, build a road or an air-strip,



bargain for a goat, settle a dispute, apply first-aid, and man the radio-phone to Nairobi.

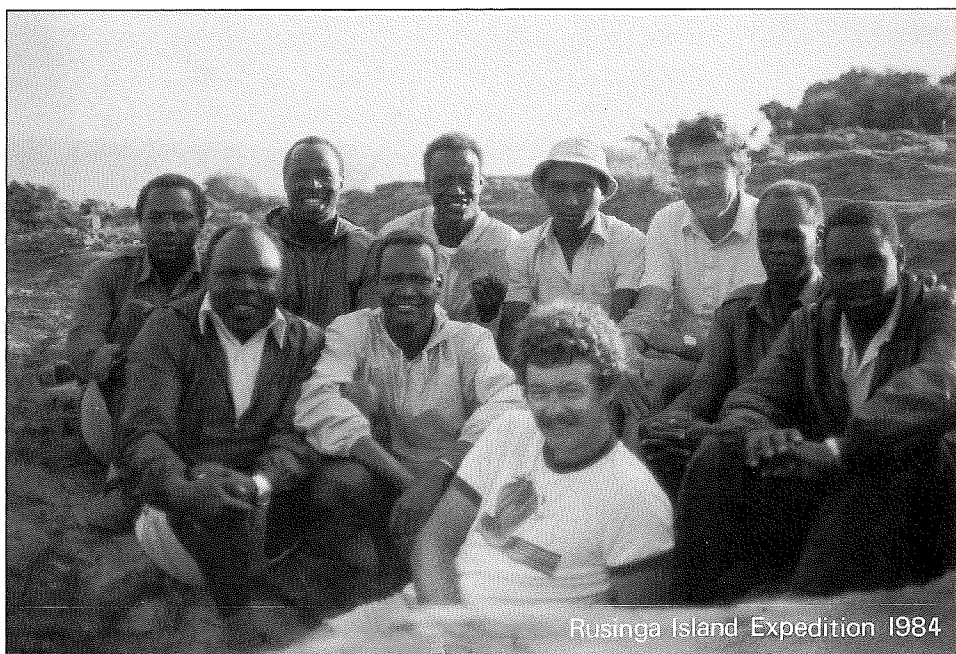
In 1964, Richard Leakey began to follow in his father's and mother's footsteps; they sent him along as organizer with a young archaeologist, Glynn Isaac, to explore an area near Lake Natron in Tanzania. Richard in turn took young Kimeu as his right-hand man or foreman, thus initiating a partnership that would last a lifetime. Kimeu repaid this opportunity by finding his first hominid: the beautiful *Australopithecus boisei* jaw known as the Peninj mandible. Through the years of fabulous discoveries of australopithecines, *Homo erectus* at East and West Turkana, and Miocene apes in sites like Rusinga and Mfangano, Kalodirr and Buluk, Kimeu's Hominid Gang, with him as foreman, has set the standard for fossil finding.

A foreman's job on an expedition is a tricky one. He is management and participates in the decisions about what work is to be done and how, decisions usually made in rambling conversations over meals. Many issues are simply pragmatic, educated guesses based on past experience. Kimeu, as foreman, must understand the objective of the expedition clearly and must know exactly what is and is not a good find. This is tempered with his knowledge of the morale, talents, and abilities of his crew, the men who must actually carry out much of the work. Once the decisions are made about how to proceed with the expedition, it is Kimeu who assigns the tasks and it is Kimeu who reprimands or corrects his crew when something goes wrong. Equally, he reports complaints or dissatisfactions from the crew back to the scientific leaders.

It is his fairness, honesty, and firmness, coupled with a keen insight into personalities, that makes the whole thing work.

Kimeu has always hand-picked and trained his Hominid Gang, using — in best African style — family connections. Each man is a brother, a cousin, or a relative in some way of the others or of someone Kimeu knows well. His hometown of Ukambani is his recruiting station and, in a sense, his quality control system.

A young man who wishes to earn a place as a fossil-finder will start doing more menial tasks, like being the cook's assistant who chops wood, does laundry, and keeps the camp tidy. If he performs well and keeps his ears and eyes open, he may learn how to find and recognize fossils. Perhaps on his time off, he can follow along with one of the team as they prospect for fossils. In time, he might be allowed to excavate something easy that is not so important or, back in Nairobi, he might be taught the delicate task of preparing fossils by removing the encrusting rocky matrix. But, above all, the would-be fossil-finder is proving his character; a man who is unreliable, dishonest, sloppy or dirty, or too interested in women or drinking will never make the team. Others simply lack the talent to find the fossils or learn what they are. But Kimeu sizes each one up, trains him in comparative osteology, excavation, and reporting procedures. He also makes clear that a team member's success or failure reflects on his entire family, not only in terms of income but also in terms of reputation. To be sent home for stealing — something which has never happened to one of Kimeu's team — would disgrace the entire family.



*The Hominid Gang, Kamoya Kimeu, and colleagues in 1984 on Rusinga Island, where they excavated nine partial skeletons of Proconsul. (Back row): The late Maundu Mulila, Wambua Mangao, Aila son of Derekich, Benson Kyongo, Alan Walker, Nzube Mutiwa, Musa Kyeve. (Front row): Kamoya Kimeu, Solomon son of Derekich, Mark Teaford. Photo courtesy of Alan Walker.*

Rusinga Island Expedition 1984

Different people have different ideas of the key to Kimeu's success. Why has he made so many important finds?

*Do the hominids really speak to you?* we asked, repeating a joke made by many of his colleagues.

"Yes," Kimeu agrees with a laugh, "but no one can understand what they are saying!"

He himself attributes his "luck" to perseverance. If you've looked over an area at dawn on one day, look it over again late in the afternoon; if you walked left of that thorn bush yesterday, walk right today; if you've crawled over that exposure twenty times, do it a twenty-first time. It is a system that works.

Listen to Kimeu's account of how he found the *Homo erectus* skeleton:

*It was our last day in camp at West Turkana and I was just walking, because other people were resting. Some of them were washing, sleeping. It was a rest day, that day, because we had come far, very far; we were very tired. We were looking for bones in a distant site. We had gone maybe two weeks without a day's rest.*

*You know, to walk continuously two weeks is too much; it's all you can do, you go crazy, you can't think. So while they were resting, I just walked across to see how the country looked. I crossed the sand river and walked up a little hill and I saw — you know, I am always looking down — I found this piece of bone. I looked at it because it was a hominid. I didn't know how old it might be, but I looked around and found another small piece of it. I put them down together.*

*Then I went back to the camp and I went around, and people were still sleeping. I said, "Wake up," and I took them across to where the bones were. We didn't find anything more because there was a lot of this lava stone. We didn't want to remove the rocks or things like that before all of us saw Richard Leakey and the geology people to make sure where the things were lying. So we went back to camp.*

*It was just a small thing; maybe there was nothing else. But I had to report to Nairobi what I found. I telephoned to Richard and called him and told him and he said, "All right,*

*I'll come on Saturday."* So he and Alan [Walker] came down.

*The morning they started working they found nothing. They were almost fed up with the site. But someone, digging, found another piece of it. The next day, they went back again. And digging down, they found a lot. All skull, because the other bones were far in. In the next three weeks, we unearthed almost the entire thing: a 1.5-million-year-old skeleton of an 11-year-old *Homo erectus* boy.*

*That first bone was on the surface and it was like the rocks, the same color as the lava rocks around it. It was lucky to find it, but I saw it and I picked it up. I saw its shape and its thickness and how it was smooth inside. It's not like a bone from an animal, a gazelle bone or a pig bone. You can see the hominid skull is smooth inside. But with these other animals, the inside of the skull has channels, grooves.*

*The thing is, to be hominid, it could be nothing or it could be good — I don't care, because it's a hominid. But if it chances to be an animal, that's a bad thing, that's very bad. If the scientists come all the way from Nairobi, they come all the way on the plane with all that petrol and they find it's a pig, it's not good.*

It is a typical Kimeu story: it was a rest day and everyone was tired and crazy from walking and looking and not finding anything — so he decided to walk and look just a little more, and made one of the most spectacular finds of the century. Like the rare fossils he finds, Kamoya Kimeu is one in a million.

In 1994, Kamoya Kimeu will turn 55, mandatory retirement age under Kenyan law. Richard Leakey and Alan Walker are setting up a special fund to provide a pension for this remarkable man. As soon as the legal details are settled, they will be asking Kamoya's friends and admirers — those who have visited his camp or studied fossils he has found or simply those who wish to honor his many accomplishments — for contributions.



# True Grit in Gabon



Rebecca Ham happily returns to the Forest. Photo courtesy of Rebecca Ham.

No one could accuse Rebecca Ham, the current Leakey Trust scholar, of being a coward. It takes a fair amount of courage to set off for the Lope Reserve in Gabon to study the behavior and ecology of the grey-cheeked mangabey (*Cercocebus albigena*). Living in a forest in West Africa is not much like attending the University of Stirling in Scotland. Climate, language, food, and a dozen other aspects of daily living conditions pose new challenges, not to mention the demands of locating and habituating her troop of mangabeys and gathering accurate information about their diet, home range, and social behavior.

Many researchers fascinated by living primates have conquered their understandable jitters about the emotional and physical demands of fieldwork. But Ham has faced an even more remarkable challenge — what she calls, dead-pan, the rather unfortunate experience of being charged by a wounded buffalo” — and has returned to her field site and her monkeys, undaunted.

In a report to the Leakey Trust, this extraordinary young woman describes her accident which occurred on June 13, 1991. She made a full recovery but needed a week of medical treatment in Franceville, two weeks recuperation at home in Canada, and a month more back in Scotland resting and getting organized (again) for the field:

*After finishing observations on my target group of monkeys, I used my walkie-talkie to radio to base camp at 14.30 hrs. I arranged to be picked up at a*

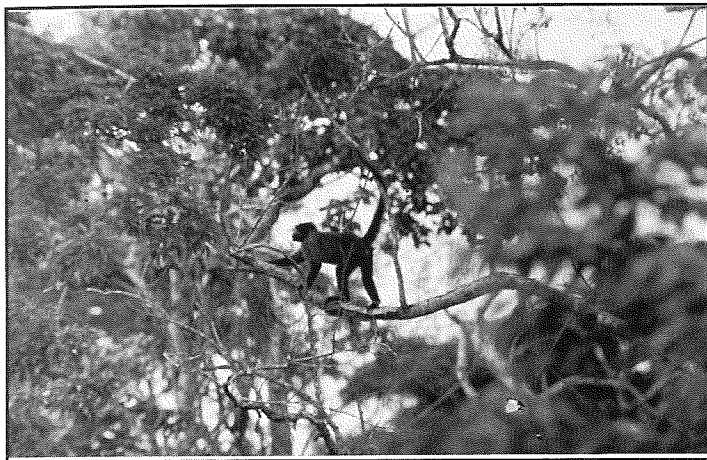
*set location but said that I would radio again once I had reached the savanna. Shortly after I set off I was charged by the buffalo.*

*I did not see or hear the buffalo before it charged. Its horn entered my left breast, bruising my ribs and coming out again about 5 cm. [2"] up. I was caught on his horn and had to lift myself off, inflicting a minor puncture on my right hand. I held his horns trying to keep his head away but was thrown into the river onto my back. He then charged repeatedly over the next few minutes. During this struggle I noticed that the buffalo was wounded. (His intestines were hanging from his abdomen; probably gored in a fight with another buffalo).... On one of these charges his horn hooked my left ankle, entering between the tendon and the bone, but damaging neither [although she could not walk normally again until June 27th].*

*I tried to 'play dead' by lying as still as possible in the water in hopes that the buffalo would stop charging. The buffalo finally stopped and stood a few minutes puffing at my feet before bolting away. I stood up and ran as fast as I could upstream away from him. I tried to radio for help but the radio had been soaked with water and did not work. Fearing that the buffalo might return, I started the 2 km walk home, stopping at a large fallen tree to self-administer first aid. Because I had not been in radio contact with base camp for over an hour, a search was already underway. I reached camp at 16.30 hrs where fellow students cleansed and rebandaged my wounds.*

From there, her colleagues managed to get her to a doctor in Booue and from there to a hospital in Franceville. After recovering from her “unfortunate experience”, Ham returned to the field in August, 1991, and plans to remain there until September or October of 1992.

“Home” in Gabon, as far as Ham is concerned, is the Station d'Etudes des Gorilles et des Chimpanzees (SEGC), established by Dr. Caroline Tutin (one of our Great Ape Fellows) and Dr. Michel Fernandez (co-Director at SEGC and Research Fellow at the University of Sterling). Fortunately, Tutin and Fernandez have always insisted that students receive rigorous and extensive training in safety, first aid, and use of safety equipment before they are permitted to conduct research on their own. Ham's close encounter with



*A grey-cheeked mangabey in the treetops. Photo courtesy of Alan Walker.*

a buffalo showed just how critical this time-consuming training and the purchase and maintenance of “extra” equipment, like walkie-talkies, can be! Without the emergency training, and without the expert assistance of Ham’s colleagues — Richard Parnell, Ben Voysey, and Lee White, who were present at SEGC when she came in — this story might have been a tragedy.

It would be selling Rebecca Ham short to suggest that the demonstration of her grit and courage is the only outcome of her work. In a progress report to the Leakey Foundation, she mentioned several fascinating patterns that are beginning to emerge from her studies now that she has identified her troop and can make regular contact with them.

First, she has found that different groups of mangabeys do not practice mutual avoidance as they have been observed to do in eastern Uganda. Intergroup encounters are common, with groups coming close enough to exchange vocalizations — verbal challenges? — and sometimes to chase each other before one group retreats. Early in her study, Ham thought she was seeing evidence for peaceful mixing of different mangabey groups, which would have been an unusual pattern. But, with additional time in the field, she began to realize that she was observing the dynamics of fission and fusion of sub-groups within the main group of mangabeys. In other words, what she had taken for “different groups” were simply all part of one larger group — another reminder of the need for individual identification of animals and a deep familiarity, over time, with each individual’s behavior.

In fact, Ham has now shown that the main group of 21 animals sometimes splits in two, with one adult male in each sub-group. Those two groups may move and forage independently for a while with as much as

350 meters between them, only to join up with each other some hours or days later. It will be fascinating to see if these are just preliminaries to a more permanent division into two groups in the future. Ham is paying special attention to ecological conditions, such as the abundance of fruit, to see if these factors influence the fission or fusion of social groups. Does something as simple as the availability of food regulate something as complex as social behavior? It could be.

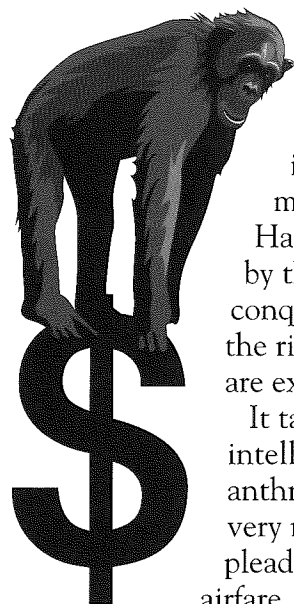
Another interesting aspect of Ham’s work was the finding that mangabeys are often associated with other species of primate; nearly half of the recorded observations occurred when another species was present. The most common species associated with the mangabeys was *Cercopithecus pogonias*, the crowned guenon monkey. Ham wonders what the benefits and costs of this relationship are and is studying the diet of the pogonias as well, to help answer her questions.

For example, when she approaches the mangabeys, it is often the pogonias who first notice her presence. Are the pogonias more vigilant because they are smaller and therefore more vulnerable? Does the presence of the larger-bodied mangabeys in turn offer the pogonias some sort of protection or other benefit? How closely do the diets of the two species resemble each other — are they complementary or overlapping? There are many more discoveries in Rebecca Ham’s future.

*A doctoral student at the University of Stirling, Rebecca Ham received \$30,000 from the Foundation for her 1990-1993 Leakey Studentship through the L.S.B. Leakey Trust. The L.S.B. Leakey Trust, formerly the London Chapter of the L.S.B. Leakey Foundation, occasionally awards a highly competitive fellowship for a PhD candidate pursuing a degree in areas of interest to the Foundation and the Trust at a University or College in the United Kingdom.*



# The Hidden Cost of Research



The perseverance of the amazing young woman whose story is told on the previous pages demonstrates several important points. First, and most dramatically, like Rebecca Ham, all of the scientists funded by the Leakey Foundation seek and conquer challenges that far exceed the rigors of everyday careers. They are extraordinary people.

It takes a special determination, intelligence and drive to succeed in anthropology, for the dangers can be very real indeed. When researchers plead for more funds — for another airfare, walkie-talkies, radios, extra vehicles, new tents or computers that they can take into the field — they are struggling with conditions that few of us can truly appreciate.

Relatively small amounts of money make an enormous difference. In Rebecca Ham's case, the walkie-talkies and the system of radio contact probably saved her life. Of course, Dr. Tutin and Mr. Fernandez deserve full credit for having the foresight to institute rigorous safety training and procedures and Ham's colleagues (Parnell, Voysey, and White) have earned our gratitude for their prompt and appropriate actions. But human resources can do only so much. It is frankly true that a few dollars may make the difference between a successful project and a frustrating one, or between research completed with a comfortable margin of safety for all those concerned and research that tiptoes on the edge of disaster. These projects are no cushy, luxurious junkets full of unnecessary frills. In fact, practically all researchers pay part of the cost of the project out of their own

pockets, especially in today's climate when funding is tight, because they are so determined to see the work done.

Even when field conditions are not life-threatening — and, fortunately, such extreme dangers are relatively rare — the work is not easy. A relatively “tame” project that relies on gathering data in a museum abroad, for example, may call upon all of a scientist's intellectual and social skills, as he or she negotiates tacitly with curators from other cultures for access to information and specimens. It is far too easy to behave in ways perceived as condescending, rude or arrogant by individuals raised in another culture who may not share our expectations of “little” details such as proper modes of address (or dress!), loudness of voice, or physical proximity to another person. Insensitivity on one researcher's part may close the doors of an institution to outsiders for years to come.

There is also another issue here, one of the responsibility of the researchers to those who make their work possible. Many scientists have become sensitive to the need to “pay back” — to offer help, expertise, equipment or training to individuals in the host countries which house the materials or animals, provide the permits and logistical support, and often supply the men and women who literally make a field camp livable. This is not bribery, nor is it “buying” science. Paying back is simply a prerequisite to establishing a two-way relationship of mutual benefit, trust and respect in the best primate fashion.

The Leakey Foundation places priority on the safety of the scientists it sponsors. We also work to support many different kinds of “pay back,” from Baldwin Fellowships for African scholars, to financial support of truly international projects, to the efforts towards conservation, training, and establishing new wildlife reserves carried out by our Great Ape Fellows.

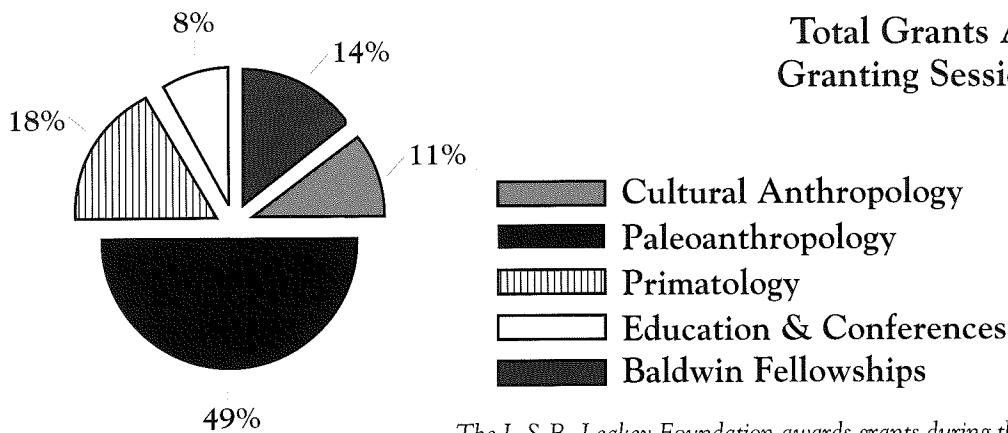
## *New member of Leakey Foundation Staff*

The Foundation is pleased to welcome to its staff Ms. Helen B. Strate, new Administrative Assistant and Assistant to the Board of Trustees. Ms. Strate is a graduate of Princeton University and holds a Master's Degree in Asian Studies from Stanford. She has traveled extensively in Asia, but her primary interest is in China; she lived and worked in Tianjin, P.R.C. and is fluent in Mandarin. Prior to the Leakey Foundation, she was Development Officer for the Asian Art Museum of San Francisco.

# GRANTS

## Winter & Spring 1992

Total Grants Awarded in Winter and Spring  
Granting Sessions and by Designated Gifts =  
\$279,015



The L.S.B. Leakey Foundation awards grants during three granting sessions: Fall, Winter and Spring

### CULTURAL ANTHROPOLOGY

<b>Alvard, Michael</b> (U New Mexico) .....	\$5,000
Rain Forest Foraging Peoples of Sulawesi, Indonesia: Exploratory Research	
<b>Bentley, Gillian</b> (Penn State U) .....	\$3,000
Microdemography and Reproduction Ecology of Foragers and Cultivators, South India	
<b>Bock, John</b> (U New Mexico) .....	\$9,000
The Determinants of Variation in Children's Labor in a Southern African Community, Botswana	
<b>Boden, Martha</b> (U New Mexico) .....	\$5,500
Female Subsistence Strategies in an haMbukushu Village, Ngamiland, Botswana	
<b>Gragson, Ted</b> (U Georgia) .....	\$4,500
Opportunity Costs and Benefits of Foraging among the Ayoreo, Paraguay	
<b>Kaplan, Hillard</b> (U New Mexico) .....	\$5,000
The Ecology of Fertility and Labor in a haMbukushu Community, Botswana	

### PALEOANTHROPOLOGY

<b>Anton, Susan</b> (UC-Berkeley) .....	\$3,925
Phylogenetic and Functional Influences on Japanese Macaque Masticatory Mechanics and Morphology	
<b>Benefit, Brenda</b> (S Illinois U) .....	\$12,500
Excavation of Middle Miocene Primates at the Maboko Formation, Kenya	
<b>Bromage, Timothy</b> (CUNY-Hunter) .....	\$8,000
Vertebrate Paleontological Survey and Age of the Chiwondo Beds, Malawi	
<b>Ciochon, Russell</b> (U of Iowa) .....	\$9,000
Paleoanthropological Investigations in the Plio-Pleistocene Karst Caves of Sichuan Province, Southern China	

<b>Cruz-Uribe, Kathryn</b> (N Arizona U) .....	\$4,900
The Significance of Rock Hyrax Bones from Eagle Roosts in South Africa	
<b>Deinard, Amos</b> (Yale U) .....	\$5,000
The Evolutionary Genetics of the Chimpanzees	
<b>Feibel, Craig</b> (U Utah) .....	\$4,530
Paleoenvironmental Reconstruction of the Mio-Pliocene Sequence at Lothagam Hill, Kenya	
<b>Goren-Inbar, Naama</b> (Hebrew U) .....	\$12,000
Hominid Adaptation and Paleoenvironments at the Site of Gesher Benot Ya'Aqov, Israel	
<b>Hardy, Bruce</b> (Indiana U) .....	\$2,000
DNA Analysis from Organic Residues: Inferences of Stone Tool Function	
<b>Kappelman, John</b> (U Texas) .....	\$12,250
Excavation and Extension of Survey of the <i>Sivapithecus</i> Bearing Sinap Formation, Turkey	
<b>Kay, Richard</b> (Duke U) .....	\$6,500
Exploration for Primates and Other Fossil Vertebrates in the Paleogene of Bolivia	
<b>Koufos, George</b> (Aristotle U) .....	\$3,000
Excavations For Hominoids in Late Miocene of Chalkidiki, Northern Greece ( <i>Ouranopithecus</i> )	
<b>Rak, Yoel</b> (Sackler School of Medicine) .....	\$8,000
<b>Hovers, Erella</b> (Hebrew University)	
Human Adaptations at the Neanderthal Site at Amud Cave, Israel	
<b>Rightmire, G.</b> (SUNY-Binghamton) .....	\$5,000
The Earliest Modern Humans from Africa & Southwest Asia	
<b>Rink, William</b> (McMaster U) .....	\$2,000
<b>Stringer, Christopher</b> (Nat'l History Museum, London)	
<b>Allsworth-Jones, Philip</b> (Clare Hall, Cambridge)	
ESR and TL Dating of Hominids and Archaeological Materials — European Samples	

# Grants Awarded

<b>Sahnouni, Mohamed</b> (Indiana U) .....	\$7,000
New Archaeological Investigations at Ain Hanech, Algeria	
<b>Scott, Katharine</b> (U Oxford) .....	\$1,000
Excavation of the Mid-Pleistocene Channel Deposits at Stanton Harcourt, Oxfordshire, England	
<b>Semah, Francois</b> (Inst de Paleontologie Humaine) ..	\$5,000
Javanese <i>Homo erectus</i> Cultural Behavior: The Ngebung Site at Sangiran	
<b>Semendeferi, Katerina</b> (U Iowa) .....	\$6,300
Hominoid Brain Evolution: A Quantitative Analysis of the Prefrontal Cortex (Areas 10 and 13) through Computer Imaging	
<b>Shea, John</b> (Harvard U).....	\$1,800
Excavation, Replication, and Lithic Technological Analysis of Assemblages from Ubeidiya, a Lower Paleolithic Site in Israel	
<b>Speth, John</b> (U Michigan).....	\$3,500
Animal Procurement in the Near Eastern Middle Paleolithic	
<b>Straus, Lawrence</b> (U New Mexico) .....	\$4,000
Middle and Upper Paleolithic Research in Southern Belgium	
<b>Tobias, Phillip</b> (U Witwatersrand) .....	\$6,500
Continued Excavations at Taung, South Africa	
<b>Wall, Christine</b> (SUNY-Stony Brook) .....	\$2,988
Form and Function of the Temporomandibular Joint in Anthropoid Primates	

## PRIMATOLOGY

<b>Czekala, Nancy</b> (San Diego Zoo).....	\$6,000
Reproductive Hormonal Parameters of the Mountain Gorillas of Rwanda	
<b>Garber, Paul</b> (U Illinois) .....	\$4,500
Cognition, Spatial Memory, and Decision Making in Primate Foraging Patterns	
<b>Marchant, Linda</b> (Miami U) .....	\$7,500
<b>McGrew, William</b> (U Stirling) .....	
Laterality of Limb Function in Wild Chimpanzees, Gombe, Tanzania	
<b>Uhlenbroek, Charlotte</b> (U Bristol) .....	\$6,720
A Functional Analysis of Chimpanzee Pant-hoots: Cooperation and Conflict Between Males at Gombe Reserve, Tanzania	
<b>Watts, David</b> (Duke U) .....	\$4,000
Conflict and Reconciliation in Wild Mountain Gorillas, Karisoke Research Centre, Rwanda	

## GREAT APE FELLOWSHIP

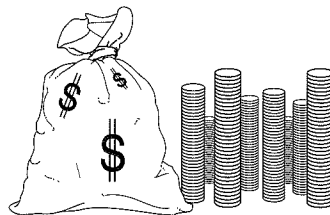
<b>Thompson-Handler, Nancy</b> (SUNY) .....	\$20,000
<b>Malenkey, Richard</b> (SUNY) .....	
Creating an Infrastructure for Research and Conservation: Lomako Forest, Zaire	

## EDUCATION AND CONFERENCES

<b>Assefa, Zelalem</b> (Nat'l Mus Ethiopia) .....	\$1,232
Paleoanthropological Training in Kenya	
<b>Ham, Rebecca</b> (U Stirling) .....	\$10,000
Grey-Cheeked Mangabey in the Lope Reserve, Gabon: A Competing Frugivore in a Forest Primate Community (Third and Final Year of Doctoral Studies and Research at University of Stirling)	
<b>Ng'ang'a, Patrick</b> (Duke U) .....	\$4,800
Support to pursue PhD in Geology at Duke University	
<b>Van Couvering, John</b> (AMNH).....	\$4,000
Apes or Ancestors? Workshop on Middle Miocene Hominids, March 28, 1992.	
<b>Zhang, Jun Shan</b> (UC-Santa Cruz) .....	\$1,570
Attendance at the University of California, Santa Cruz; One quarter of Zooarchaeology	

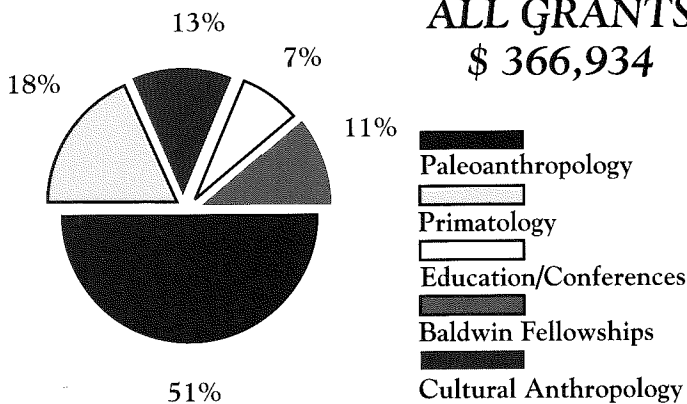
## BALDWIN FELLOWSHIPS

<b>Fessaha, Nardos</b> (Ethiopian).....	\$11,500
Continuing Fellowship: Summer Research Project and Second Year of Support to Pursue an MA in Anatomy at Howard University under the direction of Dr. Raymond Bernor. Focus on vertebrate paleontology and evolutionary biology.	
<b>Hundie, Girma</b> (Nat'l Museum Ethiopia).....	\$8,500
Continuing Fellowship: Second Year of Support to Pursue an MA in African Prehistory at University of Florida under the direction of Dr. Steven Brandt. Focus on LSA and food production.	
<b>Mutundu, Kennedy</b> (Washington U) .....	\$11,500
Continuing Fellowship: Summer Research Project and Second Year of Support to Pursue a PhD in Archaeology at Washington University under the direction of Dr. Fiona Marshall. Focus on zooarchaeology and ethnoarchaeology (pastoralism).	
<b>Negash, Agazi</b> (Nat'l Museum Ethiopia) .....	\$8,500
New Fellowship: First Year of Support to Pursue an MA in Prehistoric Archaeology at the University of Florida under the direction of Dr. Steven Brandt. Focus on the LSA with particular interest in the behavioral significance of rock art.	



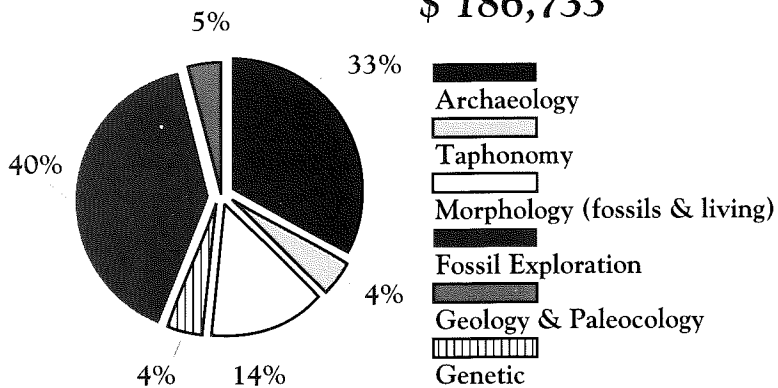
# GRANTS

## Where Did The Grants Go?



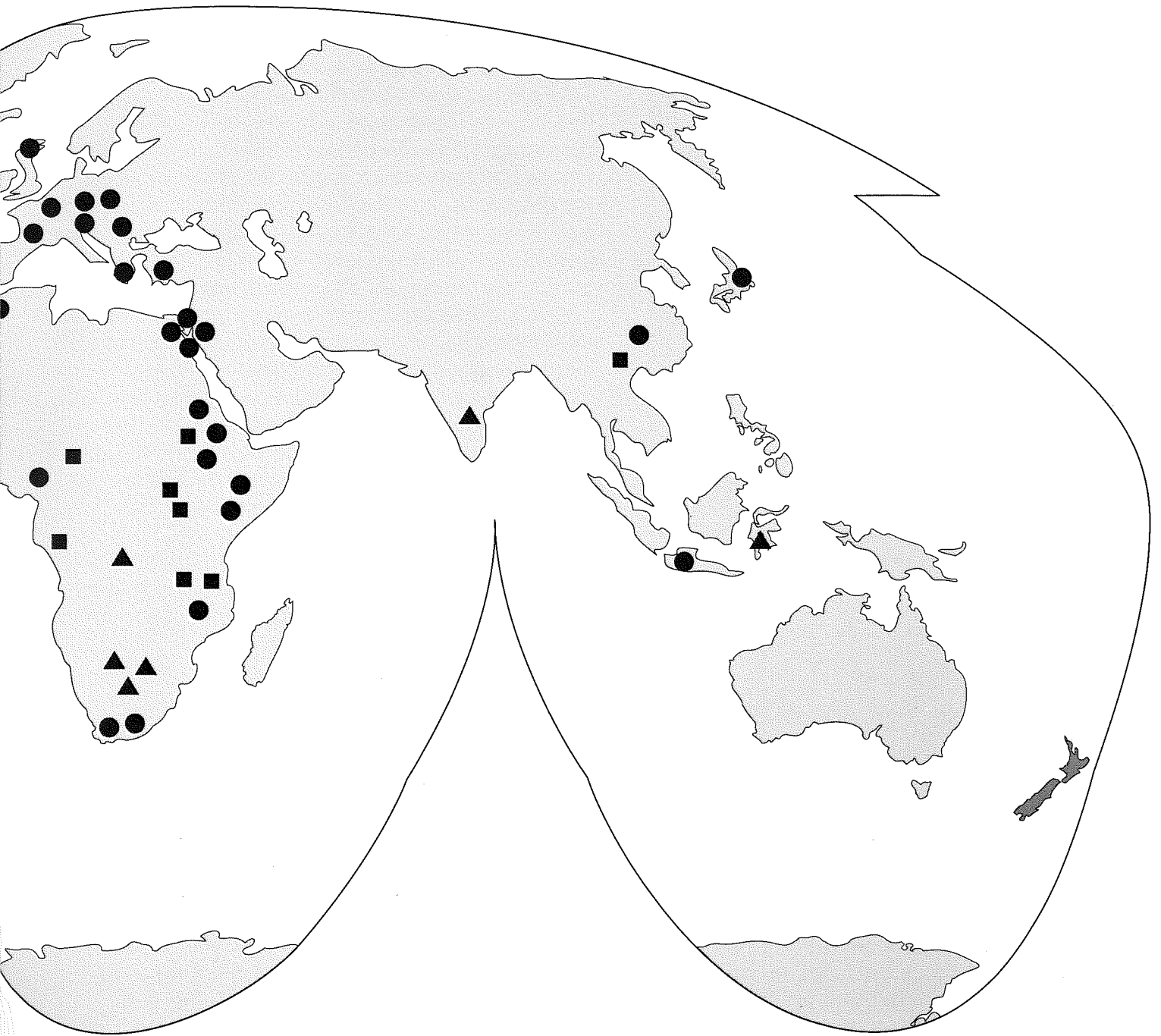
## PALEOANTHROPOLOGY

\$ 186,733



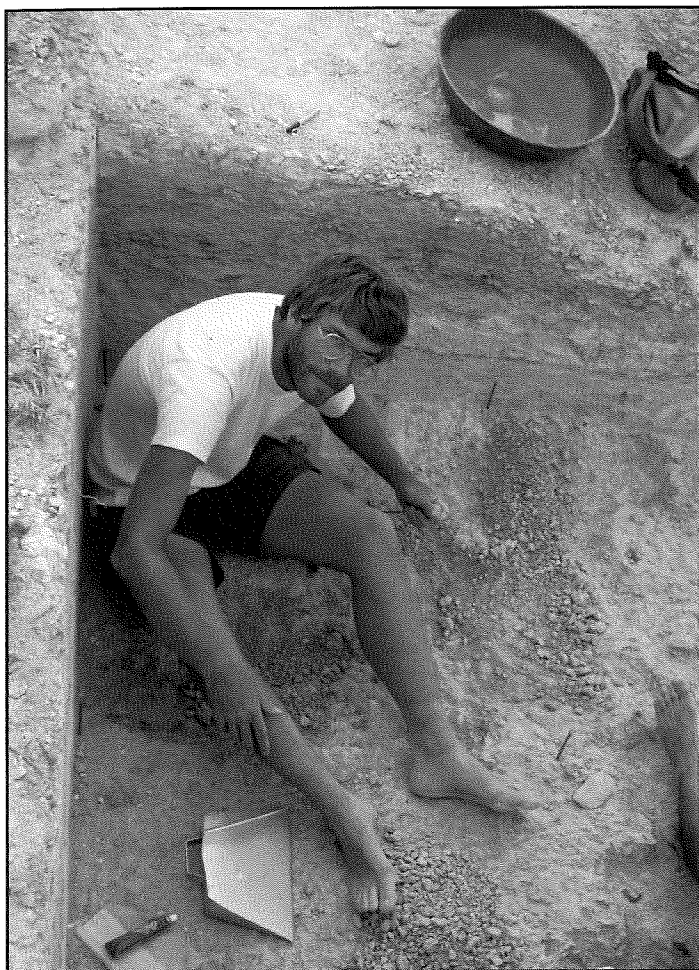
Field S





udies

- Primatology
- ▲ Cultural Anthropology
- Paleoanthropology



Thomas Plummer at Kanjera. Photo courtesy of Thomas Plummer.

## And Where Are You From?

Provenance, or knowledge of the exact place of origin, is one of the most important facts about a fossil. Where a specimen comes from often indicates its antiquity; provenance may also show what other species the fossil was buried with — and, usually, lived with — and that in turn may yield important clues about habitat and adaptation. Imagine, then, the frustration of finding a good hominid fossil and not being able to establish its provenance!

This was exactly the quandary faced by Louis Leakey in the 1930s, when he found anatomically-modern hominid fossils at Kanjera, a fossil locality on Homa Peninsula which juts out into Lake Victoria in western Kenya. For Leakey, who believed firmly in the antiquity of large-brained humans, the Kanjera hominids provided the tangible evidence of his theories. They were part of the reason that Leakey reject-

ed *Homo erectus* from the direct human lineage — a distinctly unpopular point of view.

The problem was that Leakey believed the crucial fossils were derived from the same bed as Acheulean artifacts and a fauna that pointed to Middle Pleistocene age, including some important specimens of *Theropithecus oswaldi*, the giant gelada baboon. (The Kanjera beds are now dated to between about 1.3 million and 300,000 years ago.) Skeptics argued that the fossils might have come from more recent stratigraphic layers higher in the sequence. However, erosion had changed the appearance of the gullies in the three years since the skulls' discovery; not having made a map at the time, Leakey could not relocate the precise spots where the fossils were found. As a result, his interpretation of their great antiquity was cast into considerable doubt. If he were correct, today's assessment would be that they were the oldest known specimens of anatomically-modern humans.

Louis Leakey was not alone in such problems; time and again, important specimens are located only after they have weathered out of the geological beds. Unless local geology is favorable, it is often a nightmare to reconstruct exact provenance in such cases and specimens remain controversial for decades — until now, that is.

Thomas Plummer of the National Museum of Natural History, at the Smithsonian Institution, and A. Murithi Kinyua, of the Centre for Nuclear Techniques, University of Nairobi, have recently begun applying new techniques to this old problem. They realized that an X-Ray Fluorescence Analysis (XRFA) would reveal the proportions of different trace elements in fossils which, in turn, could be compared with the profiles of fossils of known origin. Therefore, by matching XRFA profiles of a surface-collected fossil with another whose origin was precisely known, provenance could be reconstructed scientifically.

Plummer was well aware of Leakey's classic problem with the Kanjera hominids, for he was researching the site formation processes and paleoecology of Kanjera for his doctoral dissertation. In 1987-1988, Plummer was part of the Smithsonian Expedition to Kanjera which, under Richard Potts' direction, refined the stratigraphic maps of the locality and recovered the first large sample of *in situ* fossils. This information and material would provide the framework within which Plummer and Kinyua could assess the range of possible provenances of the hominid fossils.

The Kanjera Formation appears in two regions, known

# Fragments, Flakes & Sherds

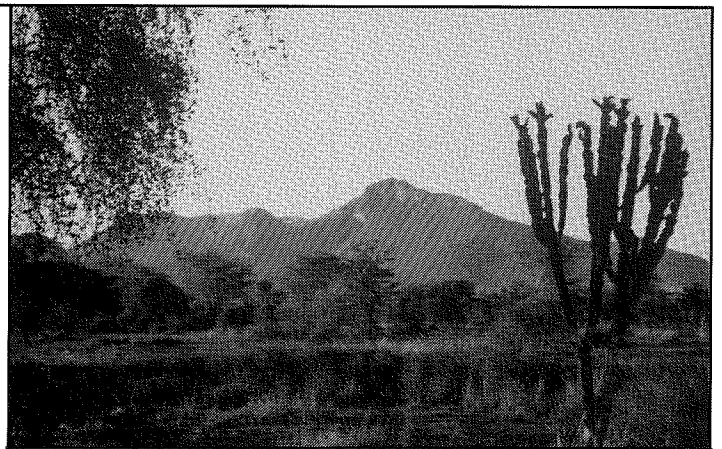
as the Northern and Southern exposures, with five Kanjera Beds in the north (known as KN-1 through KN-5) and six in the south (KS-1 to KS-6). Above the Kanjera Beds lies an unconformity (a period of time in which no geological deposition occurred) and above that is the Apoko Formation, topped by modern black cotton soil — that peculiarly East African soil which makes glutinous, Land-Rover-swallowing mud in wet seasons and a brutally-hard, cement-like substance in dry seasons. Two hundred and eighty-seven fossils from the Smithsonian excavations as well as 240 fossils from the surface nearby were selected for analysis.

There are two types of XRFA that could be used: one of which provided quantitative information and the other of which offered only qualitative results. While hard numbers might seem preferable, the quantitative analysis involved destroying samples of the fossils. Plummer and Kinyua first chose 69 fossils of little paleontological significance and analyzed each one by both procedures, comparing the results. This showed that the qualitative results closely mirrored the quantitative data, so no further fossils needed to be destroyed. Next they established the signatures or element profiles of the fossils from the different Kanjera Beds, the Apoko

Formation, and the black cotton soil, using the qualitative analysis of the fossils they had gathered from each location. This set of signatures was their reference collection, to which the unknowns could be matched.

Now it was time to examine the fossil geladas and hominids. When Plummer and Kinyua analyzed them with the XRFA, the answers were clear. All but one of the geladas showed high values for uranium, radon, and rubidium, while all of the hominids had low values for yttrium and zirconium. There was no way, then, that the geladas and the hominids all came from the same geological bed. The most likely provenance for the geladas was KN-2, where the Smithsonian expedition actually found additional gelada specimens. As for the hominids, they almost certainly originated in the relatively recent black cotton soil at the top of the sequence. With Plummer's and Kinyua's new technique in hand, the possibility of tracing the origins of all "problem fossils" has gotten a giant step closer.

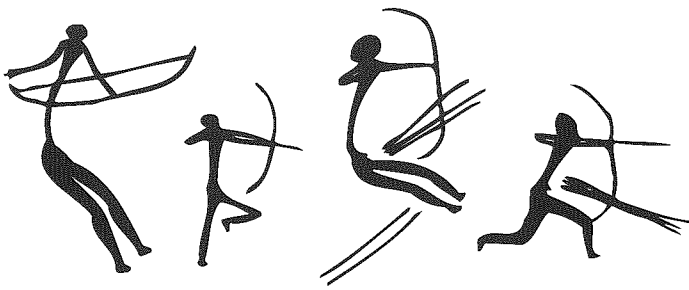
*Dr. Tom Plummer has received two grants from the Leakey Foundation for his work at Kanjera including XRFA, site formation and paleoecology. Total awards, \$5,215.*



*From left to right: Stanhope White, Peter Brill, Mr. Turner, Louis Leakey, Professor Boswell and Peter Kent.*

*Homa Mountain from Kanam Camp.*

In 1934, Louis Leakey returned to Kenya to further excavate at Kanam and Kanjera and to re-locate the exact site of the controversial Kanjera specimen. These photographs of the expedition's camp, set up half-way between the two sites, are from an exciting photo album kindly donated to the Foundation by Mr. Stanhope White. It is a visual record of the 1934-35 expedition described in Louis' memoirs, *By the Evidence*.



## Digging Tools

Stone tools and more stone tools — that's what most archaeological sites yield up to their excavators. Sometimes, by way of variety, there is also debris from the manufacturing of tools (debitage, in technical terms) and, depending on the type and preservation of the site, there may also be food refuse such as broken and butchered animal bones. But the overwhelming majority of "finds" on ancient sites are stone tools.

The standard way of studying stone tools is to examine the process by which they were made — by documenting how many flakes of what sizes were struck from the core, for example — and the source of the raw materials used for tools. But what is really treasured is evidence of what the tools were used for, and this can be a difficult piece of information to obtain. A disconcerting problem is the all-too-human tendency to mis-use tools — like hammering with the heel of your shoe or prying with a screwdriver.

Most archaeologists who have acknowledged this problem have simply ignored it — perhaps hoping secretly that it would go away — and feeling, in any case, that the most important function was the one for which the tool was designed. Russell Greaves, a graduate student at the University of New Mexico, took a totally different approach to the issue. Rather than dismiss this behavioral flexibility in tool use, Greaves decided to investigate it.

He chose to live among the Pume of southwestern Venezuela for several months to study the problem. The Pume, or "Yaruro" as they are sometimes called, hunt and fish with bows and arrows and also use hooks and lines, poisons, dams and weirs in fishing. They cultivate bitter manioc and collect and forage for other vegetable foods along the Capanaparo and Cinaruco Rivers and in the savannah between their drainages.

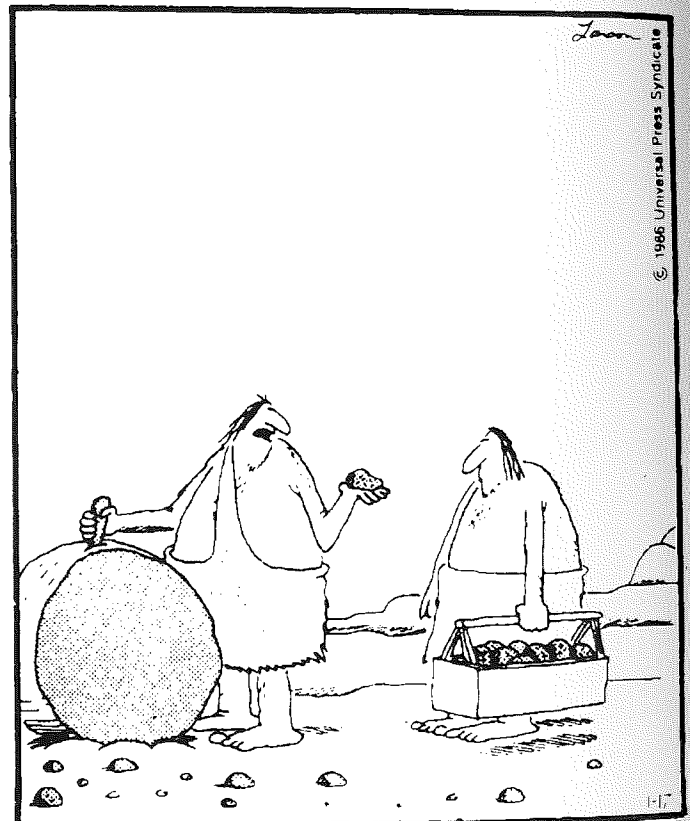
Greaves wanted to know how tool inventory (what they took with them), mobility (the length of a trip), and target resource (what foods they were trying to get) affected tool use. His intuition was that the longer the trip, the more potential food sources would be encountered, so he thought that the Pume would carry more kinds of tools on long distance

trips. He also predicted that each tool would be used in more varied ways under these conditions.

The first surprise Greaves' data revealed was that the biggest differences related to whether the intention of the trip was fishing or hunting, showing how important it was that he chose a group with a varied economy. On hunting trips, the Pume were constantly mobile as they searched for prey which might be terrestrial (such as deer), arboreal (for example, lizards), or aquatic (like capybara). They might also catch fish or gather vegetable foods on such a trip. In contrast, on fishing trips, they simply travelled to a suitable location and stayed there; different kinds of fish behaved similarly enough that catching them required the same type of behavior. Other types of resources were not ignored on fishing trips, but fewer were encountered because the Pume covered less ground.

As Greaves had suspected, the Pume tended to use tools in a wide range of functions. "For example," Greaves says, "during terrestrial hunting, bows are used more often as digging sticks, clubs, or carrying

## THE FAR SIDE



"So What's this? I asked for a *hammer*! A hammer! This is a crescent wrench! . . . Well, maybe its a hammer. Damn these stone tools."

"The Far Side by Gary Larson. © Universal Press Syndicate. Reprinted with permission. All rights reserved."

poles than as a means of firing arrows. Pume hunters use two-meter-long arrows as probes, hand-held spears, and field knives much more frequently than as projectiles." The question was whether or not this flexibility of use occurred on predictable occasions.

He called each attempt to obtain some type of food item (animal prey, fish, or vegetable foods) the targeting of a resource. How many resources would be targeted on a trip? On a hunting trip, the simplest way to tell was to ask how many tools were taken on that trip or for how many functions those tools were used. More tools meant more attempts — and more successes. More flexible use of tools (a higher number of functions) also meant more attempts at obtaining food.

It would be tempting to conclude that having the appropriate tool at hand made it more feasible to obtain the resource, except that these generalizations do not hold true for fishing trips. On fishing trips, the number of tools had no consistent relationship to the number of resources targeted (or obtained) nor did the number of functions for which tools are used relate predictably to the number of resources targeted. Greaves thinks this difference has to do with the repetitive nature of the task of fishing; one fish is much like another, so having lots of tools (or using those tools creatively) would make little difference.

Greaves also disproved some of his own predictions. He had expected that, on trips where more tools were taken along, each tool would be used for fewer functions. He explains his thinking: "The more tools that are taken along, the fewer multiple functions those tools were expected to perform, simply because more 'specialized' technical units were present." In contrast, when there were few tools, the Pume might "substitute" another tool designed for another task in the place of one that was missing. Good idea — but his data contradicted it.

Instead, he found that, on hunting trips, the more tools the Pume had with them, the more flexible was their use of those tools. More "raw material" seemed to lead to greater creativity in tool use. In contrast, on fishing trips, the number of functions to which tools were put bore no relationship whatsoever to the number of tools taken along. It would seem that some tasks stretch the creativity with which the Pume use their tools and others do not.

Because human behavior is complex and variable, Greaves cannot claim to have discovered any simple, hard-and-fast rules that will help him interpret the archaeological record in every circumstance. But, by focusing on the multiple functions of tools and by identifying the circumstances under which even specialized

tools, like bows and arrows, are "mis-used", he is beginning to identify factors that influence human tool-using behavior. Greaves' work is revealing the underlying logic of tool use and "mis-use" as well as reminding us all how opportunistic our species really is.

*Following up on his pilot study of the Pume in Venezuela, Russell Greaves has returned to the field to research more fully the information presented in this article. Both expeditions have been funded by the Leakey Foundation, \$9,530 to date.*



*Pictured above are Mr. Milton Anisman and Mrs. Max Jamison at the LSB Leakey Foundation Board of Trustees meeting in Santa Fe this summer. Mrs. Jamison (a Life Trustee of the LSB Leakey Foundation) and Mr. Anisman spearheaded the development of the Stones and Bones curriculum project and were in Santa Fe to give the LSB Leakey Foundation Trustees an update on the state of Stones and Bones. Photo courtesy of Mr. and Mrs. Milton Anisman.*

## **Stones and Bones...**

An award-winning curriculum project of the LA Unified School District, Stones and Bones was developed with the help and initial funding of the Leakey Foundation. This curriculum strengthens biology textbook programs dealing with the study of past humankind, and now has 3 different curriculum paths for high school use. An elementary school unit is currently being developed. Each curriculum unit can be accompanied by a complete set of casts of fossils such as the Taung baby and Zinj. **If you are interested in getting the Stones and Bones Curriculum into your local schools, please contact the Stones and Bones project at (818) 997-2389 or (310) 472-6175.**

## Boning Up on the Weather

Taphonomy, or the study of how and why bones get preserved as fossils, has had an enormous effect on the interpretation of archaeological and paleontological sites. The natural processes that can destroy or preserve skeletons serve as a sort of sieve through which the events of the past are filtered — and only those bony remains that survive become the fossil and archaeological record that we have to study. The sooner that burial in sediments occurs after the death of the animals in question — that is, the fewer the taphonomic agents to which the bones are exposed — the more faithfully will the fossil assemblage record what was once there.

In 1988, Paola Villa of the University of Colorado at Boulder realized it was time to pay some careful attention to weathering. Although weathering falls into the “slow but steady” category of taphonomic agents, its role is an important one because bones are often altered, rather than destroyed completely, by weathering. This means weathering has a potent effect on the bone assemblages that survive to be preserved — and on their possible interpretation.

Consider, for example, the analysis of cutmarks on bone surfaces. By studying where and on which animals cutmarks are left, archaeologists may uncover the butchery and hunting strategies of ancient populations. Where it has been argued that bones and stone tools are only accidentally associated, cutmarks may serve as the definitive link that shows that the two elements (bones and stones) were brought together at one time for a particular purpose. The same can be said of the subtle surface alterations caused by cracking open marrow bones or by burning. But fine surface details will be recorded only on pristine bones. Weathering or exposure to the elements will gradually destroy the original surface of the bones, erasing any trace of hominid activities.

Another instance in which knowledge of the natural processes of weathering can be useful occurs in large sites, with numerous stone tools and thousands of fossil bones. By documenting the range of weathering stages of the bones, it may be possible to decide whether the site was formed on a single occasion (implying the presence of many hominids) or whether it was a location that was used repeatedly, perhaps over a series of years, by a smaller number of individuals.

How long does it take for a bone to weather to destruction? And what are the physical stages through which a bone passes?

Villa knew that, in the late 1970s, A.K. Behrensmeyer had monitored bones in various African habitats. Behrensmeyer was able to define six weathering stages — from stage 0 (unweathered) to stage 6 (falling apart) — that occurred in 6-15 years under tropical conditions. But Villa's interest lay in sites in Mediterranean climates, where the changes in annual temperature were greater. No one had studied weathering under those conditions. Working with Daniel Helmer of the Centre Nationale de la Recherche Scientifique, Villa devised a series of experiments to be monitored for a period of six years (1988-1994). The pair selected three locations within the Mediterranean climatic zone in southeastern France: Valbonne at sea level, Fontbregoua at 400 meters above sea level, and Beauvezet, in the Alps, at 1200 meters. The last location was selected to provide an analog to the glacial conditions that prevailed over much of Europe during the Pleistocene, during Neandertal times.

Because they were interested in signs of hominid activities, they made sure their experimental bones would bear some. Helmer made stone tools with which they butchered (cut up) an already-dead deer and goat. The meat-covered bones were boiled or roasted; some were cracked open for marrow while others were defleshed. Cattle and sheep bones from commercial butchers, bearing marks of steel knives, saws, and cleavers, were also used. At each locality, they set up bones in the open, where they would be exposed to direct sunlight; all were placed within special wide-mesh iron cages “to avoid losses and dis-



*Villa wanted to be sure that her bone samples could be relocated, so she placed them within these special wire mesh cages, where the weather could get at them — but tourists, dogs, birds, and foxes could not! Photo by Paola Villa.*

placement by tourists, dogs, foxes and birds”, Villa explains. Three more samples were placed in a shaded area under a bush, underground, and inside a limestone cave. A total of 282 bones — some in articulated units, such as partial legs — were used in the study.

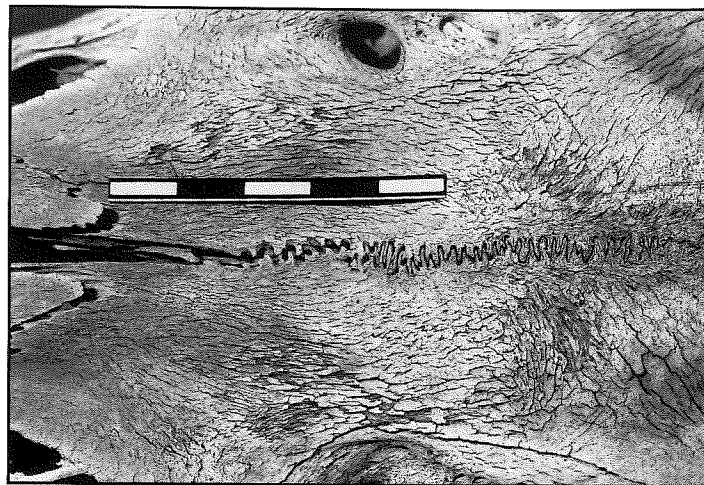
At each inspection, Villa looks at both the upper and lower surfaces of each bone for cracking, peeling, or flaking, for the presence or absence of remnants of soft tissue, and for the state of articulation with other bones. She photographs each bone and takes molds of the cutmarks, so that the sequence of changes or even obliteration of the microscopic features of those marks can be studied as well.

While Villa is cautious at this point — the study is only partly completed, after all — her preliminary observations are promising. To her surprise, she has found that bones in exactly the same microenvironment may weather at markedly different rates, like the bones in the photos to the right. In other words, bones that were deposited at the same time may show different weathering stages that would be preserved if the bones were fossilized. Finding out just what the limits of this variability are will tell Villa how wide a spread of stages can be expected in a site where all the materials are contemporaneous. If some body parts consistently weather faster, it would help explain why some skeletal elements are frequently rare and others common in fossil assemblages.

She has also found that the bones at Beauvezet, the alpine locality, weather more slowly and differently from the bones at lower elevations. The high-altitude bones maintained their original surfaces longer — so far, for as much as two years — while bones at the lower altitudes were showing weathering stage 2. But the high-altitude bones disarticulated more rapidly and seemed to be becoming more fragile and porous. If these findings are confirmed, they might explain the paucity of the open-air sites in the fossil or archaeological record during the Ice Ages in Europe, when the climate was colder and snow more frequent than in present-day Europe.

In contrast, the bones placed in the caves have been protected from weathering. After three years of exposure, these specimens still show no signs of weathering at all — indicating the importance of their being sheltered from rain, snow, direct sunlight, and temperature fluctuations. No wonder caves are such fortuitous places for preservation!

Through this study, Villa has begun to understand how much of an impact local climate may have on weathering. Her experimental bones often show

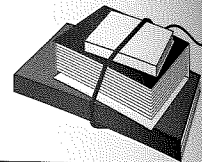


*Bones in the same microenvironment sometimes weather at different rates. This deer skull (top) shows clear signs of weathering after one year. Its surface is dry and flaky, with an extensive network of cracks. The goat rib (bottom) that was from the same open-air cage at the same time is almost pristine; only a few cracks have developed. Photos by Paola Villa.*

transitional or intermediate states that do not fit neatly into Behrensmeyer's stages. Of course, weathering of bones is a continuous process and any attempt to formulate distinct stages will be difficult. But Villa is starting to think that bones in Mediterranean settings may behave somewhat differently as they weather, as a result of the markedly different climatic regime. It seems a simple project — put the bones out, watch them weather — but the end results may radically change our ability to interpret the enigmatic record of the past.

*Paola Villa's ongoing project on bone weathering patterns was first funded by the Leakey Foundation in 1987 for \$4,405.*

# REVIEWS



Members may enjoy reading the following books. They are not available through the Leakey Foundation but can be ordered through your local bookstore or library.

## A Provocative New Theory

**Braindance: New Discoveries about Human Origins and Brain Evolution** by Dean Falk, Henry Holt and Co., Inc. 1992 \$24.95 Hardcover

Without question, some of the most important topics in human evolution are when, why and how the human lineage developed such a large brain: what this book calls the "braindance." Perhaps the very importance of these issues makes them prone to dispute.

The author of this new and entertaining book, Dean Falk, is a paleoanthropologist as well-known for her research into brain evolution as for her controversial views — and this book shows she has not yet given in and meekly accepted the establishment's dogma. Among other challenges, she presents evidence that Lucy is neither ancestral to *Homo* nor to all australopithecines, but can only have given rise to robust australopithecines. She also argues that OH 62, the partial skeleton from Olduvai Gorge identified by Don Johanson and associates as *Homo habilis*, is simply another australopithecine.

With a lively and tartly humorous style, Falk recounts her career in paleoanthropology and the development of her "radiator" theory of brain evolution. In its simplest form, Falk's theory maintains that the evolution of a large brain in hominids was held in check until the gracile australopithecines, known as *Australopithecus africanus*, evolved a superior method of cooling the brain. Keeping a cool head was important because heat generated by both physical activity and the tropic sun can lead to dangerous consequences, like heat stroke or death. Along the way, Falk also exposes in a good-humored fashion the male domination of paleoanthropology and gives full credit to a large number of women (among whom she herself must be counted) who have made significant contributions to human origin studies. She also delves into such intriguing problems as gender differences in the brain, the origin of human aggression, the origin of bipedalism, and — her personal favorite — the meaning of tap dancing.

Hers is an unusual view of human evolution — the radiator theory is not universally accepted — but her clear and engaging explanation of some familiar facts presented in a new light will make readers think (and sometimes laugh). If there is more than one way to skin a cat, Falk seems to be saying, there is also more than one way to evolve a hominid or to be a paleoanthropologist. She is to be applauded for this effort, which so clearly states her point of view even in the face of anticipated skepticism. I think lay readers and scientists alike would do well

to read Falk's book. It is bound to infuriate some anthropologists — particularly those with whom Falk disagrees — but it may also open some eyes as to the value of a healthy and good-natured diversity of opinion. Falk's theories may not be judged correct in the long run, but she has succeeded in raising some important and thought-provoking issues with wit and style.

— Pat Shipman, Editor

## Understanding Evolution

**One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought** by Ernst Mayr 1991, Harvard University Press, \$19.95

The evolution of organisms (as opposed to stars or style) is unfailingly linked with the name of Charles Darwin, who laid the foundations for our understanding of evolutionary processes in 1859. Ernst Mayr is probably the last active member of a group of evolutionists who combined Darwin's findings with those of genetics, paleontology and biogeography in the "Evolutionary Synthesis", which still forms the core of modern studies. In this book, written for a popular to college audience, Mayr presents the background of Darwin's views and demonstrates why his 1859 *On the Origin of Species by Means of Natural Selection* ... was such an important breakthrough. Although Mayr may overstate his case somewhat in claiming that Darwin led the most far-reaching of any intellectual revolution in world history, it is clear that biology, philosophy and religion were vastly modified by his findings and their implications. Mayr touches on a wide variety of topics in this slim volume, including the compound nature of Darwin's theory (5 sub-theories, not all of which were accepted by his contemporaries, or by today's scientists) and the important role played by Weismann in bringing early genetics closer to "Darwinism" in the late 1900's. The ferment of modern evolutionary theory, with its challenges to some of Darwin's ideas, and the varying interpretation of these even by his supporters, is also well portrayed. Mayr's relaxed writing style makes this book an enjoyable, leisurely read, while a glossary and a (too-limited) illustration section help the neophyte enter the world of evolution. Highly recommended for all audiences.

— Eric Delson



# EVENTS



## **October 15-18, 1992: Leakey Foundation Annual Meeting, SUNY Stony Brook, New York.**

The Leakey Foundation's Annual Meeting is scheduled to be held at SUNY Stony Brook on October 16 & 17. A symposium on the topic of "Recent Advances in the Study of Human Evolution," will be held on Saturday afternoon, October 16 at SUNY Stony Brook. Speakers include: Dr. Frederick Grine, Dr. Russell Ciochon, Dr. Curtis Marean, Dr. Randall Susman. For details call the Leakey Foundation office (510) 834-3636.

## **November 5, 1992: The Allen O'Brien Memorial Lecture, California Academy of Sciences, San Francisco.**

Reception 6 pm, lecture at 7:30 pm. To reserve tickets, please fill out the order form below.

The Leakey Foundation is proud to present the annual Allen O'Brien Lecture. This year's speakers are Dr. Leda Cosmides and Dr. John Tooby, co-authors of the recently published book, *The Adapted Mind: Evolutionary Psychology and The Generation of Culture*. The lecture topic will be the evolution of human reasoning "instincts". As stated by Dr.s Cosmides and Tooby,

"The traditional view of the human mind as a blank slate or a computer equipped only with general-purpose reasoning abilities is being challenged by new insights from evolutionary biology, cognitive psychology and paleoanthropology. In what amounts to an evolutionary 'critique of pure reason,' scientists are discovering that the human mind contains a collection of specialized information-processing programs that evolved in the Pleistocene to solve the adaptive problems that our hunter-gatherer ancestors regularly faced. Programs specialized for reasoning about important adaptive problems — problems such as mate choice, language acquisition, cooperation, sexual infidelity, and in-group versus out-groups — can be thought of as 'reasoning instincts' because they regulate how people reason about these topics, and yet get their distinctive adaptive design from human evolutionary history. These reasoning instincts often create similarities in thought and behavior across human cultures. Consequently, the old view that all mental content originates externally in the social world is being replaced by a new view of the mind as an intricate network of functionally specialized computers, each of which stamps its distinctive imprint on a different area of human life."

## **February 6, 1993: Issues in Hominid Evolution, Paul L. and Phyllis Wattis Foundation Endowment Symposium, California Academy of Sciences, San Francisco.**

This full-day symposium brings together 12 distinguished scientists for discussion in the field of hominid evolution. The group includes Dr. F. Clark Howell, Co-Chair of the Leakey Foundation's Science and Grants Committee and Dr. Ian Tattersall and Dr. Adrienne Zihlman, both members of the Foundation's Scientific Advisory Committee. There will be formal presentation followed by a panel discussion. A reception in the African Hall will close the day's events. For more information, or registration, please contact Deborah Stratmann at the Academy of Sciences, (415) 750-7163.

### **L.S.B. Leakey Foundation Allen O'Brien Memorial Lecture**

Lecture only: \$5 Members\* \$7 Non-Members  
Reception & Lecture: \$30 Members\* \$35 Non-Members

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\* "Members" refers either to current members of the L.S.B. Leakey Foundation or the current members of the California Academy of Sciences



At a new fossil-bearing site near Thessaloniki in northern Greece, Dr. George Koufos continues to uncover specimens of *Ouranopithecus* in late Miocene deposits. With Leakey Foundation funding, the team of de Bonis, Koufos, and Bouwrain uncovered this new hominid. Described in *Nature* (1990) as a possible forerunner to australopithecines, this specimen sparked a controversy: “who’s our oldest ancestor now!?”

Tracing lineages is not the only concern; anthropologists and paleontologists also find the chance to gain a glimpse of ancient adaptations like diet or locomotion fascinating. Mike Rose has studied the limb bones and locomotion of Miocene hominoids with Leakey Foundation money. “When I look at the postcranial bones from the Miocene apes, I get a fairly clear and consistent pattern from many species,” he remarks, “but it is nothing like what we see in modern apes.” Anatomically, many Miocene species are a puzzling mixture of features typical of modern monkeys and modern apes. Only partly in jest, he adds,

“Maybe we should consider the ones that survived as the bizarre ones.”

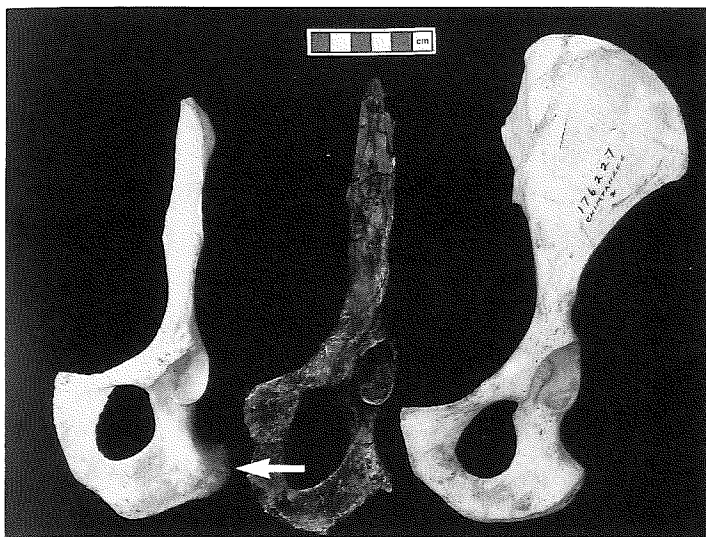
## *Proconsul* skeletons

Carol Ward of the University of Missouri agrees. The Foundation funded her research on the vertebrae, pelvis, and lower limbs of a partial skeleton of *Proconsul*, one of the best-known genera of Miocene apes. A mother and baby *Proconsul* are reconstructed on our cover by artist Jay Matternes. *Proconsul* is an exceptional species, for many specimens have been discovered in western Kenya, including about ten partial skeletons from Rusinga and Mfangano Islands that date to about 18 million years ago.

Living monkeys and apes show two fundamental patterns of locomotor behavior, Ward found. Monkeys tend to use all four limbs as equal supports (pronograde quadrupedalism) and apes rely much more on their forelimbs, especially in climbing or in bridging the gaps between trees or branches. Apes also show an upright posture more often. Not surprisingly, these differences are clearly reflected in the way the backs and lower limbs of monkeys and apes are built. But when she turned to the *Proconsul* remains, Ward found an intriguing mixture of features. There was a long, flexible spine and deep, narrow thorax, as in monkeys, coupled with the more mobile hip characteristic of apes. Ward’s study showed definitively that *Proconsul* had no tail. In other words, while *Proconsul* may have been an ape-like animal, it was neither a modern ape nor a modern monkey in the way it moved around its world!

“*Proconsul* probably emphasized a relatively slow-moving, arboreal form of quadrupedal locomotion,” Ward explains, “and it used a variety of abducted limb postures — with the limbs stretched out from the body, rather than being tucked directly underneath the torso. This pattern is simply unknown among extant hominoids.” Was this mixture of features typical of all ancient hominoids? If so, it might form the template or basic starting point from which modern ape anatomy evolved. Ward is now investigating the question by looking at the postcranial bones of other Miocene apes, to see if they are all similar below the neck. Ward has chosen to start by comparing the *Proconsul* remains with those of *Afropithecus turkanensis* — another Kenyan fossil of similar antiquity and comparable body size — and she may be able to answer this important question soon.

Other ongoing research by Leakey Foundation grantees focuses on establishing firm dating and paleoecological contexts for various Miocene apes. The



Ward compared the hip bone of *Proconsul* (center) to those of a large baboon (left) and a small chimpanzee (right). Although the fossil looks monkey-like in its general proportions, it doesn't have the large bony flange (arrow) that underlies a monkey's ischial callosities or "sitting pads". When she looked at *Proconsul's* hip socket or acetabulum, she found it was more like the chimp's and permitted a greater range of movement than would a monkey's hip. Photo courtesy of Carol Ward.

only hope of sorting out the muddle in the Miocene will be to gain a fuller picture of the many Miocene apes as animals, that lived, ate, socialized, moved about, and copulated. Some of them must have left descendants that survived and evolved to become the apes we treasure today.

With funding from the Leakey Foundation, the discovery of *Otaviipithecus* was celebrated and studied in an unusual event hosted by the American Museum of Natural History. The occasion was the opening of an exhibit displaying the fossil, and the event was kicked off with a cocktail party and dinner, chaired by Trustee Ann Willis. In attendance were an impressive crew of anthropologists and paleontologists representing England, France, Kenya, Canada, Japan, and the United States as well as Foundation guests. All were honored by the presence, of His Excellency the Ambassador of the Permanent Mission of the Republic of Namibia to the United Nations, Dr. Tungura Huaraka, and by the Director of The University Center for Studies in Namibia, Dr. Beatrice Sandelowsky. In a time in which working in many parts of Africa is increasingly difficult, Conroy was delighted with the cooperation and assistance his team received from various officials in the new country of Namibia.

The research mentioned in this article is only a small sampling of the many field and laboratory projects and conferences dealing with the Miocene that the Leakey Foundation has sponsored. Over the last 22 years, more than \$575,000 has gone into support for this crucial area of research—from Louis Leakey's original work at Fort Ternan to this year's funding of Miocene fossil explorations in Turkey, Greece, Hungary, and Kenya. In fact, most of the participants at the workshop discussed above have been funded by the Foundation.



## F. Clark Howell to be Honored at AAA Symposium

At the annual meeting of the American Anthropological Association in December, colleagues and former students of Dr. Howell will give a symposium in his honor. Entitled "Integrative Pathways to the Past: Paleoanthropological Papers," the symposium brings together 23 respected scientists from the field of paleoanthropology. This outpouring of support by his colleagues is a testament to the remarkable career of this eminent scientist.

Scientists presenting papers at the symposium are: Dr. Russell Ciochon, Dr. Robert Corruccini,

Dr. John Fleagle, Dr. Monte McCrossin, Dr. Brenda Benefit, Dr. Andrew Hill, Dr. Donald Johanson, Dr. Bernard Wood, Dr. Christopher Wood, Dr. Phillip Tobias, Dr. Noel Boaz, Dr. Dennis Etler, Dr. Geoffrey Pope, Dr. Russell Tuttle, Dr. Henry McHenry, Dr. Dorothy Dechant Boaz, Dr. Elizabeth Vrba, Dr. Leslie Freeman, Dr. Nicholas Toth, Dr. J. Desmond Clark, Dr. Ofer Bar-Yosef, Dr. Kathy Schick and Dr. Irvén DeVore.

The symposium will be held on December 4, 1992 from 8:30 am to 5:00 pm at the San Francisco Hilton, Continental Ballroom #5. This symposium is only open to individuals registered for the AAA conference. To register for the conference, please contact AAA at (202) 232-8800.

# Miscellany

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## A Note from the Editor -

Editing and writing this publication is the closest thing to tightrope-walking that I've done in a long time. Because *Anthroquest* presents the work of diverse scientists to a broad and interested public, I per-

form a delicate balancing act, carrying the expectations of scientific accuracy on the one side and the need to explain research issues simply and clearly on the other. Sometimes the importance of the work — like the great height of the circus tightrope — is dizzying, too. Our safety-net is the researchers themselves (though sometimes their responses don't reach us until after publication) and the alert readers who raise questions about the stories and help to keep *Anthroquest* on firm footing.

So I'd like to put two rather important points from the last issue into the spotlight to clear up any possible misunderstandings.

The first point is a simple one: in the story about Christophe Boesch's fascinating work with chimpanzees, we failed to give sufficient recognition to his scientific partner and wife, Hedwige. She works with Christophe in Tai and deserves plenty of the credit for improving our knowledge of chimpanzee behavior and ecology, even if Christophe is (technically) the one who has held the Great Ape Fellowship. As is obvious in all walks of life, few difficult and demanding tasks are accomplished by a single individual and Hedwige's participation in the study has been real and valuable. As for the photo of John Mitani visiting Christophe Boesch in Tai, the snapshot was actually taken by Anthony Collins when both were visiting Gombe!

A primatologist from the University of Wisconsin, Dr. Charles Snowden, wrote in with a query about another story, the *Fragments, Flakes and Sherds* piece on the dental microwear study carried out by Dr. Mark Teaford. Dr. Snowden comments:

*"...it is mentioned casually that 17 wild-shot geladas were used to get modern tooth samples. I'm sure that the Foundation would not condone shooting 17 chimpanzees or mountain gorillas to obtain*

*a few tooth samples and I cannot conceive of conditions under which I could ever condone shooting the species that I study (cotton-top tamarins and pygmy marmosets). Are gelada baboons so plentiful and insignificant (compared to great apes) that the shooting of 17 can be condoned? Why was it not possible to collect teeth from animals that died of natural causes or through predation?"*

I am happy to say that Dr. Snowden misunderstood a bit of jargon that crept into the report on Dr. Teaford's work. "Wild-shot" does not refer to any action taken in the course of this study. I'm sure Dr. Teaford would be as horrified as Dr. Snowden was at the idea of shooting geladas for his research project!

The gelada teeth that Dr. Teaford studied were museum specimens: skeletons of geladas that had been collected early in this century by shooting, rather than through natural deaths at zoos or other places of captivity. (Repellant as the idea is now, collecting safaris were common practice until the last 25 years or so.) Since zoo specimens may be severely pathological due to poor diet, lack of activity, and so on, it was important for Dr. Teaford to use the teeth of animals that ate a "natural" diet in the wild and this was the point we were trying to convey.

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## A New Resource in Primatology

The new International Directory of Primatology — a recent publication by the Wisconsin Regional Primate Research Center at the University of Wisconsin, Madison — is an essential tool for any organization or individual involved in primate research. Information is arranged in five organizational sections and four indexes. The organizational sections cover (1) geographically-arranged entries for major primate centers, laboratories, educational programs, foundations, conservation organizations and sanctuaries, (2) current field sites with program and contact information, (3) members of groups involved with nonhuman primate population management, (4) professional primate societies, and, (5) major information sources in the field. Access to this information is supported by organizational, species, subject and name indexes.

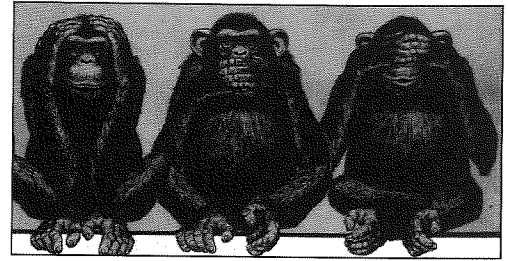
Copies of the Directory can be obtained for \$10 in the U.S. or \$18 in other countries. Send checks payable to the Wisconsin Regional Primate Research Center to:

Larry Jacobsen, IDP Coordinator  
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# SCIENTISTS

## Under the Microscope

When the demands of classroom teaching ease with the end of the academic year, scientists take advantage of the summer months to analyze and write up the results of their current research or head for the field to conduct new or continuing projects. Several Scientific Executive Committee (SEC) members were able to get into the field for the summer months. Below is a brief description of their activities.



**Dr. Ofer Bar-Yosef** spent July and August conducting the first season of excavations of a new project at Hayonim Cave (Israel). The project, co-sponsored by Dr. Bar-Yosef (Harvard University) and Dr. Bernard Vandermeesch (University of Bordeaux) and sponsored by the NSF and French Ministry of Foreign Affairs, includes a large group of Israeli, French and American scientists. This operation aims to uncover archeological remains that will indicate whether early Mousterian hominids, some 100 to 150 K years ago, were already modern in their spatial organization. In this first season, the Mousterian layers were exposed and two small human bones were found beside rich lithic and faunal assemblages. Later in August, Bar-Yosef joined the Turkish-Belgian team that excavates the caves of Karain and Okuzini in southwest Turkey. This ongoing project, headed by I. Yalcinkaya (University of Ankara) and M. Otte (University of Liege) exposed important Mousterian accumulations that possibly date to the Last Interglacial.

**Dr. Desmond Clark** spent three months teaching and excavating in the People's Republic of China. Invited by the Archaeology Department at Peking University to teach archaeology classes, Dr. Clark gave a series of lectures on aspects of current archaeological method and theory in the United States and Europe. For the rest of the summer he was involved in archaeological field work in the Nihewan Basin, where archaeological excavation is being carried out by a joint team of researchers from the United States (including Kathy Schick and Nicholas Toth from Indiana University) and from the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing (including Professors Jia Lanpo and Wei Qi). The team excavated and carried out preliminary analyses of over 2,800 artifacts this summer at the site of Donggutuo, presently dated to at least 800,000 years ago and perhaps as old as a million years.

**Dr. Irvén DeVore** departed in July for a fall term sabbatical in South Africa, having recently finished his five-year term as Chairman of the Department of Anthropology at Harvard. He will be a Visiting Professor at the University of Cape Town, South Africa, teaching an animal behavior course. Dr. DeVore discovered a troop of baboons near campus in Cape Town and has taken his students there on weekends for primate observation instruction. When Dr. DeVore first spotted the baboons, his wife, Nancy, reports that he got so excited that he aroused the angst of the troop alpha male, who proceeded to topple Irv to the ground!

**Dr. John Fleagle** continues exploration of fossil vertebrate sites in the Fejej Plain, Southern Omo region of Ethiopia. In 1990 the early-middle Miocene and early Pliocene deposits of this region, which are one focus of this year's expedition, yielded hominid teeth that are older than any other hominids that have been recovered from the Omo-Turkana region and may represent the oldest remains of the species *Australopithecus afarensis*. Members of the team helping Dr. Fleagle to identify additional Oligocene through Pliocene fossil vertebrate deposits are Dr. Thomas Bown, US Geological Survey, Dr. John Kappelman, University of Texas-Austin, and Dr. Solomon Yirga, CUNY-Hunter College.

**Dr. Richard Klein** returned to Cape Town to pursue his long-term interest into the behavior of early anatomically-modern humans and the broader question of whether anatomically-modern humans originated in Africa. Currently his field work focuses on the cave site of Die Kelders. With its stratified sequence and rich deposits containing Middle Stone Age and Later Stone Age material, Die Kelders provides information on biological, cultural, and ecological change during this critical time period leading to

anatomically-modern humans. This specific multi-year project is being conducted with Drs. Fred Grine and Curtis Marean from State University of New York, Stony Brook, and Graham Avery of the South African Museum.

**Dr. Carel van Schaik** spent part of the year in Sumatra, continuing an orang-utan census begun in 1990 with Indonesian colleague, Mr. Azwar. This year, with Wildlife Conservation International and a team of Indonesian scientists, the work was expanded as part of a training program for field ecologists.

Conducting surveys on the habitat requirements of orang-utans in different habitats throughout northern Sumatra has resulted in the ability to predict the potential carrying capacity of an area—important for conservation efforts such as reintroducing the increasingly endangered orang-utan to more protected areas. Equally important was Dr. van Schaik's discovery of a new orang-utan population with the highest density in the world; this group will be the focus of his projected long-term study of orang-utan social organization.

## Great Ape Update



### *Gorilla Victim of Rwanda War*

On May 21, 1992, the civil war in Rwanda claimed another innocent and much-beloved victim: a gentle silverback gorilla named Mrithi. He was shot with an assault rifle not far from his nest, probably at or near dawn. According to a New York Times article, Dr. Elizabeth Macfie, the director of the veterinary center at Kigali that monitors the gorillas' health, thinks the killing may have been caused by a panicked Rwandan soldier or rebel. Bullets were sprayed around the area, suggesting that, in the dim light, Mrithi was mistaken for an enemy soldier.

Mrithi's death — the first shooting of a Karisoke gorilla since 1984 — is being investigated further by the government. Park rangers had suspended their patrols of the area where Mrithi was killed because of the fighting, although the anti-poaching patrols in the immediate area of Karisoke continue (despite

occasional emergency evacuations during mortar fire) and dismantle about 350 snares a week.

The 400-pound Mrithi led one of the families of gorillas (Group 13) that was most acclimated to humans. Literally hundreds of tourists, including many Leakey Foundation members, were privileged to watch him and his family at close range. Still more were familiar with his kindly face and impressive bulk through television and films. Mrithi figured prominently in the film about Dian Fossey's work entitled "Gorillas in the Mist." After Mrithi's death, leadership of the group was taken over by a young (12 year old) blackbacked male named Ukwacumi. The regular schedule of tourist visits has been interrupted until the group becomes stable again and the area becomes safer for gorillas and humans alike.

With only about 310 mountain gorillas surviving on the Virunga volcanoes, the loss of a single one, much less an experienced male, is tragic. His death is but a poignant irony in this bitter, ethnic war which has killed thousands of Tutsi and Hutu tribespeople. By tolerating human presence, Mrithi was contributing to the tourist industry that was beginning to ease economic conditions in Rwanda. The gorilla-watching program has been hailed as an innovative way to conserve wild species through tourism, keeping gorillas alive in the wild but using them to provide jobs for the local human population and lessening the competition between humans and wildlife. It is a sad day, indeed, when a magnificent gorilla who has shared so much with humans literally gets caught in their crossfire.

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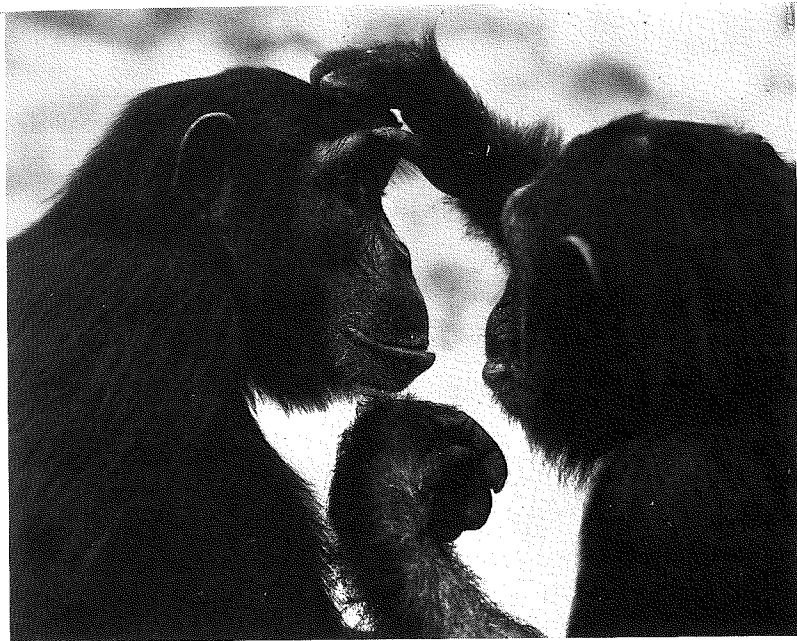
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*Photo courtesy of Chicago Academy*

In celebration of the 25th Anniversary of the L.S.B. Leakey Foundation, we have produced a 1993 Great Ape Calendar. The calendar will be commercially available through the Waldenbook or B. Dalton bookstore chains. (Unfortunately, we will be unable to sell calendars directly to members.)

As a "thank you" to our loyal supporters, all new and renewing members and donors will receive a copy of the calendar as a gift of thanks from the Foundation.

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