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The L.S.B. Leakey Foundation News

Spring 1985

DART AND TAUNG: *Sixty Years After*

The Third Allen O'Brien Memorial Lecture

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Photo: Barlow Rand

Avant Propos: Tribute to Allen O'Brien

Twenty years ago, Allen O'Brien had his first contact with the Leakey family. It took the form of a telephone conversation between Allen at Newport Beach near Los Angeles and Mary Leakey in Nairobi. That discussion set the plans for the O'Briens' first tour of the fossil man domain of East Africa. Who would have foreseen then that that visit to the Leakeys and their stomping grounds was to sow the seeds of a far greater and more lasting venture — nothing less than the establishment, only four years later, of the L.S.B. Leakey Foundation for Research Related to Man's Origin, with Allen O'Brien as its founder-president? No safari to Olduvai Gorge, Tanzania, with Louis Leakey as guide-lecturer, could ever be described as a simple outing. Yet from that brief though memorable excursion grew the mysterious chemistry of friendship, admiration and, above all, excitement that was to generate one of the most extraordinary undertakings, the setting up of a research foundation without an initial endowment fund. Probably never before in history had a foundation been started without that vital asset. Yet, if the idea

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A youthful Professor Raymond A. Dart, photographed within a few days of the announcement of the discovery of the Taung skull in February, 1925. The Australopithecus child skull is in his hands.

THE L.S.B. LEAKEY FOUNDATION

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

The Foundation sponsors:

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

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

The training and education of students in these fields.

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

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THE L.S.B. LEAKEY FOUNDATION NEWS

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PRESIDENT'S MESSAGE

To our fellows, members, and friends:

The Foundation began its year with new strengths. It ended 1984 with a cash carry-over. This means that it will begin its new tasks with fiscal confidence. Its first symposium of the year, "Hunters and Gatherers in the New World," convened at the Southwest Museum, Los Angeles, was a sell-out. Some 260 persons heard five scientists report findings relating to hunter-gatherer societies in the American West, the Amazon, Mesoamerica and the Andes, and the Arctic and the implications for Old World studies of early humans.

We also began the year with a new executive director. He is Dr. Robert Breunig, an organization and development executive, who has begun his assignment with great energy and dash. In his first report to the board, Dr. Breunig indicated trends in expenses and expenditures, and related these to Foundation policy, grants management, events, and development. Before the year is out you will have heard from him in some way. He is working with the board to establish a development organization and plan to attract significant endowment funds.

To give focus to our purpose of making funds available for important research relating to human origins, two additional documents are in preparation. The first is a statement written by the Science and Grants Committee, indicating goals and purposes in the three fields of primary concern to us: human fossils and tools; primate behavior; and hunter-gatherer societies. This will be used as the central policy statement, guiding our activities this year. The second document is an outline of the year's activities, reflecting the purposes expressed in the Science and Grants Committee paper. These two papers will give us direction for the year's work.

A third document to be prepared this spring will focus on the board's development plans. This paper, to be written in association with the Development Committee, will describe the organization of the program leadership and committee structure, and will list the steps necessary for the fulfillment of the plan.

The Visiting Scientists Program for Southern California announcement has been distributed. The spring program for Foundation fellows, trustees, and invited guests, will attract as speakers: Dr. Paul Bohannon, Dean of Social Sciences and Communication, University of Southern California; Dr. Roy Britten, Distinguished Carnegie Senior Research Associate in Biology, California Institute of Technology, and Dr. David Western, New York Zoological Society Carter Chair of Conservation.

We hope to roll out the red carpet for two giants in the field of anthropology — Mary Leakey and Richard Leakey — in May and February, and we will keep you informed as the dates firm. In recognition of the exceptional contribution she has made to original human research, Mary Leakey will receive the Foundation's designation, "Life Trustee," at the annual meeting in May. Eight lectures, co-sponsored by the Foundation, will engage Jane Goodall, Roger Fouts, and Lionel Tiger. A gala honoring Trustee Fleur Cowles is scheduled for November, and a symposium dealing with the evolution of human diet is planned for the Winter.

If you wish to receive information about any of these programs, please feel free to contact the office in Pasadena. There will be other events, of course. It will be a busy year, marked with accomplishment and pleasure. We are excited by the prospect and we hope you are, too.

Our grants officer, Dr. Kathleen Galvin, receives reports and visits from grantees. Kim Bard visited the office over the holidays and suggested that the long term Foundation support for Birute Galdikas has directly aided her own research on orangutan behavior. Having learned to estimate age using zoo animals, Bard discovered her estimates in the field were far off. Zoo animals were fat and flabby and the actual year of birth was often in doubt. Observations made by Dr. Galdikas over a period of time, including observation of birth and animal growth, enabled Bard to correctly identify age categories.

In 1977, Lars C. Smith was funded by the Foundation to study a group of East African hunter-gatherers, the Hadza. Although Smith has since moved to other interests, the data he collected is being made available in the Leakey Foundation Archive. The study is important because it was made of one of the few surviving groups living primarily on wild foods.

Among Foundation grantees who have published, Dr. Erik Trinkaus, University of

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AUGUST IN EAST AFRICA

The annual meeting of the L.S.B. Leakey Foundation was held in August, 1984, in Nairobi, Kenya. The following reports by four participants speak of Dr. Mary Leakey, her digs at Olduvai and Laetoli, the Foundation's symposium held at the National Museums of Kenya, and the safari enjoyed by trustees, fellows and guests.

The Foundation extends its special thanks for a memorable experience to: Desmond Clark, Louise Fordyce, Clark Howell, Glynn Isaac, Mary Leakey, Richard Leakey, Deborah Spies, Shirley Strum and David Western.



We are grateful to the authors of the following reports and to George Jagels, Jr. for the photographs.

A DIARY OF THE LEAKEY FOUNDATION ANNUAL MEETING AND SAFARI IN EAST AFRICA

John D. Roberts

FOREWORD

The trustees of the L.S.B. Leakey Foundation held their annual meeting in Nairobi, August 15 – 16, 1984. The several events held in conjunction with this meeting, in which many of the trustees and members of their families were privileged to participate, included a safari to national wildlife parks in both Kenya and Tanzania, as well as visits to Olduvai

and Laetoli as guests of Mary Leakey. This diary is one participant's account of the events of the annual meeting and the associated safari.

August 11, 1984 Very cool weather in London at the gathering of those of the Leakey Foundation able to visit the Museum of Natural History. Our host was Dr. Michael Day, a doctor of medicine deeply interested in bone structure and development. Participants included representatives of the Barker, Callery, Dominick, Gates and Roberts families along with Elizabeth Waldron, Deborah Spies and George Jagels, Jr.

At the museum in South Kensington, we visited with Drs. Peter Andrews and Lawrence Martin, who are exploring a very productive Miocene hominid site at Pasalar near Bursa in northwestern Turkey, in collaboration with two scientists from the University of Ankara. This site was discovered by accident in a search for lignite and has an unusually high concentration of fossil teeth. Martin is using a new tool, a scanning optical microscope with the capability of penetrating and focusing on layers up

to 200 microns deep. His research has been supported by the Leakey Foundation.

Our group then went off with Dr. Day to see first-hand the famous relics of the Piltdown Man and evaluate the clues which led to unmasking the hoax. Also out of the storage cases came the fabulous skulls of the Rhodesian Man found in a Zambia mine, the Neanderthal female from Israel and another from Gibraltar. Last we saw an excellent showcase presentation of the geological history and present configuration of Olduvai Gorge, which we will visit in a few days.

August 12 Sunday was "Leave London Day." The entire flight to Nairobi was made in the dark. The movie on board was *Greystoke* (Tarzan), which hardly prepared one for the Nairobi landscape — cool, dry and overcast.

August 13 The flight was met by Philip Leakey who, as the Kenya Minister of Foreign Affairs, beautifully arranged for all of the formalities and baggage collection. Alan Earnshaw, our safari director, had a fleet of Land Rovers to get us to



Jack and Edith Roberts.

the Norfolk Hotel, a hostel with beautiful grounds, relaxed atmosphere, excellent food and no high-rise. A lot like the old Halekulani Hotel in Honolulu.

August 14 Today, as yesterday, started off cool and overcast. The Science and Grants Committee deliberated and planned in the morning. In the afternoon the clan gathered at the National Museums for a tour conducted by Richard Leakey. He told us about the history of the museum, in which his father figured prominently, its expansion after Louis's death, mainly as a memorial to him, and about his own plans for its future. Richard wishes to make the museum far more than a depository and showcase. It is to be an expanding research center with the aim of broadening the general scientific and technical base of Kenya. Far-reaching plans are being drawn up for a museum of science and industry to help all Kenyans to understand better the basis for many of the things they



Richard Leakey.

already use. Richard said that the biggest problem at present that the Foundation might help with is scholarships and fellowships for undergraduates.

We toured the archeology and paleontology sections of the museum, where there are hundreds of thousands of bones of contemporary and fossil animals. We were allowed to enter a very special room where the rarest of the prehistoric specimens are stored, and under the supervision of the vigilant keeper of these remarkable relics, Richard opened a number of boxes and showed us a wide range of samples — from the first *Proconsul* skull found by Mary Leakey (which the Kenyans reclaimed with some difficulty from a loan to the British Museum), to some recent, very remarkable and newly found *Proconsul* foot bones, to another new acquisition of a *Homo sapiens* skull between 100,000 and 250,000 years of age. Potassium-argon dating puts the age of the foot bones at 11 million years. Also seen was the casting laboratory, heavily redolent of styrene, where replicas of the important fossils are made for distribution to other research centers.

August 15 The first plenary session of the annual meeting of the board of trustees was held today. The guests who have accompanied the trustees went to visit a refugee center where help is provided to the many refugees in Nairobi who need assistance to sustain themselves because they are ineligible for regular employment.

After a poolside lunch at the Norfolk Hotel, the guests were taken to an amphitheater outside Nairobi to see Kenyan tribal dances representing the Masai, Kikuyu and other major groups. The dances generally represented life themes: marriage, intertribal meetings, circumcision and the like.

August 16 Today there was a touch of sunshine and it was warmer — apparently Nairobi is having a real cold snap. We would call it "sweater weather" in California. Many of us visited the Primate Research Center about 10 miles out of Nairobi. Originally set up by Louis Leakey in the '60s to provide breeding stock for primates faced with extinction in their native habitat, the center is now well financed by the World Health Organization, in contrast to a period after Louis Leakey's death when the Foundation had to carry it on a minimal scale. There are many new buildings and more to come. Several species of monkeys and baboons are being studied largely for biomedical ends, especially reproduction.

Before dinner, Philip Leakey talked to the group about contemporary Kenya. He emphasized the moral strength and cooperativeness of the people, irrespective of race, color or creed. He made clear his distaste for



Philip Leakey.

South African apartheid and pleaded for understanding of the position of the African countries by the U.S. He paid strong tribute to J. Kenyatta for seeking a Kenyan solution to the problems created by independence rather than attempting to create a government based on models which would consolidate its power by a clarion call to unite against external threat, a minority group or religion. He talked about the severe drought Kenya and its neighbors are facing and requested consideration of aid to supplement the several million dollars the Kenyans have raised themselves for the purpose. Ned Munger responded with a gift of \$5000 from the Foundation and its supporters. The need is great and Kenya has been very important to the Foundation's programs.

August 17 This was a day of excursions in various directions. One group drove from Nairobi north through the Uplands, over a 9000-foot pass down into the east Rift Valley, then up again into range country to Gilgil to visit Shirley Strum's baboon project. The troops of baboons live in a savanna environment which has been used for raising cattle for many years. The baboons coexist well with range animals, but the land development program has decreed that as much as possible of the area be devoted to farming. The Kenyans have a strong urge to own land and each eligible individual is pushing to set up his own farm. Dr. Strum has tried to work



out alternatives, but this baboon range is earmarked for conversion. She has devised a scheme, to be begun next month, to move almost all of the baboons 200 miles farther north. Such a translocation has never been attempted before — if successful, it will have important implications for saving other endangered species.

One of our groups took an hour's drive to the Ngong Hills and into the Rift Valley to Olorgesailie National Park. We were met by Dr. Glynn Isaac and his wife Barbara, who took us on a tour of the 100,000 to 500,000 year old Middle Pleistocene haunt of early man where Dr. Isaac had done much research. He explained the geographic and geological circumstances that have made this area so important for the study of human evolution and the early stages of prehistory. Stone Age remains were first discovered there in 1919 by J. W. Gregory, who saw the lake silts and found a few stone tools but misunderstood the relationship of the two. It was in 1942 that Mary and Louis Leakey made a systematic search of the area seeking archeological sites and discovered several extremely rich ones. Hundreds of stone tools littered the ground and excavation proved they were washing out of lake silts. Meticulous archeological methods were first applied to the investigation of Stone Age sites of such an early period here at the Olorgesailie excavations. The site is so rich that we could pick up and examine tools and fossil bones everywhere as we walked.



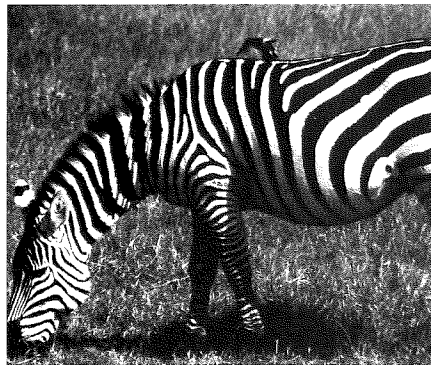
David Western, Mary Leakey and Glynn Isaac.

A dinner for perhaps 50 people honored Mary Leakey in the evening. It was held outdoors at the Carnivore Restaurant, where the specialties are spit-broiled meats. The excellent meal was followed by speeches by Desmond Clark, giving a detailed perspective of Mary and her work, Clark Howell, and finally, Richard and Philip Leakey. Mary Leakey, the heroine of this meeting which celebrates her 50th year of work in East Africa, was obviously pleased by the function and responded briefly but most graciously.

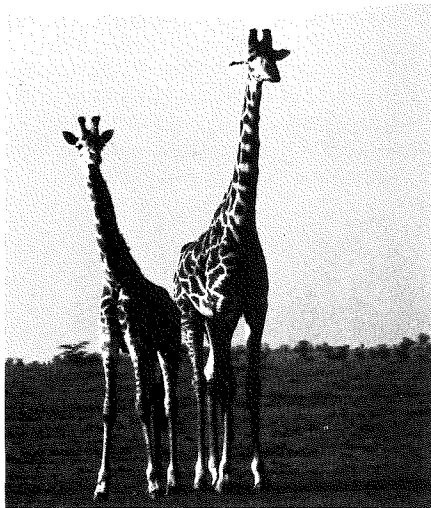
August 18 The symposium, "Hominid Evolution in the African Savannas," took place on a dark, overcast, very cold

day at the Louis Leakey Memorial Auditorium in the rear of the museum.

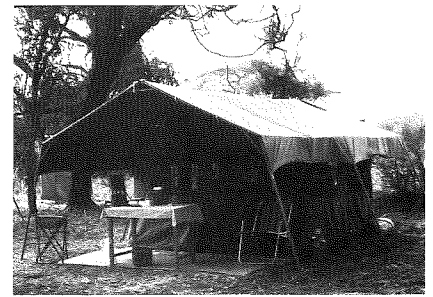
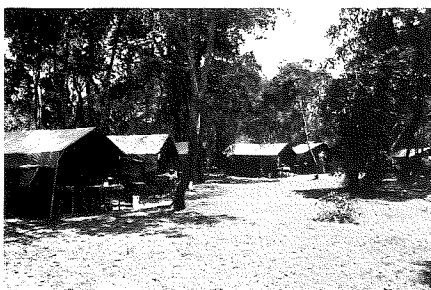
The evening was one of frenetic activity, packing and making ready for the safari. We will be divided into two groups, "Zebras" and "Giraffes," the Zebras being largely San Franciscans and the Giraffes mostly Angelenos.



August 19 What follows is necessarily the saga of the Giraffes, of which the Roberts family was part, until we all get together in Tanzania near Laetoli. The cavalcade of six safari vehicles finally got going for the 150 mile trek to Amboseli. Rather occasional wildlife —



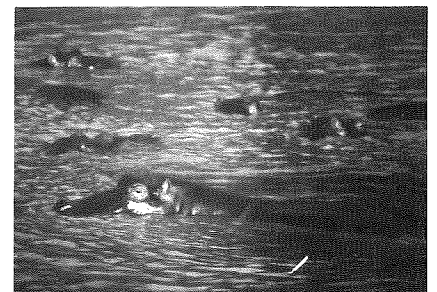
gazelles, giraffes, wildebeests, zebras and birds, but more often Masai tribespeople tending their herds or just walking in the brush. We came to a freshwater oasis at the park border where we were greeted by a herd of perhaps 100 zebras. Close by was the deluxe safari camp set up in a grove of acacias. Elaborate tents, each with veranda, wash basins and



dressing tables. Many showers were supplied with old gasoline cans fitted with shower heads and filled, when needed, with hot water. There was a large mess hall, a spacious outdoor kitchen, and even electric refrigerators. One's needs seemed quickly anticipated by the sizeable staff, at least one member per guest. The camp had been set up by a crew that came ahead in lorries. We were eager for lunch, which featured lots of beer, wonderful baked fish, French fries, vegetables, salad and a fresh fruit compote flavored with passion fruit.



After a short siesta following lunch, we went off on our first game drive into Amboseli Park, about 4,000 feet in elevation, for the most part a very dry place, with some swamps and fresh water. We were in vehicles with open sun roofs so one could stand up to see what was going on. The first major sighting was a troop of baboons followed by a herd of 27 ostriches. Then two rhinos came ambling along (only a dozen or so are supposed to be left in the whole park now, because of poaching by the Masai). One of the swamps

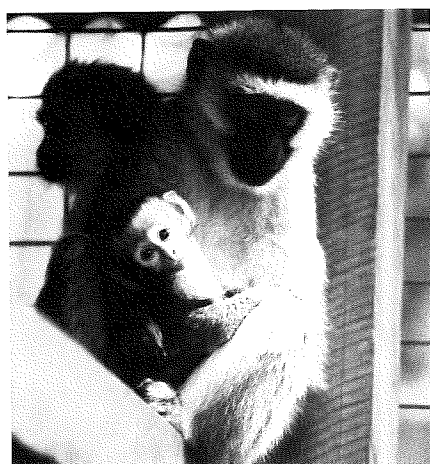


was pretty well occupied by elephants either foraging in the deep green or standing on the shore. In a stretch of open water a couple of hippopotami

were visible, and an obviously angry buffalo came by. There were a few giraffes, quite a number of wildebeests, impalas and gazelles. Near sunset, our driver turned off the road, circled a clump of grass and stopped. There, lying in the grass, were three cheetahs. They got up, leisurely surveyed the scene, posed for pictures, yawned and lay down. Beautiful animals!

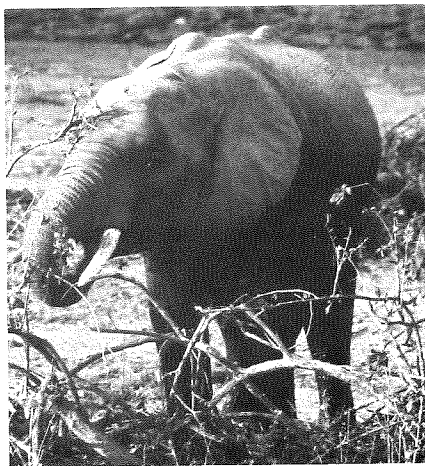


August 20 We were roused out at 6:15 a.m. to get an early start. The first part of the morning, a game drive, was very successful — many elephants, cheetahs, buffalos, ostriches, gazelles, lions, jackals, warthogs, waterbucks, impalas, giraffes and a large herd of hippopotami. Around 10 a.m., we drove into a meadow surrounded by trees where Phyllis Lee had set up a camp to study vervet monkeys. These monkeys are now dwindling in numbers, partly through decline of their habitat and partly through predation. Their social characteristics are somewhat similar to those of baboons. Dr. Lee was supported by the Foundation for her Ph.D. research. Mark Houser gave an interesting talk on the language of vervet monkeys. There is much that is not yet understood, but it is clear that there are many danger calls which elicit specific responses and there are a variety of grunts used in social interactions. The veracity of the responses has been verified by recording calls and playing them back. Interestingly, the calls seem to be learned by the infants rather than being part of their native instincts. Vervets are pretty animals, with tan bodies, dark faces and turquoise testicles.



In the afternoon, we drove to Observation Hill, close to the major swamp, for a lecture by David Western on the ecosystem of Amboseli, which is both dynamic and fascinating. The area has many special characteristics that can be directly traced to the formation of Mt. Kilimanjaro. In the sequence, the volcano blocked off a broad river valley and partially filled it with ash and lava. A shallow lake was formed, which alternately dried and filled during periods of drought and heavy rainfall. A very saline brew resulted which, in relatively dry periods, has an insufficient water table level to bring the salts close to the surface, and the fever tree, which requires a salt-free habitat, grows profusely. In long wet periods, the water table level rises and the salts are brought back to the surface, killing the fever trees. This is the current situation, resulting in elimination of these trees over a wide area in the lake bed.

The other distinguishing feature of Amboseli attributed to Kilimanjaro is the swamps. These are fed by springs which result from rains on Kilimanjaro and percolate through coarse volcanic debris down to impervious layers of lava. The water finally comes up in the middle of Amboseli to form a lush green swamp. At one end there are heavy growths of palm trees, which are apparently not palatable to elephants. At the other end are the remnants of fever trees which are close enough to the fresh spring water to have survived the salt brought up by the high water table.

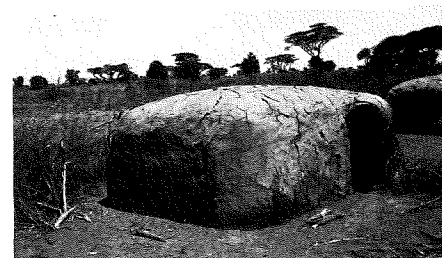


One of the keys to the ecosystem is the quality of the vegetation as forage. Surprisingly, the swamp plants are too fibrous and too low in protein to be very nutritious. Only elephants, hippos and water buffalos thrive on them.

The weather today was cool, windy and very overcast. It has not been possible to see Mt. Kilimanjaro except in barest outline, because of the clouds. On our way down from Observation Hill, it cleared enough so one could just see the snowcap.

August 21 A sunny day, our first; warm

and dry and not unlike Southern California in summer. After breakfast, we walked with David Western to a Masai settlement a few hundred yards away, inactive now because the people have moved their cattle to a more favorable grazing area. The settlement involved a clan of five families and is surrounded by a five foot barrier of thorn bush with five gates — one for each family. The Masai are polygamous, and at the right of each gate, as you enter, is the hut of the favorite wife; on the left, the next favorite wife, and so on. The huts are of extraordinary structure, covering an area of perhaps six by ten feet and generally resembling unbaked loaves of



bread. Stakes, about one inch in diameter and perhaps nine feet long, are planted about three inches apart around the periphery, then bent inward and tied to one or two central pillars. The interstices are then thatched with twigs and dried reeds to make a fairly dense canopy. After completion, the outside is first covered with hides to give warmth; later the hides are removed and the thatching is plastered over with cattle dung. Entrances are contrived to keep out the wind, a few small windows or smoke holes are inserted in the walls, and after construction of a stone fireplace and a straw sleeping place the hut is complete. Status is important, and the hut of the favorite wife is much more elegantly constructed and furnished than those of the lower-ranking wives — to the extent of a wicker-like table and an almost elegant straw-filled bed.

The Masai present interesting problems with respect to human survival in an alternate lifestyle and the future overall. They have been wholly self-sufficient, their future completely linked to their habitat and its rainfall. Their name for their monotheistic god means "rain." They have to compete with wildlife for forage and yet, in past famine years, they have been able to live, in part, off the wildlife (their "second cattle"). Since they are labor-intensive and carefully tend their cattle, the loss to predation is small. The cattle, sheep and goats are herded into the settlements each night.

David Western reviewed for us the history of wildlife conservation in Kenya, with emphasis on the problems it has created in Amboseli, where the national park has aroused deep resentment from the local Masai. He has been

very instrumental in helping to devise compromises that will benefit the Masai but there have been problems with Kenyan legislators putting these into effect. This resentment fueled decimation of the rhinos in Amboseli and only recently has agreement been reached with the Masai about the desirability of preserving this species. One factor has been the turning over of park revenues to the local Masai. These funds can be used for education, famine relief through grain purchases, medical treatment and so on. David Western is clearly playing a vital role in the understanding and conservation of Amboseli and its environs.

The afternoon game drive produced some previously unsighted animals, but the high point was a drama played out by a pair of lions and a dozen zebras. The lions, a full grown male and female, slept in one spot almost all day. When we arrived at six o'clock, they were still dormant, and the zebras came along about 150 yards away and began to graze. After quite awhile, the lions raised their heads and surveyed the zebras. Then they got to their feet and looked ready to stalk. At this point, every last zebra had its head turned to watch the lions. The drama heightened. At the crucial point, the lions' sex urge overcame their urge for food, and after a vivid demonstration of feline love, the male lion simply plopped down in a heap, the zebras resumed grazing and the curtain rang down.

August 22 We crossed the border into Tanzania. Here, everything slowed to a crawl. The Tanzanians do not normally allow Kenyan safaris to take advantage of their parks, because the income therefrom largely benefits Kenya. Permits were issued slowly. At about 1 p.m. we were finally underway, with a long way still to go.

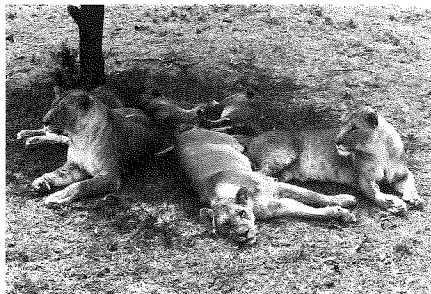
Our first introduction to Tanzania was pretty bleak. Hills grazed to dust, immature corn dried to nothing in the fields, everything gray. As we progressed to the southwest and neared Arusha, the capital, the landscape changed — we were now in the run-off area of Mt. Meru, a smaller Kilimanjaro of about 14,000 ft. The scenery became green, bananas and corn flourished, it all looked much more prosperous.

The lodge at Lake Manyara is on a high mountain ridge overlooking the lake and the area around it, which has the second highest concentration of wildlife anywhere in the world. The lodge itself is quite impressive from the outside, but the rooms are rundown, the hot water taps yield nothing, and there is a general lack of repair. Still, the view out over the park area is fantastic and just beyond the edge of the delta there is a pink cloud of flamingos that seems to extend for at least a mile or two. The hotel does what it can with very little.

Energy and food are in short supply in Tanzania. There are many gas stations with no gas to buy. The hotel turns off the electricity between midnight and 6:30 a.m., and again when it is light enough during the day. Even in this "deluxe" hotel the food is pretty sparse, but the bread is good (with butter servings the size of dice).

August 23 Arrived at the entrance to Lake Manyara Park (way down the hill) about 7:15 a.m. and drove through the lush green forest which seemed almost uninhabited compared to the dry savanna. It was too early in the day for good animal viewing and we were in a hurry to get back to the hotel for breakfast and a rapid departure for Ngorongoro Crater. It was a long dusty drive; you climb and climb and enter a fantastically verdant area at about 5,500 feet. At perhaps 7,500 feet, we suddenly broke through the clouds and the panorama of the crater lay before us. The crater itself is nine miles across and, seen from above, looks a little like Death Valley, but there is an enormous grass plain and wooded area on one side and a salt lake about 2,500 feet below the rim. The descent into the area is something. Only four-wheel-drive vehicles negotiate it.

The crater floor has beautiful grass and woodland watered by springs and is lush with wildlife. It is not clear just how all the animals got into the crater (which was formed several million years ago by a huge explosion), but they are there, and they are fat and glossy. What a contrast to Amboseli in the throes of drought: Virtually every African animal was in the crater — elephants, zebras, wildebeests, jackals, hyenas, hippos, rhinos, elands, hartebeests, gazelles, buffalos, baboons and lions. And what fat, lazy, indolent lions! Close enough to almost reach out and touch, almost wholly ignoring our presence.



Ndutu Lodge is actually on the edge of the southern Serengeti Plain and overlooks Lake Lagaja. It is hardly luxurious and certainly not pretentious, but at least it has hot water — water so alkaline that it feels soapy without soap. Nonetheless, hot showers were what we all needed after the dust of the day.

August 24 We were up before dawn, and this time it was clear enough to see

the sun come up. After a quick breakfast, we began a trek to Olduvai Gorge. There we were greeted by Mary Leakey who had been flown over from Nairobi by David Western, and enjoyed a fascinating day with her at her famous gorge.

August 25 We were to go to Laetoli today where the hominid footprints of about 3.5 million years ago are located. Mary Leakey warned us that it would not be possible to see the footprints themselves because they had been



covered with earth to protect them from passing elephants or Masai cattle herds which frequent the area. At our first stop at Laetoli, we were equipped with brushes and allowed to uncover and clean off a multitude of animal prints of the same age as the hominid footprints. They are vivid and fresh-looking; clearly, giraffe, rhinoceros, antelope and other ungulates tramped here in profusion. Many small prints are thought to have been left by hares. Intermingled in the rather hard rock are occasional tangles of fossilized vegetation. We next had an overview of the area where the actual hominid prints lie covered up, then proceeded to a lovely viewpoint to have a picnic lunch under the watchful eye of a handsome Masai in traditional dress with a spear and club. It is surprising that, out of a landscape that seems at first glance so lifeless and bare, one or two Masai appear at each stop we make, and indeed, when you look closely, there is much life at hand.

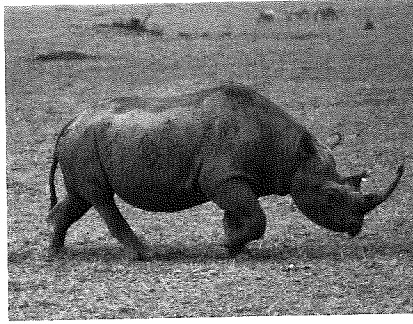
August 26 At 8:30 a.m., we started for the Serengeti Park and Lobo Lodge, perhaps 70 miles away. The plain was full of animals as we drove along but there were few predators except occasional jackals and hyenas. There is little petrol in Tanzania to use in vehicles to keep up the roads, or to patrol for and stop poaching (now amplified by the additional social burden of hungry country people). The Tanzania economy seems to be in shambles. Kenya, with fewer tourist attractions, at least in wildlife, is sorely troubled, but you can buy things you need, particularly petroleum products. The Serengeti Park is struggling against great odds — a pity, because it is a truly remarkable place, well worth support by those who

have any kind of interest in preserving the marvelous wildlife heritage it contains.

About 4 p.m., we arrived at Lobo Wildlife Lodge, almost at the Kenya border. The hotel, at 6,100 feet, is built on an enormous pile of rocks, or *kopje*, overlooking a broad, grassy plain replete with wildebeests, zebras, buffalos, baboons, impalas and more, in great multitudes. The architecture is stunning. Every advantage was taken to incorporate the rocks and living trees into the buildings, which are on a variety of levels and connected by a maze of staircases, each of which gives a different vista of rock, the plains, sky or other buildings. Although somewhat run down in spots, it is a completely charming place. The dining room and bar areas are absolutely first-rate, and the views are unbelievable. But with the fall-off in tourism, times are clearly hard. Hot water and electricity are provided only at specified hours, if at all. But it is amazing to find such a place at the end of 40 miles of a two-rut road, the last stretches of which look like the battlefield of Verdun. Dinner was not bad at all, and everyone was in a good mood. Loud lion sounds were heard under the windows that night. Tomorrow, back to Kenya.

August 27 The morning started with a bang at the door—“come see”! There, on the outside walkway which connects the rooms, was a large male baboon! Several, along with many hyraxes, trooped through the lodge while we were on our way to breakfast. Afterward, we drove through beautiful high savanna, rather fresh and green from recent rains, to the Tanzania-Kenya border. A lot of wildlife enroute, but because it was early and the sun hot, the predators, except for a lone pair of hyenas, were sleeping in the bushes. There are particularly large numbers of impala; they move really gracefully, with ballet leaps every few paces. Saw a warthog with six little piglets chasing behind. Leaving Tanzania is far less complex than entering it, and formalities at the border were not prolonged. The camp at Masai Mara Park is located in a beautiful glade of acacias beside a small, very muddy river in which there are hippos, right at the camp.

Under a very threatening sky, the afternoon game drive began about 4:45 p.m. The vast herds of wildebeest which were here until a few days ago have largely migrated farther north, but there is a lot of game — topi, waterbuck and Grant's gazelle are prevalent. This is a gently rolling, very green grass plain with knolls that are generally covered with scrub and rock. Got very close to a browsing rhino, a beautifully maned lion having dinner and a tiny baby gazelle trying to look like a rock on an empty plain while waiting for its

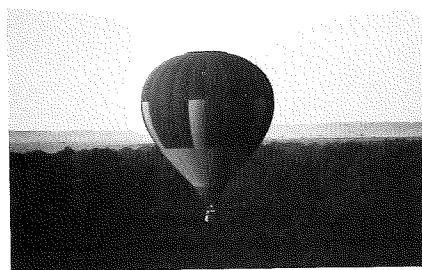


mother. It was pitch dark when we got back to camp, and there, waiting for us at the turn-off not far from the trees, were eighteen lions lying peacefully in the grass, then squinting in the glare of the headlights.

August 28 Today was ballooning day. Ballooning morning, actually. We were roused out at 4:45 a.m. to have a cup of coffee and a gingersnap to fortify ourselves for the long rough ride to Little Governor's Camp on the Mara River. It was barely light when we



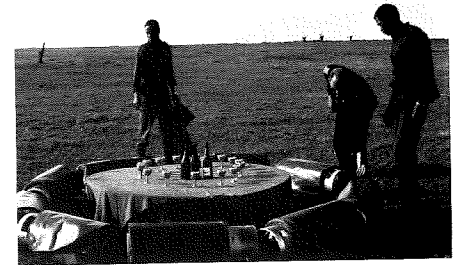
ferried in a dugout canoe across the river (full of crocodiles) by pulls, hand-over-hand, along a rope four or five feet above the water. At Little Governor's Camp proper is a rather permanent installation of tent cabins in a semicircle overlooking a marsh full of buffalo. Getting the balloons going is quite an operation. We had two, one of which is supposed to be the world's largest hot air balloon in commercial operation. The sun was just coming up as we floated at the speed of about three to four miles per hour above the forest. It was not a silent ride because of the



butane burners and the balloon's shadow, contrary to what we had hoped, did cause the animals to scatter. The views were spectacular. After touchdown, it takes time to fold up, bag and load the balloons, and while the ground crew was busy with these

chores, we sat on a circle of butane tanks and had a champagne breakfast, cooked over the burners that keep the balloons in the air.

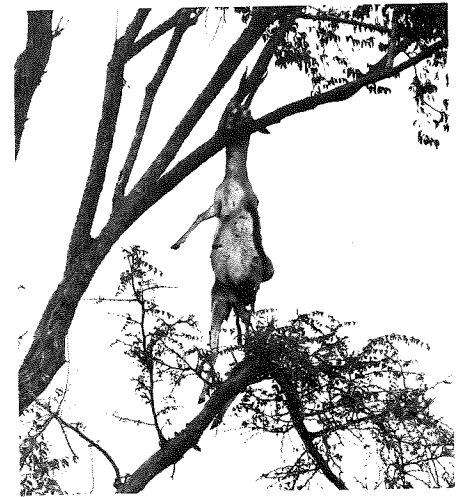
August 29 The morning was very gray and quite cool. The higher grassland areas were strangely quiet after yesterday afternoon's rain. Only occasional gazelles, topis, impalas, warthogs and



muddy hyenas were in evidence. Later, in the lower grasslands, there was much more action. Two cars saw a leopard, the first such sighting by our group. It had killed a gazelle and hung it in a tree, out of reach of other predators.

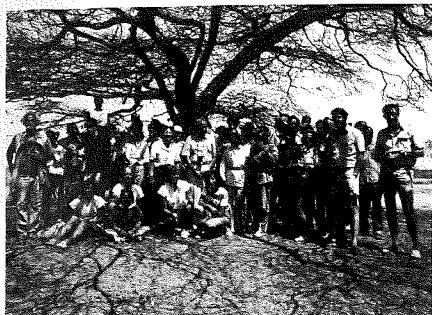
August 30 We got away from the camp at Masai Mara Park about 8:30 a.m. As we emerged from the trees and bushes, the open area seemed to be wall-to-wall lions. Two were feeding on a wildebeest they had killed during the night.

Not far along the way, the land turned arid again and the lovely



greenery we had been enjoying for several days disappeared. We stopped at Lemak for a too short visit to excavations related to early pastoral life in this area of Kenya. Our hostess was Fiona Marshall, a grantee of the Foundation. Then a ghastly stretch of deeply rutted, bumpy and unbelievably dusty road to Norak. At Norak, pavement again, the first since leaving Arusha a week earlier. The drive to Nairobi took another two hours, most of it through the terribly drought-stricken Rift Valley. Nairobi itself, which is perhaps 1,000 feet higher than the valley, looked almost Irish-green by comparison. We arrived, road-

wearily, at the Norfolk Hotel just after 3 p.m. The Leakey safari was over.

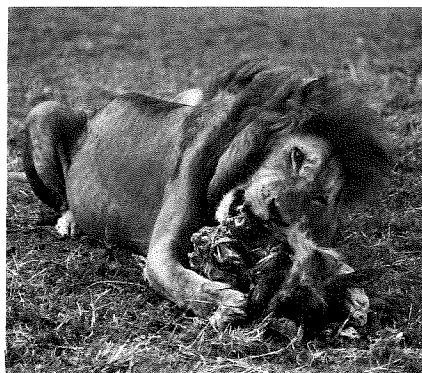


AFTERWORD

The typical American tourist can be expected to return from an African safari full of tales of wildlife, magnificent scenery, and the trials of traveling in far-off places — the lack of this or that, problems with transport, foreign exchange, food, etc., etc. Our safari members had all this and much, much more. Besides the opportunity for the trustees and their families to get to know and appreciate each other far better than would have been possible at almost any kind of previous meeting, we were exposed to a detailed, if not broad, sweep through East Africa's prehistory, its social systems and its ecology, in a most informative way. This exposure will not only make each of us a better and more knowledgeable trustee of the Leakey Foundation, it should also lead us to thoughtful analysis of the ecosystems of the world in relation to modern civilization. Louis Leakey was very deeply concerned about human survival in the modern age.

I think we have a succession of dilemmas to resolve. The problem is that modern civilization seems insatiable. It needs to feed, clothe, house, transport, guard, occupy and amuse its increasing numbers of peoples. This requires staking claims on any resource it can discover, and these resources range from Arctic oil to Antarctic krill, over teak forests in Burma to bauxite deposits in Ghana. A most important resource is agricultural land, most often acquired with little respect for the long term welfare of the indigenous populations, who are bought off at the lowest possible price and, at the same time, are presented with a variety of new problems that include diseases to which there is little or no natural resistance (including alcoholism), acid rain and trash heaps, as well as moral, social and religious values that may be inappropriate to their particular circumstances. What is more, these peoples now face the prospect of annihilation in a deliberate or accidental nuclear exchange resulting from the struggles of the superpowers to preserve or expand their exploitation "rights."

When civilization progresses to a point where there is time left over in the day after one's needs for water, food and shelter are met, then art, music and science develop, and along with them, an awareness, if not a sense of guilt, that modern civilization is selfish — indeed, insensitive to all forms of life which are of no direct societal value. Special attention is paid to animals like the gorillas (but definitely not to mosquitos), which possess one or more human-like characteristics such as courage, protection of family, tactile skills and elementary reasoning power. Efforts are then made to protect and preserve such life, either in zoos or as close to its natural habitat as is consistent with other human needs. Our trip was, in part, concerned with several very extensive efforts of this kind. When animals are allowed to live in a natural way, we do not insist that they adopt civilization's social values — lions are allowed to stalk, kill, and feed on wildebeest or buffalo; hyenas and jackals are allowed to steal; sex life is not regulated and territorial claims are not adjudicated, except through force.



Indigenous human populations might equally expect to have natural rights, but they are usually denied them. Indeed, and instead, these populations are subjected to heavy pressure to come into the modern world, to be part of a complex global ecosystem where fossil fuels are life's blood. It is by no means made clear what is to be expected of these peoples when the supplies of fossil fuels diminish or are priced beyond their means, as is almost true now. There are vague, unfulfilled promises of limitless energy from breeder or fusion reactors, but a few days of travel in Tanzania are convincing of the inappropriateness of such high technology to meet that country's needs. Perhaps the question is to what degree "wild" peoples are to be "domesticated." Is a Masai better off living in his traditional, self-sufficient nomadic way? Or is he happier in a cluster of rusty iron sheds around a small, central and permanent water source, with some assurance of a modicum of medical care, and with a chance, albeit slim, of becoming well-educated and making a career in high

circles of Nairobi commerce or government?

Too many of the world leaders are all too ready to take the short term view, too willing to make emotional rather than rational decisions about population increases, resource allocations, and international tensions. For me, the integrated exposure to prehistory, the East African ecosystems and Third World economics suggests that even greater interest might be taken by the Foundation in the problems of human survival in the very broadest sense.



NAIROBI SYMPOSIUM

Barbara Isaac

Many of us have the sense that human origins date from the time when our ancestors left the shelter of the trees and took to living in the dry and dusty open country of the African savanna. What was involved in that incongruous evolutionary move? It is unlikely that an angel with a flaming sword was responsible for the expulsion out of the cool and leafy paradise. So why did the hominids move into the open, and in what ways did the characteristics of the African savanna influence the course of subsequent human evolution?

These themes and others were taken up in a symposium convened by the Leakey Foundation in August, 1984, in Nairobi. The symposium was held in honor of Dr. Mary Leakey, whose own pioneering research has contributed invaluable archeological and fossil evidence towards understanding the prehistoric savanna and its ways of life.

For more than forty years, Mary Leakey has had a home base in Nairobi, in the midst of the high plains of East Africa. The windows of the house built by Louis Leakey look out onto the Athi uplands and the fabled ridges of the Ngong Hills, where the Masai say that God rested his hand in blessing when he



Symposium members: Glynn Isaac, Clark Howell, Mary Leakey, Shirley Strum and David Western.

had completed his creation of the earth. For thirty years, Mary Leakey's working base and her other home have been at Olduvai where the gorge cuts a deep scar through the Serengeti. So it was appropriate that the Leakey Foundation, in conjunction with the Museum Society of Kenya, should convene its meeting in honor of Dr. Leakey in Nairobi and then, afterward, move on and visit the areas where her fieldwork has been latterly most intensively pursued. The visitors from abroad were fortunate in that they could sample the wisdom of the Saturday lectures between safari outings that directly introduced them to the realities of the savanna. This is an environment which has changed from what it was two million years ago, even from what it was fifty or twenty years ago, but the observer is still able, with the right guidance, to gain an insight into the landscape.

The symposium was organized and orchestrated by Kenya-born David Western who has become a leader in the United States as well as East Africa in developing systematic ecological studies of the various savannas and their once copious wildlife. In recent years, as a member of the Leakey Foundation Science and Grants Committee, he has been drawn more and more into applying his knowledge to the understanding of human evolution. The symposium and its choice of speakers represented the fruits of this collaborative interest.

At the bright and early hour of nine o'clock on the morning of August 18, some three hundred Nairobi residents and Leakey Foundation members assembled at the auditorium of the National Museums of Kenya. The show was sold out and many late-comers found themselves disappointed. This same auditorium had been opened in 1977 on the occasion of the Seventh Pan African Congress of Prehistory and

Paleontology, when a statue of Louis Leakey flaking a handaxe was also unveiled and dedicated.

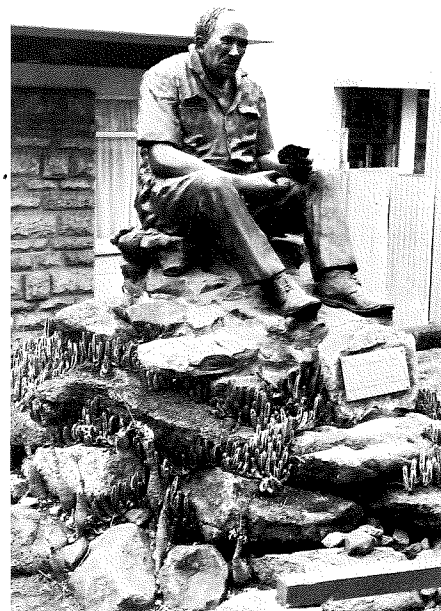
The 1984 proceedings were started by Richard Leakey who, as director of the National Museums of Kenya, welcomed the Foundation's trustees and members as well as the Nairobi audience. Mr. Leakey pointed out that enquiry into human origins was an endeavor that should actively link the peoples of the world. He expressed gratification that the Leakey Foundation was, for the first time, reaching out from the States to hold its annual meeting in Africa, where so many of its primary research interests are carried out. Of necessity, he said, the older generation of scientists involved in this research were mainly educated in Europe and America; many of the illuminating discoveries of the 1960s and '70s were made by expeditions in which scientists and students from abroad predominated. However, the old order is changing. Africa is educating new generations of its youngsters who are emerging from their own schools and universities with an interest in native flora and fauna, peoples and cultures, history and prehistory. These students want to participate actively in research into human origins and into other areas of prehistory, and they recognize that they need particular education and training. He called attention to the fact that the audience at the symposium included faculty and students from Nairobi's two universities and members of the museum staff, many of whom had already begun to play a part in this research movement or who are eager potential recruits. Mr. Leakey acknowledged the Foundation's role in helping this movement and urged the importance of redoubled efforts.

Professor Clark Howell of the University of California at Berkeley fol-

lowed and recounted to the audience aspects of the history of paleoanthropological research, and the ways in which the discipline has flowered since Mary's discovery of *Zinjanthropus* in 1959. He dealt with the development of contributions by the practitioners of many different branches of natural science: geologists and geomorphologists, geochemists and geophysicists, paleontologists, anatomists and taphonomists. He drew on thirty years of involvement in human origins research, a period that has seen enquiries move from being the pursuit of a handful of widely-spaced savants to a multidisciplinary field with hundreds of established scientists and a steady stream of students who are continually responding to the challenge of finding new approaches and using new technical methods, as they look to find vacant niches in the ecology of academe.

Then the guest of honor, Dr. Mary Leakey, took the podium. She light-heartedly renounced her published title, "Evidence of Human Origins," saying simply she was going to talk about what she knew best, namely her own research. She then delighted the audience with a review that spanned from the 3.5 million year old footprints traipsing across the thorn scrub at the edge of what is now the Serengeti, to the early toolmakers at Olduvai, including her discoveries of a hut circle at DK, and the HK pits. As she herself has written in her recent autobiography,

"Perhaps the most significant of the discoveries for which I have been responsible was the trails of hominid footprints at Laetoli, 3.5 million years old. Anthropologists had for some time postulated that *Australopithecus* walked upright, basing their conclusion on the conformation of the thigh bones and pelvis. But here was incontrovertible



proof, and moreover it was earlier than the australopithecines that had been studied. The footprints are so similar to those of modern man that they demonstrate this was by no means the beginning of bipedalism. It is all the more surprising, therefore, that no trace of tools was to be found in contemporary deposits . . .

"Laetoli has shown that bipedalism and tool making were probably quite separate developments in the mosaic of human evolution."

Then, in its turn, for thirty years Olduvai supplied the world's most important stock of information on how the earliest tool makers coped with life on the ground:

"Olduvai Gorge has given us vital clues in understanding the different aspects of the Acheulian hand axe culture, the most widely distributed and longest in duration of all Stone Age traditions."

But then, as Dr. Leakey herself admitted, her interest flags during the Middle Stone Age and the "whole of the later part of the Stone Age and is only reawakened when prehistoric man — now *Homo sapiens* like ourselves — had developed artistic ability."

With her assistance we found ourselves looking at the art created by the last Stone Age hunters of central Tanzania who, using ocher and other natural substances ground into powder and mixed with grease, put dramatic images on the walls of caves and rock-shelters. Dr. Leakey showed in slides a selection of animal and human activities, zestful festivities and social interactions:

". . . here were scenes of life of men and women hunting, dancing, singing, and playing music. And there was another thing that made the artists into real people having direct continuity with ourselves: They had lived not among extinct species of animals but among the same kinds we see around us today. And they had been acute observers not only of their distinctive features but also of the way they behaved."

Dr. Leakey's talk, like her career, encompassed highpoints in the exploration of the world's longest archeological record.

David Western of the New York Zoological Society then set out to explain how an ecologist of modern life systems views the prehistoric hominid colonization of the savanna. Just as Napoleon's armies marched on their stomachs, so it seems do modern biologists' first principles. With a witty alternation of superb natural history photographs and of not-too-terrifying graphs, Dr. Western explained how, when a creature of more-or-less human body size left the forests and woodlands, drastic changes in feeding and ranging patterns were necessary. In dense vege-

tation there is a sufficient part of annual production in the form of fruit and tender leaves to provide a nutritious and concentrated food for the right animals. Distributed as this food is at the ends of branches, the main takers are primates, birds, squirrels and similar animals which can survive on these resources alone. The realities of the savanna are different. The greatest production is in the form of grasses and the coarse leaves of widely spaced trees. A great variety of large-bodied grazing and browsing ungulates have evolved to harvest the grass and leaves, allowing few opportunities for a johnny-come-lately hominid with a primate's ancestral requirement for select high-quality foods. However, Mother Nature had left the door open just a crack: Savanna productivity includes two classes of high-quality foods that a clever, tool-using primate might be able to exploit, namely the meat of the many successful herbivores and the underground storage organs (USOs) of plants. USOs include bulbs, roots and tubers which are nutrient reserves that plants try to tuck out of harm's way from such cunning creatures as baboons, warthogs and hominids. David Western concluded that, as early hominids began to make themselves at home on savannas, their evolutionary adaptation had to slip into the exploitation of such foods.

After lunch, Professor Glynn Isaac of Harvard University tackled the twofold problem of how to keep the audience awake and of how to explain the links between the scraps of evidence that an archeologist digs up and the predictions of modern ecological theory. He hypothesized how the circumstances of the savanna resulted in such extraordinary behaviors as collecting and sharing food, talking and, even more unlikely, listening. Those who remained awake heard it suggested that simple tools such as the stone flake and the digging stick gave the hominids access to high quality, portable foods such as tubers and meat, but that since the locations of these feeding opportunities were widely spaced and, in the case of meat, also moving about from one location to another (first catch your rabbit, as Mrs. Beeton is reputed to have said), a situation arose where individual hominids did better to belong to social groups which fanned out over the landscape and then met up to exchange information and perhaps also to pool surplus food takings. Dr. Isaac showed slides of the patches of discarded artifacts and bone refuse which some archeologists argue may provide evidence of the beginnings of "central place foraging" behavior patterns. In other words, he postulated that early hominids began to adopt a solution to the problems of feeding and reproducing that resembles the solution common among birds, bees

and some social carnivores. He urged the importance of detailed studies of modern savanna food resources and reported briefly on two Leakey Foundation supported projects, those of Annie Vincent on tubers and Rob Blumen-schine on scavenged meat and marrow.

Some of the audience might have thought that Drs. Isaac and Western had discussed their papers together beforehand since they so neatly complemented each other's logic and conclusions on early hominid experience and tool use. However, this was not so; it would seem to have been an instance of two completely different approaches converging on a similar, if not identical, explanation. There was one noticeable difference; whereas Dr. Western was laudably succinct and kept within his allotted time, Dr. Isaac found himself with too much to say, admittedly interesting, and generously exceeded his hour. In conclusion, Dr. Isaac discussed where the hominids were wont to sleep before halls and benches were provided. Creatures made of one hundred pounds of meat would have been ill-advised to curl up and sleep on the open savanna ground. It is not impossible that tool-using hominids still slept in trees until fire had been brought into control.

As the closing lecturer, Professor Shirley Strum of the University of California at San Diego shifted the discourse from food to intellect and society. She took up the topic of "Larger Brains and Savanna Life." How do some of the other savanna primates such as baboons cope with the problems of life away from the woods? What effect does their way of life have on social strategies and mental abilities? With dramatic slides and a wealth of first-hand accounts of baboon life, she illustrated the importance of being able to plan ahead, together with the value of building long term, mutual assistance relationships. Among others, she told the memorable story of the ingenious maneuvers in which one particularly wily female engaged in order to outwit a male and capture from him the meat of a small animal. Clearly, when Dr. Strum's studies of the Pumphouse Gang are written up, they will be an important resource for evolutionists and will yet make entertaining and instructional fire-side reading for everyone.

The afternoon closed with a lively session of questions and answers with the speakers, moderated by Clark Howell, taking on numerous queries from the audience. It was apparent that the lengthy day had not been too long; had the moderator not ended the session, it would certainly have continued into the evening. As it was, the speakers were pursued by listeners still eager to question and be enlightened.

The organizers of this event, Dr. Western, the Leakey Foundation and

the Kenyan Museum Society, are to be congratulated for their hard work — and such a day entails *really* hard work — but their reward was the obvious success. If only more such events could take place in the countries where research is being carried out! There can be few better ways to ensure that there are continued good relations between the researchers of all nationalities and their public hosts.

MARY LEAKEY:

A TRIBUTE

J. Desmond Clark

Remarks made at a dinner honoring Dr. Leakey in Nairobi, August, 1984.

I have known Mary Leakey as a most valued friend and fellow archeologist since 1941, and the longer I have known her the better I have come to appreciate that friendship and the magnitude of what she has given us.

In the war days of early 1941, I had just arrived in Nairobi as a young sergeant in the Northern Rhodesia Regiment's Field Ambulance, on our way to Ethiopia. While we were waiting to go north, all my free time was spent with Louis and Mary Leakey. They whisked me off in their ancient car over the then atrocious, unpaved road down the Rift escarpment to visit the sites they had made famous in the volume *Stone Age Cultures of Kenya Colony* (1931) — Kariandusi, Little Gilgil River, Malewa Gorge, Deighton's Cliff, Old Nakuru and others. Louis and I had met briefly before at St. John's, Cambridge, when I was finishing up the archeology and anthropology tripos. But that was the first time I had met Mary and the host of Dalmatian dogs with which I shall always associate her.

They lived at that time in an old colonial-type house at the back of the museum (of which Louis had recently become curator), surrounded by a high wire fence to keep in the dogs. As soon as anyone appeared at the gate, there was a mad rush of barking dogs that had to be negotiated before one could get inside. Excellent protection both for the Leakeys and the museum, they kept all undesirables away. Mary reminded me only the other day that one of these Dalmatians had earned the name of "Bottom Biter"! Once through the dogs, one learned what East African hospitality was like and was able to appreciate the friendship and camaraderie of fellow archeologists getting

together; in those days there were normally few opportunities of talking with one's own kind.

I saw not a little of Louis and Mary and heard of their new discoveries on leaves and other occasions when I came down to Nairobi. Most happy times and welcome relief they were — arguing over artifacts in the museum, visiting some of their new sites or infrequent gatherings with fellow scientists such as Tony Arkell from the Sudan or Jack Trevor, the anthropologist from Cambridge. Especially do I remember my first visit to Olorgesailie with Mary in 1943, not long after they had found the site, and seeing the exploratory excavations they had done to uncover the horizons on which lay large numbers of Acheulian bifaces with fossil bone.

This brings me to what is perhaps Mary's greatest contribution to paleo-anthropology — namely, the use of new, meticulous excavation methods (already in use for archeological sites of much later age) in the excavation of Paleolithic sites of high antiquity. Louis and Mary realized that in East Africa there existed, often minimally disturbed, the very occupation places of the hominids who made the tools. So, overnight as it were, Mary opened up new possibilities for Paleolithic research which she has pursued unceasingly for the past forty years and more.

The first major site that Mary dug on her own was a Neolithic and Iron Age burial and village site at Hyrax Hill near Nakuru in 1937. This was a superb piece of excavation exposing all the features at the site and the published report (1945) may sometimes since have been equalled in thoroughness but seldom, if ever, surpassed. From later prehistoric times, Mary turned to the Paleolithic and her interests, with one exception, have remained firmly fixed there ever since.

Louis Leakey was never a very good excavator — he was too impetuous and impatient to move on to new things — so that it was Mary's insight and talents that brought revolutionary excavation and recording methods to the team studies that began in the years immediately after the Second World War. Their results can best be seen at the locality made famous by them — Olduvai Gorge — that contains a record of human history that, for its continuity and completeness for the Lower and Middle Pleistocene, is unsurpassed by any other site in the world. I would emphasize that what is so significant about Mary's contribution is that she gave us the *third dimension*, namely the horizontal distribution of assemblages of stones and bones, on — what was also unique for the time — the relatively undisturbed living places of hominids. This, then, was the imprinted record of the past, later to be made even more spectacular

by the discoveries of the bones of the hominids themselves and of their footprints at the now equally famous Laetoli site. No one had done this before and no one had yet believed that it was possible to do it. Mary did and the meticulous way in which she and her helpers uncovered and plotted the distribution patterns of artifacts, bone features and hominid remains made possible for the first time a study of what all this might mean in terms of early hominid behavior. We could now begin to study what it was they were *doing* with their tools, to start to look at function instead of treating the artifacts as type fossils, interesting for their morphology alone.

I want to impress on you how much this meant to the archeologists working on the Paleolithic and how much it means to those of us who carry on the investigations today. We can now begin to talk about what prehistoric man was doing with greater confidence in our hypotheses, for it is the possession of a number of precise, empirical studies such as those Mary has carried out at Olduvai and elsewhere that provides the evidence on which our inferences concerning early hominid behavior must be based. While the hypotheses and models of today will be swept under the carpet as new evidence becomes available, the recorded data from the activity sites themselves are there for all time as the unchanging foundation for forming new hypotheses with the expanding perceptions of more advanced methodology. Every stone tool and fragment and every piece of bone was meticulously uncovered, labeled, plotted and later studied in the lab. Out of this grows an understanding of the relationships between different kinds of artifacts, between artifacts and bones, and the relationships of the whole assemblage to the plants and animals of the locality, the ancient topography and paleogeography of the site. We begin to study a dynamic system, not simply a single, small part of that system.

I shall never forget the revelation it was to me to see at Olorgesailie in 1943 the exposed horizon with everything in position just as it had been found; and later, in 1961, to be privileged to be one of three (with Professors Dart and Arambourg) to visit Olduvai and be shown, as we crawled with our eyes a few inches above the ground, the last one meter strip of the *Zinjanthropus* living floor with the many hundreds of stone and bone fragments in intimate association. No one could doubt that here was one of the relatively undisturbed activity places of some of our earliest tool making ancestors, where they had lived and carried on some of those activities that caused us to evolve into what we are today. Nowadays this kind of excavation and analysis is the

rule rather than the exception and we owe its inception in very large part to Mary Leakey.

But Mary has many talents besides that for excavating — breeding dogs and horses, illustrating stone and bone tools, lecturing (which she hates) and writing. Her unabating interest in archeology comes from her mother's side of the family since one of her ancestors was John Frere who published, in 1797, the first record of stone tools associated with bones of extinct animals from a brickearth pit at Hoxne in Suffolk. Mary's ability to draw — and she leads us all in archeological illustration — she got from her artist father. She has done us all yet another good turn by meticulously tracing and reproducing the spirited corpus of prehistoric art in the rock shelters of central Tanzania. These can now be appreciated by all in the volume she published in 1983, *Africa's Vanishing Art*. Her reproductions are superb, with minute attention to detail, superposition and color. Records such as these are the basis from which those who seek to get at the motives of the artists can work.

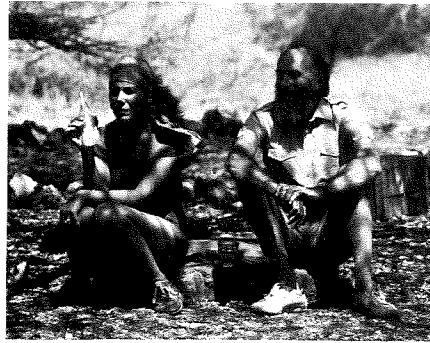
Something of what it meant to be a pioneer archeologist in East Africa from the mid-1930s onward can be seen from Mary's newly published autobiography, *Disclosing the Past*. It makes excellent and exciting reading and shows you something of the personality of one unequalled in the field of prehistory. We have come to love and respect her for the great contribution she has made and continues to make to unraveling a better understanding of ancestral hominid behavior, a knowledge of which is, of course, so highly significant for where we may be headed in the future.

VISIT TO OLDUVAI AND LAETOLI

Bernard G. Campbell

Olduvai; August 24, 1984.

The morning dawned with that air of mystery only found in Africa. At 6 a.m. the less faint-hearted dragged themselves from their beds to brave the cold dripping faucet. There wasn't enough water for a real wash, but a damp flannel was enough to wake us up. Our party of trustees, friends and relations set out at 7 a.m. from the Ndutu safari camp where we were staying — an old and somewhat decrepit hotel set in lovely country at the southern edge of the



Susan and Bernard Campbell.

Serengeti National Park. Our 12 land-cruisers were to take about an hour and a half to reach Olduvai. Leaving the lodge along the maze of tracks (or were they dried river beds?) that threaded their way through the woods surrounding the hotel, we immediately lost our way, and when we later met up with our convoy we found that two other vehicles had been side-tracked looking at game. Eventually we gathered on the only main road and proceeded east towards Ngorongoro. After an hour we could see the gorge to the left of the road, and cut across the grassy plain to the acacias that marked its edge. The scattered trees sheltered patches of aloe and the strange sword-leaved plant, *Sansevieria*, which gives the gorge its Masai name.

We met Mary Leakey at the little thatched shelter overlooking the gorge, where she told us something of its discovery and history and the many years that she and Louis had worked there. He had begun in 1931; she had joined him in 1935. Now her work was done; she had elucidated the sequences that the gorge revealed: the stratigraphy, the succession of toolkits, the hominids, the paleogeography. The publication of her book on Beds III and IV is expected shortly; her account of Beds I and II was published in 1971. While Mary was talking, the inevitable Masai, in full battledress, appeared in the background, hoping to be photographed and paid for it.



We visited the excellent museum, bought postcards, and then drove down into the gorge and up the other side to a point from which we could see the faulted stratigraphy laid out clearly before us. Behind the cliffs that faced us rose the breathtaking backcloth of the Lemagrut Mountain. We climbed down the side of the gorge (Mary had had new steps cut for us) to the site DK-I, which



lies just above the basal lava flow. Here we saw preserved in a site museum the circle of lava blocks placed on the lake-side mud which is believed to indicate a two million year old windbreak or hut shelter. Surrounding the circle, stone tools and broken bones made it certain that this was indeed a living place of early humans (*Homo habilis*). (Examples of similar stone circles which supported windbreaks and huts can be found among the Turkana and a number of other tribes.) It was startling to realize that such structures have been made here on the African savanna with little change in design for a continuous period of nearly two million years.



Our next visit was to the curious site named JK-III where what appear to be salt pans or salt licks have been excavated. The interpretation of these seemed doubtful to many people and the trustees left with differing opinions. The meaning of this strange place may never be resolved.

Then we all repaired to Mary's house to eat our picnic lunch. We sat under an acacia tree and watched the canaries



clearing up our food crumbs. After lunch Judge Newsom auctioned a cartoon by Moira Earnshaw which raised \$2500 for the Foundation.

Then we drove down to visit site FLK-I, the famous place of the 1959 discovery of *Zinjanthropus boisei* or Nutcracker Man. The site was not as tidy as it once had been; the cliff which backs it was eroding away, and there was little left to indicate the significance of the spot, except a concrete plinth and marble tablet. It was this great discovery, made by Mary Leakey herself, which persuaded the National Geographic Society of the wisdom of funding work at Olduvai and heralded a period of extraordinary success for the Leakey team. The excavation of site FLK-I was also an important landmark in archeological technique.

By 4 p.m. we were tired and set off for our Serengeti home on Lake Lagaja. Driving past magnificent giraffes that stood just 50 yards from Mary's house, we cut across the savanna to the main road and turned towards the west.

But like all our days in Africa, this too was to be full of surprises. On making a short detour from the main road, we came upon a long column of ostriches walking sedately in step, travelling in Indian file towards the setting sun. We then encountered one of the rarest sights of the Serengeti — a pack of 47 wild dogs, including 24 puppies. They were, we were told, the descendants of those made famous by Hugo van Lawick in his film and book. These almost ugly dogs, with their blotched coats and huge ears, the terror of the plains, had set out to hunt as dusk began to fall; the pack stretched across the grassland in a long line. Soon the pack split; groups of two or three older dogs set off in different directions. Only three of the adult dogs remained with the puppies and one of these was limping badly. Within five minutes, two dogs had brought down a Thompson's gazelle; five minutes later they had fed and returned to the pack and regurgitated the meat for the puppies. Mean-

while, we remained with the kill to see what would happen. First a golden jackal crept up and quietly removed the stomach. Hyenas appeared as if from nowhere, but kept their distance. Then three dogs returned, divided the kill into three by pulling it apart, and set off with it again to the puppies. As they delivered their meat, the hyenas gathered — 12 in all, circling and closing in on the dogs. But when one hyena came in too close, the dogs gave chase and grabbed it by the tail, dragging it and pulling. After two minutes of this mocking treatment, with the hyena screaming continuously, the dogs let go and the hyena escaped, tail well down between its legs and its hindquarters held even lower than usual. The hyenas continued circling ever closer and the same game was soon repeated. The dogs never really hurt the hyenas but tried to teach them a lesson; the dogs always kept the upper hand as a strong team, while the hyenas seemed to act as individuals. Eventually, when the kill was finally consumed, the dogs moved off again into the dusk. The hyenas took their place and tidied up the remains, quietly, as night fell.

We wondered at the economy and efficiency of nature: the almost painless complexity of the cycle of predation. We saw the role of each species, prey and predator, and saw that nothing is ever wasted. We knew that if some animals are killed, it is both necessary and appropriate, for in the balance of



nature, each species has its role and can survive through its own unique behavior. We wondered how our ancestors fared, two million years ago, finding themselves on this wide grassy plain. How did they survive in this bleak but beautiful world? Exactly how it was done we may never know, but that it was done — that they did succeed (but with their wits rather than their strength or speed) — of this we can be certain.

For many years it was believed that at the time humans first lived at Olduvai, the climate was very much as it is today. The barrenness of the dry gorge on this visit was striking and there seemed little food in the area for any animal but giraffe. We now know that, according to the latest research, the rainfall at Olduvai at the time of Bed I may have been considerably more than it is today. Such bountiful rains would undoubtedly have transformed the whole area into a place more wooded, more productive and vastly more plentiful in game. According to taphonomist Pat Shipman, there was probably over twice as much game present in the area. There would have been more predators (and the dogs were arriving at about this time from the north) but the fruitfulness of the land was surely something closer to a garden of Eden than we had previously realized and certainly more lush than it is today. In a way, it must have been a sort of paradise.

August 25, 1984.

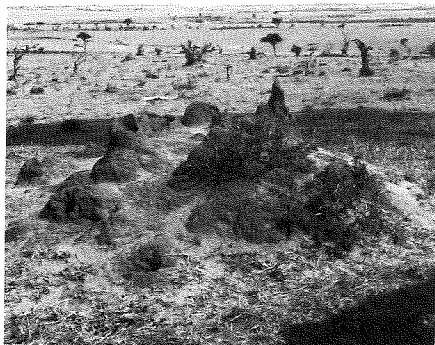
The following morning we set off again in the direction of Olduvai, but turned south near the gorge, following a riverbed through wooded valleys and hills under the shadow of Lemagrut Mountain. After two hours, driving past giraffe, gazelle and vast herds of Masai cattle, sheep and donkeys, we were directed to Mamma Leakey (Mamma is a Swahili term of respect for an older woman). When we arrived at Laetoli, we walked with her down the shallow riverbed where the footprints of some 25 species of Pliocene animals are impressed into the ancient layers of volcanic ash. We brushed aside the dust which had washed down or blown onto the ash horizon and an extraordinary record of 3.5 million years ago was revealed. It was here that the famous footprints of *Australopithecus* were discovered among those of the other animals which shared their world. We visited the site where she had found the fossils of these creatures — the numerous jawbones and other fragments. They are the earliest certain well-dated records of our ancestors.

We picked our way gingerly through the appalling thorns of the acacia scrub hoping we wouldn't disturb too many ticks. Mary strode through the thorns, oblivious of this threat, her bare legs a mass of blood, indifferent to the discomforts of this inspiring place.



Finally she took us to the site of some strange fossil termite hills. Here in a gray valley stood eerie stone pillars of almost lunar beauty. Each was topped by an eroded fossil termite mound which had protected the softer underlying rock from erosion. In the termite hills we could see the fossilized passages, chimneys and queen cells in what had been the underground parts of the colony. Now they stood dead and ghostly, an odd relic of an era long past. Mary told us that they were about four million years old, and the earliest known evidence of the most complex and advanced termite species.

After this we regained our gharries (Kenyan slang for the Toyotas) and set off on the long drive home to Ndu. Three hours later we arrived at the lodge. The sky was full of stars and the hyenas howled outside our bedrooms. We dined on immense helpings of roast wildebeest and fresh vegetables and fell into bed, to sleep deeply beneath our mosquito nets.



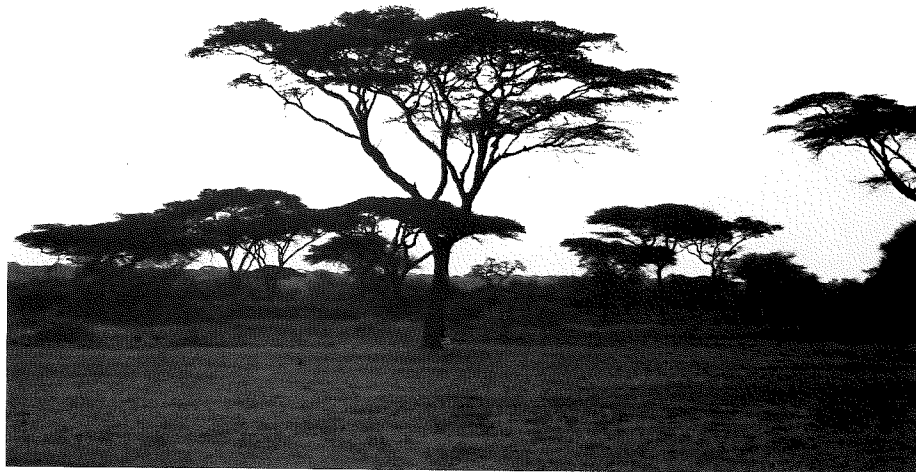
There are many ways of seeing Africa. Ours was a flying visit and our observations were necessarily superficial. But we talked with people who lived there, black and white, and we saw a country through their eyes, comparing

their impressions with our own. The Masai we spoke to could not conceive of our own strange land or the even stranger lives we lead. But we came away full of wonder, half in love with the country, half afraid of a world we still hardly knew. But above all we were changed in our perception of the place and in our understanding of it and its problems. Our hearts were touched.

When we arrived home, sitting in our

offices, we knew that out on the vast plains and along the wooded river beds, Africa continued as it always has — the giraffe standing among the thorn trees, the pastoralists with their herds of cattle, sheep and goats. The wildebeests still graze the savanna in their hundreds of thousands, and the lions and wild dogs sleep till dusk when they wake to search and find what they need. African wildlife remains one of the wonders of the world; it is not only an extraordinary display of evolutionary wealth and variety, but a window on the past — our past.

Sir Thomas Browne, writing in England in the middle of the 17th century, knew in some uncanny way that our roots lay in Africa. He wrote: "We carry within us the wonders we seek without us; there is all Africa and her prodigies in us." There is a deep connection between us all and that ancient land; our bodies, our physiology, our behavior, our whole nature is derived from an apprenticeship which we served under the African sun. Anyone visiting Africa will know this. It is our long ago home, and from it we have made a journey which will never end. ▲



CONCERNING GIFTS OF APPRECIATED PROPERTY

The Foundation regularly receives gifts of appreciated property. In response to inquiries, a three-page description of the tax benefits accruing from this kind of gift has been prepared and is available by calling the telephone number or writing to the address indicated on the bottom left of page two of this issue.

Appreciated property is expressed as securities, tangible personal property, and real property. In general, in making contributions of appreciated property, it is better to give property which, if sold, would generate long term capital gain than that which would generate

ordinary income. Each donor should consult with a qualified tax advisor in determining the amount of the gift and in selecting the type of appreciated property which will give the donor the maximum tax benefit.

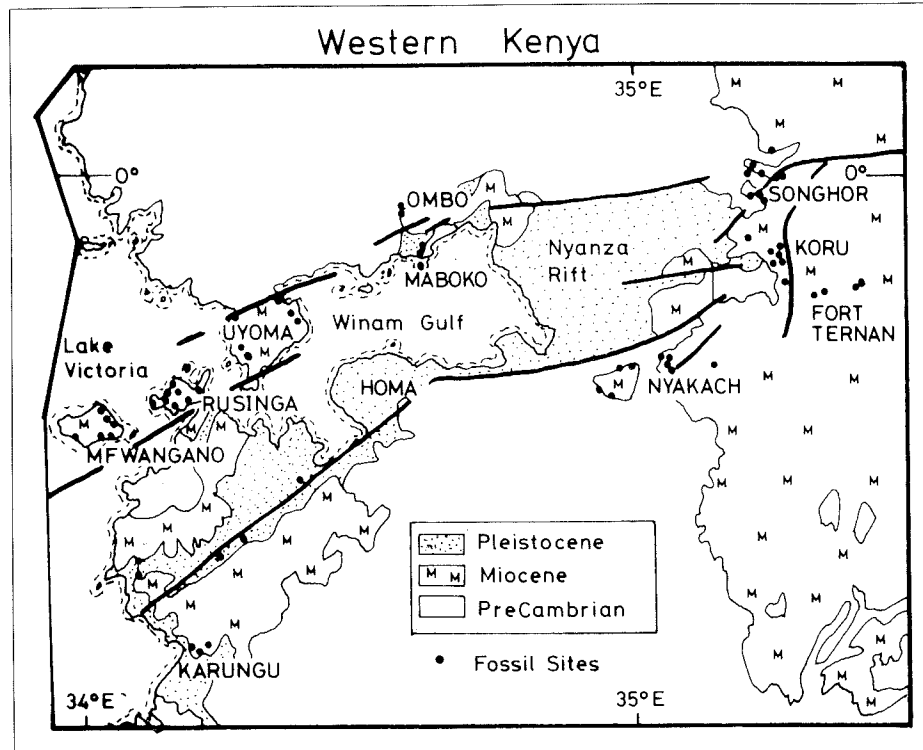
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DID YOU KNOW . . . that a group of apes is called a shrewdness? This term of ventry dates back to the 15th century. Perhaps it makes good sense if one knows the animals' habits.

That, on the other hand, a company of monkeys is now merely called a troop, and that of gorillas a band? So, we wonder, which apes show the shrewdness?

MIOCENE PREHUMAN FOSSILS IN WESTERN KENYA

Martin Pickford



Most people are interested in the past, particularly that of our own species and its forebears. My own interests lie with the very remote prehistory of the superfamily to which we, as humans, belong: the Hominoidea, a zoological group which today contains only a few representatives — man, chimpanzee, gorilla, orangutan, gibbon and siamang. One could argue that some of the extinct creatures I have worked on are so primitive that they are actually predecessors of the Hominoidea. But the Miocene hominoids from western Kenya are nevertheless extremely interesting because of their connections with living apes and humans.

My interests are not so much to do with naming the fossil creatures but in trying to determine the way they lived, what they saw in their day to day travels, how old they are, the sequence in which the various species lived, what they might have eaten, how they moved about and how they became fossils.

In order to look into these questions in a localized area with a reasonably long sequence of geological strata, I have spent nearly ten years surveying and collecting in western Kenya, without doubt the richest known locality in the world for hominoids of Lower Mio-

cene (20 to 16 M.Y.) age.

The L.S.B. Leakey Foundation has supported my research for the past seven years. I have not been working alone. A large number of colleagues have been able to participate in various expeditions and to work in the laboratory on the collections made during those expeditions. I have been pleasantly surprised by the great interest shown in the West Kenya Project by scientists from many disciplines and countries. And I shall always be grateful for the encouragement and help extended to my colleagues and me by the director of the Kenya National Museums, Richard Leakey, and the National Council for Science and Technology, Kenya. The West Kenya Project has, in effect, been multidisciplinary in the sense that many aspects of geology and paleontology have been, and are still in the process of being, studied by many scientists of diverse interests.

I very much wanted to include Kenyan scientists in my expeditions, but sadly this proved not to be possible. Kenyan citizens were, however, always present, in particular Kiptalam Chepboi of the National Museums of Kenya, whose eagle eyes show no sign of dimming and whose companionship and

amiable approach to life and to people made it a joy to be in the field. It was always an adventure with Kiptalam, be it hot or cold, wet or dry, fossils or no. The many Kenyan citizens I have worked with (and I always employ as many local people from the area of the site as I require) have always been friendly and helpful, from the gift of an egg and the spinning of yarns over a campfire to long and hard hours of work screening tons of sediment for the recovery of tiny fossils. These are the experiences that make life in the field so rewarding.

When I started work in western Kenya in 1976 there were about 140 fossil sites known which had yielded about 900 fossil higher primate specimens thought to belong to nine hominoid and two cercopithecoid species. There were few radioisotopic dates available and very little geological mapping of the requisite scale for paleontological purposes. Obvious exceptions to this general picture were John Van Couvering's (1972) mapping at Rusinga and Felix Oswald's (1914) work at Karungu. Peter Kent (1944) and Robert Shackleton (1951) had also produced useful geological surveys of a few of the fossil sites, but in general the available maps were not of much use to field paleontologists.

Until 1976 most of the fossil beds in western Kenya were assumed to have been deposited in an ancient lake. A few papers, notably by William Bishop in the early 1960s, showed that other types of non-lake deposits were present and I determined to follow up Bill's work. The biostratigraphic and paleoecological ramifications would be significant if Kent's Miocene Lake Hypothesis was incorrect. As we shall see, true lake beds are very rare in western Kenya.

Very few taphonomical studies had been done. And very few of the faunal groups had been revised since their first publication. The existing literature was inadequate for anything but the most casual paleontological interpretation. There seemed to be no overall unity of approach or interpretation and many authors were misled by accepting Kent's Miocene Lake Hypothesis. So, in 1976, I knew I would be entering a demanding and very wide field of study. But I knew that the region's importance would attract colleagues and that eventually a great deal could be accomplished.

My interest in western Kenya developed over a long period. In 1966, I was Louis Leakey's personal assistant and, having time on my hands when he was overseas on his many lecture tours, I was given the task of registering the 1966 collection of fossils from Songhor, a 20 million year old site in western Kenya. I didn't know a great deal about anatomy or fossils at the beginning but soon learned to distinguish the body

parts and taxonomic groupings. In retrospect, handling thousands of fossils was probably the best grounding a young man could get in paleontology. At any rate, ever since then I have been fascinated by fossils, in particular those from Miocene sites.

Part of my duties was to administer the sites at Songhor and Fort Ternan. I finally visited western Kenya for my own research in 1975. I found numerous fossils in the Koru area in several disused limestone quarries. Far from being worked out, as had been suggested, the area seemed to me to be full of potential. I accordingly spent six weeks at Koru in 1976, when I mapped the main deposits, delineated the stratigraphy and collected over 100 hominoid fossils. I returned the next year, continued mapping and found another 300 fossil primates. In 1978, I extended the mapped area to include Songhor and, with Peter Andrews, Terry Harrison and Lawrence Martin, excavated a very rich locality at Meswa Bridge, dated about 22.5 M.Y., and up until now, the oldest Tertiary site known in East Africa. Then, with funding from the L.S.B. Leakey Foundation, I was able to expand the mapping project, eventually covering all the important areas at Fort Ternan, Nyakach, Maboko-Ombo and Gwasi. I geologically mapped 3,700 sq. km., found more than 160 new fossil sites, and collected more than 1000 fossil primate specimens and their associated fauna and flora. Of all the sites at which I worked, the most outstanding were those at Koru and Maboko but I saw fossil primates at many of the other sites as well.

I wrote a preliminary biostratigraphy for western Kenya which was published in 1981. This work suggested that the faunas from there spanned a period of about eight to ten million years, a far cry from the short time span inferred by many authors on the basis of Kent's Lake Hypothesis. This stratigraphic and biostratigraphic framework is still being radioisotopically calibrated at Berkeley. I studied the environments of deposition of the strata and found that lake beds were almost non-existent in western Kenya. Instead, a variety of subaerial environments was represented, including fossil soils, channel deposits, river sediments and floodplain strata. Comparisons of these depositional environments with the fossil faunas found in them revealed some very closely controlled patterns of distribution. For example, *Proconsul major* and *Micropithecus clarki* occurred only in fossil soils which accumulated on the flanks of volcanoes, while *Proconsul nyanzae* and *Dendropithecus macinnesi* were, generally speaking, found in sediments which accumulated on the dry parts of flood plains. This sort of pattern was repeated time and again among the mammals, reptiles and molluscs. So

much for Kent's Miocene Lake Hypothesis.

While making collections at various sites, I noticed that mollusc assemblages from different regions tended to be different, while those within areas tended to be rather similar. Following up the studies of Bernard Verdcourt (1963), I found that, indeed, his pioneer work was very exciting because, using his criteria, I could distinguish several major vegetation types on the basis of snail assemblages. The fossil snails were found in precisely the same beds as the fossil primates and finally, as though it was specifically designed to be so, selected assemblages of snails generally occurred with specific primate and other animal assemblages. For example, *Proconsul major* and *Micropithecus clarki* were only found in association with snail assemblages that indicated the former presence of thick forest in the area, while *Proconsul nyanzae* and *Dendropithecus macinnesi* were usually associated with snails indicative of more open, perhaps moist, wooded environments. Finally, *Kenyapithecus africanus* occurred with a snail fauna which suggests regional semi-arid woodland environments with localized gallery forest along watercourses.

In the meantime, various colleagues were studying the fossil faunas and the results have been published or are in the process of publication. The primate story in particular has been fascinating, the new collections allowing complete revisions to be made, with the result that many taxa are now much better understood than they were eight years ago. In addition, there has been the discovery of several new species. The total number of hominoid species now known from western Kenya is 16, up from nine known eight years ago. Several quite knotty taxonomic problems have been solved, especially with the improved collections from Koru, the type site for several species. This tremendous diversity of higher primates is quite astonishing. Even when arranged in chronological order the diversity remains considerably higher than in any known modern fauna.

At this moment, it is good to stand back to see in perspective what advances we have made and what needs doing in the future. Work is far from complete, with several major faunal groups requiring revision. Biostratigraphy, geochronology and stratigraphy could all readily be tightened up by further work. More research needs to be done on fossilization processes and on the development of ancient soils and sedimentary sequences. I feel that significant advances have been made, but there are still questions to be asked and answered. I hope the next ten years will be as fruitful as the past ten years have been. ▲

continued from page 1

lacked a primary endowment, it was more than compensated by having an Allen O'Brien to bring it into being, and time and again to tide it over its financial growing pains.

On April 14, 1980, a fortnight after Allen's tragic and premature death in a plane crash in India, my letter to Helen O'Brien included this passage:

"What a rare and remarkable man your husband was, eternally youthful, full of energy, always thinking up new and exciting undertakings, with the enthusiasm, the bubbling effervescence of a schoolboy. I have often thought of him as in one sense a Peter Pan, one who was never quite grown up but continued to enjoy the adventures of boyhood."

In India, only three months after his 64th birthday, his luck ran out and all aboard the private plane were killed when the pilot lost his way in fog.

Melvin Payne, chairman of the board of the National Geographic Society, used these words about Allen when he introduced Mary Leakey, the first Allen O'Brien Memorial Lecturer, in Washington, D.C. in September, 1982:

"His enthusiasm in matters of common interest, his untiring efforts in causes he believed in, and the dedication with which he pursued his wide interests made him a man apart from his contemporaries. Allen was kind, generous, outgoing, always giving — never taking — and his greatest pleasure was in doing thoughtful things for others."

It was these instincts that led Allen O'Brien to envisage and to found the Leakey Foundation. What activated him is best set out in his own words in a letter he sent Robert Beck and the board of the Foundation in October, 1969:

"As you probably know, it has been a long time ambition of mine to see a foundation formed to aid research related to man's origin.

"The paradox of the world's leading anthropologists spending one quarter of their valuable time raising funds for the continuation of their work by going on lecture tours, interminable meetings and correspondence with contribution committees of government agencies and foundation staffs, and meetings with affluent friends and buffs, seemed to me to be an inequity that needed to be set right. Along with a group of friends, I undertook the task of establishing a foundation that would lift from the shoulders of these dedicated scientists all over the world this onerous and time-consuming task."

Orwell and the Decline of Dissent

"It was a bright cold day in April, and

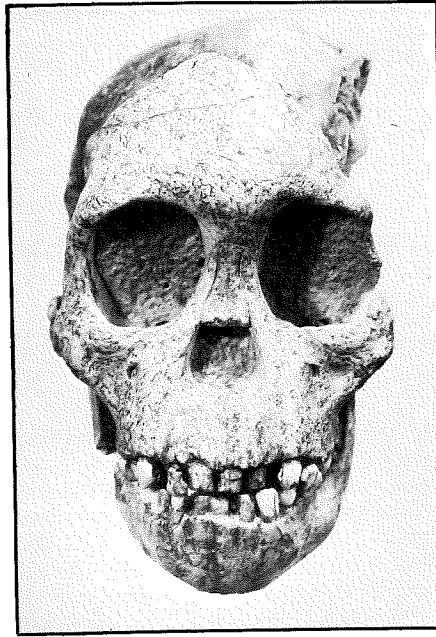
the clocks were striking thirteen."

So begins that remarkable novel, *Nineteen Eighty-Four*, by George Orwell. In an age when political orthodoxy — or, more colloquially, "toeing the party line" — was, under certain regimes, the only thinkable policy, Orwell ventured to limn a society in which this trend had gone so far that the least dissent was intolerable. "... In the future," he has his character O'Brien declare to Winston Smith, "in the future there will be no wives and no friends. Children will be taken from their mothers at birth, as one takes eggs from a hen. The sex instinct will be eradicated. Procreation will be an annual formality like the renewal of a ration card. We shall abolish the orgasm. Our neurologists are at work upon it now. There will be no loyalty, except loyalty towards the Party. There will be no love, except the love of Big Brother." In a way, this sad book was a lament over the debility and imminent demise of dissent.

Rereading it in the very year which, fortuitously, Orwell chose as the setting and the title of his macabre tale, I was struck again forcefully, as I had often been struck before, by the role and value of dissent in scientific inquiry. How crucial it is for the advancement of science that some few thinkers should rebel against what is often called these days the received or conventional wisdom of the time. In this context and even in the passage I have just quoted, dissent is not confined to the political arena but applies as well, and powerfully, to research. For science, if it is to seek out and cross new frontiers, needs men and women who are able to stand against the tide. To do so needs originality, inventiveness and, above all, courage. It is easy to swim or float with the tide; it needs a special kind of gift, of fiber, to withstand it, to go against it and even to roll it back. Such a rebel was Louis Leakey and so too was Raymond Dart. Perhaps, indeed, Dart was, had to be, even more of a rebel than Leakey, for back in 1924 Dart had to topple more preconceived notions of the day than Leakey or any other student of hominid evolution was subsequently to confront.

Both men had the kind of rock-like inner strength demanded by their anthropological dissent. Yet it is not hostility alone that the scientific rebel has to face; he has to contend with the unutterable and terrible loneliness of his position. Such a loneliness did Charles Darwin face 125 years ago when he published *The Origin of Species*.

Such a desolation did Dart have to face when, for years and even decades after he announced the discovery of the Taung skull on February 3, 1925, he stood virtually alone in his belief about the position of his little australopithe-



The face that launched a thousand slips! The beautifully preserved face of the Taung skull. Note that even the delicate little nasal bones are perfectly preserved.

cine child in the human story. There must have been times when he felt rather like Winston Smith, the tragically heroic anti-hero of *Nineteen Eighty-Four*, when he discovered deep within himself the seeds of rebelliousness and dissent:

"He felt as though he were wandering in the forests of the sea bottom, lost in a monstrous world where he himself was the monster. He was alone. The past was dead, the future was unimaginable. What certainty had he that a single human creature now living was on his side?"

The Taung Skull and Human Evolution

November, 1984, is the 60th anniversary of the discovery of the Taung Child. It was the first of all Africa's stirring fossil testimonies to the dawn of humankind. That heavily fossilized skull of an ancient child of humanoid aspect and all that flowed from its revelation were to change dramatically our conception of human origins. Inevitably it must be counted among the major scientific discoveries of the 20th century.

The skull was blasted out of the hot, dusty Buxton Limeworks near the village of Taung in the northern Cape Province in November, 1924. It could not have been unveiled to the scientific world under less auspicious circumstances; at the time the dice were heavily loaded against its acceptance. For one thing, it seemed to be in the wrong part of the world! After the primitive-looking Java Man was brought

to light by the Dutch army surgeon, Eugene Dubois, in 1890-92, Asia had been seen as the probable cradle of humanity by a number of leading investigators. These included Henry Fairfield Osborn and William D. Matthew of the American Museum of Natural History, Davidson Black of Canada and later China, and A. E. Grabau whom Ralph von Koenigswald described as "the father of Chinese paleontology." North of the Himalayas was the favored area and, in the early 1920s, Roy Chapman Andrews was inspired to lead a number of Central Asiatic expeditions to the Gobi Desert on the high plateau north of the Himalayas. This Asia-centered view was reinforced by the finding of apparently ancient human-like teeth in China early in the 20th century, which led Grabau to use, for the first time, the term "Peking Man" about 1926. Hence, on the preconceived ideas of the time, the Taung Child was geographically inconvenient.

Then again, its anatomical structure was not in accord with prevailing concepts. One strong body of opinion, supported especially by Dart's old mentor, Elliot Smith, held that the expansion of the absolute size of the brain (which is so staggering a feature of modern man) must have occurred at a very early stage in the advent of humanity, perhaps at a time when jaws and teeth were still quite ape-like. The Taung skull turned this notion on its head, for it represented a creature whose teeth were not at all ape-like but human-like, while the natural cast of its braincase betrayed an absolute brain size no bigger than that of some modern apes. On the fixed ideas of the day, the child of Taung was anatomically the wrong kind of creature.

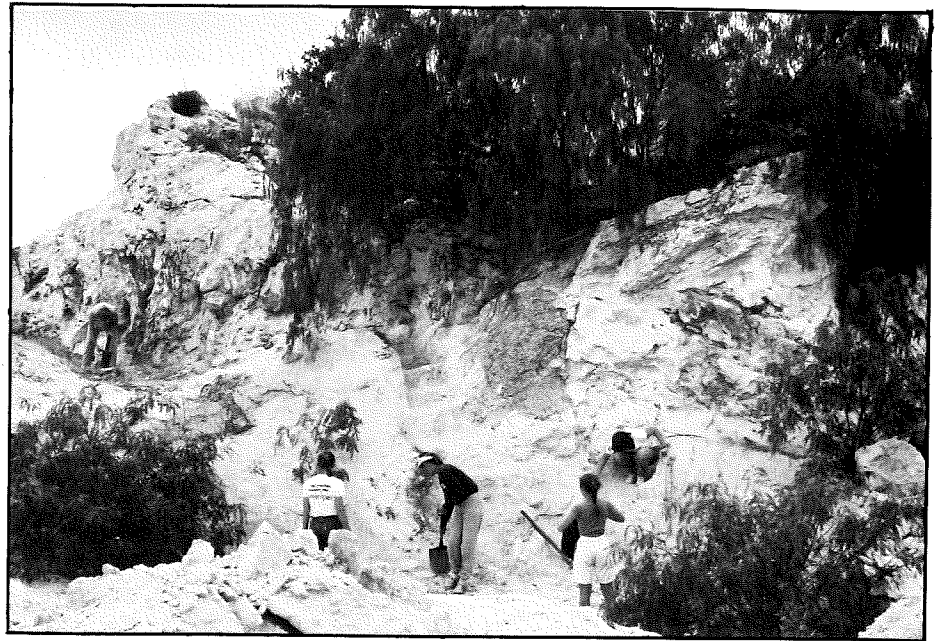
A third drawback was that the skull represented a little child. This is inferred from the presence of all 20 deciduous or milk teeth in the jaws. In addition, the first permanent molars had erupted, the lowers completely, the uppers incompletely. The modern child, at an equivalent stage of dental eruption, would be rising six years of age. That the first discovery of an "ape-man" was a child was a decided disadvantage as Wynfrid Duckworth pointed out as early as 1925. Its juvenile status left two questions unanswered: How much of the humanoid aspect of the child was simply the consequence of immaturity, since the younger the specimen, the more alike different primates appear? Secondly, into what kind of adult would the Taung Child have grown, if it had lived longer?

It might have seemed to some at the time that the fossil fell into the wrong hands. During November, 1924, R. B. Young, chairman of geology at the University of the Witwatersrand, recovered the rock-enclosed skull while on a visit

to the Taung area, brought it back and gave it to Raymond Dart who, in the previous year, had taken up the chair of anatomy at the university's fledgling medical school. Dart was young, 31, rather inexperienced, inclined to scientific heresies, ebullient, emotional, imaginative, charismatic, a product of Sydney University Medical School and the Australian Army Medical Corps in those troubled wartime years of the previous decade. Some would have said that these were a most improbable combination of qualities and a most unlikely background to have marked the man whose destiny it was to receive, disentomb from its rock matrix, describe and evaluate the world's first "missing link" between ape and human.

Yet Dart proved to be the right man in the right place at the right time. With singular skill, he delivered the fossil from its matrix within a matter of weeks. With imagination and insight, he discerned its distinctive traits (despite its childhood status) and appreciated those of its characteristics which are now known to be the hallmarks of the earliest species of hominids, the family of humankind. With incisive neuroanatomical and evolutionary acumen and not a little courage, he pointed out features of the brain cast which he believed indicated advancement of the cerebrum in a human direction, despite the small overall brain size. He taught us, in other words, that it was quality rather than quantity which was all important in the early stages of hominid brain evolution. On the base of the cranium, he detected subtle pointers as to the carriage of the head — it was poised, he asserted almost brashly, on a more or less upright spinal column, in contrast with the position in the apes in which the head hangs forward from an obliquely poised backbone. He went further: If the spine was approximately upright and the creature went on two legs instead of four, claimed Dart, the hands must have been freed for human-like sensory probings and motor skills. The small canine tooth he likened to that of man rather than to the fang-like canine of modern apes.

In other words, Dart had the perceptiveness, almost the prescience, to recognize that this creature was relevant to the study of hominid emergence and evolution. He had the insight also to realize that the Taung skull revealed something wildly at variance with the teaching of his beloved and respected mentor, Sir Grafton Elliot Smith, an immensely powerful and authoritative man. For Taung showed that, in the process of hominization, upright posture, bipedal gait, man-like canine reduction and qualitative making-over of the brain must have been attained before brain enlargement. All this he had had the temerity to read into the super-



View of the Hrdlicka Cave remnant at the Buxton Limeworks, with some of Professor Tobias's students clearing the face in July, 1984. It was here that Ales Hrdlicka, the great physical anthropologist and founder of the American Journal of Physical Anthropology, conducted an excavation in August, 1925, and found a cache of fossil baboon skulls. Some of the red cave filling or breccia is clearly seen under the tree in the center of the picture; it extends right through to the Hrdlicka pinnacle on the left of the picture.

lative skull, teeth and brain cast of the little child of Taung. Moreover, Dart had the historical sense to remind the world of that half-forgotten prediction, made by Charles Darwin in 1871, that "... It is somewhat more probable that our early progenitors lived on the African continent than elsewhere."

It was a moment of breakthrough in the history of man's probings for his ancestral roots. Small wonder that the world treated Dart's claims with scepticism, even scorn. "Too much," cried the crowned heads of anthropological science, "too much is being read into too little." This opposition and the intervention of World War II delayed the acceptance of Dart's claims for over a quarter of a century.

In one respect, Dart's initial affirmation had been modest, as wisdom after the event now permits us to acknowledge. He was emphatic that *Australopithecus africanus*, as he named the species, fell outside the range of the pongids or ape family. Yet he could not bring himself boldly to enroll it as a member of the Hominidae, the human family. Even the name *Australopithecus* points to this hesitation, for it means "southern ape," not "southern man." Instead of aligning the Taung species with the hominids, Dart proposed to recognize a new family to accommodate the creature that he believed had hovered in a twilight world between apedom and manhood. *Homo-simiadae* was the name he suggested for this intermediate family, literally man-ape, but the proposal failed to gain acceptance.

Much, much later, *Australopithecus* came to be classified as an unequivocal member of the august club of the hominids. But this could happen only after more African hominid fossils, including adult specimens, had been unearthed at Sterkfontein, Kromdraai, Makapansgat and Swartkrans, all in the Transvaal, and had been carefully studied by Dart, Broom, Robinson and Le Gros Clark. It could happen only after hundreds of skulls and skeletons of the great apes had been examined and measured, so that the limits of anatomical variability of the apes had been more extensively researched and statistically defined. One had to know what *was* an ape in order to decide what was *not*!

Then again, there had to be time enough for the old Asia-centered concept of human origins to lapse into disuse. This came about when evidence had accumulated that the oldest of the African man-like fossils were far more primitive, more ape-like and more ancient than the oldest of the Asian hominid fossils.

Another concept that had to be shed was the idea that the great increase in absolute brain size had been a very early feature in human evolution. As the Piltdown remains provided the main evidence to support this theory, their exposure as fraudulent in 1953 dealt a final, fatal blow to the old notion that the increase of absolute brain size had been first in the field in human evolution. In a sense, Piltdown had been one of the factors that had greatly helped to delay the acceptance of the Taung skull

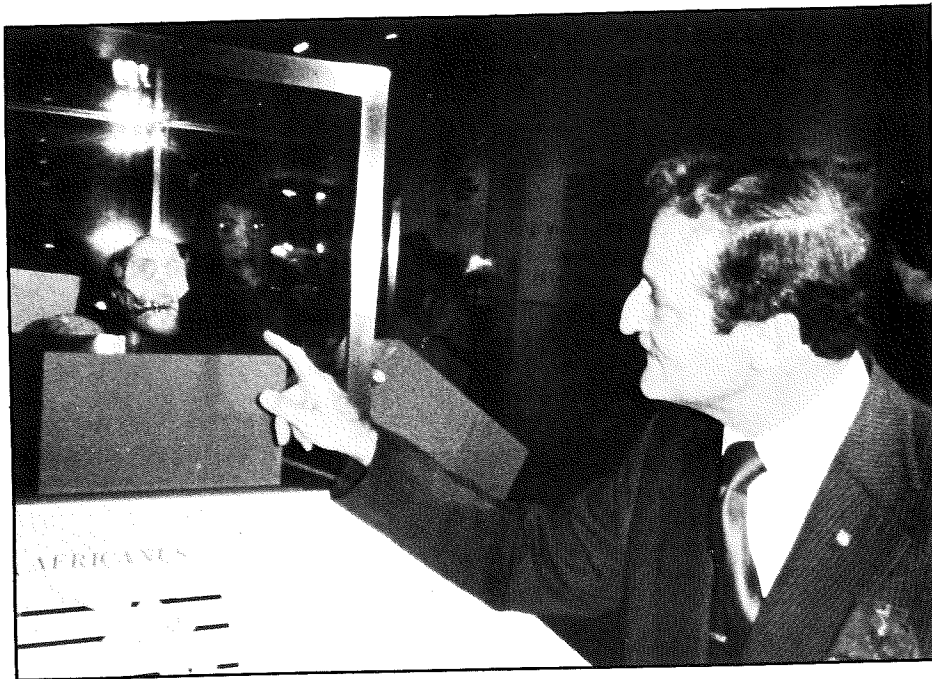


photo: Mrs. A. Sackler

The Taung skull visits New York. Dr. Tobias points to the fossil which was a center of attraction at the Ancestors exhibition in the American Museum of Natural History from April to September, 1984.

and *Australopithecus*. In some people's minds, at least, it produced a holdup of 28 years, from 1925 to 1953.

By the early '50s, all of the deterrents to the acceptance of *Australopithecus* had disappeared or been removed. The first 30 years of the Taung debate, 1925 to 1954, were over and in the second 30 years, from 1955 to 1984, *Australopithecus* gained pretty well universal acceptance as a member of the hominids and as a genus, one or more of whose species were on the direct lineage of modern man. The 30 years of loneliness, the lean years of rejection, had given way to 30 years of acceptance, the fat years of recognition.

Dart and Taung had taught the world that a small brain size alone is not sufficient to exclude a creature replete with other hominid traits from the evolutionary company of humanity. Moreover, he stressed, there is no "cerebral Rubicon," no particular brain size which demarcates hominids from pongids.

Historically, the Taung discovery gave rise to a ferment of argument and controversy. A dozen years later it led Robert Broom to seek and find the first adults of *Australopithecus* at Sterkfontein in the southern Transvaal. He found, too, the first of another group of African ape-men possessing broader premolars and molars, flatter faces, more rugged bones and generally sturdier skeletons. Now called *Australopithecus robustus*, this seems to represent an evolutionary side branch, which had developed along a different route from the path of later hominization. So Broom made the picture more complicated by finding evidence that not all

earlier hominids were ancestral to later mankind.

The subsequent work in Africa of a remarkable group of investigators — such as J. T. Robinson, Louis, Mary and Richard Leakey, C. Arambourg, Y. Coppens, F. C. Howell, C. K. Brain, R. J. Clarke, E. S. Vrba, D. Johanson, T. D. White and A. R. Hughes — has corroborated most of Dart's original claims, filled out many gaps in the story, and furnished a dynamic picture of the hominid evolutionary process. Discoveries have followed apace from the Transvaal to Ethiopia; dating methods have improved; analyses of australopithecine bodily structure, function and way of life have become refined; the appraisal of the fauna, flora and climatic conditions contemporary with *Australopithecus* have imported an ecological dimension into our understanding of human evolution.

There is now abundant evidence that the hominids emerged as an upright walking, small brained offshoot of the higher primates late in the Tertiary period (which lasted from about 65 to just under two million years ago). There is far less of an anatomical gap between early hominids (as judged by *Australopithecus*) and apes than there is between today's man and the apes. The message of Taung and *Australopithecus* points powerfully to the non-human or animal origins of humankind. It presents itself to us as the veriest crystallization of the evolutionary concept as applied to man.

Above all, the available evidence signals Africa as the cradle of mankind. That great continent, nearly 25 percent of the earth's habitable surface, straddles the Equator, so that a major part of

this landmass lies within the tropics. This area has been the crucible which generated the unique mixture of biological and cultural elements that became man. Those inclined to disparage Africa and its achievements may need reminding of its supreme benefaction: Africa gave the world the first hominids and the first human culture.

This article is a somewhat abridged version of the lecture delivered by Professor Tobias at the California Academy of Sciences in San Francisco, September, 1984. ▲

In Memory

The L.S.B. Leakey Foundation deeply regrets the death of Harold J. Coolidge on February 15 at his home in Beverly, Massachusetts. One of the most eminent primatologists in the United States, he was long a member of the Foundation's Science and Grants Committee, giving generously of his time and invaluable advice. The board of directors extends heartfelt sympathy to its good friend, his wife Muffy. He will be missed and remembered.

The grant program, the major purpose of the L.S.B. Leakey Foundation under the guidance of the distinguished Science and Grants Committee, depends upon public support for its success. Every penny of your contribution dollar directly supports the grant awards.

GRANT SPOTLIGHT

Paola Villa

\$2,000 needed

THE RECOGNITION OF CANNIBALISM IN PREHISTORY

Dr. Villa will complete her research on a case of cannibalism in a Neolithic French cave. The find provides the opportunity to develop diagnostic criteria for the recognition of human butchering and probable cannibalistic behavior in archeological contexts.

STRUCTURE, FUNCTION AND SYNTAX OF GIBBON VOCALIZATION

These funds will help to finance the study of vocal behavior of male gibbons, whose song combines syllables in characteristic sequences bearing a resemblance to human speech. This research will contribute to the understanding of similarities between grammatical systems of nonhuman and human primate vocal communication.

Lawrence B. Martin \$5,265 needed

THE EVOLUTION OF ENAMEL THICKNESS IN EXTANT AND EXTINCT CATARRHINE PRIMATES

Enamel thickness has proven to be an important indicator in the study of hominoid and hominid evolution. Thickness can be determined in a systematic way only by precise cutting for imaging under scanning electron microscopes. These funds will purchase an ultra-high precision saw, polishing equipment and photographic material for use with the scanning electron microscope. The results of continuing research are expected to have a major impact on our understanding of catarrhine evolution.

Karen B. Strier \$1,262 needed

DEMOGRAPHIC STUDY OF THE MURIQUI (*Brachyteles arachnoides*)

During a follow-up study, the applicant plans to return to Brazil to collect additional demographic data on the woolly spider monkey, the Muriqui. The focus will be on births and patterns of intergroup transfer.

CORRECTION

The University of Bophuthatswana, not the University of Botswana, was a sponsor of the Taung Diamond Jubilee, as misstated in the last issue. The Taung site is near the University of Bophuthatswana.

FIELD REPORTS

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

THE PALEOLITHIC SETTLEMENT OF WALES

H. Stephen Green
National Museum of Wales,
Cardiff

Excavations directed by Dr. Stephen Green of the National Museum of Wales took place in 1984 at two sites, Pontnewydd Cave (Clwyd) and Little Hoyle Cave (Dyfed), with some limited additional investigation at the site of Cefn Cave (Clwyd). Cefn and Pontnewydd lie very close together in the Elwy Valley near St. Asaph and are best considered together. Their relevance is to the earlier Paleolithic occupation of North Wales perhaps 250,000 years ago. Little Hoyle, on the other hand, is essentially an Upper Paleolithic site of ca. 9,000 B.C. Earlier deposits were located there, too, probably stretching back some 50,000 years at least.

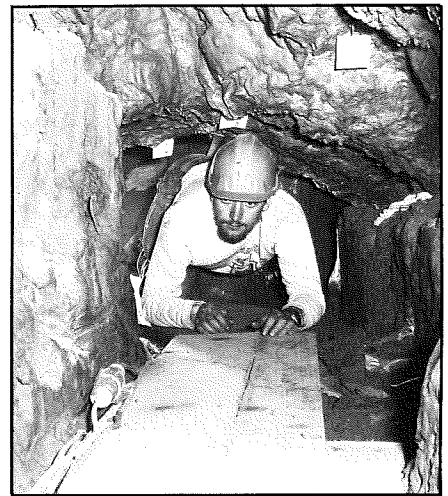
Excavations have taken place every year at Pontnewydd since 1978 and have yielded hominid finds in 1978, 1980, 1982, 1983 and 1984. The latest find is a molar tooth which came from the same unstratified context as the mandible fragment to which it is likely to belong. It is hoped that future excavation will yield more fragments of this important specimen. The most recent finds are in harmony with those of earlier seasons, with the interpretation of the artifacts as belonging to an Upper Acheulian industry.

The dating of the hominid and archaeological remains to older than 220,000 years has received additional confirmation from new determinations on stalagmite. The stratigraphy of Cefn consists of three main units dated by intercalated stalagmite floors. The middle deposit had yielded faunal remains consistent with the cave being used as a bear den. The cave has also produced a classic Ipswichian (Last Interglacial) fauna dominated by hyena but also with hippopotamus, narrow-nosed rhinoceros, lion and straight-tusked elephant.

The fauna at Little Hoyle includes reindeer, horse, lemming, collared lemming and brown bear. The relatively large stretch of platform deposits still preserved there is expected to yield *in situ* Upper Paleolithic occupation. Little Hoyle, with its interlocking archaeological, faunal, floral and dating evidence, promises to become a key site for understanding the environmental and chronological context of the later Upper

Paleolithic settlement of Britain.

Pontnewydd Cave has continued to produce important Middle Pleistocene hominid material in association with an Acheulian industry which has produced some of the earliest dates for an accomplished Levallois technique in Europe. The cave continues to be a British focus for Quaternary research and the international importance of the site is widely recognized. Continuing excavation in the cave is opening up the site for increasingly extensive and potentially fruitful excavation.



Dennis Donovan engaged in the tunneling operation to find the new entrance at Pontnewydd Cave.

THE PLEISTOCENE ISLAND HUMANS OF SARDINIA

Paul Y. Sondaar
Rijksuniversiteit Utrecht,
Netherlands

The islands of the Mediterranean are known for their peculiar Pleistocene mammalian faunas, including dwarf elephants, hippos and ruminants. For a long time these dwarfs were thought to be the result of a degeneration process in small populations, and considered as a paleontological curiosity rather than as the result of functional adaptation to the typical island environment — new ecological niches which, on the mainland, are occupied by other animals and which are absent of large predators. During the past two decades, extensive fieldwork and research resulted in a



Corbeddu, who lived for twenty years in the Sardinian cave during the 19th century.

better understanding of these faunas, and models have been developed explaining the evolutionary patterns which show similarities on islands all over the world. These include a tendency toward a decrease in size and toward a so-called "low gear locomotion" (relative shortening of especially the lower part of the leg).

However, the Pleistocene fauna from Sardinia is a clear exception to this general rule. Without any doubt, it can be classified as an island fauna: It contains endemic taxa and it shows a very low diversity (the cervid *Megaceros cazioti*, a small canid, and the ochtonid *Prolagus sardus*). In contrast to other island faunas, the deer of Sardinia is not small and its proportions (especially of the legs) resemble those of mainland Cervidae.

In order to investigate this anomaly of the usual pattern on other islands, excavations were carried out in 1983 and 1984 in Corbeddu Cave near Oliena, central Sardinia, in collaboration with the Archeological Survey of Sardinia and with financial support from the Leakey Foundation. Pits were dug in three different halls of the cave. In all three, the Pleistocene sediments containing the island fauna are covered by a layer which is different in color, with Neolithic pottery fragments and remains of domesticated mammals. However, the composition of the Pleistocene fossil assemblages appeared to be quite different in the three pits. A trench made near the entrance of the cave produced, besides a large quantity of rodent material and cervid remains, bones of a large bird of prey. Remarkable, and until now unexplained, is the fact that 70 percent of all 111 fossils from this

dig site are phalanges: 50 percent phalanges of the endemic deer and 20 percent of the bird.

Mainly complete endemic deer bones were found in the pit dug in the second hall. Their position in relation to each other was quite unusual and the bones show various kinds of marks, such as grooves, cuts, scratches and polished parts. In the same Pleistocene sediments of the second hall, a concentration of lower jaws was also discovered. The tops of the molar cusps in the jaws are damaged and broken. Bone scrap and enamel are present in between the cusps. Phalanges of deer are underrepresented.

The excavation in Hall 3 produced mainly fragmentary bones of the endemic deer and an overrepresentation of phalanges. A large quantity of rodent remains was also found, of which some bones showed the marks of burning.

The 1983 discovery of a human temporal bone put an end to any doubts that humans were present in the Pleistocene in Sardinia as part of the endemic island fauna. This does not fit in with the general idea that humans moved relatively late into the Mediterranean islands. It is generally thought that Cyprus, Crete and Sardinia were colonized only about 8000 years ago by Neolithic man.

The unusual distribution of the bones in the sediment on Sardinia and their relative position and orientation cannot be explained by natural causes. The same is true of the marks on the fossil bones of the endemic deer which strongly suggest that humans worked on these bones. A preliminary Carbon 14 date of $13,590 \pm 140$ B.P. has been obtained from a fossil deer bone.

When comparing the endemic deer of Crete and Karpatnos with the Sardinian

material, it becomes clear that the fossils from the Greek islands do not show artificial marks nor were they found in unusual positions and concentration in cave sediments.

Who the humans who lived in the young Pleistocene island environment of Sardinia were is not yet solved. More material is needed in order to arrive at more definite conclusions. However, a long human occupation there during the second half of the Pleistocene cannot be excluded. During the beginning of the middle part of the Pleistocene, a major shift in faunal composition took place on the island and it is not unthinkable that this was caused by the arrival of humans. Pleistocene Sardinia could apparently have supported a human population. Probably the presence of *Prolagus sardus* was a crucial factor, since this ochtonid may have served as the main food supply. The animals were large enough to feed upon and their high reproduction rate prevented overkill and reduction of population. Animals which meet these qualifications were not present in the faunas of other Mediterranean islands during the Pleistocene and therefore these islands could not support a population of Paleolithic humans.

As a result of their peculiar environment and isolation, the Pleistocene humans of Sardinia probably had completely different cultural habits and needs from their fellow men on the mainland. Their culture might look bizarre to a student acquainted with the Paleolithic remains from the mainland, but if studied in the context of the local environment, one can see that it was very well adapted.

The material collected in 1983 and 1984 is now stored in Utrecht and the study of it is in progress. ▲



Paul Sondaar.

New Mexico, provides new insights of the Neanderthals. In his book, *The Mousterian Legacy: Human Bioculture Changes in the Upper Pleistocene*, Dr. Trinkaus observes that the Neanderthals were robust individuals who would stand out on any modern beach. He also writes that pelvic measurements indicate that the gestation period for Neanderthals may have been as long as 12 to 13 months.

These and many more reports and insights continue to come to the Foundation offices, reflecting the worldwide search to understand human origins and behavior. It is an exciting time to be part of the Foundation.

Larry



Larry Barker and Ned Munger.

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CALENDAR

LECTURES

JANE GOODALL

APRIL 16

ALLEN O'BRIEN MEMORIAL
LECTURE, BECKMAN AUDI-
TORIUM, CALTECH, PASADENA,
8 P.M.

APRIL 17

FOR THE LOS ANGELES ZOO,
WILSHIRE EBELL THEATER,
LOS ANGELES, 7:30 P.M.

APRIL 21

UNIVERSITY OF ARIZONA,
TUCSON, 2 P.M.

APRIL 29

WEBSTER UNIVERSITY,
ST. LOUIS, MISSOURI, 8:30 P.M.

MAY 7

AGNES SCOTT COLLEGE,
DECATUR, GEORGIA, 8:15 P.M.

ROGER FOUTS

APRIL 22

COE COLLEGE, CEDAR RAPIDS,
IOWA, 7:30 P.M.

APRIL 23

COE COLLEGE, CEDAR RAPIDS,
IOWA, 11 A.M.

LIONEL TIGER

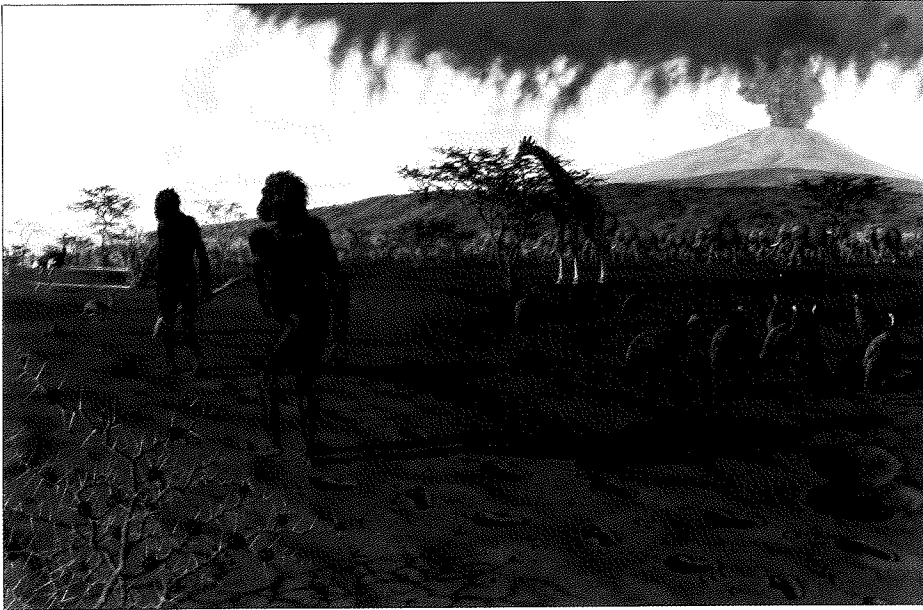
MAY 3

MORRIS MUSEUM OF ARTS
AND SCIENCES, MORRISTOWN,
NEW JERSEY, 8 P.M.

GALA DINNER

NOVEMBER 21

IN HONOR OF FLEUR COWLES,
BEVERLY WILSHIRE HOTEL,
WEST LOS ANGELES



Painting by Jay Matternes - National Geographic Society.

ASH WALK

The Leakey team uncovered two sets of near-human footprints in petrified volcanic ash more than three and a half million years old. They were so clear they could have been made yesterday . . .

She reaches the plain at dawn,
hoists her daughter to her hip;
her mate stalks on ahead.
Old Hill is sick again—
he cracks and spits,
his breath darkens the sky.
The child clings
to her and squalls.
Her feet blacken

with each step,
her old thorn wound stings.

The brush trembles. She halts,
stifles her child's cry.
Big-tooth crawls out
and springs—
a long-neck rears, tumbles,
bleeding like Old Hill.
Her grip slackens,
no danger now—
the cat will feed all day.

. . . The tracks show the smaller
hominid paused, looked sharply to
the left, and then walked on.

by Catherine A. Callaghan

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