



NUMBER 17

SUMMER 1980

LUCY GOES HOME

by Dr. Donald C. Johanson

Curator of Physical Anthropology, Director of Scientific Research, the Cleveland Museum of Natural History

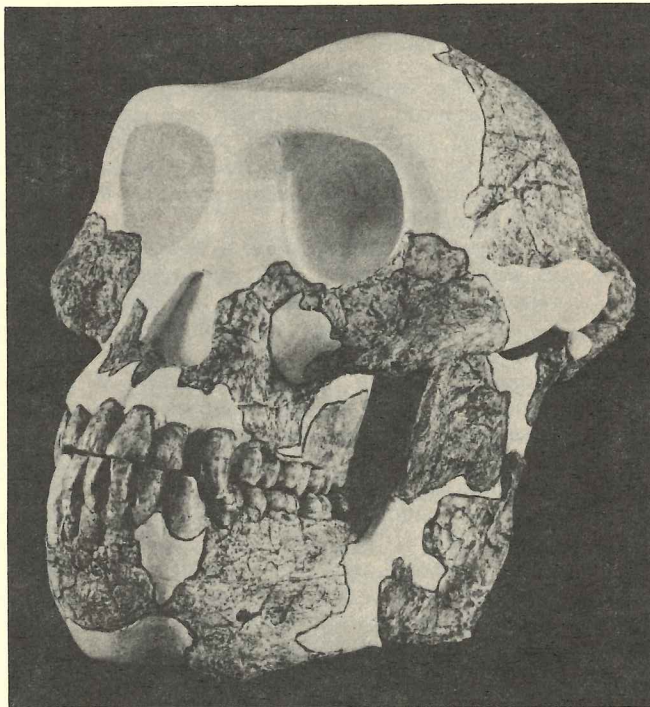
It was late one afternoon last January when Maurice Taieb, other members of a mini-expedition, and I came upon the Hadar camp site. We stopped short of the actual camp and as we walked towards the Awash River we spotted some signs of the camp we left three years ago. A special sense of euphoria came over us, a kind of victory which reinforced the hopes we had during the three years that it would again be possible to reopen explorations in Hadar. The landscape was comfortably familiar and as we sat in camp, listening to the Awash River rushing below us, we all felt as if we had never been away from Hadar, the home of Lucy and the First Family.

The three year hiatus had been necessary because the scientists involved in the Afar research project needed time to undertake laboratory analysis of the information gathered between 1972 and 1977 at the site of Hadar, now recognized as one of the most important of all Rift Valley early hominid localities. The geologists were busy in their laboratories studying the Hadar stratigraphy, the depositional environments, refining the age of the deposits and encountering questions which could only be answered with additional fieldwork. Tim White, Owen Lovejoy, some others and I had been engrossed in unravelling the mysteries of the hominid fossils themselves. Prolonged and extensive description

and comparison of the Hadar and Laetoli hominid collections convinced us that these three to four million year old fossils represented a new species called *Australopithecus afarensis*. However, more importantly, this species permitted Tim and me to present, in an article published in *Science*, a revised interpretation of early hominid evolution which placed the "Afar Ape-Man" as a common ancestor for later

hominids. On one hand, it was an ancestor to the *Homo* line which led to *Homo habilis*, then into *Homo erectus* and ultimately to *Homo sapiens*, modern man. On the other hand, we recognized that the "South African Ape-Man" (*A. africanus*) was already on a side branch and served as an ancestor to robust australopithecines like *Zinjanthropus*, which became extinct about a million years ago. The naming of the new species and the presentation of a new evolutionary tree has challenged many long-held views about early hominid evolution and has provoked considerable controversy. Nevertheless, our interpretation has received fairly wide acceptance as the most plausible rendering of the current storehouse of fossil hominids.

With such remarkable findings behind us and with many exciting new questions which could only be answered by additional fieldwork, Taieb and I decided to undertake the organization of renewed investigations in the Afar region of Ethiopia. Our close colleague Desmond Clark had expressed interest in the Middle Awash sites which had yielded the exciting Bodo skull and where numerous and extensive Acheulean butchery sites had been found. Tim and I were irresistibly drawn to the Miocene sites in the western Afar which predated Hadar by two to three million years and which we felt



A member of the First Family — *Australopithecus afarensis* skull reconstruction by Dr. Timothy White.

continued on page 12

the L.S.B. leakey foundation

The L.S.B. Leakey Foundation was established in 1968 by a group of eminent scientists and informed laymen who recognized a critical need to strengthen financial support for new multi-disciplined research into man's origins, his evolving nature and his 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 mankind.

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

The training and education of students in these fields.

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

OFFICERS OF THE BOARD

Edwin S. Munger, *President*
Robert M. Beck, *Vice President*
Gordon P. Getty, *Vice President*
Mrs. Arnold Travis, *Vice President*
Mrs. Barbara Newsom Pelosi, *Secretary*
Coleman Morton, *Treasurer*

BOARD OF TRUSTEES

Lawrence Barker, Jr., *Chairman*
Mrs. R. Hugh Caldwell, Jr.
Mrs. John B. Callery
Miss Fleur Cowles
Mrs. Justin W. Dart
Mrs. Robert Donner
Paul T. Guinn
Ed N. Harrison
Hubert R. Hudson
Mrs. Max K. Jamison
George D. Jagels
Royal Little
Mrs. Richard Muir
Mason Phelps
Mrs. Elmer Schlesinger
Mrs. George M. Seignious II
Jeffrey R. Short, Jr.
Leighton A. Wilkie
Mrs. Frank M. Woods

SCIENCE AND GRANTS COMMITTEE

Dr. F. Clark Howell, *Chairman*
Dr. Bernard Campbell
Harold J. Coolidge
Dr. Irvén DeVore
Dr. Ekpo Eyo
Dr. Murray Gell-Mann
Dr. Jane Goodall
David A. Hamburg, M.D.
Paul MacLean, M.D.
Dr. A. S. Msangi
Dr. Edwin S. Munger
Dr. Richard S. Musangi
Dr. Boniface I. Obichere
Dr. Melvin M. Payne
Dr. Frederick Seitz
Phillip V. Tobias, M.D., Ph.D., D.Sc.
Dr. Sherwood L. Washburn
Dr. Bogodar Winid

Mrs. Mary Pechanec, *Executive Director*

The L.S.B. Leakey Foundation is a public foundation. All contributions are tax-deductible as provided by law.

the L.S.B. leakey foundation news

Editor Elizabeth P. Brady
Associate Editor Elizabeth Waldron
Production Jan Slater

The L.S.B. LEAKEY FOUNDATION NEWS is published by the Foundation as a service to its members. Single copy price, \$1. L.S.B. Leakey Foundation, Foundation Center, 13-83, Pasadena, CA 91125. Copyright 1980, L.S.B. Leakey Foundation.

PRESIDENT'S MEMO

One Sunday when a family returned from worship, the father criticized the sermon, the daughter thought the choir sang atrociously, and the mother found fault with the organist's playing. But discussion ended when the little boy of the family piped up: "I thought it was better than most television and a good show for 50 cents."

We often make the point that the Leakey Foundation does not charge a penny of overhead on grants — not even 50 cents. While our grants are usually modest, they are often crucial. Dr. Don Johanson made this point recently to Fellows and members in Southern California when he narrated his magnificent film on his finding of "Lucy" and the parts of thirteen hominid skeletons in the Hadar region of Ethiopia. The film will be properly titled and shown on national television this fall while Don is leading another expedition to Ethiopia, backed in part by the Leakey Foundation.

When some of the magnificent finds were brought into the camp of the Franco-American expedition, there was such exhilaration and a shower of happy expletives on camera that some of the latter had to be edited out of the English version — the French perhaps assumed that they would not be understood in the French version.

But these peak moments mean little if there is not painstaking follow-up — a point Don emphasized in thanking the Leakey Foundation for supporting his laboratory work.

We have such a broad menu of needs that even a year in which we exceeded our previous grant totals by 39% did not allow us to fund many projects designated as worthy and valuable by our Science and Grants Committee, although we are grateful for the latest anonymous grant of \$19,000 to support exciting and promising excavations currently underway at the Acheulean site at Ambrona, Spain.

Our overworked staff of Mary Pechanec, Margaret Grayson and Gail Chase toils in two small offices, for which we are now paying one dollar a day for rent, air conditioning and light. No one could say that we have an edifice complex. But we do need all the 50 cents and \$5,000 contributions that our supporters are generous enough to make and again, all the contributions go to grants.

Ned Munger

LECTURES

long-term study of the Pokot tribes of Kenya.

Noted author and zoologist, Gerald Durrell, will open the Caltech lecture series in Beckman Auditorium.

By popular demand, Dr. Roger Payne, renowned whale expert, will return to Southern California to discuss the behavior and endangered status of these behemoths of the sea. A new dimension will be added to marine ecology and to our knowledge of early man and the sea by famed explorer Thor Heyerdahl.

Other featured speakers, whose topics have not yet been announced, include Bernard Campbell, Geoffrey Maloiy and James Sackett.

Cosponsors for the Leakey lectures include the California Institute of Technology, the California Academy of Sciences, Los Angeles County Museum of Natural History, the Orange County Natural History Foundation, the University of California campuses at Los Angeles, Santa Barbara, San Diego and Irvine; the School of American Research, the Philadelphia Academy of Natural Sciences, the American Museum of Natural History, Sweet Briar College, the Seattle Zoological Society, the New York Zoological Society, California State University at San Jose, and Pasadena City College. □

A lively season of Leakey lectures is being arranged by Foundation vice president and lecture chairman Joan Travis, who notes that a complete lecture calendar will be mailed to all Leakey members in early September.

Topics for 1980/81 cover a wide range of subjects, including early man research reports from major field sites at Laetoli, Tanzania, by Dr. Mary Leakey and from the Hadar, Ethiopia, by Dr. Donald Johanson, famed for his discovery of "Lucy". Dr. Clark Howell, chairman of the Foundation's Science and Grants Committee, will report on the reopening of the Ambrona site in Spain.

Primate studies will be covered by the "Great Ape" trio, Drs. Jane Goodall, Biruté Galdikas, and Dian Fossey — all early protégées of Louis Leakey — and by Drs. Shirley Strum and Roger Fouts.

Cultural anthropology will be represented by Tepilit Ole Saitoti, whose magnificent view of the Maasai people will be an October Book-of-the-Month Club selection, and by Elizabeth Meyerhoff, noted for her

MIOCENE ANCESTRY

by Dr. Russell L. Ciochon

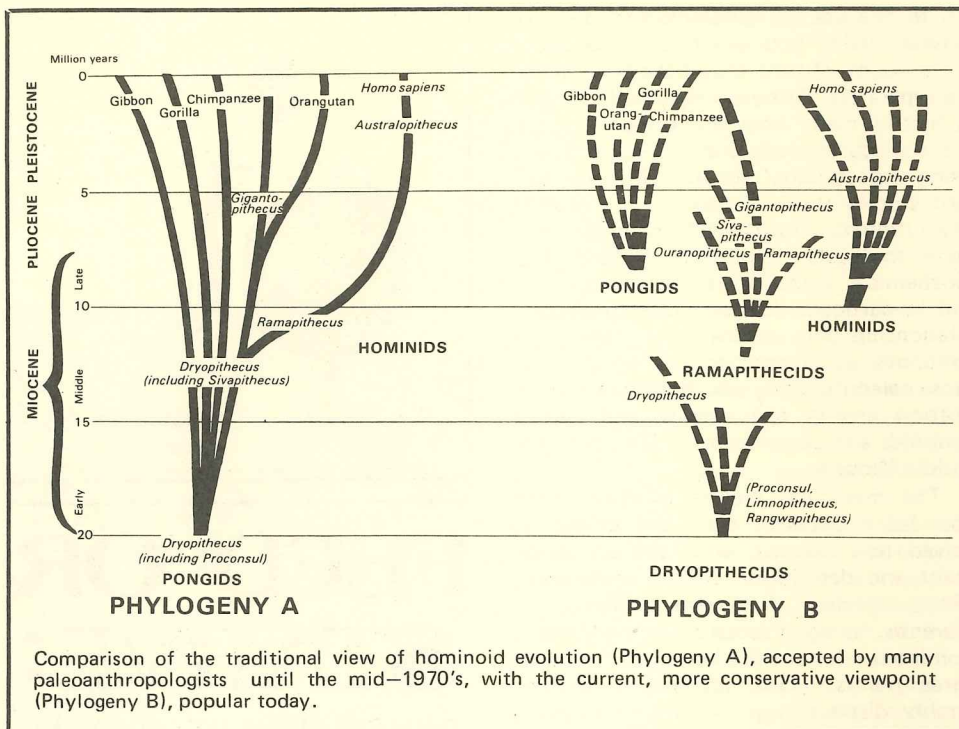
Department of Anthropology,
University of North Carolina, Charlotte

On July 2-4, 1980, the Leakey Foundation sponsored an international symposium entitled "Miocene Hominoids and New Interpretations of Ape and Human Ancestry" in Florence, Italy, in conjunction with the VIII Congress of the International Primatological Society. Its aim was to promote discussion and debate on the time and place of the hominid-pongid (human-ape) divergence in the context of the most recent fossil discoveries and other new sources of phylogenetic information. Professor Ciochon here discusses some recent discoveries and interpretations of Miocene hominoids that provided the impetus for this symposium, of which he was co-chairman.

There is no more compelling issue in anthropology than the origin of the hominid lineage. This particular ethnocentric emphasis began with the inception of the age of Darwin and evolutionary reasoning. Subsequently, fossil discoveries and advances in comparative morphology have largely narrowed the search for man's progenitors to the dryopithecines and related hominoids common in the Miocene period. It is widely, though not universally, believed that study of this group will yield better understanding of the nature of the last common ancestor of apes and man.

A great number of new fossil hominoid primate specimens have been discovered in recent years, expanding the number of different anatomical areas previously known, and the geographic range of these primates. The first dryopithecine specimen, *Dryopithecus fontani*, was discovered 124 years ago in France. It has subsequently become clear that there are major systematic subdivisions within the dryopithecines. The African apes of the Early and Middle Miocene, such as *Proconsul*, *Limnopithecus* and *Rangwapithecus*, all belong to one group and are clearly different from the African hominoid species, *Ramapithecus wickeri*. Similarly, the Asian apes of the Middle Miocene can be grouped together to include *Sivapithecus*, *Ramapithecus* and *Gigantopithecus*. Some of these Asian species are also known from Europe, and it is quite possible that the type species of *Dryopithecus* from France and Germany and a smaller species known from Spain may one day be classified in the same group as these Asian apes.

Most of the recent discoveries of Eurasian dryopithecines, such as those made by David Pilbeam in the Siwalik Hills of Pakistan and by K. N. Prasad in the Indian Siwaliks, can probably be assigned to known species of *Sivapithecus*. The enigmatic giant primate *Gigantopithecus*



has also been represented in the new collections from India and Pakistan. While early theories that this creature represents a hominid are now largely discredited, it continues to inspire great interest.

The recent developments which have inspired more interest than all these others are those concerned with the putative basal hominid, *Ramapithecus*. The sample of specimens of this genus has rapidly expanded since 1962. There are just two established species, *R. wickeri* from the Middle Miocene of Africa and Turkey, and *R. Punjabicus* from the Middle to Late Miocene of Eurasia. The Turkish material is considered by some to be the earliest and most primitive *Ramapithecus*, barely distinguishable from *Sivapithecus*. The Turkish Candir mandible is of great importance because it represents the first evidence of lower jaw shape in *Ramapithecus* that did not result from extensive reconstruction efforts. It exhibits nearly parallel tooth rows (U-shaped) which differ greatly from the parabolic (rounded) shape characteristic of humans and reconstructed *Ramapithecus* jaws. Ramapithecine mandibles from Pakistan recently recovered by David Pilbeam actually appear more V-shaped than U-shaped. Other hominid-like traits of *Ramapithecus* affirmed by new discoveries include the robust and thickened mandible, buttressed symphysis, short face, and flat-wearing postcanine teeth with thick enamel. Altogether, the new material has not served to clarify the controversial affinities of *Ramapithecus* but rather has heightened disagreement. The consensus position of the late 1960's that it was the basal hominid, ancestral to australopithecines, has diminished.

Today the past events leading up to the evolution of humans and apes are thought to be quite complex, and we are now only beginning to understand the relationships

between the hominoids of the Miocene and those living today. A rapidly increasing source of data which has helped bring about a reconceptualization involves the functional analysis of the postcranial skeleton of Miocene hominoids. It has been argued that the major hominoid specialization lies not in the teeth or diet at all but in postcranial adaptations to a "brachiating" or terminal branch hanging-and-feeding specialization that was central to diversification of extant large apes from generalized predecessors. According to this interpretation, Miocene hominoids were considered merely "dental apes." However, new material assigned to *Sivapithecus* from Pakistan and Hungary indicates that these earlier interpretations (based only on material representing *Proconsul*) may be incorrect. Detection of the beginning of increases in wrist, elbow and shoulder mobility in *Sivapithecus* postcrania is of central importance to theories about the emergence of hominoids that could be ancestral to the extant great apes.

Ecological and paleogeographical considerations are also increasing in importance for interpretation of Miocene hominoid evolution. Of interest are possible interpretations of niche specialization among the continental groups of dryopithecines, the latest time at which intercontinental migration could have occurred of forest-specialized hominoids across the spreading grasslands of the Late Miocene and Pliocene, and possible dietary specialization of individual species based on dental features of occlusal significance.

No aspect of anthropological study directed toward the evolutionary relationships of Miocene hominoids has raised more controversies than the "molecular clock." This concept is based on the hypothetical constancy of neutral mutation rates in primate macromolecules, lead-

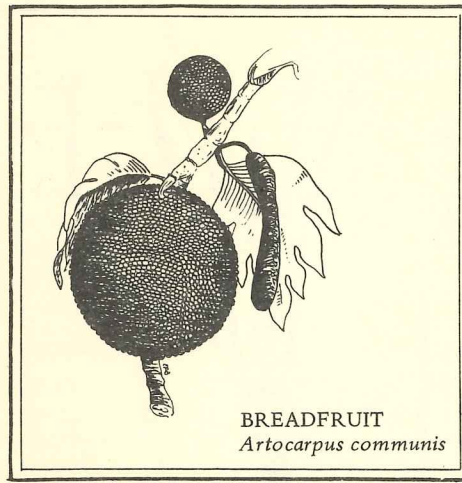
ing to the use of immunological distance between living taxa as a direct measure of the amount of time they have been evolving separately. Although vigorously refuted at first by many hominoid paleontologists, the molecular clock has gained a slowly rising respectability recently. However, current studies show evidence for a modest "evolutionary slowdown" in higher primate molecular evolution. Nevertheless, biochemical evidence remains important, and in particular the very close molecular relationship between man and chimpanzee continues to strengthen the position of those paleontologists who hold that diversification among ape species, and among hominids and apes, occurred later than the Middle Miocene.

The molecular picture of close correspondence between man and chimp received new impetus with the announcement and description of the geologically oldest species of *Australopithecus*, *A. afarensis*. Its significance regarding Miocene hominoid relationships lies in the following three points: (1) *A. afarensis* is demonstrably distinct from *A. africanus*, and is likely the common ancestor of both that species (plus its later descendants, the robust australopithecines) and of the lineage leading to genus *Homo*; (2) *A. afarensis* is the oldest demonstrable hominid; (3) the dental, facial and temporal (but not postcranial) morphology of the species is perhaps more chimp-like than *Dryopithecus*-like, leading Don Johanson and Tim White to briefly question its descent from *Ramapithecus*. Detailed analysis of the morphological affinities of *A. afarensis* then may be seen as crucial to the question of the ancestry of hominids, especially by comparison with the newly recovered Miocene hominoid specimens and new studies on extant hominoids. □

LEAKEY FOUNDATION 1980 ANNUAL MEETING

Trustees of the L. S. B. Leakey Foundation will hold their Annual Meeting September 17 – 24 in England. Formal sessions of the Science and Grants Committee and Lay Trustees will take place at Ditchley Park, Oxford. Trustees of the European Chapter, Leakey Foundation, will meet with U. S. Trustees during their visit to St. John's College, Cambridge. Phyllis Lee, recipient of the Leakey Foundation's St. John's Studentship, will report on the progress of her Amboseli research.

Following the Annual Meeting, some Trustees and friends will travel to southern France for a guided tour of prehistoric cave sites. Included in the itinerary will be visits to Pech Merle, Lascaux, Marsoulas and Niaux. □



BREADFRUIT
Artocarpus communis

FEED OR STARVE:

RENEWABLE RESOURCES FOR MAN'S SURVIVAL

On February 14, 1980, Dr. Colin L. A. Leakey, the eldest son of L. S. B. Leakey, gave the annual Leakey Memorial Lecture in London. His topic was an unusual one for the Leakey Trust and Foundation, but by no means far from the interests of Louis Leakey. The following is a brief precis of the lecture.

While best known in scientific circles for his archeology, anthropology and the promotion of primate studies, Louis Leakey was also passionately interested in the survival of man. His time scale was a broad one and his vision and interest extended perhaps as far forward as backward.

Previous memorial lectures of this series have concentrated on the past or on primate behavior, but this one is concerned with the survival of man. When Louis published *Kenya: Contrasts and Problems* in 1934, he presented an appreciation and understanding of the food and agricultural systems of the Kikuyu which explained why peasant farmers in a country such as Kenya were unwilling to accept uncritically advice given to them by professional agriculturalists, trained in temperate countries, who lacked the background and knowledge to understand the nature of the system they were hoping to improve. Louis's pioneering views were a new approach to agricultural production now shared by many people, and sometimes referred to as chemurgy. The basis is that it may be most helpful to find out what plants or animals are really productive under natural conditions when left to themselves, and then find ways to use these for food, fiber or fuel through appropriate methods of processing.

One chemurgic approach to agriculture lies in the conversion of "weeds" into food. Both aquatic weeds, such as the

water hyacinth and the alligator weed, and dry land weeds, such as the amaranths (including the notorious pig-weed of North America), can be converted into useful animal feed. While large quantities of green leaves are already used as vegetables by man and as fresh forage by livestock, there are limits to how much can be consumed in this form by man, and sometimes there are insurmountable complications in having large numbers of ruminant animals in the ecological situations where green leafy materials can be produced most effectively. In such circumstances there may be a strong case for converting the green leafy materials, through forage fractionation, into a more fibrous material, suitable for ruminants, which can be ensiled or dried, and a high protein, low fiber fraction which can be used for non-ruminant nutrition. Such material is known generally as leaf-protein.

Two orders of plants are of particular interest. One of these is the *Centrospermae*, important because of their C4 photosynthesis which makes them efficient converters of solar energy under erratic water supply, and also because of their lack of anthocyanin pigment and hence lack of tannins which tend to make protein difficult to extract or indigestible. The other order is the *Leguminales*, a source of many important tropical forage crops and fodders, both herbs and trees, in which the capacity to form nodules in symbiosis with *Rhizobium* bacteria makes this order of plants able to use the nitrogen of the air as a principal nitrogen fertilizer source.

The traditional separation and frequent antagonism between agriculture and forestry is beginning to dissolve. Today there is a rapidly increasing interest in tree food crops, since it seems that under conditions of scarcer energy for cultivation and harvesting, several neglected tree foods may be capable of giving as high a quantity of food from the same resources as the traditional staple annual crops such as maize. After its introduction to the Caribbean in 1792, the breadfruit received a certain amount of careful attention for about twenty years, after which it was effectively forgotten about by agriculturists. It was recently recognized in a food and nutrition study as providing one of the cheapest sources of food which could be produced in Barbados. Many leguminous trees producing edible pods and seeds were important foods in Biblical times and continue to be important in many societies today. The old idea that there was a sharp revolution between hunting and gathering on one hand and agriculture on the other is now considered to be an oversimplification of reality. The trend in developed countries back towards the concept of "food for free" (the collecting of wild plants for consumption) represents a convergence with the increased interest being attached to uncultivated food plants in the developing world.

By Colin L. A. Leakey

REPORTS FROM THE FIELD

ARCHEOLOGICAL STUDIES AT LAETOLI, NORTHERN TANZANIA

Dr. J. W. K. Harris,
Division of Archeology,
TILLMIAP, Nairobi, Kenya

In this initial study of the archeology of Laetoli during September and October, 1979, a survey and one excavation were undertaken with support from the L. S. B. Leakey Foundation.

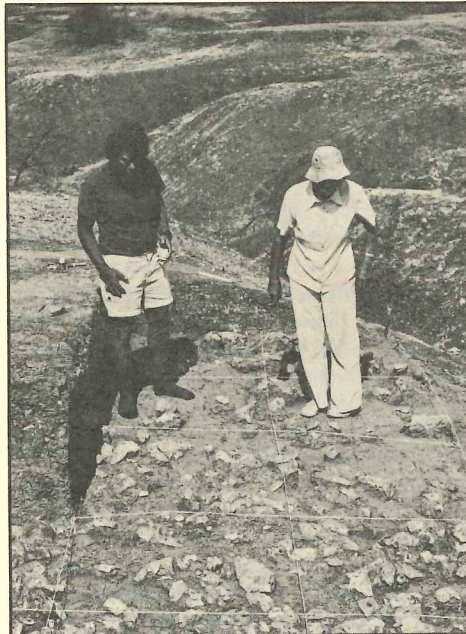
Laetoli is situated at the northern margin of the Eyasie Plateau, thirty to forty kilometers to the southwest of Olduvai Gorge. Here a long sequence of volcanic, aeolian and sedimentary deposits of Pliocene and Pleistocene age are exposed discontinuously over an area of some thirty kilometers in the divide between the Olduvai and the Eyasie drainage systems. In recent years, this area has become well known for the recovery of a wide range of fossil fauna, including well preserved early hominid remains, as well as evidence of their footprints, from the field investigations of Dr. Mary Leakey and her co-workers.

During the first half of our five week field season last year the time was divided between the survey of exposures throughout the geological sequence and the excavation of an archeological occurrence in locality 23 (sivatherium and artifact site). In the remainder of the season our energies were devoted entirely to this excavation and to the study of the stratigraphy, the collecting of soil samples, etc., around the local environs.

The stratigraphy of the beds at Laetoli is complex. The basal beds, the Ndolanya, form a discrete unit and particularly the fossiliferous upper section is recognizable by distinctive marker tuffs found throughout the area. Potassium-argon age determinations on samples from these horizons provide dates between 3.59 and 3.77 million years ago.

The Naibadad and Olpiro beds discomformably overlie the Ndolanya beds. These are thought to be equivalent in age to Bed I and Bed II at Olduvai Gorge, respectively, but unfortunately these deposits only occur as small discrete patches at a few localities.

The uppermost stratigraphic unit is called the Ngaloba beds and consists of more recent deposits which are probably Upper Pleistocene age.



J. W. K. Harris and M. D. Leakey at Laetoli.

One of the most important features to remember about any aspect of paleo-anthropological studies at Laetoli is the geographical setting of the evidence. So far, it is one of the few localities to be studied at high altitude on the plateau along the flanks of the Rift Valley. Not only is the topographical setting different but the paleogeography and presumably the ecology varies in comparison to conditions found around the shores of paleo-lakes such as Olduvai, Koobi Fora, and Hadar, for example. A basic question we need to address, therefore, is in what ways might the paleoenvironmental circumstances, in their broadest sense, affect the habits of early hominids in their adaptations to the Laetoli terrain.

Studies of the Laetoli beds indicate movement of hominids across a flat featureless landscape where perhaps permanent sources of water were lacking. No artifacts or archeological occurrences so far can be demonstrated to belong to this time period (3.6–3.8 M.Y.) This feature, which is negative evidence, has led Mary Leakey to believe that simple stone tool manufacture and use may have been beyond the capabilities of small brained but fully bipedal early hominids or that their tools or weapons were of a perishable nature at this time. One cannot overlook several features which may explain the lack of archeological evidence: the paucity of a locally available source of raw material –

volcanic rocks – for stone tool manufacture and unfavorable conditions for occupation however brief, because of the unavailability of permanent sources of water. Further studies need to be undertaken in an attempt to answer some of these questions or to provide additional information.

Lack of clarity in dating cannot be a factor in underestimating the importance of the Naibadad and Olpiro beds. Few sites have been reported from plateau localities in the Middle Pleistocene ranges of time. The well preserved fauna in association with stone artifacts, the single archeological horizon and clear lateral boundaries, are important features. Some of these features will provide insights into the dietary behavior, meat processing activities and tool use of early hominids.

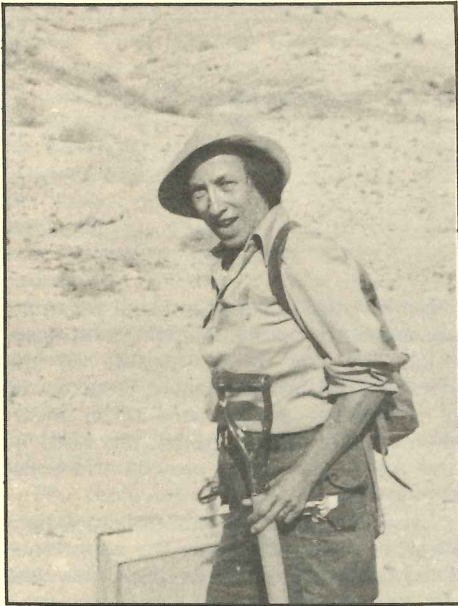
ANTHRACOTHERE HILL PROJECT ISRAEL

Dr. Naomi F. Goldsmith,
Fellow of Life Science Institute,
Hebrew University of Jerusalem

Six months after receiving a Leakey Foundation grant is a good time to sum up the work at Anthracothere Hill, a Middle Miocene bone and tooth mine near Dimona, Israel. With volunteers Eve, Rosi, John and Ilana we logged twenty-seven field trips.

The primary payoff was the recovery of a lateral incisor, beautifully polished, sparkling in the sieve box. Primate! It was the tooth of a baboon-like creature or dryopithecine ape, the first ever found in the eastern end of the Mediterranean. The nearest neighbors are *Aegyptopithecus* of the Egyptian Fayum of perhaps 28 million years ago and various *Proconsul* dryopithecines of East Africa of 12.5 to 23 million years.

From fossils and rock formations we judge that the tooth is about 14 M.Y. Remains of the horse *Hipparion* have not been found but older, conservative mammal types like the early elephant, *Gomphotherium*, are recovered, so that the tooth must be older than 12.5 M.Y. Furthermore, sediments surrounding the Great Tooth were deposited before the local oil shales burned up, about 13.6 M.Y. On the other hand, the Anthracothere Hill deposits appear to resemble those from Gebel Zelten in Libya and Moghara in Egypt but are unlikely to be in the 15 to



Naomi Goldsmith with: Israeli hat, Colorado bag, Canadian shirt, British shovel, Greek army pants and lucky Schevenigen scarf. Digging platform northwest of the hat.

20 M.Y. age bracket. The reason for this is that the Arabian Peninsula began to separate from Africa 25 to 30 M.Y. and the break or strait was complete along what is now the Suez Canal 20 M.Y. At its maximum the Suez Strait was fifty kilometers or thirty miles wide, too far for a small ape to swim.

Whether a strong current boiled through the Strait and prevented rafting of animals from Egypt to Sinai, or whether tectonic upheavals 18–19 M.Y. prevented land passage to the tip of Sinai, we can only speculate. What is sure, and nice to think about in this season after official reopening of Egypt–Israel relations, is that 14.5 M.Y. the Strait closed and the land route was once again established. And our primate probably migrated along the Mediterranean shoreline.

Could a small ape have made it to Dimona through the back door, so to speak? That is, there were two alternative routes, a middle land route through the Sinai and a southern land route — Kenya, Ethiopia, across the southern still-closed end of the Red Sea to the east coast of Arabia, then due west to Dimona. Was a middle or southern route possible? We say probably not, because mountains in Sinai and Jordan were then four kilometers or 13,000 feet high, presenting a triple physiological barrier. It was not the cold alone that made the route unlikely, for Japanese macaques are furred and insulated against cold and snow and *Rhinopithecus* may live in snow half the year. But the second barrier, altitude, would have eliminated all except the largest primates. While man and *Gorilla gorilla* with their large barrel chests can survive at 13,000 feet, it is unlikely that an unadapted smaller primate could do so.

The third physiological barrier is familiar to anyone living near the Sierra

Nevada Mountains: the rain shadow. Clouds of moisture blow in from the Pacific Ocean, are chilled by the Sierras and dump their rain on the California side. The Nevada side is desert. Even in such a climate the amazing primates have partially adapted, for Walker reports that the Patas monkey has been sighted in the semi-arid zone of Ethiopia far from water. So we think that the small ape could have only come along a shoreline route but all the evidence may not be in.

Great Tooth Day was followed by More Teeth Days — I found eleven teeth of crocodiles and mammals. But as in any gambling enterprise, not every day is pay day. Sometimes you get out there early and start to dig and the sun is hot, the wind dies, the flies are biting and — your trays are empty. *Shoom davat*. Nothing at all.

Those interested in a paleontological view of Israel should write to Dr. Goldsmith, c/o the Leakey Foundation, for details. One week field trips and digs are planned for October 5–10, 1980, and April 5–10, 1981. The cost, once you get to Israel, is about \$250.

PYGMY CHIMPANZEE LOCOMOTOR BEHAVIOR

*Evelyn Ono Vineberg,
Department of Anthropology,
University of California, Los Angeles*

Within the family of primates most closely related to man, the *Pongidae*, the species about which the least is known is the pygmy chimpanzee (*Pan paniscus*). To date, there have been very few successful attempts to observe these creatures in their natural habitat. By far the most successful and fruitful of such investigations have been conducted by Japanese researchers. Unfortunately, little of their long-term research has been published in English.

For three months in the fall of 1979, I joined a pair of Japanese researchers in observing the pygmy chimpanzees at Wamba in the Tshuapa-Equateur region of Zaire. Since leopards are extinct in the area and there is a well-observed taboo against killing pygmy chimpanzees, their population density is high at Wamba.

About 100 hours of observations were made during the study period. Information was recorded diary fashion, with still photographs supplementing the descriptions. An ethogram of locomotor and postural behaviors was also made. Locomotor behaviors were sampled for sex and age class differences and attention was given to width of branch supports and the orientation of supports traveled on.

Several factors affect the travel and foraging patterns of the pygmy chimpanzees. Their body structure allows them to

perform a wide range of movements, including quadrupedal and bipedal locomotion, brachiation, leaping, and vertical climbing. The presence of several handicapped individuals provided an unexpected experimental situation. Several adult individuals were seen traveling and foraging successfully with only three limbs. However, one adult female missing a hand appeared somewhat disabled when traveling in an arboreal setting.

Size was also an important factor in arboreal travel. For example, the largest adult male in the group tested branch supports and took travel routes different from other pygmy chimpanzees who were moving in single file through the trees.

The environment and the pygmy chimpanzees' knowledge of it play a fundamental role in their patterns of movement. Those of Wamba use a variety of habitats and their mode of travel varies with the terrain; they move frequently on the ground as well as in the trees.

Dietary habits or feeding patterns are closely related to locomotor patterns because the distribution of food resources determines where and how the pygmy chimpanzees will spend their day. In addition to feeding on fruits, they eat leaves, stems and caterpillars.

The social structure is very flexible. Group size fluctuated, with the largest groupings observed in the trees.

Data collected in the field are currently being reduced and analyzed. In addition, a biomechanical analysis will be made of films taken recently of pygmy chimpanzees at the San Diego Zoo to complement the field data.



Evelyn Ono Vineberg and the son of one of her trackers.

MY FIRST YEAR OF STUDY AT THE UNIVERSITY OF CALIFORNIA, BERKELEY

F. B. Musonda, *Anthropology Dept.,
University of California, Berkeley*

This report discusses some of the highlights of my 1979–1980 year of graduate study at Berkeley as a recipient of a coveted Franklin Mosher Baldwin Fellowship. During this period I was privileged to be a student of Professors J. Desmond Clark and Glynn Isaac. They have tremendously assisted and directed me in my quest for knowledge and in pursuit of a program of study relevant to my own interests and future work in Zambia. Indeed, I am very grateful to the Trustees of the L. S. B. Leakey Foundation for affording me this purposeful opportunity.

The program of study that I have pursued here has consisted of courses in archeology, physical anthropology, geology and paleontology.

The course in the Archeology of Human Origins was particularly interesting. A broad range of important issues bearing on the archeological evidence from the oldest known sites in the Old World was discussed. The evidence was studied in relation to a time-space-environment framework, and the human evolutionary process was reviewed in conjunction with the archeological evidence spanning the period 2.0 million years to about 100,000 years ago.

My participation in the archeological investigations of Lake Turkana, Kenya, during the fall last year enabled me to acquire a fuller understanding and appreciation of the nature of evidence related to early man in Africa, as well as the difficulties and problems that archeologists working under adverse environmental conditions face. I was afforded the opportunity to study the fossil hominid remains, ancient environments, stone artifacts and other archeological evidence that I had grappled with in class with Professor Isaac. My trip to Kenya and the successful participation in the on-going Koobi Fora research project was funded from Dr. Isaac's research grant, for which I am most grateful.

Working forward from the Lower Pleistocene in my quest to understand and elucidate the nature of human development and dynamics of culture change, I studied the Middle Stone Age/Middle Paleolithic period. A broad range of issues was tackled on regional levels in a series of seminars organized and conducted by Professors Clark and Isaac. It is interesting to note that until very recently few archeologists working in Africa have paid attention to the study of the Middle Stone Age. Chronology has been and still is a major problem for this time period. However, there is renewed interest in its study in southern Africa. This may be the result of recent findings at Border Cave and Klasies

River Mouth where excavations have yielded skeletal remains of anatomically modern humans who lived more than 100,000 years ago. These prehistoric humans were adapted to hunting large grazing animals and systematic exploitation of marine foods.

A seminar on the Beginning of Food Production in Africa conducted by J. Desmond Clark aimed at reviewing evidence of the domestication process as well as causes and effects of the change-over from hunting/gathering to food production. Although it was not possible in the ten week period to examine critically all the evidence available, we were able to identify the most important underlying features that probably were responsible for the beginning of agricultural practices. It is apparent that farming did not start at the same time in different parts of Africa and that no one single factor was responsible for its beginning.

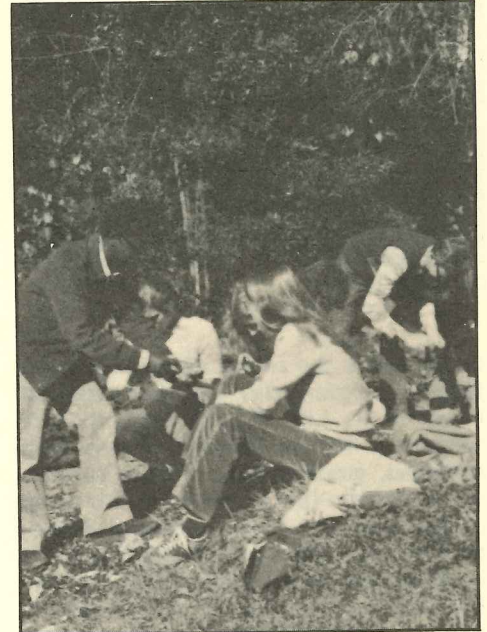
As a contribution to the seminar, I critically examined the archeological data and existing hypotheses on the origins of agriculture in the West African savanna, stretching from Senegal to Nigeria. I assessed the value of the existing models and theories in the light of the evidence available. What emerged from this research is that prior to domestication in West Africa, hunter/gatherer societies were pre-adapted to the use of wild plant food. However, the influx of populations from the Sahara Desert southwards, caused by changes in the environment around 2000 B.C., resulted in the creation of an ecological imbalance. The ultimate reaction of the hunter/gatherers was probably a gradual acceptance of a symbiotic relationship with the incoming pastoralists and a gradual change in their subsistence strategy. It was possibly through this mutual existence that the technique of food production spread through the savanna region of West Africa.

I took a course on Fossil Man in which we studied the fossil hominid record as it is presently known from the Old World. For the first time I had the opportunity to handle hominid specimens from different parts of the world. The Department of Anthropology at Berkeley has an excellent hominid cast collection for study and teaching purposes. This course enabled me not only to speculate on our origins but to bring in humanness in archeology. We as archeologists can no longer continue to treat ancient material remains in isolation.

I also took a geology course on the environmental analysis of Pleistocene sedimentary rocks from Professor Hay, the author of *Geology of the Olduvai Gorge*. For this course I wrote a paper in which I discussed the significance of surface texture of sand grains from the Zambezi Valley in Zambia as an indicator of depositional environments and its usefulness to archeology.

In the winter quarter, I served as a teaching assistant for Anthropology 2, an undergraduate beginners' course in arche-

ology, taught by Professors Glynn Isaac and Ruth Tringham. I not only gained teaching experience but learned to appreciate the importance of teaching both as a career and as an underlying factor in national development. For the first time since my return from Kenya I was able to share my experiences at Lubbock Lake Site and east of Lake Turkana with my fellow students, illustrated by slides I had taken.



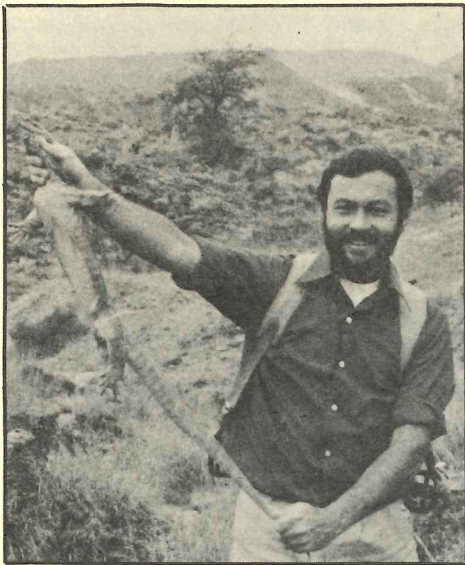
Francis Musonda giving a practical demonstration of stone tool making to a first-year class in archeology.

RECENT DISCOVERIES IN MIDDLE MIOCENE ROCKS OF WESTERN KENYA

*Dr. Martin Pickford,
National Museums of Kenya*

The recent dry spell in Kenya left us short of milk, maize and electricity. The Fort Ternan region was severely overgrazed because of the drought and during my mapping in March–April I was presented with a clean-shaven version of this usually heavily grassed area. This set of conditions revealed, perhaps for the first time, details of the rock record not normally visible. While tracing strata to the northeast in the Malaget and Saoset valleys, I noticed a few bone fragments lying on the surface of a hill called Serek, a place I had visited two years ago when it was knee-deep in grass. A follow-up search with my field assistant, Mr. Kiptalam Cheboi, showed that an area of about one half acre contained bone scrap, teeth and postcranial elements scattered over the surface. The presence of hominoids in the site was quickly revealed by the discovery of an upper incisor of a medium bodied ape (about *Ramapithecus* size).

We cut a trench into the hillside in order



Dr. Martin Pickford

to determine the source of the fossils and found a volcanic clay bed with scattered fossils in it. Like Fort Ternan, the site contains a Middle Miocene faunule with antelopes, giraffes, pigs, rodents, carnivores, a pangolin (the first fossil of this group of mammals ever found in Kenya), *Deinotherium* and choerodont proboscideans. It underlies the same lava flow that caps the Fort Ternan site and the general setting suggests that the deposits at both sites are similar in age.

At Kapsibor, a most serendipitous set of circumstances preserved a few bones and teeth from loss. On a very steep slope a tree root had been exposed running across the slope horizontally. Caught behind the root were some calcrete nodules, a sign no prospector can ignore. Among the nodules, sure enough, there were teeth and jaws of antelopes and a beautifully preserved complete skull, with both jaws still in chewing position, of a flying squirrel. This little trap yielded most of the surface material since fossils washing out of the strata at this site generally rolled straight downhill into the streambed at the bottom. A hominoid molar was recovered on the point of disappearing forever downstream. Trenching failed to reveal the source of the fossils, although matrices still attached to them show closely enough the stratum from which they came.

Having mapped the area, Kiptalam and I returned to Fort Ternan to see whether we could confirm the stratigraphic position of the new sites. Imagine our surprise when we started to find fossils in areas which must surely have been searched in the past. We found two fossil levels in gullies half a mile west of the Fort Ternan site, one yielding rhino bones. A higher level yielded antelope, rhino, proboscidean and rodent remains. A quarter of a mile further west a richer bone patch was located just below the lava which caps the Fort Ternan site.

The potential of these new sites cannot be gauged until excavations have been

attempted. Sites of Middle Miocene age which yield hominoids are rare in Africa. Serek is of great local interest because it has preserved a slightly different faunule than Fort Ternan, despite its comparable age. Surface finds suggest a greater proportion of pigs, tragulids and deinotheres with scarce bovids, while at Fort Ternan itself bovids are the dominant group and deinotheres and pigs very scarce.

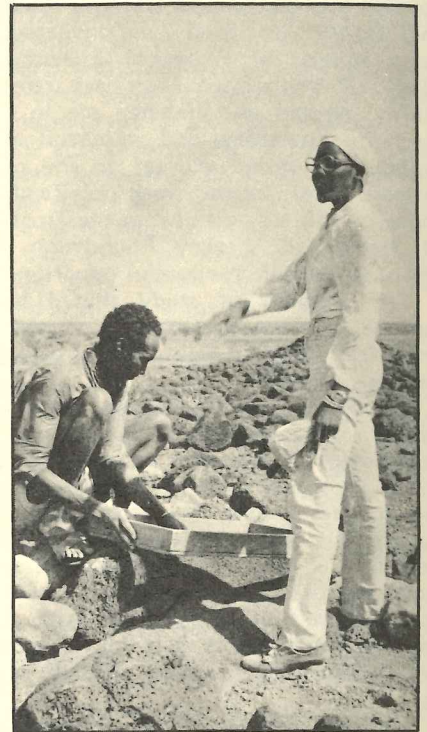
I have also examined Middle Miocene strata at Majiwa and Kaloma to the west of Kisumu and near Maboko Island. Both sites have yielded ramapithecine hominoids — Majiwa, several isolated molars; Kaloma, a complete but crushed mandible which has the dubious honor of being the most complete ramapithecine specimen from Africa, despite the damage it has suffered. Placed against new finds from Pakistan and Europe, the Kaloma jaw exemplifies the incompleteness of our knowledge concerning Middle Miocene hominoids of Africa. A visit to Maboko Island resulted in correlation of strata between there, Majiwa and Kaloma. The Maboko ramapithecines are slightly older than the Kaloma specimen, which is in its turn older than the Majiwa ones.

I examined the southeastern flank of the Nyanza Rift in the area between Sondu and Koru. There are poorly exposed but thick fluvial sedimentary sequences in several places, and all the deposits seem to be Middle Miocene in age. An aquatic assemblage with crocodiles, turtles, and mammals was found at one site, and two others yielded bovids and proboscideans.

Finally, a visit to Baringo District to inquire into rumors concerning the sale of fossils by local inhabitants led to a renewed appreciation of a very rich and extensive site of Middle Miocene aspect. This was first located by me two years ago, but extremely heavy vegetation hid its true dimensions. In the meantime, cut and burn agriculture has greatly reduced the cover and revealed a site of stupendous potential for Kenya. Bones, jaws and teeth are exposed for a distance of fifty kilometers along the side of a gully. The fossils are almost all in contact and jumbled together into a bed some twenty centimeters thick. Many of the remains are of proboscideans and *Deinotherium* but others include tragulids, rodents, carnivores and a hominoid talus.

In retrospect, it would appear that the Middle Miocene period, which was hitherto relatively poorly represented in Kenya, may after all be fairly well exposed. A program of research on the new localities will surely yield a great deal of information regarding conditions in the Middle Miocene. We can sample faunas from flood-plain deposits, lake margin and aquatic settings as well as more purely subaerial conditions. Analyses of this mosaic of depositional types will yield a picture of the sort of countryside that the very earliest ramapithecines experienced. We will be able to compare these assemblages

with others from similar depositional settings in the Lower Miocene and may perhaps be able to understand what the changes were which led from a hominoid fauna dominated by *Proconsul* in the Lower Miocene to one in which ramapithecines were better represented. □



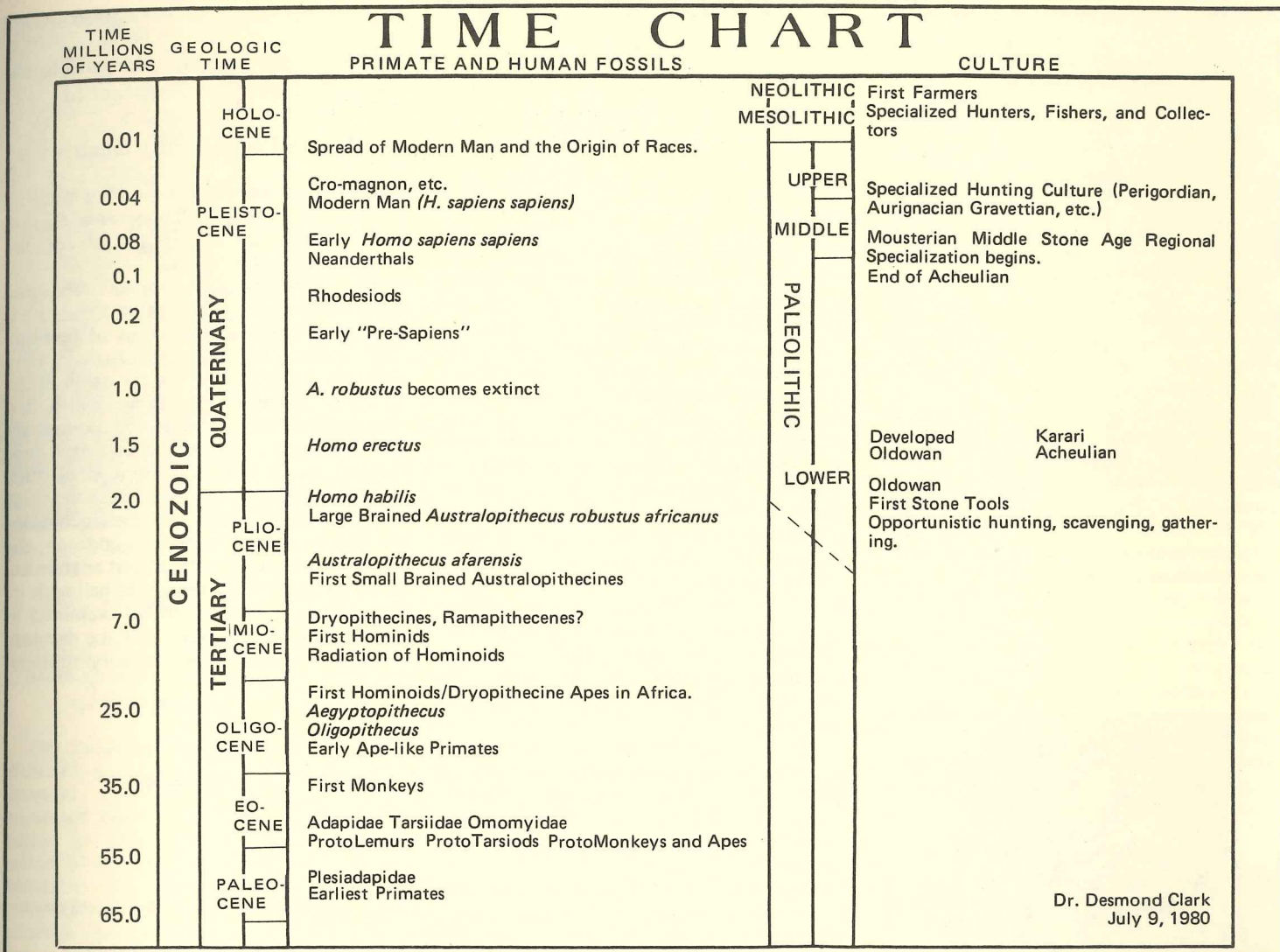
Two archeology students, John Ogolla and Jane Owalo, from the University of Nairobi, who have been working with Dr. Daniel Stiles on a pastoralism research project in northern Kenya. The group is investigating environmental and population aspects of economic, cultural and demographic change in the area over the past 10,000 years. The project is partially funded by a Franklin Mosher Baldwin Fellowship.

NEW FELLOWS

The Leakey Foundation is proud to welcome to its Fellows' roster:

Mr. & Mrs. Ronald Adams, Redwood City, California; Mrs. Joyce Black, Spring Valley, California; Mr. Robert A. Bristol, Palm Beach, Florida; Mr. Gregg Juarez, Los Angeles; Mr. David A. Ketter, Seattle, Washington; and Dr. W. V. Williamson, Newport Beach, California.

Fellows of the Foundation now total 334.



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

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

GRANT SPOTLIGHT

ducted in January, 1980, revealed the remains of an odontocete whale, intact sirenians, abundant anthracotheres and carnivores found in near shore marine, estuarine and fluvial environments. Because of these discoveries, Sahabi is now noted as the most ecologically diverse of the Late Neogene faunas yielding higher primates, including hominoids.

Dr. Noel Boaz, New York University, director of the research project, plans a cooperative field season with German scientists which will include more intensive and extensive surface survey and micro-faunal sieving.

analysis stage of the La Cotte de Saint Brelade Research Project.

First discovered in 1881, La Cotte de Saint Brelade, Isle of Jersey, is the richest archeological site of the penultimate glaciation (over 125,000 years old) in Britain. The richness of the deposits is scarcely matched anywhere else in Western Europe. Conditions for preservation were extremely good for bone, and because of the detailed stratigraphical recording, occupation plans can be drawn with a precision rarely found in sites over 100,000 years old.

By 1951, excavations had removed most of the deposits less than 70,000 years old, including Mousterian tools and Neanderthal remains. Additional fieldwork conducted in 1951 led to the realization of the antiquity of the site and continued excavations during 1966-1978 uncovered vast amounts of artifacts, as well as mammoth and rhinoceros remains.

Laboratory analysis of this incredible site has been ongoing since 1966. A backlog has arisen, however, because of the high yield of artifacts found in the past three years - 60,000 fossils in 1978 alone - making a total of over 100,000. Research funds are needed to assist with the cataloguing, computer analysis and general illustration.

Dr. Noel Boaz

\$5,000 needed

Excavation, Paleontology
and Paleoanthropology at
Sahabi, Libya

Dr. J. M. Coles

\$3,000 needed

La Cotte de Saint Brelade
Research Project

Dr. J. M. Coles, University of Cambridge, England, has been awarded a grant to be disbursed through the European Chapter, Leakey Foundation, in the amount of \$3,000 to assist with the

The Sahabi region of Libya has been under paleoanthropological investigation since 1977 and is the largest fossil site found in North Africa. Excavations con-

Dr. John Van Couvering \$2,000 needed

Stratigraphy and Radiometric Dating
of New Sites near
Fort Ternan, Kenya

In April 1980, Dr. Martin Pickford, Leakey Foundation grantee, uncovered five new Middle Miocene sites containing mammal fauna, including hominoid remains, near Fort Ternan, Kenya. These new sites may be of international importance since no other sites of this age have been discovered in Africa — and no other examples of hominoids of this age have been uncovered at Fort Ternan since the late L. S. B. Leakey worked there.

Because of previous field experience at Fort Ternan, Dr. John Van Couvering, Head, Micropaleontology Press, American Museum of Natural History, has been invited by Dr. Pickford to join him in the field to conduct both stratigraphic sampling and radiometric dating of these newly discovered fossil beds.



Diana Matthiesen

Diana G. Matthiesen \$3,000 needed

The Fossil Passerines
of
Olduvai Gorge

Diana Matthiesen, University of Florida, will receive a \$3,000 grant in support of her research on fossil passerines of Olduvai Gorge. The Gorge, the single most prolific bird locality ever discovered, has well-preserved bird fossils that number in the thousands. In fact, over fifty avian families are represented at the site.

Ms. Matthiesen, under the direction of Professor Pierce Brodkorb, will undertake a complete study of these fossils including their identification, description and biostratigraphic correlations.

Dr. Raymond Bernor & Dr. Michael Woodburne \$3,000 needed

Late Miocene Mammalian Fauna/
Paleomagnetic/Western European
Hominoid Evolution Program

Drs. Bernor and Woodburne, University of California, Riverside, have been awarded a grant of \$3,000 to investigate the possibilities of developing an integrated paleomagnetic-mammalian biostratigraphic-geochronological analysis of the type and major reference sections of the Vallesian and Turolian stages (Late Miocene) in Spain. Spain was chosen since it has one of the few well-exposed and reasonably continuous stratigraphic sequences of this time period in Western Europe — an age when important evolutionary and dispersal patterns were being developed by many mammalian groups, including hominoid primates. In order to document these patterns it is necessary to establish a closely controlled, refined, geochronological framework that can be reliably correlated with, and extended to, sequences in other areas. Thus it will be possible to discern regional patterns of evolution, dispersal, faunal exchange, and endemism.

Funding is sought to cover expenses to and from Spain (where sixteen days will be spent in the field) and to London, Utrecht, Paris, Lyon, Barcelona, and Madrid, where various important collections will be assessed for the completeness of the geologic sections' biostratigraphic record and to develop a provincial biochronological network.

Dr. Jonathon Ericson \$3,000 needed

Barium/Calcium Ratios
in
Enamel Apatite of Omo Mammals

Scientists have shown that the ratios of Sr/Ca, Ba/Ca and Pb/Ca continuously decrease for each trophic level within a modern food chain from rock, soil, herbivore, and carnivore through the processes of biodiminution at each successive trophic level. Dr. Ericson, Harvard University, plans to conduct laboratory analyses to determine whether a record of biodiminution remains in the fossil enamel apatite of Pliocene Omo mammals. If so, the data could be used to define the trophic level of unknown species, such as *Australopithecus*.

Dr. Ericson will conduct his investigations in the laboratory of Dr. Clair Patterson, California Institute of Technology, Pasadena.

Bruce M. Latimer \$2,000 needed

Investigations into the Morphological
and Functional Aspects of
the
Hadar Fossil Foot Remains

Bruce Latimer of the Cleveland Museum of Natural History will receive a \$2,000 grant in support of his analysis of the Hadar fossil foot remains.

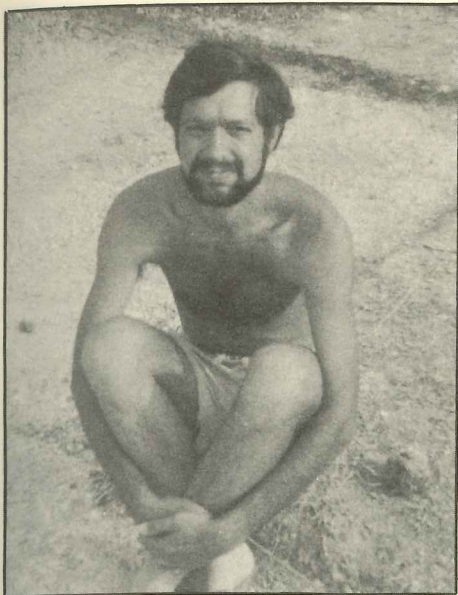
Forty-five pedal elements recovered from the Hadar sites in Ethiopia constitute the most complete collection of hominoid foot bones found in any African Plio-Pleistocene site. Under the direction of Dr. C. Owen Lovejoy, Mr. Latimer will undertake a detailed anatomical and biomechanical analysis of this material. Fossil foot remains are vitally important since they provide us with the only direct evidence with which to construct the locomotor patterns of early hominids. In addition, the Hadar fossils present the oldest anatomical evidence for bipedalism — the hallmark of *Hominidae* — and should be examined in an effort to better understand the development of this unique evolutionary strategy.

Dr. Davis M. Helgren \$1,200 needed

A Survey of Toromoja:
A Potential Early Man Site
in
Central Botswana

Dr. David Helgren, University of California, Davis, will receive a \$1,200 grant to support his participation in a joint United States and Botswanan preliminary investigation of the Toromoja site. Toromoja, recently discovered, occupies approximately twelve square kilometers on the shores of several paleolakes that were once located in the modern Makgadikgadi Pans. Cultural materials found here span the Middle Stone Age and Iron Age, and include well-fossilized bone and artifactual debris.

The interdisciplinary research program for Toromoja will include geological, geomorphological and archeological mapping of the site, as well as highly selective test excavations of both cultural debris and mammal fossils. A sedimentary suite and other datable materials will also be collected. Other U.S. participants include Drs. Alison Brooks, archeologist at George Washington University; John Yellen, director of the anthropology program at National Science Foundation; and Alan Mann, physical anthropologist at the University of Pennsylvania.



Dr. Nikos Solounias

Dr. Nikos Solounias \$677 needed

Funding for the Publication Costs of a Monograph on the Turolian Fauna of Samos Island, Greece

Dr. Solounias, University of Colorado Museum and Department of Geological Sciences, and a native of Samos Island, requested financial assistance for the publication of *The Turolian Fauna from the Island of Samos, Greece*. His research on Samos Island fauna has assisted scientists in understanding Miocene provinciality and allowed them a better perception of the paleozoogeography and paleoecology of hominoids across Eurasia. With the development of this knowledge, these occurrences are no longer random, but predictable on paleoecological information.

Christopher Koch \$5,000 needed

Hominid Bone Technology and Vertebrate Taphonomy of Ologresailie

Christopher Koch, Erindale College, University of Toronto, has been awarded a grant in the amount of \$5,000 in support of his work with the Ologresailie fossil material. The fauna remains, now housed at the National Museum of Kenya, will undergo a three phase research plan — (1) preparation of a faunal list for each site; (2) examination of bone fragments for evidence of butchery; and (3) examination for evidence of the utilization of bones as tools.

A primary goal of the research project will be to develop, refine and test criteria that distinguish bones broken by hominids from those broken by other taphonomic agencies. □

GOMBE STREAM RESEARCH CENTER 1980-1990

by Dr. Jane Goodall

Many people are, by now, fully aware of the value of the chimpanzee and baboon studies at Gombe, Tanzania. Nevertheless, it might be useful to set out here some of the major reasons as to why I feel it is vital that the research should be continued into the future.

Part of the value of the chimpanzee study lies in the fact that twenty years of data have already been collected. This makes ours the longest consecutive study on the behavior of a group of wild animals in the world. Each passing year makes the information even more significant.

A chimpanzee lives forty to fifty years; a female gives birth at thirteen to fourteen years old and has only one infant every five or six years. Each chimpanzee has its own distinct individuality. Much behavior is learned during an individual's lifetime and a variety of factors, ranging from a traumatic event such as the loss of a mother through such things as presence or absence of a sibling, can have profound influence on behavior. Not many individuals are under study at the same time and years of data must be accumulated before conclusions can be drawn regarding the effect of experience during early life on the behavior of the adult.

So far, only one mother whose own infancy was observed from the beginning has herself given birth. A second should do so in two years time, a third the following year. Only after studying the maternal techniques of all three and comparing them with those of their own mothers can we begin to make inferences about the effect of different methods of child raising on subsequent maternal behavior.

The behavior of orphaned chimpanzees is of particular interest. At the present time we have one male orphan of approximately seven or eight years of age.

During our twenty years of research, four different adult males have held the alpha position. Each was highly individual with particular character traits. The current challenger once again has his own personality and his own unique method of raising his rank. Factors which determine whether or not an individual male is "motivated" to try for the top rank and whether he is able to succeed are important to those studying social dominance in our own species. □



Vic Cox

In 1968 a two year study of male grooming behavior was completed. The results suggested that *rank* was the single most important factor in determining the extent to which an individual male groomed or was groomed by other males. Two years later, during another study, grooming behavior was again analyzed; *age* appeared to be the single most important factor. At the present time (with a different alpha and the males who were old in the previous studies now dead) neither the alpha nor the oldest male grooms or is groomed the most by other males. This points to the importance of individuality in behavior patterns in chimpanzee society, as it is in man's.

In 1970 the main study community began to divide and after two years the process was virtually complete. What were the factors which caused the division? Were there too many adult males? To what extent was the division influenced by the personalities of the high ranking males? What effect, if any, did the heavy banana feeding have on the division? These questions can only be answered when another community division has been recorded. There will not be a large number of males in the present community for many years to come.

Perhaps the question which is of most interest concerns the aggression and violence which broke out two years after the division of the community. What caused this violence? Were the Kasakela males merely trying to regain the land that was inaccessible to them after the community divided? Were they trying to gain access to additional females? Was there a feeling of crowding caused by movement of other chimpanzees into the park from outside after a new village was built beyond the boundary? Only when it becomes possible to witness further violence of a similar nature shall we be able to hazard a meaningful guess.

These are just a few of the reasons why I feel it is absolutely vital to continue the study at Gombe. □

could provide insight into the origins of *A. afarensis*. Thus, it was abundantly obvious that the Afar region, unknown to anthropologists until Maurice Taieb found fossils there in the late 1960's, contained fossiliferous strata spanning the provocative period from about six or seven million years ago when hominids were emerging as a distinctive group, up to *Homo erectus* times (about one million years ago) and even perhaps the period when *Homo sapiens* made his appearance.

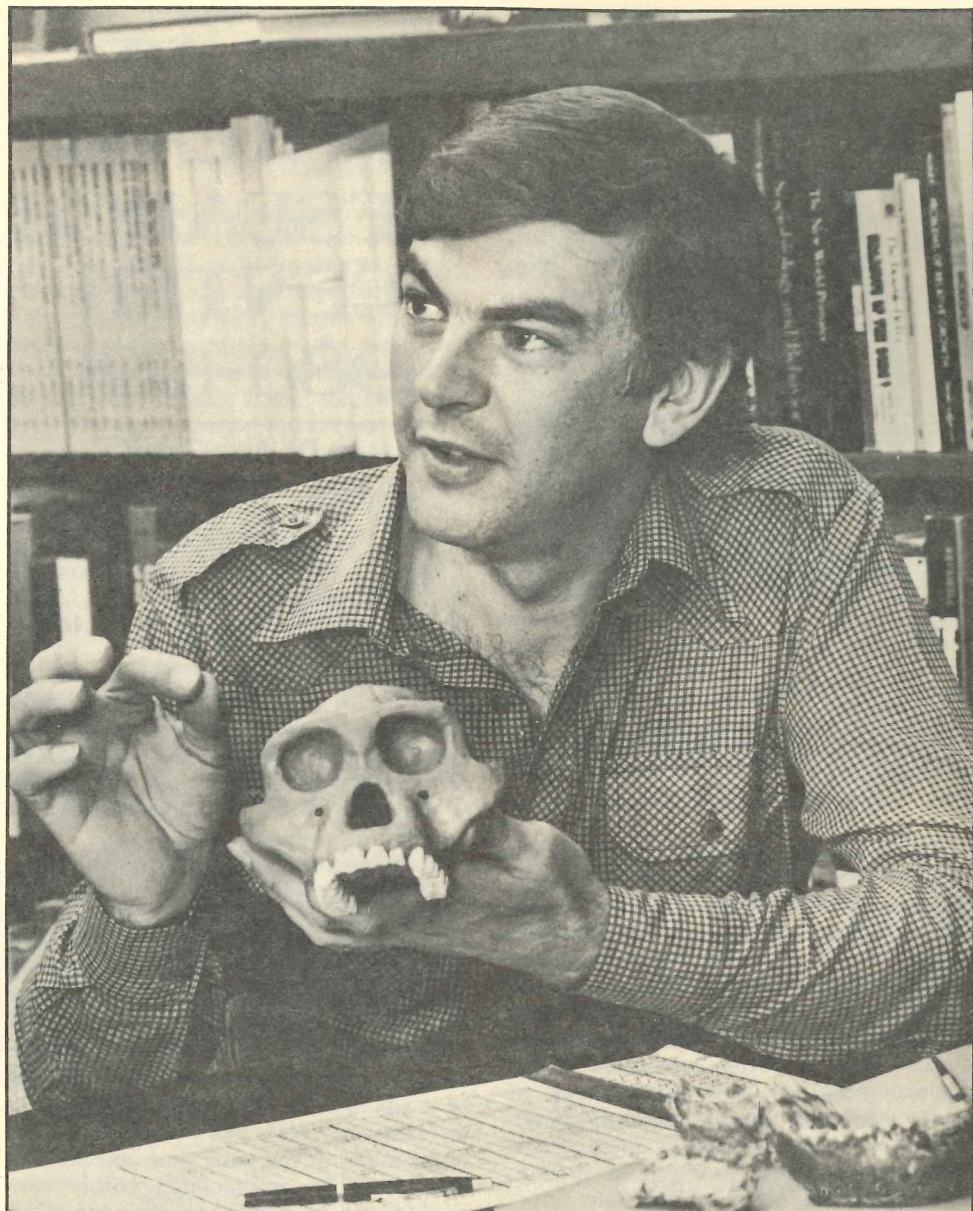
Following a meeting in Paris in December, 1979, it was decided that Taieb, Desmond Clark and I would meet in Addis Ababa in January in order to request new permits for undertaking full scale explorations in the Afar later this year. This visit was timely since our five year loan period for Lucy and the other fossils had expired. So, with the fossils carefully packed, Taieb and I arrived in Ethiopia in early January to confer with the Antiquities officials about the prospect of coordinating new fieldwork.

Our meetings with the authorities proved to be extremely rewarding and we received positive feedback to our written proposal to conduct extensive paleoanthropological research in the Afar. During the negotiations, careful plans were presented for effectively working at the important sites and in addition, we expressed our desire that Ethiopian students become involved in our research and be trained to work with us as colleagues.

So successful were our discussions with the Antiquities officials that we were granted permission to undertake a short field reconnaissance to the Middle Awash sites and a return visit to Hadar. Desmond Clark had already visited these sites of Acheulean age and was bubbling with excitement about their uniqueness compared with other places he had seen in Africa. Before leaving for India, he briefed us about the sites and asked Taieb to pursue some preliminary geological work.

Following the successful preparation in Addis Ababa of our field supplies and Land Rovers, we drove down into the Afar Depression. Everyone was filled with excitement and in Awash Station we located Kabede, our old cook from earlier expeditions, and asked him to join us for a few weeks. He was delighted and appeared as happy as we all were about going back to the fossil sites.

In order to most efficiently explore the Middle Awash sites, we found an Afar guide named Selati who had worked with Taieb, years ago. He was most eager to assist us and as he and Taieb reminisced about years gone by, we made our way to the Acheulean sites, including Bodo. This was the first time that I had seen these sites. I was amazed at the abundance of fossils and artifacts, and also by the presence of volcanic ash horizons, which, if they could be dated, would provide us with age estimates for a period of time poorly



Dr. Johanson examines a preliminary reconstruction of *Australopithecus afarensis*.

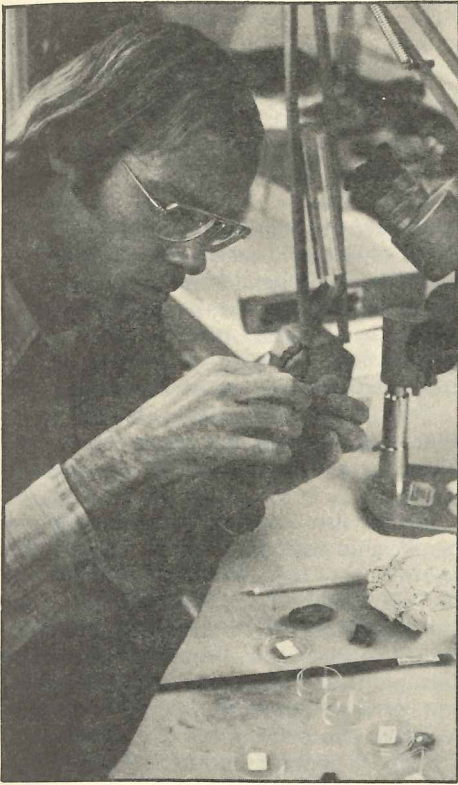
known in the evolutionary history of mankind. Taieb completed some preliminary geology in conjunction with his colleagues Jean-Jacques Tiercelin and Bob Walter and they became convinced that the area would reveal well-documented and important information for anthropologists.

During the late 1960's, when Taieb became the first person to carefully explore this remote region of the world for fossil sites, he had not realized that some deposits west of the Awash River were rich in Miocene fossils. As he and Selati discussed the area, Taieb realized that the sites he had seen, previously considered to be Miocene in age, were also full of well preserved fossils. These were the sites Tim and I were so intrigued in finding. However, due to ailing Land Rovers and our limited time, we could not revisit the area. We did know that diagnostic elephant and pig fossils from those sites confirmed an estimate of about five to six million years for the deposits.

After an exceptionally successful visit to

the Acheulean sites, we continued our trek northward to our goal of Hadar. The terrain became increasingly difficult and proved a disaster for one of our Land Rovers which required extensive repair to its differential. However, we forged on, almost as if driven by a homing instinct, towards the site of Hadar that we had not seen for three years. A sense of relief permeated the group as we all fell asleep in our mosquito nets, listening to the forest sounds along the river that cuts the Hadar deposits.

Our time in Hadar would be short, only about two weeks, and we realized that we had to make the best of every day. Our team was small — Taieb, Walter, Tiercelin and I — but we were all experienced field workers, knew exactly what had to be done, and we worked well together. Our goals were simple, but of extreme importance. First, we wanted to assess the degree of erosion that the deposits had experienced and whether any new fossils had appeared at the hominid localities. Second,



Dr. Timothy White, working on skull reconstruction.

what was the exact stratigraphic location of the artifacts excavated by Jack Harris in 1977? Third, Bob Walter wanted to collect additional volcanic samples for analysis. Fourth, Taieb had some correlations he needed to confirm. And finally, Tiercelin needed to collect important samples for sedimentological analysis.

During my careful investigation of the hominid localities, it was obvious that erosion was slow, very slow. At some places I could even see foot impressions made by our team some three years ago, or a discarded cigarette package. No new hominid fossils were found, but what was important was that nothing major had been missed by previous survey nor had erosion destroyed any recently exposed specimens. For me it was a strange time. Hadar was remarkably quiet, often not even a wind blowing. The First Family locality was unusually tranquil after the excitement in years past. I stood at the top of the slope gazing out over the large area of fossil exposures and thought to myself how easy it would have been to miss this locality and how many other spots might reveal hominid fossils during our next expedition.

The new species, *Australopithecus afarensis*, is well represented by a large number of fossil specimens, but sadly we do not have a complete fossil skull of this new creature. Tim White has put together a composite skull, but an actual fossil specimen would be terribly important to have. This would be a major reason for us to return to Hadar to undertake extensive survey. To aid us in this endeavor, my friend, Richard Leakey, has arranged to have four of the best Kenyan fossil finders

accompany us on our next field venture. These experts will aid Gerry Eck, an Omo veteran, Tim White and me during the next expedition in our search for more hominid remains. There is little doubt that with such a survey team, our chances of finding a complete skull of *A. afarensis* are very high.

When Jack Harris excavated an archeological site in the Gona Area of Hadar in January, 1977, we had the impression that the site was in the upper portion of the Hadar deposits, probably above a volcanic horizon dated to 2.7 million years. The geologists wanted to confirm this correlation, since, if it were true, these artifacts might prove to be the oldest excavated cultural remains from anywhere in the world. The geology at the site is complicated, but after careful study, Taieb, Tiercelin and Walter agreed that the artifacts were from a level immediately above the 2.7 million year old date. Walter wants to pursue additional laboratory studies on the volcanics, but for the moment it appears that Hadar possesses the oldest artifacts known, which predate those of Olduvai by about one million years.

Both Tiercelin and Walter are in the process of finishing their doctoral dissertations. This short visit to Hadar permitted them to check their field data and to refine their studies before completing their writing. Taieb was able to supervise when questions arose and by the end of the two week sojourn at Hadar he had firmed up certain stratigraphic questions that had troubled him.

The mini-expedition had proven wonderfully successful and more importantly it had rejuvenated everyone's spirits for renewed explorations not only in Hadar but also in the Miocene sites and those of the Middle Awash valley. By the time we began preparations for leaving Hadar, many of our Afar friends had come to visit our camp and reestablish contact. It was sad to leave after such a short time. We told the nomadic Afars that we would be back again in the fall.

The kitchen was packed, the Land Rovers loaded and made ready for an early morning decampment, but a strange twist of events occurred which prompted a sudden departure. Late in the afternoon our Afar guards spotted some strangers across the river. They expressed concern and suggested that our safety might be in question. This knowledge, coupled with a change in the weather, forced us to hurriedly pack the remainder of the camp and leave Hadar in the dead of night. As we were preparing to retire, the sky was lit up by lightning. If it were to rain and the gullies were to fill with water we would not be able to drive the Land Rovers up to the plateau. The decision was clear. We had to leave and in a short time were ready and reluctantly drove out in the darkness.

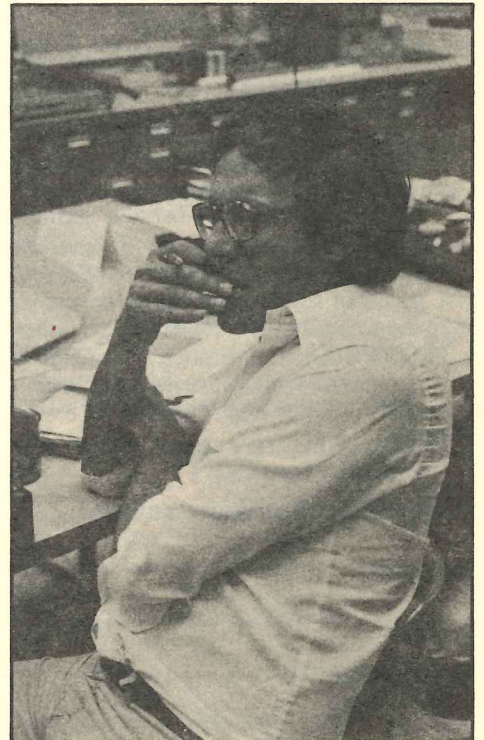
Everyone had mixed feelings during the long ride back to Addis Ababa. We were all satisfied with the work we had done, but at

the same time we were sad to leave the desert. At least we knew exactly what we could expect during the fall expedition. The only major task remaining before our departure from Ethiopia was to arrange the return of Lucy and the other hominid fossils to the National Museum.

It was a crisp morning with a blue sky on January 29 when Taieb and I met the Ethiopian officials and press at the National Museum. The ceremony received wide attention and while it was somewhat difficult to give up the fossils it was comforting to know that Lucy was now safe and at home in her own country.

Preparations are now underway and detailed planning for the fall season is well advanced. Essentially, the expedition will attempt to fill in two gaps in the fossil record. One gap is between two and three million years ago when the *Homo* and *Australopithecus* lines diverged in different evolutionary directions. Perhaps with the right deposits in the Middle Awash area we can clarify this important event in the human career. The other hiatus, the Miocene gap, pre-*A. afarensis* and post-*Ramapithecus*, no doubt holds many surprises for us. Just as Lucy has challenged long standing ideas about the origin and evolution of humankind, it is to be expected that Miocene hominoid fossils may yield many surprises for a new and intriguing perspective on human origins.

I would like to express appreciation to the Provisional Military Government of Socialist Ethiopia for its understanding and encouragement throughout our research program. In addition, it is obvious that such field work would be impossible without the generous and continuing support of the L. S. B. Leakey Foundation. □



Maurice Taieb

GLOSSARY

- ANTHRACOTHERES:** Tertiary mammals related to the pigs, some as large as rhinoceros.
- DEINOTHERES:** Very large extinct herbivorous, ungulate mammals, proboscidean, with lower tusks.
- ETHOLOGY:** The scientific and objective study of animal behavior sometimes as contrasted with comparative psychology.
- HOMINID:** A primate of the family Hominidae which includes *Homo sapiens*, earlier human subspecies (like *Homo habilis*, *Australopithecus*, & *Ramapithecus*.)
- HOMINOID:** A primate of the superfamily Hominidae, including the great apes.
- MORPHOLOGY:** The branch of biology dealing with the form and structure of animals and plants. As applied to animals, the study includes anatomy, histology and embryology.
- PONGID:** Anthropoid ape of the family of primates Pongidae, which includes gorillas, chimpanzees, orangutans and gibbons.
- SIRENIAN:** Pertaining to the order of large aquatic herbivorous mammals that includes the manatee, dugong and several fossil genera.
- SIVATHERIUM:** A genus of very large, horned, extinct mammals from the Tertiary of India.
- SYMPHYSIS:** The immovable or more or less movable union of certain bones in the median plane of the body, especially that of the two halves of the lower jaw at the chin, and of the two pubic bones at the lower anterior point of the abdomen.
- TAXONOMY:** Classification, especially of animals and plants, according to natural relationships.
- TECTONICS:** A Branch of geology concerned with structure, especially with folding and faulting.
- TRAGULIDS:** Very small, hornless, ruminant mammals.
- TROPIC:** Pertaining to nutrition.

BOOKS

BOOKS

NEW BOOKS MEMBERSHIP PREMIUMS

THE MAASAI, by Carol Beckwith and Tepilit Ole Saitoti, is our new alternate Premium for Benefactors.

The Maasai of Kenya and Tanzania still live much as they did thousands of years ago herding cattle, sheep, and goats, and existing in harmony with their peaceful environment in and around the Great Rift Valley. These handsome people have made their way into the twentieth century with their ancient customs and the structure of their society preserved to an unusual extent. For the first time ever, this book — written by a Maasai — documents their living story. Each chapter of the vigorous and intimate text is illustrated with lively drawings and color photographs of feasts and ceremonies; the daily work of maintaining the herds; the warriors' games and dances; the elders' quiet moments of contemplation. With 240 plates in full color, forty line drawings and three maps, **THE MAASAI**, has been named an October Book-of-the-Month Selection.

Carol Beckwith, a young American artist, has exhibited her paintings and photographs in the U.S., Japan, and Europe. Since 1974, she has spent much time living among the Maasai recording their way of life.

Tepilit Ole Saitoti, after earning Maasai warrior status, spent six years in the United States studying animal ecology with the partial assistance of Leakey Foundation grants. He was featured in the National Geographic film, "*Man of the Serengeti*", and has spoken before a number of Foundation audiences.

Professor Phillip V. Tobias, member of the Leakey Foundation Science and Grants Committee, has recently been honored by the Cleveland Foundation for his publication, **THE BUSHMEN: SAN HUNTERS AND HERDERS OF SOUTHERN AFRICA**. Receiving the Anisfield-Wolf Award in Race Relations for 1978, he joins the rank of such international authors as Julian Huxley, Alan Paton and Martin Luther King, Jr.

Professor Tobias has been head of the department of anatomy of the University of the Witwatersrand for the past twenty-one years and has the distinction of holding a second professorship of the University, as Honorary Professor of Paleo-anthropology. At the present time he is the Dean of the Faculty of Medicine in Johannesburg. He has a publication list of over 500 items, including twelve other

books and monographs, chapters in at least forty additional books, and hundreds of scientific and general articles. He has written extensively in the fields of anatomy, genetics, human biology and paleo-anthropology, as well as on race, education, apartheid and academic freedom.

The Leakey Foundation is honored to offer this distinguished volume as a premium for new fellows of the Foundation.

We are also proud to note that our new membership category, Family, features as a premium, **KALAHARI HUNTER-GATHERERS: STUDIES OF THE !KUNG SAN AND THEIR NEIGHBORS**, edited by Drs. Irvén DeVore and Richard B. Lee. The Kalahari Research Group under the direction of Drs. Lee and DeVore have published, in this edition, the first comprehensive report of their unusual research effort. Information featured in this instructive work represents the four major study areas of the project: ecology and social change, population and health, child development, and behavior and belief.

Dr. DeVore, professor of anthropology, Harvard University, is author and editor of several books on primates and hunter/gatherer peoples, and of numerous professional papers. His filmed documentary of baboon behavior received international acclaim and an Educational Film Library Association first prize. He has received the Walker Prize for meritorious scientific investigations and discovery by the Museum of Science, Boston, and has been honored by election to the American Academy of Arts and Sciences. We are pleased to note that Dr. DeVore is also an active member of the Leakey Foundation's Science and Grants Committee.

In addition, we are now offering a new selection for our \$30 Friend's membership. Dr. Jane Lancaster's **PRIMATE BEHAVIOR AND THE EMERGENCE OF HUMAN CULTURE** is a fascinating interdisciplinary study of the social behavior and ecological adaptations of monkeys and apes that have set the stage for the emergence of the human way of life.

Other new book selections featured in the Leakey Foundation booklist include:

THE GREAT APES, edited by Drs. David A. Hamburg and Elizabeth R. McCown. Drs. Hamburg and McCown have collected a series of informative papers describing long term systematic field observations of gorillas, chimpanzees and

orangutans. Featured reports include papers by such international scientists as Drs. Jane Goodall, Dian Fossey, Biruté Galdikas, Roger Fouts, A. H. Harcourt, Richard Wrangham, William McGrew, John MacKinnon and R. A. Hinde.

Dr. Hamburg is also a member of the Leakey Foundation's Science and Grants Committee, serving in the capacity of vice chairman. Formerly Reed-Hodgson Professor of Human Biology at Stanford University and chairman of the department of psychiatry at Stanford School of Medicine, he is presently president of the Institute of Medicine, National Academy of Sciences. Dr. Hamburg has also been honored by membership in the American Academy of Arts and Sciences and is internationally known for his studies of stress, coping and adaptation.

APE INTO HUMAN, second edition, by Dr. Sherwood L. Washburn and Ruth Moore provides an illuminating account and discussion of the course of human evolution. Primary sources for this comprehensive volume include dating information on fossils and stone tools, field studies of living primates and studies in molecular biology and immunochemistry.

Dr. Washburn is honorary University

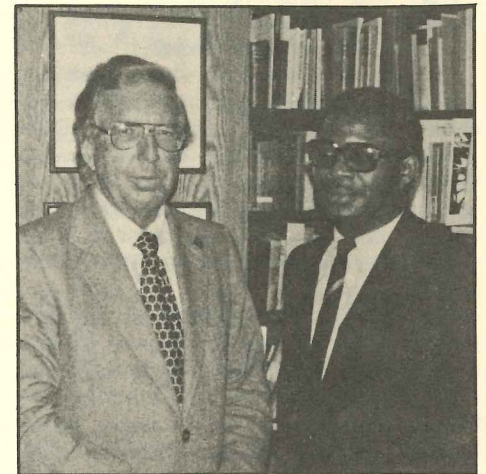
Professor at the University of California, Berkeley, and a world renowned authority on human evolution. A graduate of Harvard University, he had the unusual honor, in 1972, to have the Fourth International Congress of Primatology dedicated to him. He is a Fellow of the American Academy of Arts and Sciences and of the National Academy of Sciences and past president of the American Anthropological Association of Physical Anthropologists. Dr. Washburn is a Trustee emeritus of the Leakey Foundation's Science and Grants Committee. □

IN BRIEF...

The Leakey Foundation was honored last spring by a special visit to Pasadena of Professor Sidiki Kobela Keita. A history professor at the University of Conakry, Guinea, he is also the director general of the National Institute of Research and of Documentation of Guinea. He came to the United States at the invitation of the State

Department to inform our scientific circles about research and techniques in Guinea and to establish a basis of cooperation between U.S. foundations and public and private institutions and the Institute.

"The Leakey Foundation could help us greatly in the realization of diverse programs of archeological research," Professor Keita said.



Dr. Edwin S. Munger and Professor Sidiki Kobela Keita in Pasadena.

JOIN THE SEARCH... JOIN the leakey foundation

Without the opportunity to seek, there is no opportunity to discover. To stimulate and to provide the means for scientific discovery are major goals of the Leakey Foundation.

MEMBERS RECEIVE:

- *special premiums for many categories of membership
- *10% discount on books & tapes
- *The Leakey Newsletter with notification of our events for members only.

SEND A GIFT MEMBERSHIP TO:

_____ ZIP _____

PLEASE DESIGNATE MY GIFT TO SUPPORT:

Research Project Title or Scientist. _____

NEW MEMBER () RENEWAL ()

PLEASE KEEP MY NAME ON YOUR MAILING LIST ()YES ()NO.

MEMBERSHIP CATEGORIES

- BENEFACTOR . . . \$5,000 ..
- FELLOW \$1,000 ..
- PATRON \$ 250 ..
- SPONSOR \$ 100 ..
- FAMILY \$ 50 ..
- FRIEND \$ 30 ..
- STUDENT \$ 15

ALL MEMBERSHIPS ARE TAX DEDUCTIBLE

- The Hunter & His Art, J. & I. Rudner or The Maasai, Carol Beckwith and Tepilit Ole Saitoti (& tote bag)**
- The Bushmen, ed Phillip V. Tobias (& tote bag)**
- Leakey's Luck, Sonia Cole (& tote bag)**
- By the Evidence, Louis S. B. Leakey (or tote bag)**
- Kalahari Hunter-Gathers: Studies of the !Kung San & Their Neighbors, Dr. Irven DeVore (or tote bag)**
- Primate Behavior & the Emergence of Human Culture, Jane B. Lancaster (or tote bag)**

Every penny of your tax-deductible membership dollars supports LEAKEY FOUNDATION GRANTS to international scientific research programs.

PLEASE ENROLL ME AS A _____ MEMBER. I enclose my check for \$ _____

Charge to my ()Mastercharge or ()Visa. No.

Authorized signature _____ Expiration date _____

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

Please make checks payable to the L. S. B. LEAKEY FOUNDATION, Foundation Center 13-83, Pasadena, California 91123.

IN BRIEF . . . continued

The Associates of the L. S. B. Leakey Foundation honored Trustee Fleur Cowles, president of the European Chapter, at a special preview of her paintings at the Gregg Juarez Gallery in Los Angeles on June 3. Trustees Kay Woods of San Francisco (with husband Frank), Joan Donner, Colorado Springs, and Gordon Getty, San Francisco, joined over two hundred Los Angeles Trustees, Fellows and friends in viewing Fleur's work.

The party committee of hard working Associates, chaired by Frances Muir, included Joan Wrede, Joanna Muir, Billie Bowlby, Janice Seaman, Gloria Stewart, Bobbi Galpin and Maggie Jagels. Wine was generously donated by Mr. and Mrs. Frank Woods, (Mr. Woods is president of River Oaks Vineyards and Clos du Bois Wines), and Mr. Forrest R. Tancer, Jr., (president of the Iron Horse Vineyards). Mr. and Mrs. William Simpson won the signed, limited edition print donated by the artist. Other Fleur Cowles paintings were purchased by Messrs. and Mmes. George Jagels, James Stewart, Robert Donner, Daniel Foley, Gordon Getty, Ms. Linda Hope and Mrs. Joyce Black.

. . .

Dr. William B. Lee, a Fellow of the Leakey Foundation, has been named director of the Natural History Museum of Los Angeles County. He has been curator of

anthropology there since 1974 and will continue to hold that position.

Pete Lee was involved in the development of the cooperative project of the Museum, the Foundation and the Los Angeles City Schools called "Stones and Bones." The high school paleoanthropology curriculum continues to expand with great success.

. . .

Harold J. Coolidge, the zoologist who for over fifty years has crusaded for international wildlife conservation, is the winner of the \$50,000 J. Paul Getty Wildlife Conservation Prize for 1979. Coolidge, the first American to receive the award, is a member of the Leakey Foundation Science and Grants Committee.

The Getty Wildlife Conservation Prize is given to an individual or organization which has made outstanding and pioneering contributions to wildlife and habitat conservation on a global scale. The winner is selected by an international jury of thirteen conservationists and scientists. The Washington, D. C.-based World Wildlife Fund-U. S., which administers the annual prize, is the principal private American non-profit conservation group engaged in projects throughout the world.

. . .

Mr. and Mrs. Gordon Getty hosted a farewell banquet in San Francisco for the twelve Chinese paleontologists who spent a month in the United States, a sojourn

supported in part by a grant from the Leakey Foundation. The Chinese scientists visited five major research institutions to study and discuss recent finds in human and primate evolution and the Early Tertiary development of mammals.

Over forty American scientists and their spouses attended the dinner which marked an important milestone along the road toward full scientific cooperation and collaboration between American and Chinese paleontologists. Among the guests were Dr. and Mrs. Eric Delson of the American Museum of Natural History and Dr. Donald C. Johanson of the Cleveland Museum of Natural History. Several of the Leakey Foundation Trustees and Professor F. Clark Howell, chairman of the Foundation's Science and Grants Committee, assisted in welcoming the eminent visitors at the Gettys' home.

. . .

Three Leakey Foundation speakers made highly successful appearances this spring at the Academy of Natural Sciences of Philadelphia. Drs. Mary Leakey, Roger Payne and Jane Goodall addressed capacity audiences. Each event was preceded by a dinner and followed by a reception. While the Foundation and the Academy have cooperated on programs for a number of years, this was the largest number of Foundation speakers to visit the oldest natural science institution in the western hemisphere in a single season. □



FOUNDATION CENTER 13-83, PASADENA, CA 91125

NONPROFIT ORG.
U.S. POSTAGE PAID
L.A. CALIFORNIA
PERMIT NO. 29207

TIME VALUE -- PLEASE EXPEDITE

ADDRESS CORRECTION REQUESTED