

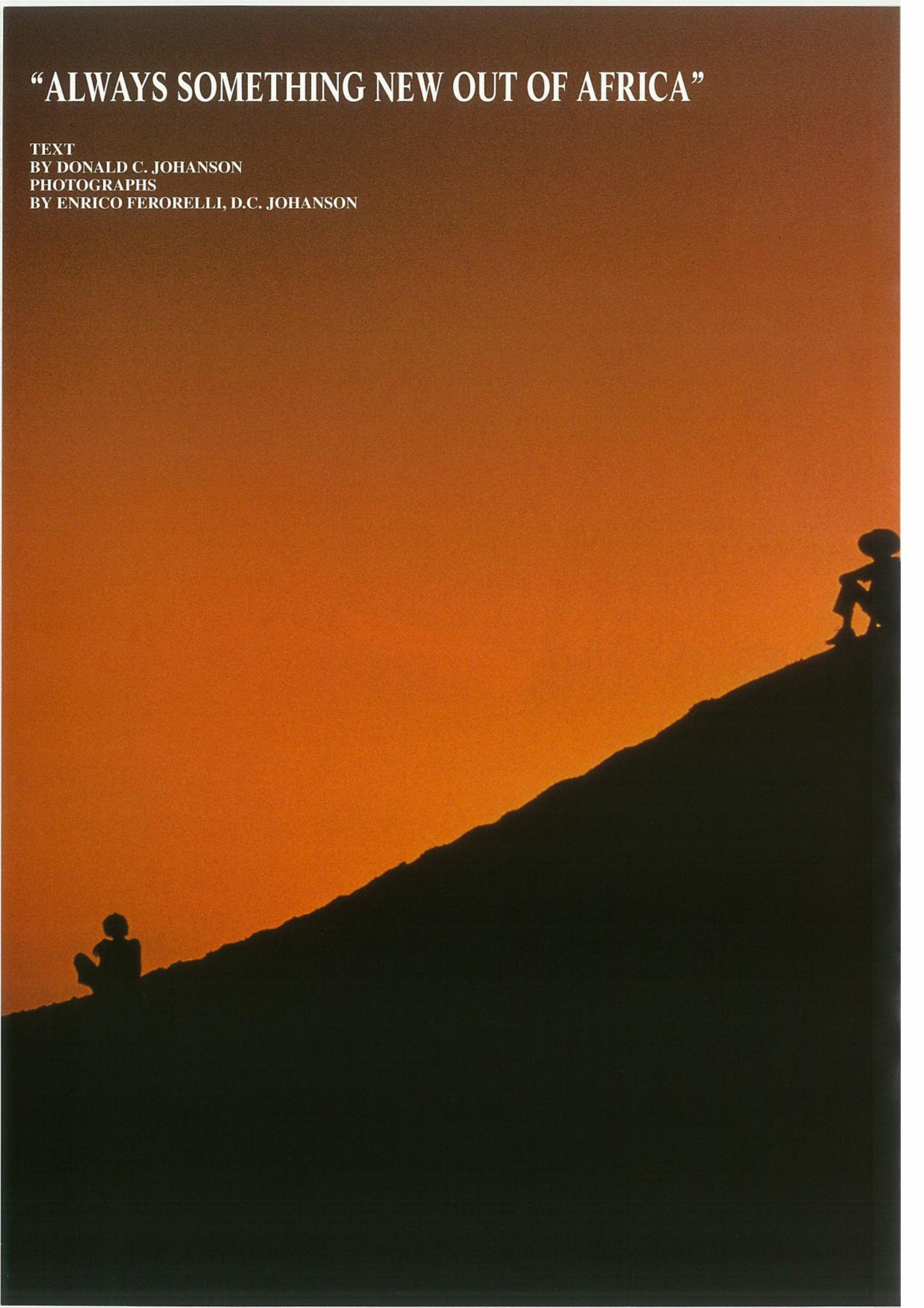
“ALWAYS SOMETHING NEW OUT OF AFRICA”

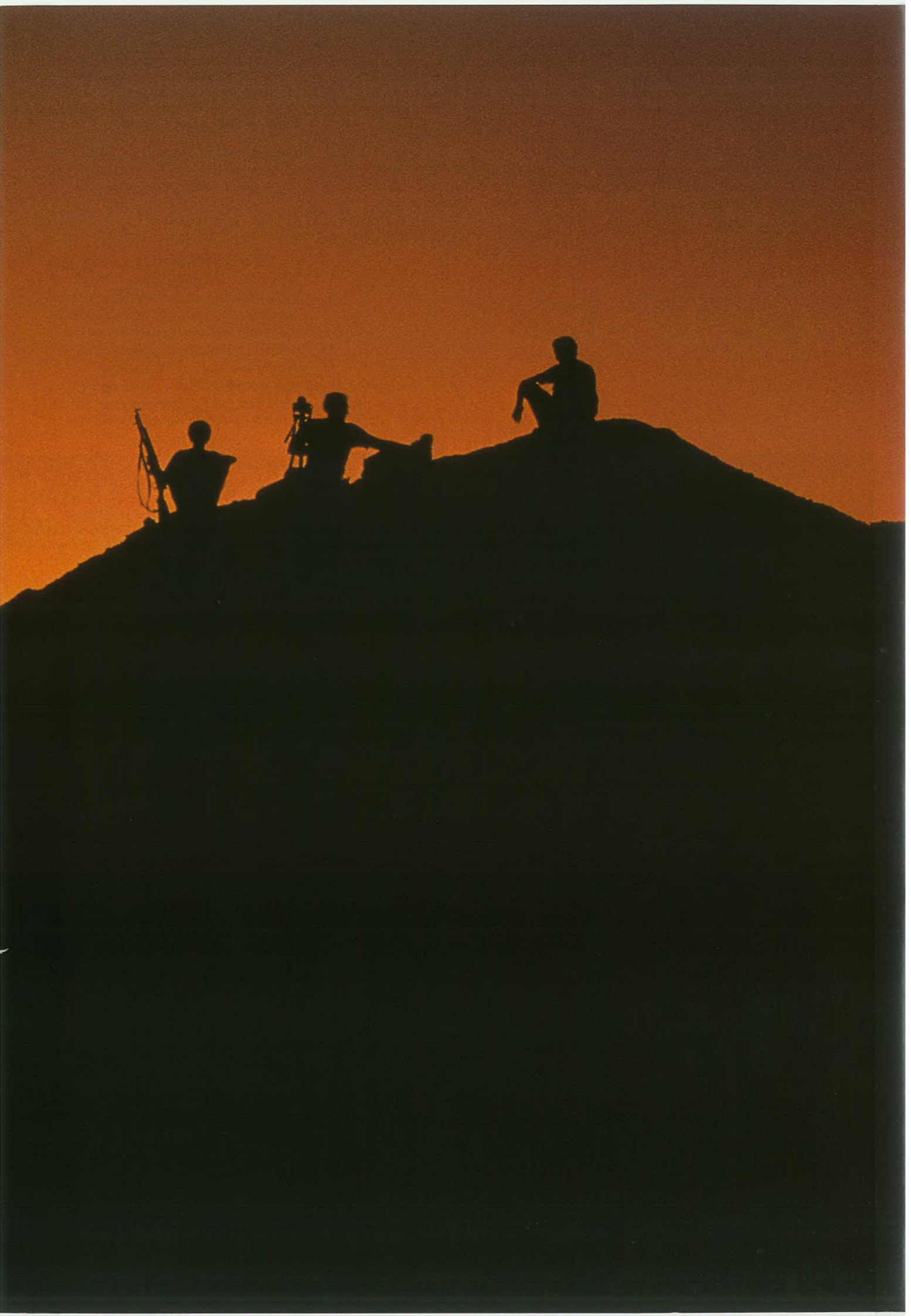
TEXT

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PHOTOGRAPHS

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Nelle pagine precedenti, alla fine di una faticosa giornata di lavoro i componenti della squadra si rilassano su di una collina: le loro figure si stagliano nel cielo radioso dei colori al tramonto.

Previous pages, at the end of a gruelling day's work some team members relax on a hill and are silhouetted against a sky radiant with the colours of the setting sun.

Sotto, i componenti della squadra interdisciplinare dell'Hadar Research Project convergono velocemente alla località Afar per compiere osservazioni ed iniziare un'attenta strategia sul rinvenimento e lo scavo del sito.

Below, Members of the Hadar Research Project interdisciplinary team quickly converged on Afar Locality to make observations and begin a careful strategy for collection and excavation of the site.

Accanto, dopo il setacciamento anche tutte le particelle che rimangono vengono attentamente selezionate per l'individuazione di altri possibili frammenti importanti di campioni fossili.

Opposite, after screening, all the particles left are carefully searched for any possible fragments of crucial fossil specimens.

Recent anthropological exploration in Africa has brought to light a number of highly significant discoveries which have augmented the number of specimens in the invaluable storehouse of fossil hominids. Fossilized remains of our distant ancestors are crucial for understanding details of our earliest beginnings and these finds from Africa's Great Rift Valley, especially sites in



Ethiopia and Kenya serve as the primary evidence for enlarging our appreciation of the diversity and adaptations of the earliest hominid species.

Expanding knowledge of our ancestry is primarily due to the successful implementation of an interdisciplinary research approach known as paleoanthropology. Paleoanthropology calls on a broadly conceived and

strategically implemented multidisciplinary approach to discover and interpret the evidence for human evolution. The integration of a diverse variety of disciplines into a sophisticated theoretical framework has led not only to additional fossil finds, but also to an expanded knowledge of the calibration of past evolutionary events as well as the paleoenvironment in which early hominids lived and even insights into their behavior. Furthermore, changes in theoretical approaches for analyzing the significance of fossil discoveries has led to a better appreciation of the complexities of the human family tree. Perhaps one of the better known stages in human evolution is represented by the species to which the famous skeleton "Lucy" belongs – *Australopithecus afarensis*. Since her discovery in 1974,

and subsequent recognition as a separate species, she has been the benchmark by which other fossil hominid discoveries are judged. Lucy's species is now well represented by hundreds of specimens from half a dozen sites in the Rift Valley extending from Hadar, Ethiopia, the home of "Lucy", south to Laetoli, Tanzania, where individuals left fossilized footprints in a 3.5 million year old volcanic ash.

A. afarensis was a long lived species, roughly spanning the one-million-year interval from four to three million years. In addition to the anatomy of the lower limb and pelvis, details of the footprints, such as the absence of a divergent, grasping great toe, confirm that *afarensis* was a bipedal species. Extensive anatomical and statistical study of the fossil remains of *afarensis* reveal a



Sotto, dopo due campagne e un'innumerabile quantità di ore di lavoro sul sito, lo scavo ha trasformato la collina in qualcosa di simile ad una piramide egizia. L'esatto orizzonte fu localizzato ove il teschio dell'ominide fu sepolto 3 milioni di anni fa.

Below, after two field seasons and countless hours working at the site, excavation has transformed the hill into something similar to an Egyptian pyramid. The exact horizon in which the hominid skull was buried three million years ago was located.

*Accanto, i sedimenti scavati vengono catalogati con attenzione e analizzati dai componenti della squadra, assicurando la conservazione di tutti i frammenti del cranio maschile dell'*Australopithecus afarensis* della località Afar 444.*

*Opposite, the excavated sediments were carefully collected and screened by team members, ensuring the recovery of all the fragments of the male skull of *Australopithecus afarensis* from Afar Locality 444.*

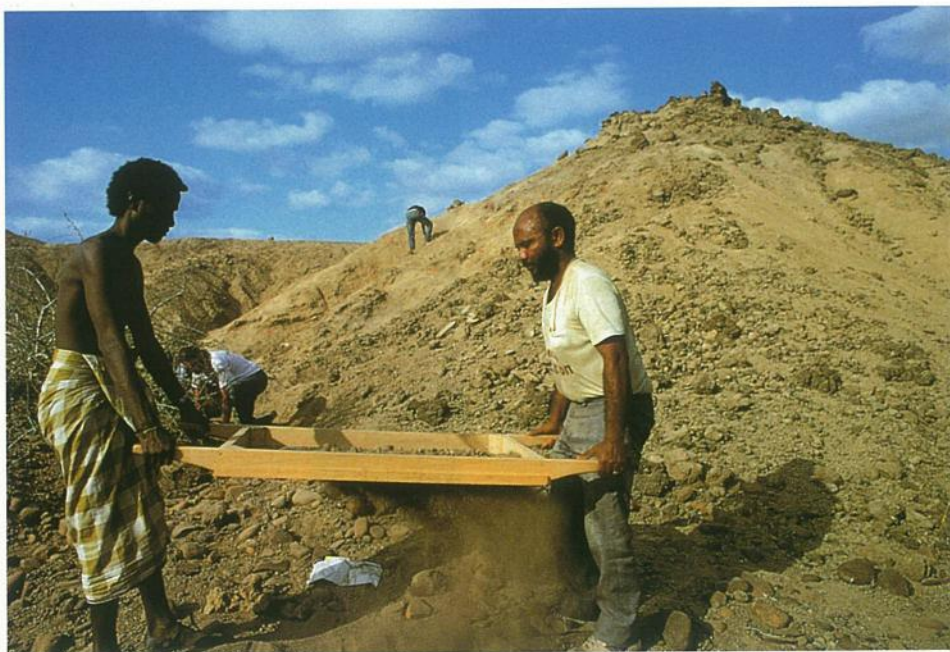




significant level of sexual dimorphism with males averaging 45 kilos, and standing 1.5 metres high and females averaging only 29 kilos and standing only 1.1 metres tall. Numerous ape-like characters in the face, cranium, mandible and teeth reflect a common ancestry shared with the extant African apes. Even the postcranial skeleton, while essentially bipedal, possessed relatively long arms, and short legs, probably an evolutionary carry-over from a more arboreal past. Absence of a fairly complete skull of *A. afarensis* has impeded our appreciation of this anatomical region, which had previously relied on a reconstruction incorporating skull fragments from different individuals. This was particularly unfortunate since it is the detailed anatomy of the skull which is most important in distinguishing one fossil

species from another. In 1992, however, Dr. Yoel Rak of Tel Aviv University participating on one of our expeditions to Hadar, discovered at Afar Locality 444, remains of a fairly complete *A. afarensis* skull in geological deposits definitively dated to three million years.

The specimen is the oldest, most complete australopithecine skull known and because of the relatively large canines and pronounced muscle markings, as well as the overall large size of the specimen, it is considered to be male. In large part it confirms the earlier skull reconstruction, but vastly expands our knowledge of the detailed skull anatomy of this ancient species. Although possessing a brain only 550 cc in size (modern humans average about 1300 cc), the skull, according to several measurements, is the largest yet found. A small crest set very far back on



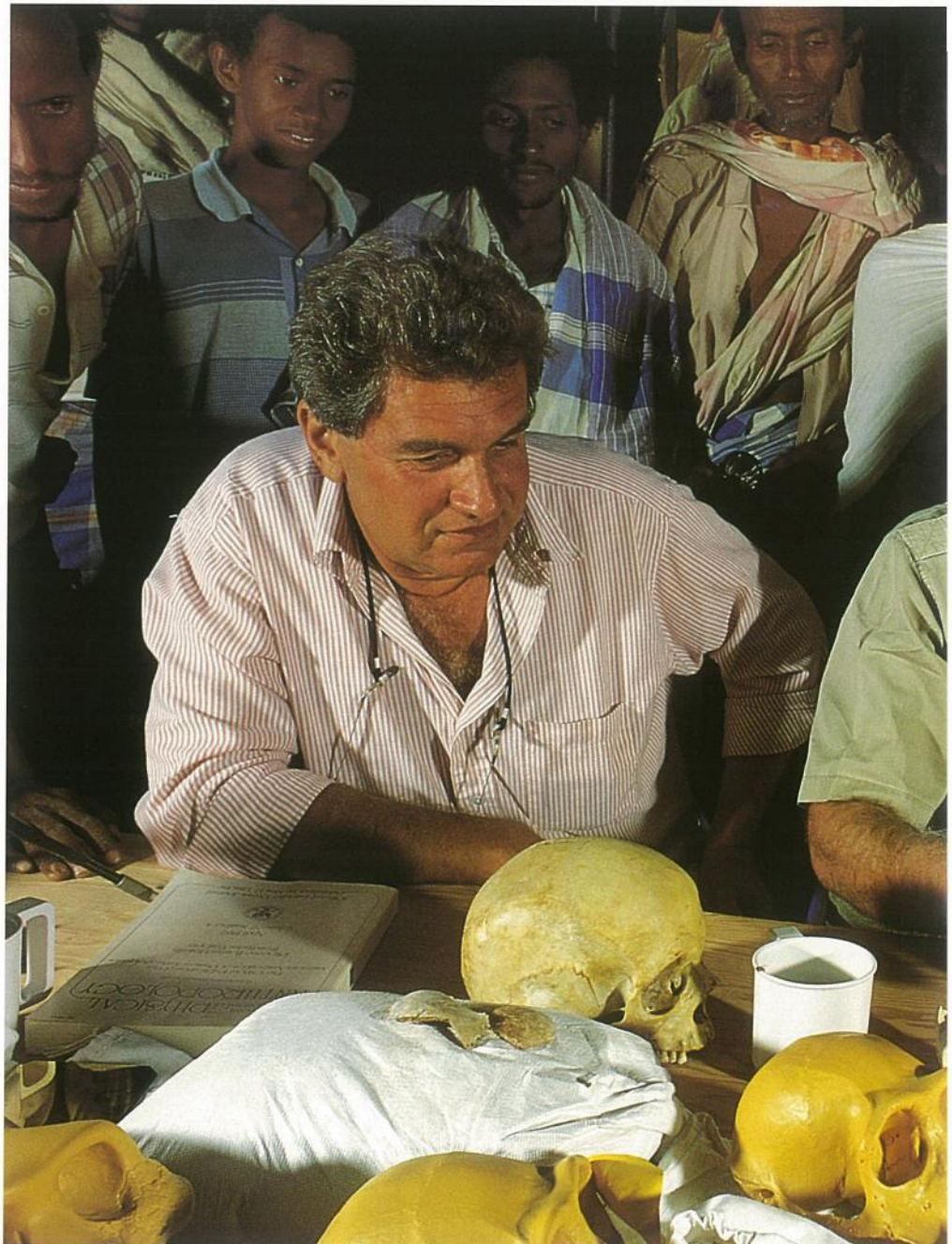
Il dottor Yoel Rak (sulla sinistra) dell'Università di Tel Aviv, con l'altro responsabile della spedizione, dottor Johanson (al centro) e il dottor Bill Kimbel, entrambi dell'Institute of Human Origins dell'Università statale dell'Arizona, discutono dei frammenti di ominidi fossili nel laboratorio da campo di Hadar. Ogni scoperta è di grande interesse per tutti i componenti della squadra. (Fotografia di Nanci Kahn).

Dr Yoel Rak (left) from the University of Tel Aviv, with the other excavation expedition leader, Dr Donald C. Johanson (centre) and Dr Bill Kimbel, both from the Institute of Human Origins at Arizona State University, discuss some hominid fossil fragments in the Hadar field laboratory. Each and every fossil hominid discovery is of great interest to all team members (Photo by Nanci Kahn).

the top of the skull, suggests that the major muscles of mastication, the temporalis, were oriented relatively horizontally, unlike modern humans in which they are more vertical. This perhaps reflects extensive use of the anterior teeth in feeding behavior. Currently under detailed study, this new Hadar skull holds substantial promise for not only more completely understanding

the anatomy and adaptations of *A. afarensis*, but also the position of this species on the evolutionary tree of humankind.

Newly discovered arm bones of *A. afarensis* are powerfully built, offering perhaps some insight into the probable behaviors of this species. Since most evidence from the teeth suggest that *afarensis* was essentially a vegetarian, it is



likely that powerful arms were utilized while gathering roots and tubers. Although essentially a terrestrial biped, *afarensis* individuals may have benefited from the use of powerful upper limbs in a variety of climbing activities, including foraging for food, climbing trees to escape predation and maybe even building sleeping nests. The extremely close genetic relationships

between modern humans and living African apes, is no doubt due to a common ancestor for these two distinct groups of primates. Based on the observation that chimps and gorillas differ much less in their anatomy than we do from the ape-like common ancestor, more ancient members of the hominid family (as is the case for *afarensis*) should be more ape-like in appearance. Until

recently, Lucy's species had no recognizable ancestors. However, finds of hominids, more than four million years old from Aramis, Ethiopia and Kanapoi, Kenya, provide us with potential precursors to *A. afarensis* and give us a broader framework in which to examine relationships of early hominid species. Although known since the late 1960s, fossil-rich geological deposits in the Middle Awash of Ethiopia have only recently been targeted for paleoanthropological research. Under the direction of anthropologists Tim White and J. Desmond Clark from the University of California and Berhane Asfaw from Addis Ababa, Ethiopia, 4.4 million year old geological strata at Aramis, have yielded provocative fossil hominid fossils. The presence of fossil hominids at Aramis, situated only 50 kilometres south of the Lucy site, was confirmed with the discovery of a single upper molar in December 1992. Less than a week later an intriguing mandible fragment containing a deciduous lower first molar was collected at the site. In 1994, after careful analysis and evaluation, these and additional finds from Aramis were placed in a new species *Australopithecus ramidus*. As predicted, *ramidus* fossils, presumably evolutionary closer in time to the common ancestor of African apes and hominids, exhibits a suite of anatomical features which are demonstrably more primitive than any other known hominid species. Some of the ape-like anatomical features which distinguish *A. ramidus* from other hominids include: relatively large upper and lower canines; a chimp-like lower first milk molar; an ape-like jaw joint; thin dental enamel; and a strongly asymmetrical lower first premolar. In fact, in some cases the morphology seen in the *ramidus* hominids is virtually indistinguishable from that seen in modern African apes. During two subsequent field seasons, 1994-95, the Middle Awash team collected numerous fossilized bones of an associated skeleton which were unfortunately badly crushed and broken. Although little information is currently available about the "mystery skeleton", because of the difficult task of preparing,



Sotto, albero filogenetico dell'evoluzione umana secondo Donald C. Johanson.

Pagina accanto, *Ardipithecus ramidus*, mandibola di bambino ritrovata nel giacimento di Aramis, in Etiopia, con un incisivo non sviluppato e un primo molare deciduo. Questo dente, custodito nel Museo di Addis Abeba, è di gran lunga più antico rispetto alle altre specie di ominidi. (Fotografia di Tim D. White/Brill Atlanta).

Below, Phylogenetic Tree of Human Evolution by Donald C. Johanson.

Opposite, *Ardipithecus ramidus*, child's jaw found in the Aramis deposit, Ethiopia. There is a undeveloped incisor and a first deciduous molar. Now in the Addis Ababa Museum, this specimen is much earlier than other species of hominids (Photo by Tim D. White/Brill Atlanta).

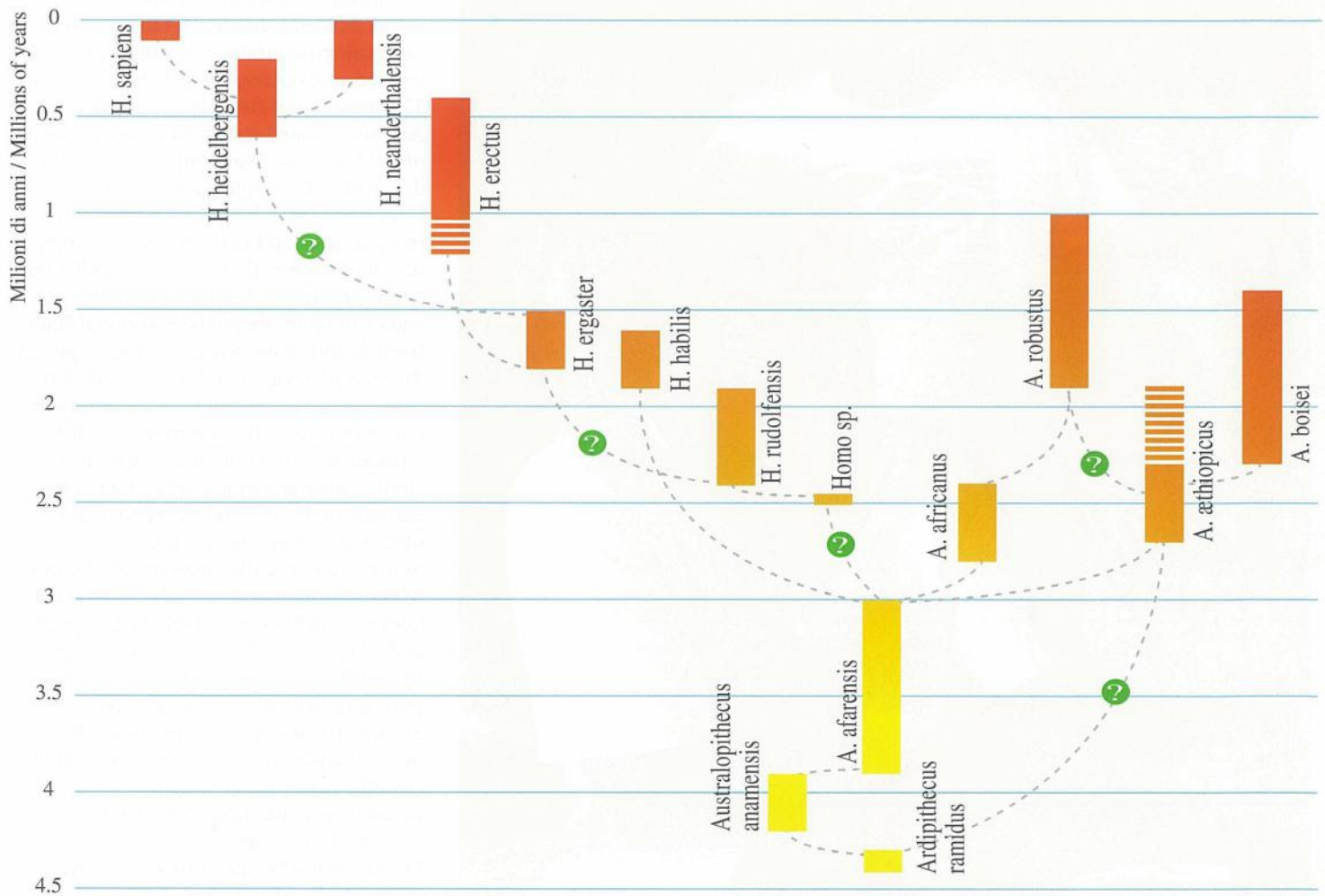
reconstructing, and analyzing the fossils, a number of observations can be offered. The skeleton is remarkably complete, even preserving seven out of the eight wrist bones and most of the finger bones, which are long and curved. The pelvis, lower limb, and foot bones will, no doubt, permit reconstruction of the locomotor behavior of this earliest hominid. Thus far, the finders have been cautious in saying that *ramidus* was bipedal, although a portion of the skull base preserves a forwardly positioned *foramen magnum*, a condition usually

considered indicative of bipedalism. Initially placed in the genus *Australopithecus*, the Aramis material, because of its anatomical and perhaps evolutionary distinctiveness, was recently transferred to a new genus, *Ardipithecus ramidus*. The genus and species names are derived from the Afar language of the local people. *Ardi* means "ground" or "floor" while *ramid* means "root"; *pithecus* is from the Greek and means ape. The name reflects the belief of the discoverers that this creature represents a basal hominid species, presumably

ancestral to all later species.

During exploration in 1965 at Kanapoi, a little known fossil site in northern Kenya, just southwest of Lake Turkana, a four million year old fragment of a hominid arm was recovered. The taxonomic identity of this specimen remained unresolved until more extensive remains were collected from this remote site in 1994 by a team under the direction of Dr. Meave Leakey of the National Museums of Kenya.

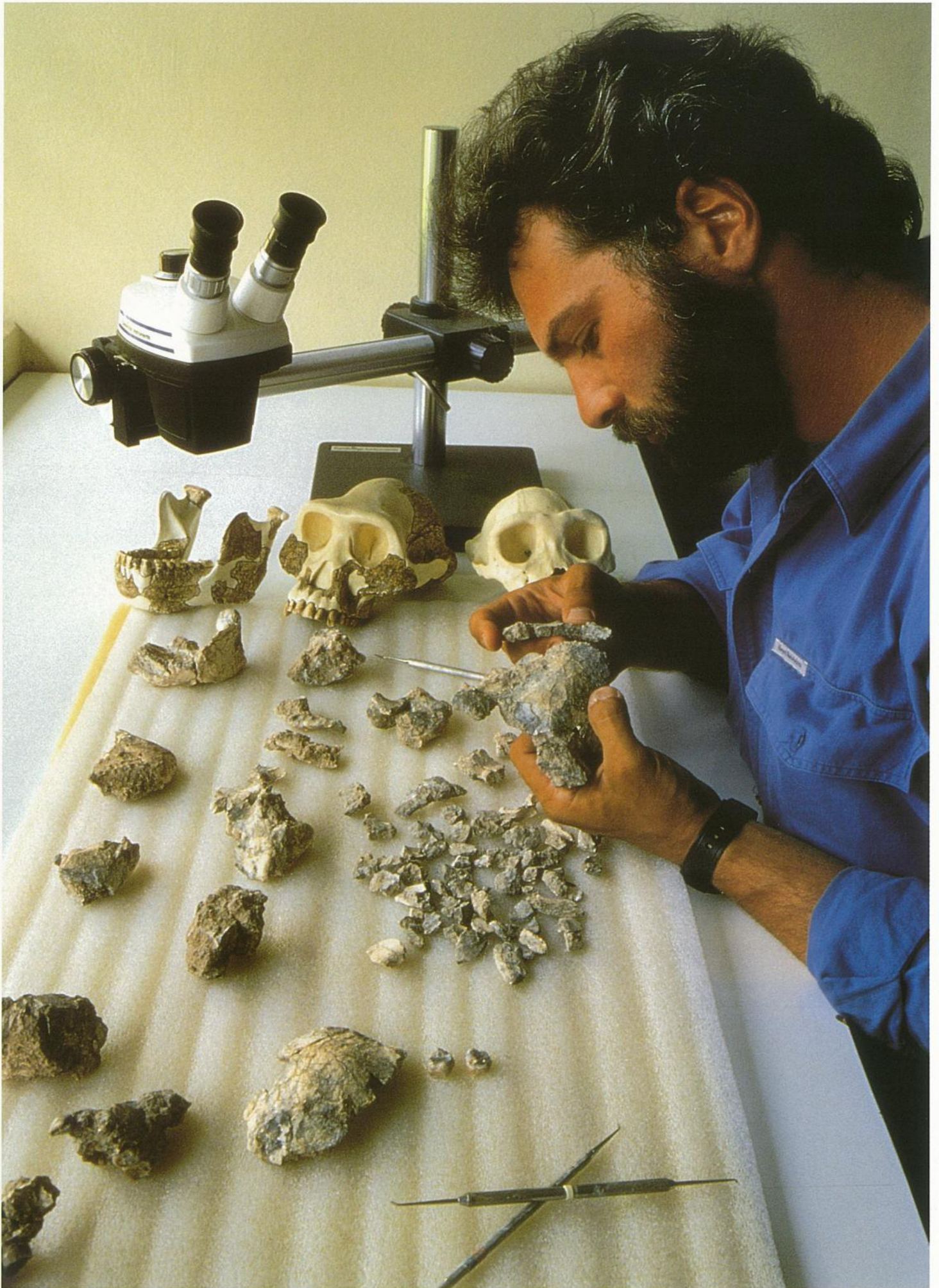
Successful fossil survey resulted in the recovery of nine dental, cranial, and



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<i>A. ramidus</i>	4.4	<i>A. boisei</i>	2.3-1.4	<i>H. ergaster</i>	1.8-1.5
<i>A. anamensis</i>	4.2-3.9	<i>A. robustus</i>	1.9-1.0	<i>H. erectus</i>	1.2-0.4
<i>A. afarensis</i>	3.9-3.0	<i>H. sp.</i>	2.5-?	<i>H. heidelbergensis</i>	0.6-0.2
<i>A. africanus</i>	2.8-2.4	<i>H. rudolfensis</i>	2.4-1.9	<i>H. neanderthalensis</i>	0.3-0.03
<i>A. aethiopicus</i>	2.7-1.9	<i>H. habilis</i>	1.9-1.6	<i>H. sapiens</i>	0.1-0.0





Pagina accanto, in un laboratorio del Museo Nazionale etiopico ad Addis Abeba, il dottor Bill Kimbel, condirettore della spedizione dell'Institute of Human Origins dell'Università statale dell'Arizona, inizia a ricomporre con attenzione i numerosi frammenti del cranio maschile di *Australopithecus afarensis*, rinvenuto ad Hadar.

Opposite, a laboratory in the Ethiopian National Museum, Addis Ababa. Dr Bill Kimbel, expedition co-director from the Institute of Human Origins at the Arizona State University begins to carefully assess the multitude of fragments of the male *Australopithecus afarensis* skull found at Hadar.

Sotto, mandibole inferiore e superiore e due frammenti di tibia appartenenti alla specie *Australopithecus anamensis* (4.1 milioni di anni) trovati nel 1994 a Kanapoi, Kenia. (Fotografia di Kenneth Garrett/National Geographic Image Collection).

Below, the upper and lower jaw and two tibia fragments from a male belonging to *Australopithecus anamensis* (4.1 million years old) found at Kanapoi, Kenya, in 1994 (Photo by Kenneth Garrett/National Geographic Image Collection).

postcranial hominid fossils. The teeth and jaws are quite primitive in their anatomy, but exhibit many similarities with *A. afarensis*. The total anatomical pattern exhibited in the Kanapoi hominids, dated to 4.1 million years, justifies placement in *Australopithecus*, but a number of primitive anatomical features warrants establishment of a new species: *Australopithecus anamensis*. The species name derives from the Turkana word anam, which means "lake", an obvious reference to nearby Lake Turkana. The type specimen, a partial mandible containing a full set of teeth, is rather small and narrow, not unlike mandibles of Miocene apes (10-15 million years

ago). Compared to mandibles of *A. afarensis*, the dental rows are even straighter and more parallel and in lateral view, the front of the *anamensis* mandible is strongly receding, and heavily buttressed internally. These and many other dental features substantiate the status of the Kanapoi material as a distinct species of *Australopithecus*. Although the postcranial skeleton is not well represented, the diagnostic anatomy of a proximal tibia affirms the bipedal behavior of *anamensis*. The most significant aspect of *A. anamensis* is that this species, with a similar but more primitive anatomy than that of *A. afarensis*, makes it a good

evolutionary predecessor to Lucy's species. Although, the lack of anatomical evidence now available for the Aramis hominids makes it difficult to ascertain its position on the family tree, the primitive, ape-like anatomy of *ramidus* opens the possibility that this species represents a separate, dead end lineage. On the other hand, with many anatomical features in *anamensis*, only slightly more primitive than those of *afarensis* a better case can be made for a continuum from the Kanapoi hominids to *A. afarensis*. The remarkable new finds from Hadar, Aramis and Kanapoi remind us of the pronouncement by Pliny the Elder, when he wrote, "*Ex Africa semper aliquid*



Sotto, benché non completo come il cranio di Australopithecus afarensis proveniente dalla località di Afar, sono stati rinvenuti frammenti sufficienti per permettere la ricostruzione di un cranio femminile. Un notevole dimorfismo sessuale caratterizzava questa specie i cui maschi erano molto più grandi delle femmine. (Fotografia di Yoel Rak).

Pagina accanto, Borneo, la mano di un piccolo primate e quella di un uomo. (Fotografia di Frans Lanting/Grazia Neri).

Below, although not as complete as the Australopithecus afarensis skull from Afar, sufficient fragments were found to make a reconstruction of this female skull. This species is characterised by marked sexual dimorphism, the males being very much larger than the females (Photo by Yoel Rak).

Opposite, Borneo, primate and man, hand in hand. (Photo by Frans Lanting/Grazia Neri).

novi". This continues to be true for paleoanthropologists, because as long as we continue to hunt for hominid fossils, the continent of Africa will continue to surprise us with intriguing pieces to the puzzle of human origins, and confirm the view that Africa was, indeed, the original homeland for humanity. What is becoming increasingly clear, however, is that the earliest hominids, those discussed in this article, most likely lived in more forested environments than is usually envisioned. It was not until later stages in human evolution, that our adventurous

ancestors ventured out onto the savannas where they encountered new environments, opportunities and challenges. A further insight into our own evolution is the simple observation, as predicted by Darwin, that there were probably many species of early hominids than we currently recognize. As more discoveries are made, the hominid family tree will undoubtedly become more complex, sprouting additional branches, most of which went extinct. What this means in practical terms is that the task of correctly identifying ancestral-

descendent relationships will become an ever more challenging process. The study of human origins is certain to remain one of the most fascinating and rewarding inquiries of the human imagination, for it is crucial that we pay close attention to uncovering and understanding the clues left behind by our ancestors. The continued success of the human species relies to a certain extent upon an expanded appreciation of our origins and our connectedness to nature and the inescapable revelation that all humans have a common origin.



