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The first sites with Pliocene and Pleistocene mammals west of the Rift Valley in Central Africa in northern Chad were reported in 1959 (ref. 1), and documented the presence of mixed savannah and woodland habitats. Further sites1 and a probable Homo erectus cranio-facial fragment2 were subsequently discovered. In 1993 a survey of Pliocene and Pleistocene formations in the Benue-Kuma-Ennedi-Tibesti Province of Chad (B.E.T.) led to the discovery of 17 new sites in the region of Bahr el Ghazal (classical Arabic for River of the Gazelles) near Koro Toro. Site KT 12 (15°58′10″ N, 18°52′46″ E) yielded an australopithecine mandible associated with a fauna biostratigraphically estimated to be 3.0-3.5 Myr old. Australopithecine species described since 1925 are known from southern Africa and from sites spread along the eastern Rift Valley from Tanzania to Ethiopia (Fig. 1). This new find from Chad, which is most similar in morphology to Australopithecus afarensis2, documents the presence of an early hominid a considerable distance, 2,500 km, west of the Rift Valley.

In the Chad basin, Pliocene sediments are generally covered by Quaternary ones and are known mostly from boreholes. However, they are exposed around Koro Toro, albeit rather poorly. Two sets of sediments are normally recognized, a lower sandy level lying unconformably on terrestrial deposits (Continental Terminal) and in part originating from these deposits, and an upper level of clays with sandy intercalations3-4. Features of the KT 12 fluvo-lacustrine facies indicate reworking of older sediments (rounded quartz, perhaps from the Continental Terminal), and suggest a very low-energy fluvial system (angular quartz and no graded bedding). The latter suggestion is supported by the discovery of an articulated Ceratotherium skeleton.

The fossil vertebrates from KT 12 consist of surface finds and some in situ material, both from the same level of poorly consolidated fine-grained sandstone. This level contains abundant quartz (some rounded, some angular) and some potash feldspar (microcline). Traces of hydrated sodium silicates indicate phases of evaporation during dry episodes. There is no graded bedding. Quartz with undulatory extinction indicates tectonic deformation. Other strongly corroded quartz indicates the presence of dissolution channels.

Preliminary identifications of the taxa from KT 12 are as follows:

Placental mammals
- Loxodonta
- Trionyx
- Crocodylidae
- Geochelone

Reptiles
- Aladji H. E. Moutaye

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TABLE 1. Dental measurements of Australsapithecus af. A. afarensis (KT 12/H)

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<th>I2</th>
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<td>L (mm)</td>
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<td>R (mm)</td>
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<td>Labiolingual (broadth) (mm)</td>
<td>7.6</td>
<td>11.0</td>
<td>11.0</td>
<td>12.7</td>
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Perissodactyla: Ceratotherium cf. procox, as from Hadar3; Hipparion sp. af. H. afarensis; H. harrisoni as from Hadar5-11.


Bovid indet.

Hippopotamidae: cf. Hexaprotodon protunpamphus turkanae, as from Omo13.

Preliminary analysis suggests that the fauna from KT 12 shows closest resemblances to collections from Hadar with an approximate age of 3.0-3.4 Myr. The non-hominid fauna contains aquatic taxa (such as Siuridae, Trionyx, cf. Tomistoma), taxa adapted to wooded habitats (such as Loxodonta, Kobus, Kolpochoerus) and to more open areas (such as Ceratotherium, Hipparion). Assuming that there has been extensive transport, as suggested by the sedimentary environment, we tentatively propose that the palaeontological and sedimentological evidence is compatible with a lakeside environment, with both perennial and permanent streams, and a vegetation mosaic of gallery forest and wooded savannah with open grassy patches.

FIG. 1. Geographic location of the major sites with primitive hominids: 1, Taung; 2, Kromdraai; 3, Sterkfontein; 4, Swartkrans; 5, Makapansgat; 6, Laetoli; 7, Olduvai; 8, Kanapoi; 9, Middle Awash; 10, Hadar; 11, Bahar el Ghazal (KT 12).
The new hominoid discovery, KT 12/1, is a parasymphyseal fragment of an adult mandible with symmetrical fractures passing distal to the P3 roots. It includes the crowns of the right P4, P3, and the left C-P1 (Figs 2 and 3, Table 1). The specimen is currently being studied at the University of Poitiers Faculty of Sciences, and will be permanently curated at CNAR in N’Djamena, Chad.

The specimen is most similar to A. africanaus, with large incisors, strongly bicuspid P4s, P3s with a modest talonid, and cingula on canines and premolars. It differs from A. aferensis (and other australopithecine specimens known to us) in several features, including the form of the lingual surface of the symphysis which has a subvertical planum alveolare, with small superior and inferior transverse tori, both premolars with three distinctly different roots, and premolar cuspoidal enamel that appears in computed axial tomography (CAT) scans to be thin. We will make extensive comparisons of the new specimen with the relevant hominid material from sites elsewhere in Africa. For the time being we refer the new specimen to Australopithecus af. A. aferensis.

The discovery of an australopithecine mandible together with a middle Plio-Pleistocene fauna 2,500 km west of the Rift Valley considerably extends the known range of these early hominids and raises several interesting issues. The Chad specimen is most similar to its East African contemporary A. aferensis. Nevertheless, in certain features—mandibular morphology, premolar roots and enamel thickness—it differs from the described hypodigm of A. aferensis. Given the genetic and morphological differences now recognized between allopatric populations within, for example, Pan troglodytes, Gorilla gorilla, Pongo pygmaeus and Papio hamadryas 15-17 as well as other African mammals 18, it is not surprising that contemporaneous hominid populations as geographically distant as Chad and Ethiopia, Kenya and Tanzania would differ in morphology, regardless of whether they are classified as species or subspecies. Here we do not choose to name a new species, recognizing that more detailed comparisons are necessary before the taxonomy of this Bahr el Gazal hominid can be resolved.

Eastern and southern Africa, the regions from which the seven or so species of australopithecine have been currently described 18,22, are separated by more than 2,000 km; similar but different species are present in the two regions, and related hominids surely inhabited the intermediate areas. No aplies have been collected throughout this entire zone. Over the past 20 years 26-28 there has been a growing consensus that the western Rift Valley, which developed during the late Miocene, played a major role in the origin of hominids, segregating more forested chimpanzee habitats to the west from more open hominid habitats to the east, with eastern Africa seeming as being particularly significant.

The presence of middle Plio-Pleistocene hominids in Chad, a further 2,500 km to the west of the western Rift Valley, suggests that at least by that time hominids were distributed throughout the woodland and savanna belt from the Atlantic Ocean across the Sahel to the Cape of Good Hope. The early Pliocene and probably late Miocene presence of hominids in eastern Africa 29 supports an origin there for the hominids, but this inference is based entirely on the fact that comparably aged sediments are either absent from or have not yet been located in southern, central and western Africa. If the origins of hominids occurred rapidly, followed by rapid range extensions, as seems likely, it may be as futile to seek a specific and localized place of origin for hominids as it is for any other group.
ACKNOWLEDGMENTS. I am honored to name this primitive hominid 'Ardi,' in dedication to the memory of our colleague and friend Abel Delson, who died in the field in Cameroun on 27 February 1993. This research was made possible by the Ministère Tahitien de l'Éducation nationale and the Centre National d'Appui à la Recherche (CNAR). Triangles Téa and the Diana de Leopoldo Gonzaga to the Hommes and the Conservation des Natives Unis pour le Développement (MNCUD), Mission Française d'Ethnologie de la Culture and the Human Development Institute of Polynesia. We thank the French Army General Antoine Gersault Météo Spécial, W. Johannes and the Mission d'Amérique de l'Est et du Pacifique for the other expedition members. M. B. Bouvier and R. V. Noir to the baskets and J. E. Fratessi for the sediments. Environment, J. Denardo and L. de Boer for assistance, V. Kaldis for photography, G. Pasch for secretarial support, G. M. Krabbendam for the cast, and S. I. Wol for the drawings.