



# A new species of bull from the Early Pleistocene paleoanthropological site of Buia (Eritrea): Parallelism on the dispersal of the genus *Bos* and the Acheulian culture

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## ABSTRACT

The origin of the genus *Bos* is a debated issue. It has traditionally been linked with that of the genera *Leptobos* and *Bison*, two Eurasian forms. The oldest record of *Bos*, *B. primigenius*, in Eurasia is at Venosa-Notarchirico, Italy (~0.5 to 0.6 Ma). However, the oldest published evidence of modern *Bos* is a skull fragment from Asbole, Lower Awash Valley, Ethiopia (~0.6 to 0.8 Ma). This paper describes a new species, *Bos buiaensis*, from Buia, Eritrea (1.0 Ma). *B. buiaensis* shows a combination of primitive characters of the African Late Pliocene and Early Pleistocene form *Pelorovis sensu stricto* and derived characters of *B. primigenius*. This new finding demonstrates that *Bos* has been part of the human ecological landscape since the beginning of the genus *Homo* in the African Late Pliocene.

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## 1. Introduction

The fossiliferous area of Buia (100 km south of Massawa, northern Danakil Depression, Eritrea) (Fig. 1) was discovered in 1995 by a joint Eritrean–Italian mission. Further studies were carried out in the area during several field seasons in 1995–1997 and 2003–2004. These activities led to the discovery of a new and important paleoanthropological site at Buia (Abbate et al., 1998, 2004; Macchiarelli et al., 2004; Bondioli et al., 2006; Ghinassi et al., 2009). Here, an abundant fossil vertebrate collection was recovered (Ferretti et al., 2003; Delfino et al., 2004; Martínez-Navarro et al., 2004) and a large number of archaeological localities with extraordinarily abundant and well preserved Mode 1 (Oldowan) and Mode 2 (Acheulean) tool industries (Martini et al., 2004) identified. Magnetostratigraphy (Albanielli and Napoleone, 2004) coupled with mammal biochronology (Ferretti et al., 2003; Martínez-Navarro et al., 2004) and fission-track dating (Bigazzi et al., 2004) has established the chronology of the site at around 1.0 Ma, at the top of the Jaramillo normal subchron.

Large Bovini remains are abundant at the site. In previous papers they were ascribed to the Early Pleistocene form *Pelorovis oldowayensis* (Abbate et al., 1998; Martínez-Navarro et al., 2004), the large buffalo described from Olduvai (Reck, 1927). In November of 2003, a fragmented cranium with both horn-cores of a large buffalo was recovered at the locality A094 at Buia. After lengthy cleaning and consolidation, all the fragments were joined, allowing the reconstruction of an almost complete skull (Fig. 2). This cranium corresponds to a new species of the genus *Bos*, more derived than *Bos oldowayensis* (the former *P. oldowayensis*) and less so than the Eurasian Middle Pleistocene–Holocene form *B. primigenius*. It is probably in connection to the early Middle Pleistocene *Bos* species from Asbole, Ethiopia (Geraads et al., 2004).

## 2. Description of the new species

Family: Bovidae Gray, 1821.

Tribe: Bovini Gray, 1821.

Genus: *Bos* Linnaeus, 1758.

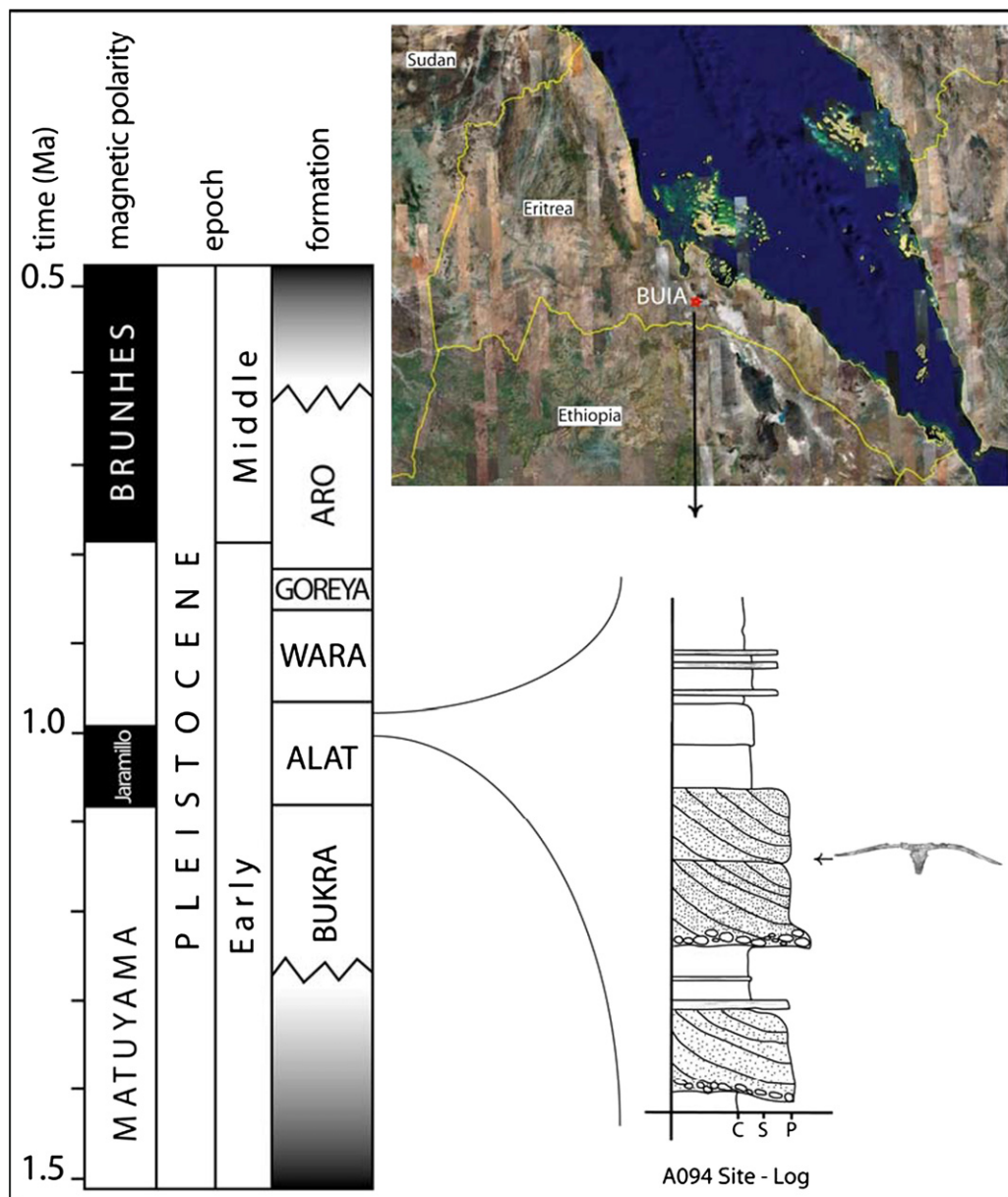
Species: *Bos buiaensis* sp. n.

**Holotype:** almost complete cranium with both horn-cores DAN-244 (Fig. 2).

**Other material:** three right horn-core fragments of the same individual (UA-138, UA-142 and UA-144), 1 apical left horn-core fragment (UA-143), 1 left horn-core fragment (UA-451), 1 horn-core fragment

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**Fig. 1.** Map and generalized sections. Top right: satellite imagery showing the location of the Buia study area. Left: generalized stratigraphic section of the Buia basin succession and its magnetostratigraphy. Right bottom: measured stratigraphic section of the upper portion of Aalat Formation as outcropping at A094 site showing the placement of Acheulean artefacts and *Bos buiaensis* n. sp. type specimen.

(UA-150) 1 left maxillary fragment with  $M^1$ – $M^2$  (UA-450), 1 upper  $M^1$  (DAN-63) 1 upper left  $M^3$  (UA-168), 2 upper molar fragments (UA-8, UA-134), 1 left mandibular fragment with  $DP_3$  and fragmented  $DP_4$  (DAN-83), 1 left scapula fragment (UA-360), 1 right scapula fragment (UA-359), 1 right radius-ulna (UA-361), 1 distal end right radius-ulna (DAN-235), 2 left talii (DAN-127, DAN-237), 2 right talii (UA-65, DAN-85), 1 left calcaneum fragment (UA-380), 1 right navicular-cuboid (UA-311), 1 distal fragment of a metacarpal (UA-46), 1 left distal fragment of a metatarsal (UA-459), 1 distal fragment of a metatarsal (UA-165), 3 medial phalanges (UA-106, DAN-196), all of which have been described previously (Martínez-Navarro et al., 2004).

*Biometric data of the holotype:* see Table 1.

*Derivatio nominis:* from the region where it has been found (Buia basin, Eritrea). Holotype and all other specimens are housed at the National Museum of Eritrea (Asmara, Eritrea).

*Type locality:* A094 (Buia Project site code); UMTS coordinates 37P E599574 N1627837; Dioli area, Buia basin, south of Dandero river, Danakil Depression, Eritrea (Fig. 1).

*Stratigraphic level:* sandy level within the Aalat Formation (Maebele Synthem; Dandero Goup) of the Buia basin (Abbate et al., 2004; Ghinassi et al., 2009). Sediments are characterized by normal polarity (paleomagnetism), interpreted as the top of the Jaramillo chron (C1r.1n) chronologically referable to approx. 1.0 Ma (Albanielli and Napoleone, 2004).

*Other localities:* specimens labelled DAN come from the type locality; specimens labelled UA come from the Wadi Aalat hominin site (UMTS coordinates 37P E600710 N1632638). Both sites are correlated on the basis of lithostratigraphy (Aalat Formation); Dioli and Wadi Aalat are correlated on the basis of basin stratigraphy and their paleomagnetic signatures.

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