



# Pliocene Carnivora (Mammalia) from the Hadar Formation at Dikika, Lower Awash Valley, Ethiopia



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## ABSTRACT

We report here on further study of the Carnivora collected by the Dikika Research Project at Dikika, in the Hadar Formation south of the type locality since 2000. The Canidae and the otter *Enhydriodon* have been described elsewhere, so we focus here on the other Mustelidae and on the Felidae and Hyaenidae. All Hyaenidae are referred to *Crocuta*, but differences in size and tooth proportions suggest two species that might belong to distinct lineages. An associated set of upper and lower teeth is made the type of a new species of *Lutra* that must be close to the divergence of *Lutra palaeindica*, *Lutra lutra*, and *Hydrictis maculicollis*. Sample size is still small, but the Dikika assemblage differs from others of similar age in the abundance of hyenas relative to felids.

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## 1. Introduction

The Dikika Research Project has been working since 1999 in the Pliocene Hadar Formation south of the Awash River. From base to top, the Dikika composite sequence includes the same members as in the type area north of the river, i.e., the Basal, Sidi Hakoma, Denen Dora and Kada Hadar Members, dated to ca. 3.5–2.9 Ma, followed by an unconformity that marks the base of the overlying Busidima Formation (Wynn et al., 2008, and Refs. therein). Most of the sediments at Dikika belong to the oldest two members, and are highly fossiliferous; they yielded numerous remains of *Australopithecus afarensis*, of which the juvenile skeleton nicknamed “Selam” is the most famous (Alemseged et al., 2006; Wynn et al., 2006), associated with a rich vertebrate fauna. Among the carnivores, new species of a canid and of a gigantic otter have already been described (Geraads et al., 2010, 2011), and we continue here the study of this group.

Abbreviations: MNHN: Muséum National d'Histoire Naturelle, Paris; KNM: National Museums of Kenya, Nairobi; RMCA: Royal Museum for Central Africa, Tervuren; NME: National Museums of

Ethiopia, Addis Ababa; RVRME: Rift Valley Research Mission in Ethiopia.

## 2. Systematic paleontology

Order Carnivora.  
Family Herpestidae.  
Genus *Herpestes* Illiger, 1811.  
Cf. *Herpestes* sp.

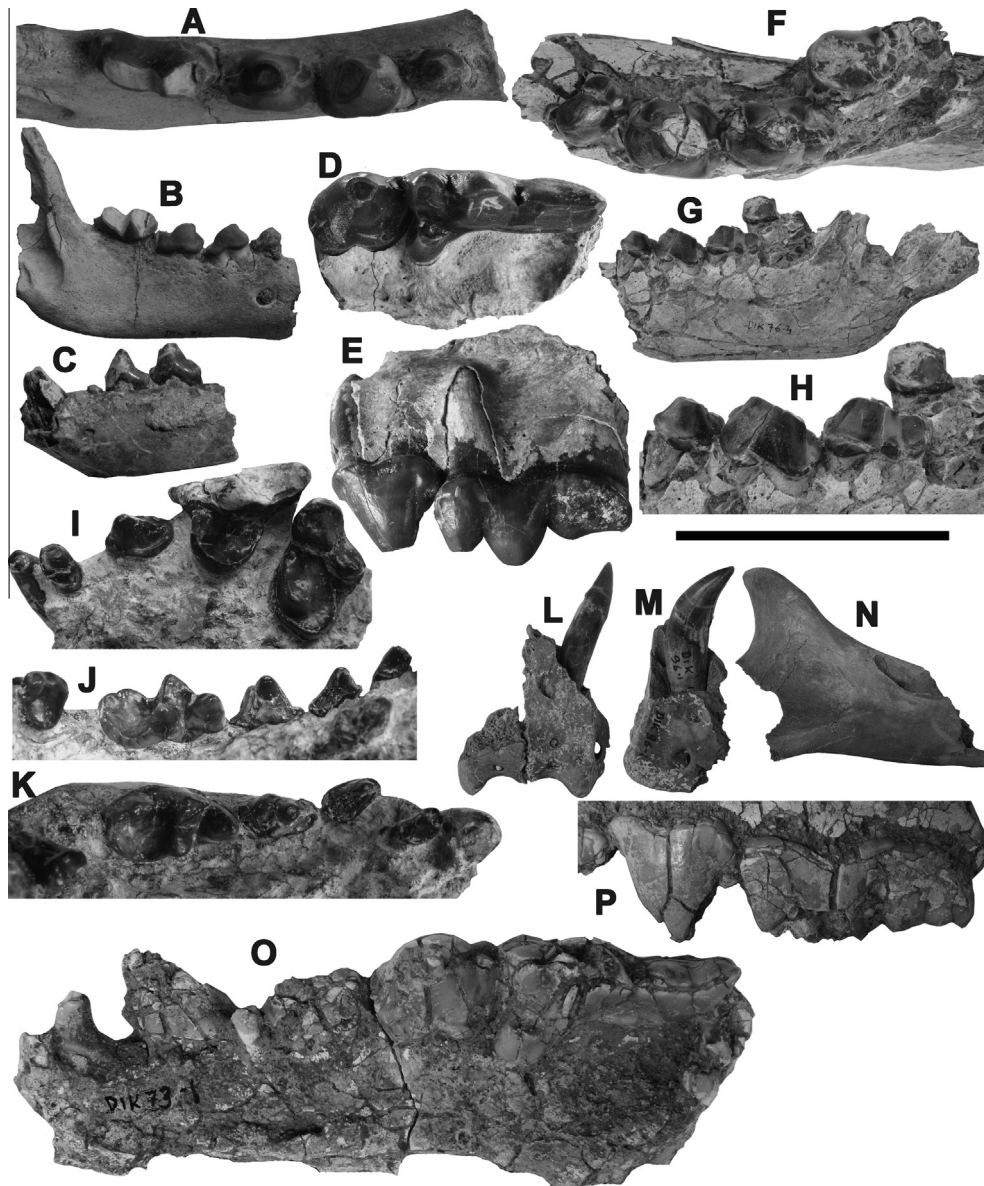
A tooth fragment collected during screening at locality DIK-1 comprises most of a thick P4 blade, but lacks the protocone; it has a tall paracone and a well-marked carnassial notch, showing that it is certainly herpestid. An anterior mandibular fragment with incomplete p1–p3, also from DIK-1 (Fig. 1C), could well be of the same species. The generic identification is tentative; the material is too limited for fruitful comparisons with other African forms.

Family Hyaenidae.  
Genus *Crocuta* Kaup, 1828.  
*Crocuta dietrichi* Petter and Howell, 1989.

DIK-32-1 is a right mandible from the Basal Member at Ilanle (Fig. 1A and B). It includes most of the corpus, the anterior portion of the ascending ramus, and well-preserved but heavily worn

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**Fig. 1.** A–B; *Crocota dietrichi*, mandible with p2–m1 DIK-32-1 in A, occlusal, and B, buccal views. C, *Cf. Herpestes* sp., mandible with c–p3 from DIK-1 in buccal view. D and E, *Crocota cf. dietrichi*, maxilla DIK-43-14 with P3–P4 in D, occlusal and E; buccal views. F–H, *Crocota cf. dietrichi*, DIK-76-4c in F, occlusal, and G and H, buccal views. I–K, *Lutra hearsti* n. sp., holotype DIK-50-35; I, occlusal view of C-M1; J, lingual view of p2–m1, K, occlusal view of c-m2. L–N, *Homotherium hadarensis*, mandible DIK-96-1; L, front view of the symphysis with the canine; M, lateral view of the same, N, lateral view of right dentary. O and P, *Crocota eturono*, maxilla with I3-M1 DIK-73-1; O, occlusal view; P, lateral view of P3–P4. Scale = 10 cm for Figs. B, G, L–N, 5 cm for Figs. A, D–F, H, O–P, 2.5 cm for Figs. C, I–K.

p2–m1. It is among the smallest known *Crocota*, being only slightly larger than the specimen from Meob, Namibia (Morales et al., 2011). Compared to other species of *Crocota*, the mandibular corpus below the ascending ramus is deep, probably because of the old age of this individual. The corpus is shallower below the premolars and diastema, but remains deep rostrally, so that it is likely that the canine was rather upright; there is a large mental foramen below p2, as in modern *C. crocuta*.

Due to the advanced wear that differentially affected the distal portions of the teeth, the crowns of p2 and p3 are not horizontal but inclined backwards. Additionally, their relative positions may have been modified but p2 did not insert significantly higher than p3. Its insertion in the jaw is thus similar to that observed in other early fossil forms such as *C. dietrichi* from Laetoli (Laet 75-2953, Laet 78-5107) and Koobi Fora (KNM-ER 721) and contrasts with the derived condition found in *C. crocuta* and most closely related forms, and in *C. dbaa* from the late Pliocene of Ahl al Oughlam,

Morocco (Geraads, 1997). Although there are exceptions, in the derived condition p2 usually inserts much higher than p3, so that their cervixes are at different levels. The height of p3 of DIK-32-1 cannot be estimated, but its position in the jaw shows that it was much less tall than in *C. crocuta*. It is, however, broad with a rectangular outline, as in other *Crocota*. The p4 is heavily worn and displays no diagnostic features. The carnassial blade is also well worn, with a small vestigial metaconid and a short and simple talonid. This tooth is remarkably long relative to the premolars, as shown in Fig. 2 where the length of m1 is plotted against the sum of the lengths of the premolars. DIK-32-1 is morphologically similar to the Meob specimen, and shares with it a long m1 relative to the premolars. As shown in Fig. 2, such a long carnassial is also found in *C. dietrichi* (the length of the missing p2s for the holotype Laet 75-2953 and for Laet 76-3970 were estimated at 13 and 14 mm, respectively; these are maximum estimates from what remains of these teeth). Not unexpectedly, among the large sample

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