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2001

Bernard Price Institute for Palaeontological Research

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Palaeont. afr., **37**, 99-102 (2001)

NEW VIVERRINAE (CARNIVORA: MAMMALIA) FROM THE BASAL MIDDLE MIOCENE OF ARRISDRIFT, NAMIBIA

by

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ABSTRACT

A new genus and species of viverrid of modern type, *Orangictis gariepensis,* is described from the basal Middle Miocene locality of Arrisdrift in southern Namibia. It is the earliest known representative of the subfamily Viverrinae from Africa. Detailed examination of the mongoose-like carnivores of the early Miocene of Africa, hitherto all assigned to the family Viverridae, reveals that none of them are related to this group.

KEYWORDS: Middle Miocene, Namibia, Viverridae, Carnivora, Arrisdrift

INTRODUCTION

In a recent publication, Morales *et al.*, (1998) described the carnivore fauna from Arrisdrift, Namibia. Excavations that were undertaken in the past few years have led to the discovery of additional taxa which were not represented in the earlier samples. The aim of this paper is to describe a new genus of viverrid from this early Middle Miocene site.

SYSTEMATIC DESCRIPTION

Family Viverridae Gray, 1821
Subfamily Viverrinae Gill, 1872
Genus *Orangictis* nov.
Species *Orangictis gariepensis* nov.

Etymology: The genus is named for the Orange River with the suffix *ictis* which is often used in composing the names of small carnivores; Gariep is the Khoi name for the Orange River.

Holotype: AD 613'98, hemi-mandible with C-M_2 (Figure 1), housed at the Geological Survey of Namibia Museum, Windhoek.

Paratype: AD 119'98, right mandible with C-M_1 (Figure 2), housed at the Geological Survey of Namibia Museum, Windhoek.

Diagnosis: Primitive viverrine intermediate in size between *Viverricula indica* and *Viverra zibetha.* Robust dentition. P_4 with greatly reduced anterior cusplet, M_1 short with high and closed trigonid, in which the metaconid is important and the paraconid is in a very lingual position. Small talonid with very well developed entoconid, attaining the height of the hypoconid. M_2 relatively large, with open trigonid in that there remains a small paraconid and the metaconid is slightly higher than the protoconid, the talonid is deeply excavated like that of M_1, but the hypoconulid is higher than the entoconid and is separated from it and the hypoconid.

Type locality: Arrisdrift, Sperrgebiet, Namibia.
Age: Basal Middle Miocene (Faunal Set P IIIa) (approximately MN 4) ca 17.5 Ma.

DESCRIPTION OF THE HOLOTYPE

The canine is poorly preserved, but would have been robust with an oval section. The P_1 is uniradiculate and very reduced. The P_2 has a voluminous main cusp, a small low anterior cusplet and a small but high distal cusplet, and there is a small basal cingulum posteriorly (Figure 1). The P_3 is similar to the P_2 but the cuspids and cingulum are better developed. The P_4 is more robust than the other premolars and possesses a large posterior cusp in a more buccal position, and an enlarged posterior cingulum which lingually develops two medium sized cusplets. The anterior cusplet is small. The M_1 is slightly corroded on its external wall at the height of the hypoconid and on the internal wall of the paraconid. Nevertheless, the structure of the tooth is clearly visible. The trigonid has a v-shaped occlusal morphology with a high, voluminous metaconid situated close to the protoconid which occupies a very lingual position. The talonid is well developed, possessing a strong entoconid which is probably slightly lower than the hypoconid, but in any case almost the same height as it. The entoconid is joined to the hypoconid by a low but well developed hypoconulid which closes the posterior margin of the talonid. The entoconid is clearly separated from the metaconid, so much so that a small, low, cusplet exists between them. The lingual wall of the hypoconid is oblique to the axis of the tooth, being oriented towards

the contact between the metaconid and protoconid. The talonid valley is closed only on its buccal side and appears to be deeply excavated. The M_2 is well developed, the trigonid being formed of a high, conical metaconid and a lower, more elongated protoconid, and a minute paraconid can be detected. The strong talonid is limited anteriorly by the posterior cristids of the metaconid and protoconid, and like the M_1, is deeply excavated, but the hypoconulid is higher than the entoconid and is separated from it and the hypoconid. The mandibular body is high and wide with a robust symphysis marked by strong rugosities.



Figure 1. *Orangictis gariepensis* nov. gen., sp. from Arrisdrift, Early Middle Miocene, Namibia. AD 613'98, holotype left mandible with C-M_2; top: longual view, middle: labial view, bottom: occlusal view (stereo). (Scale bar: 10mm).



Figure 2. *Orangictis gariepensis* nov. gen., nov. sp. from Arrisdrift, Early Middle Miocene, Namibia. AD 119'98, paratype right mandible with C-M1 in occlusal view (stereo). (Scale bar: 10mm).

Measurements: (Length-width in mm) P_2 5.1 x 3; P_3 6.3 x 3.9; P_4 7.0x 4.4; M_1 ca 8.5 x 5.0; M_2 5.2 x 4.1.

Referred material. AD 429'97, a left mandible and AD 119'98 a right hemi-mandible (Figure 2). These specimens show a similar, quite advanced stage of wear of the teeth. Judging from the size and the similar dental wear stage, the two pieces may well belong to a single individual. Differences from the holotype are minor. There is no P_1. In the P_4 the posterior cingulum on the postero-internal side of the tooth does not form any lingual cuspids. The M_1 has a well developed wear facet parallel to the occlusal surface, revealing that this tooth is robust as a consequence of the increased width of the trigonid, which is widest at the level of the protoconid-metaconid. There is an alveolus for the M_2, indicating that the tooth possessed two poorly fused roots.

Measurements: (Length-width in mm). AD 421'97, P_2 4.8 x 2.7; P_3 5.5 x 3.5; P_4 7.1 x 4.5; M_1 ca 9.2 x 5.8; AD 119'98, C_* 6 x 4.7; P_2 5.1 x 2.9; P_3 6 x 3.5; P_4 7.4 x 4.5; M_1 9.9 x 5.8.

COMPARISONS

Orangictis shares with extant Viverrinae (*Viverra*, *Viverricula* and *Civettictis*) the structure of the talonid of the lower molars in which the entoconid is well developed and separated from the neighbouring cusps. This morphology is typical of Viverrinae and primitive Hyaenidae (*Protictitherium*) and differs greatly from *Genetta* or *Herpestes,* in which the entoconid is either weaker or is fused with the hypoconulid, forming a cutting crest. In Hemigalinae there is a similar construction of the talonid, but the structure of the molars is very different. In Paradoxurinae as well, there is a strong entoconid in the talonid of M_1, but the dentition is more bunodont and the M_2 more reduced. Among the known fossil forms from the Early Miocene of East Africa (Schmidt-Kittler 1987) only *Kichechia zamanae* Savage (1965) possesses similar characters to *Orangictis*. The new genus is not close to *Legetetia* (by reduction of the M_2 among other characters) nor to

Herpestides aequatorialis and *Leptoplesictis rangwai* (by the morphology of the talonid of the M_1 and M_2). These two forms appear to be highly derived in the direction of *Leptoplesictis aurelianensis*, and for the same reasons away from the Viverrinae.

Orangictis shares with *Kichechia* the general robusticity of the dentition, the morphology of the premolars and the construction of the trigonid of the M_1. However, the morphology of the M_1 of *Orangictis* is very advanced and similar to that encountered in Viverrinae, showing that *Kichechia* is clearly primitive. Comparisons between second molars are not possible on account of the doubts expressed by Schmidt-Kittler (1987) concerning the identification of the Songhor mandible previously attributed to *Kichechia* by Savage (1965).

Among the fossil forms known from the Early Miocene only *Herpestides antiquus* from western Europe (Beaumont, 1967) shows a comparable structure of the talonid of M_1 and M_2, but the development of the cuspids is weaker. In addition, the structure of the trigonid in *Herpestides antiquus* is much more secodont and its dentition is relatively closer to that of *Protictitherium.*

Special mention should be made of *Plioviverrops collectus* from the Early Miocene of Laugnac, France, described by Bonis (1973) as *Herpestides collectus. Plioviverrops*, the type species of which is *Plioviverrops orbignyi*, is known from the Turolian of Pikermi. The genus is not well known before the Late Miocene. The form from Laugnac, *Plioviverrops collectus*, shows important differences from typical *Plioviverrops* from the Late Miocene, including the height of the entoconid of M_1 (which in *Plioviverrops* reaches the height of the metaconid), the reduction of the M_2, the morphology of the P_4 (which is more robust with a conical protoconid) and the absence of cingula in the M_1. *Plioviverrops collectus* is clearly different from *Herpestides antiquus*, as was shown by Bonis (1995), but it is not possible to classify it in *Plioviverrops.* It differs at least at the generic level from both *Herpestides* and *Plioviverrops*, but is closer in several features to *Leptoplesictis aurelianensis* from La Grive (Viret 1951; Beaumont 1973).

Orangictis and the Laugnac form differ in the amount of reduction of the M_2, being more advanced in the French form, which instead possesses a more elongated and gracile M_1, and in the structure of the talonid of the molars which is more excavated in *Orangictis* than in the Laugnac species. An important difference resides in the degree of separation of the entoconid, which in *Laugnictis* is almost indistinguishable from the hypoconulid, whereas in *Orangictis* it is clearly separated from it.

SYSTEMATIC STATUS OF *ORANGICITIS*

The separation between the families Herpestidae and Viverridae has been a major problem to palaeontologists due to the fact that the distinction of the extant representatives of the two families is based on characters related to the soft anatomy - not observable in the fossil record – and/or to the morphology of the auditory region – scarce in the fossil record – (Wozencraft 1989; Wyss & Flynn 1993; Hunt & Tedford 1993; Véron 1995).

The most relevant characters for diagnosing *Orangictis* are related to the structure of the lower molar talonid, especially the strong development of the entoconid, which reaches the size of the hypoconid. Probably the important size of the entoconid could be considered as a derived character not shared with the extant Herpestidae. The representatives of this family have a different talonid configuration, without entoconid or with a keeled prolongation of the hypoconid that reaches the position of the entoconid. Hypocarnivorous members of Viverridae such as *Viverra* and *Civettictis* share this talonid construction with *Orangictis*, but hypercarnivorous genera of the same family such as *Genetta, Prionodon, Poiana*, and others have a more simple talonid quite close to some Herpestidae. The existence of two different dental patterns within the Viverridae is evident and it is questionable whether the family is a monophyletic group, as suggested by Véron (1995).

The lower molar pattern that occurs in *Orangictis* can also be seen in the subfamily Hemigalinae, which is normally included in the Viverridae, as well as in some fossil genera such as *Herpestides* which is considered either to be the oldest known fossil Viverridae (Hunt 1991) or a viverrid probably related with the hyaenid stem group (Beaumont 1967), and *Protictitherium* considered to be a primitive hyaenid (Schmidt-Kittler 1976). The possible phylogenetic relationship between Herpestidae and Hyaenidae (Hunt & Tedford 1993; Véron 1995) is not supported by the dental morphology of these two fossil genera, which show a dental pattern closer to Viverridae than to any other feloid, including Herpestidae.

In conclusion, *Orangictis* is closely related to some modern Viverrinae. None of the early Miocene East African carnivores described by Schmidt-Kittler (1987) are related to this group, meaning that the new genus is the earliest known Viverrinae in Africa. Attention is called to the fact that in such a diverse group of "viverrids" as those described by Schmidt-Kittler from the early Miocene of East Africa, there is no form related to the hypocarnivorous Viverrinae or with the primitive Hyaenidae. On the contrary, the East African forms are either more primitive, the case with *Legetetia* and *Kichechia*, or they present characters derived in the direction of hypercarnivorous Viverridae or Herpestidae.

ACKNOWLEDGEMENTS

We thank the Museo Nacional de Ciencias Naturales, CSIC, Madrid DGICYT projects PB 95-0113 and PB95-0014 and the Spanish Agency for International Cooperation (AECI). Thanks are also due to Professor Y. Coppens (Collège de France), Professor Ph. Taquet and Dr B. Senut (Laboratoire de Paléontologie), Mr R. Burrell and Dr J. Ward (Namdeb, Namibia), Messrs G. Hoveka and A. Vogt (National Monuments Council of Namibia) and Dr G. Schneider (Geological Survey of Namibia).

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