

## Erfkroon: a new Florisian fossil locality from fluvial contexts in the western Free State, South Africa

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**A** PALAEOLOGICAL SURVEY OF fluvial deposits along the Modder River in the western Free State of South Africa resulted in the discovery, in 1997, of one of the most extensive open-air fossil localities in southern Africa outside of the Western Cape Province, and one rivalled in size only by the Pliocene locality of Langebaanweg near Saldanha Bay. We have named the place Erfkroon after the farm on which most of the site is situated. Erfkroon is located approximately 60 km WNW of Bloemfontein (at 28° 52' S, 25° 36' E) (Fig. 1). Fossil-bearing sediments are exposed in erosional gullies (dongas) and represent both river channel gravels and overbank silts and clays. The taphonomy of the fossil material is complex, with evidence of different primary collecting agents in different localities. Overbank sediments have in places yielded artefacts characteristic of both the Middle Stone Age [MSA: c. 240–25 thousand years before present (kyr BP)] and Late Stone Age (LSA: c. 25 kyr BP to historic times), as well as fossil assemblages broadly comparable to, but more diverse than, those from the Florisbad Spring type locality<sup>1</sup> and Vlak-kraal,<sup>2,3</sup> the former dated to 400–100 kyr BP.<sup>4</sup> The fossil-bearing strata span an estimated area of 400 000 m<sup>2</sup> and comprise no fewer than 17 mapped localities (localities are numbered beginning with 1 and are assigned the prefix EFK). To date, five di-

verse localities have been sampled. These represent both archaeological sites and purely faunal samples, and the descriptions below are intended as preliminary analyses of these deposits.

Locality EFK-1 (28° 52' 07.3" S, 25° 35' 39.6" E) is an occurrence of fossil bone and stone tools within, and eroding from, overbank sediments. Excavations have revealed a possible MSA/ early LSA transitional layer *in situ*, with both stone tools and faunal remains. Humans appear to have been the agents of accumulation of the animal remains in this horizon. Optically-stimulated luminescence (OSL) applied to sand particles immediately below the LSA surface produced a date of 25 ± 1.2 kyr BP. Another LSA horizon lies above the sedimentary layer containing the *in situ* deposit, yet no faunal remains were found in this stratum. Thus this locality appears to represent a stratified deposit spanning portions of the Late MSA and LSA. Surface-collected fossils in this area comprise mostly remains of mammals adapted to open grassland, typical of the Middle to Late Pleistocene of the central interior of South Africa (Table 1). While the agent of accumulation of the

MSA-associated fossils is as yet undetermined, the abundance of MSA artefacts suggests that humans were at least partly responsible. This possibility is being tested by continuing excavations.

The EFK-2 locality (28° 52' 09.3" S, 25° 35' 36.8" E) has produced, among other fossils, a lower jaw of what appears to be an extinct hippopotamus (Fig. 2) from the upper reaches of an upward-fining gravel sequence. A single OSL determination on sand particles adhering to the specimen produced an age estimate of 113 ± 6 kyr BP. It is unlikely that this specimen represents the extant hippopotamus (*Hippopotamus amphibius*), as the Erfkroon specimen is more gracile and morphologically distinct in the area of the mental symphysis than comparative specimens in the collections of the Florisbad Quaternary Research Department. We lack sufficient comparative fossil material to confidently assign the specimen to the only other known Pleistocene form, *H. gorgops*, an archaic hippopotamus known only from presumably older sediments, such as Olduvai Beds III and IV and Cornelia-Uitzoek.<sup>5,6</sup>

The excavation of gravel bars at locality EFK-4 (28° 52' 28.1" S, 25° 36' 04.9" E) has produced heavily mineralized and manganese-stained fossils of numerous large mammals, representing forms typical of an extensive, open grassland environment. Hyaena coprolites are in evidence, implicating hyaenas as at least partially responsible for the fossil accumulation. The coprolites contain fossil pollens that are currently being analysed.

The EFK-5 locality (28° 52' 27.4" S, 25° 36' 06.3" E) was excavated to recover a well-

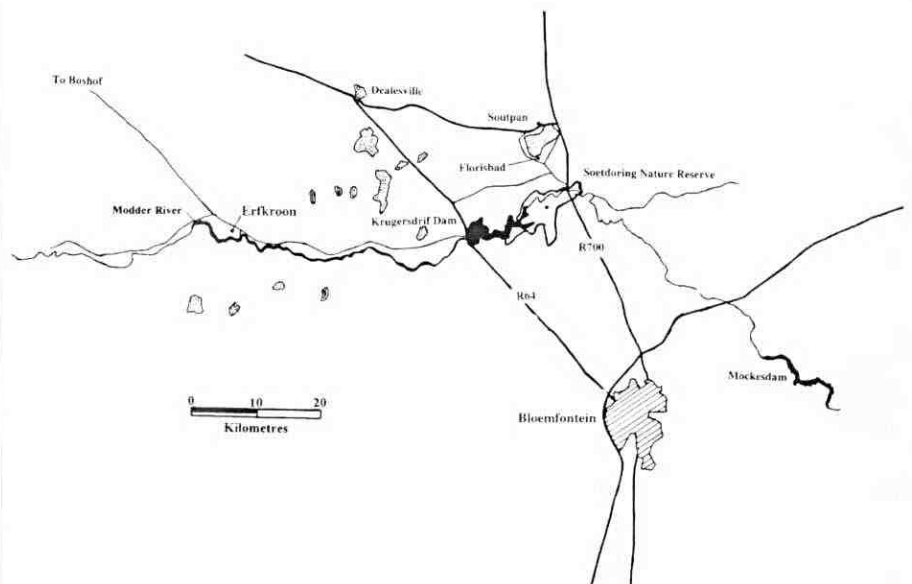


Fig. 1. The approximate location of the Erfkroon site (25° 36' E; 28° 52' S).

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**Table 1.** Taxonomic comparisons of the faunal assemblages from EFK-1, 2, 4, 5 and 7<sup>a</sup> and the Florisbad Spring Assemblage (FLO).

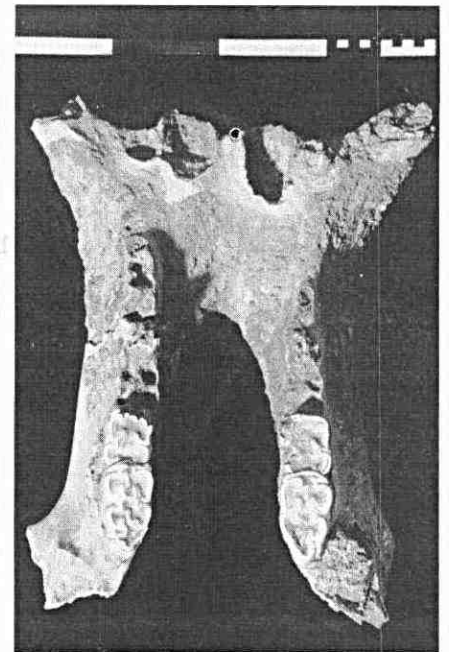
	EFK-1	EFK-2	EFK-4	EFK-5	EFK-7	FLO
AMPHIBIA						
Indet.			X		X	X
PISCES						
<i>Clarias</i> sp.			X	X	X	
Indet.			X			
REPTILIA						
Indet.			X		X	X
AVES						
Indet.			X		X	X
MAMMALIA						
INSECTIVORA						
Indet.			X			
PRIMATES						
<i>Homo sapiens</i>						X
LAGOMORPHA						
Leporidae indet.	X		X			X
RODENTIA						
Murinae indet.	X	X	X	X	X	X
<i>Pedetes capensis</i>						X
CARNIVORA						
<i>Aonyx capensis</i>						X
<i>Cynictis penicillata</i>				X	X	
<i>Galerella sanguinea</i>					X	X
<i>Atilax paludinosus</i>					X	X
<i>Vulpes chama</i>			X		X	
<i>Canis mesomelas</i>			X		X	X
<i>Lycaon pictus</i>			cf.			X
<i>Crocuta crocuta</i>			X			X
Hyaenidae indet. (coprolites)	X	X	X	X	X	X
<i>Panthera leo</i>	X		cf.			X
PERISSODACTYLA						
<i>Equus capensis</i>	X		X		X	X
<i>Equus</i> spp. <sup>b</sup>	X		X		X	X
ARTIODACTYLA						
<i>Hippopotamus</i> sp.		X	cf.			
<i>H. amphibius</i>	X					X
<i>Phacochoerus</i> sp.	X					X
<i>Taurotragus oryx</i>						X
' <i>Pelorovis</i> ' <i>antiquus</i>	X		X			X
<i>Kobus leche</i>						X
<i>K. ellipsiprymnus</i>			cf.	X		X
<i>Hippotragus</i> sp.	X					X
<i>Damaliscus niro</i>	X		X			X
<i>D. dorcas</i>	X		X		X	X
<i>Alcelaphus buselaphus</i>	X					X
<i>Megalotragus priscus</i>	X			X	X	X
<i>Connochaetes gnou</i>	X	X	X	X	X	X
<i>Antidorcas bondi</i>	X		X		X	X
<i>A. marsupialis</i>	X		cf.			X

<sup>a</sup>EFK-1 is the only locality thus far sampled from the overbank deposits. We have grouped together the fauna from the four localities deriving from the river channel deposits (EFK-2, 4, 5 and 7) the better to represent the overall diversity at Erfkroon. The contemporaneity of disparate localities within the river channel deposits has not been demonstrated, thus the unquantified taxonomic list above should be used with caution.

<sup>b</sup>Probably includes two species, of which one is ass-like, *E. (Asinus) sp.*, (= '*E. lylei*') and the other is the plains zebra, *E. quagga*, or a similar-sized equid.

preserved partial cranium of the extinct giant wildebeest, *Megalotragus priscus* (Fig. 3) eroding from the side of a gully. The horncores exhibit damage by borer moth larvae, including well-preserved tunnels, indicating that the specimen

originally lay exposed on the surface before burial and fossilization. The specimen came from a fossiliferous sand horizon situated immediately above a poorly sorted fossiliferous gravel layer. The horn bases combine well-fused pedicles with

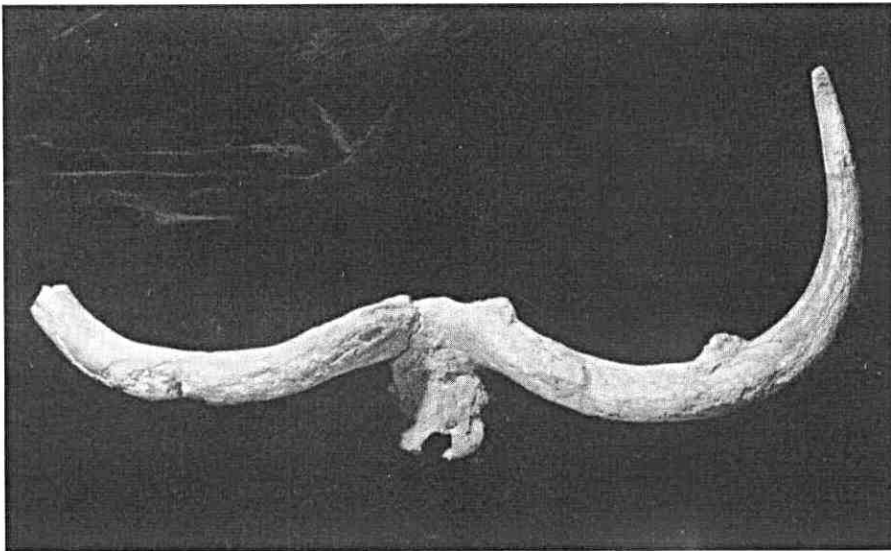
**Fig. 2.** Occlusal view of an hippopotamus lower jaw recovered from locality EFK-2.

laterally diverging horns, a morphological pattern usually considered characteristic of *Megalotragus* specimens from the later part of the time period represented by the assemblage at Florisbad.<sup>1</sup> Although known *Megalotragus* horns appear to be sexually dimorphic (with bulls having more laterally divergent horns),<sup>8</sup> the overall pattern suggests that locality EFK-5 represents a late Quaternary fauna. *M. priscus* is generally well-represented in Florisian faunal assemblages, and indicates local open-country, grassland environments. Nearby and in the same layer was recovered the horncore of a large reduncine, *Kobus* cf. *ellipsiprymnus*, a water-dependent bovid which is not present in the fossil or historical records of the Holocene (latest Quaternary) of the central interior of southern Africa.<sup>9</sup>

Excavation of a single gravel bar at EFK-7 (28° 52' 27.0" S, 25° 36' 12.9" E) has produced birds, amphibians, small reptiles, fish and micromammals, which complement the diverse open grassland macro-mammal component at this locality.

The geology of Erfkroon is complex. It is broadly fluvial in its genesis, with extensive exposures of channel sedimentation as well as abundant development of overbank silts and clays. Overall, the exposed sequences reflect the evolution of the Modder River system under changing palaeoclimates which ranged from semiarid to arid.

Before the discovery of Erfkroon, our understanding of Florisian faunas and environments derived largely from fossils



**Fig. 3.** Superior view of the partial cranium and horncores of *Megalotragus priscus* recovered from locality EFK-5. Note the fused condition of the horn pedicles and that the horns diverge laterally from the base. The distance between the two ends is approximately 1.2 m.

recovered in open-country pan and spring mound depositional contexts. Erfkroon preserves Florisian-aged deposits that at least in part illustrate a more complex, riverine environment, thus giving us a new ecological perspective on this time period. The presence of lithic tools and faunal remains *in situ* in overbank sediments provides a rare opportunity for further insight into the behavioural char-

acteristics and adaptive strategies of MSA and LSA humans in southern Africa.<sup>10</sup>

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