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PRELIMINARY ANALYSIS OF THE FAUNA FROM BUFFALO CAVE, NORTHERN TRANSVAAL, SOUTH AFRICA

by

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ABSTRACT

Systematic excavations at Buffalo Cave in the Makapan Valley were begun in October 1993. This paper presents our preliminary analysis of the faunal assemblage from this site, including new *in situ* fossils and the collections which have been housed at the Bernard Price Institute, Palaeontology since the 1940's. Our palaeoecological reconstruction suggests that the local environment at Buffalo Cave at the time of deposition was an open country grassland or savanna, including a high proportion of alcelaphine bovids and other grazing fauna. However, the presence of other taxa, particularly of tragelaphines, hippotragines, and reduncines, may indicate that a more wooded habitat including a local water source, could also have been part of the Buffalo Cave environment during some part of its depositional history. The fauna overall indicates that deposition occurred during the Pleistocene, rather than the Pliocene. Thus, the environmental and temporal information presently available suggests that the Buffalo Cave fauna represents an environment and time period distinct from other sites in the Makapansgat Valley (i.e., the Limeworks and Cave of Hearths).

INTRODUCTION

Knowledge of bone-breccia deposits from the Makapan Valley probably dates back to the turn of the century, as a result of the extensive limeworks mining operations throughout the region (Mason 1962, 1988). At the very least, amateur palaeontologists had learned of these fossiliferous beds by about 1920 from locals employed by the limeworks operations (Eitzman 1958).

Although the Makapan Limeworks site has been the major focus of palaeoanthropological research in this region (e.g., Cadman & Rayner 1989; Dart 1925, 1948, 1952, 1957; Ewer 1956, 1958; Gentry 1970; Kitching 1953, 1965, 1980; Maguire B. 1980a; Maguire, J.M. *et al.* 1980, 1985; Partridge 1979, 1986; Rayner *et al.* 1993; Torien 1952; Vrba 1982, 1987; Wells & Cooke 1956; and others), other fossil-bearing sites are present in the valley, and have drawn the interest of palaeontologists, as well as archaeologists (e.g., Broom 1937; Cooke 1962; Mason 1971, 1988; van Riet Lowe 1948). In 1937, from another former mining operation across the valley from the Limeworks, Broom (1937) discovered and described a fossil which he believed to represent an extinct dwarf buffalo. He named the species *Bos makapani*, and the site has become known as "Buffalo Cave". No systematic excavations were ever undertaken there, and the site has only a few mentions in palaeontological literature (Boas *et al.* 1982; Broom and Jensen 1946; Gentry 1978; van Riet Lowe 1948). Periodic excursions by the University of the Witwatersrand since the 1940's (J.W. Kitching and P.V. Tobias pers. comm.) have resulted in a modest collection of bone breccia blocks which are stored at the Bernard Price Institute for Palaeontological Research at the University of the Witwatersrand.

Beginning in October 1993, a systematic palaeontological excavation has been conducted at Buffalo Cave under the auspices of the Hominid Palaeoecology Research Programme (HPRP) at the University of the Witwatersrand. The objective of the HPRP, and therefore of the excavations at Buffalo Cave and elsewhere, is the analysis of evolutionary changes in the fauna and ecosystems of southern Africa during the time period in which early hominids were evolving. The palaeontological remains recovered are thus an important part of an ever-growing database, and have the potential to fill in important temporal gaps in our knowledge concerning environmental changes during the more recent evolutionary history of the southern African region. This report is our preliminary assessment of the Buffalo Cave fauna, including our initial interpretation of the ecological and temporal setting of the site in relation to other South African Plio-Pleistocene localities. Obviously, our interpretation of the palaeoecological conditions at Buffalo Cave is subject to modification following the future recovery of *in situ* materials during our ongoing excavations.

CONTEXT OF BUFFALO CAVE FOSSILS

Buffalo Cave is located in the Makapan Valley at approximately 24° 08'S 29° 11'E, 19 km east-northeast of Potgietersrus in the Northern Transvaal (Figure 1).

Like other palaeontological sites in the valley, Buffalo Cave was subjected to lime mining operations during the 1920's and '30's (Eitzman 1958; Maguire B. 1980b; Mason 1988; van Riet Lowe 1948). Thus, the materials there consist of *ex situ* breccia blocks in various mining dumps, as well as *in situ* stratified breccias which represent the ancient cave fillings. These breccias appear to be of several types (see below), but the geology of the deposits has not yet been thoroughly studied. Buffalo Cave was a dolomitic cave system similar to other Transvaal fossil-bearing breccia localities (e.g., Sterkfontein, Swartkrans, Kromdraai), and geological processes described by Brain (1958, 1976, 1978, 1993) are generally applicable.

Identifications were made as part of an inventory of all materials so far collected, and rely heavily on dental fossils, either isolated or those still encased in breccia blocks. Horn cores were also useful for classification of bovids. For the purposes of this inventory, initial processing of breccia blocks was only carried out to the extent necessary for identification, such as to expose the occlusal surface or crowns of teeth. Postcranial remains are largely unidentified at present, and will certainly augment our analysis in the future.

At present, many of the identifications are only to tribe or family, although specimens were classified to genus or species where possible; these identifications

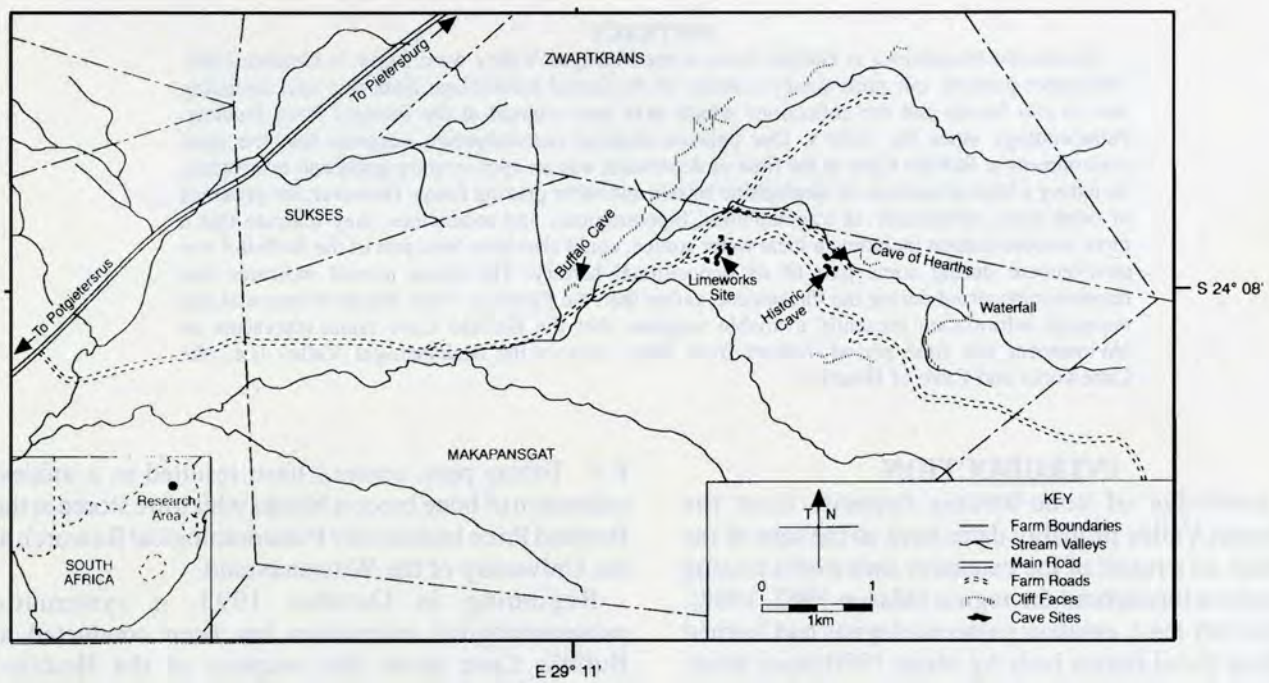

Figure 1. Regional map of the Makapan Valley showing the location of Buffalo Cave in relation to other major cave sites (after Wells & Cooke 1956, and Rayner et al. 1993).

MATERIALS & METHODS

This analysis utilises the collections at the Bernard Price Institute for Palaeontological Research (BPI) and those from the new excavations during 1993-94. To date, the BPI collections include 538 accessioned specimens; a "specimen" may refer to breccia blocks with one or more fossils exposed on the surface, or to isolated fossils (especially teeth). The recent excavations have so far recovered 103 accessioned specimens, most of which are isolated fossil fragments, although fossiliferous breccia blocks are also included. Blocks and isolated fossils are coded separately so that a block "specimen" may include multiple fossils, which may in future be isolated using acid bath or manual techniques. Blocks are catalogued using a "B #" designation; isolated fossils, whether they were extracted from a block or recovered as such during excavation, are catalogued with the designation "BP/17/#", where 17 is the BPI identification number for Buffalo Cave.

must be considered tentative. No attempt was made to determine minimum numbers of individuals at such a preliminary point in the analysis. However, a rough estimate of the relative abundance of different tribes and other taxonomic groups was obtained from tabulated counts of identified specimens (e.g., for Bovidae or Alcelaphini).

Finally, breccia blocks, and where possible, individual specimens were coded by a preliminary matrix type, subjectively identified on the basis of colour, content, and degree of calcification. Although our sample is restricted at present, these data should allow us in future to recognize distinct depositional events and/or processes, possibly representative of changing environments and/or time periods at Buffalo Cave.

FAUNAL ASSESSMENT

Table 1 presents the breakdown of identified specimens from Buffalo Cave. A total of 87 individual specimens have been identified to the taxonomic level

of tribe or lower (e.g., to genus), although many more have been identified to family. Bovidae is the most common family in the assemblage, including at least 6 tribes and 7 genera. No other taxonomic group is as well-represented, but the mammalian fauna also includes the families Suidae, Felidae, Hyaenidae, Equidae, and Cercopithecidae. Although not included in this analysis, fossil rodents, and at least one reptile (a chelonian) have also been recovered from Buffalo Cave.

Bovidae

Bovid remains include isolated teeth, maxillary and mandibular fragments (including dentition), horn cores, and postcranial elements; identifications are based upon dental materials and horn cores. As indicated in Table 1, the most common bovids recovered are alcelaphines, including the genera *Damaliscus* (and perhaps *Parmularius*) and *Connochaetes*. Alcelaphines are typically medium- to large-sized grazers, inhabiting open grasslands or savannas. The other grazer from Buffalo Cave is the bovine *Syncerus*. In contrast, the fossil fauna also include the tribes Tragelaphini (cf. *Tragelaphus*), Reduncini (*Redunca*), and Hippotragini (cf. *Hippotragus*), which typically occupy a closed or perhaps more forested habitat, and require a nearby water supply (Gentry 1978; Vrba 1987). If not indicative of a differing environment, such a habitat may have existed as a nearby gallery forest (which exists presently in the Makapansgat Valley) at some point during the depositional history of Buffalo Cave.

Certain of the bovid genera at Buffalo Cave (*Tragelaphus*, *Redunca*, and *Hippotragus*) range from Pliocene to Recent times (Gentry 1978; McKee *et al.* 1995; Partridge, 1986; Vrba 1976), thus they are of little use for refined dating purposes. However, given the lack of any characteristic Pliocene genera,it appears that our bovid assemblage generally represents a Pleistocene age for Buffalo Cave. Further identifications to species level will in future assist in refining this conclusion.

Bos makapani, the original bovid fossil described by Broom in 1937, and for which the cave is named, is enigmatic for a number of reasons. First, no other fossils of this species have been identified from the Buffalo Cave collections, nor at any other South African sites. However, East African specimens from Olduvai Bed I (Gentry 1978) and at Hadar have been attributed to this species, the latter dating to approximately 3 mya (Boaz *et al.* 1982).

Second, Broom (1937) placed this species within tribe Bovini, and considered it to be a dwarf species. Gentry (1978) later designated *Bos makapani* to tribe Ovibovini (including the modern musk ox and takin, and also the extinct *Makapania broomi*). Thus, this fossil raises questions concerning the age of the site, it's own taxonomic classification, and also the palaeoecological setting of the deposits in which it was found.

Equidae

Two partial mandibles with intact dentition have been assigned to the genera *Equus* and *Hipparion*, on the basis of differences in the complexity of the enamel pattern for the mandibular cheek teeth (Churcher & Richardson 1978). Broom (1937) first reported the presence of *Equus* cf. *capensis* at Buffalo Cave; we have identified the other specimen as *Hipparion* cf. *libycum*. Like the alcelaphine bovids, both equid taxa are suggestive of a more open grassland environment.

Equus capensis is known from many sites throughout southern Africa from the late Pliocene to the late Pleistocene and, like modern members of the genus, probably occupied regions of arid or semiarid savanna (Churcher & Richardson 1978). *Hipparion libycum* is widespread in North, East, and South Africa from the late Pliocene to late Pleistocene. Unlike earlier forest-living hipparions, this species possessed advanced dental specializations indicating "strong reliance on savanna environments and a grazing habit" (Churcher and Richardson 1978:402).

Suidae

A single molar tooth has been attributed to *Phacochoerus*, a genus occupying open habitats such as floodplains or grassland, and which is known to avoid thick bush and forest (Smithers 1983; Bender 1990). Although a species designation has not been made, this genus is known throughout the Pleistocene of North, East, and southern Africa and also includes the living warthogs (Cooke & Wilkinson 1978). An additional partial cranium has also been assigned to Suidae, although a more precise identification will have to await further processing.

Carnivora

Three carnivore specimens have so far been identified from Buffalo Cave, consisting of two isolated teeth and one distal phalanx. One fragmented tooth is an unidentified premolar or molar, and an isolated canine has been placed within Hyaenidae. The phalanx resembles those of the modern felid genus *Panthera*, and is larger than phalanges of any other modern carnivore for which comparisons were available at the Transvaal Museum. Both of these carnivores are grassland or savannah predators, but without more refined identifications these specimens are not useful for establishing the chronological context of the site.

Primates

Several fossils have been identified to the primate subfamily Cercopithecinae, including a partial cranium, a distal humerus, and a fragmentary palate with the maxillary tooth crowns embedded in breccia. The cranial remains appear to belong to juveniles, but the humerus is large enough to represent an adult-sized baboon. However, these primate remains are either too fragmentary, or incompletely processed, to identify

whether they represent tribe Papionini or Cercopithecini. As a group, cercopithecine monkeys occupy a wide range of habitats, from dense woodland to open savanna (Melnick & Pearl 1986; Tappen 1968).

Table 1: List of Mammalian fauna from Buffalo Cave.

Taxon	Number of identified specimens
PRIMATES	
Cercopithecidae	
Cercopithecinae indet.	3
CARNIVORA indet.	1
Felidae	
Panthera cf. *leo*	1
Hyaenidae	1
ARTIODACTYLA	
Bovidae indet.	240
Alcelaphini indet.	20
Damaliscus	15
Connochaetes	7
cf. *Parmularis*	1
Tragelaphini indet.	2
cf. *Tragelaphus*	8
Hippotragini indet.	1
cf. *Hippotragus*	1
Reduncini	
Redunca	2
Bovini	
Syncerus	1
Antilopini indet.	1
Ovibovini	
Bos makapani	2
Suidae indet.	1
Phacochoerus	1
PERISSODACTYLA	
Equidae	
Equus	1
Hipparion	1
RODENTIA	40
TOTAL	**351**

SUMMARY AND CONCLUSIONS

The Buffalo Cave fauna appears to represent primarily an open country savanna or grassland environment, dominated by alcelaphine bovids. However, there are elements which suggest the presence of a more forested and wetter habitat at some time during the depositional history of the cave. This evidence may indicate one or both of the following: (a) that a gallery forest existed along local waterways; or (b) that climatic change occurred within the Buffalo Cave sequence. This latter prospect is also supported by the presence of several different breccia types at Buffalo Cave.

We believe that the fauna overall is more indicative of a Pleistocene, as opposed to a Pliocene assemblage, but whether it is early or late Pleistocene cannot yet be determined. Most of the genera identified at Buffalo Cave include modern species (e.g., *Damaliscus, Connochaetes, Panthera, Equus, Phacochoerus*), but many of these have long evolutionary histories, and some (*Redunca, Tragelaphus, Hippotragus*) are also found at Makapansgat (Member 3) which is Pliocene in age (Partridge, 1986). Likewise, the presence of *Hipparion*, and also of the enigmatic *Bos makapani*, may suggest an age during the earlier Pleistocene or Pliocene (Churcher & Richardson 1978; Gentry 1978; Boaz *et al.* 1982).

At present we can produce only a simplified reconstruction of the Buffalo Cave environment. Ecosystems are variable and complex even on a local scale, and there are many factors and lines of evidence--microfauna, sedimentology, pollen analysis, cave geomorphology--which we have not yet had the opportunity to employ, and which will hopefully lead to refinement of our preliminary assessment. Like other South African cave sites (Brain 1981, 1993; Cadman & Rayner 1989; McKee 1991; McKee *et al.* 1995; Partridge 1986; Rayner *et al.*1993; Vrba 1975, 1976, 1987), it is possible that a record of environmental change is preserved in the deposits at Buffalo Cave, and that the fauna as currently known represents a temporally and ecologically mixed assemblage.

The Buffalo Cave fauna appears to represent a time period intermediate between the Pliocene Makapansgat Limeworks site (Members 3 and 4) and late Pleistocene sites in the Makapan Valley, particularly Cave of Hearths and Equus Cave. Furthermore, Buffalo Cave has the potential to provide information concerning the nature of local environmental change during the temporal gap between early and late Pleistocene times.

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