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FAUNAL REMAINS FROM HOT POT CAVE, BREDASDORP

by

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ABSTRACT

Recent unconsolidated cave deposits can be useful in providing an understanding of how consolidated fossil cave deposits were formed and are far easier and quicker to analyse. This preliminary study describes an extensive, extremely rich bone accumulation in a horizontal cave system linked to the surface by a single vertical shaft from the middle of a domed chamber. The cave is in Tertiary marine limestone on the southwestern Cape coast.

The fauna has two chief components: a macrofauna resulting from entirely fortuitous introductions such as animals falling down the shaft; and an extensive microfauna accumulated by the barn owl, *Tyto alba*. Between these two groups there is a very small range of possible overlap.

The macrofauna contains a mixture of wild and domestic animals, herbivores and predators with sizes ranging from hare to buffalo. The microfauna is closely packed in a black organic-rich soil of predominantly dust sized particles. A feature of this soil is the vast number of tiny terrestrial snail shells it contains. The deposit represents continuous accumulation over several hundred years at least. Seeds, pollen and carbonised wood are present in the undisturbed deposit so that sequential dating will be possible. By contrast, recognisable insect cuticle is virtually absent though dung beetles, for example, are frequently seen in surface solution cavities and must fall into the cave in fair numbers.

Alignment of microfaunal longbones within the deposit is horizontal and parallel to the passage walls, so it is clear that the material was distributed by stream action.

Much of the fauna has a wide geographic range, but throughout there are elements either endemic to the southern Cape or indicative of the prevailing vegetation type.

INTRODUCTION

As in the study of sedimentology, where modern analogues are used in the interpretation of ancient sedimentary rocks, so too can the study of recent unconsolidated cave fills assist in the interpretation of Plio-Pleistocene cave breccias. Similarly, just as major zones of sedimentation are subject to ongoing geological processes, so too may the processes of cave formation continue during the accumulation of cave deposits. Consequently, the reworking of sediments can be as much a feature of the cave environment as any other situation where sediments accumulate.

It would be difficult to find modern analogues for the australopithecine bearing breccias within the Transvaal dolomite, because, although the caves within the dolomite vary considerably in age, they are generally speaking old mature caves, and none to our knowledge contain significant recent bone bearing deposits. Some 1 500 km to the south, however, in the southern Cape coastal area near Bredasdorp (fig. 1) there is an extensive region of late Tertiary marine limestone deposited unconformably on wave cut pre-Cape shales. Just inland of the present coastline this limestone is only about 10 metres thick with cave systems developed at the contact with the underlying shale and linked to the surface by means of vertical shafts that vary from 1–10 m in diameter (fig. 2). These caves are still actively forming and have been accumulating partially surface-derived deposits for some considerable time.

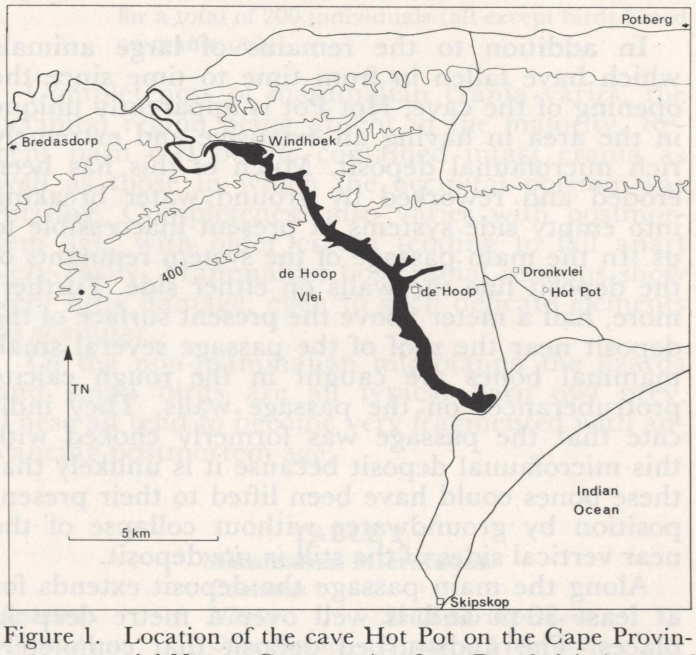

Figure 1. Location of the cave Hot Pot on the Cape Provincial Nature Conservation farm Dronkvlei. A row of low hills is indicated by the 400 foot contour.

DESCRIPTION OF HOT POT

Hot Pot cave is an extensive system linked to the surface in one place only by a narrow shaft at the apex of the domed roof of a large chamber; the shaft itself is about 5 m long. The name derives from the hot, humid, stale air which makes it an unpleasant cave to examine.

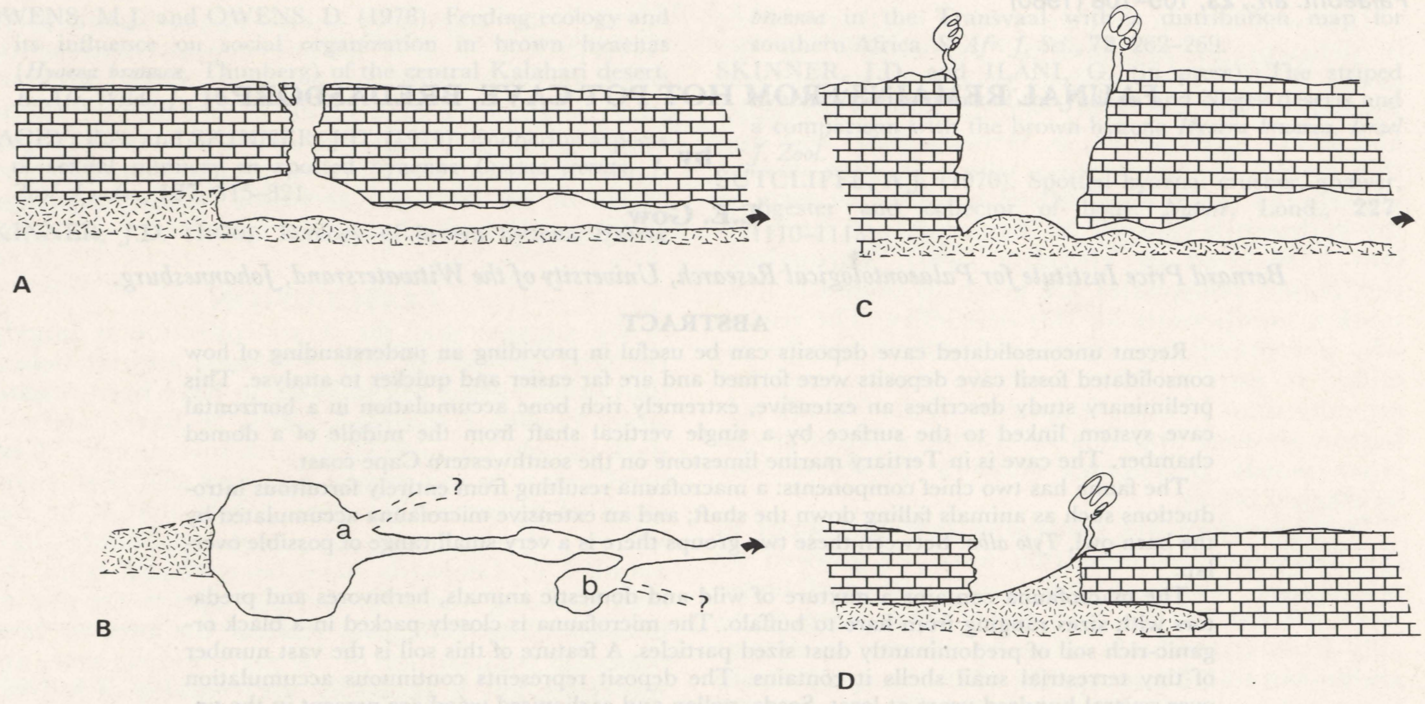

Figure 2. Sketch diagrams of cave forms in the Bredasdorp limestone:
A. sectional view of Hot Pot;
B. plan view of Hot Pot, 'a' and 'b' are collecting sites;
C. a more mature cave than A where the roof of the aven has collapsed completely;
D. a further stage in cave formation where the whole system has become choked with fill.
C and D are caves of the same form as A.
Blocks indicate limestone, dashes cave fill.

In addition to the remains of large animals which have fallen in from time to time since the opening of the cave, Hot Pot is apparently unique in the area in having an extensive and extremely rich microfaunal deposit. Much of this has been eroded and reworked by ground water breaking into empty side systems at present inaccessible to us. In the main passage of the system remnants of the deposit line the walls on either side. Furthermore, half a meter above the present surface of the deposit near the roof of the passage several small mammal bones are caught in the rough calcite protruberances on the passage walls. They indicate that the passage was formerly choked with this microfaunal deposit because it is unlikely that these bones could have been lifted to their present position by groundwater without collapse of the near vertical sides of the still *in situ* deposit.

Along the main passage the deposit extends for at least 30 m and is well over a metre deep in places. The undisturbed deposit that completely chokes the cave in the opposite direction from the entrance may also be more extensive. My recollection of the deposit from a visit about 15 years ago was that it had a moist firm consistency such that one would be able to take out an intact oriented block. During the time of sampling in December 1978, the deposit was powder dry, but it was apparent that microfaunal long bones not only lay flat in the soil but were oriented with their long axes parallel to the walls of the cave passage.

METHODS

Sampling of the Deposit

Samples were taken at two points. Point "a" (fig. 2A) is a break in the deposit where some had slumped into a side system. About 2 litres of microfaunal deposit was collected here. Point "b" (fig. 2B) is a blind side chamber which had been reworked by ground water. Here one walks on the deposit. Microfaunal remains are concentrated in surface depressions, and for some reason many larger bones accumulated in this part of the cave. All identifiable large bones were collected together with about a litre of microfaunal remains.

Laboratory treatment of material

Larger bones were scrubbed in clean water and then thoroughly soaked in dilute PVA clear sealer before drying on wire screens. The microfauna was sifted out of the cave soil. Handfuls of bones were carefully agitated in water to remove most of the adhering dirt. These were soaked in the PVA solution. The container was then emptied over a wire screen, the PVA passing into a second container for re-use. The cave earth was retained and screened for plant remains and grain characteristics.

RESULTS

Macrofauna (table 1)

The few remains of large animals such as buffalo, kudu and equid may have been introduced as isolated skeletal elements by a variety of fortuitous events. Most of the rest of this fauna, particularly the small antelope and domestic animals, almost certainly fell down the shaft and died in the cave, in many cases probably only after wandering about underground. A recent complete duiker skeleton lay some way down the main passage. The provenance of some of the smaller animals is equivocal; hare, large mole rat, and francolin might indicate occasional use of the cave by eagle owls, but the present sample is too small for a definite conclusion. Five barn owl bones of at least two individuals are probably remains of birds resident in the cave. These are bones of adult birds, and their presence could be explained in several ways, including the situation where a small predator such as a genet might have fallen uninjured into the cave and eaten an owl.

TABLE 1
Macrofauna

Species	*Common Name*	*Skeletal elements present*
Syncerus caffer	Buffalo	lower premolar
Tragelaphus strepsiceros	Kudu	left ilium
Equus sp.	Equid	cervical vertebra
Tragelaphus scriptus	Bushbuck	humerus
Alcelaphus buselaphus	Hartebeest	horn core
Ovis sp.	Domestic sheep	partial skull, innominate
Sylvicapra grimmia	Duiker	lower jaw, carpal element, metatarsal epiphysis, two femora (different sizes), scapula, cervical vertebra
Raphicerus campestris	Steenbok	right and left jaw rami of different individuals, cervical vertebra, two femora, two tibiae
Potamochoerus porcus	Bushpig	humerus
Sus sp.	Domestic pig	humerus
Lepus sp.	Hare	partial skull
Bathyergus s. suillus	Cape Dune Mole	scapula, jaw ramus
Felis lybica	Cape Wild Cat	maxilla, jaw ramus (both with teeth)
Genetta genetta	Genet	complete skull
Herpestes cf. *pulverulentus*	Cape Grey Mongoose	jaw ramus
Tyto alba	Barn owl	two humeri of different individuals, two tarsometatarsi of different individuals, one phalanx
Francolinus sp.	Francolin	coracoid, humerus

Microfauna (tables 2, 3)

The microfaunal deposit is extremely rich. With unimportant exceptions this assemblage is typical of the food remains of the barn owl, *Tyto alba*, which was without doubt the concentrating agent for this deposit. The relative importance of the various components of the microfauna in the diet of barn owls based on a sample of 200 crania is indicated in Figure 3.

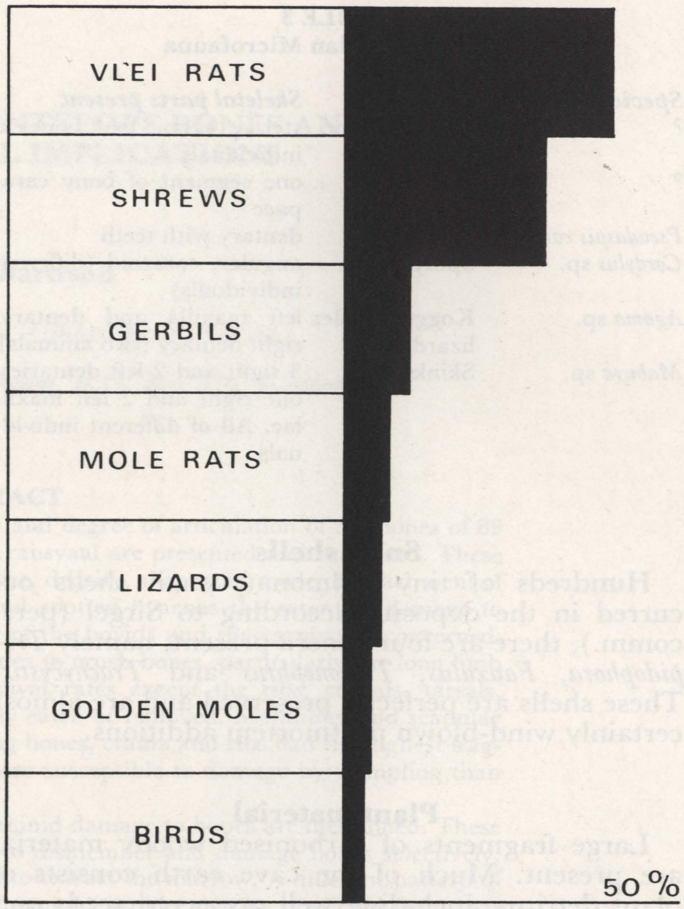

Figure 3: Histogram of abundance of microfaunal elements for a total of 200 individuals (all except birds based on crania only).

Completeness of mammalian crania varies, the occipital region being absent in the majority. Recent barn owl pellets contained intact crania as well as those in which the occipital portion was missing. Completeness also varies with postmortem age, with older crania tending to fall apart very easily. Mammalian postcranial remains show very little damage, even to such delicate elements as scapulae.

Of the non-mammalian microfauna the lizards and small birds are all typical barn owl prey. These all tend to become very fragmented with advancing postmortem age.

TABLE 2
Mammalian Microfauna

Species	*Common Name*	*Skull parts present*
Chrysochloris asiatica	Cape Golden Mole	9 crania, 4 jaw rami
Crocidura sp.	Shrews	62 crania, 101 jaw rami
Macroscelididae	Elephant Shrews	one jaw ramus
Georhychus capensis	Mole Rat	4 crania
Cryptomys hottentotus	Common Mole Rat	11 crania, 4 jaw rami
Otomys sp.	Vlei Rats	86 crania, 107 jaw rami
Gerbillinae 4 species	Gerbils	20 crania, 42 jaw rami
Rhinolophus sp.	Horseshoe Bat	one jaw ramus

TABLE 3
Non-mammalian Microfauna

Species	*Common Name*	*Skeletal parts present*
?	Sm. passerine birds	sterna, sacra, foot bones 6 individuals
?	Tortoise	one segment of bony carapace
Pseudaspis cana	Mole Snake	dentary with teeth
Cordylus sp.	Spiny lizard	angular, coracoid (different individuals)
Agama sp.	Koggelmander lizard	left maxilla and dentary, right dentary (two animals)
Mabuya sp.	Skinks	3 right and 2 left dentaries, one right and 2 left maxillae. All of different individuals

Snail shells

Hundreds of tiny pulmonate snail shells occurred in the deposit. According to Sirgel (pers. comm.), there are four genera present, namely *Tropidophora, Fauxulus, Trigonephrus* and *Trachycystis*. These shells are perfectly preserved and are almost certainly wind-blown postmortem additions.

Plant material

Large fragments of carbonised woody material are present. Much of the cave earth consists of plant detritus, including well preserved seeds and pollens.

Soil

One kilogram of residual soil was coarse screened and the following percentages were retained by the mesh sizes indicated:

1,7 mm	10 %
1,1 mm	4 %
0,6 mm	15 %
finer	72 %

One hundred grams of the fine material was screened further with the following results:

355 μm	21 %
250 μm	21 %
150 μm	32 %
finer	24 %

For the examination of the organic content 100 ml of dry material of the fine fraction was put in 20 % H_2O_2 until bubbling ceased. Even this treatment did not entirely disaggregate the finer particles. About 1 ml of floating organic matter was scooped off with filter paper. The residue was allowed to settle out in the beaker and about 3 ml of the dense organic matter removed. The mineral grains were then washed as clean as possible and retained.

This material was then screened with the following results:

Floating organic component

355 μm: intact snail shells, seeds and fine plant detritus

250 μm: intact snail shells, large pollen grains and fine plant detritus

150 μm: pollen, and fine plant detritus

Sinking organic component

250 μm: some discrete plant fragments, but most grains aggregates of finer particles

150 μm: similar except that discrete plant fragments were distinctly elongate

<150 μm: (i.e. half this sample) still a lot of adhesion of particles. Unrecognisable plant detritus.

From the foregoing it is apparent that seeds and pollens are best obtained from the floating organic fraction provided disaggregation is reasonably complete.

To examine the characteristics of the mineral grains 17 g of original limestone were picked out of the soil. This material was dissolved in 10 % formic acid and 1 g of resistant sandy material recovered. As is typical of sands from this sort of depositional setting, the grains are predominantly quartzitic, poorly sorted (±2 mm down to 0,15 mm) and vary from angular to rounded. There are sparse, fragmentary marine microfossils. In view of the above it is not possible to distinguish between sand derived more or less *in situ* from re-solution of the limestone and surface derived sand which is effectively from the same source.

DISCUSSION AND CONCLUSIONS

This site has excellent potential for a controlled excavation. It will provide a comprehensive record of barn owl diet for the area, a record of the large animal fauna dating from the present to recent prehistoric times and a similar record for the flora. Cave formation and depositional processes can be studied, and it should prove possible to assess the rate of accumulation of the deposit.

ACKNOWLEDGEMENTS

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