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THE PALAEONTOLOGY OF HAASGAT A PRELIMINARY ACCOUNT

by

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ABSTRACT

Haasgat is a cave on the steep western slope of the upper reach of the Witwatersrand Spruit, on the farm Leeuwenkloof 480 JQ, in the Brits District. It was heavily mined for flowstone (calcite). The cave contains a deposit of fossiliferous cave silt and breccia that was partially removed by the miners and dumped on the steep slopes of the valley.

The original entrance was probably a shallow inclined pit, leading into an upper chamber and then into the preserved depository.

Both porcupines and carnivores served as accumulating agents for the bones.

Fossils of the primates *Parapapio* and *Cercopithecoides*, hyaena (*Chasmaporthetes*), fox, porcupines, several species of bovids and two species of Hyrax have been recovered. An insufficient number of fossils have been prepared to determine the age of the deposit with certainty. The deposit was provisionally thought to be of *Pliocene* age because of the occurrence of *Parapapio*. At this stage it would be unwise to correlate this occurrence with any other caves in this age range.

It is concluded that the cave silts were deposited by flash floods, under a wetter climatic regime than that of the present.

MAIN FEATURES AND ORIGIN OF THE DEPOSIT

Haasgat is the remains of what once was a more extensive cave on the farm Leeuwenkloof 48 JQ in the Brits District. It is situated on the steep western slope at the uppermost end of the Witwatersrand Spruit Valley (Figure 1). The cave was mined for calcite flowstone early in the present century, and is so damaged that it is impossible to ascertain the original conformation of the cave at the time of discovery by the limeworkers.

Occurrences of basal collapse breccia outside the cave prove that it was once a much larger cave than is presently preserved.

The cave originated as a phreatic chamber along a joint or small fault, in dolomite of the Eccles Formation of the Malmani Subgroup (Chunniespoort Group). The oldest sediment in the cave is a basal collapse breccia that must have formed shortly after the cave was drained of its phreatic water by the downcutting of the Witwatersrand Spruit Valley. This was followed by the deposition of a thick basal flowstone that cemented the basal collapse breccia. At this stage the cave was intersected by the formation of the valley, and developed an opening to the surface through which external clastic material and animals could enter the cave. From this stage onward the cave was filled with fossiliferous cave silt and breccia. These sediments were cemented by calcite deposited from percolating vadose water. Further cutting down of the valley led to the removal of the upper parts of the cave and the excavation of a smaller cave or Makondo (Brink and

Figure 1. View of Haasgat from the opposite side of the valley of the Witwatersrandspruit. The arrow indicates the position of the large opening in the roof of the cave. Note the extensive dumps on the steep slope below the cave entrance

Partridge 1980) within the sediment of the original cave fill. This cave was in turn also filled with fossiliferous rubble that became partially cemented. Later on much of the roof of the cave was removed by weathering.

Presently the cave consists of an elongate irregular passage with a large opening in the roof near the entrance (Figure 1). A bridge of cemented cave sediment is formed between the entrance and the collapse opening in the roof. Over much of the length of the cave the ceiling consists of fossiliferous cave sediment. Mining caused part of this ceiling to collapse, leaving a large heap of fossiliferous blocks in the middle section of the cave. This collapse probably occurred after the miners had abandoned the operation. The material from this collapse has not been studied yet.

During operations the limeworkers entirely removed the basal flowstone from the cave, and caused the collapse of a large part of the cave fill. They dumped this material downslope, below the cave entrance (See Figure 1). The fauna described here was retrieved by mechanical preparation of blocks from this dump. The fossil deposit was discovered by Dr. J.E.J. Martini, and was surveyed and studied by Dr Martini and the author (Keyser and Martini 1991). The purpose of this paper is to give a preliminary overview of the fauna.

PALAEONTOLOGY

The cave silts preserved in Haasgat are fossiliferous but do not anywhere contain the great concentration of bone seen in some other caves like Sterkfontein and Makapansgat.

As yet, only material from the dumps has been prepared and studied. This material probably came mostly from the siltstone beds immediately above the floor flowstone and is not highly fossiliferous. It is possible that the cave opening was relatively much smaller when the lower siltstone beds were deposited, and it is possible that the siltstone rubble from the roof collapse in the limeworks would be more productive.

SOME TAPHONOMIC CONSIDERATIONS

Virtually all the fossil specimens from the sediment blocks on the dumps were badly broken and weathered prior to fossilization. Bones in all stages of weathering, according to the scale of Behrensmeyer (1981), are encountered. A very large number have, however, weathered to stage 5. The weathering and other destruction could have happened on the surface, but bones in all stages of weathering are encountered in other caves in the vicinity. In another cave in the area, Hyaena Cave (Martini and Keyser, 1989), bones associated with hyaena droppings can be seen at all stages of weathering. This weathering is obviously taking place in the cave because many cracked and weathered bones have all their fragments lying in association. This exfoliation and fragmentation are often due to the crystallization of brushite, forming shiny needles which resemble frost. This phenomenon is very common in caves in the area (Martini and Kavalieris 1978). It is therefore possible that most of the weathered bone and bone fragments found in the cave silts of Haasgat weathered on a debris-cone below an opening in the cave, and were broken when they were transported down the slopes of the debris cone together with boulders and other clasts by gravity, and later transported by floods and deposited in the cave slits. Weathering would have stopped immediately after deposition. The possibility that the bones were weathered in an upper chamber connecting the cave entrance (which could have been either a sinkhole or a passage) with the lower cave, also deserves serious consideration. No definite decision can be reached on the available evidence.

There can be no doubt that porcupines and carnivores were important accumulators of bones in the cave sediment. In Figure 2 a fragment of a large bone that was first chewed by a porcupine, then broken and afterwards transported to be deposited in the cave silts, is shown. This can be deduced from the fact that the fracture cuts across the porcupine-type gnawing marks (Maguire and Pemberton 1980), and that some matrix still adheres to the fracture surface. In Figures 3 and 4 puncture marks of carnivore teeth on an antelope sacrum are illustrated. Figure 4 is an enlarged photograph of the puncture marks in Figure 3.

Since the whole of the eastern end of the cave that included the opening to the surface has been weathered away, thereby exposing the ancient cave sediments, a more exact model for bone accumulation may never be found.

THE FOSSIL FAUNA

Primates

A nearly complete *Parapapio* (baboon) female skull, without the occiput and its canines (Figure 5), was found. It was a fairly young female with the second molars starting to erupt. A palate with some teeth of another juvenile individual was also recovered. According to Simons and Delson (1978), it would be unwise to attempt a definite identification on such an inadequate sample.

Figure 2. Bone gnawed by a porcupine

Figure 3. Anterior view of antelope sacrum with a puncture mark caused by the teeth of a carnivore.

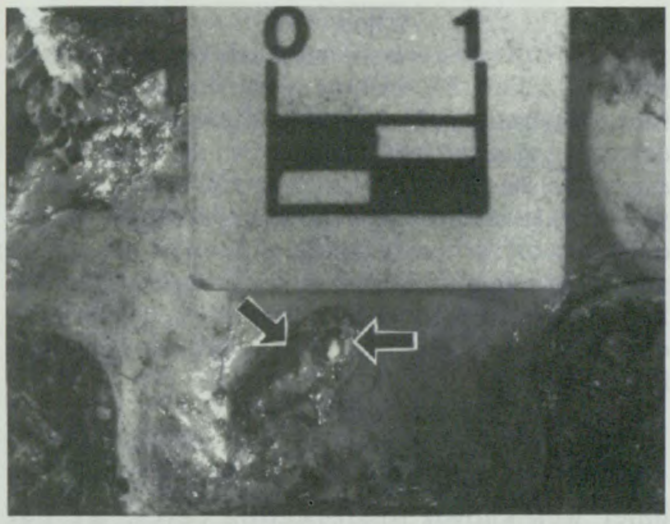

Figure 4. Enlargement of the puncture marks seen in Figure 3, showing smaller puncture marks within the larger puncture.

Figure 5. Skull of a young female *Parapapio*

Figure 6. Partial skull of *Cercopithecoides williamsi*.

The specimen does resemble a specimen of *Parapapio broomi* illustrated by Maier (1970).

Several skulls of the colobine monkey, *Cercopithecoides williamsi*, (Figure 6) were also recovered. A piece of jaw with two very worn large molars could possibly be a Simonpithecus; the material, however, is too inadequate to be sure.

No remains of hominids have been recovered to date.

Carnivora

A left maxilla of a hyaenid, possibly *Chasmapoorthetes nitidula* (Ewer) (Figure 7), was recovered from the dumps. The present specimen has a slightly larger pm^3 than most of the material from Kromdraai. This tooth is again smaller than that of *Hyaena brunnea* Thunberg. Both the above taxa are known from Sterkfontein Member 4 (Turner 1987). The left jaw of a fox was also found. Unfortunately all the teeth of this jaw have been lost, and a definite identification is not possible. It is comparable in size with that of *Canis mesomelas*.

Hyracoidea

Two species of hyracoids were recovered. The large one appears to be *Procavia transvaalensis* Shaw (Figure 8), while the smaller species is *Procavia antiqua* Broom (Figure 9), as is evidenced by its more brachydont dentition when compared with recent *Procavia capensis*. Only one juvenile lower jaw of the smaller species has been recovered to date.

Artiodactyla

Teeth of several species of Artiodactyla were recovered from the dumps. Most of the material is, however, so badly damaged that identification is doubtful. A badly-distorted palate and lower jaw (Figure 10) of *Pelea capreolus*, the living grey rhebok, could be identified with confidence. A ramus of the lower jaw with complete dentition was also found. A large molar of an alcelaphine and one of an *Antidorcas*-like antelope were also found. Many fragments of bones of large bovids were seen in the dumps, but no teeth have been recovered. As yet no suids have come to light.

Rodentia

Large concentrations of rodent bones, common in the other well-known fossil-bearing caves, are not encountered in the dumps of the roof collapse in Haasgat. A possible explanation is that the preserved sediments were deposited very far from the cave entrance where owls did not roost (Maguire *et al.* 1985). The only identifiable rodent material is a lower jaw with two post-canine teeth, and some isolated incisors and molars of a hystricoid that can not be distinguished from recent *Hystrix africae-australis*.

Age of the Fauna

All the taxa recovered from Haasgat are known from all the other fossil-bearing caves in the Krugersdorp area, i.e. Sterkfontein, Swartkrans and Kromdraai, as well as from Makapansgat Limeworks near Potgietersrus. The presence of *Parapapio* and *Chasmaporthetes* leaves no doubt that the Haasgat deposit is of similar age to the other cave deposits and is therefore near the Plio-Pleistocene boundary – probably upper Pliocene. It is however, impossible to correlate it unequivocally with any one of the other known deposits at present, because an insufficient number of identifiable fossils have been recovered to date. If hominids

Figure 8. Teeth of *Procavia transvaalensi* Shaw (above) compared with a lower jaw of a large individual of *Procavia capensis*

Figure 9. Lower jaw of a juvenile *Procavia antiqua* Broom.

Figure 7. Lateral view of the left maxilla of a hyaena, possibly *Chasmaporthetes nitidula* (Ewer).

Figure 10. Maxilla and lower jaw of a specimen of *Pelea capreolus* Sundevall from Haasgat.

and/or suids could be found, a better correlation will be possible.

Palaeoclimatic considerations

The most abundant ruminant in the collection of fossils from Haasgat is *Pelea capreolus*, the grey rhebok. The fossil material does not appear to differ from the recent species in any way. Grey rhebok tend to frequent grassy plateaux and can be regarded as an upland animal.

Their presence in Haasgat suggests that the African surface was a grassy upland at the time when the Haasgat deposit was being formed. Carcasses were probably brought into the cave by scavenging carnivores.

Of all taxa, *Cercopithecoides williamsi*, a colobine monkey, is the most abundant (seven individuals). Colobines tend to be specialized leaf-eaters, as is clearly displayed by the high cusps on the molars (Brain 1981). It is possible that *Cercopithecoides williamsi* occupied the same ecological niche as recent *Cercopithecus aethiops* (Brain 1981). The long, sharp cusps on the molariform teeth of *Cercopithecoides* do, however, indicate that it was a forest rather than a savannah dweller. These facts support the conclusion that the then much shallower Witwatersrandspruit Valley contained a dense forest. Colobine monkeys normally sleep in trees and do not shelter in caves. It therefore appears likely that the *Cercopithecoides* material found in Haasgat was scavenged from the forest.

The presence of a fairly dense forest in the Witwatersrandspruit Valley is indicative of a higher annual rainfall than is presently encountered in the Haasgat area. Because of its high elevation and the fact that most of the original proximal deposits have been weathered away, there is still reason to believe that Haasgat can be older than the lower members of Sterkfontein and Makapansgat, which are generally thought to be the oldest cave deposits. It is therefore intended to have more material prepared in order to establish a better biostratigraphic correlation with the other, better-known deposits.

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