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Brief Communication: A New Pleistocene Hominid-Bearing Locality at Hoedjiespunt, South Africa

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ABSTRACT HDP1 is an archaeological and faunal site located on the Hoedjiespunt peninsula at Saldanha Bay, South Africa, that has recently yielded fossil human remains. Artefacts from the associated archaeological deposits are identified as being Middle Stone Age. U series analysis of capping calcretes and analysis of the foraminifera and fauna associated with the human fossils indicate an age for the deposit in excess of 74,000 years before present, and it most probably dates to around 300,000 years before present. The fossil human teeth from in situ deposits at Hoedjiespunt are described and found to be large by comparison with modern humans but smaller than the known upper dentitions of southern African "archaic" *Homo sapiens*. The Hoedjiespunt molars are found to be morphologically within the range of variation observed in the teeth of modern *Homo sapiens*.

In Africa there are few sites that have yielded fossil human remains that may be dated between 730,000 and 40,000 years before present (ybp). In southern Africa, this period, covering the Middle and early Upper Pleistocene, has produced stone tool assemblages that would be termed Early and Middle Stone Age (ESA and MSA, respectively). From these archaeological sites only a handful of human fossils are well provenanced. However, despite their paucity, human fossils from this period in Africa, particularly southern Africa, are of critical importance because the behaviour of Middle Pleistocene and Middle Stone Age African populations is not well understood and because the anatomy of the southern African Middle and Upper Pleistocene populations lies at the centre of a debate concerning the origins of "anatomically modern humans" (Bräuer, 1984; Rightmire, 1984; Stringer and Andrews, 1988; Wolpoff, 1989; Wolpoff and Caspari, 1990; Bräuer et al., 1992). Every individual, southern African, MSA human fossil is thus a potentially important contribution to these discussions, and every new site from which MSA human fossils are recovered has the potential of leading to greater insight into these archaic populations' behavior.

In this paper we report the discovery of human fossil remains from Hoedjiespunt, South Africa, a Pleistocene site that is almost certainly in excess of 74,000 years in age. While only two hominid teeth have as yet been recovered from the site, the extreme paucity of provenanced middle Pleistocene and MSA hominid specimens and, in particular, the near absence of relatively unworn adult hominid teeth from the Middle to Upper Pleistocene of Africa, lends importance to the finds. As a contribution to the discussion on the anatomy and behaviour of MSA

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humans, the fossil site at Hoedjiespunt is described and the descriptions of the hominid teeth are given.

STRATIGRAPHY AND DATING

The Hoedjiespunt peninsula juts eastward into the northwest corner of Saldanha Bay (Fig. 1) and forms part of the fossil dune landscape that also houses the Sea Harvest site (Grine and Klein, 1993). The sequence of sands is capped by calcrete and lies on an emerged (±6 m above sea level [asl]) beach not visible at HDP1, the site described here. Both Later Stone Age and Middle Stone Age sites are common on the Hoedjiespunt peninsula, the former in unconsolidated surface contexts, the latter buried and often cemented in the fossil dunes. HDP1 is a locality on the southern edge of the peninsula, where road grading has exposed some 6 m of fossiliferous sands.

The stratigraphic sequence at HDP1 is capped by about a metre of consolidated calcrete carapase, at the base of which is a shell midden. The shells, mostly limpets (*Patella* spp.), but also some mussel (*Choromytilus*), are well preserved and are associated with large numbers of ostrich eggshell fragments and stone artefacts, mostly made of quartz. Although rather informal, the stone tool assemblage is almost certainly MSA with rare faceted platform flakes. Similar artefacts were found nearby at Sea Harvest, also in association with shell midden deposits (Volman, 1978). There are few bones in this horizon. Several similar MSA shell middens are visible at other localities on the Hoedjiespunt peninsula, also in disturbed sections. Below the shell midden is a dark horizon quite unlike other local sediments in being poorly sorted and with a high clay component. It may be a peaty residue formed in the swale of dunes under partly waterlogged conditions. In it are a substantial, but moderately well-preserved, faunal assemblage, ochre, and a large assemblage of quartz MSA stone tools, identical to those from the shell midden above. There are no marine shells or ostrich eggshell fragments from this dark horizon.

These upper artefact-bearing horizons have been disturbed by grading and have released shell, ostrich eggshell, and stone flakes onto the slope below. The two horizons are, however, clearly separated from two lower, undisturbed bone-bearing sands by a fine, stiff, shelly sand approximately 2 m thick that appears to have no mammalian fossils. The lower deposits have no shell midden component, no ostrich eggshells, and no stone artefacts. Collections of bone made prior to road grading at this site (by R.G. Klein and G. Avery) are housed in the South African Museum and probably reflect an assemblage largely, but perhaps not exclusively, from these lower sands. The fauna is heavily dominated by grazing forms, such as *Connochaetes/Alcelaphus* and *Antidorcas*, and includes many carnivore taxa. This seems likely to reflect accumulation by a predator such as the brown hyena (*Hyaena brunnea*) under environmental circumstances quite different from today. Referring to the similar pattern at the nearby Sea Harvest site, Klein felt that this suggests ". . . relatively cool and moist conditions that are arguably more in keeping with a Last Interglacial than with a Last Glacial regressive (cold) phase" (Grine and Klein, 1993, p. 148). The human teeth (HDP1-1 and HDP1-2), described later, were found in situ in the lowermost undisturbed shelly sand of HDP1.

The hominid-bearing shelly sands at the bottom of the sequence preserve a foraminiferal assemblage that implies a near shore windblown context, perhaps a regressional phase of lowering sea level. The foraminiferal assemblage does not resemble that known for the isotope stage 5/4 regression (McMillan, 1980) and indicates an age older than this (+78,000 years) (McMillan, 1993, pers. comm.). The presence of the informal MSA tool assemblage indicates an age of between 40,000 and 240,000 ybp. U series analysis of the calcrete capping at the site has given a date of around 300,000 ybp (J.C. Vogel, 1994, pers. comm.). The fauna from the hominid-bearing deposit indicates a time of deposition older than 78,000 years ago. From excavations conducted during 1994, it is our opinion that the entire sequence, including the MSA assemblages, was deposited over a relatively short period of time. We therefore suggest that the the hominid bearing sands

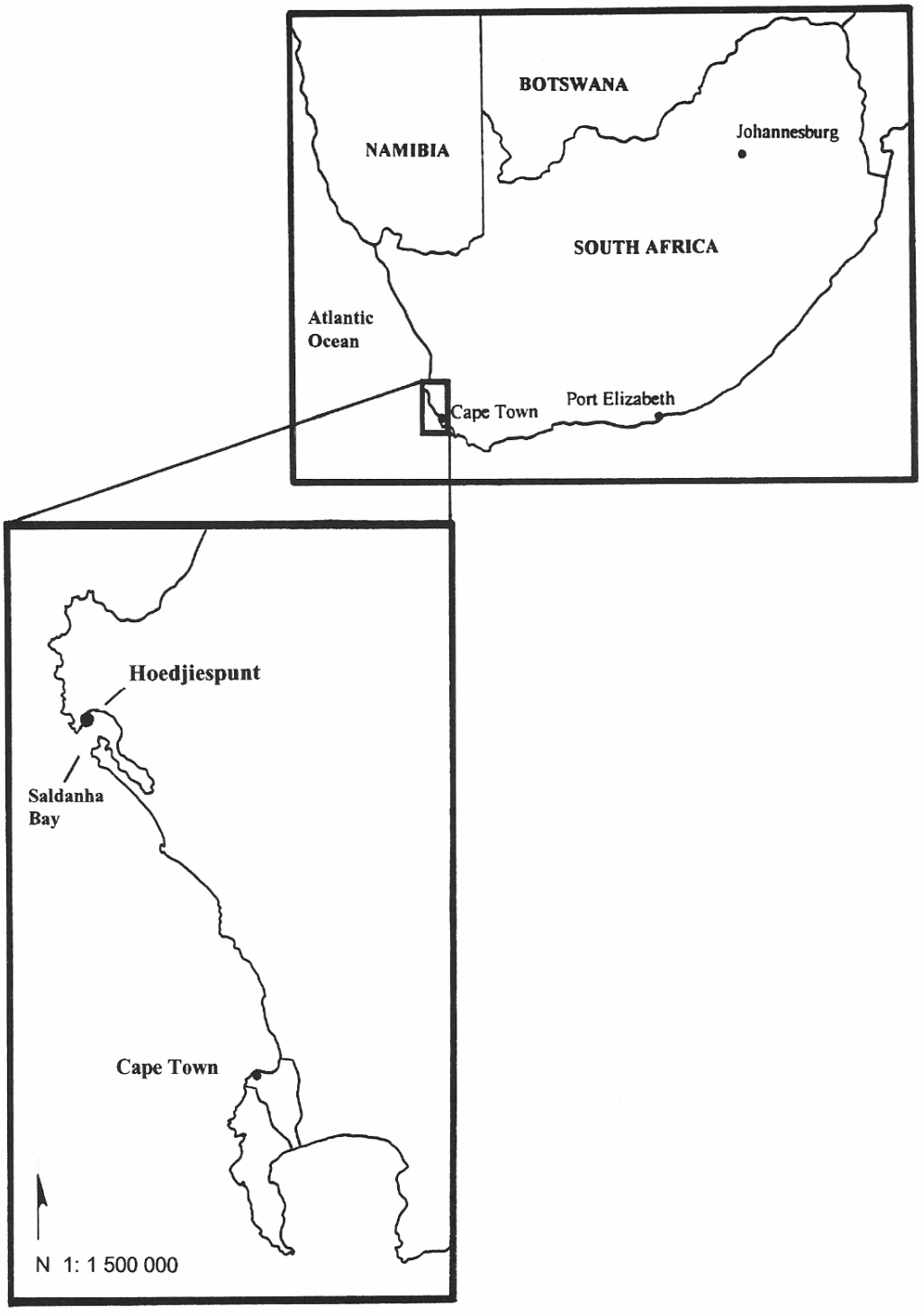

Fig. 1. Map showing the approximate location of the Hoedjiespunt peninsula and the HDP1 locality.

were most probably deposited between 200,000 and 300,000 ybp.

HUMAN FOSSIL MATERIAL

HDP1-1

HDP1-1 (Fig. 2) is an upper left molar discovered by one of the authors (L.R.B.) on August 22, 1993. The specimen was recovered in 10 pieces. The fracturing of the tooth was almost certainly a result of the formation of salt crystals within the specimen. However, after cleaning the authors were able to reconstruct the tooth with nine of the pieces so that they fit in good alignment. The resulting preliminary reconstruction allows for an accurate assessment of the surface morphology and estimation of nearly all dimensions.

The crown and root of HDP1-1 are completely formed, and the specimen may be considered adult. On the lingual surface, the protocone is well developed, and its cusp is shifted distally, being situated just mesial to the buccolingual centre line of the crown. There is a distolingual "wrinkle" on the occlusal surface (Fig. 2a), which the authors consider to be a hypocone cusp in an extreme degree of reduction. On the mesiobuccal surface there is a well-developed paracone. The central fovea is well defined. In keeping with the tooth being a left, the cusp tip of the protocone is slightly distally placed with respect to the paracone. Distobuccally on the surface, the metacone is reduced. Lingual to this cusp, the metacone is divided and there are two distostyles of nearly equal height to the main metacone cusp. These two distostyles form a distal occlusal rim. Separating the lingual cusps from the buccal cusps, there is a deep central fissure that lies in an almost straight mesiodistal line. The fissure begins near the mesial border and ends in three strongly developed distal fissures that serve to separate the distostyles from the hypocone and the metacone and from each other. A marked developmental groove begins at the buccal border near the occlusal margin and serves to separate the protocone from the metacone. The groove ends lingually in the central fovea. There are phase 1 (Hiiemae, 1978) wear facets on the lingual surface of the protocone near the cusp (Fig. 2a, 2c) and the lingual side of the paracone (Fig. 2c). There are phase 2 wear facets on the central mesial margin and on the tip of the distolingual distostyle (Fig. 2a, 2b).

The mesial face of the crown is vertical occluso-cervically, while the distal face is convex occluso-cervically. There is an interproximal wear facet present on the mesial face, but no identifiable interproximal wear facet on the distal face. On the distal face there is a marked hypoplastic groove that runs occluso-cervically along the bases of the two distostyles and the hypocone (Fig. 2a, 2b). Both the buccal and lingual faces are convex occluso-cervically, the lingual being slightly more rounded than the buccal face.

The tooth crown is buccolingually expanded (BL = 12.7 mm as measured, and c12.3 mm as corrected for damage) in relation to its mesiodistal diameter (MD = 11.2 as measured, and c10.8 mm as corrected for damage), giving a crown shape index (BL/MD) of 113.89%. The crown heights are 6.6 mm (protocone), 6.8 mm (paracone), and 6.8 mm (metacone).

The single preserved root is positioned directly below the paracone. It is mainly straight, exhibiting only a slight lingual curvature near its tip. Measured from the cervical enamel line on the buccal surface, the root is approximately 11.0 mm in length. The specimen has an undivided pulp cavity that is buccolingually oriented (Fig. 2d). The buccolingual diameter of the pulp cavity is c. 6.5 mm, while its mesiodistal diameter is c. 3.7 mm.

In our opinion the strong reduction of the distal cusps excludes this from being a first molar. More difficult was the assessment of whether this specimen is a second or third molar. The reduction in size of the metacone, with the extreme reduction of the hypocone, the single pulp cavity, and the absence of a distal interproximal wear facet, all strongly suggested that this specimen was a third molar. The recovery, however, of a second tooth (HDP1-2, described later) adjacent to this specimen that is undoubtedly a third molar at a degree of formation, compatible with being from the same individual, suggests that HDP1-1 may in fact be a second molar. If the specimen is a third molar, then it is substantially larger than those of mod-

Fig. 2. (**a**) Occlusal, (**b**) distal, (**c**) mesial, and (**d**) superior (basal) views of HPD1-1 left maxillary second molar. The scale is in millimetres.

TABLE 1. Measurements of M²s and M³s in seclected fossil hominids and modern humans

	MD (mean) SD	*BL (mean) SD*	*RL (mean)*	*CH (mean)*	*Crown shape index (BL/MD × 100)*
HDP1-1[1]	c10.8	c12.3	11.0	6.87	113.89%
HDP1-2[1]	9.8	11.0		6.02	112.24%
Florsibad[2]	10.2	11.9	17.0		116.67%
M³					
Broken Hill[1]	c9.2	c12.7			138.04%
M³					
M³	c13.5	c12.2			90.37%
Homo sapiens					
M³					
Male	9.24 ± 0.05[3]	11.64 ± 0.05[3]	12.6[4] (12)	6.5[5]	126.39% ± 9.42[3]
Female	8.79 ± 0.11	10.84 ± 0.13			123.45% ± 1.1
M²					
Male	10.32 ± 0.04[3]	11.93 ± 0.04[3]	11.3[4] (15)	6.0[5]	116.05% ± 6.47[3]
Female	10.03 ± 0.06	11.53 ± 0.07			114.50% ± 0.07

[1] Measurments made by the authors (Broken Hill measurements taken from a cast).
[2] From Dreyer (1935).
[3] Measurements of the teeth of South African blacks from Jacobsen (1982); n = 265 male and 81 female M³s, and 303 male and 99 female M²s.
[4] Weighted means of measurements of the teeth of southern African blacks from Drennan (1929).
[5] Data for crown height based on measurements of 132 South African blacks by Shaw (1931).
Crown height (CH) measured at the highest point from the edge of the enamel at the cervix on the lingual side. RL refers to root length. Numbers in parentheses represent the number of individual teeth measured.

ern southern African peoples and would be in keeping with this being from an "archaic" population of humans (Table 1). If the tooth is a second molar, the tooth is still large by comparison with modern southern African teeth but is not outside the range of variation of this group. It is our opinion, given the stratigraphic context, that the latter suggestion is correct.

HDP1-2

HDP1-2 (Fig. 3) is a tricuspid maxillary right third molar discovered on June 11, 1994 during systematic excavations. The crown of HDP1-2 is completely formed, but only c2.60 of the root has formed. On the lingual surface the protocone is well developed and its cusp is positioned just mesial to the buccolingual centre line of the crown. The hypocone is absent. On the mesiobuccal surface the paracone is well developed (Fig. 3a and 3b). The central fovea is complicated but well defined. Distobuccally on the surface, the metacone is reduced. Distolingual to this cusp, the metacone is divided, and there is a single, large distostyle of nearly equal height to the main metacone cusp (Fig. 3b). The central fissure is divided into two separate fovea (Fig. 3a). One is mesiobucally situated and separates the paracone from the protocone; the other is distolingually situated and separates the metacone from the distal protocone.

The mesial face of the crown is vertical occluso-cervically (Fig. 3a and 3c), while the distal face is convex occluso-cervically (Fig. 3a and 3d). Both the buccal and lingual faces are convex occluso-cervically. The tooth crown is buccolingually expanded (BL = 10.97) in relation to its mesiodistal diameter (MD = 9.83), giving a crown shape index of 112.24%. The crown heights are 6.39 (protocone), 6.39 (paracone), and 5.9 (metacone).

DISCUSSION

Relative to the M²s of most modern southern African humans, the surface dimensions of the crown of HDP1-1 are large and buccolingually expanded (Table 1). The specimen's crown dimensions are most closely comparable with those from some southern African archaic *Homo sapiens*, being large in comparison with the second molars of modern southern African blacks. In contrast, the specimen is not particularly high crowned compared with archaic dentitions but is still slightly higher crowned than specimens from modern South African blacks in this respect (Table 1; see also Tobias, 1991).

Due to the relatively low degree of wear on the occlusal surface, it is most probable that this tooth had only recently come into occlusion and thus most probably originated from a young adult. The hypoplastic groove on the distal face suggests a marked develop-

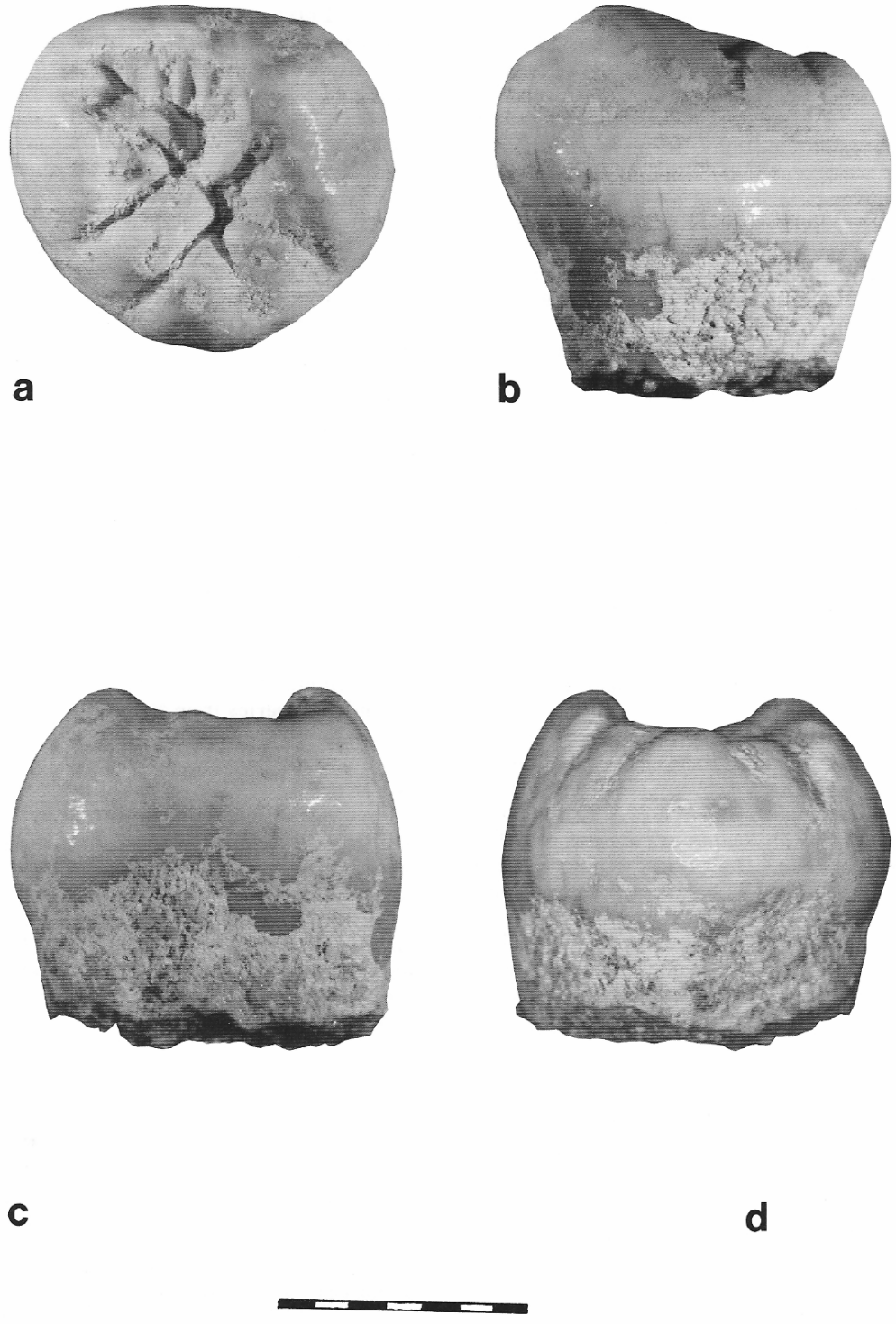

Fig. 3. (**a**) Occlusal, (**b**) distal, (**c**) mesial, and (**d**) superior (basal) views of HPD1-2 right maxillary third molar. The scale is in millimetres.

mental disruption during crown formation. Crown formation in (lower) second molars reportedly occurs between 3 and 4 years, and it has been suggested that these statistics may be loosely applied to crown formation in upper dentition (Aiello and Dean, 1990). If we accept that cuspal enamel takes approximately 1 year to form (Beynon and Wood, 1987), then judging by the position of the hypoplastic groove on the distal face, the event that caused enamel hypoplasia in this tooth could be traced to approximately 4–5 years.

HDP1-2 is human-like in its morphology and dimensions. Although somewhat mesiodistally expanded, the high degree of variability in crown shape of M^3s in modern human populations reduces the importance of this slight variation in HDP1-2. The tooth may be considered that of a juvenile adult, since there is no occlusal wear and, judging by the slight degree of root development, was from an individual in its early teens. That this tooth belongs to the same individual as HDP1-1 is supported by the close proximity of their recovery (within 15 cm) and the comparable developmental stages of the two teeth.

Whilst the Hoedjiespunt molars are large by comparison with the modern human teeth examined here, they are certainly comparable in shape and morphology to the modern human dental sample. Furthermore, if the specimens are from a male, the Hoedjiespunt individual would be dentally comparable in size to the largest male individuals within the modern southern African sample. However, if the teeth are derived from a female, the population was substantially more robust dentally than modern humans, as well as being more robust dentally than the Upper Pleistocene *Homo sapiens* populations recovered from such southern African sites as Klasies River Mouth, since the latter are somewhat microdont (Singer and Wymer, 1982; Rightmire and Deacon, 1991). It is interesting to note, however, that there are no comparable upper teeth from either Klasies River Mouth or Border cave for comparison. Nevertheless, given the generally modern humanlike dimensions of the lower molars from the Klasies River dental sample (Singer and Wymer, 1982; Rightmire and Deacon, 1991), it is possible that the Hoedjiespunt hominid represents an extreme size variation within this early population of *Homo*. Nevertheless, one must also consider whether the Hoedjiespunt molars could represent an individual from a more robust, archaic population of *Homo*, such as is represented by the Florsibad and Broken Hill specimens. If it is found that the age of the deposit is closer to 300,000 years ago, then it would in fact be surprising if the specimens originated from an "anatomically modern" population of *Homo*.

Until the dating of the Hoedjiespunt sediments can be refined, the sample will add little to the debate of whether Late Middle Pleistocene humans in southern Africa were dentally anatomically modern (Grine and Klein, 1993). Whether the larger size of the Hoedjiespunt teeth suggests that they are from a more archaic population or a more derived population of humans, or whether the size variation between the two samples represents the range of dental size between penecontemporaneous populations of late Middle Pleistocene southern African humans, will only be established with further hominid discoveries from the site.

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