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A New Hominid Parietal From Bodo, Middle Awash Valley, Ethiopia

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ABSTRACT A piece of left parietal of a Middle Pleistocene hominid, recovered from the Upper Bodo Sand Unit, in the Middle Awash, Ethiopia, is described anatomically and compared to Middle Pleistocene hominids and modern *Homo sapiens*. It bears several primitive features and has important implications for the original Bodo skull, found at the same stratigraphic level in the same area. The new fossil skull represents a different individual from the original Bodo skull.

An adult hominid parietal fragment was discovered on the surface of the Bodo exposures, Middle Awash Valley, Ethiopia by T. White on October 21 (second day of survey), 1981. This was the first hominid found by Prof. J.D. Clark's expedition to the area. Surface scraping was done to recover the possible remaining parts but no additional pieces were found.

The fragment (specimen number BOD-VP-1/1) was found 350 m 20° west of south from the original Bodo cranium site within the same layer, the Upper Bodo Sand Unit (Kalb et al., 1980). This unit consists of a horizontal grey conglomerate and sand that contains mammalian fossils and Acheulian artifacts (Kalb et al., 1980). Comparisons of the fauna and artifacts with other East African sites indicate a Middle Pleistocene age for the unit (Kalb et al., 1982). Dr. R.C. Walter is currently working to establish radiometric dates for this level.

The fossil is the posterior, inferior quadrant of a left parietal. It is 70 mm in length and 60 mm in width. It is well preserved with much detail retained and represents a different individual from the original Bodo skull. The fossil has suffered no distortion and is light-grey in color, like most of the bones from the same geological source. Some sand grains are cemented by calcite to the specimen. Descriptive terminology below follows Weidenreich (1943). See Figure 1 for photographs of the specimen.

This paper contains anatomical description and comparative study of the new fossil. Comparisons were made with a small (N = 50) sample of anatomically modern *H. sapiens*, with the original Bodo specimen, and with a variety of casts and published descriptions of Middle Pleistocene hominids.

MORPHOLOGY: DESCRIPTIONS AND COMPARISONS

Angular torus

A rounded, 10 mm-wide, elongate bony thickening occupies almost the entire mastoid angle of the parietal. This feature corresponds to what Weidenreich designated the *torus angularis* (Weidenreich, 1940). In BOD-VP-1/1 the angular torus extends superiorly for about 39 mm from asterion before it is interrupted by the break. It almost certainly continued as a temporal line as typically observed in other *H. erectus* specimens (D. Black, 1930; Weidenreich, 1943). Some workers may have interchanged the angular torus with the supramastoid/suprameatal crest extension for this reason (e.g., Rightmire, 1979). The angular torus in modern humans is weak or nonexistent.

In modern humans the angular torus region of the vault is usually thinner than the surrounding parts because the transverse sinus forms a deep sulcus by crossing the parietal corner (Weidenreich, 1943). Among other Middle Pleistocene hominid crania, the angular torus varies from nonexistent on Swanscombe to weak on OH-12 and prominent on Arago, Broken Hill, and Choukoutien (Skull VII). Compared to all the observed hominids, the BOD-VP-1/1 angular torus is the largest.

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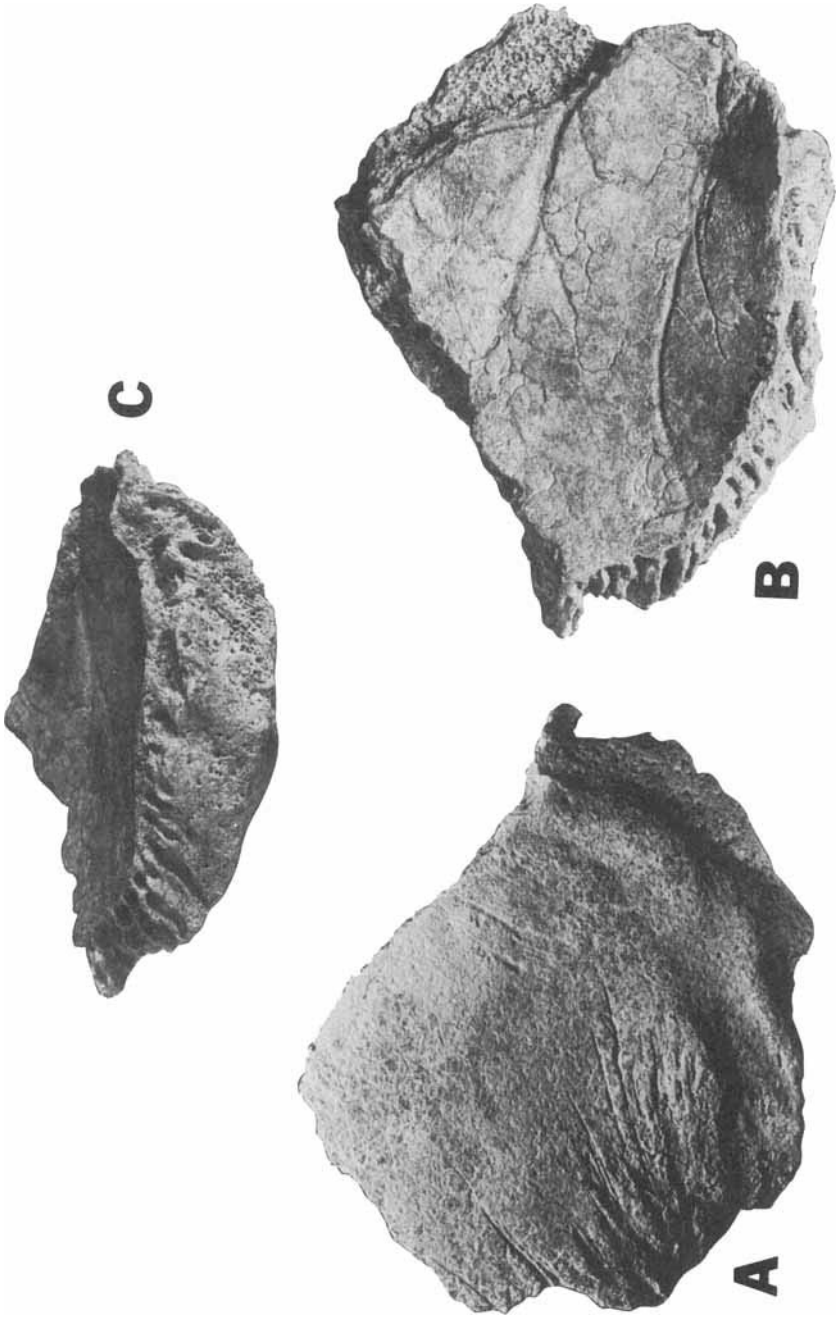

Fig. 1. A.External view, BOD-VP-1/1. B. Internal view, BOD-VP-1/1. C. Posteroinferior view, BOD-VP-1/1.

Supramastoid crest extension

This is a small bony thickening parallel to the angular torus which extends from the supramastoid crest of the temporal bone to the parietal. The supramastoid crest extension is usually observed only on the most robust modern human parietals. The prominence of the supramastoid crest extension of the Bodo parietal is far greater than Broken Hill, Arago, Swanscombe, Choukoutien III, Choukoutien XII, OH-9, Salé, and Petralona. The Bodo parietal displays a very distinct supramastoid crest extension for about 38 mm from the inferior squamosal border.

Supramastoid sulcus extension

This is the sulcus formed between the supramastoid crest extension and the angular torus on the parietal. This depression appears to represent an upward continuation of the supramastoid sulcus (D. Black, 1930). The supramastoid sulcus extension is found only on Middle Pleistocene hominids that have both the angular torus and supramastoid crest extension. On BOD-VP-1/1 it is deeper and wider than on any other hominid observed.

Squamosal border

From the temporal margin on the external surface of the parietal bone a series of ridges is found accompanied by straie *(striae parietalis)*. These indicate an extensive overlap between the temporal squama and the parietal (see Rak, 1978). The maximum overlap observed in modern humans is 21.0 mm (see Table 1). On BOD-VP-1/1 the overlap is 28.3 mm. A comparable overlap is present on the Bodo cranium where a more anterior part of the parietal is preserved.

Striae parietalis are common in modern humans. The maximum length measured is 34.7 mm. Weidenreich observed these markings on the Choukoutien parietals. Striae are also found in other Middle Pleistocene hominids but are virtually never mentioned in the literature. BOD-VP-1/1 bears deeply incised *striae parietalis*, the longest measuring 41 mm from the inferior temporal edge.

Mastoid border

The mastoid border of the parietal is the 39.2 mm-long section between asterion and the posterior termination of the squamosal border. On BOD-VP-1/1 the sutural face widens towards asterion. Its external margin thins and curves endocranially in its anteroinferior extent. It forms an angle of about 120° with the squamosal border. In alignment it belongs more to the lambdoid than to the squamosal border.

In modern humans the mastoid border is usually short (see Table 1). It can be curved or straight. In most modern humans the border is more aligned with the squamosal border than it is in Bodo.

Choukoutien Skull XI, Broken Hill, and OH-12 mastoid borders are more aligned with the squamosal borders. T. Marston (1937), described the Swanscombe mastoid border (more aligned with the lambdoid) as a primitive character. The new Bodo parietal (BOD-VP-1/1) also has a mastoid angle more aligned with the lambdoid, straight and long. I find the alignment of the mastoid border observed on Bodo and Swanscombe to merely represent a variation in Middle Pleistocene hominids. This alignment is also observed infrequently among modern humans and for this reason cannot be considered an exclusively primitive feature.

Lambdoid border

The length of the preserved lambdoid border is 46 mm externally from the asterion. It becomes strongly serrated about 15 mm from asterion. Around asterion, the interlocking sutures occupy only the internal margin. In contrast, modern humans bear serrations across the entire region, right down to asterion.

Endocranial

Two deep grooves of the meningeal arteries, the posterior temporal ramus and superior temporal ramus are present on the fossil. The superior temporal ramus is wider and deeper. In modern humans, the middle meningeal artery usually has three main rami well distributed from the anterior to the posterior parietal borders. The Ternifine parietal has two main rami with accessory branches, fronto-parietal and posterior temporal rami (Arambourg, 1955). Chinese *H. erectus* skulls have well-developed, branched posterior temporal rami and non-branched frontoparietal rami. BOD-VP-1/1 appears to be like the latter, with emphasis on the posterior parts of the rami. However, we still lack definitive evidence since we do not yet have a complete parietal.

The inferior part of BOD-VP-1/1 shows a small depression (fossa) formed by the inward bending of the mastoid border that functions to articulate with the petrous portion. This depression was also observed by Weidenreich (1943). The depression may occasionally be found in modern humans.

TABLE 1. Comparative cranial metrics, modern H. sapiens *(Amerindian) (Lowie Museum Collections)*

Specimen no.	Parietal striation length[1] (mm)	Squamosal suture overlap[2] (mm)	Mastoid border length[3] (mm)	Asterionic sutural breadth[4] (mm)	Maximum asterionic thickness[5] (mm)	Parietal squama thickness[6] (mm)
Fossil BOD-VP-1/1	41.4	28.3	39.2	17.4	20.8	8
2724	12.4	—	23	8.8	9.7	4
4243	22.8	21.0	—	9.9	11.0	2.5
4656	33.4	17.5	27	9.3	10.0	4
4337	34.7	15.7	27	6.7	6.9	3
4219	19.5	14.1	—	—	9.6	5
4734	18.7	12.0	27	4.7	—	3
4415	20.3	—	27	10.0	11.9	6
4598	29.3	13.4	31	5.5	7.6	4
4681	11.2	—	—	4.9	5.8	4
4373	6.8	—	—	7.0	7.6	4
4513	6.6	11.0	32	7.0	7.9	3
4416	21.7	9.9	25.5	6.7	7.2	2
4314	13.0	11.6	33	6.6	7.4	4
4525	20.0	9.9	24	5.4	7.8	5
4238	14.2	13.3	22	7.2	7.5	4
5535	16.3	16.2	—	7.7	10.0	6
4526	26.4	11.5	34	5.6	7.3	—
5585	24.3	14.8	—	7.7	8.6	5
2107	19.1	8.8	30	8.4	9.8	4
4368	14.5	12.4	—	8.0	8.4	5
3592	—	15.5	36	9.9	10.7	7
4391	—	12.8	37	—	—	—
4673	—	14.2	—	—	—	—
5426	—	9.2	24	—	—	—
5838	—	—	26	—	—	—
3600	—	—	34	—	—	—
5410	—	—	26.5	—	—	—
4291	—	—	22	—	—	—
N	20	20	20	20	20	20
R	6.6–34.7	8.8–21.0	22–37	4.7–10.0	5.8–11.9	2–7
X	19.0	13.2	28.4	7.4	8.6	4.2
SD	7.5	3.0	4.66	1.7	1.6	1.2

All specimens adult.
[1]Parietal striation length: measured from the inferior squamosal suture edge to the terminus.
[2]Squamosal suture overlap: a maximum distance measured from the inferior squamosal suture edge to the overlap terminus, parallel to the striae axis.
[3]Mastoid border length: measured from the ectocranial asterionic point to the most anterior point of the mastoid border.
[4]Asterionic sutural breadth: width of the sutural surface at the asterion.
[5]Maximum asterionic thickness: measured as a maximum thickness above asterion across the angular torus.
[6]Parietal squama thickness: vault thickness measured at a point 50 mm from the asterion and 50 mm from their inferior squamosal border, on the parietal squama.

Internal anatomy

The broken section of BOD-VP-1/1 exhibits a very thick cancelleous zone bounded by thinner plates of compact bone. The cancelleous layer is 8.5 mm thick on the superior breakage border away from the angular torus. The sum of the two bounding plates of compact bone is about 2 mm here. In modern humans the cancelleous tissue is smaller or equal to the sum of the thicknesses of the two compact bone layers. In Swanscombe the cancelleous tissue is thick like BOD-VP-1/1 but is fully replaced by compact bone toward the inferior border (T. Marston, 1937). In BOD-VP-1/1 the cancelleous zone extends inferiorly to the squamosal border.

Parietal thickness

The parietal squama of BOD-VP-1/1 is 8.0 mm thick at a point 50 mm from asterion and 50 mm from the inferior border. It thickens posteriorly. The maximum thickness observed on modern humans at the same spot is 7 mm (see Table 1) and here there is no significant thickness increase towards the lambdoid border. No measurement was found at a comparable placement on other Middle Pleistocene hominids. However, the great thickness of the new Bodo fragment is evident when its max-

imum asterionic thickness of 20.8 mm (see Table 1) is compared to that of other Middle Pleistocene hominids (Murrill, 1981: Petralona, 8 mm; Broken Hill, 12 mm; *Sinanthropus/Pithecanthropus,* 13–14 mm).

CONCLUSION

The BOD-VP-1/1 specimen is significant since it retains a part not represented in the previously found Bodo skull. Initial description of the original Bodo skull (Conroy et al., 1978) withheld taxonomic judgment. More recently, the fossil has been formally assigned to *Homo sapiens rhodesiensis* (Kalb et al., 1982). Study of the new parietal from Bodo has revealed a suite of features like the large angular torus, prominent supramastoid crest extension, well-pronounced angular sulcus, and very thick diploe.

This suite of features can not be matched in modern *Homo sapiens* crania examined by the author. Archaic *H. sapiens* and *H. erectus* specimens examined by me also failed to match BOD-VP-1/1 in the prominent expression of the features. In modern human crania, the prominence of these features is size and sex related. In the fossils, *H. erectus* shows these features more often and more prominently than archaic *H. sapiens.*

The prominent expression of the supramastoid crest extension and angular torus, the deep angular sulcus, and the thick diploe of BOD-VP-1/1 among the fossils could therefore be due to individual variation in archaic *H. sapiens.* Alternatively these features could imply a more primitive phylogenetic placement. With the amount of information available, it is impossible to choose between these alternatives. Only additional fossils and proper study of the original Bodo specimen can resolve this problem.

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