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PLEISTOCENE VERTEBRATES FROM CELEBES. V. LOWER MOLARS OF ARCHIDISKODON CELEBENSIS HOOIJER

by

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Since 1948 Mr. H. R. van Heekeren, then prehistorian to the Archaeological Survey of the Dutch East Indies, kept up an intermittent search for fossil teeth and bones that occur in association with Palaeolithic artifacts at Beru and Sompoh, near Tjabengè (Sopeng district), about 100 km Northeast of Macassar in Southwestern Celebes. These sites are now known to yield an interesting vertebrate fauna, presumably Pleistocene in age, the first found elements of which were described a few years ago (Hooijer, 1948, 1949). One of the most remarkable discoveries in the Tjabengè area made by Mr. Van Heekeren is a small elephantine that I have named *Archidiskodon celebensis* (Hooijer, 1949). It was based on an almost complete and unworn upper molar, and on a similar but worn specimen, while parts of an ulna and a tibia were also described. I ventured to interpret these fossils as belonging to a dwarf archidiskodont elephant (standing about six feet high at the shoulder when adult), in a curious way retaining the characters of *Archidiskodon planifrons* (Falconer et Cautley) from which I took the Celebes elephantine to have been derived.

It is a great pleasure, again, to acknowledge my indebtedness to Prof. Dr. A. J. Bernet Kempers, Head of the Dinas Purbakala R.I. at Djakarta, Java, who entrusted the Celebes fossil vertebrates to me for study. Moreover, I wish to thank Dr. Edwin H. Colbert of the American Museum of Natural History, New York, for stimulating discussions and kind advice. The proboscidean remains to be described below are the best specimens that Mr.

Van Heekeren ever collected in Celebes in the years 1948 to and including 1950, and credit should go to him especially for his perseverance in the field without which these valuable specimens would never have been collected.

The specimen represented on pl. XIX (upper left and lower right) is a complete lower left last molar with a portion of the M_2 also in situ in the mandible. The fossil originates from Sompoh. Of the bone of the mandible, well preserved on the outer surface, parts have been removed to expose the lingual surface of the M_3 as well as its posterior end. The molar appeared to be fully calcified and to possess eleven plates; in addition there is one half-plate in front, and a "talonid" at the hinder end of the specimen. Five plates are worn only. There is much cement on the crown between and also on the outer surfaces of the plates. The posterior six plates, all unworn, increase steadily in height from back to front, and, in lateral side view, are seen to be slightly concave anteriorly. As far as the covering of cement allows of the conelets to be seen, there are four or five conelets to each plate. The talonid is single.

Continuing the description of the M_3 from behind forward: plate 5 from the front has just been touched by wear and shows five rings of enamel. In plate 4 from the front the conelets are worn out already; the enamel is slightly crimped. The enamel figure thus shown on the masticatory surface has a slight median anterior point, while behind and against it in the median line there is a small ring of enamel, i.e., the worn tip of an intermediate pillar. In plate 3 the posterior median pillar has united with the main enamel figure, forming a loop in its border. There is also a median anterior point. The same condition is found in plate 2 from the front; the posterior median expansion is not very marked, however, and in plate 1 from the front this is not so either.

Cement in the valleys between the plates that are already worn is plentiful; it is worn away to a greater extent lingually than in the buccal part. The valleys are blocked in the median line by the contact of the expansions of the enamel plates. There is some damage to the tooth here: the lingual portions of the anterior three plates are injured. The natural masticatory surface, however, can be seen to be almost flat, falling off slightly toward the buccal side.

The half-plate in front of the M_3 is confluent in the median line with plate 1; it extends transversely from the buccal edge of the molar surface to slightly over the median line.

Little is preserved of the M_2 which is much worn down. The masticatory surface, incomplete lingually, shows the bases of the valleys between three plates, all of which must have been much expanded anteriorly in the median

line. There is an extensive posterior concavity; a result of interproximal pressure, or wear, or both. A similar facet is seen on the anterior end of the M_3 .

Measurements of the penultimate molar cannot be given; those of M_3 are: total length 164 mm, greatest width (at plate 4 from front), 43 mm, height of crown from lower border of enamel to unworn apex of plate 6 from front 47 mm. The five worn plates are contained in 65 mm antero-posteriorly, which gives a laminar frequency of $7\frac{1}{2}$. This is exactly the figure found for the worn upper molar from the same locality (Sompoh) described in my previous publication (Hooijer, 1949, p. 212). The thickness of the enamel, both in the present M_2 and in the M_3 , is 2-3 mm.

In lingual side view is exposed the antero-posteriorly elongated root, apically damaged, as well as the anterior root; the junction between these two roots is just below plate 3 from front, exactly like in the M_3 of *Archidiskodon planifrons* (Falconer and Cautley, 1845, pl. 12 fig. 12; Osborn, 1942, p. 959 fig. 845) and in that of *A. meridionalis* (Falconer and Cautley, 1846, pl. 14 B fig. 17a). This character could not be determined in the previously described molars of the Celebes pygmy elephantine. Schlesinger (1912, p. 103) has pointed out that in *A. meridionalis* the crown of the molars not only is higher than that in *A. planifrons*, but that it is also higher relative to the height of the root. While in *A. planifrons* the molar crown is about as high as the root, in *A. meridionalis* the root occupies less than one-third of the total height of the tooth. Now in our specimen just described the height of the crown, as given above, is 47 mm at plate 6 from front, while the anterior root is approximately as high as that: a character that points to *A. planifrons* rather than to *A. meridionalis*.

There is a great amount of variation in shape of the enamel figures in archidiskodont molars, and we do find distinct median posterior expansions, very much like those in the Sompoh M_3 , caused by the presence of intermediate pillars, in the last molars of a mandible of *A. planifrons* from the Siwaliks (Falconer and Cautley, 1845, pl. 11 fig. 2, cf. Falconer, 1868 I, p. 430), and in European specimens referred to the same species (Schlesinger, 1913, pl. XXVII; Depéret and Mayet, 1923, p. 101 fig. 4, p. 105 fig. 6, pl. IV fig. 8). As Schlesinger (1912, pp. 101, 106) writes, these median posterior expansions do not appear in typical *A. meridionalis*. Even when compared with the above cited figures, the enamel in our Celebes specimen appears to be less crimped. In addition, the conelets of the Celebes molar plates seem to be worn out more rapidly than is the case in the Siwalik molars. In *A. meridionalis* the enamel figures of the molar plates are definitely more irregularly formed, and less expanded in the median line. In its

relatively simple enamel pattern, therefore, the Celebes molar is closer again to *A. planifrons* than to *A. meridionalis*.

The number of plates in the last lower molar of *A. planifrons* varies from 8 to 14½ (including the ascending mutations of Osborn, 1942, pp. 949 and 953); the typical number, however, is considered to be eleven (Osborn, l.c., p. 959); this is what it is in the Sompoh M₃.

In tables 1 and 2 are presented the variation ranges of dimensions and indices of the lower molars of *A. planifrons* from the Upper Siwaliks of India described by Falconer (1868) and Osborn (1942), while table 2 contains the data for *A. meridionalis* from the Upper Villafranchian and Saint Prestian of Europe (Falconer, 1868; Adams, 1877-81; Pohlig, 1888-91; Weithofer, 1890; and Depéret and Mayet, 1923).

TABLE 1

Archidiskodon planifrons (Falconer et Cautley)

| | greatest length | greatest width | width-length index | greatest height | height-width index |
|-----------------|-----------------|----------------|--------------------|-----------------|--------------------|
| pd ₃ | 61 | 36 | 59 | — | — |
| pd ₄ | 113—121 | 61—63 | 52—54 | 44 | 70 |
| M ₁ | 127—190 | 66—90 | 39—67 | 73—91 | 81—117 |
| M ₂ | 178—204 | 71—95 | 35—53 | 82—99 | 118 |
| M ₃ | 203—323 | 77—109 | 26—49 | 77—124 | 78—125 |

TABLE 2

Archidiskodon meridionalis (Nesti)

| | greatest length | greatest width | width-length index | greatest height | height-width index |
|-----------------|-----------------|----------------|--------------------|-----------------|--------------------|
| pd ₃ | 55—76 | 31—43 | 44—64 | — | — |
| pd ₄ | 102—130 | 43—71 | 34—58 | 52—60 | 95—122 |
| M ₁ | 135—172 | 51—70 | 35—48 | 58—88 | 87—138 |
| M ₂ | 170—254 | 64—90 | 31—47 | 100—110 | 122—157 |
| M ₃ | 220—356 | 76—111 | 27—43 | 104—130 | 105—148 |

With a total length of 164 mm and a greatest width of 43 mm the M₃ from Celebes obtains a width-length index of 26. As my tables 1 and 2 show, there is much variation in this index in both of the species of *Archidiskodon*. There is reason to suspect that the greatest length in a certain number of ultimate lower molars on record has not been fully measured and has been underestimated; these elongated and posteriorly tapering elements seldom are fully exposed in the mandible. Therefore, the width and height measure-

ments of the crown can better be relied upon. In the average, the M_3 of *A. planifrons* (18 specimens) is 94 mm wide; this is also the average width of the M_3 of *A. meridionalis* (26 specimens). Thus, while the Celebean M_3 is just about one-half as long as the longest M_3 of *A. planifrons* on record, it is slightly less than one-half as wide as its homologue in *A. planifrons* and *A. meridionalis*. The greatest height of the Celebean M_3 , 47 mm, makes its height-width index 109; in *A. planifrons* the average crown height is 97 mm, and the average height-width index 113; in *A. meridionalis* the average crown height amounts to as much as 121 mm, and the average height-width index is 128. Since the Celebean M_3 is only very slightly higher than wide it should be classed, again, with *A. planifrons* rather than with *A. meridionalis*.

In summary, in its relatively low ridge-plate formula, which may be given as $\frac{1}{2} 11 \times$, as well as in its relatively low crown and simple enamel figures, to which may be added the relatively long root, the M_3 from Celebes appears to represent the very same species as that of the first found upper molars (Hooijer, 1949), an apparently archidiskodont elephant, with a laminar frequency of $7\frac{1}{2}$ in its last molars that corresponds to 4 in molars that are two times larger in linear dimensions, as is the case in *A. planifrons*. The importance of the now described M_3 lies in the fact that about its serial position there can be no doubt (the incomplete upper molars of 1949 may represent either M^3 or M^2). As such, the present molar can safely be referred to *Archidiskodon celebensis* Hooijer, and it establishes the distinctness of this pygmy elephantine beyond all question.

With the increased knowledge of the Celebean pygmy elephantine thus obtained, let us pass on the another completely preserved lower molar. This is the specimen, likewise from Sompoh, figured on pl. XIX, upper right and lower left. It is of the right side and has eight full-sized plates, one half-plate in front, and a plate that is slightly narrower and lower than the others behind, the "talonid". The talonid is hidden in a cement coating that also extends along the outer surfaces of the plates.

Plate 8 from the front is hardly touched by wear and has four conelets, in plate 7 the conelets, four in number too, have their dentine just exposed. Plate 6, in which the enamel figures of the conelets have just coalesced on the masticatory surface, shows anterior and posterior median points; these expansions of the enamel figure of the plate are worn to enamel loops in plate 5 from the front. The posterior loop is the larger. Plates 4 and 3 present further stages of wear, with rounded median anterior and posterior projections of the enamel figure; added to that the enamel in itself is somewhat less coarsish than it is in the more posteriorly placed plates. The anterior two and a half plates are so much worn down that only the buccal

half of the valley separating plate 2 from plate 1, and of that between plate 1 and the anterior half-plate remain. The small foremost plate extends only slightly over the median line of the crown; it is placed buccally, like that in the left M_3 above described.

Roots are for the greater part missing, but what is preserved shows that the division between the main root and the anterior root is just below plate 3 from the front. The anterior root is more than 50 mm long.

There is such a great resemblance between the left M_3 dealt with before and the present lower molar that I can have no doubt as to their conspecificity. But what is the serial position of the molar now under discussion?

With a total length of 85 mm and a greatest width of 31 mm the present tooth is about one-half the size of a large M_1 or a small M_2 in *A. planifrons* and *A. meridionalis* (tables 1 and 2). The resulting width-length index, 36, is rather low for the M_1 of *A. planifrons*, but we find a very similar figure (35) for the width-length index of the M_2 of that species figured by Falconer and Cautley (1845, pl. 11 fig. 6; cf. Falconer, 1868 I, p. 431). The height of the crown (at plate 8 from the front) is 29 mm, giving a height-width index of 94; this is a figure apparently much too low for M_2 in *A. meridionalis*. The number of (full-sized) plates, 8, is consistent with that of the intermediate molars of *A. planifrons*: for M_1 in this species the typical number is 7 (Lydekker, 1880, p. 277), while Osborn (1942, p. 957 fig. 838) figures an eight-plated lower molar as an M_1 of *A. planifrons*, too. The laminar frequency of the present Celebes specimen is as much as 11 (plates 3 to 7 inclusive occupy an antero-posterior length of 47 mm). This would correspond to $5\frac{1}{2}$ in a molar that is two times larger in dimensions. Now Osborn's *A. planifrons* M_1 has a laminar frequency of 5 (Osborn, 1942, p. 954), and it is also stated that in the Upper Siwalik *A. planifrons* these molars attain laminar frequencies of $5\frac{1}{2}$ to 6 (Osborn, l.c.).

I cannot decide whether the present specimen represents M_1 or M_2 . It seems to me that present evidence is best in accord with a provisional interpretation. Because of its relatively high laminar frequency in combination with the low number of plates the intermediate molar just discussed would seem to be somewhat more progressive than *A. celebensis* as exemplified by the upper penultimate or last molars and the last lower molar described before. Like the latter, the upper molars of *A. celebensis* (Hooijer, 1949) evidently belong to an elephantine that is just a 50 per cent scale reduction of *Archidiskodon planifrons*. Certain details that could be brought out while describing the splendid left M_3 (such as the configuration of the enamel figures and the relatively long root) fully endorse this view. In the case of the intermediate lower molar, it is the proportionally high laminar frequency

that is somewhat unexpected, for this tooth has the low crown and ridge-plate formula typical of *A. planifrons*, and I see no reason why it should not belong to *A. celebensis*. The most conservative opinion is to regard the specimen as probably slightly more advanced than the type of *Archidiskodon celebensis*. Unfortunately we do not possess the fossils yet that will enable us to elaborate the individual and sexual variation in the Celebes form. Tooth fragments are of very little avail, and we can only hope that upon further discoveries of complete molars, or jaws with teeth in situ, we may be able to further disentangle the probable history of the Celebean pygmy elephantine.

ABSTRACT

As a supplement to my first description of remains of a dwarfed archidiskodont elephant from Pleistocene Celebes (Hooijer, 1949), descriptions are here presented of a left M_3 ($\frac{1}{2}$ 11 X) and of a right M_1 or M_2 ($\frac{1}{2}$ 8 X). The archaic characters of *Archidiskodon planifrons* are displayed throughout the upper and lower molars thus far described, and further molars are required to settle matters of variation and affinity.

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EXPLANATION OF PLATE XIX

Archidiskodon celebensis Hooijer, Sompoh, S. W. Celebes. Upper left, M₃ sin., lingual view; lower right, same specimen, crown view; $\times \frac{3}{5}$. Upper right, M₁ or M₂ dext., crown view; lower left, same specimen, buccal view; $\times \frac{3}{4}$.

