

## REMARKS ON THE FOSSIL CETACEAN RHABDOSTEUS LATIRADIX Cope.

BY FREDERICK W. TRUE.

The genus and species *Rhabdosteus latiradix* were first described by Cope in 1867,<sup>1</sup> and were based on a rostrum from Charles County, Md., near the Patuxent River, collected by James T. Thomas. Three teeth were also "with much probability" assigned to the species. Cope remarked: "Joseph T. Thomas, the discoverer of this cetacean, tells me that he has seen portions of the muzzle between two and three feet long."

No further original information regarding the species appears to have been published until 1890, when Cope published figures of the type specimen, as restored, and of a tooth. He remarked, however, that the posterior parts of the maxillary and premaxillary bones "were restored from a different specimen from that represented in the rest of the figures."<sup>2</sup> This "different specimen" was figured by Mr. Case, in 1904, together with still another rostrum<sup>3</sup> and the three teeth.

From an examination of the three beaks, which were very kindly placed in my hands for study by the authorities of the Philadelphia Academy of Natural Sciences and Mr. Witmer Stone, it appears probable that three species are represented. The rostrum figured by Mr. Case in Pl. 15, fig. 1, is the same as that described by Leidy, in 1869, as probably belonging to *Priscodelphinus grandævus*.<sup>4</sup> I have remarked in a previous paper that the reasons for identifying the rostrum with that species are unsatisfactory,<sup>5</sup> but, however that may be, the rostrum certainly does not belong to the same species as the one called *Rhabdosteus latiradix* by Cope, nor is it likely that it represents the same genus.

The "different specimen" mentioned by Cope in 1890, and figured by Mr. Case in Pl. 15, fig. 2, does not, in my opinion, belong to the species *latiradix*, nor is it at all probable that it belongs to the genus *Rhabdosteus*.

<sup>1</sup> *Proc. Acad. Nat. Sci. Phila.*, 1867, pp. 132 and 145.

<sup>2</sup> *Amer. Nat.*, 1890, p. 607, fig. 4.

<sup>3</sup> *Rep. Maryland Geol. Surv.*, Miocene, 1904, Pl. 15.

<sup>4</sup> *Journ. Acad. Nat. Sci. Phila.*, Ser. 2, Vol. 7, 1869, p. 434.

<sup>5</sup> *Smithsonian Misc. Colls.*, Quart. Issue, 50, Pt. 4, No. 1782, p. 451, January 27, 1908.

Leaving out of consideration for the moment the rostrum originally assigned to *Priscodelphinus grandævus* (Case's Pl. 15, fig. 1), I would remark that the restoration of neither of the other two beaks appears to me satisfactory, and that the figure published by Cope in 1890 is even less so. As regards the latter, by adding a portion from the second beak to the posterior end of the type, Cope has, in my opinion, produced a figure which does not represent any species which has actually existed, and, furthermore, as the portion added is itself incorrect, the erroneousness of the figure is compounded. It should also be remarked that in the side view (Cope's fig. 4 (1a)) the alveoli are much smaller than in the restoration of the type itself.

Cope's note on the genus *Rhabdosteus*, published in 1890, is as follows:

"The muzzle reaches an extraordinary elongation, and for the greater part of its length forms an edentulous cylinder, which resembles the beak of the sword-fishes. The few teeth which remain at the base of the muzzle are like those of *Platanista*, with roots compressed so as to be longitudinal, and crowns compressed so as to be transverse, to the axis of the skull. The *R. latiradix* Cope is not uncommon in the Miocene beds of Maryland. Its skeleton is unknown. The nearest approach to *Rhabdosteus* is made by the genus *Stenodelphis*."

After repeatedly examining the type specimen (Pl. VI), I am satisfied that this characterization is only partially correct.

The alveoli, as restored, are horizontal. They are nine in number, about equal in size, and situated in advance of the depression in the palate in which a lozenge-shaped area of the vomer usually appears. Hence, they are hardly likely to represent the posterior end of the series. That the alveoli should be horizontal in the middle of the series is improbable. No known cetacean has such a conformation, and on anatomical grounds it appears unlikely to occur. The lower (or inner) margin of the alveoli and the lower half of the various septa are alone preserved, and this only on one side of the jaw. No distinct trace of the upper (or outer) margin of the alveoli and septa can be seen on the long rod-like superior portions of the maxilla. The narrow inferior strip of the maxilla, which bears the incomplete alveoli and septa (already mentioned), has been placed outside the larger piece, which forms the proximal end of the palate, and parallel with it. Such a combination could be justified only on the ground that the maxilla had split lengthwise, and that the outer and inner pieces represent two parts of one and the same bone. This is improbable, as the inferior surface of the larger piece is convex, while that of the smaller piece is nearly plane. The smaller piece is, in my opinion, much more likely

to have been anterior to the larger piece originally and in line with it, though this would bring the rather large alveoli farther forward than might be expected. If the superior, rod-like portion of the maxilla were turned outward on its axis, so as to bring the alveoli nearly or quite to a vertical position, a space would apparently be left between the premaxilla and maxilla. It is not reasonable to suppose that any such space existed originally.

In view of the circumstances mentioned above, I think it is unlikely that the real form of the rostrum can be determined until additional specimens have been collected, or at least until the type specimen has been taken to pieces, so that all the surfaces of the component bones can be examined.

It should be remarked that at the anterior end of the small piece of the maxilla which bears the alveoli there is a space of 19 mm., in which it is obvious that no alveoli existed, and between this and the first alveolus which is traceable is another space of about 25 mm., in which additional alveoli may or may not have existed. In any case, the fragment in question bears the end of the series of alveoli, and, if it is properly oriented, the anterior end. As the fragment bearing the alveoli is much shorter than the rod-like portions of the maxillæ above it, this confirms to some extent Cope's assertion that the muzzle "in the greater part of its length forms an edentulous cylinder."

*Measurements of the type-beak of Rhabdosteus latiradix Cope.*

Total length of beak, as restored, . . . . .	440 mm.
Greatest breadth of the same, as restored, . . . . .	39 "
Length of longest piece of premaxilla preserved, . . . . .	330 "
Length of longest piece of maxilla preserved, . . . . .	277 "
Breadth of premaxilla at posterior end, . . . . .	11 "
Breadth of premaxilla at anterior end . . . . .	7 "
Breadth of portion of maxilla above the alveoli at posterior end, . . . . .	9 "
Breadth of alveoli at anterior end, . . . . .	7 "
Greatest breadth of palate between alveoli, as restored, . . . . .	21 "
Length of the palatal portion of the left maxilla, which contains the alveoli, . . . . .	166 "
Breadth of the same at the anterior end, . . . . .	4 "
Breadth of the same at the posterior end, . . . . .	4 "
Length of larger palatal fragment (left), which is internal to the preceding in the restoration, . . . . .	193 "
Breadth of the same at the anterior end, . . . . .	5 "
Breadth of the same at the posterior end, . . . . .	16 "
Length occupied by nine alveoli, . . . . .	103 "
Antero-posterior breadth of largest septum between alveoli, . . . . .	5 "
Antero-posterior breadth of largest alveolus, . . . . .	7 "

The "different specimen" mentioned by Cope, and figured by Mr. Case,<sup>6</sup> consists of two pairs of slender elongated bones, of which the outer pair represents the superior rostral portion of the maxillæ, and the inner pair the superior rostral portion of the premaxillæ. The maxillæ diverge at both anterior and posterior ends, while the premaxillæ diverge at the anterior end and converge at the posterior end. At the latter point, in the median line, is inserted a piece of bone which may represent a portion of the vomer or mesethmoid.

After examining this specimen, I am of the opinion that it is not properly put together, especially as a space is left between the maxillæ and premaxillæ proximally. The small fragment inserted between the premaxillæ does not belong in that position. It is unsymmetrical and probably represents some portion of the maxilla.

Traces of several alveoli are visible on the under side of the maxillæ, at the proximal end. That these bones are acuminate at this end is due to the fact that both the inner and outer edges are abraded. The bones should be turned outward somewhat on their axes, so that the lower free border, which is now directed outward, would be directed downward. This would bring the maxillæ into such a position that the upper surface would be horizontal proximally, very much as in *Inia*.

The two inner bones are probably premaxillæ, although at the anterior end the inner surface is plane or slightly convex rather than concave. At the middle, the inner wall is concave, with traces of a continuous longitudinal ridge. If they are really premaxillæ, they should be transposed, that on the right side being placed on the left and *vice versa*. At the same time they should be given a quarter turn on their axes, so as to make horizontal the inner surfaces which are now vertical. This would also cause the bones to diverge at the posterior end, as they do in *Inia* and most other *Odontoceti*, leaving space for the preauricular triangle. Their shape would then correspond closely to that of the same bones in *Inia*, except that the sides near the proximal end would be somewhat more nearly vertical.

The specimen probably represents a genus allied to *Inia*, but it is impossible without more material to determine its relationships accurately. It does not agree with any European genus of which the rostrum has been figured, nor with any American genus of which the rostrum is available for comparison.

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<sup>6</sup> *Rep. Maryland Geol. Surv., Miocene, Pl. 15, fig. 2.*



Fig. 1.—Rostrum of *Priscodelphinus* sp.? from the Miocene of Shiloh, N. J. superior surface. ( $\frac{1}{2}$  nat. size.)

The third rostrum (text fig. 1), which is that mentioned by Leidy in 1869 under *Priscodelphinus* (or *Tretosphys*) *grandavus*,<sup>7</sup> and also figured by Mr. Case,<sup>8</sup> has, as already mentioned, no close relationship with the other two. It may for the present be considered as representing a species of *Priscodelphinus*, although, as explained in a previous paper,<sup>9</sup> the reasons for referring it to that genus are not satisfactory.

The principal peculiarities of the rostrum are that the premaxillæ are much depressed, but not narrowed, anteriorly, that the anterior alveoli are larger than the posterior ones and directed forward, and that the external free border of the maxillæ is rounded (see text figs. 2 and 3).

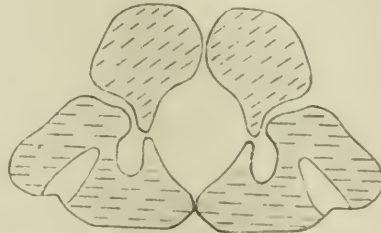


Fig. 2.—Transverse section of the same at the posterior end. (Nat. size.)



Fig. 3.—Transverse section of the same at the anterior end. (Nat. size.) In figs. 2 and 3 the maxillæ are indicated by horizontal lines and the premaxillæ by oblique lines

The three teeth which were provisionally referred to *Rhabdosteus* by Cope are preserved in the Academy of Natural Sciences of Philadelphia, and were examined by me in 1907. Very good figures of the largest one were published by Cope

<sup>7</sup> *Journ. Acad. Nat. Sci. Phila.*, Ser. 2, Vol. 7, 1869, p. 434.

<sup>8</sup> *Rep. Maryland Geol. Surv.*, Miocene, Pl. 15, fig. 1.

<sup>9</sup> *Smithsonian Misc. Colls.*, Quarterly Issue, 50, Pt. 4, No. 1782, p. 451, January 27, 1908.

in 1890.<sup>10</sup> This tooth and one other are blackish in color, while the third tooth is yellowish. The last mentioned is 21 mm. long, and that figured by Cope 23 mm.

As mentioned by Cope, both crown and root are compressed, the former at right angles to the latter.<sup>11</sup> This form of tooth occurs in *Stenodelphis* and in some genera of *Delphinidæ*. The crown is slightly recurved. The base of the crown is somewhat convex, both internally and externally, and is marked off from the root by a distinct constriction, due in part, no doubt, to wear.

Teeth similar to these in size and form, from Baltringen, Würtemberg, Germany, were described and figured by Dr. J. Probst in 1886,<sup>12</sup> under the name of *Schizodelphis canaliculatus* H. von Meyer. This species is considered identical with *S. sulcatus* by Dr. Abel, but the teeth of the latter, figured by Dal Piaz,<sup>13</sup> are certainly different, as regards the shape of the crown and the direction of its compression, from those figured by Probst. Even with allowance for variation, it seems to me probable that they may represent two different species of the genus *Schizodelphis*. The principal difference between the teeth assigned to *Rhabdosteus* and those figured by Probst is that the crown is shorter in the former.

On the whole, it seems probable that the teeth described by Cope belong to the genus *Schizodelphis*, but this is not a sufficient reason for considering *Rhabdosteus* synonymous with *Schizodelphis*, especially in view of the fact that it is uncertain whether the teeth have any direct connection with the type rostrum of *Rhabdosteus*. The most that can be said is that the alveoli of *Rhabdosteus* indicate that the teeth had flattened roots of the same size as those of the teeth which Cope assigned to that genus.

#### EXPLANATION OF PLATE VI.

PLATE VI.—Fig. 1.—Type specimen of *Rhabdosteus latiradix* Cope. Superior surface. Scale  $\frac{1}{15}$ .

Fig. 2.—The same. Left side. Scale  $\frac{1}{25}$ .

Fig. 3.—The same. Inferior surface. Scale  $\frac{1}{15}$ .

<sup>10</sup> *Amer. Nat.*, 1890, p. 607, fig. 4 (2, 2a, 2b).

<sup>11</sup> That the anterior and posterior surfaces of the crown are flat is not due to wear.

<sup>12</sup> *Jahreshefte Ver. Vaterland. Naturkunde Würtemberg*, 42, 1886, Pl. 3, figs. 11-14.

<sup>13</sup> *Palaeont. Ital.*, 9, Pl. 31, figs. 6-28.

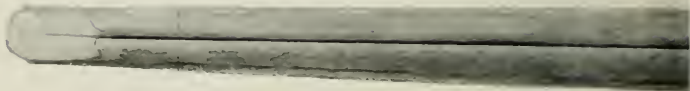
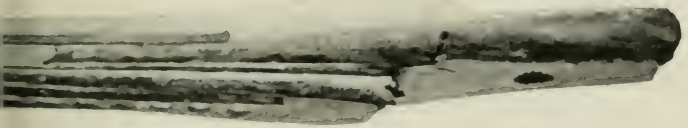


PLATE VI



LATIRADIX COPE