

ON THE OCCURRENCE OF REMAINS OF FOSSIL CETACEANS OF THE GENUS *SCHIZODELPHIS* IN THE UNITED STATES, AND ON *PRISCODELPHINUS* (?) *CRASSANGULUM* CASE

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(With two plates)

In 1904 Mr. E. C. Case described in the Report of the Maryland Geological Survey¹ a skull of a fossil porpoise, which he assigned provisionally to the genus *Priscodelphinus*, as a new species, under the name of *Priscodelphinus* (?) *crassangulum*. The type specimen was obtained on the shore of Chesapeake Bay, three-fourths of a mile north of Governor's Run, Calvert County, Maryland, from the Miocene marl belonging to the Calvert formation. The type consists of the rostrum of the skull, nearly complete, a part of the basis of the skull, one zygomatic process, one occipital condyle, a tympanic bulla, and the mandible, which is nearly complete, but lacks the condyles. In addition, a large fragment, which resembles the orbital process of the frontal, is present, but, as will be explained later, I have been unable to satisfy myself that it is really such. Among other fragments, which I have been unable to identify positively, are some which appear to represent the thin portions of the pterygoids. No teeth were preserved. The rostrum, mandible, *basis cranii*, zygomatic process, occipital condyle, and tympanic bulla were figured by Mr. Case.²

While studying the types of various fossil cetaceans in the collections of Johns Hopkins University and of the Maryland Geological Survey, I was permitted by Prof. William B. Clark to bring the type of Mr. Case's species to Washington, where it has been put together under my direction. As Mr. Case's figures are from drawings, I have thought it desirable to supplement them by figures reproduced from photographs.

Before considering this valuable specimen in detail, I desire to make certain observations regarding the genus *Priscodelphinus*. The genus was established by Leidy in 1851 or 1852³ on the basis of a dorsal

¹Report of Maryland Geological Survey, Miocene, text, 1904, p. 12, pl. 11, figs. 1-3.

²*Op. cit.*, pl. 11, figs. 1-3.

³Proc. Acad. Nat. Sci. Phila., 5, p. 326. Read Dec. 9, 1851.

vertebra from the green sand of Mullica Hills, New Jersey, which had been mentioned and figured by Harlan in 1824 as that of a saurian.¹ Leidy dedicated the species to Harlan, under the name of *Priscodelphinus harlani*.

I examined the type specimen of this species in Philadelphia in the spring of the present year, and compared it with Harlan's figure, which is a very good representation of it. The epiphyses, which are ankylosed to the centrum, are thin. There is a distinct keel, the outline of which is concave when viewed from the side. The transverse processes are recurved at the end and thickened, and have a rounded ridge superiorly near the posterior margin. The articular surface for the rib is oval in outline. The superior surface of the centrum is very concave, with a narrow median ridge reaching nearly to the epiphyses at both ends.

Cope in 1868² remarked that there were a few more vertebræ of this species in the collection of the Philadelphia Academy, but I did not find them. In 1890 Cope united *P. harlani* with *P. grandævus* Leidy,³ but, as Leidy had pointed out previously, the latter appears to be a considerably larger species. However this may be, Leidy himself placed *grandævus* in the genus *Priscodelphinus*, and the species was described at the same time with *harlani*. Various other species based on vertebræ were assigned to *Priscodelphinus* by Leidy and Cope from time to time. The characters of a genus, however, are not properly elucidated by such material.

Cope's diagnosis of *Priscodelphinus*, published in 1868,⁴ relates entirely to the vertebræ, but in referring to it in the previous year (1867) he remarked: "In this genus the muzzle is elongate and flattened, and furnished with cylindrical fanged teeth, which extend throughout much or all of its length. The symphysis mandibuli is very elongate. The teeth have not been described. *Delphinus canaliculatus* von Meyer (*Palæontographica*, 1856, p. 44), from the Swiss Tertiary, appears to belong to it."⁵ In 1890⁶ he stated that *P. grandævus* had "a slender muzzle, with a full series of curved cylindrical teeth; a neck like that of a seal in proportions, and a long slender body. The first sternal segment is T-shaped, and the ribs are slender, compressed, and mostly two-headed." His diagnosis of the genus, published at the same time, comprises the following char-

¹ Journ. Acad. Nat. Sci. Phila., 4, 1824, p. 232, pl. 14, fig. 1.

² Proc. Acad. Nat. Sci. Phila., 1868, p. 159.

³ Amer. Nat., 1890, p. 615.

⁴ Proc. Acad. Nat. Sci. Phila., 1868, pp. 186, 187.

⁵ *Loc. cit.*, 1867, p. 145.

⁶ Amer. Nat., 1890, p. 604.

acters: "Teeth with cylindric roots, caudal vertebræ plane; lumbar diapophyses wide, flat; muzzle elongate, slender; cervical vertebræ long." In connection with this diagnosis, Cope published figures of seven cervical vertebræ, the manubrium of a sternum, and a rib, from Cumberland County, New Jersey, which he assigned to *P. grandævus*. The type of the species was from this county, but it is not clear on what ground Cope associated the specimens above mentioned with the type, except that they were from the same locality, or how he ascertained that the muzzle was elongated in the genus *Priscodelphinus*. Probably the latter assertion was based on the fact that Leidy, in 1869, mentioned a portion of an elongated rostrum in the Philadelphia Academy as probably representing *P. grandævus*.¹ According to Leidy, it came from the same locality as the type vertebræ, at a later date, and accompanied another lot of vertebræ. He remarked, "It is suspected to belong to the same animal."

The fact that this rostrum came from the same locality as the type vertebræ of a species of *Priscodelphinus* is an insufficient reason for placing it in the same genus. It is well known that the remains of many genera and several families of Cetacea are found in the marine Miocene formations of the east coast of the United States. Until a skull (or at least part of one) is found with some vertebræ which can be identified with the type vertebræ of *Priscodelphinus harlani* or *grandævus*, under such circumstances that their connection cannot be doubted, the real characters of *Priscodelphinus* can hardly be determined. A comparison of vertebræ which have been assigned to different species of *Priscodelphinus* with one another, and with those of European genera supposed to be closely allied, will doubtless throw some light on the subject. So far as present evidence goes, there is some ground for believing that vertebræ like those of *P. harlani* can properly be associated with *Schizodelphis*, or, in other words, that the genus *Priscodelphinus* will eventually prove identical with *Schizodelphis*.

In the meantime, I agree with Mr. Case that his species *crassangulum* is only doubtfully to be associated generically with such species as *Priscodelphinus harlani*, *grandævus*, etc. On the other hand, there appears to be good reason for placing it in the genus *Schizodelphis* Gervais (= *Cyrtodelphis* Abel).² Dr. Abel's re-characterization of this genus, under the name of *Cyrtodelphis* Abel, is as follows:

¹ Journ. Acad. Nat. Sci. Phila., (2), 7, 1869, p. 434. This rostrum was figured by Case in Report of Maryland Geological Survey, Miocene, pl. 15, fig. 1, but the scale should be $\frac{1}{2.5}$ instead of $\frac{1}{2}$.

² See C. R. Eastman, Bull. Mus. Comp. Zool., 51, 1907, p. 84.

Symphysis long, occupying about two-thirds the length of the jaw. Outer side of lower jaw with long vascular impressions, which often unite to form a groove, which is broad and shallow at first and afterward narrow and deep. Angle of the symphysis rounded. The lower borders of the rami concave, the upper bent inward, so that, seen $\frac{1}{2}$ m above, the rami, with the angle of the symphysis, assume an elongated oval form. Alveoli numerous, reaching up on the rami. Teeth small; those on the rami short cone-shaped, with the crown bent backward and swollen above the base.

Premaxillæ approximated, anchylosed together in age, depressed in the nasal region, with many grooves in the broader part which converge anteriorly. Nasals small. Interparietal enclosed between the two frontals and the occipital. Frontals mostly free, covered by the maxillæ only on the sides.¹

The skull of *crassangulum* presents the majority of these characters, and especially those of the lower jaw, on the conformation of which, according to Dr. Abel, the chief reliance is to be placed. As nearly all of the brain-case and adjoining parts are lacking, the agreement, as regards the form of the frontals, nasals, etc., cannot be determined.

Schizodelphis sulcatus is peculiar as regards the form of the brain-case. The supraoccipital is very low and the frontals occupy a very large area on the vertex. As a result, the cranium is depressed and somewhat rectangular, and the temporal fossæ are irregularly pentangular. The palate is deeply grooved and its surface more or less rounded. The teeth are comparatively few in number and widely spaced, but the two rows are closely approximated anteriorly, at least in the mandible.

In the shape of the palate, the greater number of teeth, and the greater relative distances between the rows, *Schizodelphis crassangulum* differs from *sulcatus*. It seems best at present, however, to regard these differences as specific rather than generic.

Mr. Case has described the type specimen of *crassangulum* quite in detail. The following notes relate chiefly to characters which are not mentioned by him, or to such as seem to me worthy of a more extended description:

At the middle point of the rostrum a cross-section of the premaxillæ forms nearly the quadrant of a circle, the height and breadth being about equal. As they extend forward they become gradually more depressed, while posteriorly they become higher, until they reach a point about opposite the posterior end of the tooth-row, beyond which they become rapidly lower again and also broader. This broad portion is nearly flat. It is succeeded further back by a second broad, flattened area, which is separated from the first by a distinct

¹ Denkschr. k. Akad. Wiss. Wien, Math.-Nat.-Wiss. Classe, 68, 1900, p. 849.

groove. This groove runs diagonally toward the median line, and thence anteriorly along the inner margin of each premaxilla to a point a little in advance of the line of the posterior end of the tooth-row. The posterior ends of the premaxillæ are lacking.

The maxillæ at the middle of the rostrum are much narrower than the premaxillæ (viewed from above, only about half as broad). They taper gradually anteriorly, as do the premaxillæ. Posteriorly they increase in breadth gradually, and opposite the posterior end of the tooth-row appear to have been originally about as broad as the premaxillæ at the same point. They increase in breadth rapidly posterior to this point, with nearly straight free margins and the upper surface nearly plane, but inclined inward.

On the upper surface of the rostrum the suture between the maxillæ and premaxillæ is in a groove, which is traceable throughout the length of the rostrum and appears to have been especially deep at the base of the latter.

The inferior or palatal surface of the rostrum is flat, and is bisected by a longitudinal triangular median groove, 3 mm. wide and 2 mm. deep at the middle point. This groove is bounded on each side by the sharp inner edge of the inferior palatal surface of the maxilla, which does not curve upward to meet it, as in *S. sulcatus*. It increases greatly in breadth and decreases in depth anteriorly, and at the end of the rostrum fades away altogether, leaving the whole palatal surface flat.

At the anterior end of the rostrum the premaxillæ occupy more than half the palatal surface and form a triangular area between the maxillæ. This triangle is greatly prolonged posteriorly, and the thin strips of the premaxillæ probably extend in the median groove nearly as far back as the line of the posterior end of the tooth-row, where the vomer appears between the maxillæ, but the sutures are not distinct.

The vomer is visible as a linear slip for a distance of 77 mm. in front of the anterior insertion of the palatine bones, and probably extended 30 mm. further originally, or 107 mm. in all.

A triangular rugose area 55 mm. long at the base of the maxillæ indicates the position of the palatine bones, but the ridges probably do not represent any portion of the bones themselves. Farther back there is a shallow depression on the palatal surface of the maxillæ, laterally.

The thin inflated portion of the pterygoids is not developed, or may be represented by small pieces, which cannot be joined to the posterior thicker part. The latter, which borders the nares posteriorly, is concave externally and convex internally.

The alveoli are directed downward, forward, and outward. They are all somewhat flattened and elliptical in outline, but some of the posterior ones are more nearly circular. The bony septa between them are all incomplete in the specimen, but were probably complete originally and at least half as broad as the alveoli. On the right side, 65 alveoli can be counted, and as the rostrum is nearly complete, this was probably about the original number of teeth.

The nares are small and have a longitudinal diameter of 15 mm. The posterior vertical free border of the vomer is concave and ends abruptly on meeting the surface of the basisphenoid. The free margins of the inferior lateral borders of the basisphenoid are very rough. The basioccipital is lacking, except a small fragment attached to the occipital condyle. Only the left condyle is present. It is 45 mm. high and 30 mm. broad. It is closely appressed to the surface of the exoccipital, the outer margin being only 9 mm. at most from that surface.

Only the left zygomatic process of the temporal is present. It is 75 mm. long from its articulation with the exoccipital to the anterior free end and 51 mm. from the tip of the postglenoid process to the lower margin of the temporal fossa. Enough of the posterior margin of the temporal fossa remains to indicate that it was nearly semicircular, and that it extended backward little, if any, beyond the line of the occipital condyles. The glenoid surface of the zygomatic is 41 mm. broad and only slightly concave. The free margin is quite thin, both laterally and in front. The exoccipital terminates in a semicircular process, with the end truncated and deeply pitted.

The length of the symphysis of the mandible is 444 mm., and when complete was probably but little longer. At the middle of its length the breadth is 28 mm. On the line of the posterior end of the symphysis the breadth is 50 mm. and the depth 29 mm. The superior surface of the symphysis is flat, with a median groove, which is about 2 mm. broad at the middle point. It dies away gradually anteriorly and is bifurcated posteriorly. The tooth-row extends about 23 mm. beyond the posterior end of the symphysis. The internal surface of the anterior end of the rami is convex, the external surface nearly plane, and the inferior margin rounded. The rami diverge at an angle of about 45°. The apex of the angle is rounded.

The inferior surface of the symphysis is rounded and is divided on each side by a very distinct groove, which is deepest posteriorly, becomes shallower anteriorly, and disappears near the tip of the jaw, where the surface is nearly flat. The bottom of the groove is occupied by several foramina, which are prolonged into narrow

channels running forward. At the widest point the main grooves have a breadth of 6 mm. The rounded eminence between them is 12 mm. broad at the middle of the symphysis.

The alveoli are like those of the upper jaw, being somewhat elliptical in outline, and are directed forward, outward, and upward. At the tip of the jaw the roots of the teeth, at least, must have been directed almost horizontally. A few of the posterior septa are complete and are nearly as broad as the diameter of the alveoli. More anteriorly they are less distinct and were probably incomplete. This is especially true at the tip of the jaw, where the alveoli are very close together. On the left side about 67 alveoli can be counted, which was probably nearly the full number of teeth. The dentition would then be about $\frac{65-65}{67-67} = 264$.

The posterior portion of one of the rami is present, but lacks the condyle. Mr. Case gives the length from the posterior end of the symphysis to the posterior end of the ramus as 199 mm., but when the fragment above mentioned is placed so as to be in contact with the portion of the ramus attached to the symphysis, this length is 232 mm. It is certain, however, that a portion of the ramus is lacking. When complete its length must have been considerably greater than is indicated by either of the foregoing measurements. The dental canal appears to have had a wide orifice, as in the Delphinidæ, *Mesoplodon*, etc., rather than as in *Platanista* and *Inia*.

The left tympanic bulla, which is the only one preserved, is 52 mm. long and 30 mm. broad. The inferior surface is divided unsymmetrically by a deep longitudinal furrow, the latter being nearest the inner lip. This groove continues to the posterior end of the bulla, where it lies between the two rounded prominences which represent the termination of the outer and inner lips. The inner prominence is only a little smaller than the outer one and is equally rounded. The inferior surface of the inner lip and of the bottom of the furrow is rugose; the surface of the outer lip is smooth. The anterior end of the bulla is acuminate. The lateral and superior surfaces of the inner lip are divided by a broad, shallow groove running transversely near the posterior end. A similar groove in the outer lip runs in front of the sigmoid process. The inner wall of the concavity of the bulla is rugose.

The frontals were briefly described by Mr. Case, and there is with the type specimen, as already mentioned, a piece about 85 mm. long and 58 mm. wide, which may represent the orbital part of one of these bones. After repeatedly examining it, however, I am unable

to satisfy myself that it is really such. It has one thick edge, which may be the orbital free border, and an opposite thin edge. The superior surface (supposing it to be such) exhibits a shallow, semi-circular depression, which might mark the position of the superimposed maxilla. With the bone thus oriented, however, the under surfaces are not readily interpreted, nor does the bone agree in general form with the frontal plate shown in any figure of *Schizodelphis*, *Champsodelphis*, or *Acrodelphis* which I have been able to find. In my opinion, the fragment represents a portion from the side of the basisphenoid of a species of *Mesoplodon*, and has, therefore, no connection with the type specimen of *S. crassangulum*.

In 1900 Dr. Abel united several European species formerly assigned to the genera *Champsodelphis*, *Schizodelphis*, *Platydelphis*, *Cetorhynchus*, etc., under his genus *Cyrtodelphis*, grouping them in two species—*C. sulcatus* and *C. christolii*.¹ Subsequently he withdrew *C. christolii* to another genus and family.² In 1907 Dr. C. R. Eastman pointed out that *Cyrtodelphis* was a synonym of *Schizodelphis*,³ and Abel's remaining species therefore becomes *Schizodelphis sulcatus* (Gervais).

It is evident that *S. crassangulum* (Case) is not identical with *S. sulcatus*. The latter is considerably larger, with a more massive beak and fewer teeth, more widely spaced. The teeth are about $\frac{39}{39}$ to $\frac{49}{49}$ in *sulcatus*, while in *crassangulum* they are about $\frac{65}{67}$. In the former species 5 teeth are included in a length of 50 mm., as against 8 teeth in *S. crassangulum*.

The type specimen of *S. sulcatus* appears to be a skull from Vendargues, Department of Herault, France, which was first described by Gervais in 1840, under the name of *Delphinus pseudodelphis*.⁴ The condition of this skull is such that it can scarcely be used in comparative studies. Having found that the specific name was preoccupied, he changed it in 1853 to *sulcatus*,⁵ and at the same time described another skull, obtained from Couronsec (Herault), France. This specimen, which was in excellent condition, may be considered the real type of the species. As already stated, it is larger than that of *crassangulum*. The teeth are larger, fewer, and more widely spaced, the palate is deeply concave above the

¹ Denkschr. k. Akad. Wiss. Wien, Math.-Nat.-Wiss. Classe, 68, 1900, p. 850.

² Mém. Mus. Roy. Hist. Nat. Belg., 3, 1905, p. 95.

³ Bull. Mus. Comp. Zool., 51, 1907, p. 84.

⁴ Bull. Acad. Sci. Montpellier, 1840, p. 11.

⁵ Bull. Soc. Geol. France, 10, 1853, p. 312.

median line instead of flat, as in *crassangulum*, and the two rows are closely approximated anteriorly. It does not seem to me quite certain that the species *canaliculatus* Meyer, *planus* Gervais, *depereti* Paquier, and *dationum* Gervais¹ are identical with *sulcatus*, as Dr. Abel believes. The mandible of *caniculatus* Meyer is of about the same size as that of *crassangulum*, or is even smaller. The mandibular alveoli are equal in size and also the septa between them. In *caniculatus*, however, the inferior mandibular channels appear to become deeper and narrower anteriorly, while in *crassangulum* they become much wider and shallower, and finally disappear altogether.

In the species *planus* Gervais the palate is flat, as in *crassangulum*, but about twice as wide, while the alveoli and septa are equal in size. The *depereti* of Paquier appears to resemble *sulcatus* closely, except in proportions. The anterior mandibular teeth are much larger than in *crassangulum* and are directed upward rather than outward. The portion of the symphysis between the two rows is much narrower.

As to *dationum* Gervais,² the angle of the mandibular symphysis is so small that the species should probably be assigned to *Acrodelphis* rather than to *Schizodelphis*. The jaw is of about the same size as that of *crassangulum*, but the teeth are larger and more widely spaced.

As already mentioned (p. 450), Cope, in 1867, when treating of the genus *Priscodelphinus*, remarked, "*Delphinus canaliculatus* von Meyer, from the Swiss Tertiary, appears to belong to it (Palæontographia, 1856, p. 44)". Von Meyer's species belongs to the genus *Schizodelphis*,³ and Cope's statement amounts, therefore, to a provisional introduction of the genus *Schizodelphis* into the North America fossil fauna. Should his surmise be confirmed, the name *Priscodelphinus* (1852) would supplant *Schizodelphis* for both European and American species. It is not clear on what ground Cope based his opinion, as *S. canaliculatus* was described from mandibles, and no mandibles of *Priscodelphinus* were known. To a certain extent he was probably influenced by an examination of the beak from Cumberland County, New Jersey, which is mentioned by Leidy (see p. 451) as probably representing *Priscodelphinus grandævus*. This beak, which was figured by Mr. Case in 1904,⁴ is still preserved in the Academy of Natural Sciences of Philadelphia. Its

¹ In part, Zool. et Pal. Franç., ed. 2, 1859, pl. 83, figs. 1, 2.

² *Op. cit.*, Ostéogr. des Cét., pl. 57, fig. 11.

³ It is made a synonym of *S. sulcatus* (Gervais) by Dr. Abel, but may be a separate species.

⁴ Report of Maryland Geological Survey, Miocene, pl. 15, fig. 1.

dimensions are as follows: Total length of the fragment, 325 mm.; breadth at posterior end, 49 mm.; breadth at anterior end, 33; breadth of the two premaxillæ at the posterior end, 26; the same at the anterior end, 24; breadth of palate at the middle of the length of the fragment, 39; breadth between alveoli (transverse) at the same point, 26; space between adjoining alveoli, 7; length of an anterior alveolus, 7.5; breadth of the same, 6; length of a posterior alveolus, 6; breadth of the same, 4; depth of the beak at the anterior end, 19; depth at the posterior end, 28.

The beak is broad and depressed, especially at the anterior end, where, however, it is not complete. The premaxillæ are high and rounded posteriorly, low and flattened anteriorly. Together they are nearly as wide anteriorly as posteriorly, and on account of their being depressed look wider. The maxillæ are triangular in section, with a rounded external free margin. The palate is flat, with a median wedge-shaped groove. The vomer is not visible on the palate. The alveoli are directed downward and forward. The anterior ones are larger than the posterior. In the fragment preserved there are 22 on the left side and 20 on the right side. The roots of the teeth are preserved in the 13th, 14th, and 17th alveoli of the right side. They appear somewhat oval in section and are directed backward, but are not flattened below.

Schizodelphis crassangulum appears to be a rather common species in the Miocene marls of Maryland. Among specimens from the Calvert Cliffs in the National Museum, collected by myself, are 7 more or less imperfect tympanic bullæ, which are identical with the bulla belonging to the type specimen; also fragments of premaxillæ and of the mandibular symphysis.

MEASUREMENTS OF THE TYPE SPECIMEN OF SCHIZODELPHIS CRASSANGULUM
(CASE)

	Mm.
Total length of rostrum (as preserved).....	595
Length from posterior end of superior tooth-row to anterior end of rostrum	433
From insertion of palatines to end of rostrum.....	498
Breadth of rostrum opposite the posterior end of the tooth-row.....	48
Depth at the same point.....	33
Breadth of rostrum midway between posterior end of tooth-row and tip..	25
Depth at the same point.....	16
Breadth of premaxillæ at the same point.....	15
Height of premaxillæ at the same point.....	7
Breadth of premaxillæ at tip of rostrum.....	13
Greatest breadth of left premaxilla proximally.....	25
Breadth of mesethmoid at anterior end.....	18
Height of mesethmoid at anterior end.....	37
Least breadth between blowholes.....	11
Greatest breadth between free margins of basisphenoid.....	71
Length of zygomatic process from postglenoid process to anterior free end	76
Breadth of zygomatic process from outer margin of temporal fossa to glenoid process	51
Height of occipital condyle.....	46
Breadth of occipital condyle.....	29
Total length of mandible (as preserved).....	590
Length from angle of symphysis to tip of mandible.....	446
Breadth of mandible opposite angle of symphysis.....	53
Depth of mandible opposite angle of symphysis.....	24
Breadth of mandible midway between angle of symphysis and tip.....	27
Depth at the same point.....	12
Breadth between inferior mandibular grooves at the same point.....	12
Breadth of mandible at distal end (about).....	19
Depth of mandible at distal end.....	7
Distance between the two tooth-rows at the distal end.....	9
Length of tooth-row posterior to angle of symphysis.....	17
Greatest length of tympanic bulla.....	51
Greatest breadth of tympanic bulla.....	28
Length of orifice of tympanic bulla.....	41
Breadth of bulla at posterior end.....	24

EXPLANATION OF PLATES

PLATE LIX

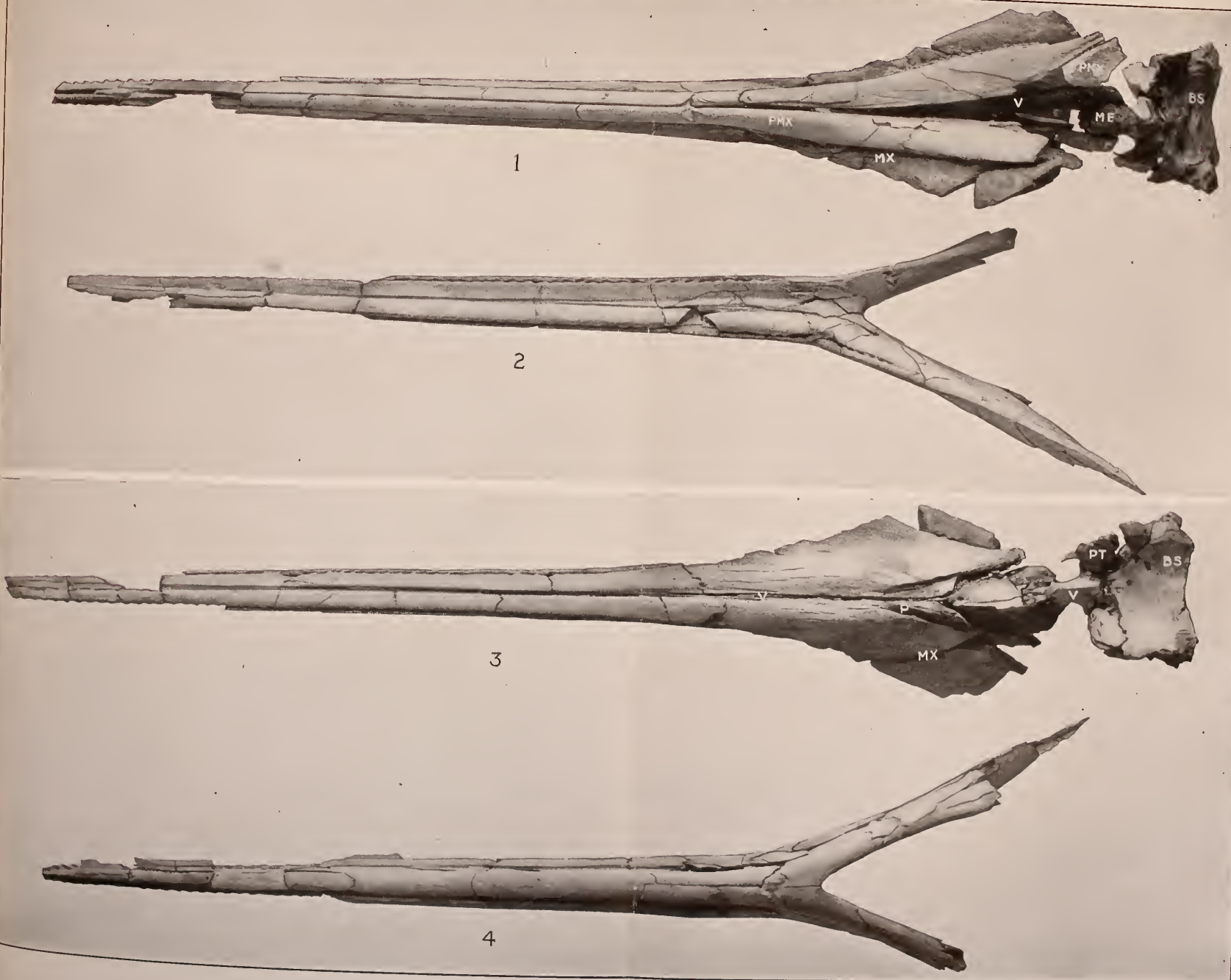
- FIG. 1. Type specimen of *Schizodelphis crassangulum* (Case), (= *Priscodelphinus* ? *crassangulum* Case). Superior surface of the rostrum. One-third natural size.
- FIG. 2. The same. Superior surface of the mandible. One-third natural size.
- FIG. 3. The same. Inferior surface of the rostrum. One-third natural size.
- FIG. 4. The same. Inferior surface of the mandible. One-third natural size.

PLATE LX

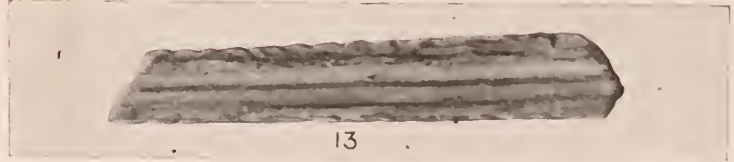
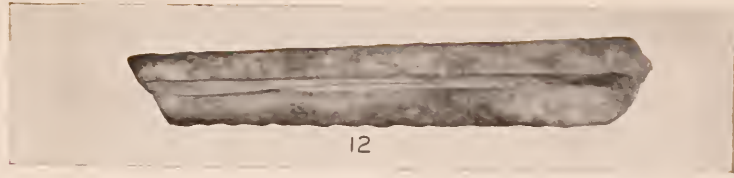
- FIG. 1. Type specimen of *Schizodelphis crassangulum*. Left side of rostrum and mandible. One-third natural size.
- FIG. 2. The same. Left zygomatic process of the temporal, exoccipital, and occipital condyle. Posterior view. One-half natural size.
- FIG. 3. The same specimen and parts. Anterior view. One-half natural size.
- FIG. 4. The same specimen. Left tympanic bulla. Inferior surface. One-half natural size.
- FIG. 5. The same. Internal surface. One-half natural size.
- FIGS. 6-11. Fragments of tympanic bullæ of *S. crassangulum* from Chesapeake Beach, Md. (In the U. S. National Museum.) One-half natural size.
- FIG. 12. Fragment of the symphysis of the mandible of *S. crassangulum* from Chesapeake Beach, Md. (In the U. S. National Museum.) Upper surface. One-half natural size.
- FIG. 13. The same fragment. Lower surface. One-half natural size.

BS = Basisphenoid.
 ME = Mesethmoid.
 MX = Maxilla.
 PMX = Premaxilla.

PT = Pterygoid.
 V = Vomer.
 XO = Exoccipital.
 ZG = Zygomatic.



SCHIZODELPHIS CRASSANGULUM (CASE)



SCHIZODELPHIS CRASSANGULUM (CASE)

