

MEMOIRS

OF THE

CARNEGIE MUSEUM.

VOL. II.

NO. 9.

NOTES ON OSTEOLOGY OF BAPTANODON.

WITH A DESCRIPTION OF A NEW SPECIES.

BY CHARLES W. GILMORE.

During the season of 1903, while in the service of the Carnegie Museum, the writer collected from the marine beds of the Jurassic in the Freeze Out Mountains in Carbon County, Wyoming, quite a complete *Baptanodon* skull (No. 1441¹) and lower jaws associated with other parts of the skeleton.

Through the courtesy of the Director, Dr. W. J. Holland,² the writer was accorded the privilege of studying this specimen, thinking perhaps it would give some information regarding the obscure points in our knowledge of the anatomy of this interesting reptile.

The skeleton like nearly all of the American Jurassic Ichthyosaurians was enclosed in a very hard limestone concretion³ much seamed and cracked by exposure to the elements.

Since publishing a paper on the Osteology of *Baptanodon*⁴ additional discoveries have thrown new light on the structure of this animal. It thus becomes necessary

¹ Card catalogue number, Department of Vertebrate Fossils of the Carnegie Museum.

² My acknowledgments are especially due Dr. W. J. Holland, and I take this opportunity to express my appreciation of the many courtesies extended during the preparation of these notes. The text-figures were drawn by Mr. H. W. Hendley, of the U. S. National Museum, Washington, D. C.

³ A recent letter from W. H. Reed, of the Museum of the University of Wyoming, informs me that during the past summer he collected a very complete Ichthyosaurian skeleton, which was quite free from the refractory matrix mentioned above: He regards this specimen as coming from a lower horizon than those found in the concretionary layer.

⁴ MEMOIRS OF THE CARNEGIE MUSEUM, Vol. II., No. 2, August, 1905.

to make certain alterations and additions to the description and drawings then given, especially those relating to the elements of the skull and lower jaws.

The parts of specimen No. 1441 recovered consist of a skull and lower jaws lacking a median section of the rostrum, the coössified atlas and axis, third and fourth cervicals, besides vertebræ in various stages of preservation from other parts of the vertebral column. With the exception of the proximal end of one humerus, the ulna, and a few paddle bones, all other elements are missing.

THE SKULL.

The cranium, although subjected to severe pressurê, which has somewhat distorted the outlines of the skull, appears very similar to those previously described in the paper above mentioned, with the exception that it pertains to a somewhat smaller individual.

The superior view shows the transverse displacement between the anterior end of the postfrontal and the posterior end of the nasal, and, as breaks occur in identically the same place, and take the same transverse direction in two other crania (Nos. 603 and 878) in the collections of the Carnegie Museum, the writer now assumes this displacement as following the line of suture, and in the corrected drawing (See Plate XXXVII., Fig. 1), they are indicated as absolutely determined. The suture separating the premaxillæ at the anterior third of the rostrum is plainly shown in this specimen. Another point of interest is the wide prefrontal developed in this individual.

Viewed laterally this skull sheds new light on the posterior termination of the premaxillary. In *Baptanodon* the posterior end of the premaxillary is somewhat forked as in many forms of the Ichthyosauria. The lower posterior branch extends back under the nares, laps over and hides from a lateral view most of the anterior prolongation of the maxillary. (See Plate XXXVI.) The longitudinal channel along the side of both the premaxillaries and dentaries, just above and below the dental grooves (See Fig. 3), has many more nerve pits for the entrance of nerves to the teeth than was indicated in the first restoration of the skull of *Baptanodon*. A pineal foramen appears to be present and occupying essentially the same position as in the other skulls in this museum. The posterior part of the skull is so badly disarranged that nothing of importance is shown.

The other views of the skull show nothing new, and, as the other elements have been fully described in a previous paper, it is unnecessary to repeat the description here.

LOWER JAWS.

A study of the well preserved jaws of No. 1441, not only shows the exact number of elements composing the mandible as six pairs of bones; but it also indicates clearly the extent and relative positions of these elements, particularly those bones

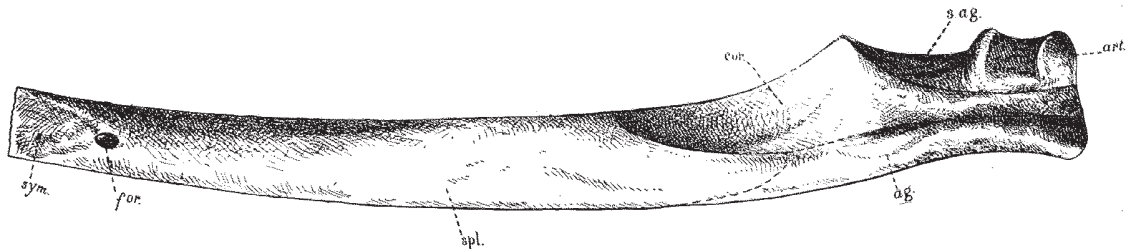


FIG. 1. Internal view of the right mandibular ramus of *Baptanodon natans* (No. 1441). One fourth natural size. *art.*, articular; *ag.*, angular; *cor.*, coronoid; *for.*, foramen; *s.ag.*, surangular; *spl.*, splenial; *sym.*, beginning of the symphysis.

composing the posterior portion of the rami, which previous to the discovery of this specimen had not been well understood.

This specimen (No. 1441) gives the first positive knowledge of the shape and extent of the coronoid in *Baptanodon*. Figs. 1 and 2 show it to be a thin plate of bone extending along the inner side of the posterior end of the ramus. Its lower border laps along the upper internal border of the angular except anteriorly where it overlaps the posterior prolongation of the splenial. The anterior termination is somewhat in advance of the node-like protuberance developed upon the upper border of the surangular, where it is overlapped by the posterior end of the splenial. Posteriorly the coronoid is narrow, and laps along the articular, thus assisting the surangular in holding that element in position. More anteriorly the coronoid widens rapidly, the upper margin being elevated in a dorsal process which is nearly the height of the protuberance on the surangular. Anterior to this process it gradually narrows to the point where it meets the overlapping splenial. The posterior end of the splenial is wholly confined to the internal side of the ramus. The exact extent of the lower posterior prolongation could not be determined from this specimen. The splenials enter the symphysis and entirely separate the dentaries posteriorly.

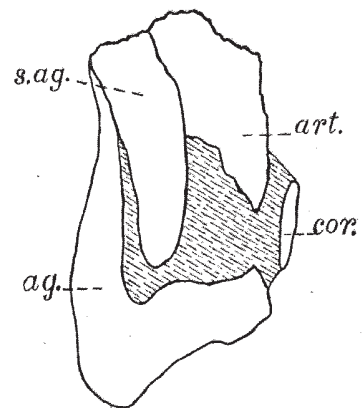


FIG. 2. Cross-section of posterior end of left mandibular ramus of *Baptanodon natans* (No. 1441). Natural size. *art.*, articular; *ag.*, angular; *cor.*, coronoid; *s.ag.*, surangular.

The anterior part of the splenial has been fully described in a previous paper. The oval foramen present in the jaws of No. 603 (*loc. cit.*, p. 96) is also present near the symphysis in this individual. (See *for.*, Fig. 1.) The suture between the surangular and angular on the external posterior end of the ramus now appears to be accurately determined, as following nearly the course provisionally indicated in the first restoration of the skull and jaws. (See Plate XXXVI.)

Fig. 2 shows how the angular laps over and along the surangular, although the two elements were probably more closely applied than is shown by the cross-section.

The articular appears very similar to those described previously, though perhaps more robust and occupying a more nearly horizontal position in the ramus.

The rami are very slender for their length and height.

MEASUREMENTS.

No. 1441.	Greatest length of coronoid, about	220 mm.
" 1441.	" width " " "	45 "
" 1441.	" " " posterior end of ramus	70 "
" 1441.	" " " anterior " " "	18 "

THYROHYAL.

This specimen, as in No. 878 in the collections of the museum, has the right thyrohyal preserved quite intact. It was retained in the matrix parallel to the inner posterior part of the ramus of that side. The anterior extremity while somewhat expanded is more circular in cross-section than was indicated by the element mentioned above. There is evidence of the opposite element in a fragmentary posterior end found in the matrix along the other ramus. Otherwise the shape and proportions are very similar to the thyrohyal of No. 878 described and figured previously.

SCLEROTIC PLATES.

Although crushing has badly distorted the sclerotic rings of both orbits there appears to be essentially the same number of plates (14) as observed in other members of this genus. The distortion mentioned above has so displaced the plates that the manner in which they overlap one another is clearly shown. (See Fig. 3.)



FIG. 3. Cross-section of sclerotic plates of *Baptanodon natans* (No. 1441). One half natural size.

The plates lap over one another from left to right, the bevelled edge of one overlapping the reverse bevel of the other. This long free union of the plates would allow the sclerotic ring to expand and contract considerably. One orbit shows the bony covering extending back 40 mm. from the periphery, and it appears quite probable that this covering extended to the very back of the eyeball as in some

birds. It may prove to be the case that these bony plates curve in on the back of the eye similar to the cartilaginous protection of the eyes in some of the whales. The surface markings of the sclerotic plates have been fully described in a previous paper.

DENTITION.

No. 1441 gives but little information regarding the teeth of this form. Only one tooth was found intact, this being in position near the anterior end of the rostrum. (See Fig. 4.)

This tooth measures 13 mm. in length and is a good example of the anterior teeth as known in two other individuals of this group. There is no swelling at the base, as may be observed in the teeth of some of the Ichthyosaurs. This tooth is circular in cross-section, ending in a sub-acute apex, the top being covered with

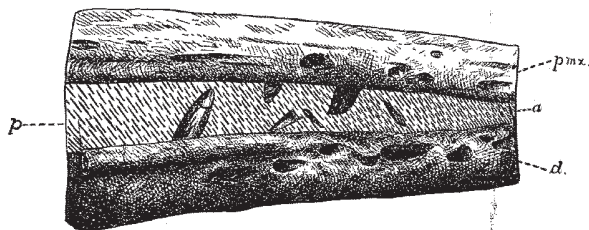


FIG. 4. Lateral view of a section of the anterior part of the rostrum of *Baptanodon natans* (No. 1441). One half natural size. *a.*, anterior end; *d.*, dentary; *p.*, posterior end; *pmx.*, premaxillary.

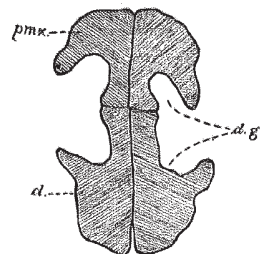


FIG. 5. Cross-section near the middle of the snout of *Baptanodon natans* (No. 1441). One half natural size. *d.*, dentary; *d.g.*, dental grooves; *pmx.*, premaxillary.

enamel without striation. In the latter respect the tooth appears very similar to the single tooth known in the type of *Baptanodon natans*. There are parts of other teeth preserved which are more slender and pointed than the one just described, but their enameled surfaces are perfectly smooth. The presence posteriorly of faint alveolar partitions indicates the position of other teeth. Because of the small size of this individual and the apparent similarity of the teeth I refer this specimen to *B. natans*. Fig. 5 shows a cross-section of the rostrum somewhat anterior to the symphysis and gives a good idea of the depth and shape of the dental grooves in this part of the snout.

VERTEBRÆ.⁵

The atlas, axis, third, and fourth cervicals were found in the matrix but little removed from their normal position at the back of the skull and still in contact

⁵Mr. W. H. Reed writes me that there are fifty consecutive vertebræ in the caudal series of specimen "T" in the collection of the University of Wyoming, instead of forty-six as published by Knight and quoted by me in a later paper.

with the basioccipital. These elements are smaller than the homologous parts of *B. marshi* and *B. discus* and are hardly more than half the size of *B. robustus*. They differ in several minor characteristics. The atlas resembles *B. marshi* and *B. robustus* in having a single hypapophysis on the lower anterior surface of the centrum. The third and fourth cervicals differ from the same elements of *B. marshi* in having well developed parapophyses, and very small diapophyses.

There is no indication of the parapophysis on the axis as found in both *B. marshi* and *B. discus*. Just below the diapophysis and separated from it by a non-articular tract is a faint antero-posterior ridge, which anteriorly probably represents

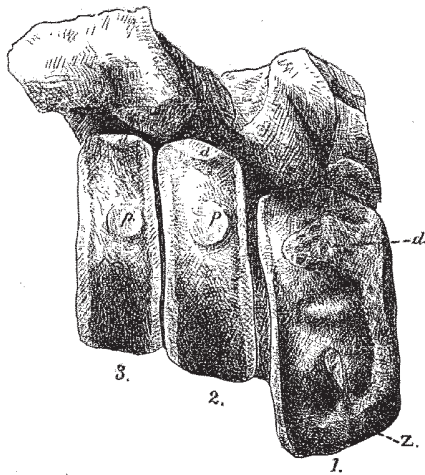


FIG. 6. Atlas, axis, third, and fourth cervical vertebræ of *Baplanodon natans* (No. 1441). One half natural size. 1. Coalesced atlas and axis. 2 and 3. Third and fourth cervicals. *d.*, diapophysis; *p.*, parapophysis; *z.*, hypapophysis.



FIG. 7. Lateral view of intervertebral disk of *Baplanodon* (No. 1441). One half natural size.

the rudimentary parapophysis of the atlas. Midway between this ridge and the lower border is a small vertical eminence not observed in the other species. The upper arches of these vertebræ are not sufficiently well preserved to be described here. The other vertebræ preserved appear very similar to the corresponding elements in the other members of this group.

Intervertebral Disks.— Fig. 7 represents the shape and size of the matrix filling the space between the centra of the anterior vertebræ. These biconvex disks are quite uniform in character and give an accurate idea of the thickness of the cartilage that once filled the spaces between the centra. The average thickness of the disks at their middle is about 30 mm.

Anterior Limbs.— About half of the proximal portion of one humerus was found. Fig. 8 shows the subrectangular outline of this articular end. The surface of this

end is somewhat weathered and worn, and does not show the very rugose nature observed in better preserved specimens. The head is very convex, the portion for cartilaginous attachment extending far around both anteriorly and posteriorly. There is a well developed trochanter on the dorsal surface.

The *ulna* is a pentagonal block of bone, the proximal being thicker than the distal end. The proximal end is slightly convex and was opposed to the concave

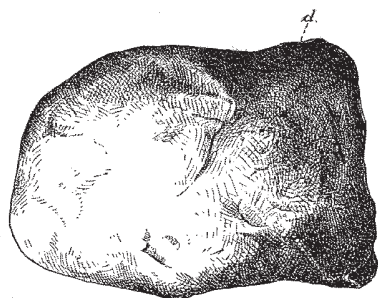


FIG. 8. View of the proximal end of the humerus of *Baptanodon natans* (No. 1441). One half natural size. *d.*, dorsal surface.

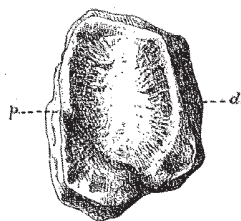


FIG. 9. Ulna of *Baptanodon natans* (No. 1441). One half natural size. *d.*, distal end; *p.*, proximal end.

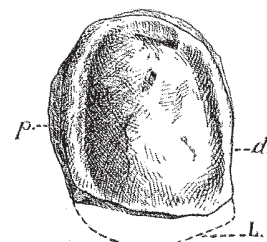


FIG. 10. Radius of *Baptanodon natans* (No. 1441). One half natural size. *d.*, distal end; *l.*, lateral border, restored; *p.*, proximal end.

facet on the distal end of the humerus though probably separated by cartilage. The other sides are slightly convex and were evidently surrounded by a thick cartilage as indicated by their rugose surfaces. The upper and lower surfaces are slightly concave antero-posteriorly. The element appears to be more angular than the ulna of *Baptanodon marshi*.

MEASUREMENTS.

No. 1441.	Greatest length of ulna antero-posteriorly.....	40 mm.
" 1441.	" breadth of ulna	50 "
" 1441.	" thickness of ulna, proximal end.....	35 "
" 1441.	" " " distal "	25 "

The *radius* is a sub-quadrate element somewhat wider than long and like the ulna thicker on the proximal than on the distal end. The external margin is missing but apparently reduced to a comparatively thin edge. The radius is larger than the ulna in all of its dimensions. The proximal end is convex and was opposed to the largest of the three concave facets on the distal end of the humerus. The inner side is slightly convex, the distal flat, and all except the external side are rugose. The upper and lower surfaces are slightly concave antero-posteriorly.

MEASUREMENTS.

No. 1441.	Greatest length of radius antero-posteriorly, estimated.....	51 mm.
" 1441.	" breadth of radius	65 "
" 1441.	" thickness of radius, proximal end.....	42 "
" 1441.	" " " distal "	30 "

PELVIC ELEMENT.

With specimen 603 in the collection of the Carnegie Museum is a portion of a bone which at the time of preparing my memoir on *Baptanodon* I was unable to identify but since have concluded that it represents the acetabular end of the ilium. This end is expanded into a thickened head somewhat roughened on the acetabular surface. The shaft above the head is constricted up to the fractured end, both antero-posteriorly and internally. One side of the bone is flattened and probably represents the internal surface. The fractured end is nearly half oval in cross-section. (See (3), Fig. 11.) If correctly determined this is the first evidence we have of the character of the pelvic region in *Baptanodon* and it appears to indicate a weak posterior extremity as compared with the strong anterior limb. It also furnishes additional evidence that Professor Marsh was mistaken in his identification of the limb in the type of *B. discus* (1955)⁶ as a posterior extremity, a question discussed in my previous paper. This element resembles somewhat the ilium of *Toretocnemus californicus*, a Triassic Ichthyosaurian described by Dr. J. C. Merriam.

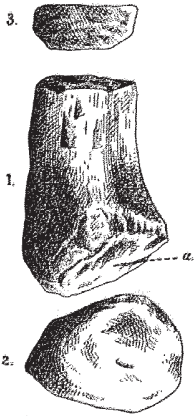


FIG. 11. (1), external view of the acetabular end of the ilium of *Baptanodon discus* (No. 603), one half natural size, *a.*, articular end; (2), view of articular end of same; (3), cross section of the broken end.

MEASUREMENTS.

No. 603.	Greatest width antero-posteriorly of acetabular end.....	45 mm.
" 603.	" " " " fractured end	27 mm.

***Baptanodon robustus* sp. nov.**

The type material of this species includes a fairly well-preserved pectoral girdle, a series of ten cervical vertebræ beginning with the atlas; a second series of eleven vertebræ from the anterior dorsal region commencing back of the point where the diapophysis becomes distinct from the neurapophysial articular surface; a third section of eleven posterior dorsals beginning just back of the first vertebræ having the diapophysis and parapophysis united to form a single node-like articulation for the single headed ribs of this region. The fourth and last section contains parts of twelve anterior caudals. These show the rapid decrease posteriorly in the size of the centra, which has been previously pointed out by Knight.⁷

This specimen, No. 919, is from the Red Fork of Powder River, Big Horn County,

⁶ Catalogue number of Museum of Yale University.

⁷ Knight, W. C., "Some Notes on the Genus *Baptanodon* with Description of a New Species," *Amer. Jour. of Science* (4), Vol. XV., 1903.

Wyoming, and was collected by Mr. W. H. Utterback from the marine beds of the Jurassic in 1902. It is now in the collection of the Carnegie Museum.

The large size of all of the vertebræ and the long straight border of the external ends of the coracoids for articulation with the humeri appear to indicate a new species for which I propose the name *Baptanodon robustus*. Although the material at hand is insufficient for a satisfactory diagnosis of this form, yet the dimensions of the parts preserved, particularly the vertebræ and ribs, show this to be the largest member of the *Baptanodontidæ*. A right coracoid, No. 1953, in the Museum of Yale University shows the same long straight border on the external end and may pertain to this species.

Vertebræ. — The coalesced atlas and axis are very large, and this is the first individual I have examined which shows the suture separating these vertebræ. (See Fig. 12, S.) On the lower border the atlas is 35 mm. wide antero-posteriorly, the axis being 30 mm. The great disparity in length antero-posteriorly between the

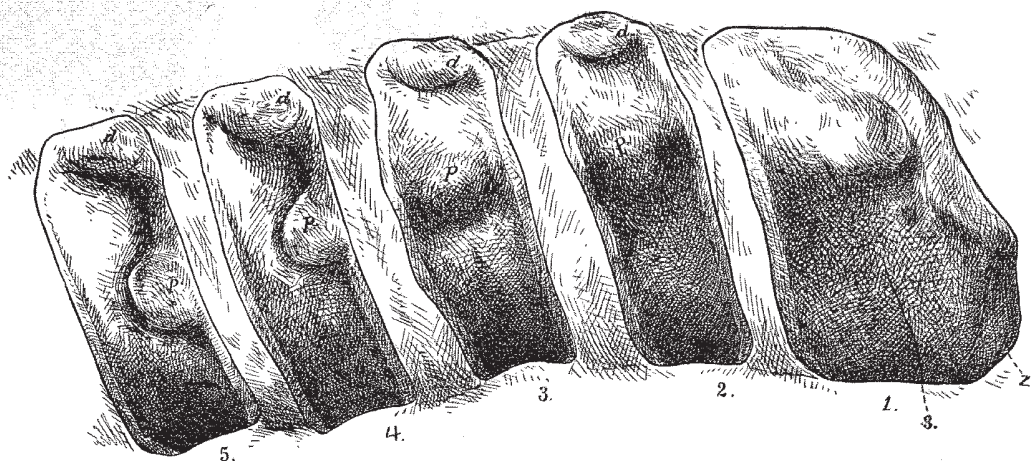


FIG. 12. Atlas, axis, third, fourth, fifth, and sixth cervical vertebræ of *Baptanodon robustus*. Type specimen, No. 919. One half natural size. 1, Coalesced atlas and axis. 2, 3, 4, and 5, third, fourth, fifth, and sixth cervicals d., diapophysis; p., parapophysis; s., suture between the atlas and axis; z., hypapophysis.

lower and upper parts of the combined centra appears to be distinctive of this species. The hypapophyses on these vertebræ are very indistinct and no attempt has been made to indicate them in the drawing. (See Fig. 12.)

On the third and fourth cervicals the parapophysis appears to be indicated by hardly more than a slight antero-posterior swelling on the side of the centra. In this respect it resembles somewhat the corresponding elements of *B. marshi*. The succeeding vertebræ have well developed parapophyses on the anterior half of the centra. The diapophyses on all of the vertebræ preserved are very robust and confluent with the articular surfaces on the dorsal surfaces of the centra. The fourth

to the ninth cervicals have a vertical ridge connecting the di- and parapophyses on the anterior margin of the centra. This character may also prove to be a feature of this species.

The anterior or median dorsals have two well defined apophyses (See Fig. 13) placed well down on the anterior margins of the centra. The diapophysis is the

larger of the two. In these vertebræ the pedicels of the upper arches are extended antero-posteriorly, being nearly as wide as the centra upon which they rest. The spines are somewhat compressed laterally, and very high. The arches in what is considered the anterior dorsal region are held together by single zygapophyses, which are of considerable extent obliquely. The pedicels do not project laterally as in some of the Ichthyopterygians but form a smooth surface with the upper lateral surfaces of the centra.

The series of posterior dorsals appear very similar, except in size, to those from this region of *B. discus*. The single apophyses posteriorly recede to the lowermost border of the centra as in the other species.

The parts of caudals preserved, besides showing the rapid decrease in size posteriorly, appear to have

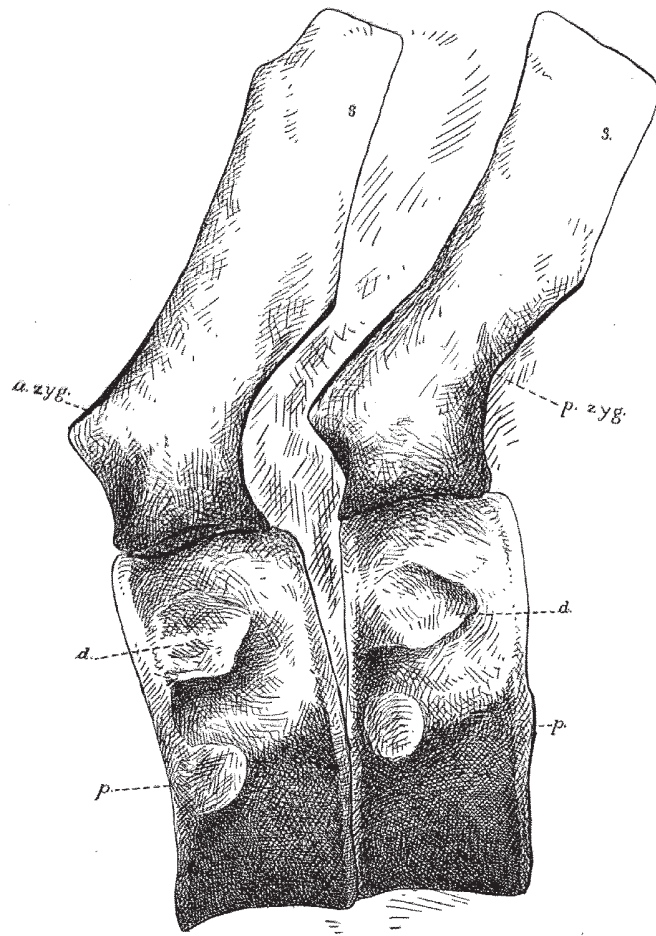


FIG. 13. Lateral view of anterior or median dorsals of *Buptanodon robustus* (No. 919). Type specimen. One half natural size. *d.*, diapophysis; *p.*, parapophysis; *s.*, spinous process; *a.zyg.*, anterior zygapophysis; *p.zyg.*, posterior zygapophysis.

parts of several chevrons retained in the matrix near them and furnish the first evidence of these bones in *Buptanodon*.

All of the vertebræ are deeply biconcave as in other members of the genus.

MEASUREMENTS OF VERTEBRÆ OF No. 919.

	Atlas and axis	3d	4th	5th	6th	7th	8th	9th	10th	11th	
Cervicals											
Greatest length of centrum in mm.	57	34	34	30	35	35	35	35	<i>b</i>	—	—
Greatest width of centrum in mm.	100	100	100	90	80	70	60	60	—	—	—
Anterior dorsals	1	2	3	4	5	6	7	8	9	10	11
Greatest length of centrum in mm.	—	45	45	45	43	43	43 <i>a</i>	43 <i>a</i>	43 <i>a</i>	42 <i>a</i>	—
Greatest height of centrum in mm.	100 <i>b</i>	120 <i>b</i>	110	110 <i>b</i>	110	110	101	—	—	—	—
Greatest height with spine in mm.	210 <i>b</i>	245 <i>a</i>	245 <i>a</i>	210 <i>b</i>	—	—	—	—	—	—	—
Posterior dorsals	1	2	3	4	5	6	7	8	9	10	11
Greatest length of centrum in mm.	37	37	38	40	40	43	45	45	50	48	50
Greatest height of centrum in mm.	100	104	104	104	104	106	106	102	99	99	99

a = approximate, *b* = broken.

THE PECTORAL GIRDLE.

The elements of the pectoral girdle of No. 919 are finely preserved and entirely free from distortion. The scapulæ lack about half of their upper free ends and the coracoids their posterior borders. (See Plate XXXVIII.) These missing parts have been restored from the pectoral girdle of *B. discus*, No. 878 in the Carnegie Museum.

The *coracoids* are broad subquadrangular bones which join one another medially by large elliptical facets. The superior surfaces (Plate XXXVIII., Fig. 2) are flattened, although both elements are gently inclined toward the median line. The inferior surfaces are concave transversely and convex antero-posteriorly. The lateral borders are especially thickened forming a heavy articular face for the scapulæ and humeri. This outer articular end is divided into two unequal faces meeting in an obtuse angle. The more anterior and smaller one of the two is for the scapula, and looks outward, forward, and obliquely upward. The larger and posterior surface forms the greater part of the glenoid cavity. This border is much straighter and longer antero-posteriorly than on the coracoids of *B. discus*. It is very slightly convex from above downward and is covered with tubercle-like eminences. This articular end is supported by a broad neck formed by a deep notch on the anterior margin. The anterior border from the inner notch thickens rapidly as it recedes posteriorly to form the intercoracoidal facet. (See Plate XXXVIII., Fig. 1.)

The *scapulæ* are moderately long bones the upper halves being narrow with nearly parallel sides, the articular end is broadly expanded antero-posteriorly and thickened on their posterior margins where they enter into the formation of the glenoid cavity. The articulating face for the coracoid joins this border at an obtuse angle.

The scapulæ extend outward, upward, and forward. Viewed longitudinally the inner surface is slightly concave as they curve up to lap over the side of the ribs. The articular ends on the dorsal surfaces are concave antero-posteriorly.

The anterior border of the parts preserved is slightly rounded, but, as it approaches the articular end it widens into flattened oblique surfaces which look forward and upward and probably represent the points of attachment for the ligaments which held the clavicles in position. (See Pl. XXXVIII., Fig. 1.) The ventral surface of the scapulæ antero-posteriorly at the expanded articular ends is somewhat concave. Between the point of attachment for the clavicle and the articulation with the coracoid the internal border is especially compressed and remains free.

The clavicles and interclavicular bones were not found with this specimen.

MEASUREMENTS.

No. 919.	Greatest width of coracoids, transversely.....	430 mm.
" 919.	" length of articular surface for scapula.....	85 "
" 919.	" " of straight external border.....	110 "
" 919.	" width of scapulæ, antero-posteriorly.....	175 "
" 919.	" length of glenoid articular face.....	60 "

COMMENTS ON RECENT LITERATURE.

In discussing the age of the Baptanodon Beds Dr. S. W. Williston⁸ speaks of the relationship of *Baptanodon* and *Ophthalmosaurus* and makes the statement that the two species of *Ophthalmosaurus* are probably not congeneric and "it is also apparently quite true that *Baptanodon* seems to be as closely allied to the Cretaceous as to the Jurassic species." In a previous paper⁹ I have shown that *O. icenicus* (the Jurassic form) and *Baptanodon* are very closely allied, while *O. cantabrigiensis* is not similar in any respect.

The discovery the past season (1905) by Mr. W. H. Reed of an Ichthyosaurian in the Benton Cretaceous is of considerable interest as showing the occurrence in North America of this group at a much later period than hitherto supposed.

Dr. J. C. Merriam, who has examined the fragmentary specimen collected by Reed, says:¹⁰ "The centrum is very thin antero-posteriorly and in this respect somewhat resembles the corresponding centra in *Baptanodon discus*. . . . When more material is available it will be interesting to learn whether this form really represents a true *Ichthyosaurus* or possibly a more highly specialized form of *Baptanodon* than those we know from the Baptanodon beds. Should it be *Baptanodon*, it will

⁸ Williston, S. W., "Hallopus, Baptanodon and Atlantosaurus Beds of Marsh," *Jour. of Geology*, Vol. XIII., No. 4, May-June, 1905.

⁹ Gilmore, C. W., "Osteology of Baptanodon," MEMOIRS OF THE CARNEGIE MUSEUM, Vol. II., No. 2, August, 1905.

¹⁰ Merriam, J. C., "The Occurrence of Ichthyosaur-like Remains in the Upper Cretaceous of Wyoming," *Science*, N. S., Vol. XXII., No. 568, pp. 640-641, November 17, 1905.

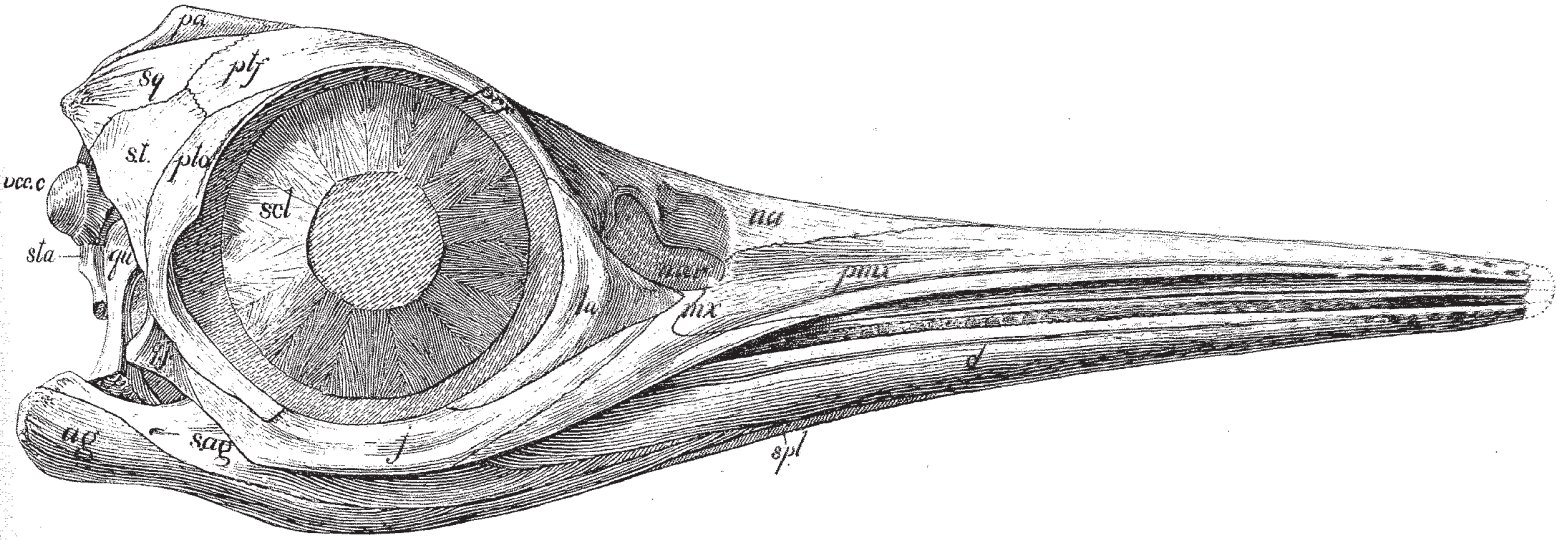
probably show some extreme specializations, as the time separating the Benton from the Baptonodon beds is considerable."

Moreover, it would be of interest to note the presence of this group in the Cretaceous of this country, which has already been shown to be the geological range of the closely allied European genus *Ophthalmosaurus*.

U. S. NATIONAL MUSEUM,
February 6, 1906.

EXPLANATION OF PLATE XXXVI.

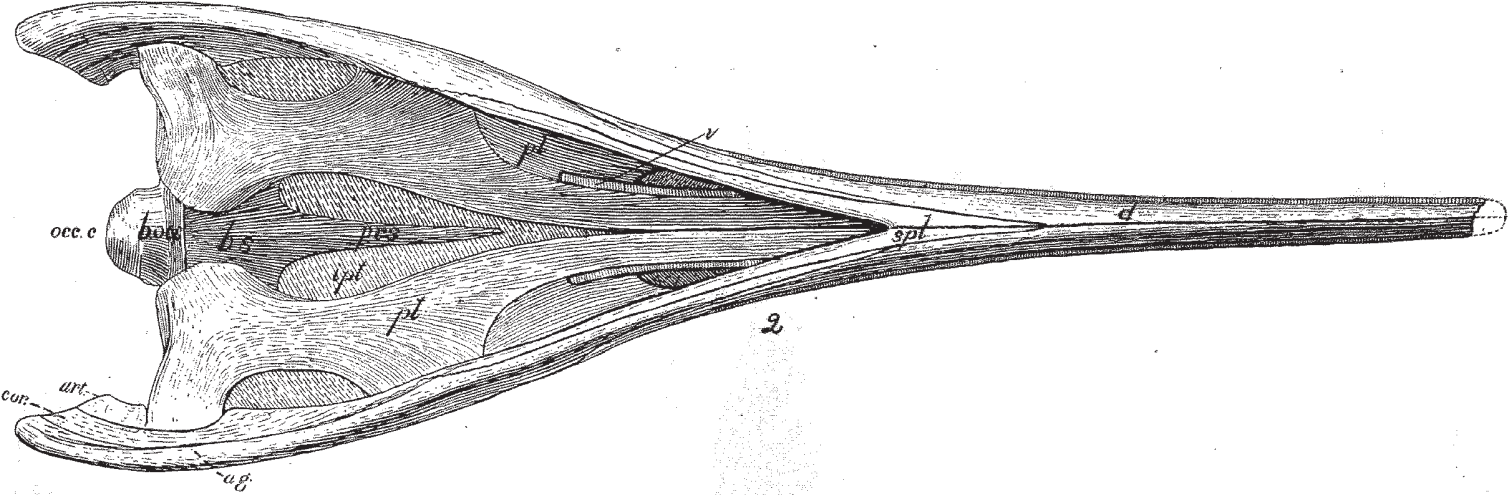
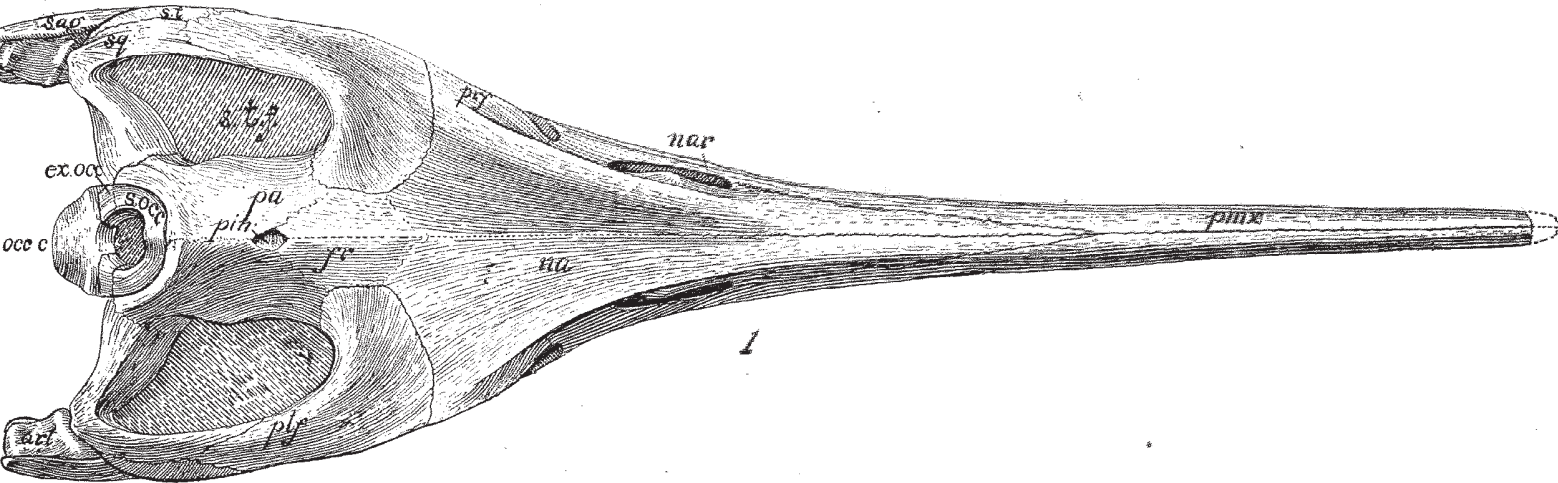
Side view of skull of *Baptanodon discus* Marsh (No. 878). One fifth natural size. Restored.
ag., angular; *d.*, dentary; *j.*, jugal; *la.*, lachrymal; *mx.*, maxillary; *na.*, nasal; *nar.*, narial opening; *occ.e.*, occipital condyle; *pa.*, parietal; *pma.*, premaxillary; *prf.*, prefrontal; *ptf.*, postfrontal; *pto.*, postorbital; *qj.*, quadrato-jugal; *qu.*, quadrate; *s.ag.*, surangular; *s.t.*, supra-temporal; *scl.*, sclerotic plates; *sta.*, stapes; *spl.*, splenial; *sq.*, squamosal.



SIDE VIEW OF SKULL OF *BAPTANODON DISCUS* MARSH (No. 878). $\frac{1}{3}$ NATURAL SIZE. RESTORED.
 SOME SUTURES DRAWN AFTER NO. 1441.

EXPLANATION OF PLATE XXXVII.

1. Top view of skull of *Baptanodon discus* Marsh (No. 878). One fifth natural size. Restored.
art., articular; *ex.occ.*, exoccipital; *fr.*, frontal; *na.*, nasal; *nar.*, nares; *occ.c.*, occipital condyle; *pa.*, parietal; *pin.*, pineal foramen; *pmx.*, premaxilla; *prf.*, prefrontal; *ptf.*, postfrontal; *s.ag.*, surangular; *s.occ.*, supraoccipital; *s.t.*, supratemporal; *s.t.f.*, supratemporal fossa; *sq.*, squamosal.
2. Inferior view of skull of *Baptanodon discus* (No. 603). One fifth natural size. Restored.
ag., angular; *art.*, articular; *b.occ.*, basioccipital; *b.s.*, basisphenoid; *cor.*, coronoid; *d.*, dentary; *ipt.*, interpterygoid vacuity; *occ.c.*, occipital condyle; *pl.*, palatine; *prs.*, presphenoid; *pt.*, pterygoid; *spl.*, splenial; *v.*, vomer.

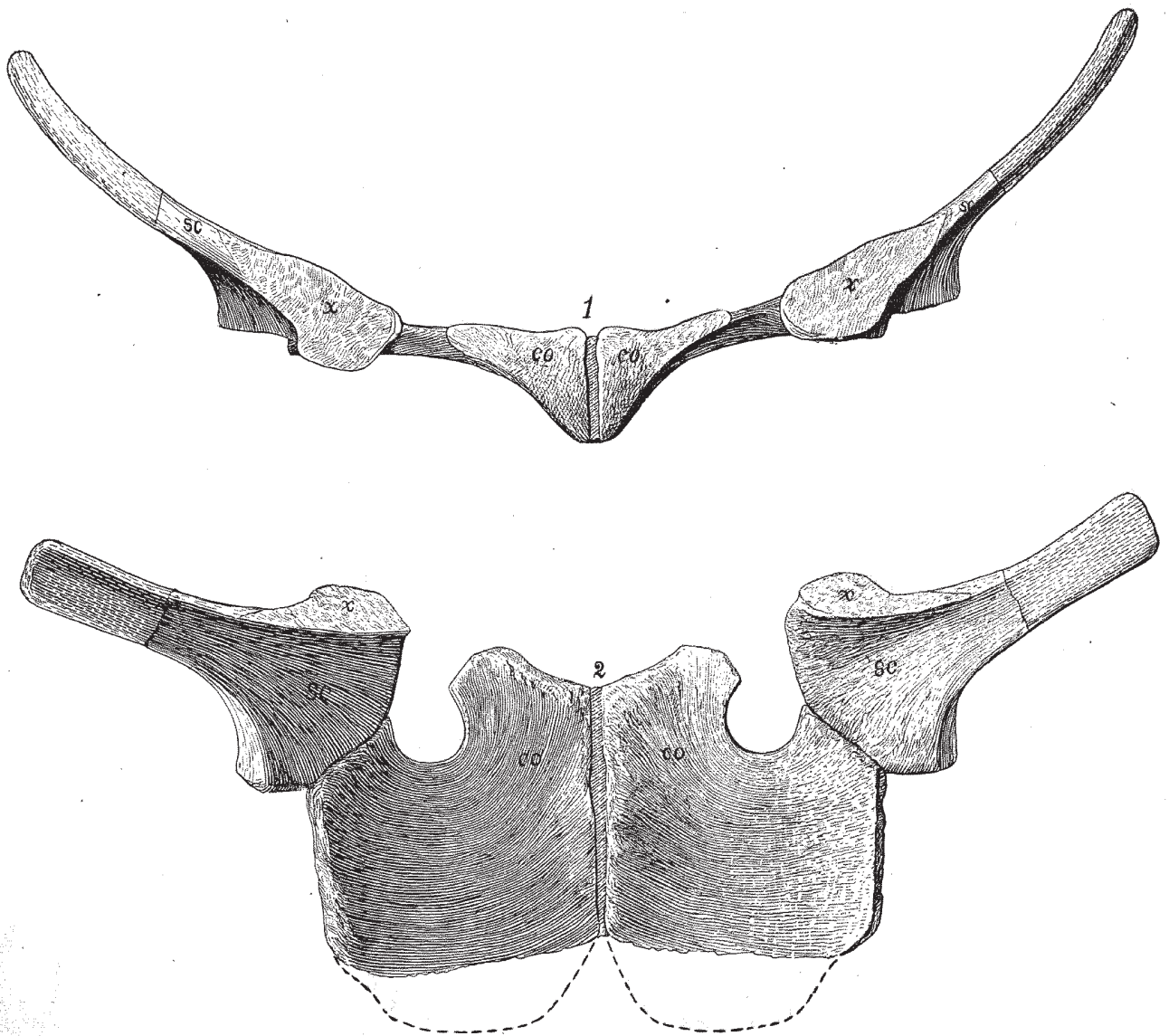


SKULL OF *BAPTANODON DISCUS*. 1, SUPERIOR VIEW (No. 878); 2, INFERIOR VIEW (No. 603). BOTH $\frac{1}{2}$ NATURAL SIZE. SOME SUTURES DRAWN AFTER NO. 1441.

EXPLANATION OF PLATE XXXVIII.

1. Anterior view of pectoral girdle of *Baptanodon robustus* (No. 919). Type. One fifth natural size. *co.*, coracoids; *sc.*, scapulæ; *x.*, surfaces for attachment of the clavicles.

2. Dorsal view of the same girdle. One fifth natural size. *co.*, coracoids; *sc.*, scapulæ; *x.*, surfaces for attachment of the clavicles.



PECTORAL GIRDLE OF *BAPTANODON ROBUSTUS* (TYPE SPECIMEN). 1, ANTERIOR VIEW; 2, DORSAL VIEW
(No. 919). BOTH $\frac{1}{2}$ NATURAL SIZE.