

34,098

## PALEONTOLOGICAL BULLETIN, No. 25.

*Verbal communication on a New Locality of the Green River Shales containing Fishes, Insects and Plants in a good state of preservation.*

By E. D. COPE.

Owing to the rather softer character of the matrix the characters of the fishes could be worked out with much nicety. A collection which he had recently received includes sixteen species, all new. Their names are as follows:

? Chromididæ.

- Priscacara serrata* Cope.  
 " *cypha* Cope.  
 " *liops* Cope.

Percidæ.

- Mioplosus abbreviatus* Cope.  
 " *labracoides* Cope  
 " *longus* Cope.  
 " *beanii* Cope.

Asineopidæ.

- Asineops pauciradiatus* Cope.

? Aphredodiridæ.

- Erismatopterus endlichii* Cope.  
*Amphiplaga brachyptera* Cope.

Clupeidæ.

- Diplomystus dentatus* Cope.  
 "  *analis* Cope.  
 "  *pectorosus* Cope.  
 "  *humilis* Leidy.  
 "  *altus* Leidy.

Osteoglossidæ.

- Dapedoglossus testis* Cope.  
 " ? *encaustus* Cope.

Of the above genera all but two are new to science, and all of the species but three are likewise new. From the present collection something like a general view of the ichthyological fauna could be obtained, since the predominant types were probably represented in it. *Priscacara* is a Pharyngognath allied to the *Chromididæ* and *Pomacentridæ*, most nearly to the former; and *Dapedoglossus* is not far removed from *Arapæma* and *Osteoglossum*. The facies of the fauna is of a mixed character, both fresh water and marine types being present. The largest species is the *Osteoglossum encaustum*; the second in size the *Diplomystus dentatus*, which exceeds the moss bunker (*Brevurtia menhaden*).

The descriptions of the species and genera are in process of publication in the Bulletin of the U. S. Geol. Survey Terrs.

*On a New Species of Adocidæ from the Tertiary of Georgia.*

BY E. D. COPE.

Professor George Little, State Geologist of Georgia, placed in my hands for determination a Chelonite from a Tertiary formation in Macon Co. of that State. The matrix is a rather soft limestone of a light drab color. When the specimen was first obtained it was nearly perfect, lacking only the posterior part of one side, and the posterior border of the carapace. Having been mutilated by destructive curiosity hunters, there remain now the plastron and the anterior half of the carapace, with a considerable portion of the posterior part of the left margin. The surface has been exposed to the weather so as to obscure, and in some places to obliterate the dermal sutures, while the skeletal sutures are distinct. The form has been slightly distorted by lateral pressure, but not much.

The obscurity of the dermal sutures renders the determination of the generic affinities somewhat difficult. The skeleton preserves the Emydoid type, not exhibiting intersternal bones, and having a well developed mesosternum. The vertebral bones extend to between the sixth pair of costals, beyond which the specimen is imperfect in that region. The costal capitula are well developed, but whether they reach the vertebral centra, the specimen does not permit me to discover. The plastron is of peculiar form, the lobes being short and contracted. The anterior is rounded from a base of usual width, while the posterior, from a similar base, narrows rapidly to a point, as in the genus *Aromochelys*.

An important point is observed in the direction of the abdomino-pectoral dermal suture. At its lateral extremities instead of continuing to the marginal scuta as in Emydoid genera, it turns forward and terminates at the inguinal notch, as in genera with intermarginal plates, as *Adocus* and *Dermatemys*. But the sutures of the intermarginals in the specimen are, if they ever existed, very obscure, owing to exposure to the weather. Nevertheless there is sufficient indication of them on one side, to render it tolerably safe to infer their existence. Anterior to the abdomino-pectoral suture, the border of the plastron is crossed by emarginations representing three scutal sutures, defining the humeral, gular, and intergular scuta. The courses of these sutures across the plastron are obscure. The humero-pectoral suture commences on the margin just in front of the axilla and extends forwards parallel with the border, becoming a deep open groove, which is apparent on both sides of the plastron. It then turns backwards, and appears to cross the plastron behind the mesosternum, presenting a concavity forwards. The next suture in front appears to cross near the middle of the mesosternal bone, presenting a strong concavity forwards. The relation between the intergulars and the gulars is difficult to discover. The suture between them at the free margin is distinct, but after proceeding inwards a short distance it appears to divide and take two directions. One

depressed line extends backwards to the humero-gular suture, cutting off triangular gulars and extending the intergulars back to the humerals as in *Adocus*. The other depression extends directly across the anterior lobe, cutting off small intergulars as in *Baëna*. In either case the arrangement represents a genus distinct from either of those named. If the intergulars extend to the humerals they are double, the mesosternal region being divided by a distinct longitudinal dermal suture. If the intergulars are short, with the gulars in contact behind them, the arrangement is equally distinct from *Adocus*. From *Baëna* the absence of intersternal bones, and the Emydoid mesosternum distinguish it. It approaches also *Polythorax*,\* and may indeed belong to that genus. But it does not appear that the humerals and interhumeral are distinct in the Georgia turtle, and no intermarginals are observed in *Polythorax*. It is therefore necessary to give the present genus a name to be used until its relations to the latter are positively ascertained. I propose AMPHIEMYS for the genus, and A. OXYSTERNUM as the specific name.

*Specific characters.* The plastron is nearly plane in the transverse direction; longitudinally the posterior lobe is a little raised above the plane, and the anterior lobe rather more so.

The general form is elevated, the vertical diameter being large when compared with the longitudinal and transverse, which preserve usual proportions. The border of the carapace is not flared at the sides, and rises anteriorly to the nuchal bone. The free anterior margin is somewhat undulate. The anterior half of the carapace does not display any median or lateral keels.

The nuchal bone is considerably wider than long, and the costal and marginal sutures are of about equal length. The vertebrae are all longer than wide, and of the usual form, with truncate antero-lateral angles, excepting the first. This one has both the sides and extremities convex, the latter being of subequal width. The costals are thick, and have parallel borders. The marginals are all higher than long, especially those of the bridge.

The sutures of the plastron are fine and straight. The portion of the mesosternum enclosed by the episternal or clavicular bones has greater longitudinal extent than the part embraced by the hyosternals. The sutures with the clavicular bone are nearly straight, and are parallel with the free border. The common suture of the hyosternals is a little longer than that of the hyposternals, and is a little shorter than that of the post-abdominals. The anterior suture of the latter has a slight posterior obliquity, and is abruptly turned backwards at the free borders of the lobe.

The dermal sutures of the carapace are mostly obliterated. Enough remains to show that the second vertebral was wider than long, while the nuchal shield is considerably narrower than the nuchal bone. The marginal scuta are much narrower than the marginal bones, and become narrower forwards. The region of the nuchal marginal is obscure.

\* Cope, Proceed. Acad. Philad'a, 1876, Nov.

<i>Measurements.</i>	M.
Length of carapace to the posterior border of seventh costal.....	.250
Depth at third vertebral bone.....	.150
Length of second vertebral bone.....	.031
Width " " " ".....	.032
Thickness " " " ".....	.013
Length of first marginal ".....	.035
Width " " " ".....	.033
Length of first do. of the bridge.....	.028
Width " " " ".....	.060
Width of second costal.....	.033
Thickness of " ".....	.012
Greatest width of carapace.....	.182
Length of plastron (axial).....	.211
" " anterior lobe (axial).....	.073
" " posterior lobe ".....	.070
Width of base of anterior lobe.....	.115
" " " posterior ".....	.086
Length of bridge.....	.090
" " mesosternum.....	.042
Width " ".....	.046
Length of clavicle.....	.051
" " common suture of clavicles.....	.014
" " " " " " hyosternals....	.051
" " " " " " hyposternals.....	.047
Width of postabdominals at anterior border.....	.057

The shell of this species is thicker than in any species of tortoise now living in North America, a peculiarity characteristic of most of the species of the Cretaceous period, and of many of those of the Eocene. Its size is about that of the *Pseudemys serrata*.

*On a Gigantic Saurian from the Dakota epoch of Colorado.*

BY E. D. COPE.

Not long since I was informed by the Superintendent of Public Schools of Fremont County, Colorado, Mr. O. W. Lucas, that he had discovered the bones of an enormous saurian at an outcrop of the rocks of the Dakota group, not far from Canyon City. I encouraged him to proceed with the exploration, and asked him to send some specimens which should explain the character of his discovery. One of the first objects sent is a fragmentary lower jaw of a carnivorous dinosaurian, which he found on the surface of the ground. This fossil was found to belong to a species heretofore unknown, which I referred to the genus *Laelaps* under the name of *Laelaps trihedron*.\* The second sending included a number of vertebræ, which apparently represent a much more gigantic animal, and I believe the largest or most bulky animal capable of progression on land, of which we have any account.

The vertebræ comprise a cervical, three dorsal and four caudal vertebræ. The dimensions of the animal to which they belonged may be inferred from the fact that the first is twenty inches in length, and twelve in transverse diameter; and that one of the dorsals measures three and a half feet in the spread of its diapophyses, two and a half feet in elevation, and the centrum thirteen inches in transverse diameter. Another dorsal is two feet ten inches in elevation.

The centra of these vertebræ have a ball and socket articulation of the opisthocælian type, the cups and balls being well pronounced. Just beneath the diapophysis is situated a huge foramen. A broken centrum from which Mr. Lucas removed the matrix, shows that this foramen communicates with a huge internal sinus, which occupies almost the entire half of the body of the vertebra. Those of opposite sides are separated by a septum which is thin medially. Thus the centra of the dorsals are hollow. The neural arches are remarkable for their great elevation, and the great expanse of the zygapophyses. They are more remarkable for the form of the neural spines, which are transverse to the long axis of the centrum. That of one of the vertebræ is strongly emarginate so as to be bifurcate. The widely extended diapophyses support the rib-articulations, and there are no capitular articular facets on the centra, but such are found on the basal region of the diapophyses in some vertebræ.

The supposed cervical vertebra is depressed, the anterior or convex extremity of the centrum the most so. It is remarkable for its elongate form exceeding the proportions found in known *Dinosauria* and *Crocodylia*, and resembling that seen in some fluviatile tortoises. Near the anterior extremity a short, robust parapophysis has its origin, from which it extends outwards and downwards, and soon terminates in a truncate extremity which presents downwards. A deep fossa occupies its upper base, and above

\*Bullet. U. S. Geol. Surv. Terrs. III, 1877.

this a deep linear foramen extends throughout the greater part of the length of the centrum. If this vertebra possesses a diapophysis it is rudimental. The caudal vertebræ are amphicælian, but not deeply so. They are subquadrate in section and not so short as the corresponding ones of *Hydro-saurus*. The most anterior one of the series has short robust diapophyses, and is more concave anteriorly than posteriorly. The other caudals are more equally bi-concave, but the cavity is very shallow on the most distal of them. The centrum is also relatively more elongate and compressed than those of the others. None of them display the lateral pneumatic fossa which exists in the dorsals, and, where broken so as to permit a view of the internal structure, the latter appears to consist of rather finely spongy tissue. The chevron facets are not very well defined, and the neural spines are of usual forms, and on the anterior two vertebræ, elongate.

Several genera have been described which possess some of the features presented by the one to which the present animal belongs. The following are characterized by the presence of the lateral sinuses of the vertebral centra: *Megadactylus* Hitch., *Cetiosaurus* Owen., *Ornithopsis* Seeley, *Bothrospondylus* Ow., and *Pneumatosteus* Cope. The first of these may be dismissed with the remark that its caudal vertebræ possess the sinuses as well as the dorsals, which we have seen is not the case with the Colorado animal. The centra of *Cetiosaurus*, according to Owen, and those of *Pneumatosteus* do not exhibit the cavernous structure above described, but are uniformly spongy interiorly. *Ornithopsis*, of Seeley, which Owen refers to his subsequently described *Bothrospondylus*, possesses a cavernous cellular internal structure, which I have not found in the reptile from Canyon City, Colorado, but which occurs in another huge saurian discovered by Prof. Lakes near Golden, Colorado, in the same stratigraphical horizon. Another name (*Chondrosteosaurus*) has been introduced by Prof. Owen, but he specifies no generic characters, nor points out how it differs from *Ornithopsis*, which it resembles in its cellular structure.

Prior to the reception of the present specimen, I was negotiating with Prof. Arthur Lakes, of Golden, Colorado, for the acquisition of another fossil skeleton of a gigantic saurian which he had discovered in that region. This gentleman sent for my inspection two vertebral centra with other fragments. Anticipating their purchase I made some remarks on their characters before a meeting of the American Philosophical Society held on July 20th of the present year. Before my arrangements with Prof. Lakes were completed, the bones which he had found were purchased by Prof. O. C. Marsh, of Yale College. The specimens in my possession were thereupon sent to Prof. Marsh, and my proposed article withdrawn from the hands of the printer. A short time previous to this, a portion of a sacrum of a saurian found by Prof. Lakes had been noticed by Prof. Marsh in the July number of the *American Journal of Science and Arts*, and he had given names generic and specific to the animal to which it belongs. That of the genus not being accompanied by any specific diagnosis nor specific reference to its characters, has no claim to adoption according to

the rules of nomenclature, nor can the genus be distinguished from some of those above enumerated from the few characters of mixed significance which are mentioned. Especially is there nothing to indicate that it differs from *Ornithopsis* or *Bothrospodylus*.

The opportunity of studying the dorsal and caudal vertebræ of the saurian discovered by Professor Lakes, enables me to point out the characters in which the animal from Canyon City differs from it. The centrum of the dorsal vertebra from near Golden is concave posteriorly and plane anteriorly, instead of being convex anteriorly. The supposed caudal is larger than the dorsal vertebra, while that of my specimen is smaller than that of the dorsal centra. The articular faces are nearly plane, not bi-concave, and the antero-posterior diameter of the centrum is disproportionately small, as in *Hadrosaurus*. It has a lateral fossa, and its interior is cavernous. A detached neural spine of this saurian has a form not widely different from what is usual in these reptiles, and totally unlike the extraordinary shape of the present genus.

On such grounds I regard the present species as representing a genus hitherto unknown, which may be called *Camarasaurus* and the species :

CAMARASAURUS SUPREMUS.

Many peculiarities are exhibited by the vertebræ of this species, which are not described in saurians known up to the present time. Many of these would have been lost in less careful hands than those of Mr. Lucas, and science is much indebted to him for the preservation of many thin osseous walls and buttresses. In general, the external walls of the centra are thin, and the processes are composed of laminae, united by narrow margins. The vertebræ are lighter in proportion to their bulk than in any air-breathing vertebrate.

The anterior extremity of the centrum of the cervical vertebra is prominently convex, and much depressed. The posterior and concave extremity is wider, and of rather greater vertical diameter. The base of the neural arch only occupies half of the length of the centrum, an equal extent of the superior surface extending freely beyond it at its anterior and posterior extremities.

The linear lateral foramen commences a little behind the anterior base of the neural arch, and descending somewhat in its direction, terminates beneath the posterior extremity of the base of the neural arch. The base of the latter overhangs the foramen and the base of the transverse process. The inferior surface of the centrum is concave, the concavity being bounded in front by the inferior convex thickening of the extremity. Behind the middle the surface becomes plane, and is, near the posterior extremity, bounded on each side by a short, angular ridge.

<i>Measurements.</i>	M.
Length of centrum between anterior convexity and posterior lip.....	.565
Depth of posterior cup.....	.090

	M.
Diameter of cup { vertical.....	.310
{ transverse.....	.160
Length of parapophysis .....	.095
Width of neural canal.....	.063

The dorsal vertebra which I suppose to be the anterior one of those received is characterized by its undivided transverse neural spine. The entire neural arch is of enormous elevation, but as the zygapophyses are above its middle, the neural spine is not as long relatively as in various other genera, or as in the caudals of this one. The sides of the centrum are strongly concave, and the borders of the cup flaring. The neural arch is everywhere excavated, so as to reduce the bulk, and produce lightness so far as consistent with strength. The diapophyses rise from a point above the neural canal, and are directed upwards as well as outwards. It sends a narrow ridge down to the sides of the centrum, on each side of which its shaft and base are deeply excavated. The posterior of these fossæ is overlooked by the wide zygapophysis; and the roof of the anterior one supports the anterior zygapophysis. The former are separated by another and vertical septum, which bifurcates below, forming two prominent borders of the neural canal. At each side of the base of the neural canal there are two trilateral fossæ, of which the anterior is much the larger, and extends higher up on the lateral edge of the spine. They are separated by a lamina. The diapophysis is not very long, and is subtriangular in section near the extremity. The neural spine is thickened at the extremity as though for the attachment of a huge ligament. At the summit of its posterior basal fossa, at the middle of its height, is an outwardly curved process with a smooth, extero-superior face.

	<i>Measurements.</i>	M.
Length of centrum.....		.275
Total elevation of vertebra.....		.830
Elevation to posterior zygapophyses.....		.550
“ of superior edge of diapophyses above centrum.....		.350
“ of neural spine above posterior zygapophyses.....		.295
Length of diapophysis behind.....		.215
Depth of extremity of do. (restored).....		.075
Transverse extent of summit of neural spine.....		.215
“ “ neural spine at middle.....		.330

Another dorsal vertebra is better preserved than the last described. It is distinguished by the lack of the median portion of the neural spine and the extension outwards, of the median lateral processes described above. The diapophyses are much larger, and the zygapophyses more extended transversely. The centrum is constricted at the middle, and especially just behind the convex articular extremity, whose circumference forms a prominent rim. The edges of the lip are flared outwards, forming a deep basin, much wider than deep. The fossæ described in the last vertebra



are present in this one, but differ in proportions, owing to the greater size and expanse of the superior parts of the neural arch. The fossa posterior to the base of the diapophysis is nearly plane, while that at the anterior base is deeply excavated, is narrower, and extends so far along the inferior side of the process as to give it a semi-circular section near the middle. Distally the diapophysis has a trialate section owing to its three longitudinal ridges, and the articular extremity is large and antero-posterior in direction. The process differs from that of the vertebra already described, in the possession of a facet near the middle of its anterior inferior bounding ridge, which is probably costal, as in the vertebræ of *Crocodylia*. The lateral foramen of the centrum is subround. The general surface is smooth.

<i>Measurements.</i>		M.	
Total elevation of vertebra.....		.770	
Total transverse extent of diapophyses.....		1.010	
Diameter of centrum	{	longitudinal.....	.300
		vertical of cup .....	.250
		transverse " .....	.340
		" at middle.....	.205
Elevation of zygapophyses above centrum.....		.310	
Diameter of zygapophysis	{	transverse.....	.170
		antero-posterior.....	.090
Width of neural canal.....		.085	
Transverse extent of neural spine.....		.440	
Length of diapophysis from posterior zygapophysis.....		.320	
Antero-posterior width of end of diapophysis.....		.135	
Diameter of centrum of anterior caudal	{	fore and aft....	.170
		vertical .....	.245
		transverse ....	.245
Total elevation of do.....		.545	
Elevation of neural canal.....		.040	
Antero-posterior width of neural spine.....		.075	
Diameter of median caudal	{	fore and aft .	.180
		vertical .	.200
		transverse.....	.192
Diameter of posterior caudal	{	fore and aft ..	.155
		vertical .....	.175
		transverse .....	.145

Besides the characters above-mentioned under the head of the genus, in which the vertebræ of this species differ from those found by Professor Lakes, I may add that they also differ in general proportion. Those of the *Camarasaurus*, are relatively shorter and wider, and more depressed, with deeper cup, and less elongate lateral foramen or fossa. The proportions of the caudals differ totally. The dorsal vertebræ are larger than those of the Golden City saurian.

What the total dimensions of this saurian are, is not readily estimated

without further data. Six cervical vertebræ of the length of the one described would give a neck of ten feet in length. The femur, which I have not yet received, is stated by Mr. Lucas, to be six feet in length. I hope ere long to be able to give a fuller account of this remarkable creature, which exceeds in its proportions any other land animal hitherto discovered, including the one found near Golden City by Professor Lakes.

*Published, August 23, 1877.*