

## XII. DESCRIPTION OF VERTEBRATE FOSSILS FROM THE VICINITY OF PITTSBURGH, PENNSYLVANIA.

BY E. C. CASE.

(PLATE LIX.)

The fossils described below were placed in the hands of the author by the kindness of Dr. W. J. Holland, Director of the Carnegie Museum, and Dr. Percy E. Raymond, their discoverer. To both of these gentlemen I desire to express my thanks for the opportunity to examine these most interesting specimens.

They were collected by Dr. Raymond at Pitcairn, about fifteen miles east of Pittsburgh. Dr. Raymond in a letter to me says: "The bones are from the upper part of the formation which I. C. White has named the Pittsburgh Red Shale (Geol. Survey West Virginia, Vol. 11, p. 263). This formation is usually from 100 to 125 feet thick in the vicinity and consists of red clays and red and yellow sandstones. At the top there is a bed of almost structureless clay which varies from 18 to 40 feet in thickness. At Pitcairn the clay is 37 feet thick and the fossils were found 4 feet above the base of the clay. Three feet above the base of the clay there is a layer of nodular limestone, and the teeth were found lying on this layer where it projects from the bank on the roadside. The other bones were all imbedded in the clay about one foot above the limestone. . . . On the Pittsburgh Shale rests the Ames Limestone, the youngest of the marine limestones in the region. It is almost exactly in the middle of the Conemaugh series. It is 315 feet below the base of the Pittsburgh Coal, and 695 feet below the base of the Dunkard series (Permian). The Ames Limestone is about 300 feet above the Freeport Coal (top of the Allegheny series)."

It will be seen at once that this horizon is decidedly lower than any in which terrestrial reptiles have been found, unless those from Vermilion County, Illinois, shall turn out to be from well within the Pennsylvanian.

The collection consists of numerous bones and fragments, about twenty of the specimens being determinable. They are distinctly of the same character as the bones from the beds of northern Texas.

There are recognizable vertebræ, ribs, and intercentra of Amphibia; teeth and chevron bones from Diadectid forms; a fragment of a spine probably belonging to the genus *Naosaurus*; and an ilium and fragments of a large pelvis from some undetermined forms. With the exception of *Bathygnathus* from Prince Edward Island these bones are from the easternmost locality known for Permian (?) vertebrates. In general the collection resembles rather those from Texas than those from Illinois, but the specimens are far too few to base any generalizations as to distribution upon them.

The specimens are described in detail below.

#### AMPHIBIA.

*Eryops*. — A dorsal vertebra is very probably from this genus (Fig. 1). The specimen consists of a nearly perfect vertebra, lacking only the anterior zygapophyses and the upper portion of the neural spine. It shows no character that would warrant its separation from the genus, and indicates a medium-sized individual. The zygapophyses are well formed with clean-cut articular faces. The pleurocentra are thickened above with well-defined articular faces, which were applied to faces on the neural arch just posterior to the origin of the transverse process. The intercentrum is of the familiar half-moon shape, thick and heavy below, and thinner toward the extremities; the anterior edge is marked near the top by the indentation found on the intercentra of *Eryops*.

Height of the vertebra from the middle of the lower face of the intercentrum to the middle of the neural canal .035 m. Width of intercentrum .026.

The second recognizable specimen is a neural spine from the caudal series (Fig. 2).

This is without question a portion of the skeleton of an *Eryops*. Similar spines were described by Cope as *Eryops* (*Epicordylus*) *erythroliticus*, but later discoveries seem to show that similar characters occur in other species of the genus as well. The apex of the spine is bifurcate, the space between extremities is concave and perfectly smooth; below the sides of the spine are rather rugose and marked

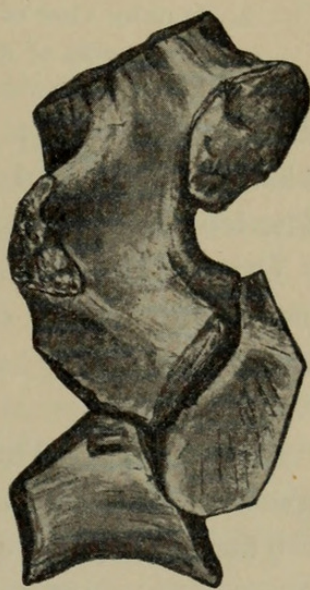


Fig. 1. Dorsal vertebra of *Eryops*. Left side.  $\frac{1}{2}$ .

with ridges. The lower portion of the spine is elongated antero-posteriorly and the edges are marked with sharp, double ridges.

Three ribs (Fig. 3) also belong, in all probability, to the genus *Eryops*. The head of each rib is broad and the articular edge is divided between two faces which meet at an angle somewhat greater

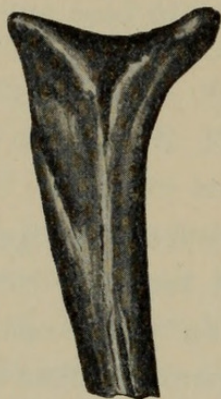


FIG. 2. Anterior view of dorsal spine of caudal vertebra of *Eryops*.  $\frac{1}{1}$ .

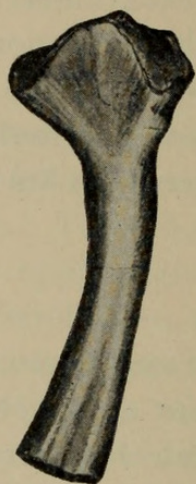


FIG. 3. Rib of *Eryops*?  $\frac{1}{1}$ .

than a right angle; the two faces are continuous. The shaft is somewhat flattened and in the undistorted specimens is gently curved. The length of the largest rib is about .07 m.

Other than these specimens there are several small intercentra and the neural spine of a caudal vertebra from some undetermined amphibian.

#### REPTILIA.

*Diadectidae*.— This family is represented by a fragment of an upper jaw with four teeth and the roots of a fifth and several chevron bones.

The teeth (Fig. 4) are of peculiar interest as they represent an intermediate stage between those of *Bolbodon* and those of *Empedias*. They seem to indicate with little doubt the existence of a new genus which may be called *Desmatodon hollandi*. The type is the specimen before me, which I designate specifically as *Desmatodon*. The teeth are transversely elongate; the crown is slightly wider than the root and is also somewhat swollen in the antero-posterior direction. The outer half of the crown rises gently into a sharp apex from which there is a sharp descent to the inner half, which is lower than the outer half.



FIG. 4. Tooth of *Desmatodon hollandi*.  $\frac{1}{1}$ . Antero-posterior diam. = .001 m.

The inner side of the apex is nearly vertical and presents a flat face inwards, this more prominent on the posterior and largest of the teeth than on the anterior ones. The surface of the crown is marked with fine lines and the sides of the root show the same character, but here the lines are coarser. The inner half of the crown of the anterior and the posterior teeth shows no wear, but on the two in the middle there are surfaces worn by attrition on both the inner half of the crown and on the apex. The relation of this genus to its nearest related forms is indicated in the figure here given (Fig. 5).

It has recently been shown (Case 1907) that *Bolosaurus* is a member of the reptilian group Synaptosauria, but it is probably nearer to the Pariotichidæ than the Chelydosauria, so that the intermediate forms of the teeth of *Desmatodon* may indicate rather a stage of adaptation to food supply than a step in a phylogenetic series. The teeth of the Diadectids are so characteristic in form that their discovery is especially fortunate, as it places beyond any doubt the correlation of this fauna with that of Texas.

There are seven chevron bones preserved (Fig. 6); they all have the characteristic form already described (Case 1903). The upper portion is nearly semicircular and the articular face is divided into two portions which lie nearly at a right angle to each other, so that the shaft of the bone, in its natural position, with the articular faces interposed between the lower edges of the articular faces of two adjacent vertebræ, was nearly parallel to the tail. The distal portion of the bone is comparatively long and the extremity is somewhat flattened from side to side. The largest of the chevrons is .051 m. in length, which indicates an animal from four to five feet long.

*Pelycosauria*. — A small fragment of what is evidently a neural spine gives evidence of the existence of a new member of this sub-

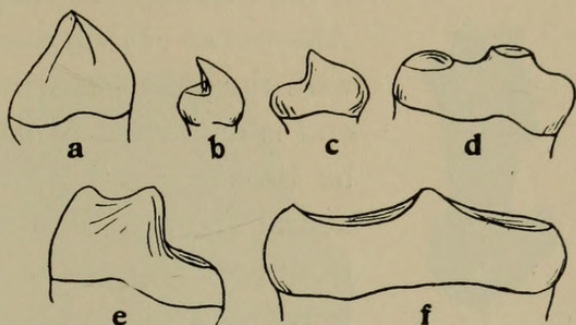


FIG. 5. Teeth of various Diadectids and related forms. *a*, *Bolbodon*; *b*, *Bolosaurus*; *c*, *Desmatodon*; *d*, *Diadectes*; *e*, *Diadectes*; *f*, *Empedias*.

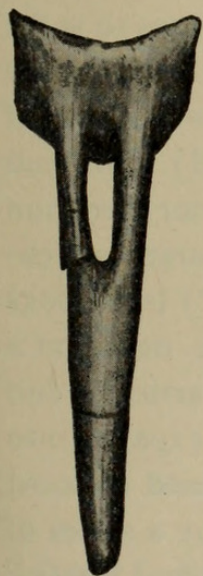


FIG. 6. Chevron bone of a Diadectid.  $\frac{1}{1}$ .

order (Fig. 7). The fragment is very small, not over .012 m. in length, but of characteristic form. The shaft is somewhat oval in cross section and from the sides extend the bases of four lateral projections such as occur only in the genus *Naosaurus*. As there seem to be no characters other than its size by which this specimen can be separated from typical specimens of *Naosaurus* it seems best to retain



FIG. 7. Part of the dorsal spine of *Naosaurus*(?) *raymondi*.  $\frac{2}{1}$ .

it provisionally in that genus and it may be known as *Naosaurus* (?) *raymondi*. The spine is oval in section with the greatest diameter antero-posterior; the lower end is expanded in the opposite direction and seems to be broken not far from the point where it joined the neural arch. There is no means of distinguishing the front and rear sides. As indicated by the stumps the lower pair of processes were located nearly opposite to each other and were inclined somewhat upwards. The upper pair was located rather on the same side of the spine than opposite to each other and one is farther up the spine than the other. Greatest diameter of the upper end .004 m.

*Incertæ Sedis.* — There are fragments of the acetabula of two reptiles of large size and a complete ilium of a smaller form. This latter is of considerable interest, but, as in all probability it belongs to some form described from another portion of the skeleton, it will not be given a new name here. In outline it is somewhat between that of the amphibian *Eryops* and the reptile *Naosaurus* (Fig. 8). Instead of the main axis of the bone lying in the antero-posterior direction it is vertical. The lower end is divided into two separate articular faces for the ischium and pubis, the larger (pubic?) face looks almost directly downward and the smaller (ischial?) lies nearly at a right angle to this with the face vertical. Just above the articular end the bone is contracted into a flattened shaft and above this expands into a broad thin plate. The anterior edge of the plate is turned outward as a rather prominent ridge. The inner face is marked by a series of prominent rugose lines radiating from a point on the shaft and serving for the attachment of the sacral ribs. The length of the ilium is .090 m. and the width of the distal end 0.53 m.

The other two fragments are evidently portions of the acetabula of two large reptiles, probably pelycosaurs, but perhaps they were *Dia-*  
*dectidæ*. They show no determinative characters, but indicate ani-

mals of considerable size, from 5 to 6 feet in length, if pelycosaurian ; and from 4 to 5 feet, if Diadectid.

The main interest of these specimens lies in the light which they cast on the geological position of these forms and their geographical distribution.

Though it has been pretty generally accepted that the beds in Texas were Permian, there has been no little evidence that they may be

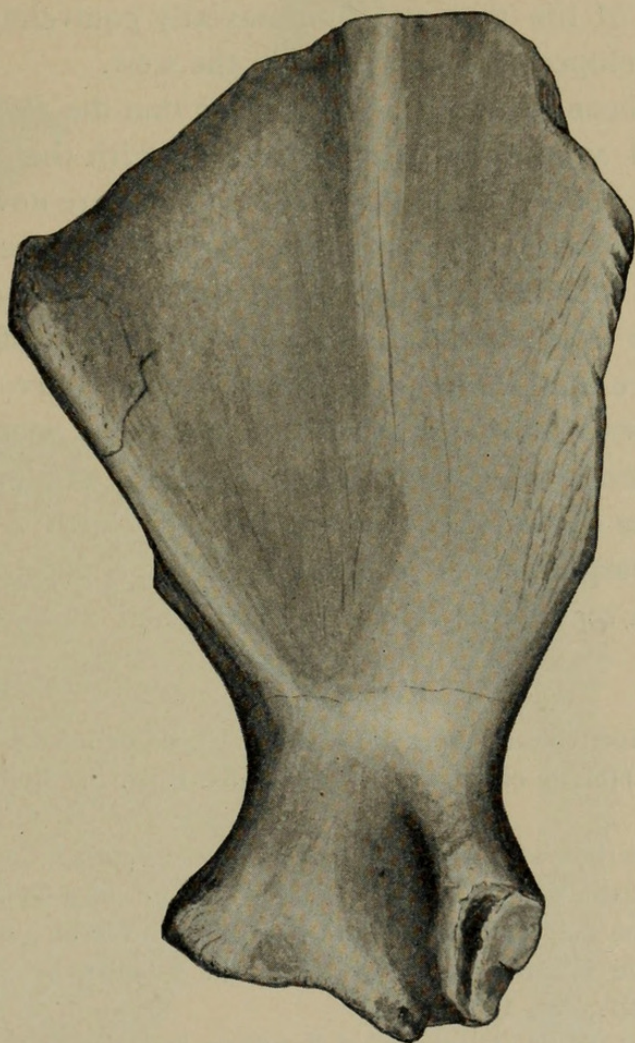


FIG. 8. Ilium of an undetermined reptile. External view.  $\frac{1}{1}$ .

lower. Recently the discussion as to their geological age has been summarized by Beede and Case (Beede 1907, Case 1907). The remains from Vermilion County, Illinois, occur in a region of Pennsylvanian rock, but until quite recently it has been supposed that they were buried in the deposits of a Permian River on a Carboniferous land. This idea seems to be wrong (*fide* Williston). The important

discovery by Dr. Raymond of this fauna, so definitely located in the Pennsylvanian, must reopen somewhat the discussion of the age of the Texas Red Beds. It certainly places the advent of a distinctly terrestrial reptilian fauna earlier than has hitherto been supposed. The suggestion may not be impossible that conditions for terrestrial life of a high order were reached earlier in the east than in the west, and, that the Carboniferous swamps of Pennsylvanian time, giving place to upland surfaces before the advance of the Appalachian uplift, made possible a type of life that was homotaxially equivalent to a similar type, which developed at a later time in the west.

Evidence has been gradually accumulating that the *Pelycosauria*, and the reptilian and amphibian forms associated with them, had a widespread distribution over North America. Forms are now known from Prince Edward Island, Pennsylvania, Illinois, Kansas, Oklahoma, Texas, and New Mexico. Though there seems to be some difference in the collections from the different localities it is not sufficient to warrant the inference that there were marked faunal differences in North America. It seems more probable that the fauna was rather homogeneous, inhabiting the ponds, lakes, swamps, and uplands of the entire area of the central and eastern part of North America. The occurrence of a large number of forms in Texas is due to their deposition in the delta of a large river, which drained an extensive area to the north.

#### REFERENCES.

- Beede, J. W.** "Invertebrate Paleontology of the Upper Permian Beds of Oklahoma and the Pan Handle of Texas." The Kans. Univ. Sc. Bull., Vol. IV., No. 3, 1907.
- Case, E. C.** "Descriptions of the Skull of *Bolosaurus striatus*, Cope." Bull. Am. Mus. Nat. Hist., Vol. XXIII., Art. XXVIII., pp. 653-658. 1907.
- "Revision of the *Pelycosauria* of North America." Washington, July, 1907.
- "New or Little Known Vertebrates from the Permian of Texas." Journal Geol., Vol. XI., No. IV., 1903.
- Raymond, P. E.** "On the Discovery of Reptilian Remains in the Pennsylvanian near Pittsburg, Pennsylvania." Science, N. S., Vol. XXVI., p. 835, 1907.

#### EXPLANATION OF PLATE LIX.

(All figures are natural size.)

Fig. 1. *Desmatodon hollandi* Case. The holotype, consisting of a fragment of a jaw with four teeth.

Fig. 2. A diadectid reptile. Chevron of an undetermined species.

Fig. 3. *Naosaurus* (?) *raymondi* Case. Holotype, consisting of the neural spine of a vertebra.



Reptilian Remains found near Pittsburgh, Pa.



Fig. 4. An amphibian. Sp. ind. The neural arch and spine of a caudal vertebra.

Fig. 5. *Eryops* sp. ind. A nearly complete (composite) vertebra. The parts were found dissociated, and may not all pertain to the same vertebra.

Fig. 6. *Eryops* sp. ind. One of the pleurocentra.

Figs. 7, 8. *Eryops* sp. ind. Two ribs, somewhat distorted.

Fig. 9. The ilium of an undetermined reptile. The opposite side of the same specimen is shown in the text, Figure 8.



Case, E. C. 1908. "Description of vertebrate fossils from the vicinity of Pittsburgh, Pennsylvania." *Annals of the Carnegie Museum* 4(3-4), 234–241.  
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