56.81.1(1161:78.9)

Article XV.—ON REPTILES OF THE NEW MEXICAN TRIAS IN THE COPE COLLECTION.

By Friedrich von Huene.

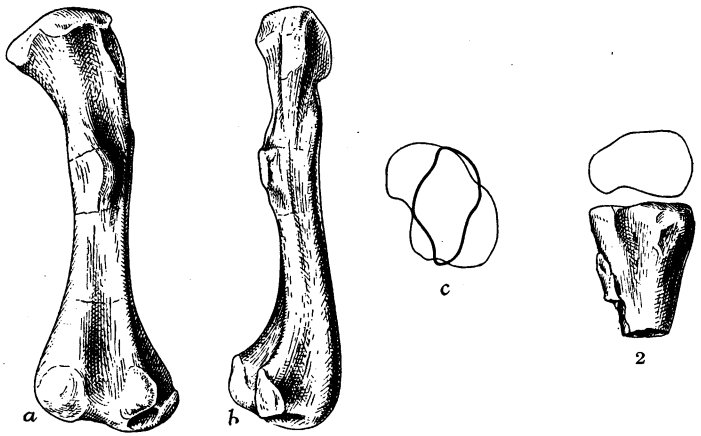
Some time ago Professor H. F. Osborn and Dr. W. D. Matthew suggested that I reëxamine the Triassic Cope Collection now in the possession of the American Museum of Natural History in New York. After having seen the collection I gladly consented to accept that honor and the collection was accordingly forwarded to Tübingen for this purpose. With the exception of one skull the remains are very fragmentary and in some cases it is hardly possible to know which specimens are Cope's types and which ones of the others belong with them. As several skeletons of Phytosaurs have been found in Wyoming and New Mexico during the last few years and have not yet been described it is necessary to be very careful in describing single scattered Phytosaurian bones. Therefore I shall only redescribe and figure Cope's type specimens and bones surely belonging with them. At the present time only the describer of Prof. Williston's new skeletons would be able to do more.

? Parasuchia.

1. **Typothorax coccinarum** *Cope.*

Femur: The femur (Fig. 1), 22 cm. in length, most nearly resembles that of *Thecodontosaurus antiquus.* The main difference is the extreme thickening of the distal end. The trochanter quartus is very much more prominent than in any other known Pseudosuchian or Phytosaur, but it makes the characteristic angle always seen in the feeble Phytosaurian trochanter. The proximal end is not quite so broad as in many Phytosaurs; in this respect it more nearly resembles Pseudosuchians; it is also not so flat from the inner side as in many Phytosaurs. The trochanter minor is rather strongly developed, but lateral to it there is a groove as in many Phytosaurs, only smaller. Even a trochanter major is developed in this femur, but not quite so much as in *Thecodontosaurus.* The distal half of the bone is not so much curved (Fig. 1c) as is usual in Phytosaurs, but the turning of the distal extremity is about the same as in other Phytosaurs. This part of the femur is not only very thick but also extraordinarily broad. The articular faces of the condyles are very much rounded and the sharp

lower prominence of the lateral condyle is still about 2 cm. away from the lateral border of the bone. In other Phytosaurs the condyles are not so distinctly developed.



1

Fig. 1. *Typothorax coccinarum* Cope. Right femur; *a* posterior, *b* lateral view, *c* upper (thick) and lower (thin) contour, one upon the other to show the twisting of the distal end. × ½. (Type: Cope, l. c. 1887, pl. 1, fig. 3).

Fig. 2. *Typothorax coccinarum.* Proximal end of tibia. × ½.

The right femur is quite complete. In the left one the distal end is missing; the bone is still connected by matrix with a rib, a dorsal and a caudal dermal scute.

The measurements of the right femur are:

Length	22	cm.
Transverse diameter of the head	6	cm
Length of trochanter quartus	4	cm.
Distance of its lower extremity from the proximal end of the bone	10	cm.
Diameter of the shaft below trochanter quartus, transverse	3	cm.
Diameter of the shaft below trochanter quartus, antero-posterior	2.2	cm.
Diameter of the condyles, transverse	8	cm.
" " " " antero-posterior at medial condyle	4	cm.
" " " " " " lateral "	5.4	cm.
" " " " " " groove	3.4	cm.

Tibia: A head of a bone (7 cm. long), with the greater part missing, I take for the proximal end of a left tibia. The bone is quite hollow at the break (Fig. 2).

Antero-posterior diameter of articular face	5.5 cm.
Transverse " " " " in posterior part	3.3 cm.
Greater diameter of shaft at break, estimated	3.3 cm.
Smaller " " " " "	1.8 cm.

Metatarsals: There are a number of fragments of metatarsals with distal articular faces of about the type of other Phytosaurs. They are quite straight with oval section of the shaft and much thickened distal articular end.

Scapula: With these bones is an articular end of a right scapula (Fig. 3). It is very much thickened near the articular faces, but very thin farther on.

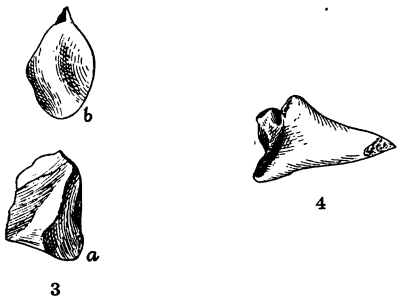


Fig. 3. *?Typothorax coccinarum.* Articular extremity of scapula. × ½.
Fig. 4. *?Typothorax coccinarum.* Left cervical rib. × ½.

There are the characteristic double facets for the coracoid and the humerus; both of them together have an oval contour, the greater diameter being 5.3, the smaller 3.8 cm.

Ribs: There are a few fragments of vertebræ, but not enough to give any idea of their character. One left cervical rib (Fig. 4) is of the Parasuchian type, but very broad.

The thoracic ribs are of a very singular type. They are flat and broadened probably to a breadth equal to the length of the vertebra they belong to. Each rib is covered by a sculptured dermal scute corresponding in breadth and length with the rib, somewhat like *Aëtosaurus ferratus* or *Stegomus arcuatus*. Two ribs covered by such scutes have, together, a breadth of 7.5–8. cm. (Fig. 5 and 6). In their thickest part the ribs only measure 1.5 cm. This thickening, being the main part of the rib itself, and prominent only on the inner side, is about 3 cm. broad and the distal end of it curved into one of the corners which is probably the posterior one. In that specimen the rib does not naturally end by becoming more and more slender, but the whole breadth is just obliquely cut off. The ribs are not evenly

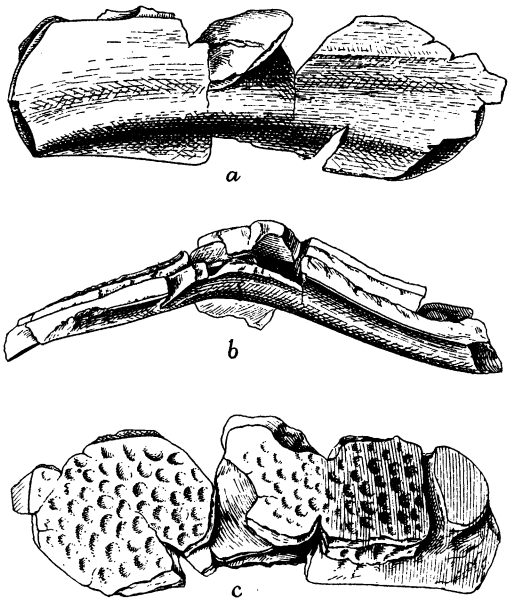


Fig. 5. *Typothorax coccinarum.* Fragment of dorsal rib; *a* from below, *b* from behind, *c* from above, covered with dermal scute. × ½. (Type: Cope, l. c. 1887, pl. 1, fig. 1.)

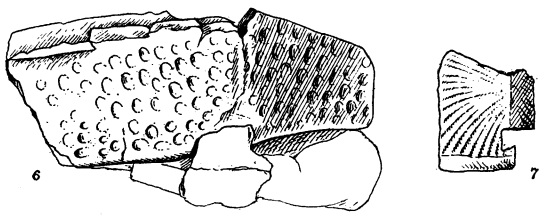


Fig. 6. *Typothorax coccinarum.* Fragment of another dermal scute covering a rib, from above. The left femur is attached at the side and a smaller scute (fig. 7) below. × ½. (Type: Cope, l. c. 1887, pl. 1, fig. 2).

Fig. 7. *Typothorax coccinarum.* Imperfect lateral (?) scute, attached below, scute shown in fig. 6. × ½.

curved but seem to be in two planes, the probably shorter medial part of the rib is straight, then comes a slight angle downwards and the rest is straight again. In *Phytosaurus, Mystriosuchus* and *Rutiodon* the ribs are not broadened at all and we do not yet know the thoracic ribs of *Aëtosaurus ferratus* nor those of *Stegomus arcuatus*. So this case is still a single one in Parasuchians, slightly resembling some of the turtles.

Dermal scutes: The back is covered with transversely long and relatively narrow (8 cm. broad) sculptured dermal bones. These scutes are not connected with the ribs; there is always matrix between. Their sculpture consists of small (about 5 mm. diameter) shallow pits near each other. They are arranged in a crypto-radial order with the center of radiation in the middle of the anterior border just above the angle of curvature already mentioned. The thinner posterior border is marked by a raised smooth and narrow strip. Each scute probably covered its anterior neighbor in overlapping that thin border, in the manner of tiles. The more complete one of the scutes is 25 cm. long and 8 cm. broad.

There are still 4 other scutes, three of which belong to the tail. One of them (Fig. 7) on the inner side of the rib, connected by matrix with the left femur, is possibly one of the lateral rows of scutes of the body or possibly of the beginning of the tail; it is longer in axial direction than in transverse; the posterior border is the same as in the medial dorsal scutes; its sculpture consists in radially arranged pits and fossæ, radiating from a centre at the broken anterior border.

The smallest one (Fig. 8) of the three remaining scutes is also a lateral one, but is from the tail. Except for the size it is similar to the one just described.

The two other scutes, of different size, are of the upper medial rows of the tail (Fig. 9 and 10). They are strongly curved. Their form is rectangular, the smaller one being subquadrate, the larger one longer in transverse direction. Their posterior border is formed as in the dorsal scutes. Near the middle of the anterior border is a high spine-like elevation from which the sculpture radiates.

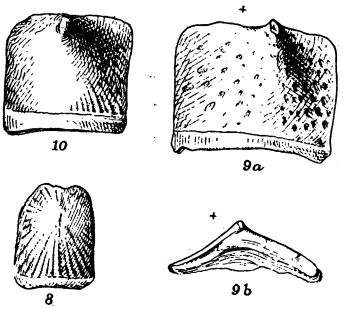


Fig. 8. *Typothorax coccinarum.* Lateral (?) scute. × ½.

Figs. 9 and 10. *Typothorax coccinarum.* Tail scutes; 9b showing curvature. × ½.

Classification: It is difficult to say whether *Typothorax* should be classified with the Pseudosuchians or with the Parasuchians. The resemblance of the dorsal shield with *Aëtosaurus* is great, but *Phytosaurus* has a shield of the same form; femur and scapula go, perhaps, a little better with the

Parasuchia than with the Pseudosuchia, but there is no unmistakable criterion. *Typothorax coccinarum* may possibly be related to *Stegomus arcuatus* (not to *S. longipes*). Probably a new family should be established, the Typothoracidæ, from the characters of the ribs. I leave it open to the future to decide whether *Typothorax* belongs with the Pseudosuchia or with the Parasuchia, but I personally have rather the impression that it is a Parasuchian.

Parasuchia.

2. **Phytosaurus buceros** *Cope.*

Of this species there is but one skull, without lower jaw (No. 2318). It is nearly complete (Fig. 11), only the top of the snout being missing. Its length is now 70 cm. In Cope's time there still existed posterior teeth

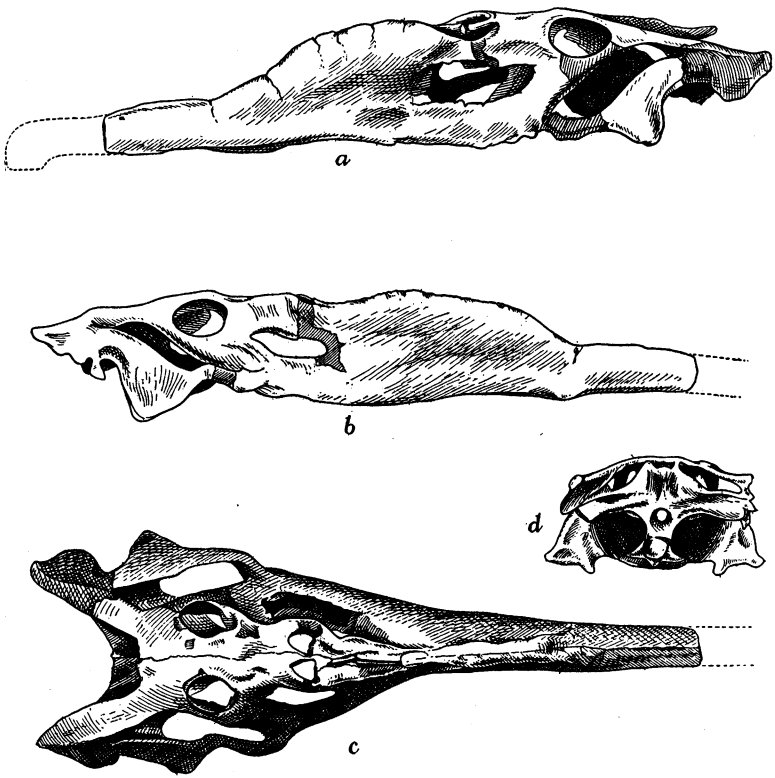


Fig. 11. *Phytosaurus buceros* Cope. Skull, type specimen; *a* from left side, *b* from right side, *c* from above, *d* from behind. × ⅛.

with compressed denticulate crowns, but they are not present now. The preservation of the skull, in details, is rather rough and hardly shows any sutures, but the external form is very well seen. Cope also described the braincast.

The arrangement of the openings is most like that of *Phytosaurus*, especially *P. kapffi*. The nares are as in that form above the middle of the preorbita. In *Mystriosuchus* and in *Rutiodon* the lower temporal fenestra is much bigger and broader than in *Phytosaurus kapffi* and in this species. The same is to be said of the upper temporal opening. Here it is not visible from above in contrast to *Mystriosuchus* and *Rutiodon* and is still more different from *Palœorhinus* and far more from *Mesorhinus*. *Angistorhinus* is of the *Mesosuchus* type. The nasal openings are little broader than in *Phytosaurus kapffi;* they are not situated in a special elevation, as, for instance, they are in *Angistorhinus*, but their borders lie nearly in the same plane as the frontals and the posterior medial part of the nasals; they are only slightly inclined forward. In front of the preorbital openings the snout becomes very much compressed and raises higher than the anterior border of the nares. The protuberance has a length of about 25 cm. from the border of the nares; from that point the snout is low as in *Mystriosuchus*, *Rutiodon*, *Angistorhinus* and *Palœorhinus*. Only 14 cm. of that part are still preserved and I suppose, for reasons given below, that 10 more centimeters are missing of the original extremity of the snout. I think I am able to trace the anterior end of the maxillæ from the palatal side, because on the right and on the left side I see the suture obliquely crossing the ridges inside the alveoli, but at the place where it should cross the tooth-line there is a break on both sides filled up with plaster. But there can hardly be a doubt about the very end of the maxillæ. The most anterior two or three alveoli of the maxilla are a little smaller than the others in front and behind. I count 23 alveoli in the maxilla, 15 or 16 more alveoli are preserved in the premaxilla (one side). In *Phytosaurus kapffi* and in *Mystriosuchus planirostris* and *plieningeri* there is about the same number of teeth in the maxilla and in the premaxilla. From the great resemblance to *Phytosaurus kapffi* I suppose the same is true in this species, which makes 7 or 8 teeth, or about 10 centimetres missing. In restoring the snout in this manner the aspect will be very different from what Jaekel thought in Sitz. ber. Ges. naturf. Freunde, Berlin. No. 5, 1910, p. 215, f. 8. The high and the low part of the snout are of about equal length.

Phytosaurus buceros is not so primitive as *Palœorhinus*, because the snout is relatively longer and the nares are situated farther back, but not so far as Jaekel suggests. *Palœorhinus* seems to be what we should postulate for the precursor of *Angistorhinus*, *Rutiodon* and *Mystriosuchus*, though it is

contemporaneous. The group of these few genera is characterized in the skull by a broad infratemporal fenestra and a relatively great supratemporal fenestra, cutting farther into the parietal roof; in the body they are characterized by subquadrate and scale-like dermal scutes. They may be called the Family Mystriosuchidæ. *Phytosaurus kapffi* and *buceros* have long narrow infratemporal fenestra, very small and narrow supratemporal opening, relatively longer and more backwardly directed squamosal rami, narrower and more horizontal preorbital openings; the dorsal dermal scutes are in transverse direction long and narrow strips, touching each other like tiles; these scutes most nearly resemble Aëtosaurus. This family may be called Phytosauridæ (*s. str*). Both of these families are preceded by the Stagonolepidæ as characterized by the author (l. c.), consisting of *Stagonolepis* and *Mesorhinus*.

There is no doubt that *Phytosaurus buceros* is very nearly related to *Phytosaurus kapffi*, much nearer than to any other known form. One difference is in the formation of the snout; the low anterior part is very much longer than in *Phytosaurus kapffi*, but there also the very extremity of the snout is really low. The lower part of the snout being relatively longer than in the other species would not be enough for a generic difference. So in the present state of knowledge I do not see any reason for establishing a new genus for *Phytosaurus buceros* as Jaekel did ("*Metarhinus*" l. c. p. 220).

From the resemblance of the skull it is supposed that the dermal scutes were of the same type as in *Phytosaurus kapffi*. Now *Typothorax* has such an armature, but it also has at the same time an extremely aberrant type of ribs and peculiar skeleton bones with extraordinarily thickened articular ends. It is absolutely impossible to declare *Phytosaurus buceros* and *Typothorax coccinarum* as belonging to the same species or even genus. I only say that this is the only true Phytosaurian skull hitherto known in America, and on the other hand *Typothorax* is the only type of armature much resembling *Phytosaurus kapffi* (except the smaller *Stegomus arcuatus*), therefore while this idea, that *Typothorax and Phytosaurus* are identical, may arise I do not think it is very probable.

3. **Episcoposaurus horridus** *Cope.*

In the Triassic Cope Collection many bones and fragments are marked with the same number (2307) as the type specimens; that means they come from the same place. The boxes containing them are also marked in Cope's handwriting, as *Episcoposaurus horridus*, but nevertheless they belong to different Parasuchia. It is impossible to take out only those bones de-

scribed by Cope as *Episcoposaurus,* because even they belong to at least two quite different animals. Cope describes as belonging to this species: "two caudal vertebræ, a proximal and a distal one; one humerus; two ulnæ; a femur lacking the condyles; a proximal part of a tibia; the distal part of a fibula; a calcaneum and a number of dermal bones. The only part of the skull probably belonging to this animal is a splenial bone." The named parts of the fore leg are so very much smaller than those of the hind leg that from all experience in Parasuchia it seems impossible that the animal could have been so disproportionate. The two caudal vertebræ and the splenial (two splenials) may belong to the same animal as the hind leg. The dermal bones of Mystriosuchian type may possibly belong to the latter too, but there are different types of scutes and it is hard to say whether they really all did belong to different parts of the same animal (species).

In consequence I shall eliminate humerus, radius (which is also there) and ulna from the determination *Episcoposaurus horridus* and shall take the bones of the hind leg as the real type of this species, appending also the splenials, the two caudals and possibly some of the scutes.

Femur: As demonstrated by Cope the femur is a thick and strong bone, but unusually straight for the distance preserved in one piece; there is also the greater part of the distal extremity with part of the condyles of the same right femur, neglected by Cope (Fig. 12). And this taken together with the greater piece, though

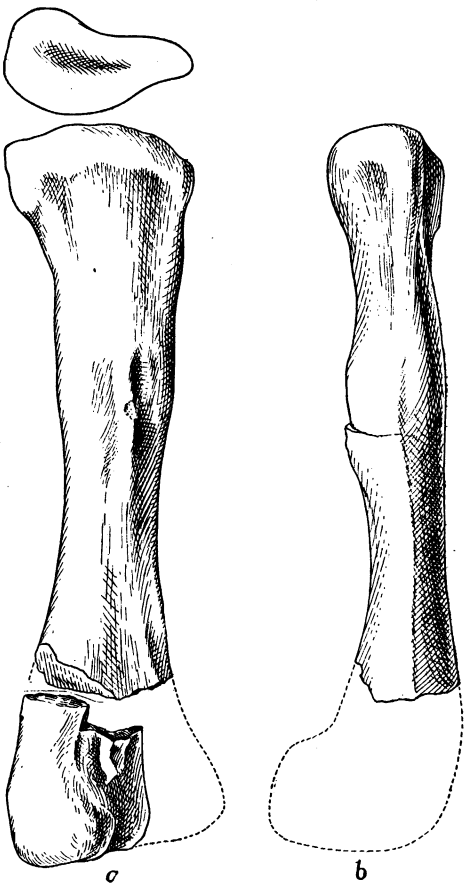
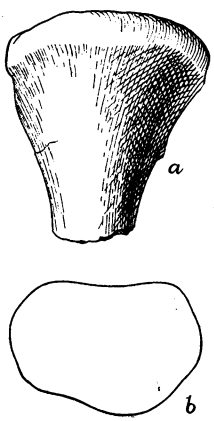


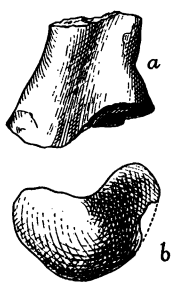
Fig. 12. *Episcoposaurus horridus* Cope. Right femur in two pieces; *a* from behind with upper view. *b* lateral view. × ½. (Type: Cope, l. c. 1887, p. 215.)

they no longer fit together, shows that the distal end of the femur had a slight curvature and the turning characteristic in Parasuchia. The trochanter quartus is relatively well marked and the thick head is only very little expanded, not even quite so much (and straighter) as in *Rutiodon manhattanensis* von Huene. The length of the greater fragment is 31 cm. The original complete length was probably, approximately, 40 cm.

Tibia: There are three pieces of the tibia, the head of probably a left bone, a small bit of the shaft and the distal extremity of a right tibia. The last had been taken by Cope for the distal end of a fibula. The diameters of the head are 11 cm. and 7.3 cm.; the shaft 12 cm. below the head has 3.2 and 4.5 cm. diameter. That shows a relatively thick head and thin shaft,



13



14

Fig. 13. *Episcoposaurus horridus.* Proximal end of right (?) tibia, medial and upper view. × ½. (Type: Cope, l. c. 1887, p. 216.)

Fig. 14. *Episcoposaurus horridus.* Distal end of right tibia; *a* lateral, *b* lower view. × ½. (Type: Cope, l. c. 1887, p. 216. "Fibula.")

(Fig. 13), which is very different from *Rutiodon manhattanensis* and also *R. carolinensis.* The contour of the articular face resembles that of a bean; at the slightly concave side of it the shaft is flat or even slightly concave in its beginning; the opposite side is strongly convex. The latter is the medial, the former the lateral side. I take the bone as a right one, because one of the short sides of the head (the posterior one) is projecting from the shaft a little more than the other one (the anterior).

The distal end of the same right tibia (Fig. 14) shows a character not yet well known in Parasuchia, the division of the distal end into two processes, the posterior one going straight down, the anterior and shorter one

projecting laterally. It strikingly resembles the Saurischia though not so broad as is usual in that group. A Phytosaurian tibia figured by H. v. Meyer (Palæontographica VIII, 1859. Tb. 42, f. 1) shows the same tendency only the epiphysis is missing there.

From these fragments it is impossible to determine the length of the tibia.

Calcaneum: This is the most striking bone of the whole set, because at first impression it seems to have a likeness to the true Crocodilian calcaneum. Cope says: "The calcaneum has the form usual in crocodiles and especially in Belodontidæ." As far as I know a Parasuchian ("belodont") calcaneum has never been found, or at least described, except this one, and from crocodiles it differs quite essentially. The Crocodilian calcaneum has three faces of contact (with fibula, distal tarsals and astragalus); this one (Fig. 15) lacks an articulation with the astragalus and the tuber has not the form usual in crocodiles; there is rather a slight resemblance to the calcaneum of *Hallopus* (cf. Huene: Beiträge zur Geschichte der Archosaurier. Geol. u. Pal. Abhandl. 13 (17), 1. 1914). The contour of the calcaneum in anterior aspect has a resemblance to that of a Pelycosaur rather than to a later reptile. It is known that the Phytosaurian skull in many points has great similarity to Pelycosaurs. Through the kindness of Mr. D. M. S. Watson of the British Museum I am enabled to give figures (Fig. 16) of the calcaneum of *Erythosuchus africanus* Broom which is also enlarged, but in another way than in crocodiles and *Episcoposaurus*. It does not possess a tuber, but is a broad and thick plate rather similar to primitive reptiles.

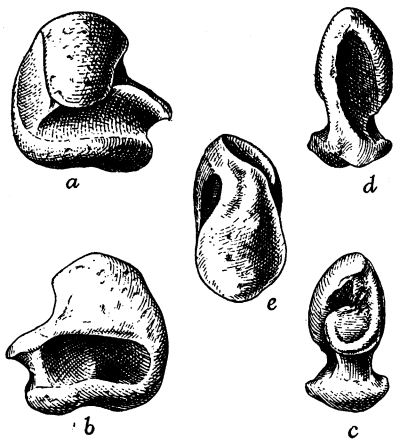


Fig. 15. *Episcoposaurus horridus.* Left calcaneum; *a* from behind, *b* front view, *c* medial view; *d* lateral view, *e* from below. × ½. (Type: Cope, l. c. 1887, p. 216.)

The calcaneum of other Parasuchia is not yet known, but it is probable that all of them possessed large tarsals of the first row as is also indicated by the cited tibia of *Phytosaurus kapffi.*

This kind of calcaneum as well as many other points illustrates the convergent adaptation in Parasuchia and Crocodilia (Fig. 17), which can never be derived directly from each other. It is a distinct development by itself.

The calcaneum, I suppose, is a left one. The tuber extending laterally backwards and upwards is flat from the latero-anterior side and has a cushion-like thickening at the postero-medial side, for fixation of the tendons. The upper articular face of the tibia is quite flat, the lower one is convex and has its anterior border more rounded and higher than the posterior one. The greatest vertical extension at the tuber is 9 cm., the transverse direction measures about the same.

Caudal vertebræ: They are of course not very characteristic of the species. They are both of the same length, 7.2 cm. (at the neuro-central limit). One of them, a centrum only, is of the anterior third of the tail (Fig. 18).

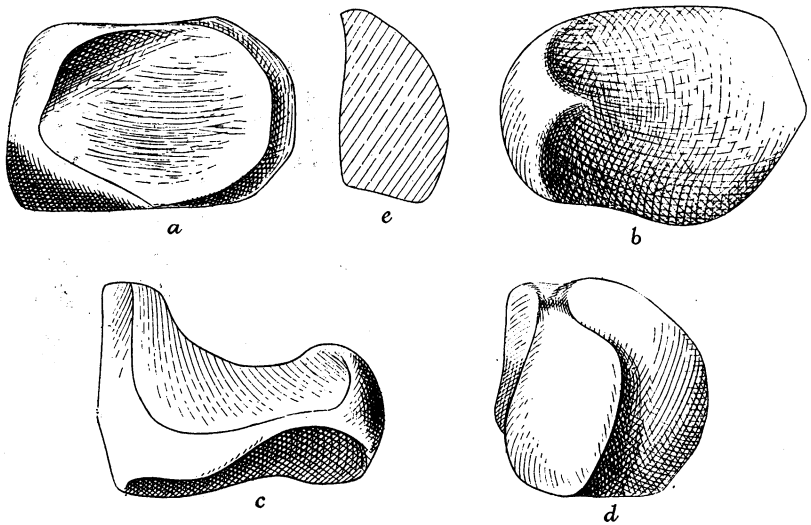
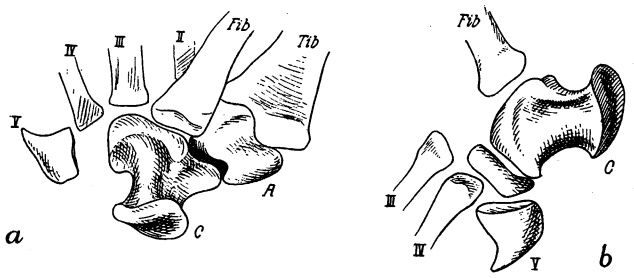


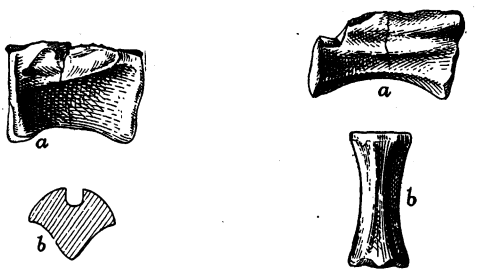
Fig. 16. Left calcaneum of *Erythrosuchus africanus* Broom, in the British Museum, Natural History (Coll. Watson). London; *a* anterior view, *b* posterior view, *c* upper view, *d* lateral view, *e* from below. × ½.

Its posterior articular face measures 5 cm. in vertical and the same in transverse direction. The section of the vertebra in the middle is cuneiform, rather sharp below. It has distinct articular faces for the hæmapophysis at the posterior end, but nothing of that kind at the anterior end. The neural canal is deep. Its neural arch possessed big transverse processes as shown by the deep curvature of the contact line of the centrum and arch.

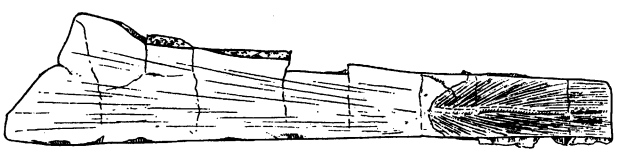
The posterior vertebra may be the beginning of the last third of the tail (Fig. 19). It still shows the greater part of the neural arch without any trace of a transverse process. The anterior articular face measures 3.2 cm. in vertical and in horizontal direction. There is a median longitudinal ridge



17



18 19



20

Fig. 17. Left foot of *Crocodilus niloticus* showing calcaneum (*C*); *a* from above and behind, *b* lateral aspect. × ½.

Fig. 18. *Episcoposaurus horridus.* Anterior tail vertebra with transverse section. × ½. (Type: Cope, l. c. 1887, p. 213.)

Fig. 19. *Episcoposaurus horridus.* Distal tail vertebra, two views. × ½. (Type: Cope, l. c. 1887, p. 213.)

Fig. 20. *Episcoposaurus horridus.* Medial view of splenial with symphysis. × ½. (Type: Cope, l. c. 1887, p. 213.)

below, and lateral to each side. From here upward the vertebra becomes narrower. Instead of a neural spine there is a broad and low lamella. At the posterior border of the centrum are two distinct small facettes for the hæmapophysis, but none at the anterior end.

Splenial: Two big splenial bones are preserved, 35 and 32 cm. long; they are the right and the left. The smaller (left) one shows distinctly (and I think the longer does too) a symphysial face of 9 cm. in length; the anterior extremity of it is missing (Fig. 20). The ventral border of these bones is 2–2.5 cm. thick. In the anterior part they are 3.5, in the posterior 7 cm. high. They belong to a jaw at least 90 cm. long. Possibly these splenials do not belong to the same individual, as one of them seems to be a very little larger in every dimension.

Dermal bones: All scutes lying with *Episcoposaurus* bones (but also with

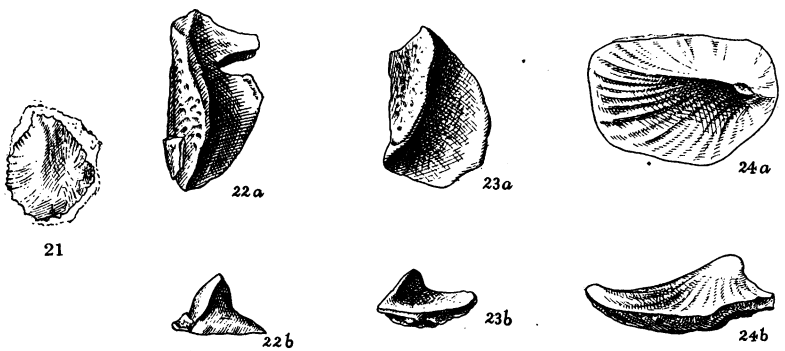
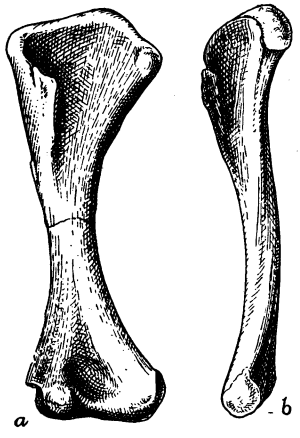


Fig. 21. *? Episcoposaurus horridus.* Dermal scute from the throat-shield. × ½.
Figs. 22–24. *? Episcoposaurus horridus.* Dermal scutes. × ½.

other Phytosaurs mixed with them) are of the Mystriosuchid type. If one of them really belonged with *Episcoposaurus* it is to be expected that *Episcoposaurus* had a low snout in its skull. One of these scutes is a polygonal one belonging with the throat-shield (Fig. 21). Two others, rather small, possess a very high, steep and sharp longitudinal ridge. Two others (Fig. 22–23) of rather tile-like form are badly preserved. The biggest and best one of the scutes (Fig. 24) has a high longitudinal spine-like elevation, rising obliquely and having its highest point near the short border of the scute; a slight sculpture radiates from there.

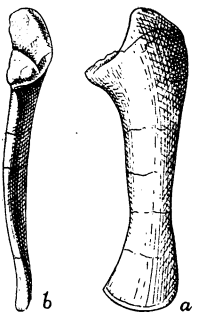
Only new discoveries of *Episcoposaurus* will make it possible to determine which of these scutes belong with it; whether the above described scutes are all from different parts of the same animal, which I doubt, or whether they belong to different animals.

The bones of the front leg, also described by Cope as *Episcoposaurus horridus*, belong to a small Mystriosuchid phytosaur. There are also femur and vertebræ apparently belonging together with the humerus, etc. (Fig. 25–27). Also in series No. 2308 the same species is represented by vertebræ, scapula, ulna, radius, femur, etc. It is possible, if not probable, that these smaller bones belong to Cope's "*Belodon*" *scolopax*. The anterior part of skull, which he so named, seems to be lost now, but it was found at about the same place with all the other remains. This skull was of the Mystriosuchid type and rather small, the snout being extremely low and



25

26



27

Fig. 25. *Episcoposaurus horridus.* Series No. 2308. Right humerus; *a* front view. *b* medial view. × ½. (Type: Cope, l. c. 1887, p. 22).

Fig 26. *Episcoposaurus horridus.* Series No. 2308. Upper part of radius. × ½. (Type: Cope, l. c. 1887, p. 215.)

Fig. 27. *Episcoposaurus horridus.* Series No. 2308. Left ulna; *a* posterior, *b* lateral view. × ½. (Type: Cope, l. c. 1887, p. 215).

tiny. From these indications the bones mentioned here, and possibly coming from the same spot, could very well belong to this skull, but without new finds there is no possibility of being sure of that.

The series numbered 2312, also coming from about the same place, belongs to another phytosaur also of Mystriosuchid type as easily determinable from the nicely preserved vertebræ. They have a darker red color, having been imbedded in a soft red clay. All the bones of the set No. 2407, No. 2308 and No. 2310 are partly incrusted with gray, greenish and purple silicious clay with dark silicious grains.

CŒLUROSAURIA.

4. **Coelophysis longicollis, bauri** and **willistoni** *Cope.*

FIGS. 28–64.

Coelophysis seems not to be uncommon in the New Mexican Trias. In the Cope Collection are several series of bones and fragments and there were also several vertebræ mixed with the remains of *Typothorax* and *Episcoposaurus*. In 1906 I redescribed (l. c.) and figured the most important ones of the remains of *Coelophysis longicollis* and *bauri*, when Prof. Osborn sent me splendid casts of them.

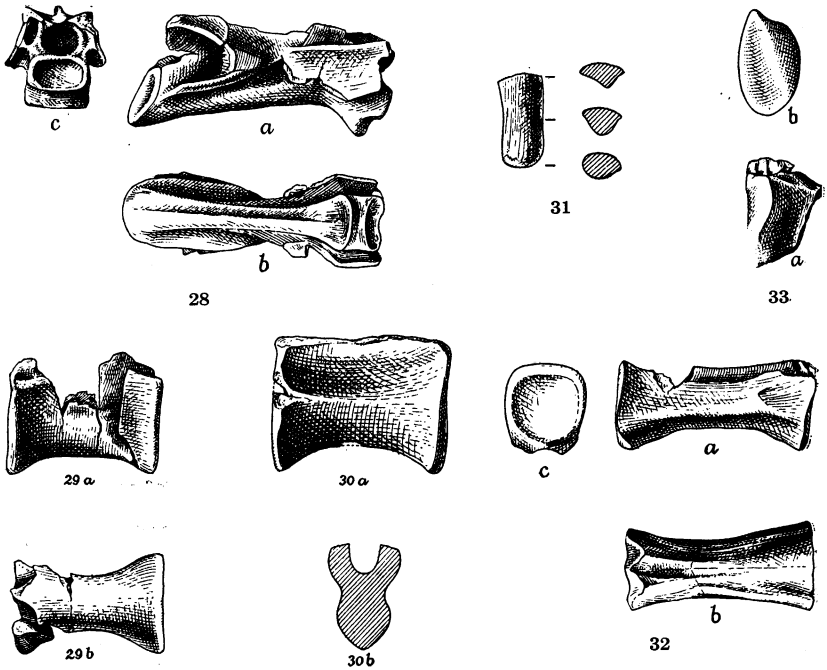


Fig. 28. *Cœlophysis longicollis* Cope. Epistropheus; *a* right aspect, *b* lower aspect, *c* anterior aspect, showing the facet for the atlas. × ½. (Type: Cope, l. c. 1887, p. 222 "?third cervical").

Fig. 29. *?Cœlophysis longicollis.* Centrum of a dorsal vertebra in lateral and lower view. × ½.

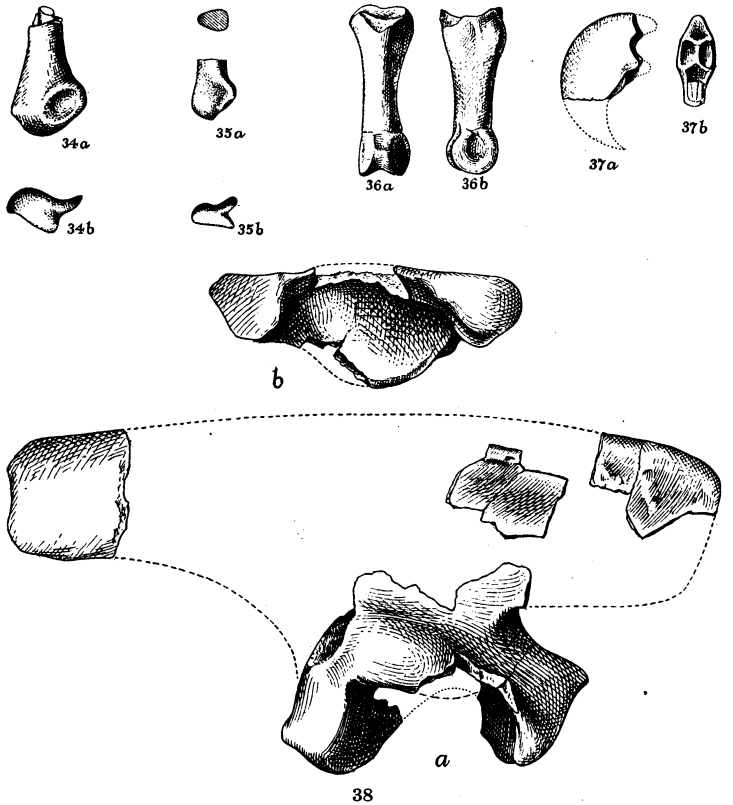
Fig. 30. *?Cœlophysis longicollis.* Centrum of a larger dorsal vertebra, with transverse section. × ½.

Fig. 31. *?Cœlophysis longicollis.* Transverse process of a dorsal vertebra, upper aspect, with sections. × ½.

Fig. 32. *Cœlophysis longicollis.* Centrum of middle tail vertebra; *a* right, *b* lower, *c* posterior aspect. with facets for hæmapophysis. × ½. (Type: Cope, l. c. 1887, p. 223).

Fig. 33. *Cœlophysis longicollis.* Articular extremity of scapula; *a* inner view, *b* glenoid face. × ½.

Cœlophysis belongs in the family Podokesauridæ recently established by the writer (l. c.). All the bones are hollow and have thin walls. The vertebræ are elongated; the sacrum consists of at least 3 vertebræ, probably



38

Fig. 34. *Cœlophysis longicollis.* Distal end of a large metacarpal; *a* side view, *b* articular facet. × ½.

Fig. 35. *Cœlophysis longicollis* or *C. bauri.* Distal end of smaller (lateral?) metacarpal. × ½.

Fig. 36. *Cœlophysis longicollis.* First phalange of largest finger; *a* front, *b* side view. × ½. (Type: Cope, l. c. 1887, p. 225).

Fig. 37. *Cœlophysis longicollis.* Claw phalange of first(?) finger; *a* side view, *b* articular view. × ½. (Type: Cope, l. c. 1887, p. 225).

Fig. 38. *Cœlophysis longicollis.* Fragments of right ilium; *a* lateral aspect, *b* from below showing articular facets for ischium and pubis and big acetabular crest. × ½. (Type: Cope, l. c. 1887, p. 224. "No. 2".)

4. The ilium is of the *Ornitholestes* type and differs from that of the Triassic Pachypodosauria by the bulky lower process and the broad spina anterior. The pubis is slender and longer than the femur (different from

the Pachypodosauria). There are only fragments of the ischium at present, Cope's better specimens apparently being lost. The proximal extremity of the tibia of *Cœlophysis bauri*, if the determination is correct, differs essentially from the Pachypodosauria. From the anterior leg are only fragments of the manus, showing it to have been extremely long and slender, very much like *Ornitholestes*. A small fragment may represent part of the scapula.

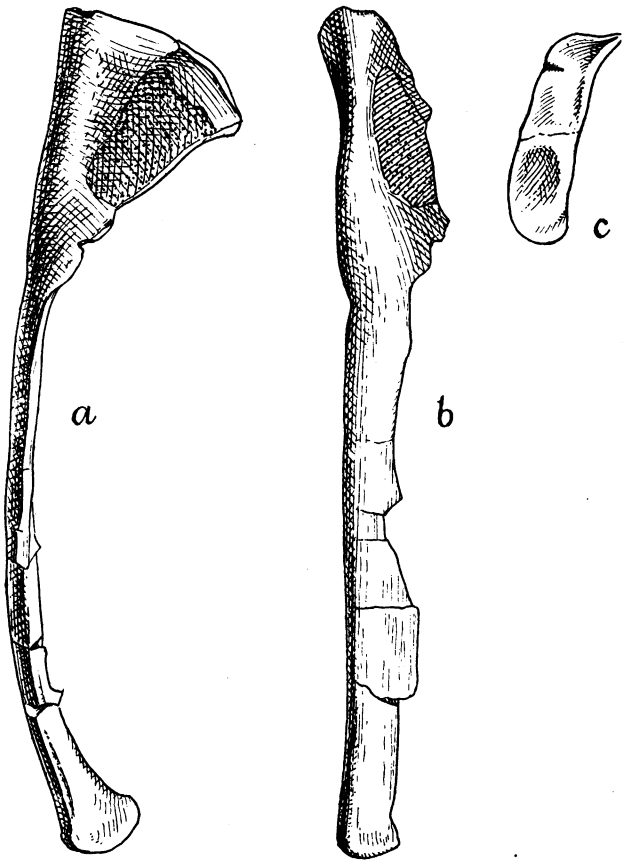


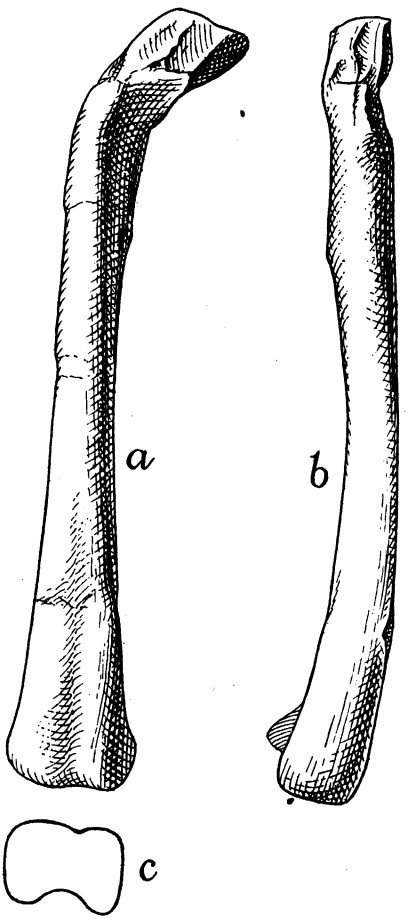
Fig. 39. *Cœlophysis longicollis.* Right pubis (articular facet fitting with the ilium, Fig. 38, therefore belonging with the same individual); *a* medial, *b* upper, *c* articular view. × ½. (Type: Cope, l. c. 1887, p. 228).

Cœlophysis longicollis is the largest: *Cœlophysis willistoni* the smallest species.[1] There may even be more than three similar species. In the sacral vertebræ of *Cœlophysis bauri* the exitus of the spinal nerves are

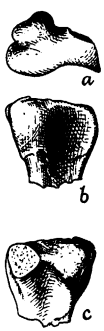
[1] The figures will give the best idea of these species.

visible at the sides of the anterior halves of the second and third sacral vertebra. Part of an ilium of *Cœlophysis bauri* is connected by matrix with this sacrum of *Cœlophysis bauri*. The acetabulum of the ilium of *Cœlophysis willistoni* is relatively far wider than in *Cœlophysis longicollis*. The latter species seems to vary quite a good deal in size, as shown by vertebræ and ilia.

Stratigraphical position and locality. Cope refers to these bones only as



40



41

Fig. 40. *Cœlophysis longicollis.* Right femur; *a* anterior, *b* lateral, *c* distal view. × ⅛. (Type: Cope, l. c. 1887, p. 225).

Fig. 41. *Cœlophysis longicollis* or *C. bauri.* Proximal extremity of right(?) tibia of *C. bauri* or of a big metatarsal of *C. longicollis:* three views. × ⅛. (Type: Cope, l. c. 1887, p. 226 "tibia of C. bauri").

coming from the Trias of New Mexico. Labels and letters lying with them show that they were found by the late David A. Baldwin, 1881, in Rio Arriba County, New Mexico, in the vicinity of the Chama River, western tributary of the Rio Grande del Norte, especially near Gallina and in Arroyo Seco. Most specimens were obtained near the former locality. Williston and Case have rediscovered the place (cf. their paper: The Permo-

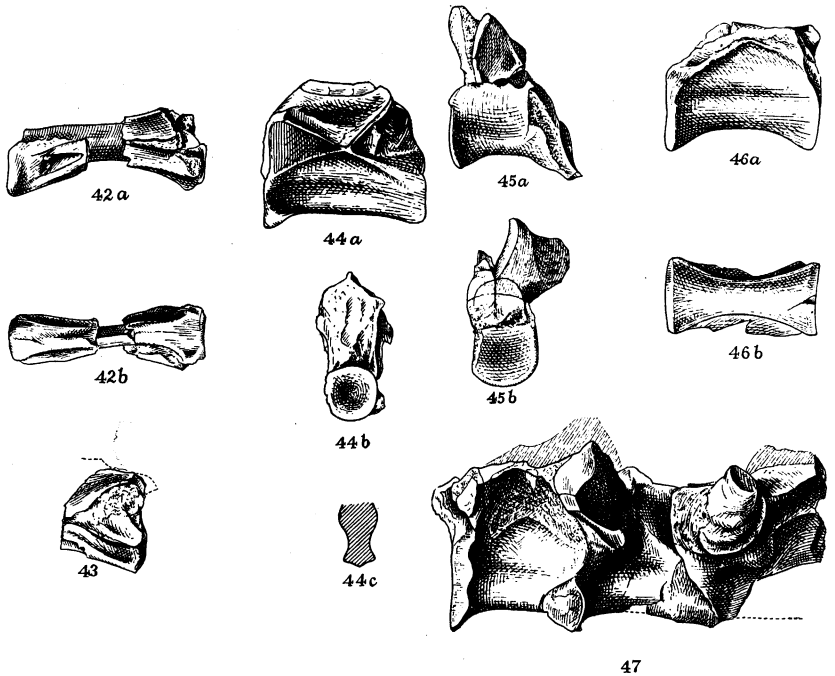


Fig. 42. *Cœlophysis bauri* Cope. Third or fourth cervical vertebra; *a* from right side, *b* from below, showing cast of big internal hole together with neural canal connecting both extremities of the injured vertebra. × ½. (Type: Cope, l. c. 1887, p. 226 "third cervical".)

Fig. 43. *Cœlophysis bauri.* Left aspect of fourth or fifth cervical vertebra. × ½.

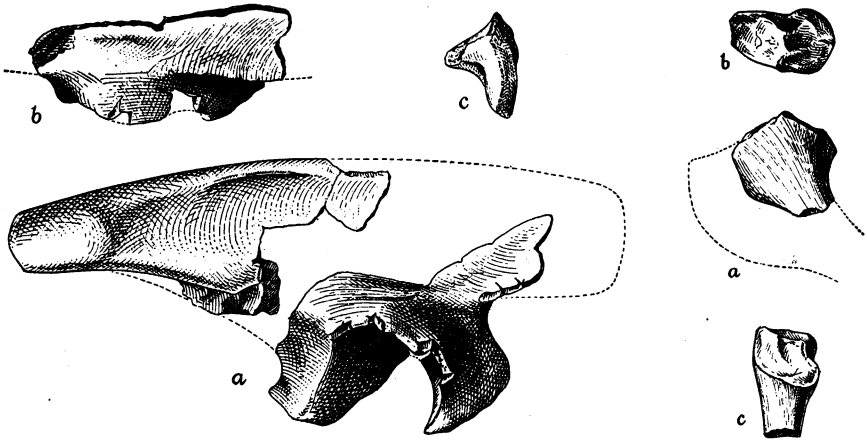
Fig. 44. *?Cœlophysis bauri.* Ninth or tenth cervical vertebra; *a* left aspect, *b* anterior aspect, *c* transverse section. × ½.

Fig. 45. *Cœlophysis bauri.* Anterior dorsal vertebra with left transverse process and left prezygapophysis; *a* left, *b* front aspect. × ½.

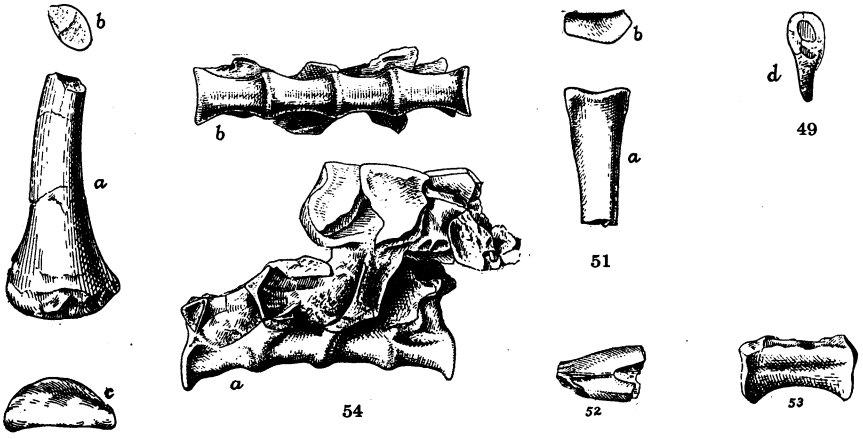
Fig. 46. *Cœlophysis bauri.* Dorsal vertebra, centrum, two views. × ½. (Type: Cope, l. c. 1887, p. 223 "*C. longicollis*").

Fig. 47. *Cœlophysis bauri.* Sacrum, two and one-half anterior sacrals; a fourth one was probably in existence. Left aspect. × ½.

carboniferous in northern New Mexico. Journ. of Geology, 1912, p. 3 and 11); it is at the foot of the upper Triassic rocks north of Cerro Blanco, near the settlement Gallina, and opposite the face of the Capulin Mesa bluff. Case found there various fresh-water shells and bone fragments



48



50

Fig. 48. *Cœlophysis bauri.* Two pieces of right ilium with restoration in dotted line; *a* lateral view, *b* upper view of lower part, *c* posterior view of upper part showing medial crest and real breadth of posterior spine which is oblique in *a* and therefore seems narrower. × ½. (Type: Cope, l. c. 1887, p. 224 "No. 1 of *C. longicollis*").

Fig. 49. *Cœlophysis bauri.* Proximal posterior part of left ischium; *a* lateral, *b* upper, *c* posterior, *d* lower view. × ½. (Type: Cope, l. c. 1887, p. 226).

Fig. 50. *Cœlophysis bauri.* Distal part of left ischium; *a* lateral, *b* upper, *c* end view. × ½. (Type: Cope, l. c. 1887, p. 226).

Fig. 51. *?Cœlophysis bauri.* Proximal extremity of fibula (?), two views. × ½.

Fig. 52. *Cœlophysis willistoni* Cope. Upper arch of cervical vertebra, anterior part. × ½.

Fig. 53. *Cœlophysis willistoni.* Centrum of dorsal vertebra, lateral view. × ½. (Type: Cope, l. c. 1887, p. 226 "*C. bauri*".)

Fig. 54. *Cœlophysis willistoni.* Sacrum, consisting of four vertebræ; *a* left, *b* lower view. Above the vertebræ is a pubic process of an ilium of *C. bauri.* × ½. (Type: Cope, l. c. 1887, p. 226 "*C. bauri*".)

provisionally referred by Williston to the genus *Cœlophysis*. As shown by the writer (Kurze Mitteilung über Perm, Trias und Jura in New Mexico, N. Jahrb. f. Min. etc. Beil. Bd. 32, 1911, p. 730–739) the Trias in Poleo Creek and Mesa Prieta near Gallina is divided into two parts by the "Poleo-top-sandstone." The basis of the latter is equivalent to the

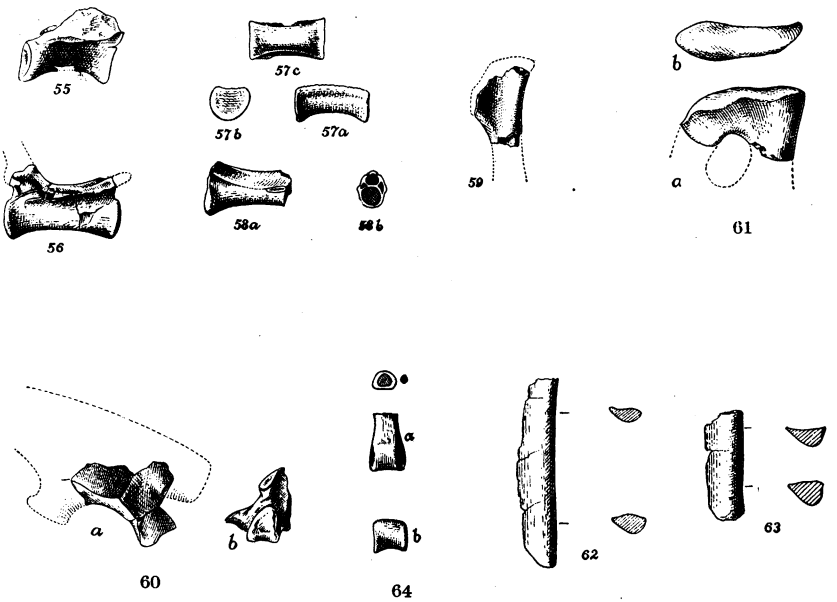


Fig. 55. *Cœlophysis willistoni.* Anterior tail vertebra, right aspect. × ½.

Fig. 56. *Cœlophysis willistoni.* Middle tail vertebra, right aspect. × ½.

Fig. 57. *?Cœlophysis willistoni.* Tail vertebra, centrum, three views. × ½. Or perhaps a dorsal of a very small specimen. (Type: Cope, l. c. 1887, p. 227, "dorsal".)

Fig. 58. *Cœlophysis willistoni* or *C. bauri.* Half of tail vertebra; *b* section showing neural canal and three cavities. × ½.

Fig. 59. *Cœlophysis willistoni.* Right humerus, anterior aspect. × ½.

Fig. 60. *Cœlophysis willistoni.* Part of right ilium; *a* lateral, *b* anterior aspect showing pubic facet and acetabular crest. × ½. (Type. Cope, l. c. 1887, p. 227).

Fig. 61. *Cœlophysis sp.* A species of *Cœlophysis* medium in size between *bauri* and *willistoni.* Head of right pubis with articular face. × ½.

Fig. 62. *Cœlophysis willistoni.* Fragment of middle part of pubis. × ½.

Fig. 63. *Cœlophysis willistoni.* Distal extremity of left ischium, lateral aspect with sections. × ½.

Fig. 64. *Cœlophysis willistoni.* Distal extremity of metatarsal, three views. × ½.

Shinarump conglomerate of Colorado and Utah, a horizon yielding Phytosaurian and Labyrinthodont bones in a very wide area in New Mexico, Arizona, Utah and Colorado, and even in Wyoming. The Triassic clays and sandstones below this horizon contain some fossil wood, but no other fossils. This lower division is 50–60 m. thick in Poleo Creek. The Poleo-

top-sandstone is about 12–15 m. thick. Above it are the upper red beds with a thickness of about 70 m. The top of the Trias (above the latter) is formed by 50 m. of compact yellow sandstone, the "Prieta sandstone"; it is covered by 20 m. of gypsum, probably being the base of the Jurassic. Now the level where Case in 1911 found invertebrates and bones of *Cœlophysis* is in the Upper Triassic red beds, not less than 30 m. above the Poleo-top-sandstone, that is, about in the middle of the upper red beds. So their age must be supposed to be Upper Triassic. Baldwin's discoveries demonstrate that *Cœlophysis* occurred together with *Typothorax* and *Episcoposaurus*. But other Phytosaurian bones are of another (more red) color and so must come from another horizon. It cannot be taken as certain that the Phytosaurian remains from the base of the Poleo-top-sandstone (= Shinarump horizon) also are of Upper Triassic age (Keuper) or whether they already belong to the middle Trias. The whole Trias is called Dolores formation in southwestern Colorado, and the New Mexican Trias is the direct continuation of it.

LITERATURE.

1887. **E. D. Cope.** A Contribution to the History of the Vertebrata of the Trias of North America. Proceed. Amer. Phil. Soc., Vol. XXIV, p. 209–228.

1904. **S. W. Williston.** Notice of some New Reptiles from the Upper Trias of Wyoming. Journ. of Geology, Vol. XII, p. 688–697. (Palæorhinus.)

1906. **F. v. Huene.** Aussereuropäische Dinosaurier der Trias. Geol. u. Pal. Abhandl. 12, 2.

1906. **J. H. McGregor.** The Phytosauria, with Especial Reference to Mystriosuchus and Rhytidodon. Mem. Amer. Mus. Nat. Hist., Vol. IX, Pt. 2.

1907. **J. H. Lees.** The Skull of Palæorhinus. Journ. of Geology, Vol. XV, p. 121–151.

1910. **O. Jaekel.** Ueber einen neuen Belodonten aus dem Buntsandstein von Bernburg. Sitz. ber. d. Ges. naturf. Freunde, Berlin, p. 197–229.

1911. **F. v. Huene.** Kurze Mitteilung über Perm, Trias u. Jura in New Mexico. N. Jahrb. f. Min. etc. Beil. Bd. 32, p. 730–739, T. 32.

1912. **S. W. Williston** and **E. C. Case.** The Permo-Carboniferous of Northern New Mexico. Journ. of Geology, Vol. XX, p. 1–12.

1913. **M. G. Mehl.** Angistorhinus, a New Genus of Phytosauria from the Trias of Wyoming. Journ. of Geology, Vol. XXI, p. 186–191.

More literature will be found in **O. P. Hay**: Bibliography and Catalogue of the Fossil Vertebrata of North America, 1902. (Reference to the genera and species.)