

A LARGE PSEUDOSUCHIAN FROM THE ORENBURG TRIAS*

BY

FRIEDRICH FREIHERR VON HUENE
TÜBINGEN

WITH PLATES 11-15 AND 3 ILLUSTRATIONS IN THE TEXT

The Palaeontological Museum of the Academy of Sciences in Moscow possesses the largest part of a pseudosuchian skeleton from Zone 6-7 of the area of Orenburg. Some bones are of a smaller individual of same kind. I was allowed to study and draw these remains, when I was invited in November 1957 to the Academy of Sciences, for which I am cordially grateful. Now this description was also permitted to me; but I commend Professor Orlov, the director of the Museum, and his colleagues sincere thanks.

I would like to call this new pseudosuchian *Vjushkovia triplocostata* n. gen. n.sp., in the memory of my dear Muscovite colleague Dr. Viushkov, whom in the previous year was victim of an accident in the field.

Skull : Skull roof (Plate 11, Figure 1) and occipital are present in a connected piece, which also nearly completely encloses the upper temporal openings. These two temporal openings lie only 5 cm apart. This opening is on 4 cm across and extends 7 cm laterally. It is enclosed in front of the orbital. Located between and before these openings is a superficial 3.5 to 4 cm rough knob on the parietal. The 2.5 cm postorbital broadens in front of the opening, laterally diminishes and rises completely laterally in a narrow branch downward before the lower temporal opening against the jugal. The frontals are only 6 cm wide before the orbital rapidly spreading (together) to 14 cm over the orbital and again diminishing; they are together only 4 cm wide at the front. They close to only 3 cm apart at the nasal. The skull roof piece measures 33 cm from the rear edge to the front end of the nasal in the center line. Between the postorbital and the beginning of the frontal, the profile is sharply angled.

The occipital (Plate 11, Figure 2) is at the ends of the parietal, which are covered by the interparietals, 16 cm across, at the median only 3.5 cm high over the Foramen magnum, however rising laterally 1 cm higher before it drops again. The supraoccipital ascends in a broad triangle 2.5 cm of the Foramen magnum. The opisthoticum forms a long extension for 8.5 cm horizontal after the Foramen and becomes laterally 2.3 cm wide. The occipital condyle is a hemispherical curve, is 2.8 cm wide, and 2 cm high. Before it, one sees the basisphenoid protruding from both sides.

The right quadrate (Plate 11, Figure 8) of 14 cm length is 8 cm wide above and at the distal joint end is 5.5 cm wide; it is strongly constricted below the center, and both ends are against each other rotated approximately 40°. The proximal ball joint is over 2.5 cm thick. The lateral edge outgoing from this ball joint extends 6 cm in length, is extremely thin, and just as medial from the ball joint 2.5 cm away also thin. These two wings stand right-angled to each other. The distal joint for the lower jaw is only 1 to 1.5 cm thick.

The left quadratojugal (Plate 11, Figure 5) forms a pointed angle with its wings. The smooth wing runs along the quadrate 11 cm long and is 1.5 to 2 cm wide. The wider part runs diagonally upward and is incomplete and textured.

The incomplete right jugal (Plate 11, Figure 6) has a 6 cm long extension directed upward against the orbital, between which the orbital opens. The straight-line branch positioned backwards from there is kept to 8 cm long and 2 cm wide. Only a little is missing at the end. The largest part is covered by the horizontal front wing of the quadratojugal. Before the ascending branch, the jugal extends a short piece of itself under the orbital against the maxilla. The edge is broken off. The total length of the jugal is 12 cm.

Regarding another isolated bone of the facial skull, I present the prefrontal with the lacrymal (Plate 11, Figure 3). It too is probably an almost completely straight bone area of 2 cm broad and 14 cm length. The supraorbital prefrontal is nearly completely missing, but it extends with vibrant texture along the smooth lacrymal front. The beginning of the narrow downward-running preorbital column is received, which in front locks the orbital and with which the hind end of the preorbital forms with the jugal extension together. The latter is limited above by the long preorbital of the lacrymal.

Likewise, there is the right maxilla (Plate 11, Figure 4) of 21 cm length. In the center, it is 4 cm high, but the edge of the thin top margin is broken. The Alveolar point is 3 cm thick in the center. A few stumps of the tooth are still in it. The front end is outward curved in the longitudinal direction. That means that the head is broad in the back and the foremost part of the lip diminishes itself strongly.

The left premaxilla (Plate 11, Figure 7) is 8 cm in length at the Alveolar point, ascending at the symphysis 5 cm steeply and proceeds there over the nostril in a narrow branch backwards against the nasal. The nostril is approximately 3.5 cm from the Alveolar point. It has a vertical diameter of 3.5 cm and width would have been 5 cm long probably. The hind border of the nasal and septomaxillary is missing.

From the lower jaw (Plate 11, Figures 9-11) three parts are present: right rear parts of 23 cm length and 7.5 cm height, from articulare to suprangulare and angulare, then a left tooth-bearing dental without point of 21 cm length. Long dental piece is from a smaller individual than the others. All teeth are of uniform size. Their points are sharply curved backwards. Between suprangulare and angulare is an oval side-opening. The prearticular, however, is further forward.

Skull Reconstruction (Plate 12, Figure 1) : These skull remains well enable the whole skull to be reconstructed. The back of the head up to the center is broad, and is laterally strongly-sharpened in the front part. It is my estimate that it is 47 cm long, 17 cm high in the back, and 25 cm wide at the temporo-mandibular joint. A triangular orbital approximately 8 cm in height results, by, framed by two narrow bone columns, one recessed from the rear an infratemporal opening, and one perhaps 12 cm for a long preorbital opening. The upper delimitation of the orbital remains uncertain. The angle between postorbital and frontal can hardly be replaced by postfrontal since it must itself form the lacrymal out of those. Also the lateral edge of the nasal remains uncertain. The shape of the preorbital opening must have been as long as the long lacrymal, but the rear end is unknown.

Vertebral Column : Present are 25 presacral vertebrae, 2 sacral vertebrae, and the first 4 caudal vertebrae. The first 7 vertebrae belong to the neck. The vertebral bodies are 3.5 cm long and likewise high and are clearly amphicoelous; only in the front trunk region are some 4 cm long. The atlas body is a cone of 1 cm length and 2 cm height (Plate 13, Figure 1). The epistropheus is 4 cm long and has a steeply rising broad thorn extension of 11 cm height. The spinous processes of the neck vertebrae rise up 6 cm over the postzygapophysis (epistropheus only 5 cm) and are narrow, only 2 to 2.5 cm wide. The zygapophysis with diagonally standing facets is strongly developed. The prezygapophysis is the latter, and has sharp corners above in the front and back. The rather short transverse extension is arranged diagonally downward; it sets completely in front under the prezygapophysis. The parapophysal articulation surface is completely flat in front at the center (Plate 13, Figures 2-4).

The front dorsal vertebrae - beginning with the 8th (Plate 13, Figure 5) - differ only a little from the cervical vertebrae. The narrow spinous process is clearly thickened above, the zygapophysis stands more highly over the center. The posterior edge of the diapophysis changes into the bend of the lateral edge of the postzygapophysis. In particular, however, on the 8th through 12th vertebrae (Plate 13, Figures 5-8; Plate 14, Figures 2-6) a new small articulation surface originates under the outer margin of the diapophysis for a special small point of the rib between the two proximal fork branches. The edge connects diapophysis and parapophysis at the 8th vertebra is still completely weak; however, the 9th through 12th strengthen it and it disappears again with the process in further vertebrae lying backwards. On the 9th vertebra the spinous process becomes somewhat broader above with sharp corners in the front and back. By the 17th vertebra, it is already above 3.2 cm wide and 4 cm at the 19th. Then it again diminishes, with 22nd being 3 cm wide, and the 25th only 2.1 cm. With the disappearing of the third articulation surface for the rib, the parapophysis also moves ever higher at the front edge of the vertebra, and almost reaches the diapophysis by the 22nd vertebra, then disappears completely. At the 25th vertebra, the diapophysis is nearly completely rudimentary because of the front edge.

The two sacral vertebrae (Plate 13, Figures 15, 16) are each 3 cm long and 3.5 cm across the front. Both sacral ribs are 3.5 cm long, constricted in the center, and the distals are broad; the first 3.5 cm, the second 3 cm. The sacral ribs of the first vertebra sit at the center, those of the second to the front of the center.

Only the first four vertebrae from the tail are present. The 2nd caudal vertebra (Plate 13, Figure 17) is 3.5 cm long and 3 cm high; with the neural arch and spinous process, it is 9.5 cm high, the spinous process being 2.5 cm wide. The zygapophysis is weaker than in dorsal vertebrae. There is little strengthening the transverse process, originating from the center below the neural channel and running horizontally 1.5 cm (incompletely).

Incomplete fragments (1.5-2 mm at most) of gastral elements (Plate 14, Figure 6x) are present.

Chest-Pectoral Girdle : The left scapula (Plate 14, Figure 10) is relatively short and compact, length 20 cm, proximal width 11 cm, center width 5 cm, and at the beveled upper end 10 cm. The corresponding coracoid (Plate 14, Figure 10) is 11.8 cm high and 7.5 cm wide. The outline is oval-shaped. 2 cm of the scapular margin is perforated. The interclavicle (Plate 14, Figure 7) is over 16 cm long, both terminal edges incomplete. Their proximal width is more than 3 cm (perhaps, however, more than doubling as much). An interclavicle from a very young animal is also present (Plate 14, Figure 8), 9 cm in length widening itself evenly up to the distal end. A left clavicle (Plate 14, Figure 9), the lateral end of which is incomplete, has at the medial end a 4 cm-long flattened piece 13 cm wide, bent slightly in accordance with the rib-like structure, measuring only 8 to 9 mm in diameter.

The right humerus (Plate 14, Figure 11) is short, but proximal and distal ends very broad. The length is 16.5 cm, proximal width 10.5 cm, and distal width 9 cm. The diameter in the center is only 2.5 cm. The angle of both ends is moderate. The processus lateralis has a 6 cm axial length. A small lateral projection is on the distal end.

The radius (Plate 14, Figure 13) is 13.5 cm long. Proximally end is nearly round in cross-section, but the distal is much widened. At the proximal end, the greatest diameter is 3.2 cm, while the distal end is 4.8 cm wide and 2 cm thick. The ulna (Plate 14, Figure 12) is 14.5 cm long, proximal 5.2 to 3 cm, and distal 3 cm throughout.

The hand is small and very slender.

The pelvis (Plate 15, Figure 1) is not reminiscent of *Erythrosuchus*. The ilium with triangular acetabulum has a long posterior point and barely any suggestion of an anterior point. It is 12.5 cm high, and in the acetabulum it is 11.5 cm wide. The acetabulum is 8 cm high. Above it the ilium is constricted to 6 cm in width. The length of the dorsal margin measures up to 15 cm. The posterior point rises from the constriction 8 cm to the rear. The ischium, an oblong, broad plate, is 19 cm long, with proximal 12 cm and distal 6 cm wide. The pubis is 12 cm long, possesses a large foramen, and is over 8 cm wide at the proximal and 5 cm at the distal. The lateral marginal length is 2 cm thick, the other one much thinner. The thicker lateral edge begins slightly before rising as a “shoulder” opposite the foramen.

The (left) femur (Plate 15, Figure 2) is 24 cm long and is slightly downward curved in the distal half. It is constructed in the same manner as *Erythrosuchus*. The lateral trochanter rises proximally 6 cm forward. There, the bone is 6 cm wide, and a broad pit adjacent to the trochanter is 2 cm deep. The center of the femur shaft has a diameter of 3.5 cm. Distally the bone becomes 9 cm wide, but the distal trochlea has a (sagittal) thickness of only 3 to 4 cm.

The (left) tibia (Plate 15, Figure 3) is 22 cm long, and has a proximal diameter of 7.5 to 4.5 cm. The shaft is 2.5 cm thick in the center. The distal end has diameters of 4.5 to 3 cm.

The (left) fibula (Plate 15, Figure 4) has a 23 cm front and 22 cm back length. It is proximally 4 cm wide and 1.5 cm thick, and distally 3.5 cm wide and 1 cm thick. It shows a slight S-shaped curvature.

From the foot, a few metatarsals (Plate 15, Figures 6-8) are present, having 5.5 and 4.5 cm lengths. A few phalanges (Plate 15, Figures 9-12) have 3.5, 2.7, 2, and 1.7 cm lengths.

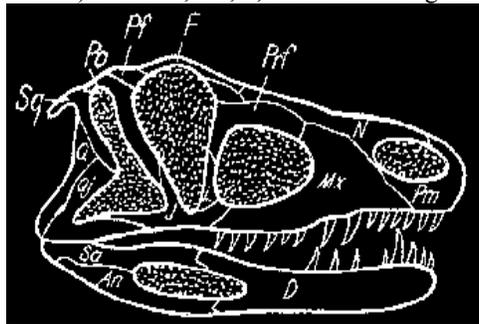


Illustration 1

Comparisons : If one first considers the skull (Plate 12, Figure 1), the broken infratemporal opening, the triangular orbital, and the long and large preorbital opening are noticeable. This form is found in extreme in the skull of *Ornithosuchus* (Illustration 1) from the lower Upper Triassic of Elgin, almost simultaneous. Here, the skull is also strongly-sharpened laterally in front. Also *Stagonolepis* (Illustration 2), also of Elgin, has – if one refrains from the presence of the upper temporal opening – a head typically similar to *Ornithosuchus* and *Vjushkovia*. But the Orenburg skull is not as highly-specialized, and the teeth

are only moderate in size. No other pseudosuchian skull is as similar to *Ornithosuchus* in construction as *Vjushkovia*, the Scottish form being built smaller and more delicately.

But in the skeleton (Plate 2, Figure 2), the difference is great.¹ The girdle and especially the limbs are much slimmer and higher in *Ornithosuchus*. Pectoral girdle, pelvis, and particularly the limbs are much more comparable with those of *Erythrosuchus* (Illustration 3). The scapula of *Vjushkovia* is more compact than that of *Erythrosuchus*. The ilium has a longer and stronger posterior point and a more reduced anterior point. The ischium is arranged more uniformly. The pubis in *Vjushkovia* proceeds less downward, is weaker, and forms a peculiar shape. The humerus and femur are similar, but weaker in *Vjushkovia*. The femur is constructed nearly identically. The vertebral column of *Vjushkovia* has shortened neck vertebrae, as is typical in most pseudosuchians.

¹ The three-way joint at the front of the dorsal ribs is singular.

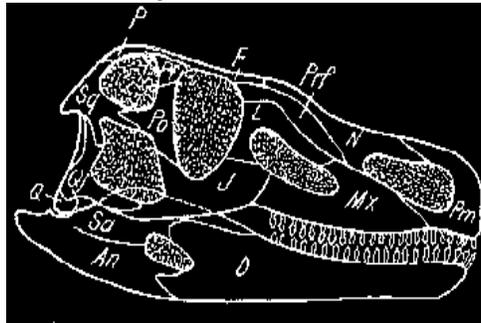


Illustration 2

Thus, one sees an advanced skull with a primitive skeleton. One could call *Vjushkovia* a derived erythrosuchid. The species belongs in a different family completely. Also, the South American *Prestosuchus* has a different skull and longer forelimbs. One will have to understand *Vjushkovia* as a representative of its own family, which will be called Vjushkoviidae, regarded as the forerunners of the

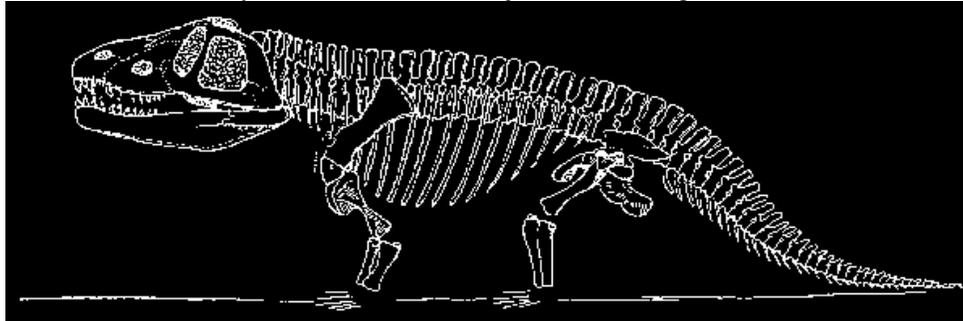


Illustration 3

ornithosuchids. The vertebral column of the raiisuchids with their short neck vertebrae are similar to *Vjushkovia*, but the limbs of most raiisuchids are more slender and more derived. *Stagonosuchus* from the East African Ruhuhu, Gebeit comes relatively close to *Vjushkovia*, despite the limbs being of a more slender type. Armour-plates of *Vjushkovia* are not well-known, as is also the case in raiisuchids. Most likely they are absent in *Vjushkovia* as in *Erythrosuchus*. The same is true for *Chasmatosuchus* and *Dongusia*, though they have few similarities in their vertebrae to *Vjushkovia*.

Vjushkovia is therefore a long-surviving primitive intercontinental pseudosuchian form, however, showing progression through the Upper Triassic in its skull.

References

- Broom, R.: Contributions to South African vertebrate paleontology. 1. On the remains of *Erythrosuchus africanus* Broom. – Ann. S. Afr. Mus. 1, 187-195, 1906.
 - , - On the South African pseudosuchian *Euparkeria* and allied genera. – Proc. Zool. Soc., 619-633. London 1913
 - , - On some South African pseudosuchians. (*Chasmatosaurus*.) – Ann. Natal Mus. 7, 55-59, 1932.

- , - A new primitive protorosauroid reptile (*Elaphrosuchus.*) – Ann. Transvaal Mus. 20, 343-346, 1946.
 Huene, F. von: Ein großer Stagonolepide aus der jüngeren Trias Ostafrikas. (*Stagonosuchus.*) – N. Jb. Miner. etc., Beil.-Bd. 80, 264-278, 1938.
 - , - Eine Reptilfauna aus der ältesten Trias Nordrußlands. – N. Jb. Miner. etc., Beil.-Bd. 84, 1-23, 1940.
 - , - Die fossilen Reptilien des südamerikanischen Gondwanalandes. (*Prestosuchus, Radinosuchus, Hoplitosuchus, Rauisuchus, Procerosuchus.*) – 161-246, München (Beck) 1935-1942
 - , - Paläontologie und Phylogenie der Niederen Tetrapoden. – 140-156, Jena (Fischer) 1956.
 Newton, E.T.: Reptiles from the Elgin sandstone. Description of two new genera. (*Erpetosuchus, Ornithosuchus.*) – Phil. Trans. R. Soc. London 185, 573-607, 1894.

Plate Explanations

Plate 11

All illustrations ½ natural size

- Fig. 1. Skull roof in dorsal view; parietal, postorbital, frontal, nasal connected.
 Fig. 2. Posterior view of skull remains; parietal, supraoccipital, opisthotica, exoccipital, condyle, and seen among them in reduced progression are the skull base and so on.
 Fig. 3. Right prefrontale and part of the lachrymal.
 Fig. 4. Right maxilla; a in lateral view, b in dorsal view.
 Fig. 5. Left quadratojugal in lateral view.
 Fig. 6. Right jugal in lateral view.
 Fig. 7. Left premaxilla in lateral view.
 Fig. 8. Right quadrate; a in lateral view, b upper edge in dorsal view, c distal joint surface
 Fig. 9. Posterior half of right dentary in medial view.
 Fig. 10. Front part of left dentary in lateral view.
 Fig. 11. Whole of left dentary in lateral view.

Plate 12

- Fig. 1. Reconstruction of lateral view of skull restored in ½ natural size.
 Fig. 2. Reconstruction of whole skeleton in 1/10 natural size.

Plate 13

All illustrations ½ natural size.

- Fig. 1. Epistropheus with atlas body from left; b dorsal view.
 Fig. 2. Neck vertebra 3 from left.
 Fig. 3. Neck vertebra 6 from left.
 Fig. 4. Neck vertebra 7 from left.
 Fig. 5. 8th presacral vertebra; a from left, b anterior view.
 Fig. 6. 9th presacral vertebra from right.
 Fig. 7. 10th presacral vertebra; a from right, b posterior view.
 Fig. 8. 12th presacral vertebra from left.
 Fig. 9. 13th presacral vertebra from right.
 Fig. 10. 15th presacral vertebra from right.
 Fig. 11. 17th presacral vertebra from right; b anterior view.
 Fig. 12. 19th presacral vertebra from right; b anterior view.
 Fig. 13. 22nd presacral vertebra from left.
 Fig. 14. 25th presacral vertebra from right; b posterior view.
 Fig. 15. 1st sacral vertebra in anterior view; b ventral view.
 Fig. 16. 2nd sacral vertebra in ventral view.
 Fig. 17. 2nd caudal vertebra from left; b posterior view.

Plate 14

All illustrations ½ natural size.

- Fig. 1. Cervical ribs in two positions.
 Fig. 2. Right rib from 8th presacral vertebra in medial view.
 Fig. 3. Right rib from 9th presacral vertebra in medial view, as well as upper view.
 Fig. 4. Right rib from 11th presacral vertebra in lateral view, with joint surface.

- Fig. 5. Left rib from 12th presacral vertebra in lateral view, with joint surface.
- Fig. 6. Right middle dorsal rib in lateral view, with joint surface.
- Fig. 6x. Fragment of gastralia.
- Fig. 7. Interclavicle in ventral view, with curvature line.
- Fig. 8. Nearly complete interclavicle from a young individual.
- Fig. 9. Half of clavicle with cross-section.
- Fig. 10. Left scapula and coracoid in lateral view.
- Fig. 11. Right humerus in posterior view with dorsal view.
- Fig. 12. Right ulna in lateral view with proximal outline.
- Fig. 13. Right radius with ends restored.

Plate 15

All illustrations ½ natural size.

- Fig. 1. Left half of pelvis in lateral view; b Pubis in anterior view; c Pubis in proximal view.
- Fig. 2. Left femur; a anterior view with ends shown, b posterior view.
- Fig. 3. Left tibia with ends shown.
- Fig. 4. Left fibula with ends shown.
- Fig. 5. Fibula from young specimen.
- Figs. 6, 7, and 8 Three metatarsals with proximal ends shown.
- Figs. 9-12 Phalanges from the foot.

* Translated from Huene, F. von, 1960. Ein grosser Pseudosuchier aus der Orenburger Trias. *Palaeontographica Abteilung A*, 114: 105-111, Plates 11-15. Translated by Jason W. Noble, 2007.