



### The Pterosaur Database

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The original paper is in Russian and it has been translated here to give the general gist of the content. This is not an academically accurate translation.

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#### NOTE ABOUT A PTEROSAUR FROM THE JURA MOUNTAINS OF KARATAU

The first reliable account about the discovery of a pterosaur within the limits of the USSR was made by N. N. Bogolyubov in 1914, when he described the vertebra of *Ornithostoma orientalis* Bogol. from the Senonian of the Saratov of Guberniia<sup>1</sup>.

In 1933, in the Palaeo-zoological Institute of the Academy of Sciences of the USSR, M. A. Vedenyapinyan received a fossil of the pterosaur (Fig. 1 and table.I) from the sediments referred to as the paper schists of Kazakhstan, by Bolypinstvom, which the researchers referred to the upper Jurassic.

The fossil was found in the Karatau Mountains, near Der. Mikhaylovki (Kochkarata), in the Chayanovskoye province of the Chimkent region, Kazakhstan. It is a slab of schist with the remains of the pterosaur preserved on it. Unfortunately, these remains of bones are dissociated and disarticulated. There is no doubt whatever, that they are definitely *Pterosaurian*. The find is especially interesting in the sense that the form of skull is similar to *Anurognathus ammoni* Döderlein, being characterized by the similar nature and form of the teeth.

The described remains relate, evidently, to the suborder *Rhamphorhynchoidea* Pleininger (*Pterodermata* Seeley) and, probably, to family the *Rhamphorhynchidae*.

I propose for them the new name *Batrachognathus volans* n. g. n. sp.

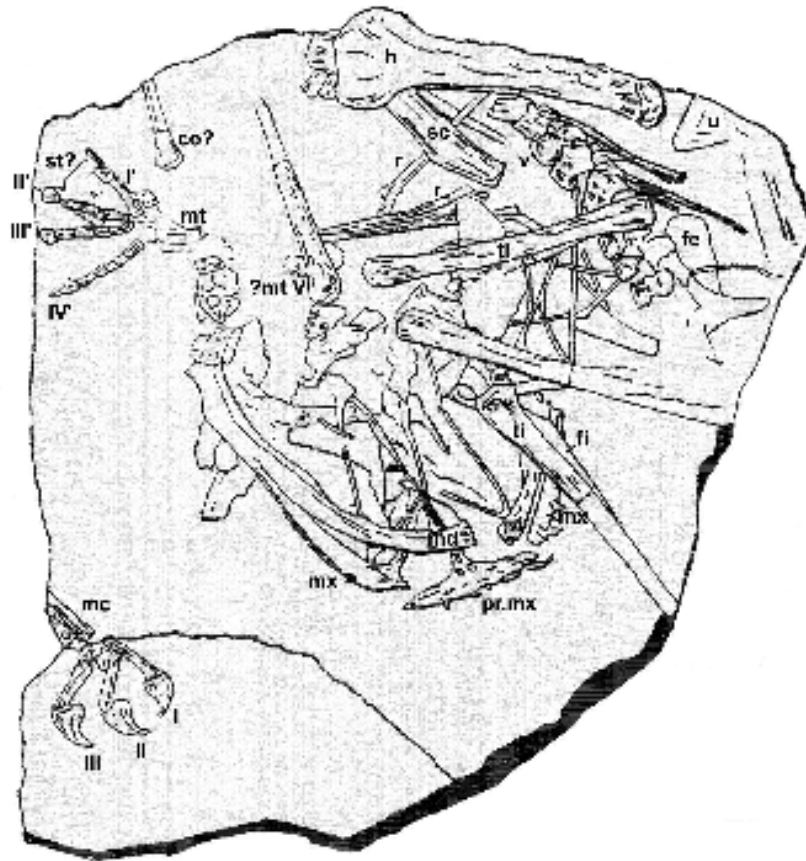
Order **Pterosauria**

Family ***Rhamphorhynchidae***

*Batrachognathus volans* n. g. n. sp.

**Skull.** Near complete remains of the disassociated skull are located in the middle of the slab, in ventral aspect. Its outlines are given by the curved lower and upper jaws. The left mandible of lower jaw is seen to be the most complete bone and it is almost uniform in width, and free at the distal end, evidently, not fused with the right branch, similar to that observed in *Campylognathus*. There are no sutures observed at the end of the forward section of the snout. In terms of this

information, the described fossil is notably different from *Rhamphorhynchus*. The right mandible of the lower jaw is visible in the fossil only in its distal end. Remaining parts are hidden firstly under the tibia and fibula, and then under other bones.



*Batrachognathus volans* n. g. n. sp. No. 52-2

Examined specimen. key: pr. mx - praemaxillare; mx - maxillare; md - lower jaw; v - vertebrae; r - ribs; h - humerus; co? - coracoideum?; sc - shoulder blade; u - ulna; mc - metacarpalia; st? - sternum?; I, II, III - the first, the second and third fingers of anterior extremity; fe - femur; ti - tibia; fi - fibula; mt - metatarsalia; I', II', III', IV', V' - the first, the second, the third, the fourth and the fifth the fingers of the rear extremity.

The teeth in the lower jaw are hidden in this specimen, as a result of its position. Undoubtedly they were present, as the dental apparatus indicates, being well preserved in the upper jaw. The branches of this latter are also curved and much better preserved on the left side, than on the right.

The bone taken to be the intermaxillary is separate in this species, T-shaped in form with teeth curved at the ends. There are three teeth on each branch. The very wide and blunt front end of the intermaxillary bone resembles the corresponding bone in *Anura*. The left branch of the upper jaw is seen ventrally, showing eight teeth; so the total number of teeth in the jaw must be at least 11.

A number of teeth in the right ramus of the upper jaw cannot be clearly observed; in partial exposure 3 – 4 teeth are seen. The rest are hidden beneath other bones of the skeleton.

These teeth are conical, with thin curved bent tips, curving backwards; they are located on the outer edge of the jaw. There are approximately 4 teeth in a 10mm jaw section.

The length of the lower jaw, measured along the chord of the major arc (external), - 48mm.

With the same approximation, and the length of skull is somewhat less than the length of the skull of pigeon, taken to be about 52mm.

Concerning the remaining parts of the skull, the study cannot presently be considered final. It appears that amongst the skull there is a long, square bone, possibly basioccipital with the vertebral condyle. The position of the other bones is still unclear. Clearly, the restoration of the skull of *Batrachognathus* is only tentative and detailed comparison with the skulls of other pterosaurs is needed. It is possible, however, with confidence to say, that in form and sizes it was close to *Anurognathus*, differing from it in the nature of its teeth, thin and curved at the ends, with more teeth present in *Batrachognathus*.

**Vertebrae.** The vertebral column was not fully preserved in the fossil.

**Cervical vertebrae.** Observed near the proximal end of the lower jaw are the remains of the first cervical vertebrae. These remnants in the specimen lay across the metacarpals, leaning on them and extending to the left and upward on the specimen completely obscuring their imprints.

Usually in *Pterosauria* there are 7 or 8 (in *Pteranodon* 9) cervical vertebrae.

**Spinal vertebrae.** Nine vertebrae, linked together in sequence, located in the upper right area of the specimen, well preserved, they can be considered spinal. The first is poorly preserved, as is the last one. They are very strong, at the longitudinally wide and low crests of the dorsal processes, which curve backwards. The centra of these vertebrae are solid; they are longer in length, than in height.

The number of vertebrae observed in *Anurognathus ammoni*, Döderlein, it is equal to 36: from them 8 neck, 10 spinal, 2 lumbar, 5 sacral and 11 tailed.

It is possible, evidently, with confidence to count, that the vertebrae observed in the specimen do not exceed 12 in number, the identifiable vertebrae mainly relating to the spinal.

The length of the body in *Anurognathus*, Döderlein, is equal to 45mm. This length was, clearly shorter than the length of the body in *Batrachognathus*, since already the length of 9 vertebrae of the latter measures 42mm. The subsequent following vertebrae which were not preserved are clearly impossible to predict.

It is necessary to take into consideration, that the very closely observed number of vertebrae must follow two lumbar and sacral vertebrae. The number of latter in *Rhamphorhynchoidea* occurs from 3 to 5, and for all *Pterosauria* from 3 to 6.

The vertebrae of the tail are impossible to distinguish thus far, also, since they were not preserved in the specimen, their nature, and the dimensions of tail remain obscure. It is very probably however, that the tail in the described form was also short, being similar to *Anurognathus*.

It is possibly that a more detailed study of the region of the slab will make it possible to resolve this question.

**Ribs.** The remainders of ribs are concentrated in by right upper area of the slab in the region of the vertebral column. Among them can be counted at least 12 individual ribs, which corresponds to 6 thoracic vertebrae; similar to that observed in *Dorygnathus*, moreover the longest is the 4<sup>th</sup> rib.

These ribs are located as follows: one of them, with the proximal end in the form of an imprint, is observed downward, to the left from the humerus, being obscured in the centre by the scapula. Three ribs together (the proximal end was preserved in each case) are located in the upper area, parallel to the upper tibia. Three ribs, crossing over, are located between the humerus, scapula and by the spine. Three opposite ribs join with the spine, extending from it.

One small rib is located at the distal end of the scapula and, possibly, one additional rib is observed among the attached ribs, being located higher than the vertebral column. Thus in this species probably, a total of twelve ribs were preserved. To distinguish them in their order, however, is very difficult, but, it seems, the first of them appears in the first position. The length of this rib is 28mm.

The remainder, besides those ribs indicated, are not clear. They are located in the region of the rear end of the spine. Some of these ribs are relatively straight whilst others are strongly curved. The latter may be the parasternal (abdominal) ribs.

**Shoulder girdle. Scapula.** This long flat bone, in the specimen is located in the distal part under the humerus; it is probably the blade (scapula) of the left side. The visible part is flat, weakly expanding at first, and then reducing, acquiring a trapezoidal outline to the ventral end. Its length is 32.3mm.

**Coracoid** (?). Upwards and to the left from scapula in the species is observed the suppositional fragment of a Coracoid, in the form of its proximal part, by very similar with coracoid in *Dorygnathus* and *Campylognathus*. The distal end of this bone is broken, and only the partial imprint was preserved in the specimen. The bone is rod-shaped, the proximal end a little widened. The length of the fragment of the coracoid is 12mm. The width of the proximal end is 3.3mm

**Sternum** (?). To the left in the specimen, below the first and the second phalanges of the pes, is observed what appears to be the sternum (?).

The form of this bone is clearly trapezoidal, it is elongated being widened at its rear part and narrowed to the anterior. The rear end is rounded in the centre, displays flanges in the form of hollows along the sides. The bone is visible from the ventral side, being slightly convex. In the middle, on its surface, are observed two and, possibly, still the third protuberance of three-edged form. The forward edge of the sternum is under the phalanges, and it is partly destroyed. Nevertheless, under close examination, it is possible to expose its slightly rounded but angular side edge. Judging by the trapezoidal form, the sternum in the described form of *Pterosauria* from Kazakhstan is closer in its form to the sternum in some *Rhamphorhynchoidea* and it is completely different from the semicircular sterna, observed in *Pterodactyloidea* (*Pterodactylus*).

Concerning the *Rhamphorhynchoidea*, the sternum of the Kazakhstan pterosaurian differs greatly from the triangular sterna of *Tribelesodon* and *Dorygnathus*, than from the trapezoidal, but wider formed sterna in *Rhamphorhynchus* and *Campylognathus*. Its rear edge is similar to the corresponding edge on the sternum in *Dorygnathus*.

**Left humerus.** To the upper right, a very solid, wide bone is observed from above the specimen, the proximal end being partly damaged at the edge, this be considered as the left humerus. It is distally narrowed, it is slightly curved, and moreover this curvature is much weaker, than in the *Pterodactyloidea*. Length is 46.2mm. Width of the proximal end is 13.7mm; the width of the distal end is 6mm.

**Ulna.** Near the distal end of the humerus is seen the impression of the proximal end of the bone, in a form very similar to the ulna. The width of this end is 6.5mm.

A reliable imprint of the radius was not preserved.

**Metacarpalia.** Three elongated rod-shaped pieces of bone, damaged distally and located in the left lower part of the slab, represent the first three metacarpals (I, II, III), counting from right to left.

The fourth (IV) metacarpal was not preserved.

**Phalanges.** The first Finger with two phalanges (first longest phalanx and claw) is to the right located in the same position on the slab; to the left of it is the second finger with three phalanges (first short phalanx, the second - long and claw); the third finger consists, probably, of four phalanges (the first, short phalanx, by the displaced and covered third metacarpal, by the second - small, by the third - rod-shaped and claw). Claws - curves, with the grooves along the sides, strongly developed, deeper than the claws of rear extremity. The impression of the fourth (wing) finger is not preserved, since there are only parts of two-long bones showing, the length of these remain unclear.

It is not possible to extrapolate the length of the metacarpals as a result of their incomplete preservation.

The sizes of phalanges (in mm) are as follows:

Table 1.

Digit	I		II			III			
Phalanges	1	2	1	2	3	1	2	3	4
Length	9.7	5	2.7	8	6	Est. 2	2	8	6
Width at articular end	2	3.3	2	2	3.6	-	1	1.8	4

**The Pelvic Girdle.** There are no identified bones of the pelvis observed on the slab. It is probable, however, that a partial impression can be an observed in the right to corner of the slab near the last linked vertebra.

## Hind Limbs

**Femur.** To right of the slab, nearly parallel to the axis of the spinal column is an impression of a bone, which from its form and position can be interpreted as the proximal end of the femur, seen from the side. Its length is 23mm; the thickness of the distal end 6mm. This bone appears to be more solid than the humerus.

**Tibia and Fibula.** Above the right distal maxilla of the jaw are two bones, which I assume are the tibia and fibula. The first bone is larger, slightly curved, with similar thickness at both ends; when seen from the side edges, the bone is narrower. The fibula thins at the distal end.

Size of tibia is: length 42mm, thickness on proximal articulation approximately 5mm.

**Tarsals.** The bone of triangular form, partly hidden under the long phalanx (?) wing finger, is probably one of the tarsals

Other remains of the tarsals have not been found.

**Metatarsals** are represented, although in the form of impressions (large partials), mostly complete.

Metatarsals of the 1st to 4th toes were preserved in the form of the long and thin imprints of their distal parts; clearly visible at the base of phalanx is the claw. And only the obscure imprints of the proximal ends of one or two metatarsals are noticeable on the slab, continuation near the region of arrangement.

Metatarsal V of the wing finger was preserved as a fragment of the bone at the proximal end and in the form of an impression of the distal end.

The form of this bone, if I am not mistaken, resembles closely the form of metatarsal V, described by Döderlein for *Anurognathus ammoni*, that is, the bone is bottle shaped in outline at its base, also, with the narrow distal end (in the form of an imprint).

The phalanges were more or less fully preserved. The first (I) finger consists of 2 phalanges (long rod-shaped phalanx and claw), II - of three phalanges (shortened phalanx, long rod-shaped second phalanx and claw); III - of four phalanges (two short stubby bones, long rod-shaped phalanx and claw) and the IV - of five phalanges (three short stubby bones, rod-shaped phalanx and claw). Claws in the pes are less well developed, than in the manus.

Judging by my observations the remainder of metatarsal V is similar to the metatarsal V in *Anurognathus ammoni* Döderlein, one should expect that here are located the long laterally curved phalanges of the wing finger. Unfortunately, it is possible to assert with a certain confidence, that on the position of it, only the proximal part of the first rod-shaped long phalanx was preserved, located obliquely with respect to metatarsal V, and only in the form of an impression.

Thus a question about the form, length and direction of the wing finger remains only in conjectural comparison with the corresponding finger in *Anurognathus ammoni* Döderlein.

**The remainder of the leg.** Here pertaining supposedly to the distal end of the femur, protruding almost in the centre of the specimen slab, and the proximal end tibia and fibula, skewed and located in the middle of the right side of the specimen.

The distal part of the tibia was preserved here in the form of an imprint, evidently, to its end. Upwards and to the right next to tibia is seen the thin fibula, which extends distally a little further than half the tibia. The distally reduced end of the fibula was preserved only in the form of imprint. The dimensions of the whole tibia are equal to 42mm (21 + 21). The length of the fibula is not less than 26mm, i. e. it is more than half the tibia length. The sizes of some Pterosauria are given in table 2.

## PRELIMINARY CONCLUSIONS

In describing the remains of *Batrachognathus volans* n. g. n. sp. they are most closely related to *Anurognathus ammoni* Döderlein and they probably relate to the *Rhamphorhynchoidea*, if it is not subsequently found that they should be put into the special suborder together with *Anurognathus* Döderlein from the Upper Jurassic of Germany where both kinds have a skull form, rounded at the front without any beak extension, *Batrachognathus* is characterized as different from the other *Rhamphorhynchoidea* and, especially, *Pterodactyloidea* in having a high and narrow trapezoidal sternum

In the present preliminary note as yet there is no clarity with which to give the complete picture of the skull, or the reconstruction of the skeleton of this interesting representative of the order *Pterosauria*. Furthermore, it is impossible to make any conclusions about its lifestyle and flying ability.

Judging by the nature of its teeth, it is possible to make an assumption, that this animal was a coastal predator, most likely feeding on insects and small fish. At this locality these organisms are frequently found in these deposits.

It is extremely interesting to note that the appearance of pterosaurs from the Upper Jurassic of Asia conform closely to those from Germany in Europe, being very similar in their nature and quantity of teeth.

Table 2. Specimen dimensions (length in mm) of some Pterosauria (from Döderlein with additions for *Batrachognathus*)

No. pp	Forms	Skull	Humerus	Metacarpus	I – III phalanx	Femur	Tibia	Longest foot phalanx
1	<i>Dimorphodon</i> <i>Macronyx</i>	222	87	41	27, 36, 50	86	132	32
2	<i>Dorygnathus</i> <i>banthensis</i>	149	63	31	22, 31, 40	52	69	36
3	<i>Scaphognathus</i> <i>crassirostris</i>	115	50	27	23, 27, 33	53	-	-
4	<i>Ramphorhynchus</i> <i>longicaudatus</i>	34	15	10	6, 8, 11.5	12	15	5
5	<i>Ramphorhynchus</i> <i>gemmingi</i>	123	39	19	14, 17, 19	28	42	18
6	<i>Ramphorhynchus</i> <i>kokeni</i>	150	58	34	26, 34, 42	45	64	-
7	<i>Campylognathus</i> <i>liassicus</i>	80	42	18	-, -, 16	32	38	16
8	<i>Campylognathus</i> <i>kokeni</i>	130	68	32	-, -, -	69	88	38
9	<i>Anurognathus</i> <i>ammoni</i>	45	31	10.5	15, 16, 18	27	39	14
10	<i>Batrachognathus</i> <i>volans</i>	48	46.2	8	14, 16.7, 18	24	42	15

### BRIEF DIAGNOSIS OF KIND AND FORM

The skull is rounded from the front. Lower jaws are not fused at the symphysis. Teeth are conical with the thin curved ends, hooked distally. The number of teeth in the upper jaw is not less than 11. On elongation four teeth occupy 10mm. The length of the skull is almost 48mm. Scapula is narrow, oblong, and trapezoidal in outline towards the ventral end. The sternum appears to be high, narrow, and trapezoidal in form, rounded at the back, with flanges along the sides.

Humerus is short and powerful, with a strongly widened proximal end. The phalanges of first three fingers of the anterior extremity have strong curved claws, which are much larger than the claws of rear extremity. The femur is thinner and weaker than humerus. The distal end of the fibula is reduced. The phalanges of the hind limb are weaker than the forelimb. Supposedly the fifth phalanx of the leg is long and is bent backwards and outwards, as in *Anurognathus*. Spinal vertebrae are procoelous, they have a wide transverse process and low dorsal processes; the length of vertebrae is greater than their height. Anterior ribs are double headed, posterior single headed. Para-sternal ribs have been observed. The length of body is not less than 50mm.

Footnotes:

1. N. N. Bogolyubov. On the vertebra of pterodactylia from the upper-Cretaceous deposits of Saratov province. Annual of geology and mineralogy, Russia, vol. XVI, part. 1, pp. 1-7, 1914. In the same article it is brought to our attention, that in 1865 - 1868. E. I. Eykhval'd erroneously described the broken off supra-angular bone of ichthyosaurus from the sandstone at Kursk, by the name *Pterodactylus cuvieri* Bowerbank, probably, Cenomanian in age. Lethaea rossica, II, pp.. 1283 - 1285, XXXIX, fig. 8, 1865 - 1868.

LITERATURE

- Arthaber G. 1921. Studien über Flugsaurier auf Grund der Bearbeitung des Wiener Exemplares von *Dorygnathus banthensis*. Denkschr. Akad. Wien, Bd. XCVII.  
(with the list of extensive literature on *Pterosauria*)
- Doderlein L. 1923. *Anurognathus ammoni*, ein neuer Flugsaurier Sitzungsberichte d. math. – phys.. Klass d. Bayer. Akad. Wiss. München, Heft II.
- Owen R. 1870. The Reptilia of the Liassic formation, p.II. Mon. Palaeontogr. Soc. vol., XXIII.
- Plieninger F. 1895. *Campylognathus Zitteli*. Palaeontographica, Bd. XLI.
- Salee A. 1928. L'exemplaire de Louvain de *Dorygnathus banthensis*. Mém. Inst. Géol. Univ. de Louvain, vol. IV, fasc. IV.
- Wiman C. 1923. *Dorygnathus* und andere Flugsaurier. Bul. Geol. Inst. Upsala, vol. XIX.
- Zittel K. 1932. Text-book of Palaeontology, vol. II, revised by A. S. Woodward.

### key to plate 1

*Batrachognathus volans* n. g. n. sp. Upper Jurassic. Ridge of Karatau, der. Mikhaylovka. Koll. M. A. Vedenyapina, No. 52 - 2. Natural appearance.

