

On Ichthyosaur Remains from the Cretaceous of the Voronezh Region

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Abstract—A new ichthyosaur, *Platypterygius ochevi* sp. nov., from the Albian–Cenomanian of the Voronezh Region is described based on a partial forefin. It differs from congeners in the very large facet for the lageniformis on the humerus.

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INTRODUCTION

Remains of the globally distributed ichthyosaur genus *Platypterygius* occur in the Cretaceous of Russia and adjacent countries. They are usually confined to condensation horizons (phosphoritic horizons) of the Albian and Cenomanian stages and represented by isolated extremely rolled vertebral centers, fragmentary ribs and jaws, and, less frequently, by tooth crowns (Pervushov et al., 1999). The fragmentary nature of the material complicates exact identification and morphological examination. Relatively complete skeletal specimens of representatives of this genus have been recorded outside Russia (Broili, 1907; Kuhn, 1946; Romer, 1968; McGowan, 1972; Wade, 1984, 1990; Bardet, 1992; Fernandez and Aguirre-Urreta, 2005; Kear, 2005), but the Russian Cretaceous beds have yielded only three relatively complete specimens; *Platypterygius birjukovi* (Ochev et Efimov, 1985) and *P. bedengensis* (Efimov, 1997) from the Barremian and Hauterivian of the Ulyanovsk Region, respectively, and *P. bannovkensis* Arkhangelsky, 1998 from the Cenomanian of the Saratov Region (Ochev and Efimov, 1985; Efimov, 1997; Arkhangelsky, 1998). *P. kiprianoffi* (Romer, 1968) from the Albian–Cenomanian of the Belgorod and Kursk regions is represented only by fragmentary cranial and postcranial bones, and has not yet been thoroughly described (Kiprianoff, 1881; Romer, 1968).

Therefore, even incomplete specimens of *Platypterygius* deserve special attention. In this connection, an incomplete ichthyosaur skeleton found in the spring of 1984 during educational field work for students of the Geological Faculty of Voronezh State University

(VGU) is of significant interest (Koval' and Sirotnin, 2001). The bones were found by employees of the Department of General and Historical Geology of VGU in a sand quarry (Semiluki locality) in the valley of the right bank of the Veduga River (close to the Voronezh–Semiluki highway), 4 km north of the town of Semiluki of the Voronezh Region. Many bones were in situ, with slight displacement relative to their natural positions in the skeleton. Some specimens were collected in debris.

Based on the lithological characteristics of the respective interval of the section in this region, geologists from Voronezh have shown that the bone material in question comes from Albian–Cenomanian glauconitic–quartz sand. This conclusion is supported by the presence of the foraminifers *Ammobaculites agglutinans* Mjatl., *Haplophragmoides nonioninoides* (Reuss), *Trochammina dampelae* Mjatl., *Tritaxia pyramidata* Reuss, and *Glomospirella gaultina* (Berthelin), which are characteristic of the Albian–Cenomanian (determined by N.Yu. Zozyrev from Saratov State University).

The bones are yellowish white, very weakly phosphatized, covered in places by a crust of fine-grained sandstone, with siliceous cement. During preparation, the sandstone is separated along with the superficial bone layer.

The material was transferred to the Zoological Institute of the Russian Academy of Sciences (ZIN).

Based on the characteristic structure of the forelimb, this skeleton is assigned to the ichthyosaur genus *Platypterygius*. The forefin described differs from late ichthyosaurs with three facets on the distal epiphysis of the humerus (*Ophthalmosaurus* Seeley, 1874, *Caypullisaurus* Fernandez, 1997, *Brachypterygius* Huene,

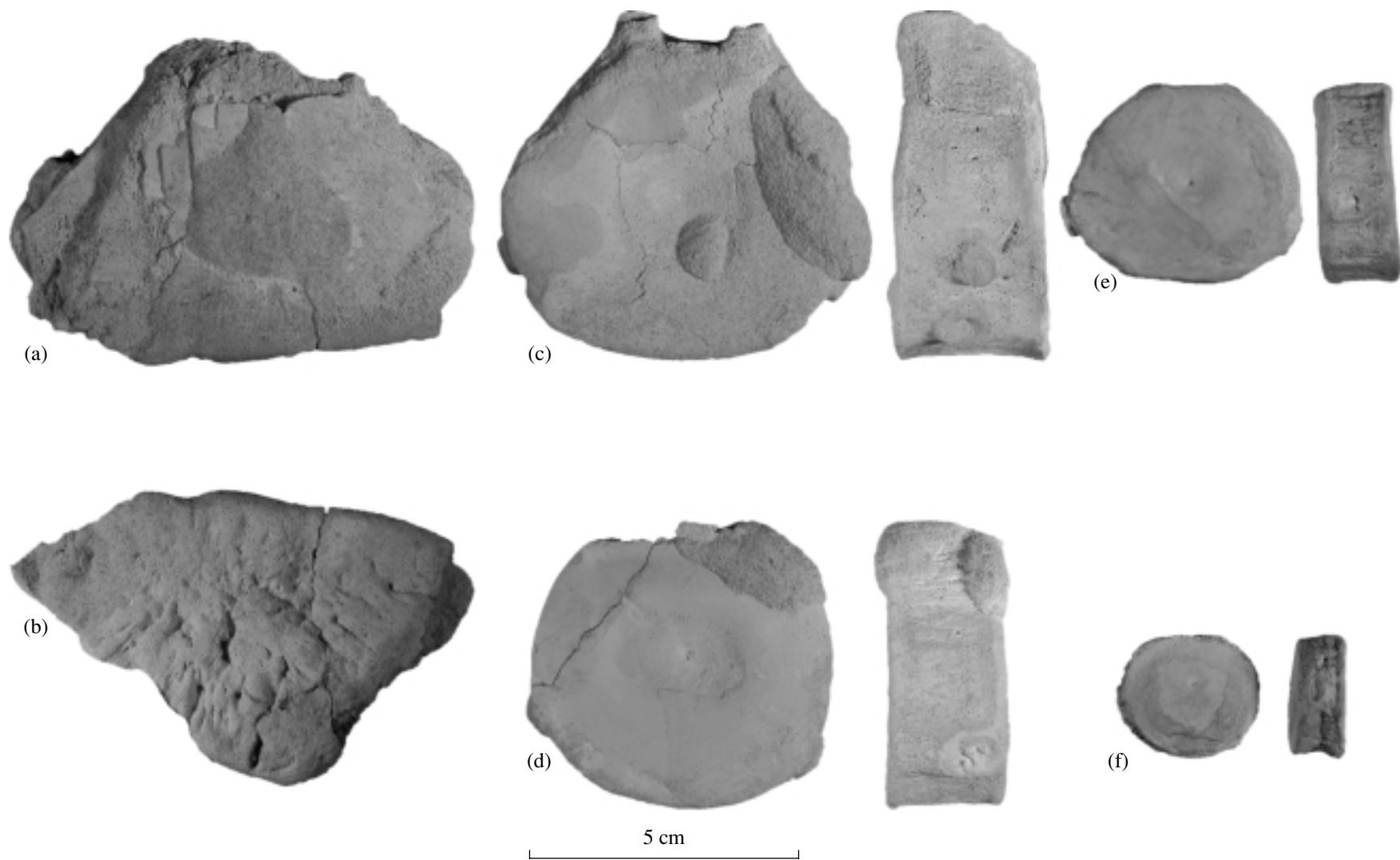


Fig. 1. *Platypterygius ochevi* sp. nov., holotype ZIN, ZIN PH 1/71: (a, b) coracoid fragment: (a) ventral surface, (b) medial articular surface; (c–f) vertebral centers: (c) posterior thoracic, (d) anterior caudal, and (e, f) posterior caudal.

1922, *Otschevia* Efimov, 1998, etc.) in the polygonal bones of the autopodium, while, in the genera listed, these bones are subspherical and subovate; this is typical of Jurassic ichthyosaurs. In addition, the new species differs from *Brachypterygius* in the size and arrangement of the distal facets of the humerus. The analysis of the fin structure has shown differences from the previously known representatives of *Platypterygius*; this provides a basis for the establishment of a new species, although the material described is incomplete.

SYSTEMATIC PALEONTOLOGY

Family *Platypterygiidae* Bardet, 1995

Genus *Platypterygius* Huene, 1922

Platypterygius ochevi Arkhangelsky, sp. nov.

E t y m o l o g y. The species is named in memory of the paleozoologist and professor of Saratov State University Vitalii Georgievich Ochev.

H o l o t y p e. ZIN, no. ZIN PH 1/71, fragments of cranial bones, incomplete coracoid, forelimbs, partial vertebral column, and rib fragments; Voronezh Region, Semilukskii District, sandy quarry 4 km north of the town of Semiluki, right bank of the Veduga River; Cretaceous, Albian–Cenomanian.

Description (Figs. 1, 2). The skull is represented by an incomplete opisthotic, fragments of the right angular and the left articular, many small fragments of the lower jaw, and two segments of the sclerotic ring.

In the vertebral column, 21 vertebral centers are preserved, some are in natural articulation (Figs. 1c–1f). Seven posterior thoracic vertebrae are pear-shaped in cross section. They are 58–61 mm high, 61–64 mm wide, and 24–26 mm long. The diapophyses and parapophyses are circular and circular-ovate. Seven anterior caudal vertebrae are preserved. They are 42–59 mm high, 46–59 mm wide, and 17–23 mm long. Towards the tail, the width-to-length ratio of the vertebral centers increases. Seven posterior caudal vertebrae are circular, 24–37 mm high, 26–44 mm wide, and 10–16 mm long.

The collection includes many small rib fragments.

The pectoral girdle is only represented by the medial part of the coracoid (Figs. 1a, 1b). Its medial facet is subtriangular and the apex is directed downwards. The facet is 80 mm long and 60 mm high. Judging from the fragment preserved, a complete coracoid was approximately 15–17 cm wide.

The right fin (Fig. 2) is almost completely preserved. The bones of the epipodium and five digits are

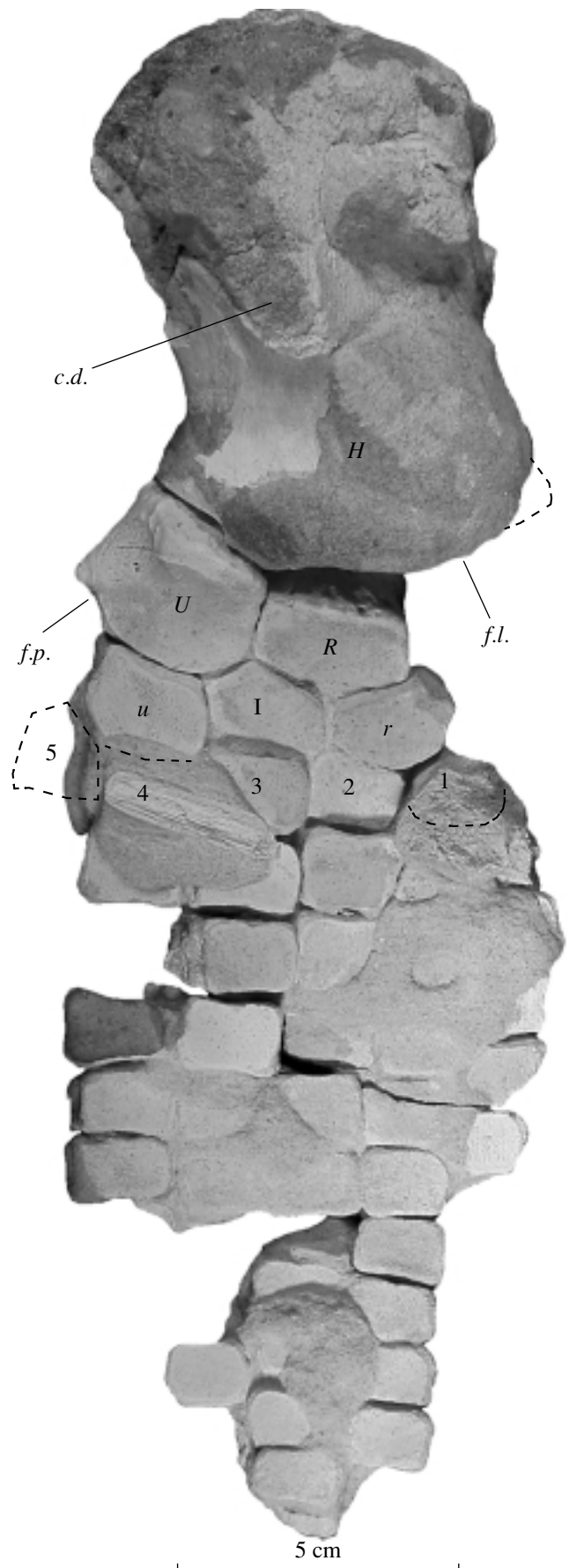


Fig. 2. *Platypterygius ochevi* sp. nov., holotype ZIN, ZIN PH 1/71, right forefin, dorsal surface. Designations: (c.d.) dorsal crest, (f.l.) facet for lageniformis, (f.p.) facet for the pisiform, (H) humerus, (I) intermedium, (R) radius, (r) radiale, (U) ulna, and (u) ulnare, (1–5) main digits.

in natural articulation. The humerus is 89 mm long. The proximal epiphysis is 69 mm wide and 43 mm high, the distal epiphysis is 61 mm wide. The epiphyses are very weakly twisted. The proximal epiphysis is irregularly trapezoidal in cross section. The anteroventral surface of the humerus has a poorly developed deltpectoral crest. A well developed dorsal crest extends obliquely anteriorly towards the facet for the radius; it is 50 mm long. The distal epiphysis of the humerus has three facets: for the basal element of the anterior supplementary digit (lageniformis) and for the radius and ulna. The facets are 28, 25, and 24 mm long, respectively.

The radius is articulated anteriorly with the lageniformis; anterodistally, medially, and distally, it adjoins the radiale, ulna, and intermedium, respectively. The radiale has two distal facets for the basal elements of the first and second main digits. The basal element of the second digit also has weak contact with the intermedium. The third digit is articulated with the intermedium, which has a wide distal facet for the basale distale. The fourth and fifth digits adjoin the ulnare, which also has a posterior facet for the pisiform. The posterior supplementary digit adjoins the ulna, which has a small posteroventral facet for the basal element of this digit (pisiform). The epipodial and autopodial elements are polygonal, transversely extended.

Thus, the forefin had at least seven digits. However, taking into account the incomplete preservation of the limb, it could have had a greater number of digits.

Measurements. The animal was approximately 3.6 m long.

Comparison. The new species differs from *P. kiprianoffi* in the presence of three facets on the distal epiphysis of the humerus and in the very weak twisting of the epiphyses. It differs from other congeners in the very large facet for the lageniformis on the humerus, probably, in the large humerus, and in the positions of digits in the limb.

Remarks. It is likely that the body of the ichthyosaur sank into aleuritic psammitic deposits in a depression in conditions of relatively extensive sedimentation. The bone remains lack traces of significant phosphatization, in contrast to what is typical of biogenic remains and abiogenic forms that remained for a long time on the surface of deposits of Late Cretaceous basins. The bones lack traces of activity of scavengers or lithophages, which are characteristic of accumulations of osteological material in the Upper Cretaceous beds of the Volga Region.

Sporadic occurrence on bone specimens of psammitic matter on siliceous cement corroborates the absence of an active hydrodynamic regime or gas exchange in the bottom layer and gradual decomposition of organic matter, soft and bone tissues. The absence of remains of benthic macrofauna or traces of lithophages, and the formation of siliceous nodules are

probably evidence of moderate water temperatures in the bottom zone; this provided good primary preservation of bone specimens.

The features of distribution of remains are apparently determined by two factors, the patterns of decomposition of corpses of marine reptiles and the influence of wave conditions on both the body and bones projecting near the deposit surface. The cranial bones were isolated from the vertebral column, which is found articulated with limb bones, which are preserved in natural articulation (this was partially promoted by siliceous cementation). Wave processes are possibly responsible for the crowded position of some vertebrae within the pelvic girdle, the distribution of cranial bones over the burial, the subundulate distribution of caudal vertebrae, and the dispersion of rib fragments over the bed of bone accumulation (they are scattered over limb bones and vertebrae).

Thus, this is a subautochthonal, probably condensed scattered burial.

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