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SOME TURTLE REMAINS FROM THE CRETACEOUS AND PALEOGENE OF VOLGOGRAD REGION, RUSSIA

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Fragmental remains of a chelosphargine *Teguliscapha*(?) sp. (Cenomanian), large sized Chelonioidea indet. (possibly protostegid) (Campanian), cheloniid Osteopyginae indet., as well as Trionychidae indet. and *Testudinata* gen. et sp. indet. 1 and 2 (Paleocene) are described from the Volgograd Region, Russia.

Key words: Chelosphargine, Protostegidae, Chelonioidea, Osteopyginae, Trionychidae, Cretaceous, Paleogene, Volgograd Region, Russia

INTRODUCTION

During the past decade interesting paleontological discoveries were made by one of us (A. Ya.) in the Cretaceous – Paleogene of the Volgograd Region, circum-Volga region in the central Russia. The finding of rare terrestrial and marine tetrapods are of special interest, because they were nearly totally unknown for this area previously. Among the most important discoveries were dentaries of the flying bird *Volgavis marina* Nessov et Yarkov, 1989, bones of the hesperornithiform bird *Hesperornis rossica* Nessov et Yarkov, 1993, a dentary fragment of the crocodile *Asiatosuchus volgensis* Efimov et Yarkov, 1993, bones of the gigantic sturgeon *Acipenserae gigantissimus* Nessov et Yarkov, 1997, bone fragments of pterosaurs, and various bones of diverse mosasaurs (Nessov and Yarkov, 1989, 1993; Nessov, 1990, 1997; Yarkov, 1993; Efimov and Yarkov, 1993). These new materials and taxa contribute much to our understanding of the ancient Cretaceous – Paleogene biotas of the Volga region. This paper is devoted to description of the turtle remains, the most rare marine tetrapods for the Cretaceous – Paleogene of the Russian Plain. The specimens reported here were collected by the second author in 1988 – 1990.

Collection abbreviation: ZISP) Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Paleoherpetological collection.

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List of localities bearing turtle materials described in this paper

1) Chukhonastovka, Kamyshin District, Volgograd Region, Russia. Upper Cretaceous (Cenomanian). The right(?) third or fifth costal and right posterolateral(?) peripheral of small sized (immature specimen?) *Teguliscapha* sp. (Protostegidae, Chelosphargine). Material collected by A. A. Yarkov in 1988.

2) Polunino 2, Ol'khov District, Volgograd Region, Russia. Quartz-glauconite sands and sandstone. Upper Cretaceous (Campanian). For locality description see Pervushov et al. (1999). The metapodial or phalanx, right dentary fragment, and costal fragment of Chelonioidea indet. Material collected by A. A. Yarkov in 1984 – 1985.

1) Karpovka, Gorodishche District, Volgograd Region, Russia. Green-gray quartz-glauconite sands with phosphorites within Saratov beds. Upper Paleocene (Thanetian). Shell fragments of cheloniid sea turtles (Efimov and Yarkov, 1993, p. 88). The fragmented right maxilla and premaxilla, fragment of left hyoplastron, two fragmented posterolateral (?) peripherals of Osteopyginae indet. (Cheloniidae). Nine shell fragments, including four pieces of costals of Trionychidae indet. Left sixth(?) costal of Testudines genus and species indet. 1. Neural of Testudines genus and species indet. 2. Material collected by A. A. Yarkov in 1990.

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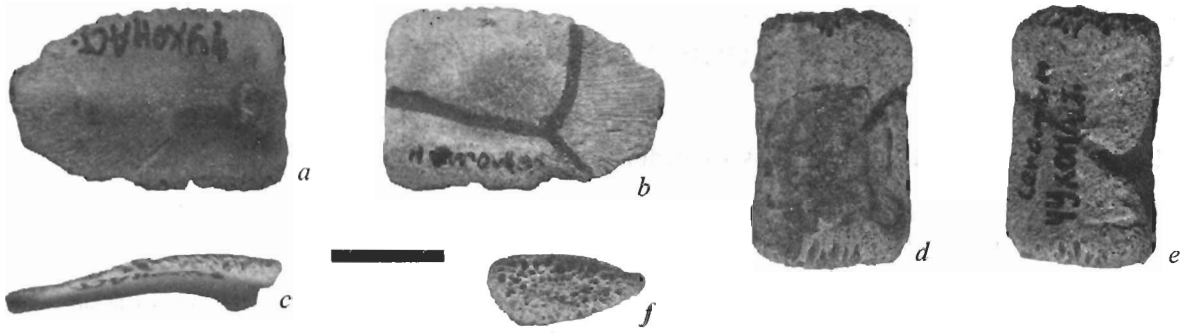

Fig. 1. Right(?) third or fifth costal, ZISP 1/22 (*a* – *c*) and right posterolateral(?) peripheral, ZISP 2/22 (*d* – *f*) of *Teguliscapha*(?) sp. in ventral (*a*, *e*), dorsal (*b*, *d*), anterior (*c*), and posterior (*f*) views. Chukhonastovka; upper Cretaceous (Cenomanian). Scale bar is 1 cm.

SYSTEMATIC PALEONTOLOGY

Order Testudines Linnaeus, 1766
Superfamily Chelonioidea Baur, 1893
Family Protostegidae Cope, 1889
Subfamily Chelospharginae Zangerl, 1953
***Teguliscapha* Nessov, 1988**
***Teguliscapha*(?) sp.**
Fig. 1

Material. ZISP 1/22 and 2/22, right(?) third or fifth costal and right posterolateral(?) peripheral. Chukhonastovka; upper Cretaceous (Cenomanian).

Description. The costal plate is subrectangular in shape, with rounded lateral margin. The maximal length of the preserved fragment is 24.0 mm, the width is 15.6 mm. This is a thin plate, maximal thickness is about 2.0 mm. The free rib end is broken off. On the dorsal surface there is a weakly defined intervertebral sulcus going from the midline of the medial margin midline laterally approximately up to one half of the plate length. After that it apparently divides into vertebroperipheral sulci, which, however, are hardly to trace. The dorsal surface is smooth. The rib head is relatively large, compressed mediolaterally. The free rib end on the preserved portion is quite a broad (7.0 mm), indicating that it was long and costoperipheral fontanelles were large.

The peripheral plate is narrow, its preserved width is 13.4 mm, length is 22.3 mm. Apparently the dorsomedial thin portion is lacking and the lateral margin is water polished. There is a weak sulcus at the lateral margin closer to the anterior end, which does not reach the medial margin. The hole for the rib end is closer to the posterior margin. Both surfaces of the plate are smooth.

Remarks. The costal is essentially the same as in *Teguliscapha rossica* Nessov, 1988 from the Albian-Cenomanian of Belgorod Province (Nessov, 1987, Fig. 4*d* and unpublished materials), differs only by smaller size. All known peripherals of *T. rossica* are noticeably larger than the peripheral described here. This difference is considered here as an ontogenetic variation. However, there is another chelospharginе turtle, known from the Cenomanian of Russian Plain, for which the carapace is still unknown. It is Chelospharginae? gen. et sp. indet. from Saratov, known from isolated dentaries only, and differing from *Teguliscapha* by the evidently shorter symphysis. The chelosphargine material from Chukhonastovka could belong to this new taxon so the assignment to the genus *Teguliscapha* is only tentative.

Superfamily Chelonioidea Baur, 1893
Chelonioidea indet.
Fig. 2

Material. ZISP 3/22, metapodial or phalanx; ZISP 4/22, right dentary fragment; ZISP 5/22, costal fragment. Polunino 2, upper Cretaceous (Campanian).

Description. *Dentary*. The dentary is almost complete, lacking the most anterior end and the posterior portion. The anterior portion forms a beak. The dentaries were not fused at the symphysis. The symphysis is rather long. The ventral (chin) shelf at the symphysis is only slightly wider than the dorsal one. The triturating surface is relatively wide, predominantly flat, with some convex emargination along the midline. The cutting edge of the dentary is not sharp. The tomial ridge is thin. The sulcus cartilaginis meckeli is relatively narrow and deep. The foramen alveolare inferius and foramen intermandibularis oralis are set well within the dentary, at the anterior ends of prominent notches. The bone surface is covered with numerous coarse nutritional pits, like on the dentary of *Protostega gigas* Cope, 1872 (Zangerl, 1953, Fig. 33).

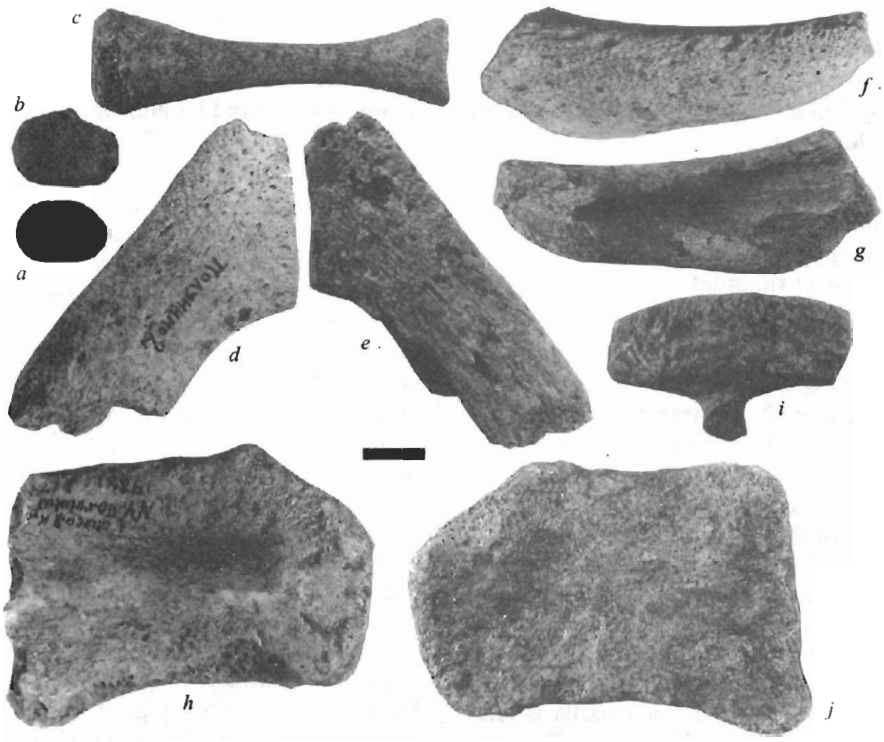

Fig. 2. Remains of Chelonioidea indet from Polunino 2, upper Cretaceous (Campanian). *a – c*) ZISP 3/22, metapodial or phalanx in distal (*a*), proximal (*b*), and lateral or medial (*c*) views; *d – g*) ZISP 4/22, right dentary fragment in ventral (*d*), dorsal (*e*), lateral (*f*), and medial (*g*) views; h-j) ZISP 5/22, left costal fragment in ventral (*h*), dorsal (*j*), and medial (*i*) views. Scale bar is 1 cm.

Limb bones. There is complete elongated metapodial or phalanx of II-V digit. Its length 57 mm. The bone is flattened mediolaterally. The proximal end is wider than the distal one. Both the articular surfaces are slightly concave, indicating that the finger was immobile. The bone is generally similar with the metapodials or phalanges in *Protostega gigas* (Wieland, 1906).

Carapace. There is a medial fragment of left second (less probably, fourth, or sixth) costal. The dorsal surface lacks scute sulci and slightly concave. The lacking of scute sulci on the fragment preserved possibly indicates that the vertebral scute was relatively wide. The plate is massive, considerably thickened at the medial margin (up to 14.2 mm) and elevated here. It looks like the carapace was keeled. The rib head is relatively weak, especially when compared with the massive costal bone, and shortened antero-posteriorly. It is situated quite distant from the medial plate margin. The rib shaft could be traced along the ventral surface of the costal. The medial surface bears two sutural facets, meeting at the angle of about 125°. The posterior surface possibly contacted with the posterior neural.

Remarks. The elongated metapodial or phalanx of immobile digit clearly come from the flipper of a specialized sea turtle. Such a specialization was independently acquired by advanced Protostegidae and Cheloniidae (Hirayama, 1998). The dentary is generally similar with dentaries in *Protostega* Cope, 1872, but it is more widened posteriorly, indicating that the skull was wider than in *Protostega*. The beaked snout and greatly reduced costals were cited as diagnostic features for Protosteginae by Zangerl (1953). Our turtle, if described elements are correctly associated, similar with Protosteginae in having a beak, but sharply differs in having unreduced and, moreover, thickened costals. However, in the latter respect the turtle described might be similar with *Santanachelys gaffneyi* Hirayama, 1998 from the Aptian-Albian of Brazil, the oldest known protostegid (Hirayama, 1998). Another similarity might be the presumed relatively wide vertebral scute. Possibly, the turtle from Polunino 2 could belong to a currently unrecognized group of relatively generalized and large sized protostegids. These would have evolved in the epicontinental Cretaceous sea of the Russian Plain in vicariance with the true Protosteginae of North America.

Unfortunately, our material does not allow us to check the synapomorphies listed for Protostegidae, Protosteginae, or any other group of sea turtles (e.g., Hirayama, 1994; Hooks, 1998). Thus we attribute the turtle to Chelonioidea indet.

Superfamily Chelonioidea Baur, 1893
Family Cheloniidae Gray, 1825
Subfamily Osteopyginae Zangerl, 1953
Osteopyginae gen. et sp. indet.
Figs. 3*a* – *e*, 4

Material. ZISP 6/22, fragmented right maxilla and premaxilla; ZISP 7/22, fragment of left hyoplastron; ZISP 8/22 and 9/22, two fragmented posterolateral (?) peripherals. Karpovka; upper Paleocene (Thanetian).

Description. *Premaxilla*. Only the right premaxilla is preserved. It shows the lateral contact with the maxilla. The suture is fused on the lateral surface, but visible on the ventral surface. The medial part of the bone is incomplete, so the medial contact with the opposing premaxilla could not be traced. The posterior border of the bone, contacting with the vomer, seems to be complete. If so, the premaxilla is relatively short anteroposteriorly. There are no foramina on the preserved dorsal surface. The ventral surface is convex anteroposteriorly. The bone is rather thick, its minimum height at the anterior end is 8.6 mm, the maximum height at the posterior end is 12.5 mm.

Maxilla. The nearly complete right maxilla is preserved. The bone lacks the posterior part of the horizontal (palatine) plate and upper part of the vertical plate. On the preserved fragment there are contacts with the premaxilla anteromedially, with the vomer medially, and with the palatine posteromedially. The ventral surface of the horizontal plate is concave transversely, with a distinct emargination at the anterior end, making the convex surface here and on the premaxilla. The ventral surface bears a number of distinct small and a few of larger pits for the blood vessels penetrating the rhamphotheca. These pits are not so evident on the lateral surface of the bone. The labial ridge is hardly sharp, nearly eliminating towards the anterior end. The horizontal plate is rather thick, its maximal thickness is 10.5, the minimal one is 6.7 mm. The maximal height of the preserved vertical plate is 24.5 mm, measured from the palate floor. The surface of the nasal cavity is smooth.

Carapace. There are two quite incomplete fragments of large robust posterolateral (?) peripherals. The bone surface is smooth.

Plastron. There is a medial portion of left hyoplastron only. This is a very massive bone, maximally thick anteromedially (up to 15.0 mm thick). Its posterior margin, contacting with the hypoplastron, is unusually rounded, not straight. The ventral surface is smooth, covered by numerous shallow nutritional pits. There is no trace of a horn sulcus on the fragment preserved.

Comparison. There are a few sea turtles with considerably developed secondary palate, all currently classified within the family Cheloniidae. They are late Cretaceous – Paleogene North American and European Osteopyginae (*Osteopygis* Cope, 1868, *Erquelinnesia* Dollo, 1887, and *Glossochelys* Seeley, 1871), advanced Paleogene Eurasiatic Eochelyinae (*Puppigerus* Cope, 1871, *Argillochelys* Lydekker, 1889, and *Tasbacka* Nessov, 1987), and two genera of Neogene — Recent Cheloniinae (*Chelonia* Bonaparte, 1800 and *Caretta* Rafinesque, 1814). The turtle described clearly differs from the eochelyines and cheloniines by the snout shape, which is shortened and rounded, not narrowed at the end. By the snout proportions it is closer to the osteopygines, more approximating condition of *Osteopygis emarginatus* Cope, 1868 (Gaffney, 1979, Fig. 198; Fastovsky, 1985, Fig. 4; Weems, 1988, Figs. 4, 11A – C). From *Erquelinnesia* it differs by more rounded snout end and possibly by shorter (antero-posteriorly) premaxillae, if its posterior end is completely preserved.

Remarks. The turtle described possibly represents a new genus of Osteopyginae (as was thought by L. A. Nessov, according to his label accompanying the specimen), or a new species of *Osteopygis*. We hope that future discoveries will provide us with more information on this interesting turtle.

The undoubted Osteopyginae are reported here for the first time for the territory of the USSR. This discovery is in line with the Zangerl's idea that osteopygines of the *Osteopygis* – *Erquelinnesia* line (toxochelyids in his classification) extended their range north-eastward across the Atlantic (to western Europe (Zangerl, 1971). Previously, osteopygines in Europe were known only from the early Eocene of England (*Glossochelys*) and Belgium (*Erquelinnesia*). The new discovery extends European range of the osteopygines up to the Volga region, eastern Europe.

Superfamily Trionychoidea Gray, 1870
Family Trionychidae Bell, 1828
Trionychidae indet.
Fig. 3*f*

Material. ZISP 10 – 18/22, nine shell fragments, including four pieces of costals. Karpovka; upper Paleocene (Thanetian).

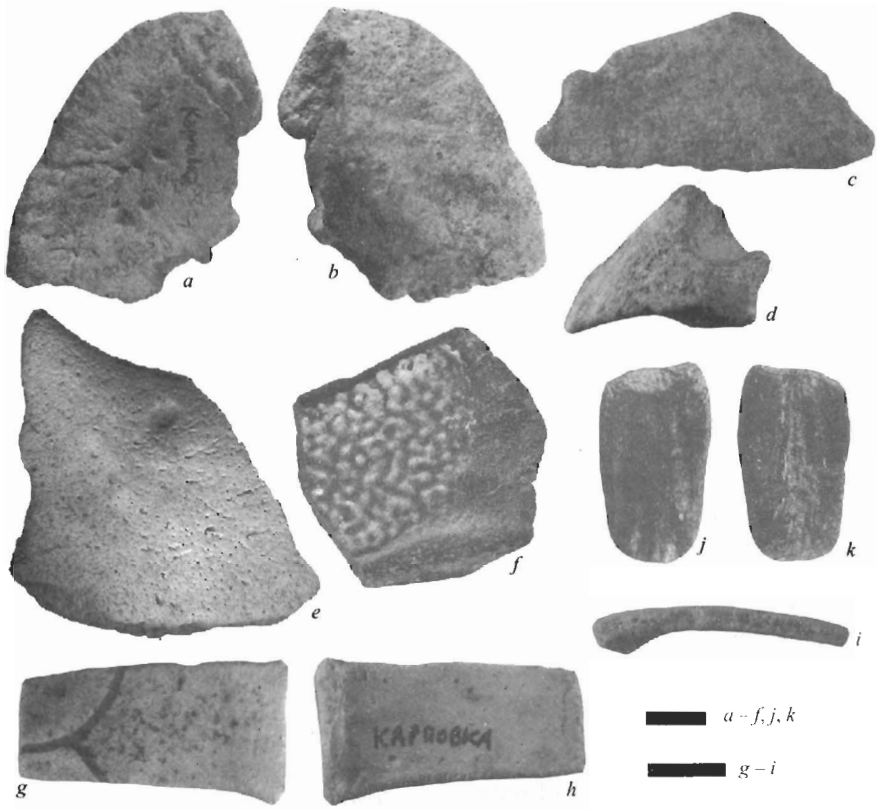

Fig. 3. Turtle remains from Karpovka, upper Paleocene (Thanetian). *a – d*) right maxilla and premaxilla of Osteopyginae indet., ZISP 6/22, in ventral (*a*), dorsal (*b*), lateral (*c*), and anterior (*d*) views; *e*) left hyoplastron fragment of Osteopyginae indet., ZISP 7/22, in ventral view; *f*) lateral end of costal plate of Trionychidae indet., ZISP 10/22, in dorsal view; *g – i*) left sixth(?) costal plate of Testudinata gen. et sp. indet. 1, ZISP 19/22, in dorsal (*g*), ventral (*h*), and anterior (*i*) views; *j – k*) neural plate of Testudinata gen. et sp. indet. 2, ZISP 20/22, in dorsal (*j*) and ventral (*k*) views. Scale bar is 1 cm.

Description. Shell fragments belong to quite a large trionychid. On the most complete costal fragment (Fig. 3*f*), the free (not ornamented) area is relatively broad. The pits are weakly excavated.

Remarks. The fragmentary nature of the trionychid material does not allow closer determination. Karpovka is the new locality of fossil trionychids for the territory of the USSR (see Kordikova, 1994 for review of localities).

Testudinata indet.
Genus and species indet. 1

Fig. 3*g – i*

Material. ZISP 19/22, left sixth(?) costal. Karpovka; upper Paleocene (Thanetian).

Description. The posterior (sixth?) costal lacks lateral portion. Its maximal width (at the medial margin) is 19.0 mm. The costal is wedge-shaped, unusual in having anteroposteriorly expanded and straight medial margin. The vertebral scute is relatively broad. The dorsal surface is smooth. The rib head is very weak. The rib shaft does not distinct along the

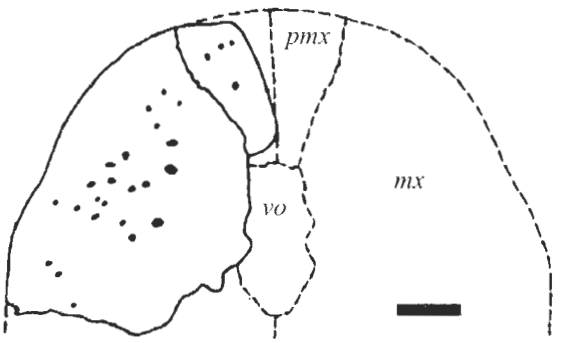

Fig. 4. Sketch restoration of the anterior snout region in Osteopyginae indet., ZISP 6/22, ventral view. Karpovka; upper Paleocene (Thanetian). *mx*) Maxilla, *pmx*) premaxilla, *vo*) vomer. Scale bar is 1 cm.

ventral surface of the plate. The plate is rather thin, its thickness at the lateral margin is 3.0 mm.

Remarks. The carapace of this turtle was relatively flat, i.e., this was a sea or fresh-water turtle. The turtle possibly had no neurals in the posterior part of the carapace. The costal described may belongs to an immature specimen of Osteopyginae gen. et sp. indet. described above from the same locality, but the known osteopygines have much narrower vertebral scutes.

Genus and species indet. 2

Fig. 3*j*, *k*

Material. ZISP 20/22, neural. Karpovka; upper Paleocene (Thanetian).

Description. The neural is complete. It is relatively large and narrow four-sided plate (length 32.5 mm, width 18.5 mm). The anterior margin is slightly incised. The dorsal surface bears two longitudinal depressions along the lateral margins. The medial portion is elevating towards the posterior end, where it bears a short (10.5 mm long) weakly developed keel. The plate is thicker at the posterior end (thickness 7.3 mm).

Remarks. The neural described is similar in general proportions with the keeled neurals of some carettochelyids, e.g., *Allaeochelys* Noulet, 1867 from the middle Eocene of France (Broin, 1977), but distinctly differs by presence of two longitudinal depressions and lack of the ornamentation. The presence of carettochelyids, cited previously for the Karpovka assemblage (Efimov and Yarkov, 1993, p. 88), cannot be supported by our materials from this site.

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