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

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Fragmentary remains of Cryptodira *incertae sedis* sp. 1 (dentary, scapular fragments, and neural; Rasstrigin 1, Maastrichtian), Cryptodira *incertae sedis* sp. 2 (fused epiplastra with two pairs of gular scutes; Bereslavka 1, Maastrichtian), Chelonioidea *incertae sedis* sp. 1 (frontal bone and carapace fragments; Polunino 2, Campanian), and Testudines indet. (phalanx; Loznoe, upper Paleocene) are described. Chelonioidea *incertae sedis* sp. 1 from Polunino 2 is similar to *Allopleuron* by lacking a prefrontal-postorbital contact, in having a interdigitating contact between costals and neurals, the loss of suprapygal-pygal contact, the reduction of horn sulci, and the possible development of the secondary bony palate (inferred from the rather long dentary symphysis). Three new localities for marine turtles (Cenomanian Solodcha and Paleocene Bereslavka 2a and 2b) are also indicated for the first time, but the material is insufficient for description.

Keywords: Testudines, Cretaceous, Paleogene, Volgograd Region.

INTRODUCTION

In the Lower Volga Region there are numerous localities of predominantly marine vertebrates of Late Cretaceous and Paleogene age. These deposits were formed in the near shore of the ancient epicontinental sea that covered the Russian Platform. In addition to numerous and diverse cartilaginous and bony fishes, these localities produce abundant, albeit fragmentary, remains of Mesozoic marine reptiles that include plesiosaurs and mosasaurs, and rare Mesozoic and Paleogene sea turtles and birds. Remains of terrestrial vertebrates are extremely rare and include bones of non-marine turtles, dinosaurs, and pterosaurs for the Late Cretaceous and non-marine turtles and crocodiles for the Paleogene. Many of these vertebrate fossils were collected by A. Yarkov over the past 20 years, and some of them were subsequently published (Nessov and Yarkov, 1989, 1993; Nessov, 1990, 1997; Yarkov, 1993, 2000; Efimov and Yarkov, 1993; Averianov and Yarkov, 2000, 2004, in press; Yarkov and Nessov, 2000; Popov and Yarkov, 2001).

In this report we describe some marine and terrestrial turtle remains from five localities in the Volgograd Region (Fig. 1). Three of these localities, with remains of sea turtles (Solodcha, Bereslavka 2a and 2b), were not mentioned in the published review of the Russian fossil sea turtles occurrences (Averianov, 2002).

Collection abbreviation. VGI, Museum of Natural History, Humanitarian Institute, Volzhskii, Volgograd Region, Russia.

LOCALITIES

Solodcha, Ol'khov District, Volgograd Region, Russia. The locality is situated on the Ilovlya River in the vicinity of Solodcha village, approximately 95 km North of Volgograd (49°41′ N 44°18′ E). Upper Cenomanian quartz-glauconite micaceous sands produced four very fragmentary costals of a sea turtle, cf. *Teguliscapha* sp., together with numerous shark teeth and remains of bony fishes. The rib heads resemble those of *Teguliscapha* by size, and are also relatively gracile and dorsoventrally compressed. Other details of these plates are similar to those of *Teguliscapha rossica* from the Albian-Cenomanian of Belgorod Region (Nessov, 1987; Averianov, 2002) and *Teguliscapha*(?) sp. from the Cenomanian of Chukhonastovka, Volgograd Region (Averianov and Yarkov, 2002).

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Polunino 2 (= Gora Lysaya), Ol'khov District, Volgograd Region, Russia. The locality is situated 3 km North-West of Polunino khutor, ~95 km North-West-North of Volgograd (49°40′ N 44°52′ E). Besides sea turtles, the Campanian quartz-glauconite sands and sandstones produce remains of crustaceans, pelecypods, sharks, chimeras, bony fishes, mosasaurs, plesiosaurs, crocodiles, dinosaurs(?), and pterosaurs (Yarkov, 2000). Averianov and Yarkov (2000, in press) described fragmentary bones of a sea turtle Chelonioidea indet. and a pterosaur Ornithocheiridae indet. from this assemblage. Here we describe additional remains of sea turtles from this locality.

Rasstrigin 1, Dubovka District, Volgograd Region, Russia. The locality is situated in the middle of Krutoi ravine, 1 km North-West of Rasstrigin khutor, ~80 km North-West-North of Volgograd (49°32′ N 44°59′ E). Here there are two fossiliferous levels. The lower one is confined to the basal phosphorite bone bed within the Maastrichtian Bereza Beds and contains remains of phosphatized wood, pelecypods, belemnites, sharks, chimeras, bony fishes, mosasaurs, and turtles (Yarkov, 2000; Popov and Yarkov, 2001). The upper level (Rasstrigin 2) is within the lower Paleocene (Danian) deposits and produce shark teeth, chimaeroid tooth plates, and crocodile and turtle remains. From the Maastrichtian (Rasstrigin 1) level remains of a sturgeon "*Acipenser*" *gigantissimus* and a chimaeroid fish *Edaphodon eolucifer* have been described (Nessov, 1997; Popov and Yarkov, 2001). Here we describe a partial mandible, two scapular fragments, and a neural plate of a giant turtle from this level.

Bereslavka 1 (= Karpovka in Efimov and Yarkov, 1993; Averianov and Yarkov, 2000)**, Gorodishche District, Volgograd Region, Russia.** This locality is situated on the right bank of the Bereslavka water reservoir (former channel of the Chervlyenaya River) in the Don River basin, ~30 km West-South-West of Volgograd (48°37′ N 44°06′ E). This locality was discovered in 1985 and sampled during past fifteen years by A. A. Yarkov. Along the reservoir beach, there a phosphorite bone-bed is exposed, containing possibly repeatedly reworked fossils of Maastrichtian and early Paleogene age: silicified wood, sponges, pelecypods, gastropods, belemnites, ammonite *Baculites* sp., shark teeth and chimaeroid tooth plates, abundant remains of mosasaurs and rare plesiosaurs, turtles, theropod and other(?) dinosaurs, and birds Hesperornithidae indet., together with rolled teeth of Paleocene sharks and Paleocene crocodile and turtle remains (Yarkov, 2000; Yarkov and Nessov, 2000; Averianov and Yarkov, 2004). From the Bereslavka phosphorite bone-bed only remains of hesperornithiform birds and theropod dinosaurs have been described previously (Yarkov and Nessov, 2000; Averianov and Yarkov, 2004). Here we describe fused epiplastra and entoplastron (VGI 231/5) of a primitive turtle from this layer at Bereslavka 1.

Bereslavka 2, location the same as for Bereslavka 1. The coarse grained quartz-glauconite sands with late Paleocene (Thanetian, Kamyshin Formation; Bereslavka 2b level) shark teeth and more fine grained sands with early Paleocene (Zelandian, Syzran Formation; Bereslavka 2a level) sharks and bony fishes. These beds underlie the phosphorite conglomerate bone-bed constituting the locality Bereslavka 1. The crocodile and turtle remains described by Efimov and Yarkov (1993) and Averianov and Yarkov (2000) come possibly from the lower Paleocene (Bereslavka 2a) level. At this level, fragmented carapace remains of a single individual of a sea turtle (Cheloniidae indet.; VGI 231/7) were found. Unfortunately, these remains are too incomplete to allow a reasonable determination. From the upper Paleocene (Bereslavka 2b) level come few very fragmented costals of a large, but thin-plated Cheloniidae indet. with massive rib heads, and one fragmented neural of Trionychidae indet.

Loznoe, Dubovka District, Volgograd Region, Russia. The locality is situated 3 km North of Loznoe village, ~57 km North-West-North of Volgograd (49°19′ N 44°25′ E). From the coarse grained quartz sands of Kamyshin Formation (upper Paleocene, Thanetian) a turtle phalanx (Testudines indet., VGI 231/16), turtle shell fragments, numerous teeth of sharks and rays, and one chimaeroid tooth plate were found.

SYSTEMATIC PALEONTOLOGY

Testudines Linnaeus, 1758
Casichelydia Gaffney, 1975
Cryptodira Cope, 1868
Cryptodira *incertae sedis* sp. 1
(Figs. 2, 3)

Material. VGI 231/6, symphyseal dentary fragment; VGI 231/17 and 18, two fragments of a left scapula of different size and individual age; VGI 231/19, neural plate. Rasstrigin 1, Upper Cretaceous (Maastrichtian).

Description. *Dentary.* The dentary (Fig. 2) is not complete, lacking the posterior portions of both rami and articulation surfaces with the postdentary bones. It is a large and massive bone, relatively shallow dorsoventrally, and with broadly rounded anterior margin. The triturating surfaces are narrow and demarcated by

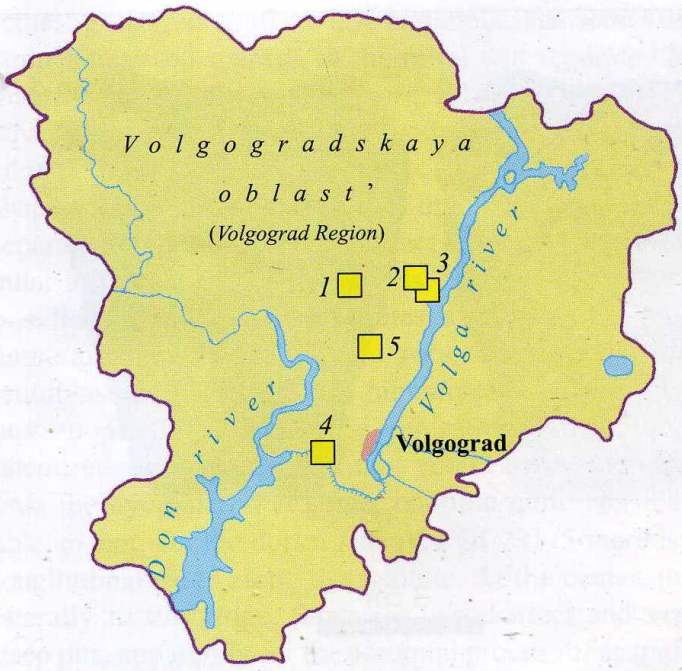

Fig. 1. Map of Volgograd Region showing turtles localities discussed in the text: *1*, Solodcha; *2*, Polunino 2; *3*, Rasstrigin 1; *4*, Bereslavka 1, 2a, b; *5*, Loznoe.

poorly preserved lingual and labial ridges. These ridges are parallel each other, both are of approximately equal height and separated by a relatively shallow trough. The labial ridge is horizontal in lateral view. The lingual ridge possibly did not reach the symphysis, but this part is obscured by poor preservation. Both rami are solidly fused at the symphysis. There is no symphyseal hook. The midline of the dorsal symphyseal surface is elevated, more prominently in the posterior part. Anterolateral to this midline elevation the dorsal dentary surface is little depressed. The symphysis is quite short, only little longer than the labiolingual width of the rami. The ventral (chin) shelf at the symphysis is anteroposteriorly longer (45.5 mm) than the dorsal one (36.5 mm), and the former is well visible in dorsal view (Fig. 2*b*). The sulcus cartilaginis meckelii is a distinct groove, ventrally depressed at the symphysis. The external surface of dentary is rugose with numerous relatively large nutritient foramina.

Limb bones. Both preserved scapula fragments (Fig. 3*a*, *b*) are similar in morphology but differs in size, one being some 11% larger than the other. The scapular prong is broken for the most of its length. The acromion is flattened proximally, and becomes almost triangular shaped in cross section distally. The angle between the scapular prong and acromion is about 92° (VGI 231/18) and 105° (VGI 231/17). The scapular neck is relatively short.

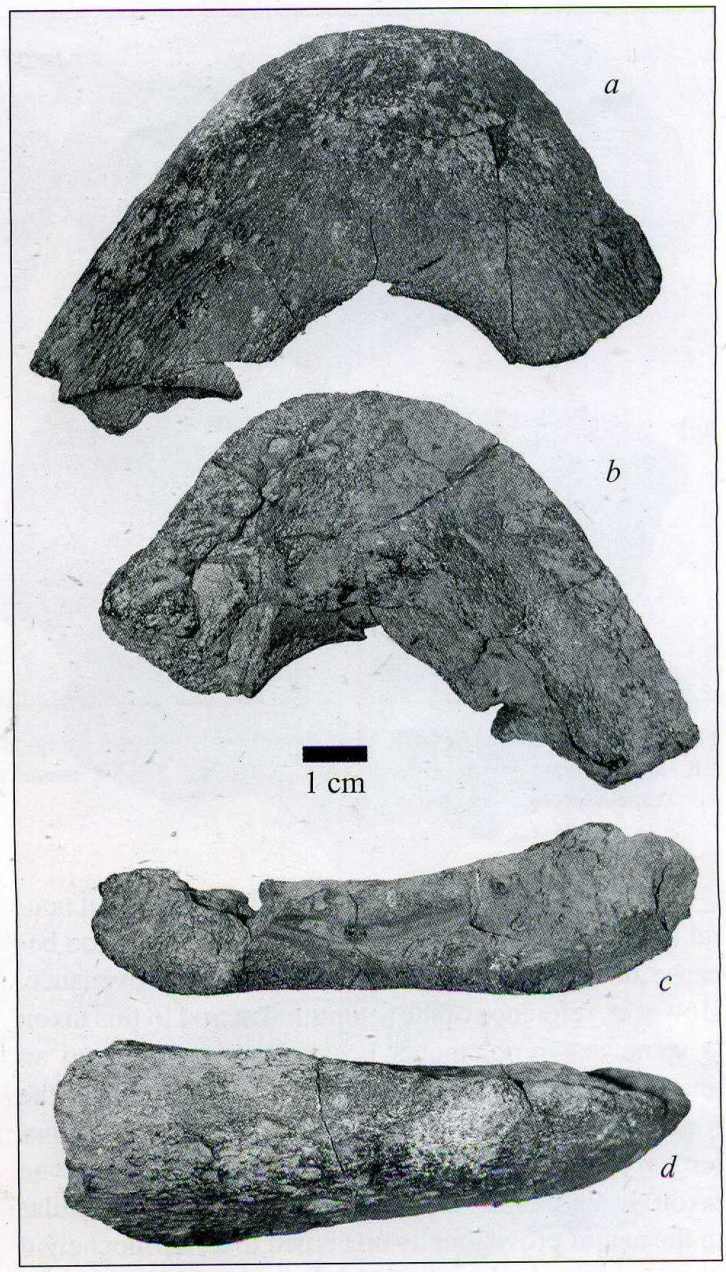

Fig. 2. Cryptodira *incertae sedis* sp. 1, VGI 231/6, dentary fragment. Rasstrigin 1, Volgograd Region; Upper Cretaceous (Maastrichtian). *a*, Ventral; *b*, dorsal; *c*, posterior; *d*, lateral views. Scale bar is 1 cm.

Carapace. An anterior (second?) neural (Fig. 3*c*, *d*) is hexagonal, with very short anterolateral edges and more than three times longer posterolateral edges. The anterior edge is only slightly convex. The anterior and posterior edges are slanting, so the anterior edge was overhanging by the posterior edge of preceding neural in articulation. The plate is almost flat and very thick (16.5 mm in thickness), with very low curvature in frontal section, more pronounced anteriorly. There are no traces of horn sulci. The dorsal surface is sculptured by prominent tubercles and pits, and sometimes by short ridges. The maximum length of the plate is 78.5 mm, its maximum wide (close to the anterior edge) is 69 mm.

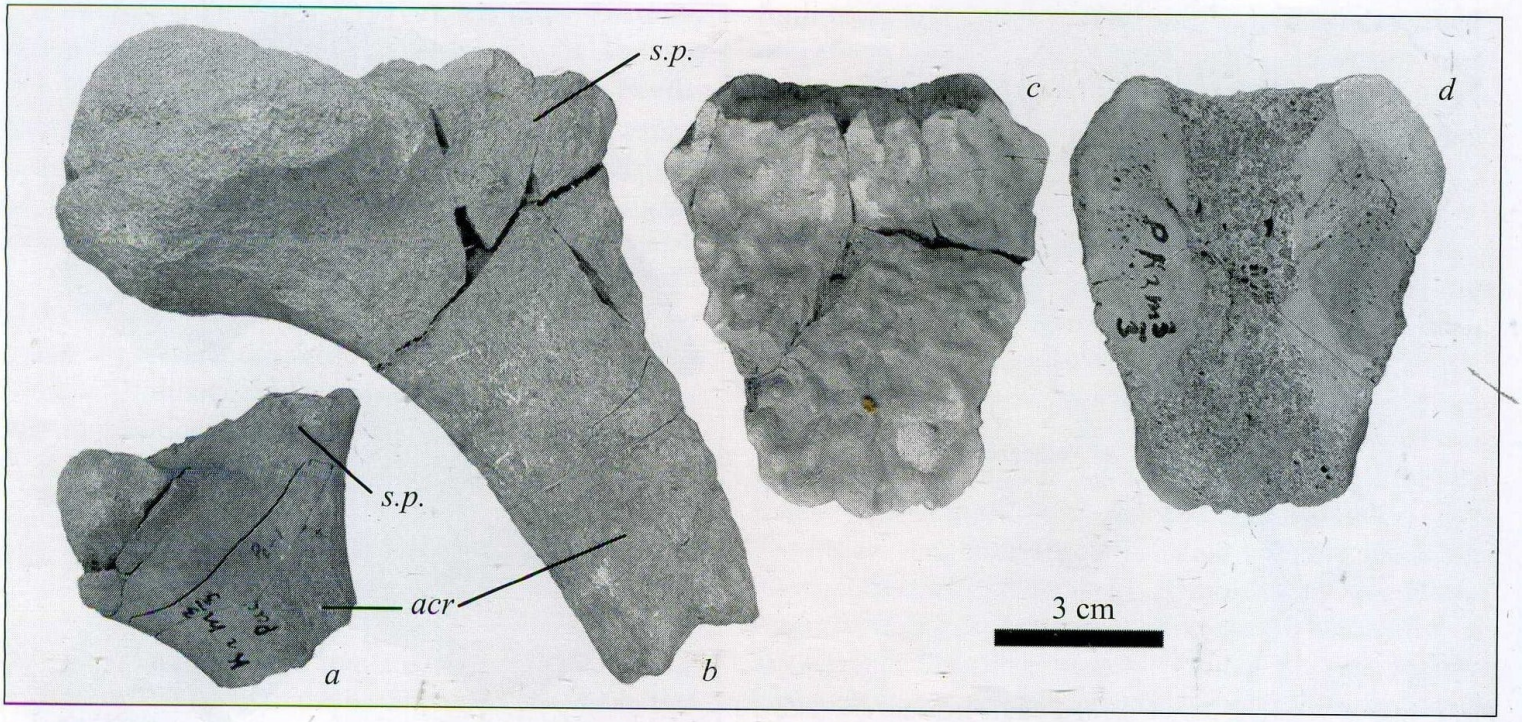

Fig. 3. Cryptodira *incertae sedis* sp. 1. Rasstrigin 1, Volgograd Region; Upper Cretaceous (Maastrichtian). *a*, *b*: VGI 231/18 (*a*) and 231/17 (*b*), left scapula fragments in posterior view; *c*, *d*: VGI 231/19, neural plate in dorsal (*c*) and ventral (*d*) views. Abbreviations: *acr*, acromion; *s.p.*, scapular prong. Scale bar is 3 cm.

Remarks. The dentary, scapular fragments and neural described above are attributed to the single taxon because of their gigantic size and the same provenance. However, reference of the sculptured neural to this taxon is somewhat problematic, because both sculptured an unsculptured shell fragments are known from the Rasstrigin 1 locality. It is not clear if these elements belong to different turtles, or represent variation within one taxon. In its flatness and sculpture this neural is similar to the neural provisionally attributed to a ?dermochelyid *Turgaiscapha kushmurunica* Averianov, 2002 from the late Campanian – ? early Maastrichtian of Northern Kazakhstan (Averianov, 2002: Fig. 12), but differs from the latter by larger size and wider and less incised anterior margin. In marine turtles with similarly sculptured shell, like in the Maastrichtian *Peritresius ornatus* (Leidy, 1856) and Miocene *Syllomus crispatus* Cope, 1896 (Berry, 1937; Baird, 1964), the neurals are keeled, whereas VGI 231/19 is remarkably flat.

The only previously known gigantic turtle from the European Maastrichtian is a marine turtle *Allopleuron hoffmanni* (Gray, 1831), represented by numerous remains from Netherlands and Belgium (Mulder, 2003). Except large size, Cryptodira *incertae sedis* sp. 1 from Rasstrigin 1 is similar with *A. hoffmanni* in a relatively short mandibular symphysis, but differs in somewhat wider snout (e.g., Ubaghs, 1883: Plate 1, Figs. 1 – 3; Rüschkamp, 1925: Fig. 1; Mulder, 2003: Fig. 17) and lesser scapular angle (Bardet et al., 1993: Fig. 4). If the neural described above is correctly attributed to the Cryptodira *incertae sedis* sp. 1, this will future differentiate this form from *A. hoffmanni*, because the latter has a smooth shell. Moreover, in *A. hoffmanni* the neurals are of hexagonal shape, with almost equal in length anterolateral and posterolateral edges, and keeled (Mulder, 2003: Plates 24, 25, 28). In conclusion, Cryptodira *incertae sedis* sp. 1 from Rasstrigin 1 may belongs to Chelonioidea, or even related to *Allopleuron*, but this cannot be convincingly demonstrated with materials presently available.

Cryptodira *incertae sedis* sp. 2
(Fig. 4)

Material. VGI 231/5, fused epiplastra and entoplastron(?). Bereslavka 1, Upper Cretaceous (Maastrichtian).

Description. VGI 231/5 represents solidly fused both epiplastra and possibly entoplastron, with no traces of the interbone sutures. It is relatively thick and massive bone (maximal thickness 15.0 mm), wide transversely (80.3 mm) and short antero-posteriorly (40.5 mm), with broadly convex and rounded anterior margin. Epiplastral dorsal processes are missing, possibly not preserved. The possibly entoplastron portion project posteriorly far beyond the posterior level of the epiplastra. On the ventral side there are three pairs of

scutes: gulars, intergulars, and humerals. The scutes are eminencies well marked in the relief and separated by distinct and relatively deep horn sulci. The epiplastra have slight notches where the sulci meet the anterior edge. The intergular and gular scutes are trapezoid in shape, roughly equal in size. The intergulars completely separate gulars and broadly contact humerals. The intergular and gular scutes' surface is covered by irregular pits, the surface of humeral scutes is smooth. The interhumeral sulcus is straight and goes along the plastron (entoplastron?) midline. The humero-gular sulcus turns postero-laterally and leave the epiplastron well before its lateral edge. This indicates that gulars were extending onto the hyoplastron at some, possible quite considerable, extent. On the dorsal side of VGI 231/5 there is a longitudinal ridge along the midline. At the center, just laterally to this ridge, there are two distinct and very deep pits, apparently for the acromial process of scapula. The anterior border is thickened, except slight depressions lateral to the median ridge. Along the "entoplastron"-hyoplastron suture there are two (left side) or three (right side) irregular quite deep pits for spine-like projections of the hyoplastron.

Remarks. The phylogenetic position of Cryptodira *incertae sedis* sp. 2 is difficult to evaluate because of incomplete data. The loss of the dorsal processes of epiplastra was considered as an apomorphy for the Daiocryptodira sensu Gaffney and Meylan (1988), but distribution of this character was later found to be more ambiguous (Gaffney and Meylan, 1992: 32). However, in the Bereslavka 1 turtle absence of the dorsal processes is not certain, it can be an artefact of poor preservation. Among eucryptodires this character was retained in Meiolaniidae and Xinjiangchelyidae. According to the recent analysis by Hirayama et al. (2000) Meiolaniidae are excluded from Eucryptodira.

Cryptodira *incertae sedis* sp. 2 is basically different from pleurodires by shape of epiplastra and gular scutes, and by lacking of characteristic sculpture, but shows characters variously present in some primitive cryptodires. Although cryptodiran synapomorphies cannot be directly observed on the material available, Cryptodira *incertae sedis* sp. 2 is best attributed within the Cryptodira. The paired gular scutes excludes Cryptodira *incertae sedis* sp. 2 from the crown-group cryptodiran clades (Chelydridae, Chelonioidea, Testudinoidea), except Trionychoidea. Among the latter group Cryptodira *incertae sedis* sp. 2 shows some similarities only with Adocidae Cope, 1870 by shape of the plastron anterior margin, paired gulars, shape of intergulars and gulars, intergulars completely separate gulars, and by rudimentary (obscured by poor preservation?) pit-like sculpture. But

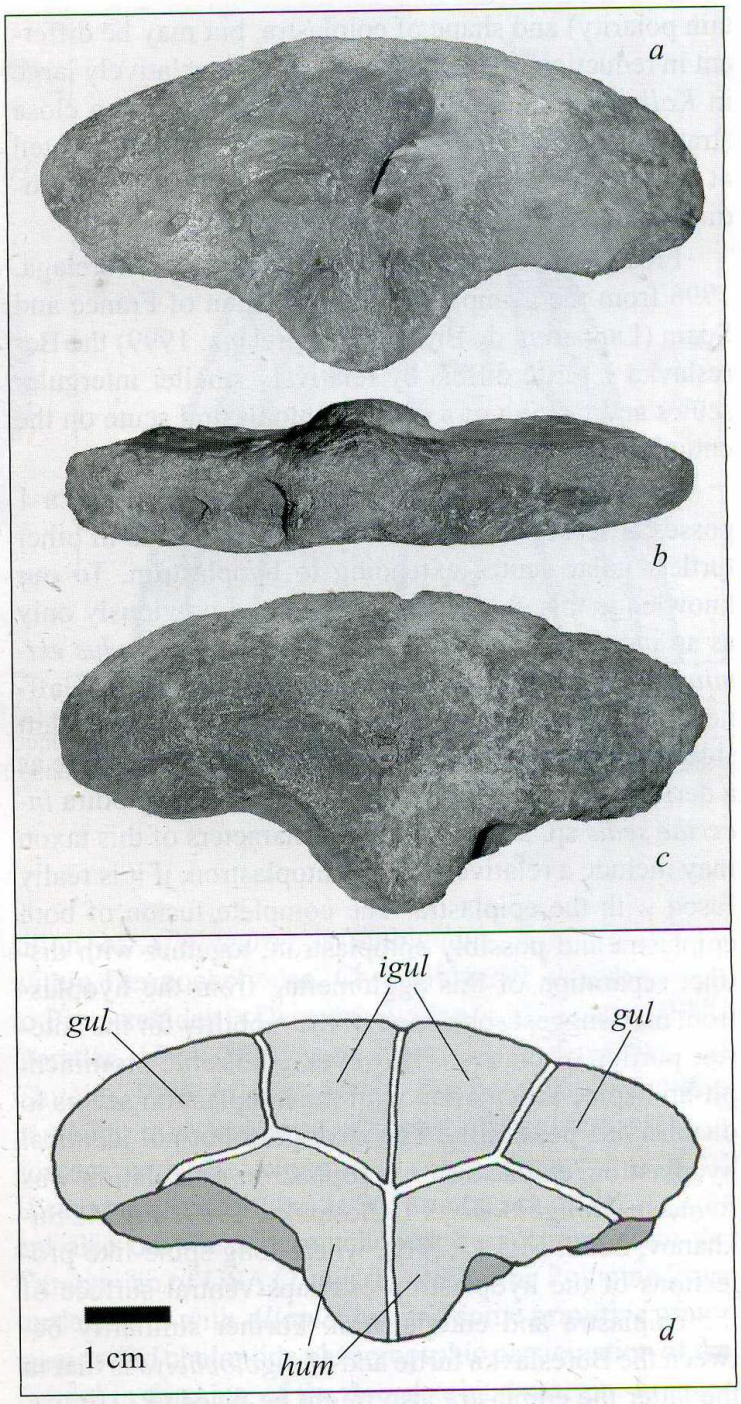

Fig. 4. Cryptodira *incertae sedis* sp. 2, VGI 231/5, fused epiplastra and entoplastron(?). Bereslavka 1, Volgograd Region; Upper Cretaceous (Maastrichtian). *a*, Dorsal; *b*, posterior; *c*, *d*, ventral views; *gul*, gular scutes; *hum.*, humeral scutes; *igul.*, intergular scutes. Scale bar is 1 cm.

adocids usually have shell sculpture much more pronounced, epiplastra longer antero-posteriorly, and a relatively large entoplastron, which in Cryptodira *incertae sedis* sp. 2 seems to be reduced. This makes the allocation of Cryptodira *incertae sedis* sp. 2 within Adocidae unlikely. Among primitive cryptodirans Cryptodira *incertae sedis* sp. 2 is similar also with *Kallokibotion* by rounded anterior lobe of the plastron (character of uncer-

tain polarity) and shape of epiplastra, but may be different in reduction of entoplastron, which is relatively large in *Kallokibotion*. Nevertheless, both taxa, having close stratigraphic and geographic occurrence, may be related at some extent, but currently the Bereslavka 1 cryptodiran is insufficiently known to prove this.

From *Solemys* Lapparent de Broin & Murelaga, 1996 from the Campanian-Maastrichtian of France and Spain (Lapparent de Broin and Murelaga, 1999) the Bereslavka 1 turtle differs by relatively smaller intergular scutes and lacking of a distinct entoplastral scute on the entoplastron.

Cryptodira *incertae sedis* sp. 2 from Bereslavka 1 posses at least one character that rarely occurs in other turtles: gular scutes extending to hyoplastron. To our knowledge this character was observed previously only as an individual variation, in a baenid *Neurankylus eximius* Lambe, 1902 from the Campanian of USA (Gaffney, 1972: Fig. 38A), where it occurs only on the left side of the plastron. This character is considered here as a derived trait, possible autapomorphy of Cryptodira *incertae sedis* sp. 2. Other derived characters of this taxon may include a relatively small entoplastron, if it is really fused with the epiplastra. The complete fusion of both epiplastra and possibly entoplastron, together with distinct separation of this agglomerate from the hyoplastron, may suggest some kind of the mobility for the anterior portion of plastron. However, a possible prominent pit-and-spine articulation with the hyoplastron seems to dismiss this possibility. The analogous but not identical hyoplastron/epiplastron + entoplastron articulation was found in *Mongolochelys* (Khosatzky, 1997: Fig. 4; Sukhanov, 2000: Fig. 17.29B), where long spine-like projections of the hyoplastron overlaps ventral surface of the epiplastra and entoplastron. Further similarity between the Bereslavka turtle and *Mongolochelys* is that in the latter the epiplastra also might be fused (R. Hirayama, personal communication). The fusion of some shell sutures is a primitive character, found, for example, in *Proganochelys* and Meiolaniidae (Gaffney, 1990, 1996).

It is intriguing that during the latest Cretaceous quite primitive and large sized to giant cryptodires appeared in several regions of Eurasia: in Mongolia (*Mongolochelys*; Khosatzky, 1997; Sukhanov, 2000), Romania (*Kallokibotion*; Gaffney and Meylan, 1992), France and Spain (*Solemys*; Lapparent de Broin and Murelaga, 1999), and Volga region (Cryptodira *incertae sedis* sp. 1 and 2; this report). These turtles have no direct ancestors in the previous faunas of these regions and appear to be obsolete relicts in the background of much more derived turtles that dominated the Late Cretaceous Eurasiatic faunas. Possibly these turtles were surviving in more northern territories during most of the Late Cretaceous and spread to south following Maastrichtian cooling.

Chelonioidea Baur, 1893
Chelonioidea *incertae sedis* sp. 1
(Figs. 5, 6)
= Chelonioidea indet.:
Averianov and Yarkov, 2000: 162, Fig. 2

Material. VGI 231/8, left frontal; VGI 231/9, left fragmented adult dentary; VGI 231/10, right juvenile dentary; VGI 231/11 – 13, unidentified medial costal fragments with rib heads; VGI 231/14, left(?) bridge peripheral; VGI 231/15, pygal; other more fragmented, undetermined and uncatalogued shell fragments and appendicular bones. Polunino 2, Upper Cretaceous (Campanian).

Description. *Frontal.* The frontal (Fig. 5) is a trapezoid bone with maximum length (along the medial border) 27.7 mm and maximum width 21 mm. It bears prominent anterior frontal process which was completely covered dorsally by the prefrontal. The deep sutural contact with the prefrontal occupies most of the anterior frontal edge, except the most lateral portion, which forms the dorsal part of the orbital margin, preventing contact of the prefrontal and postorbital. The free dorsal bone is almost flat, with very weak transverse horn sulcus at the middle. On the ventral surface there is a prominent parasagittal ridge approximating the medial border and leaving little space for the sulcus olfactorius. The fossa orbitalis occupies major part of the ventral surface and gently convex. On the posterior edge of frontal ventrally there is deep sutural pocket for the parietal projection, lying along the posterior portion of the parasagittal ridge.

Dentary. Both new dentaries agree well with description of this bone made previously (Averianov and Yarkov, 2000:162, Fig. 2*d* – *g*). The juvenile dentary (Fig. 6*d* – *f*) indicates early development in the ontogenesis of a relatively long symphysis and an anterior beak.

Limb bones. Among uncatalogued specimens there are two complete metapodials or phalanges, similar to that described previously (Averianov and Yarkov, 2000:163, Fig. 2*a* – *c*) in having strong shaft constriction, but more flattened. All these bones may belong to the sea turtle under consideration, as well as to a mosasaur; the latter are quite abundant in the Polunino 2 assemblage.

Carapace. The costal fragments (Fig. 6*g*, *h*, *m* – *p*) have flat dorsal surface without horn sulci. The medial edge is not straight, but more or less triangular, with medial projecting between the adjacent neurals. The rib

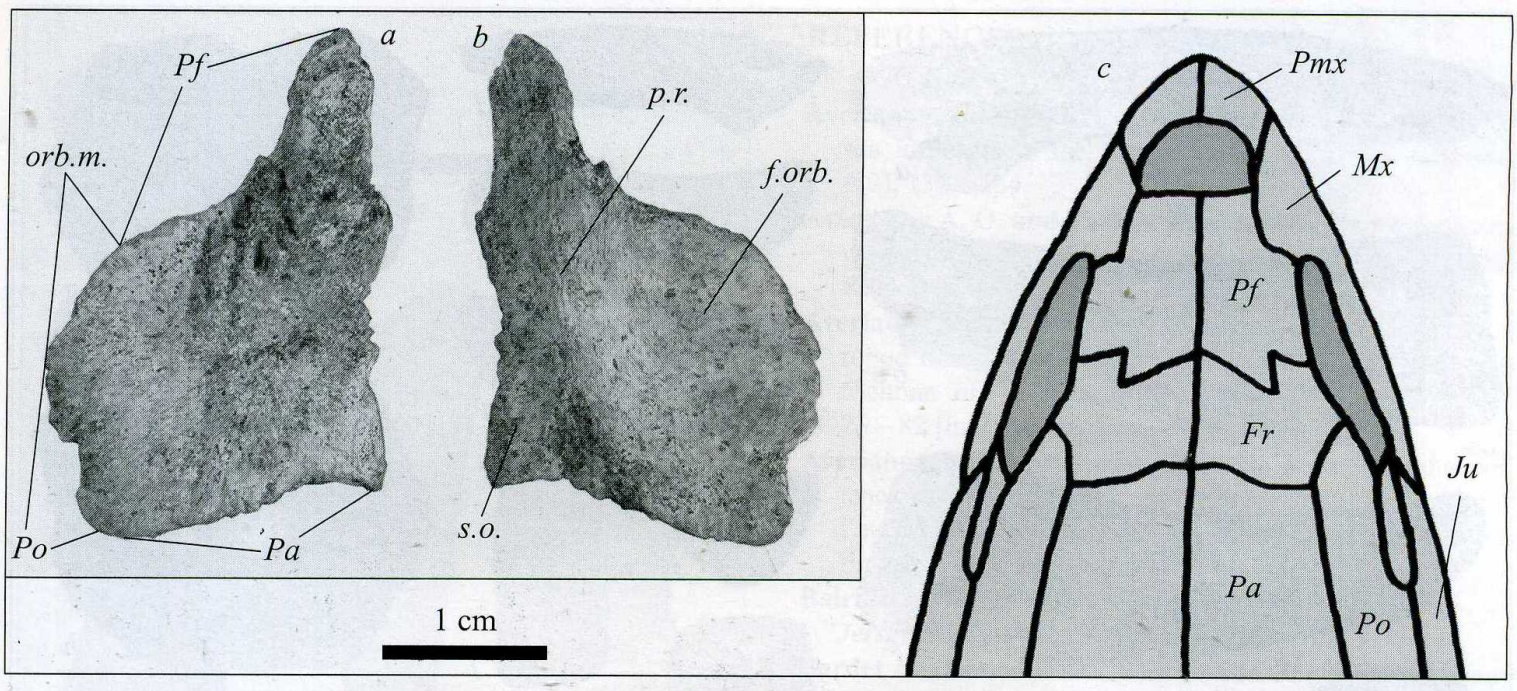

Fig. 5. Chelonioidea *incertae sedis* sp. 1, VGI 231/8, left frontal in dorsal (*a*) and ventral (*b*) views and hypothetical reconstruction of the anterior portion of the skull in dorsal view (*c*). Polunino 2, Volgograd Region; Upper Cretaceous (Campanian). Abbreviations: *f.orb.*, fossa orbitalis; *Fr*, frontal; *Ju*, jugal; *Mx*, maxilla; *orb.m.*, orbital margin of frontal; *Pf*, prefrontal; *Pa*, parietal; *Pmx*, premaxilla; *Po*, postorbital; *p.r.*, parasagittal ridge; *s.o.*, sulcus olfactorius. Scale bar is 1 cm (for *a* and *b*).

heads are massive, antero-posteriorly compressed, or rounded (VGI 231/13). The maximum thickness along the medial edge varies from 6.2 to 8.7 mm.

The bridge peripheral (Fig. 6*i* – *l*) has short dorsal and ventral parts set at almost right angle, and a deep hole for the rib end shifted towards the anterior(?) end. There are no traces of horn sulci.

The pygal (Fig. 6*q*, *r*) is 26.5 mm long and 48 mm wide, pentagonal in shape. Its maximal thickness (at the anterior edge) is 15.3 mm; it is rapidly decreasing towards the posterior end, so the angle between the dorsal and ventral surfaces is ~53°. The ventral surface is almost flat. The dorsal surface is gently convex in both anteroposterior and transverse directions. The posterior edge is gently rounded without a posterior notch and with very week remnants of the intermarginal sulcus both dorsally and ventrally. There are well developed sutural contacts with the adjacent peripherals, but not with the suprapygal.

Remarks. In the previous description (Averianov and Yarkov, 2000:163) this turtle was thought to represent "a currently unrecognized group of relatively generalized and large sized protostegids." New materials from Polunino 2, described above, may challenge this view. The triangular-shaped (not straight) medial margin characteristic for at least some of the costals, is diagnostic for *Allopleuron* from the Maastrichtian of Western Europe and Paleocene of eastern USA. The systematic position of *Allopleuron* is ambiguous, being classified within Dermochelyidae, Cheloniidae, or as sister taxon to Protostegidae + Dermochelyidae (e.g., Weems, 1988; Derstler, 1994; Hirayama, 1994, 1997; Hirayama and Chitoku, 1996; Mulder, 2003). The Polunino 2 sea turtle is similar to *Allopleuron* in having a pygal that does not contact with the suprapygal. This character (118 of Hirayama and Chitoku, 1996) among sea turtles is present also only in a dermochelyid Corsochelys from the Campanian of USA (Zangerl, 1960). The Polunino 2 sea turtle shares with *Allopleuron* and some primitive protostegids and cheloniids plesiomorphic participation of the frontal in forming of the dorsal orbital margin. In more derived protostegids (e.g., *Protostega*), cheloniids, and in dermochelyids the frontal is excluded from the orbital margin by the postorbital-prefrontal contact (character 5 of Hirayama and Chitoku, 1996). At least two unique derived characters (cogged contact between costals and neurals and lost of suprapygal-pygal contact), shared between the Polunino 2 chelonioid and *Allopleuron*, may indicate some kind of relationship between these taxa. Two more ambiguous characters may support this conclusion: reduction of horn sulci in the Polunino 2 taxon (completely lost in *Allopleuron*, derived protostegids, and dermochelyids), and possible development of the secondary bony palate, inferred from the rather long dentary symphysis in the Polunino 2 turtle (present in *Allopleuron* and derived Cheloniidae). However, in the

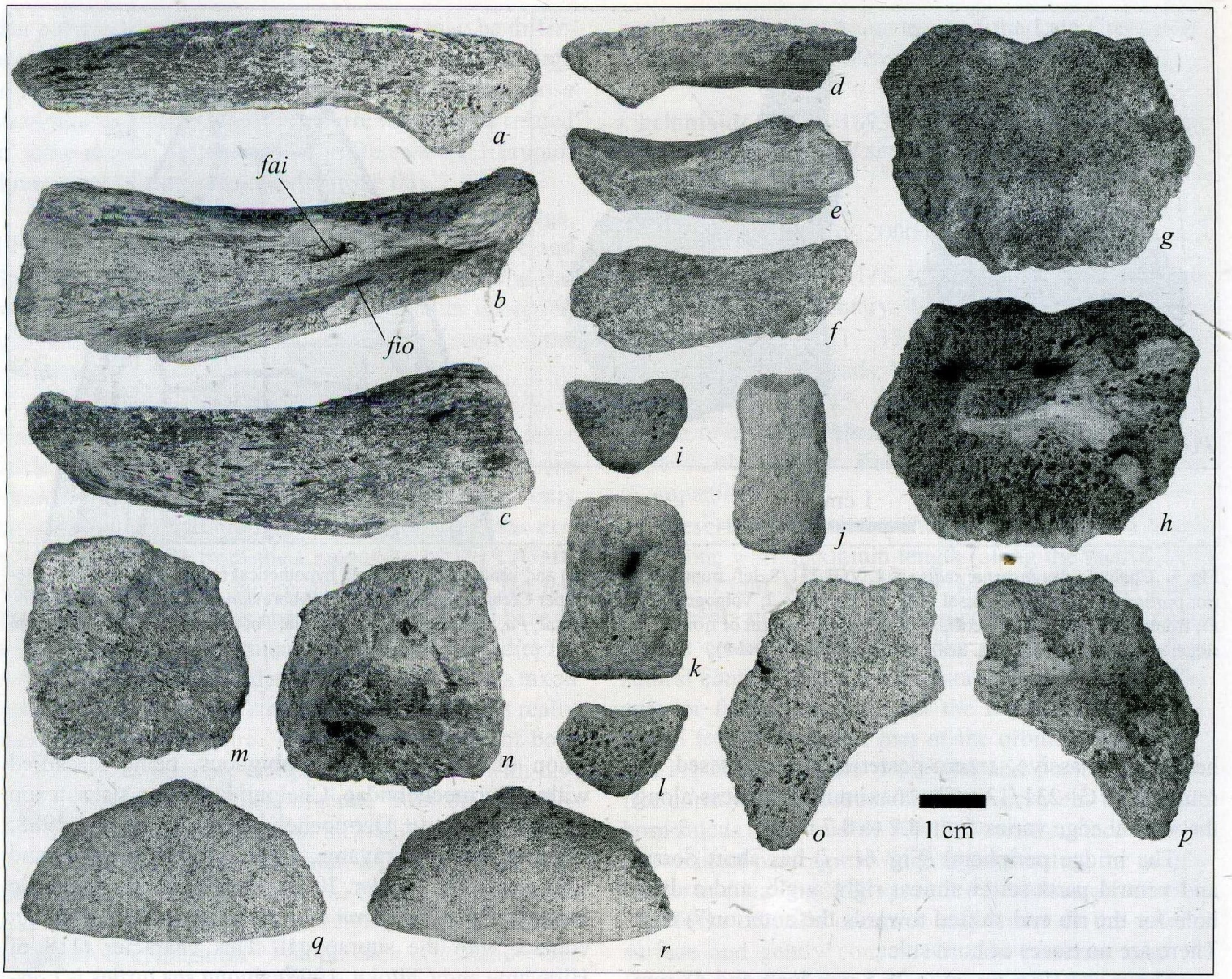

Fig. 6. Chelonioidea *incertae sedis* sp. 1. Polunino 2, Volgograd Region; Upper Cretaceous (Campanian). *a – c*: VGI 231/9, left adult dentary in dorsal (*a*), medial (*b*), and lateral (*c*) views; *d – f*: VGI 231/10, right juvenile dentary in dorsal (*d*), medial (*e*), and lateral (*f*) views; *g*, *h*: VGI 231/11, costal fragment in dorsal (*g*) and ventral (*h*) views; *i – l*: VGI 231/14, left(?) bridge peripheral in anterior (*i*), ventral(?) (*j*), medial (*k*), and posterior (*l*) views; *m*, *n*: VGI 231/12, costal fragment in dorsal (*m*) and ventral (*n*) views; *o*, *p*: VGI 231/13, costal fragment in dorsal (*o*) and ventral (*p*) views; *q*, *r*: VGI 231/15, pygal in dorsal (*q*) and ventral (*r*) views. Abbreviations: *fai*, foramen alveolare inferius; *fio*, foramen intermandibularis oralis. Scale bar is 1 cm.

Polunino 2 turtle the triturating dentary surface is simply concave, whereas in *Allopleuron* this surface is subdivided into narrow concave anterior part and flat rugose posterior part (Mulder, 2003: Fig. 17). Furthermore, *Allopleuron* is characterized by much larger size. This difference may be considered as plesiomorphic for the geologically older (Campanian) Polunino 2 chelonioid compared with younger (late Maastrichtian Paleocene) *Allopleuron*. Taking these uncertainties into account, we currently determine the Polunino 2 chelonioid not closer than Chelonioidea *incertae sedis* sp. 1.

Testudines Linnaeus, 1758
Testudines indet.
(Fig. 7)

Material. VGI 231/16, phalanx. Loznoe, upper Paleocene (Thanetian).

Description. The phalanx is rather large (length 35 mm, width of proximal epiphysis 12.8 mm, width of distal epiphysis 12.8 mm). The bone is moderately elongated, with slightly expanded epiphyses, and asymmetrical distal epiphysis, having ligamental pit from only one (lateral?) side. The proximal epiphysis bears single ovale shaped concave articulation surface. The distal ar-

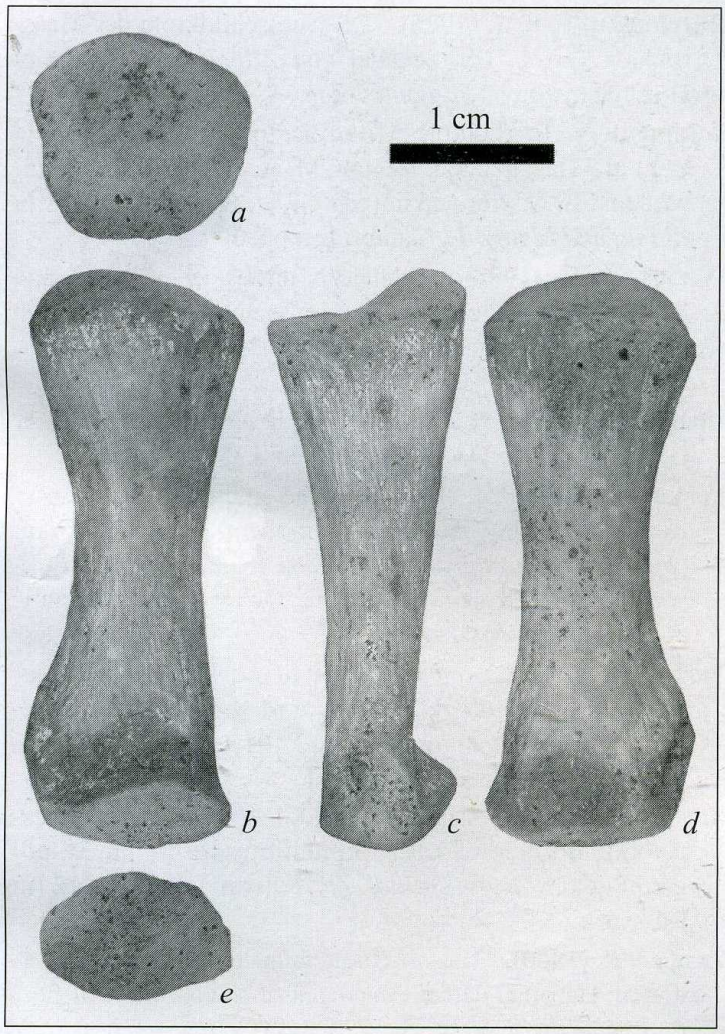

Fig. 7. Testudines indet., VGI 231/16, left(?) phalanx in proximal (*a*), posterior (*b*), lateral(?) (*c*), anterior (*d*), and distal (*e*) views. Loznoe, Volgograd Region; upper Paleocene (Thanetian).

ticulation surface is undivided and expanded on the posterior side.

Remarks. By relative elongation and robustness this phalanx can be compared with proximal, or preungual pedal phalanges of the middle (II and III) toes of trionychids. In cheloniids the phalanges are more gracile with more reduced epiphyses and in land tortoises of this size the phalanges are usually much more shortened. However, scarcity of the material does not allow determination beyond Testudines indet.

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