

New Data on the Neocomitidae (Ammonoidea) from the Berriasian of the Moscow Region

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Abstract—A new ammonoid species of the family Neocomitidae is discovered in the *Riasanites rjasanensis* Zone of the Ryazanian Stage (Berriasian) in the course of the study of the Jurassic–Cretaceous boundary beds in the Russian Platform. The family Neocomitidae is important for the correlation of the Jurassic–Cretaceous boundary beds of the Boreal and Mediterranean Realms. A brief account of the central Russian representatives of the Neocomitidae is given and *Subalpinites? krischtawitschi* sp. nov. is described.

INTRODUCTION

After a long interval of separation of the boreal and subboreal basins of the Russian Platform from the Tethys in the Volgian, elements of the Mediterranean fauna for the first time appear in the *Riasanites rjasanensis* Zone. These are primarily relatively well studied representatives of the genus *Riasanites* Spath, 1923. The Central Russian representatives of the group *Euthymiceras* Grigorieva, 1938 (sometimes synonymized with *Neocosmoceras* Blanchet, 1922) are poorly studied, because they have not been reexamined since Bogoslovsky (1897), who described several new species under the name "*Hoplites*," as well as several taxa, which were not identified to species level, from the basin of the Oka River. Some taxa of Bogoslovsky were later assigned to the genus *Transcaspiites* Luppov (Bogdanova *et al.*, 1985), first described based on the material from Mangyshlak.

In the course of the study of the Jurassic–Cretaceous boundary beds of the Russian Platform, numerous ammonoids, including those belonging to the family Neocomitidae, were collected in summer 2000 from the *Riasanites rjasanensis* Zone. The preliminary results of the examination of these ammonoids from the sections of Moscow and the Moscow Region are summarized below.

The most convenient section in the area under consideration is in the vicinity of the town of Voskresensk exposed by the quarries of the Lopatinskii Phosphorite Mine (Fig. 1). Sections of this mine, which are repeatedly described in the literature and are well characterized by fossils, are hypostratotypes for the Volgian Stage (Gerassimov and Mikhailov, 1966). However, ammonoids from the Ryazanian (Berriasian) beds overlying the Volgian Stage were not studied in this region.

The *Riasanites rjasanensis* Zone overlies the upper substage of the Volgian Stage (phosphatized sandstones of the *Craspedites subditus* Zone or, more rarely, *Craspedites nodiger* Zone) and displays the following lithology:

Yellowish-reddish-brown, inequigranular sandstone with ferruginous oolites. The sandstone is indistinctly bedded; phosphatized; in places loose and weakly cemented; containing numerous fossils, including bivalves (pectinids, *Buchia*, etc.), more rarely, brachiopods and gastropods; sometimes, with pseudophragmocones of belemnites. Ammonoids mainly occur in the lower third of the beds, where they are represented by many fragments (frequently partly rounded) and complete shells of *Riasanites*, more rarely *Euthymiceras*, *Praesurites*, *Pseudocraspedites*, *Hectoroceras*, etc. Ammonoid shells usually retain the nacreous layer. In the lower part, they are buried subhorizontally, and slightly above, more often subvertically. The base contains a lens-shaped bed (0–0.05 m) formed by dark brown, almost black solid phosphorite nodules containing rare fragments of *Riasanites* spp., *Euthymiceras* sp. The top of the zone sometimes contain a bed (0–0.1 m) of dark-brown sandy clay horizontally replaced by clayey inequigranular sand with rare, usually poorly preserved ammonites. The entire thickness is 0.35–0.65 m.

These beds are overlain by clayey sands and sandy clays of the succeeding *Surites tzikwinianus* Zone recognized in the Berriasian of Central Russia.

The lower third of the *Riasanites rjasanensis* Zone contains *Riasanites* and *Euthymiceras* along with a few ammonoid shells described below.

Abbreviations: (VNIGNI) All-Russia Geological Oil Research Institute.

SYSTEMATIC PALEONTOLOGY

Family Neocomitidae Salfeld, 1921

Genus *Subalpinites* Mazenot, 1939

Subalpinites? krischtawitschi Mitta, sp. nov.

Plate 3, figs. 1–3

Etymology. In honor of Nikolai Iosifovich Krischtawitsch (1866–1941) who was the first to establish the presence of the deposits (Krischtawit-

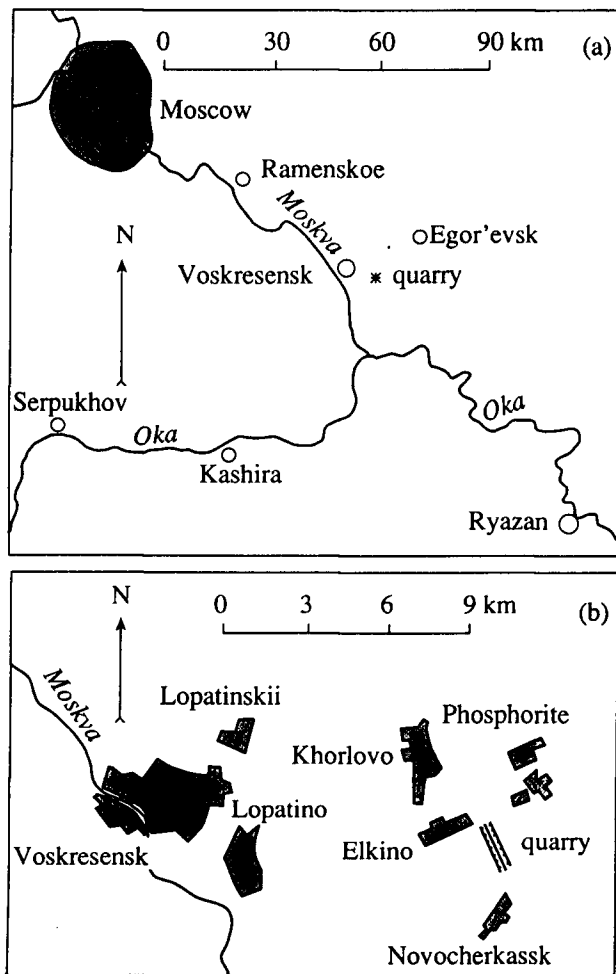


Fig. 1. Schemes showing quarry no. 10 of the Lopatinskii Phosphorite Mine: (a) overview and (b) details.

itsch, 1892), later named Ryazanian (Bogoslowky, 1894)¹ in Moscow and Moscow Region.

¹ In modern publications, the establishment of the Ryazanian Horizon is dated as 1895, i.e., the year when Volume 17 of *Materialy dlya geologii Rossii* with a paper by Bogoslowky was published. However, a separate copy of the same paper was printed at the beginning of 1894. This is evidenced, for instance, by Pavlov (1894, p. 9) who wrote, "this year [I received] another paper by the same author [Bogoslowky], in which he describes outcrops that he studied in 1893 near Novoselki and Kuz'minskoe." This paper by Pavlov is dated May, 1894. Hence, the correct date of the establishment of the Ryazanian Horizon is 1894.

Holotype. VNIGNI, no. CR-2562; Moscow Region, Voskresensk District, quarry near the village of Elkino; Berriasian, *Riasanites rjasanensis* Zone.

Description. The shell is large (the phragmocone is up to 120 mm in diameter), with flattened compressed whorls subtrapezoid in cross section. The flanks are weakly inflated and are widest in the lower part. The venter is narrow rounded and slightly flattened. The umbilicus is moderately wide or wide. The umbilical wall relatively gently sloping at early stages later becomes almost vertical; the umbilical shoulder is rounded. The body chamber and the shape of the aperture are unknown. As early as at the early stages (diameter 20–30 mm), the umbilical nodes are readily noticeable on the umbilical shoulder. The nodes give rise to two, three, or, more rarely, four S-shaped ribs. As the shell diameter increases, the ribs gradually straighten; some of them become smoothened in the lower half of the flanks, losing the connection with the umbilical nodes, and the ribs are transformed into intercalating ribs. Sometimes in the mid-flank, the intercalating ribs extend closer to the main (primary) rib to form weak bulges and the so-called bidichotomous ribs. At the adult stages, it is clearly noticeable that the ribbing is not interrupted on the venter, although becoming more weakly developed in the mid-venter.

Dimensions in mm and ratios:

Specimen VNIGNI, no.	Dm	WH	WW	UW	WH/Dm	WW/Dm	UW/Dm
CR-2561	114	43	32	43	0.29	0.28	0.29
	85	33	25	29	0.39	0.29	0.32
Holotype CR-2562	94	36	27	34	0.38	0.29	0.36
	68	28	20	23	0.41	0.29	0.34

Comparison. This species resembles the type species of the genus *Subalpinites*, *S. fauriensis* Mazenot (see Nikolov, 1982, pl. 70, fig. 5). However, the majority of the species in this genus have ornamentation that, even at the early stages, mainly remains in the umbilical and ventrolateral zones.

Remarks. The generic assignment of the species under description was difficult because of the poorly understood taxonomy of the entire family. The resemblance of the new species to ammonites described as *Subalpinites* from Mangyshlak (Luppov *et al.*, 1988, pl. 14, fig. 6; pl. 15, fig. 1) allows for the tentative

Explanation of Plate 3

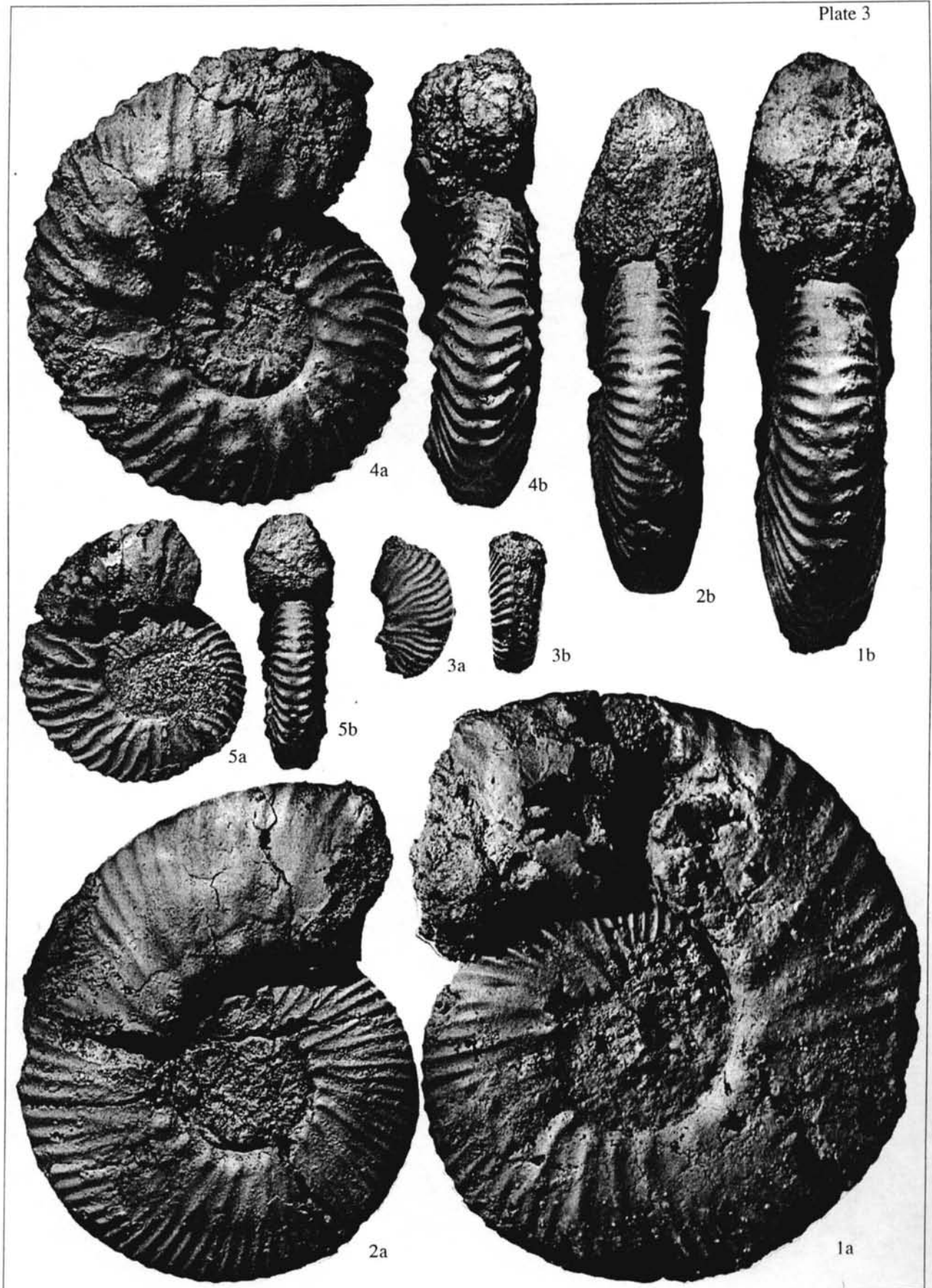
All figures are of natural size.

Figs. 1–3. *Subalpinites? krischtafowitschi* sp. nov.: (1) paratype VNIGNI, no. CR-2561: (1a) lateral and (1b) apertural view; (2) holotype VNIGNI, no. CR-2562: (2a) lateral and (2b) apertural view; and (3) paratype VNIGNI, no. CR-2563: (3a) lateral and (3b) ventral view.

Figs. 4 and 5. *Euthymiceras euthymi* (Pictet): (4) specimen VNIGNI, no. CR-2564: (4a) lateral and (4b) apertural view; (5) specimen VNIGNI, no. CR-2565: (5a) lateral and (5b) apertural view.

All specimens are phragmocones and come from the Lopatinskii Phosphorite Mine (Moscow Region., Voskresensk District, quarry near the village of Elkino); Berriasian, *Riasanites rjasanensis* Zone; collected by V.V. Mitta. Original material is housed at the Collection Fund of the VNIGNI.

Plate 3



assignment of the new species to *Subalpinites*. The features supporting this conclusion include a compressed shell with the whorl height exceeding the whorl width, a wide umbilicus with a steep wall, the presence of umbilical and (although small) lateral nodes, and ribs prominent in the ventrolateral zone.

The species *Dalmsiceras stephanovi* Nikolov et Mandov (see Nikolov, 1982, pl. 25, fig. 2) described from the Berriasian of Bulgaria based on a single specimen ca. 40 mm in diameter is also close to the new species. Note that some researchers consider *Subalpinites* to be a subgenus of *Dalmsiceras* (Hoedemaeker, 1982).

The new species resembles a form described by Bogoslawsky (1897, p. 103, pl. 6, fig. 5) as *Hoplites* aff. *progenitor* Opp. in the presence of a single umbilical row of nodes and in the ribbing weakening but not completely disappearing on the venter. Apparently, this is precisely the specimen that was incorrectly described as *Transcaspiites bogoslovskii* sp. nov. in the above-mentioned monograph on the Berriasian of Mangyshlak. The new species is distinguished by more densely spaced nodes and more regular ribbing. Another specimen resembling the new species is one from Bogoslawsky's study (1897, p. 104, pl. 6, fig. 6) described as *Hoplites* sp. indet. and later proposed by Luppov et al. (1988) as the holotype of *Riasanites bogoslovskii* Luppov. However, the poor preservation of this specimen does not allow one to identify it with certainty.

Occurrence. Berriasian, *Riasanites rjasanensis* Zone of Central Russia.

Material. Two well-preserved phragmocones and several fragments from the quarries of the Lopatin-skii Phosphorite Mine.

DISCUSSION

Representatives of the Neocomitidae from the Berriasian of Central Russia can be subdivided in the following groups based on the shell shape, shell size, and the growing pattern of the shell ornamentation (because the taxonomy of the family is poorly studied, the generic names should be considered to be provisional, except, possibly, for *Riasanites*).

(1a) Microconches without nodes—[m] *Riasanites subrjasanensis* (Nikitin). The shell is up to 75–100 mm in diameter, flattened, with a highly-rectangular cross section, weakly inflated flanks, and a flattened venter. The umbilicus is wide or very wide and open. The adult whorls and the body chamber are very weakly overlapping. The ribs are strong, dichotomous, simple, and intercalating. In the midventer of the phragmocone, the ribs often smoothen to form a ventral furrow. The ribbing is always raised on the umbilical shoulder.

(1b) Macroconches without nodes—[M] *Riasanites subrjasanensis* (Nikitin). The shell is over 150 mm in diameter, compressed and angular-ellipsoidal in cross section. The umbilicus is wide; the umbilical shoulder is rounded. The ribs are bifurcating, simple, and inter-

calating. In the midventer of the phragmocone, the ribs often smoothen to form a ventral furrow.

(2a) Microconches with prominent lateral nodes—[m] *Riasanites swistowianus* (Nikitin). The shell is up to 60–90 mm in diameter, moderately wide, with whorls rounded-subquadrate in cross section. The umbilicus is narrow; the umbilical wall is low with a rounded shoulder. The ribs are simple, intercalating, and bifurcating; they are prominent, acute, and raised in the midflanks, at the point of bifurcation. In the midflanks the ribs are noticeably lowered, forming a ventral furrow.

(2b) Macroconches with indistinct lateral nodes—[M] *Riasanites rjasanensis* (Nikitin). The shell is over 150 mm in diameter and flattened or moderately wide; the early whorls are rectangular in cross section with weakly inflated flanks and a compressed venter. Throughout growth, the whorls widen and the cross section becomes moderately oval with a rounded venter. The umbilicus moderately wide in the early whorls with age becomes wide. The ribs are bifurcating, more rarely, simple and intercalating, slightly lowering in the midventer. In the adult whorls, bulges develop at the point of the rib bifurcation, sometimes appearing as a lateral row of nodes.

(3a) Microconches with pronounced umbilical and lateral rows of nodes and a relatively narrow ventral surface—[m] *Euthymiceras* ex gr. *euthymi* (Pictet) (Pl. 1, fig. 4). The shell is up to 100–120 mm in diameter, with an evolute body chamber and evolute last whorl of the phragmocone. The whorls are of medium width, noticeably converging toward the relatively narrow ventral side. The umbilicus is wide, the wall is steep, and the umbilical shoulder is rounded. The ribs are bifurcating and trifurcating and intercalating. The umbilical and, especially, lateral nodes are well developed. In the ventrolateral part, the ribs are raised as elongate expansions, which are extremely rarely transformed into separate nodes. In the midventer, the ribs are sharply smoothened and sometimes completely disappear; the ends of the ribs are usually directed orad (forming an arrow-shaped pattern).

(3b) Macroconches with indistinct lateral and developed umbilical nodes—[M] *Subalpinites? krischtalofowitschi* sp. nov. See description given above.

(4a) Microconches with developed umbilical, lateral, and ventrolateral rows of nodes and relatively thick low whorls—[m] *Transcaspiites* ex gr. *micheicus/transfigurabilis*² Bogoslawsky). The shell is up to 90–100 mm in diameter, moderately wide, with a rounded cross section, flattened venter, and maximum

² "*Hoplites*" *transfigurabilis* (Bogoslawsky, 1897, pl. 6, fig. 3) is very similar to "*H.*" *micheicus* Bogoslawsky (ibid., fig. 1, holotype by monotypy) and differs only by coarser ribs. Judging from the figure, the type of "*Hoplites*" *transfigurabilis* has an injury inflicted during life, which causes abnormal coiling. Most likely, both these forms represent microconches of the same species, which should be named *micheicus*.

width in the lower third of the flanks. The umbilicus is wide; the shoulder is rounded. The ribs are bifurcating, simple, and intercalating, extending straight across the venter, becoming noticeably weaker in the midventer of the phragmocone.

(4b) Macroconches with the pronounced umbilical, lateral, and ventrolateral rows of nodes and relatively wide whorls, with a broad venter—[M] *Transcaspites hospes* (Bogoslowsky). The shell is over 150 mm in diameter, of medium width, with an ellipsoidal or highly-subtrapezoid cross section, and a flattened venter. The umbilicus is wide, with a rounded umbilical shoulder. The ribs are bifurcating, trifurcating, and intercalating, more rarely simple, usually running straight across the venter, and becoming weaker in the midventer.

Thus, the majority of the Neocomitidae from the Berriasian of Central Russia that have been identified to species level are grouped in a few distinct and well-differentiated dimorphic pairs: [m] *R. subrjasanensis*—[M] *R. subrjasanensis*, [m] *R. swistowianus*—[M] *R. rjasanensis*, and [m] *T. micheicus*—[M] *T. ? hospes*.

The association [m] of *Euthymiceras* ex gr. *euthymi*—[M] *Subalpinites? krischtafowitschi* is apparently less convincing but cannot be excluded. The nomenclature of taxa in this case is not very important, because both generic names are used conventionally when the Central Russian ammonoids are concerned. Perhaps, further investigation of this group will allow more positive taxonomic conclusions.

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