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# On the Zonal Index-Species of the Standard Scale of the Ryazanian Stage on the Russian Platform

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**Abstract**—The validity and index species of the standard ammonite-based zones (from bottom to top: *Rjasanensis, Spasskensis*, and *Tzikwinianus* zones) of the Ryazanian Stage in the type region are discussed. The species *Surites spasskensis* (Nikitin, 1888) and *S. tzikwinianus* (Bogoslowsky, 1896) are re-examined and re-described. It has been established that these two phylogenetically successive species characterize two adjacent intervals of the geological section. For the first time, photographs of holotypes (by monotypy) of these species and of the lectotype of *Riasanites rjasanensis* (Nikitin, 1888) are published.

**Keywords:** Ammonoidea, Craspeditidae, Tolliinae, *Surites*, Lower Cretaceous, Ryazanian, *Spasskensis* Zone, *Tzikwinianus* zone, Russian Platform

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## INTRODUCTION

Biostratigraphic units at the rank of zones and subzones are established based on differences in the taxonomic composition of fossils in successive intervals of the geological section. Index species play a key role in identification of zones. The evaluation of the validity of the biostratigraphic units largely depends on the state of knowledge of their index species, primarily of the material from the type localities.

The biostratigraphic subdivision of the Ryazanian Stage of the Russian Platform remains a subject of dispute, although its zonation was first proposed more than a century ago. To a large extent, these disagreements are due to the lack of an updated description of the index species, since until now no photographs of the type specimens of the index species have been published, so researchers have had to rely on drawings published in the 19th century, that were not always accurate.

This paper presents the results of revision of the index species of the Ryazanian Stage of the Russian Platform, including emendation of their stratigraphic ranges.

## LOCALITIES AND MATERIAL

This work is based on the observations and collections of the author, who for the last several decades has regularly carried out field work on the sections of the Ryazanian Stage of the Russian Platform. These are, first of all, natural outcrops on the Oka River in the Ryazan region, on the Menya River (basin of the Sura River) in Chuvashia, on the Unzha River in the Kostroma region, known from the end of the 19th century, and sections in the quarries of the Egorievsk and Voskresensk phosphorite deposits, Moscow Region that became known in the middle of the 20th century (Fig. 1).

In addition, I re-examined museum collections, including the types and figured specimens from the monographic works of S.N. Nikitin (1888), N.A. Bogoslowsky (1896a), and I.G. Sasonova (1971, 1977), housed in the F.N. Chernyshev Central Scientific Research Geological and Prospecting Museum in St. Petersburg (TsNIGR Museum) and the Mining Museum of St. Petersburg Mining University (GM). The specimens from the author's ammonite collection are housed in the A.A. Borissiak Paleontological Institute RAS (PIN).

## DISCUSSION

The interval of the geological section, currently recognized as the Ryazanian Stage, has been widely known since the publication of Nikitin's work (1888). Nikitin published a description of several outcrops of this interval in the Oka River basin, designating it as Beds with *Hoplites rjasanensis*. He also described some ammonite species from these beds, including *H. rjasanensis* Nikitin and *Olcostephanus spasskensis* Nikitin. Slightly later, N.I. Krischtafowitsch (1892a, 1892b), Bogoslowsky (1894), and A.P. Pavlow (1894),

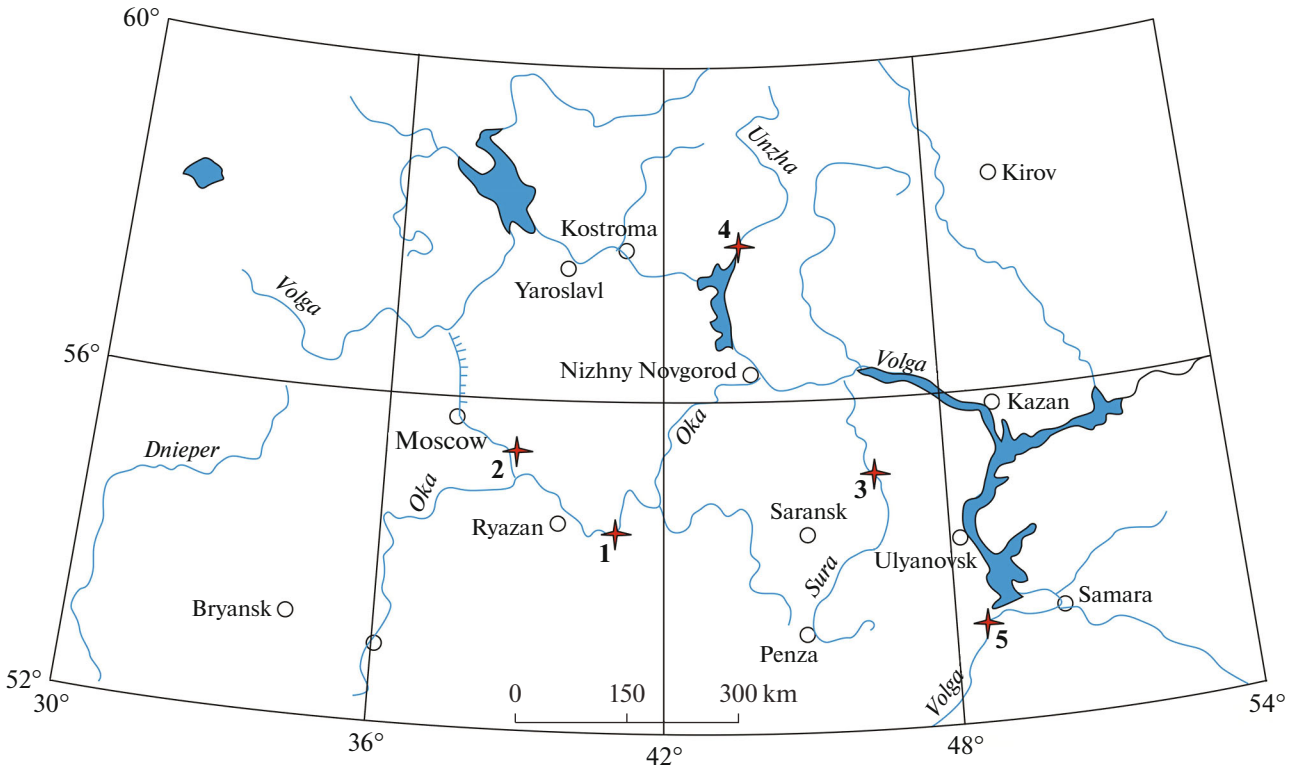



**Fig. 1.** Scheme of the above-mentioned localities of the Ryazanian Stage of the Russian Platform: 1—Staraya Ryazan area on the Oka River (Nikitino village, Chevkino village, Shatrishche village, Staraya Ryazan settlement); 2—quarries of the Lopatinsky phosphorite mine; 3—Mishukovo on the Menya River; 4—Ogarkovo on the Unzha River; 5—Kashpir on the Volga.

published papers discussing the position of the beds with *H. rjasanensis* in the stratigraphic scale. The fundamental work of Bogoslowsky (1896a), with a description of numerous sections on the Oka River, and a number of newly established ammonite species laid the foundation for the modern understanding of the range of the Ryazanian Stage ("Horizon", according to the terminology of the late 19th century). In the most complete sections of the Ryazanian Horizon, Bogoslowsky recognized three beds (lower, middle, and upper), but these were lithostratigraphic, rather than biostratigraphic units. However, if we compare the most representative sections, which are also type localities for *H. rjasanensis, O. spasskensis*, and *O. tzikwinianus* (Table 1), with the complete lists of ammonites found in them, the biostratigraphic nature of these units seems to be undeniable.

Beds with *Olcostephanus spasskensis* (and even a zone) figure in the controversy that unfolded (Bogoslowsky, 1896b; Pavlow, 1899, 1901). However, the first work in which the interval with *Spasskensis* was quite definitely separated from the interval with *Rjasanensis* is apparently Pavlow's monograph (Pavlow, 1907). In this work, there are discrepancies in the names of the zones (in the text on p. 76 and in the diagram of stratigraphic distribution and phylogenetic relationships of bivalves, now assigned to the genus *Buchia*). Nevertheless, the uppermost Volgian and lowermost Ryazanian zones (accepted by Pavlow as part of the Aquilonian Stage that he proposed) and the upper part of the Ryazanian-lower Valanginian stages (which he attributed to the lower Neocomian) were clearly outlined (Fig. 2).

In the following decades, the range, subdivision, and species-indexes of biostratigraphic subdivisions of the Ryazanian Stage were adopted by researchers in different ways. These differences were apparently caused by different interpretations of the taxonomic composition and stratigraphic distribution of *Surites spasskensis*, due to insufficient knowledge. In addition, the correlation of part of the Ryazanian deposits of the Oka River basin in the Ryazan Region with basal deposits of the Valanginian of the Menya River in Chuvashia was erroneous (Gerasimov, 1959, 1962, 1971; Sasonova, 1977).

Attempts have been made at the infrazonal stratigraphy of the Ryazanian Stage, with the recognition of additional units of various ranks (Casey et al., 1977, 1988; Mesezhnikov et al., 1979; Baraboshkin, 1999; Mitta, 2007, 2011b; Mitta and Bogomolov, 2008; Mitta and Sha, 2011; Baraboshkin in: Rogov et al., 2015); most of these newly proposed biostratigraphic units have previously been critically analyzed (Mitta, 2017). Recent surveys (Mitta, 2019b) have clearly

**Table 1.** Abbreviated and adapted comparative description of type localities of *Riasanites rjasanensis* (Nikitin), *Surites spasskensis* (Nikitin), and *S. tzikwinianus* (Bogoslowsky) on the Oka River

| Age | | Staraya Ryazan (after Nikitin, 1888) | Tsykvino (after Bogoslowsky, 1896a) |
|---|---|---|---|
| Valanginian | *Hoplitoides* | Coarse ferruginous sand with phosphorite nodules | Ferruginous sand with sandy-phosphorite nodules<br>Pebble conglomerate with ferruginous cement |
| Ryazanian | *Tzikwinianus* | Ferruginous plate-like sandstone | Ferruginous argillaceous sandstone, with *Surites tzikwinianus* |
| | *Spasskensis* | Sandstone, grayish green glauconite, loose, with numerous *Buchia* and *Surites spasskensis* | Dark phosphorite sandstone, loose, with numerous *Buchia* and *Surites* cf. *spasskensis* |
| | *Rjasanensis* | Dark glauconite sand with concretions of glauconite and phosphorite sandstone, with *Riasanites rjasanensis* | Dark green glauconite sand with scattered black pebbles, with *Riasanites rjasanensis* |

shown that *Hectoroceras* and *Riasanites* co-occur in the lower part of the Ryazanian Stage. This makes it superfluous to distinguish the East Greenland (Spath, 1947) *Kochi* Zone on the Russian Platform, given the valid name of the *Rjasanensis* Zone. Although the distribution interval of *Hectoroceras kochi* Spath is an interregional marker species in Boreal regions, *Riasanites rjasanensis* (Nikitin) has priority as a marker species for the Ryazanian Stage of the Russian Platform.

Taking into account all the available data, I consider it necessary to return to the scheme published by Mesezhnikov (1984) in his final paper on this topic, but without double index species, where the Ryazanian Stage is represented by the *Riasanites rjasanensis, Surites spasskensis*, and *Surites tzikwinianus* zones (Fig. 2). The ammonite associations typical of each of the three zones are well differentiated at the generic level (Mitta, 2019b); at the same time, transit genera ensure the contact of zones, which is important in the stratigraphy of highly condensed deposits. In addition, historical priority is fully respected in this scheme.

The ammonite assemblage characteristic of the *Rjasanensis* Zone is well studied in the Moscow Region, where it is represented by *Riasanites swistowianus* (Nikitin), *R. rjasanensis* (Nikitin) morph α, *Riasanella rausingi* Mitta, *R. plana* Mitta, *R. olorizi* Mitta, *R. riasanitoides* Mitta, *Subalpinites krischtafowitschi* Mitta, *S. gruendeli* Mitta, *S. faurieformis* Mitta, *S. remaneiformis* Mitta, *Mazenoticeras ceccai* Mitta, *Malbosiceras robustum* Mitta, *Pomeliceras* sp., *Dalmasiceras crassicostatum* (Djanelidze), *Craspedites ultimus* Mitta et Sha, *Hectoroceras kochi* Spath, *Praesurites unshensis* (Nikitin), *Pseudocraspedites bogomolovi* Mitta, etc. (Mitta, 2002, 2004, 2005, 2008, 2009, 2011a, 2011b, 2019a, 2019b; Mitta and Sha, 2011). In the Oka River basin in the Ryazan Region, this zone, because of high condensation, is often inseparable from the *Spasskensis* Zone, but in the most complete

<table>
<tr><th>Stage</th><th colspan="2">Pavlow, 1907</th><th>Gerasimov, 1971</th><th>Sasonova, 1971</th><th>Mesezhnikov, 1984</th><th>Mitta, 2019b</th></tr>
<tr><td>Valanginian</td><td rowspan="3">Neocomian</td><td>Gevrili and Stenomphalus</td><td>Undulatoplicatilis</td><td>Undulatoplicatilis</td><td>Undulatoplicatilis</td><td>Undulatoplicatilis</td></tr>
<tr><td rowspan="3">Ryazanian</td><td rowspan="2">Spasskensis and Pressulus</td><td>Tzikwinianus</td><td rowspan="2">Spasskensis</td><td>Tzikwinianus</td><td>Tzikwinianus</td></tr>
<tr><td rowspan="2">Rjasanensis and Spasskensis</td><td>Rjasanensis and Spasskensis</td><td>Spasskensis</td></tr>
<tr><td>Aquilonian</td><td>Rjasanensis and Kaschpuricus</td><td>Rjasanensis</td><td>Rjasanensis and Kochi</td><td>Rjasanensis</td></tr>
<tr><td>Volgian</td><td>Aquilonian</td><td>Nodiger</td><td>Nodiger</td><td>Nodiger</td><td>Nodiger</td><td>Nodiger</td></tr>
</table>

**Fig. 2.** Scheme of development of views on the zonal subdivision of the Ryazanian Stage of the Russian Platform.

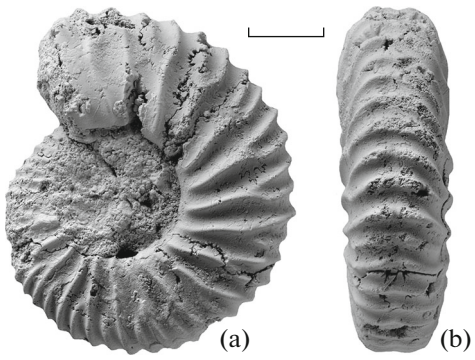



**Fig. 3.** *Riasanites rjasanensis* (Nikitin, 1888), lectotype, Mining Museum, 1/81, phragmocone: (a) lateral view, (b) ventral view; Ryazan Region, Spassk District, right bank of the Oka River upstream of the Staraya Ryazan Hillfort; Ryazanian Stage, *Rjasanensis* Zone. Scale bar 10 mm.

sections, both zones are also lithologically reasonably well distinguished (Table 1).

The ammonite assemblage of the *Spasskensis* Zone is best studied in the Oka Basin in the Ryazan Region, and is represented by *Riasanites rjasanensis* (Nikitin) morph β, *R. rulevae* (Mitta), *Subalpinites* aff. *krischtafowitschi* Mitta, *Transcaspiites transfigurabilis* (Bogoslowsky), T. *micheicus* (Bogoslowsky), *T. tscheffkini* Mitta, *T. transitionis* Mitta, *Karasyazites bajarunasi* (Luppov), *Surites spasskensis* (Nikitin), *S. analogus* (Bogoslowsky), *Pronjaites bidevexus* (Bogoslowsky), *Gerassimovia mostjae* (Bogoslowsky), *Externiceras solowaticum* (Bogoslowsky) and others (Nikitin, 1888; Bogoslowsky, 1896a; Mitta, 2007, 2008, 2018).

The ammonite assemblage of the *Tzikwinianus* zone is well represented both on the Oka in the Ryazan Region and on the Menya River in Chuvashia. It includes *Surites tzikwinianus* (Bogoslowsky), *S. subtzikwinianus* (Bogoslowsky), *S. kosakowianus* (Bogoslowsky), *S. clementianus* (Bogoslowsky), *Caseyceras caseyi* Sasonova, *Peregrinoceras pressulum* (Bogoslowsky), *P. subpressulum* (Bogoslowsky) and others (Bogoslowsky, 1896a, 1902; Sasonova, 1971, 1972, 1977; Mesezhnikov et al., 1979).

The above lists show that the late morph of *Riasanites rjasanensis* occurs in the range of distribution of *Surites spasskensis*, although I have never found these two species in the same sandstone nodules (while the nodules here reach up to a meter in length and are often overflowing with fragments of easily identifiable ammonites). This circumstances of the joint occurrence of the two index species, in my opinion, cannot in any way interfere with the delineation of the *Rjasanensis* and *Spasskensis* zones. Ammonite zones are zones of complex substantiation, where the index species can characterize only a very narrow stratigraphic interval within the zone, including at its top. In the latter case, the last appearance (LAD) of the index species of one zone in the basal part of the next zone is possible.

Below is a description of two representatives of the genus *Surites,* index species of the middle and upper zones of the Ryazanian Stage. The revision of *Riasanites rjasanensis* was carried out relatively recently (Mitta, 2008), and I will confine myself here to presenting a photograph of the lectotype (Fig. 3), until now known only from the drawing in the work of Nikitin (1888).

## SYSTEMATIC PALEONTOLOGY

Superfamily Perisphinctoidea Steinmann, 1890

**Family Craspeditidae Spath, 1924**

**Subfamily Tolliinae Spath, 1952**

**Genus *Surites* Sasonov, 1951**

***Surites spasskensis* (Nikitin, 1888)**

Plate 8, figs. 1–4

*Olcostephanus spasskensis*: Nikitin, 1888, p. 95, pl. 1, figs. 9–11; Bogoslowsky, 1896a, p. 50, pl. 2, fig. 1.

*Surites spasskensis*: Sasonova, 1971, p. 40, pl. 9, fig. 2; Mesezhnikov et al., 1979, pl. 1, fig. 9; Mitta and Bogomolov, 2008, pl. 1, figs. 1, 3 (non Sasonova, 1971, p. 40, pl. 10, fig. 2; 1977, p. 48, pl. 4, fig. 1, pl. 7, fig. 4, pl. 24, fig. 2).

*Surites (Surites) spasskensoides*: Schulgina, 1972a, p. 127; 1972b, p. 152.

*Surites (Surites) subspasskensis*: Schulgina, 1985, p. 131.

aff. *Surites* cf. *spasskensis*: Luppov et al., 1988, p. 114, pl. 13, fig. 2.

Holotype (by monotypy). Mining Museum, nos. 9/81, 10/81 (Nikitin, 1888, p. 95, pl. 1, figs. 9–11); right bank of the Oka River opposite the village of Spassk-Ryazanskiy (Staraya Ryazan area, upstream of the hillfort); glauconitic sandstone in the middle part of the Ryazanian Stage.

Description (Fig. 4). The phragmocones of adult specimens reach a diameter of 100 mm. Young whorls (D up to 50 mm) are of medium thickness, subtriangular in section with slightly convex flanks; with age, the whorls become more inflated. The umbilicus is moderately wide. The umbilical wall is rather gently sloping in the early stages, becomes steeper on the last whorl of the phragmocone and on the body chamber; the shoulder is rounded. The length of the adult body chamber and specimens with a preserved aperture are unknown. The ornamentation of young whorls is represented by subradial primary ribs, in the middle of the sides, and more often closer to the ventral side, dividing into two branches slightly curved forward. With age, one, less often two, inserted ribs intercalate between the bipartite ribs. The lingual bend of the secondary ribs on the venter, characteristic of the genus as a whole, is still weakly expressed.

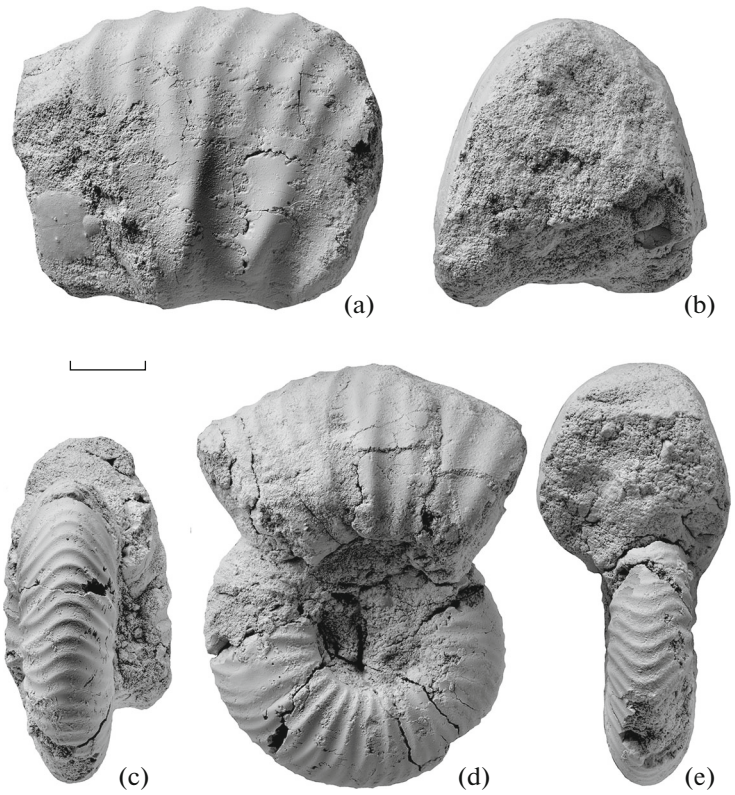



**Fig. 4.** *Surites spasskensis* (Nikitin, 1888), holotype Mining Museum, nos. 9/81 and 10/81, phragmocone: (a, d) lateral view, (b, e) apertural view, (c) ventral view; Ryazan Region, Spassk District, right bank of the Oka River, upstream of the Staraya Ryazan Hillfort; Ryazanian Stage, Spasskensis Zone. Scale bar 10 mm.

Dimensions in mm and ratios:

| Specimen no. | Dm | WH | WW | UW | WH / Dm | WW/ Dm | UW / Dm |
|---|---|---|---|---|---|---|---|
| PIN no. 3990/485 | 98 | 39.5 | 39 | 24 | 0.4 | 0.4 | 0.25 |
| | 85 | 38.5 | 34 | 20 | 0.45 | 0.4 | 0.24 |
| GM 9/81 (holotype) | 56 | 27 | 24 | – | 0.48 | 0.43 | – |
| | 40 | 15.5 | 13 | 14 | 0.39 | 0.33 | 0.35 |
| TsNIGR Museum 5/623 | 52.5 | 22.3 | 22 | 16.5 | 0.43 | 0.42 | 0.31 |
| | 42 | 16 | 13 | 13 | 0.38 | 0.31 | 0.31 |
| PIN no. 3990/486 | 42.5 | 17 | 15 | 11.5 | 0.4 | 0.35 | 0.27 |
| | 34 | 15.5 | 12 | 8 | 0.45 | 0.35 | 0.24 |

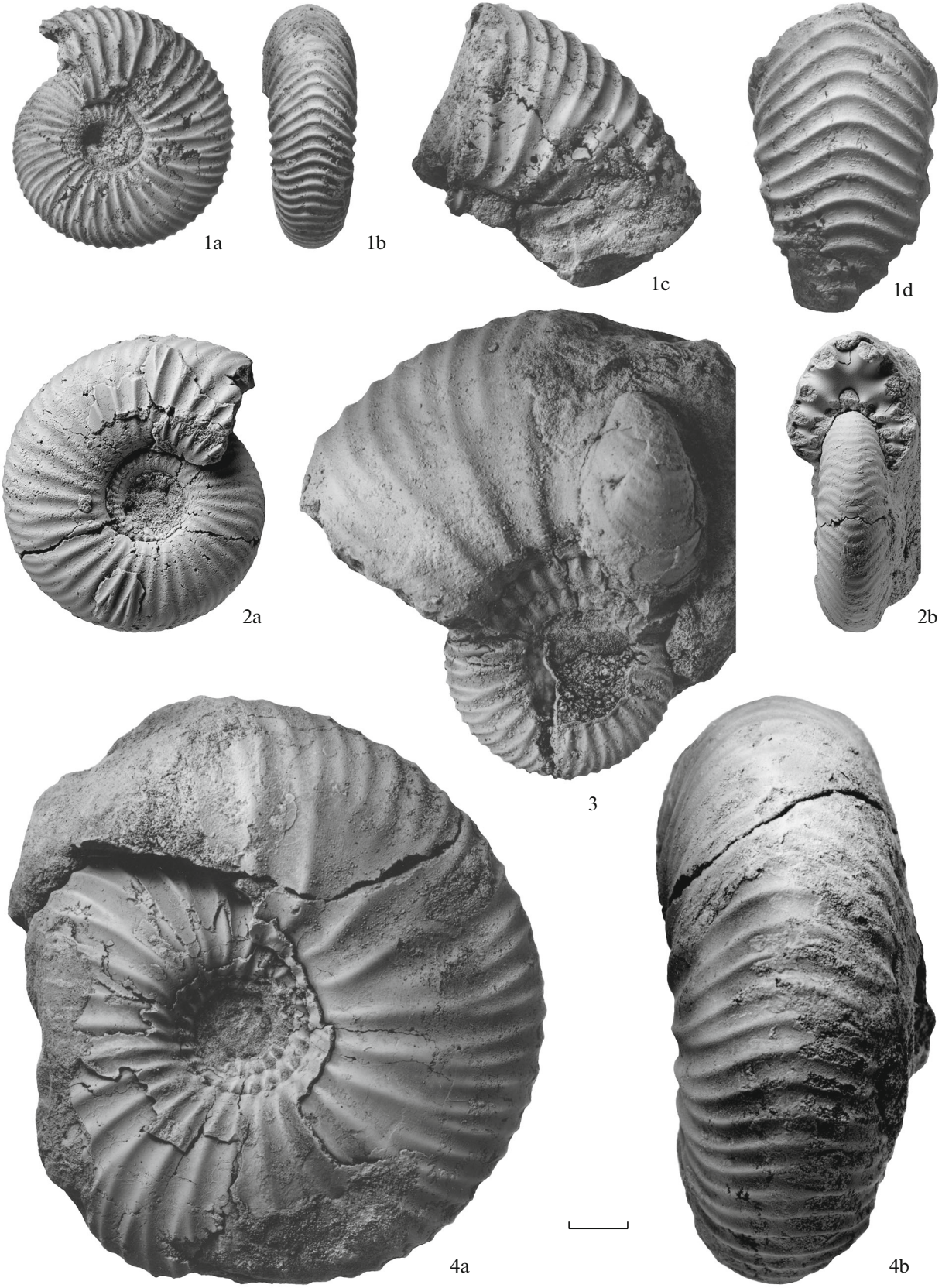
Variability. The variability is expressed in small differences in the shape of the section of whorls and in the number of inserted ribs of adult shells.

Comparison. Descriptions from *S. tzikwinianus* (Bogoslowsky) are listed below, after the description of the latter.

Remarks. Sasonova (1971, p. 40, pl. 10, fig. 2) mistakenly indicated a specimen from her collection as the lectotype. However, from the description of the species, it follows that her concept of the species was still based on the specimen depicted by Nikitin, and this is confirmed in a later work (Sasonova, 1977, p. 48). However, from the work of Nikitin (1888) it clearly follows that he described parts of the same specimen, only one of which served to describe it as a new species. Consequently, this specimen is the holotype, as Schulgina (1972b, p. 151) correctly indicated, by monotypy.

The species described above differs from its most likely direct ancestor, *Praesurites unshensis* (Nikitin) from the *Rjasanensis* Zone (Mitta, 2019a), in the shape of the whorl cross-section, more prominent, well-pronounced ornamentation at adult stages, and the absence of distinctly tripartite ribs.

Plate 8



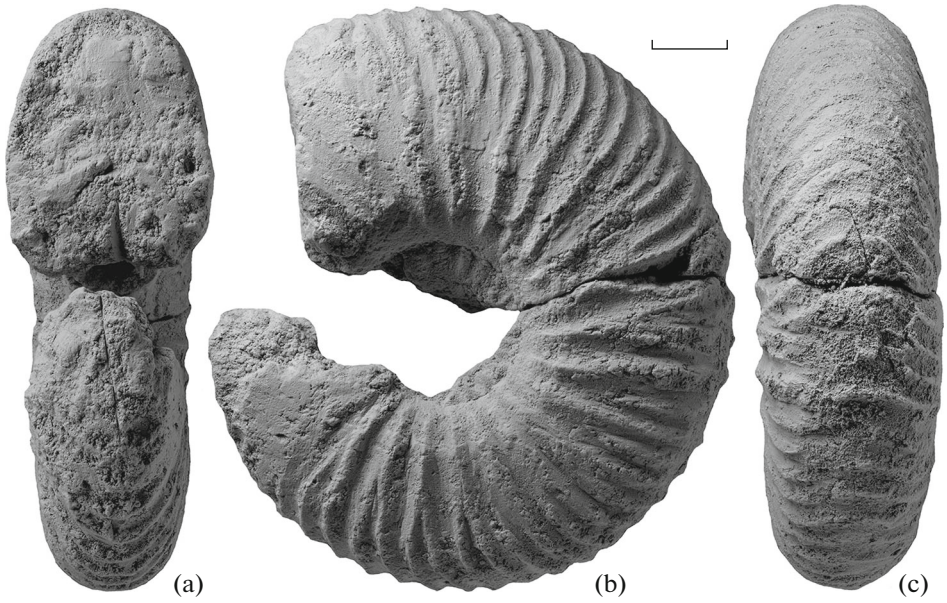



**Fig. 5.** *Surites tzikwinianus* (Bogoslowsky, 1896), holotype TsNIGR Museum, no. 15/623, phragmocone: (a) apertural view, (b) lateral view, (c) ventral view; Ryazan Region, Spassk District, right bank of the Oka River, near the village of Tsyvkino [=Chevkino]; Ryazanian Stage, *Tzikwinianus* Zone. Scale bar 10 mm.

Ammonites from the Menya River identified by Sasonova (1971, 1977) as *S. spasskensis* (see synonymy), are distinguished by a pronounced bend of the ribs on the venter, which is typical of the later representatives of the genus. The state of preservation of these ammonites, completely or partially filled with calcite, is typical for the lowermost Valanginian (*Unduloplicatilis* Zone) in sections of the Sura River basin (Mitta, 2018).

The specimen identified as *S. spasskensis* by Bogoslowsky, was nominally identified by Schulgina (1972a, 1972b) as *S. spasskensoides* sp. nov., and later (Schulgina, 1985) as *S. subspasskensis* nom. nov. pro *S. spasskensis* Bogoslowsky. I consider both these names to be junior subjective synonyms of *S. spasskensis*.

The ammonites in my collection from the Kashpir section on the Volga River, where *Olcostephanus spasskensis* was recorded by Bogoslowsky (1896b), are strongly compressed; they can only be defined as *Surites* cf. *spasskensis*.

M a t e r i a l. Three specimens from the quarries of the Lopatinsky phosphorite mine, Voskresensk District, Moscow Region; eight specimens from the outcrop below the village of Nikitino on the Oka River, Spassk District, Ryazan Region; all Ryazanian Stage, *Spasskensis* Zone.

***Surites tzikwinianus* (Bogoslowsky, 1896)**

Plate 9, figs. 1–6

*Olcostephanus tzikwinianus*: Bogoslowsky, 1896a, p. 59, pl. 2, fig. 6. *Olcostephanus* cf. *tzikwinianus*: Bogoslowsky, 1902, p. 25, pl. 5, fig. 1.

*Surites tzikwinianus*: Sasonova, 1971, p. 35, pl. 4, fig. 1; 1977, p. 48, pl. 10, fig. 1, pl. 23, fig. 4; Mitta and Bogomolov, 2008, pl. 1, fig. 4; Rogov et al., 2015, pl. 7, fig. 10.

non *Paracraspedites tzikwinianus*: Gerasimov et al., 1962, pl. 9, fig. 3 (=*Caseyiceras*? sp.).

H o l o t y p e (by monotypy). TsNIGR Museum, no. 15/623 (Bogoslowsky, 1896a, p. 59, pl. 2, fig. 6); Ryazan Region, Spassk District, right bank of the Oka river, near the village of Tsykvino (=Chevkino); ferruginous sand in the upper part of the Ryazan stage.

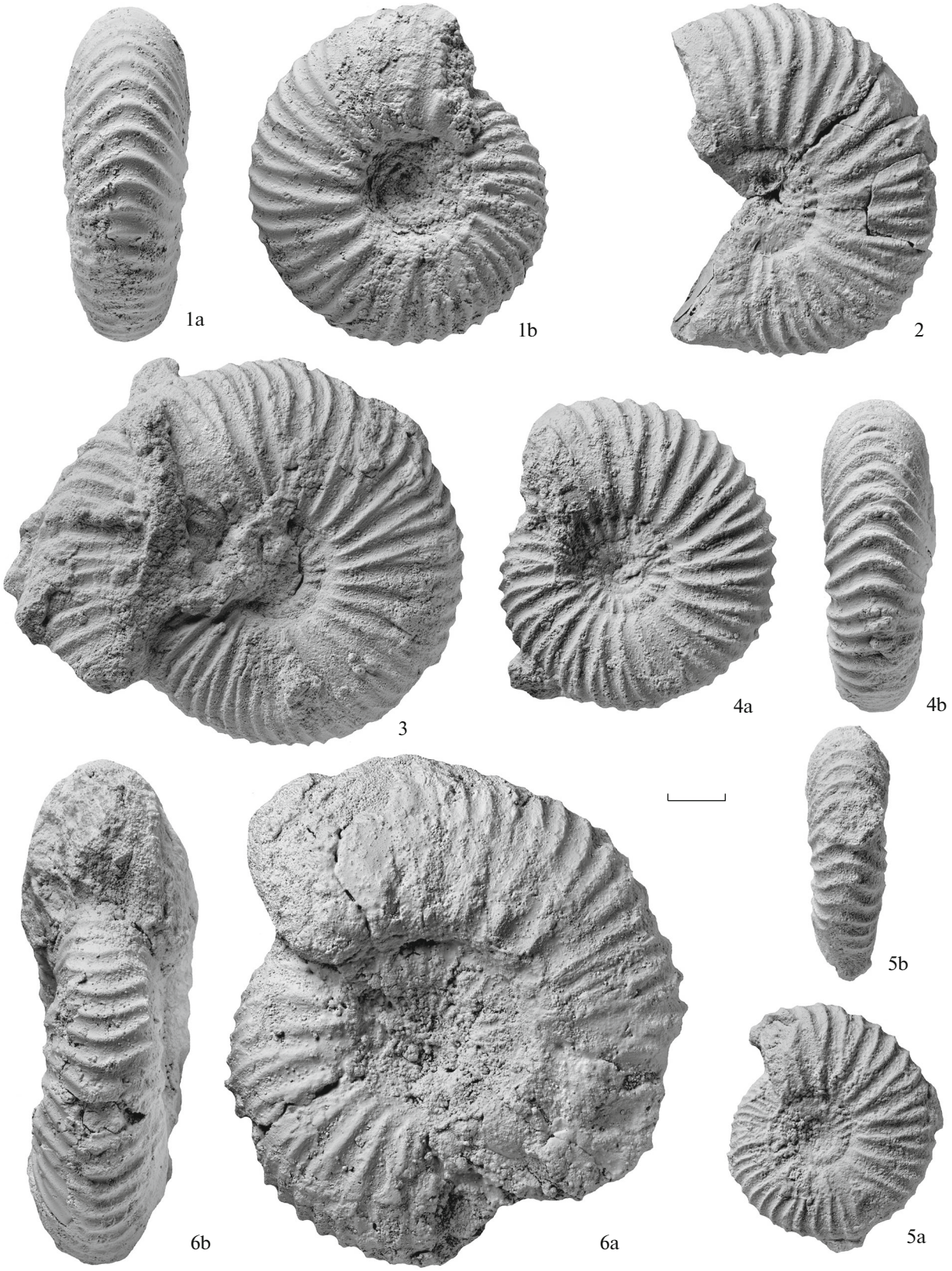
D e s c r i p t i o n (Fig. 5). Phragmocones of the largest specimens in the collection reach 100 mm in diameter. The whorls are moderately wide, oval in

E x p l a n a t i o n o f P l a t e 8

**Figs. 1–4.** *Surites spasskensis* (Bogoslowsky): (1) specimen PIN, no. 3990/486, phragmocone: (1a, 1c) lateral view, (1b, 1d) ventral view; (2) specimen TsNIGR Museum, no. 5/623, phragmocone: (2a) lateral view, (2b) apertural view; (3) specimen PIN, no. 3990/487, phragmocone of an adult shell with a partly preserved body chamber, lateral view; (4) specimen PIN, no. 3990/485, phragmocone of an adult shell with a partly preserved body chamber: (4a) lateral view, (4b) ventral view. Scale bar 10 mm; asterisk (*) marks the beginning of body chamber.

Moscow region, Lopatinsky phosphorite mine, collection of present author; (2) Ryazan Region, river bank of the Oka River near the village of Shatrishche (illustrated by Bogoslowsky, 1896a, pl. 9, fig. 1); (3, 4) Ryazan Region, bank of the Oka River, downstream of the village of Nikitino, collection of present author; all—Ryazanian Stage, *Surites spasskensis* Zone.

Plate 9



Explanation of Plate 9

**Figs. 1–6.** *Surites tzikwinianus* (Bogoslowsky): (1) specimen PIN, no. 3990/481, phragmocone: (1a) lateral view, (1b) ventral view; (2) specimen PIN, no. 3990/480, phragmocone, lateral view; (3) specimen PIN, no. 3990/479, phragmocone, lateral view; (4) specimen PIN, no. 3990/478, phragmocone: (4a) lateral view, (4b) ventral view; (5) specimen PIN, no. 3990/494, phragmocone: (5a) lateral view, (5b) ventral view; (6) specimen PIN, no. 3990/493, phragmocone: (6a) lateral view, (6b) apertural view. Scale bar 10 mm.

(1, 2, 6) Moscow Region, Voskresensk district, Lopatinsky phosphorite mine; (3–5) Chuvashia, Poretskoe District, bank of the Menya River downstream of the village of Mishukovo; all—Ryazanian Stage, *Surites tzikwinianus* Zone; present author's collection.

cross-section; at young stages (D up to 50–60 mm) the greatest thickness is in the middle part of the sides, with age it moves to the umbilical edge. The flanks are almost flat or very slightly convex. The umbilicus is moderately wide; the low umbilical wall is steep. Now shells with an adult body chamber are known.

The ornamentation consists of relatively short subradial primary ribs, which are divided into two, more rarely three (at D more than 60 mm), slightly curved anteriorly. The branching point of the ribs in the same specimen can be located closer to the umbilical edge or, conversely, move to the mid-flanks. With age, intercalating ribs appear, due to the loss of connection of one of the branches with the primary rib. The lingual bend of the secondary ribs on the venter is distinctly expressed. Irregular constrictions are sometimes present.

D i m e n s i o n s in mm and ratios:

| Specimen no. | Dm | WH | WW | UW | WH/Dm | WW/Dm | UW/Dm |
|---|---|---|---|---|---|---|---|
| PIN no. 3990/492 | 98.5 | ~35 | ~35 | ~32 | 0.35 | 0.35 | 0.32 |
| PIN no. 3990/493 | 86 | 31 | 31 | 31.5 | 0.36 | 0.36 | 0.32 |
| TsNIGR Museum no. 15/623 | 76.7 | 32 | 26.3 | 22.7 | 0.42 | 0.34 | 0.3 |
| PIN no. 3990/479 | 68 | 28 | 21 | 21 | 0.41 | 0.31 | 0.31 |
| PIN no. 3990/480 | 58 | 23 | 21 | 17 | 0.4 | 0.36 | 0.29 |
| PIN no. 3990/481 | 57 | 23 | ~22 | 16 | 0.4 | 0.39 | 0.28 |
| | 47 | 20 | ~17 | 14.5 | 0.42 | 0.36 | 0.31 |
| PIN 3990/478 | 55.5 | 21 | 19 | 17.5 | 0.38 | 0.34 | 0.31 |
| | 46.5 | 18 | 15.5 | 15 | 0.39 | 0.33 | 0.32 |
| PIN 3990/494 | 41 | 16 | 14 | 13 | 0.39 | 0.34 | 0.32 |

C o m p a r i s o n. The described species is readily distinguished from *S. spasskensi*s (Nikitin) by the less strongly inflated whorls with almost flat lateral sides, a shallow umbilicus, and the branching point of the ribs located closer to the umbilicus.

M a t e r i a l. Six specimens from the quarries of the Lopatinsky phosphorite mine, Voskresensk District, Moscow Region; four specimens from the outcrop on the Unzha River, between the villages of Ogarkovo and Efimovo, Makariev District, Kostroma Region; 17 specimens from outcrops on the Menya River downstream of the village of Mishukovo, Poretskoe District of Chuvashia; all Ryazanian Stage, *Tzikwinianus* Zone.

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