

## The gastropod genus *Stegocoelia* Donald, 1889 (Murchisoniidae) from Middle and Upper Carboniferous of the Central part of Russian Plate

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**ABSTRACT.** The gastropod genus *Stegocoelia* is widespread in the Middle and Upper Carboniferous of the Central part of Russian Plate and represented by 11 species, 8 described as new. The new species are: *Stegocoelia acuta* sp. nov., *S. okaensis* sp. nov., *S. korobtshevoensis* sp. nov., *S. acutiformis* sp. nov., *S. klyazmaensis* sp. nov., *S. gzheliensis* sp. nov., *S. turabievoensis* sp. nov., and *S. laschmaensis* sp. nov. Shells of *S. (S.) knighti* (Licharew, 1975), *S. (S.) alta* Licharew, 1975, and *S. (S.) berestovensis* Zernetskaja, 1983 were found and described from the marine deposits of the studied region for the first time. The Licharew's gastropod collection from the Eastern Flank of the Urals was thoroughly examined, and representatives of *Stegocoelia* from Karabolka River region are revised. The systematic position of *Stegocoelia*, *Hypergonia*, *Taasia*, *Vebericochlis*, *Donaldospira*, *Goniasma*, and *Orthonema* is discussed.

The present paper continues the study of gastropods from the Middle and Upper Carboniferous of the Central part of the Russian Plate [Mazaev 1994, 1996, 1997, 1998; Starobogatov, Mazaev 1999]. Although *Stegocoelia* is a common faunal element in the studied successions, this genus is reported here for the first time. Eleven species were recognized during the study, 8 of them being new. Most described species are abundant and widespread. Their remains occur in offshore sublittoral facies together with other diverse and abundant skeletal remains. *S. laschmaensis* sp. nov. occurs in shallow, apparently lagoonal limestone with extreme depositional regime and signs of episodic emergence; it is considered as endemic.

Over 330 specimens of *Stegocoelia* were obtained from the 24 localities of the Moscow Basin and Oksko-Tzninskiy Swell [description of localities see Mazaev 1994, 1996, 1997, 1998]. All the material obtained is represented by imprints, often of quite imperfect preservation, and studied using the latex moulds. All the material described here is housed in the Paleontological Museum of the Russian Academy of Sciences, collection No. 4471.

### History and distribution of *Stegocoelia*

Originally species of *Stegocoelia* and *Hypergonia* have been described from the Lower Carboniferous of Great Britain and Belgium [Donald 1889, 1892, 1895]. Longstaff (née Donald) [1926], when revising the British Carboniferous Murchisoniidae, considered *Stegocoelia* as a synonym of *Hypergonia* and listed 25 species of the genus. Latter, Batten [1966] mentioned 6 previously described species from Lower Carboniferous of Great Britain.

From the American Mississippian, about eight nominal species of the genus have been described [Yochelson, Saunders, 1967; Thein, Nitecki 1974]. The list of *Stegocoelia* species from the Pennsylvanian and Permian American marine units is considerably shorter, though these species were often mentioned and well described [Yochelson, Saunders 1967; Batten 1995; Hoare et al., 1997; Kues, Batten, 2001].

Two Permian species *S. (Taasia) bengkaka* Batten, 1985, and *S. (Stegocoelia)* sp. were described by Batten [1985] from Malaysia, however, from my point of view, accommodation of these species in *Stegocoelia* is doubtful.

Yin [1932] described several species of murchisoniid gastropods from the Middle Carboniferous of Northern China, but attributed them to *Solenospira* Ulrich et Scofield, 1897. The species described by Yin as *Solenospira amana* (Konink 1883) is identified here as *Stegocoelia berestovensis* Zernetskaja, 1983.

A large number of species of *Stegocoelia* was described from Ferghana Valley (Uzbekistan) by Licharew [1967].

Zernetskaja [1983] mentioned two species of the genus from the Serpuchovian and Bashkirian Stages of the Donetsk Basin (Ukraine), one of them was found in the studied region and described here.

The large gastropod complex from the Karabolka River (the Eastern Flank of the Urals) was described by Licharew [1975]. This complex contains many species common with the gastropod complex from the Russian Plate, it was reexamined and when preparing this work. The shells of *Stegocoelia* in the collection are very small, mainly

juvenile. Licharew described 14 new species of *Stegocoelia*. However, most of them proved to be synonyms. Other two species, *Cyclozyga rara* Licharew, 1975 and *C. knighti* Licharew, 1975 do not show collabral sculptural elements on juvenile whorls and, taking into account other morphological features, I refer them to *Stegocoelia*. In the same work, Licharew described a new species *Stegocoelia (S.) rara* Licharew [1975: 67, 68, pl. X, figs. 5, 6], which is considered here as senior homonym. It is thus necessary to introduce a replacement name for the junior secondary homonym. *Stegocoelia licharewi* nom. nov. is given here to replace *Cyclozyga? rara* Licharew [Licharew, 1975: 114, pl. XVII, fig. 16; holotype No. 260, Central Geological Museum, St.-Petersburg, collection No. 9758]. This species has been based on a single shell of good preservation; it is unknown from the Central part of the Russian Plate.

The second species identified as *Stegocoelia knighti* (Licharew, 1975) is relatively abundant in the studied region. The type material of *S. (Stegocoelia) compactiformis* Licharew, 1975 and *S. (S.) rara* Licharew, 1975 ( $\neq$  *Cyclozyga rara* Licharew, 1975) is represented by two very small shells of each species (maximum height 2.7 mm). The surface of the shells of *S. (S.) compactiformis* was hardly damaged by acid during the preparation. The sculptural elements and angle of juvenile whorls of both species strongly resemble those of juvenile shells of *Stegocoelia knighti* (Licharew, 1975) and differ only in size and, respectively, in the number of whorls. Therefore I consider them as synonyms.

*S. (Stegocoelia) yakowlewi* Licharew, 1975 is represented by juvenile shells and its comparison with the species from the Russian Plate is very difficult. However, this species is apparently close to *S. okaensis* sp. nov.

*S. (Hypergonia?) alta* Licharew, 1975, *S. (H.?) altiformis* Licharew, 1975, *S. (H.?) acris* Licharew, 1975, *S. (H.?)* sp. aff. *acris* Licharew, 1975, *S. (H.?) procera* Licharew, 1975, and *S. (H.?)* sp. indet. *C* Licharew, 1975 were described from rather few (1 to 8 specimens for each species) almost adult shells or their fragments of different size. Comparison of the type materials with specimens from the Russian Plate shows that all these shells belong to one species. The whorl profile of the species changes at different ontogenetic stages: angular — at juvenile whorls, rounded — at adult whorls, and sometimes nearly flattened — on the last whorls.

The holotype of *S. (Hypergonia?) korobkovi* Licharew, 1975 is a juvenile shell. Judging from the whorl profile and selenizone position, this species should be referred to the genus *Goniasma* Tomlin 1930. Other seven specimens referred to this species are rather small and can be identified as juvenile shells of *S. (H.?) alta*.

*S. (H.?) arguta* Licharew, 1975 was based on a single specimen of good quality. The shells of species are well represented in the Russian Plate

(Moscovian Stage). Based on the features of the studied specimens I provisionally refer the species to *Orthonema*.

*S. (Hypergonia?) scalaris* Licharew, 1975 has been described from a single fragment of very small shell (2.4 mm in diameter). Licharew [1975: 72] noted that "...exterior outline of this species is peculiar and differs from the other species of the subgenus *Hypergonia*". This specimen is obviously a juvenile shell of *S. (H.?) arguta* Licharew, 1975. The whorl of this shell is drum-like shaped; whorl surface straight and almost parallel to shell axis, bears three spiral lirae. This specimen is quite similar to some juvenile shells of the same species from the Russian Plate.

Thus, only four species in the Licharew's collection which to *Stegocoelia*: *S. knighti*, *S. alta*, *S. licharewi* nom. nov. (= *Cyclozyga rara* Licharew, 1975), *S. yakowlewi*. Two species are known in the Middle and Upper Carboniferous from the Central part of the Russian Plate and described here.

## Morphology

Shells of *Stegocoelia* are small, up to 30 mm, high-spined, consist of 10-18 whorls divided into protoconch, juvenile whorls, and adult whorls. The protoconch (Fig. 1) is orthostrophic, smooth, consisting of one to three whorls. The juvenile whorls (Fig. 1) are one to six in number, bearing three spiral lirae: upper lira weak and placed just below upper suture, two other lirae are strong, closely placed, and the uppermost forms a carina about at midwhorl. The carina is variously, and forming a slightly angular periphery. Selenizone band is placed on the upper slope of the whorl, almost twice wider than the interspace between two strong, closely placed spiral lirae. The juvenile whorls of different species of *Stegocoelia* always possess this specific structure and differ usually only in their whorl height/width ratio and in the number of whorls. The three lirae are correspond to the first, second and third main lira on the adult whorls. During ontogenesis, the first lira shifts from suture, and the interspace between it and the suture becomes equal to or slightly larger than the selenizone. The juvenile whorls of the species that have additional sutural lira on the adult whorls show the same sculpture. The sutural lira appears on the last juvenile whorl, between the suture and shifted upper lira. (Fig. 1 sl).

Sculptural elements of adult whorls consist of spiral lirae and fine growth lines. The face of adult whorls always bears four main spiral lirae with nearly equal interspaces (Fig. 1: 11, 21, 31, 41). The lira bordering selenizone band from the top is proposed to designate as the *first lira* (upper lira on juvenile whorls) (Fig. 1 11). Some species possess an additional spiral lira placed between first lira and upper suture, *sutural lira* in my designation (Fig. 1 sl). The sutural lira is often placed just below the suture and it slightly differs in its size

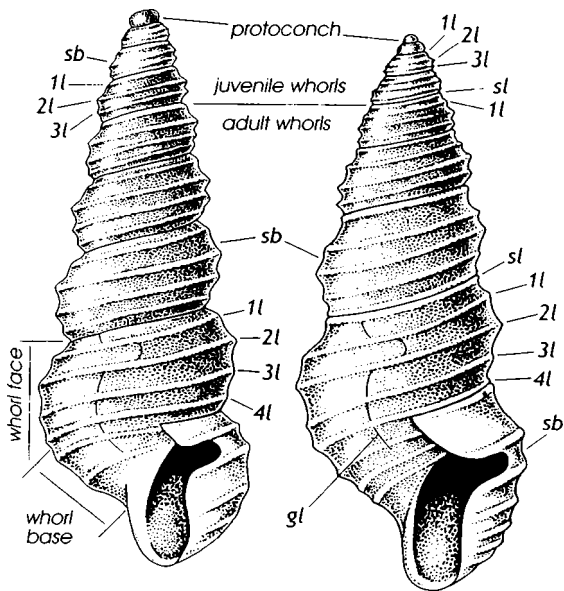


FIG. 1. Morphology of a *Stegocoelia* shell: sb — selenizone band, sl — sutural liras, 1l, 2l, 3l, 4l — first, second, third, and fourth main liras, gl — growth lines.

РИС. 1. Морфология раковины *Stegocoelia*: sb — полоска селенизоны, sl — пришовное ребро, 1l, 2l, 3l, 4l — первое, второе, третье и четвертое спиральное ребро, gl — линии роста

from other main liras. The presence of this liras is an important character in species considered. The basal side of the adult whorls may be smooth or ornamented with up to six spiral liras. The number of the spiral liras on the basal side changes in ontogenesis. Additional spiral threads of smaller size are some times placed between main spiral liras on whorl face and/or basal side on the last whorls of some species.

The selenizone band (Fig. 1 sb) delimited by the first and second spiral liras, has a smooth, slightly concave surface, with weak lunula of growth lines. Some specimens, i. e. *Stegocoelia knighti* and *S. (S.) gzheliensis* sp. nov., have a fine thread near the second spiral liras on the selenizone band. *Stegocoelia acutiformis* sp. nov. is the only known representative of the genus possessing completely preserved aperture margins with preserved slit (Figs. 2 M).

The growth lines (Fig. 1 gl) are usually fine and distinct, gently curved, procline above selenizone and opisthocline below it.

The profile of the adult whorls may be rounded or angular. The periphery of a whorl always coincides with the position of the second spiral liras. If the liras forms a distinct carina, the whorl profile is characterized as angular, with upper and down slopes. Some species show both types of profiles at different ontogenetic stages (*S. alta*, *S. acuta* sp. nov., and *S. acutiformis* sp. nov.).

The species-level character are the size, apical angle, whorl number, height/width ratio of the

whorls, number of juvenile whorls, adult pattern whorl profile, position and number of spiral liras, presence or absence of sutural liras, number of the spiral liras on basal side.

## Taxonomy

Donald [1889] erected the taxon *Stegocoelia* as a "section" of *Murchisonia*, then proposed the "section" *Hypergonia* as an additional taxon which "...agrees with *Stegocoelia* in position of the sinus, but differs in not having the inner lip reflected on the columella, and in not being umbilicated" [Donald, 1892: 564]. Later Longstaff [1926 p. 529] (née Donald), after a detailed investigation, concluded that *Stegocoelia* might be a synonym of *Hypergonia* and raised the latter to the generic rank. Knight et al. [1960] restored the priority of the genus *Stegocoelia* and divided it into three subgenera: *Stegocoelia*, *Hypergonia*, and *Taosia* Girty, 1939. Batten [1966: 76] noted that "...the principal difference between the three subgenera of *Stegocoelia* is based on the relative height of the spire, the position of the periphery on the whorl and the whorl profile... In *S. (Stegocoelia)* the shell is low spired and the periphery is high on the whorl, which is usually rounded. In *S. (Hypergonia)* Donald the shell tends to be high spired and with periphery about mid-whorl. Finally, *S. (Taosia)* Girty which also has a high spire, has periphery low on the whorl and, in addition, may develop nodes or other forms of collabral ornament." In fact, *Taosia* is distinctly defined by low periphery position and angular whorl profile. In respect to other two taxa: *Stegocoelia* s. str. and *Hypergonia*, the characters proposed by Knight et al. [1960] and then Batten [1966], are not clear. First, it is difficult to draw a distinct boundary between such characters as high- and low-spired shells. Second, we also cannot use the proposed combination of the characters, because there are species of *Stegocoelia* s. l. possessing the inverted combination of features: low spire — angular whorl profile (*S. knighti*), and high spire — rounded whorl profile (*S. acuta* sp. nov.). Moreover, some species show different whorl profile (angular or rounded) at different ontogenetic stages (*S. alta*, *S. klyazmaensis* sp. nov.) or in the row of intraspecific variability (*S. acutiformis* sp. nov.). Finally, the diagnostic features that provide the basis for the separation of *Stegocoelia* and *Hypergonia* completely differ from those suggested by Donald [1892: 564]. Thus, there are no features that allow to separate these taxa, and, therefore, I consider that *S. (Hypergonia)* is a junior synonym of *S. (Stegocoelia)*.

*Taosia* Girty, 1939 which was originally described as a genus, similarly to *Stegocoelia* is characterized by four main spiral liras on the whorl face, growth lines, flattened selenizone band ornamented with very weak lunulae and bordered by the first and second upper spiral liras. However, *Taosia* distinctly differs from *Stegocoelia* in having

a distinct angular carina, which is placed on the third main spiral lira, whereas in species of *Stegocoelia* with the same type of carina it is placed on the second main spiral lira. This character is obviously single and essential for distinguishing these two taxa.

Licharew [1967] erected *Vebericochlis* as a subgenus of *Stegocoelia*. The type species, *S. (Vebericochlis) maclayi* Licharew, 1967, has been described from the Lower Permian of Ferghana Valley and it is very similar to species of *Stegocoelia* in having four spiral lirae on whorl face and flattened selenizone band, which is placed between the first and second lirae. Like *Taosia crenulata* Girty 1939, *S. (Vebericochlis) maclayi* has a nodose ornamentation, and Licharew noted that the presence of colabral nodose ornamentation is the main feature for distinguishing of the subgenus. In my mind, *Vebericochlis* differs primarily by its shell outline. The whorl shell profile of the subgenus is barrel-like, a small moderately sharp carina is placed on the first spiral lira and forms a narrow shoulder. From this point of view, the type species of *Vebericochlis* is similar with a species of *Orthonema* but in contrast to it, lacks the shoulder and possesses a slender base of body whorl.

The monotype genus *Hermosanema* Kues et Batten, 2001 is suggested to be closely related to *Orthonema* and is placed in Acanthonematidae. However, the juvenile whorls of type species, *Hermosanema varium* Kues et Batten, 2001 are quite similar to those of species of *Stegocoelia* described here. These juvenile whorls bear a pair of strong, closely spaced spiral lirae, the upper forming angular periphery, and the third weak spiral lira is placed just below upper shoulder. The subsequent whorls of *Hermosanema* bear four spiral lirae becoming obsolete on the last whorls. In respect to above-mentioned features, *Hermosanema* is very similar to *Concinnispira* Zernetskaja, 1983 [Zernetskaja, 1983]. However, *Concinnispira* differs in having the selenizone defined by faint striae, and this feature brings it close to *Arribazona* Kues, 1990. Unfortunately the juvenile whorls of the type species, *Arribazona hesperia* Kues, 1990, are poorly preserved and described as virtually flat, with very shallow sutures.

The genus *Orthonema* Meek et Worthen, which is traditionally separated from murchisoniid gastropods (except for Tracey et al. [1993] who provisionally assigned it to Murchisoniidae) shares some common characters with *Stegocoelia*. Like *Stegocoelia* specimens, the whorls of *Orthonema* are usually ornamented with four spiral lirae. The large specimens of some *Orthonema* species show weak lunulae on the band between the first and second spiral lirae and obviously might have a shallow apertural slit. The mantle cavity of the taxa should be very similar in general structure and, in spite of the traditional point of view, I suggest that both genera are closely related, and include *Orthonema* in Murchisoniidae.

Thus, the above-listed taxa are similar in the position of selenizone. The other characters (type of selenizone, structure of juvenile whorls, profile and ornamentation of adult whorls), form arbitrary combination in various taxa. These taxa can not form optimal groups by combination of two or more characters and therefore they all must have the same taxonomic rank. Therefore, *Stegocoelia* s. str., *Taosia*, and *Vebericochlis* are considered here as separate genera.

*Donaldospira* Batten, 1966 and *Goniasma* which were treated as subgenera of *Stegocoelia* by Batten [1995] and later by Kues and Batten [2001], are also raised here to generic rank and considered as separate genera. The species of *Goniasma* possess the same type of selenizone as *Stegocoelia*, i. e. flattened and bordered by two spiral lirae, but the selenizone is placed just below the mid-whorl. The species of *Donaldospira* have the selenizone positioned exactly at mid-whorl, with the selenizone surface convex and with strongly developed lunulae. Thus, the *Stegocoelia* evidently differs from *Donaldospira* and *Goniasma*, primarily by selenizone position.

## Order Pleurotomariiformes Thiele, 1925

### Suborder Murchisonioidei

#### Cox et Knight, 1960

#### Superfamily Murchisoniacea Koken, 1896

#### Family Murchisoniidae Koken, 1896

### *Stegocoelia* Donald, 1889

*Murchisonia (Stegocoelia)*: Donald, 1889: 623; *Murchisonia (Hypergonia)*: Donald, 1892: 564; *Hypergonia*: Longstaff, 1926: 529; *Stegocoelia*: Knight et al., 1960: 1293; Batten, 1966: 76; Licharew, 1967: 55; Thein, Nitecki, 1974: 161; Licharew, 1975: 66; Kues, Batten, 2001: 45; *Stegocoelia (Stegocoelia)*: Knight et al., 1960: 1293; Thein, Nitecki, 1974: 161; *Stegocoelia (Hypergonia)*: Knight et al., 1960: 1293; Batten, 1966: 77; Thein, Nitecki, 1974: 167; Licharew, 1975: 66.

**Type species** — *Murchisonia (Stegocoelia) compacta* Donald, 1889: 624, pl. 20, figs. 9-13. Upper limestone series, lower Carboniferous; Glencart, Darly, Scotland. Holotype No. PG122, paratypes: No. PG123, No.126 in the Natural History Museum, London, Great Britain.

**Diagnosis.** Shells high-spined, consisting of about 10-18 whorls. Sculpture consists of spiral lirae and fine growth lines. Protoconch conical, of 1 to 3 smooth whorls. The juvenile whorls 1 to 4 in number, angular in profile, bearing three spiral lirae: upper lira weak and placed just below upper suture, two other lirae strong, closely placed, the uppermost forming distinct carina at about mid-whorl. Selenizone band placed on upper slope of whorl face, almost twice wider the interspace between two strong, closely set spiral lirae. At adult stage, first lira shifted downward from upper suture, the bend between first lira and suture equal to or slightly larger than selenizone band. Selenizone

band concave, smooth, bordered by first and second spiral lirae, with weak lunula of growth lines. Whorl face ornamented by four main revolving lirae, an additional sutural lira may be placed just below suture. Basal side of shell may be smooth or ornamented by up to six spiral lirae. Additional smaller spiral threads may be placed between main spiral lirae at whorl face and/or basal side on the last whorls. Second lira always marking periphery of the whorl. Whorl profile at adult stages may be rounded or angular. If whorl profile angular, the second lira forming distinct carina that divides whorl profile into upper and down slopes. Base of adult whorl rounded. Growth lines fine and distinct, gently rounded, prosocline above selenizone and prosocyrct below selenizone.

### *Stegocoelia alta* Licharew, 1975

(Figs. 2 A-E)

*Stegocoelia* (*Hypergonia*?) *alta*: Licharew, 1975: 69-70, pl. X, figs. 7-9; *Stegocoelia* (*Hypergonia*?) *altiformis*: Licharew, 1975: 70, pl. X, figs. 10-12; *Stegocoelia* (*Hypergonia*?) *acris*: Licharew, 1975: 70, 71, pl. X, figs. 13, 14; *Stegocoelia* (*Hypergonia*?) sp. aff. *acris*: Licharew, 1975: 71, pl. X, fig. 15; *Stegocoelia* (*Hypergonia*?) *procera*: Licharew, 1975: 72, pl. XI, figs. 4, 5; *Stegocoelia* (*Hypergonia*?) *korobkovi* (part.): Licharew, 1975: 72, pl. XI, figs. 1, 3, non fig. 2; *Stegocoelia* (*Hypergonia*?) sp. indet. c.: Licharew, 1975: 73, 74, pl. XI, fig. 8.

**Types:** Holotype No. 124, paratypes: No. 125, 351, 352, 353, Central Geological Museum, St. -Petersburg, collection No. 9758.

**Type locality:** Eastern Flank of the Urals, Karabolka River, outcrops near Ust'-Karabolka village, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small high-spired shell, up to 13 whorls, with low whorl expansion, anomphalous, sutures shallowly impressed. Protoconch of two smooth whorls, next 4-6 juvenile whorls sharply angulated and bear three spiral lirae, second lira forms sharp carina. Profile of adult whorls nearly straight-sided, gently convex. Ornamentation of one weak sutural lira and five spiral lirae. Smaller spiral lirae divided by equal interspaces, sutural lira faint to absent, fourth lira situated near lower suture, fifth lira placed on basal side. Selenizone between first and second lirae, interspace slightly wider than other. Aperture subcircular in shape, columella very short. Growth lines very thin, prosocline above selenizone and prosocyrct below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** Shells of the species undergo considerable ontogenetic changes. The juvenile whorls ornamented with three spiral lirae, second lira forms sharp carina. The profile of adult whorls is usually rounded or slightly angular. The profile of last adult whorls varies from rounded to flat.

### Measurements (mm):

Specimen	Height	Max. diameter
4471/79/89	6.0	1.5
4471/74/7	6.5	1.5
4471/74/237	6.5	1.5
4471/74/76	9.0	2.5
4471/20/18	9.0	2.5
4471/31/3	6.0	2.0

**Material examined:** 38 specimens. Loc. 18 — 5 specimens; loc. 20 — 3 specimens; loc. 26 — 1 specimen; loc. 31 — 1 specimen; loc. 74 — 10 specimens; loc. 79 — 13 specimens; loc. 87 — 7 specimens.

**Occurrence.** Central part of the Russian Plate: Myachkovian and Krevyakinian Provincial Stage; Eastern Flank of the Urals: Myachkovian Provincial Stage.

### *Stegocoelia klyzmaensis* Mazaev, sp. nov.

(Fig. 2 F)

**Types.** Holotype : No. 4471/4/5, paratype: No. 4471/4/29.

**Type locality.** Quarry near Schelkovo Town. 4.5 m above the top of motley shales. Amerevian Provincial Stage, Gzhelian Stage.

**Description.** Small, high-spired shell, formed by at least from 10 whorls, anomphalous, sutures grooved, moderately deep. Protoconch not preserved. Two juvenile whorls gently angular in profile, ornamented with three spiral lirae. Upper lira weak, placed just below upper suture, two other lirae strong, closely placed, forming angular whorl profile. Adult whorls ornamented with four spiral lirae. Sutural lira absent, selenizone situated between first and second lirae. Selenizone band almost twice wider than interspaces between other lirae. Second lira forming distinct carina on firsts three adult whorls, profile of these whorls angular. Profile of next four whorls rounded. Basal whorl side gently rounded, smooth, bears one spiral lira. Aperture suboval in shape, outer lip thin. Growth lines and slit not preserved.

**Discussion.** This species is most similar to *S. gzheliensis* sp. nov. and *S. acutiformis* sp. nov. and differs in having a wide selenizone band which is almost twice wider than interspaces between other lirae. From *S. acuta* sp. nov. this species also differs in having the whorl width/height ratio about 2.0.

### Measurements (mm):

Specimen	Height	Max. diameter
4471/4/5 holotype	8.0	3.0
4471/84/3	4.5	2.0

**Material examined:** 10 specimens: loc. 3 — 4 specimens, loc. 4 — 2 specimens, loc. 6 — 1 specimen, loc. 84 — 3 specimens.

**Occurrence.** Central part of the Russian Plate: Rethyzian and Amerevian Provincial Stage.

**Etymology.** The species is named after the Kly-

azma River in the Basin from which the first sample of the species was supplied.

[**Диагноз.** Раковина маленькая, башенковидная, образована не менее чем 10 оборотами, без пупка, шов каналовидный, относительно глубокий. Протоконх не сохранился. Два ювенильных оборота слегка угловатые в профиле, орнаментированы тремя спиральными ребрами. Верхнее ребро слабое и расположено сразу под верхним швом, два остальных ребра резко сближены и формируют угловатый профиль оборота. Взрослые обороты орнаментированы четырьмя спиральными ребрами. Подшовное ребро отсутствует, селенизона расположена между первым и вторым ребром. Селенизона почти в два раза шире расстояния между остальными ребрами. На первых трех взрослых оборотах второе ребро формирует четкий киль, профиль этих оборотов угловатый. Профиль следующих четырех оборотов округлый. Базальная поверхность оборота округлая, гладкая, несет одно спиральное ребро. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Линии роста и мантинная шель не сохранились.]

*Stegocoelia turabievoensis* Mazaev, sp. nov.

(Figs. 2 G, H)

**Types.** Holotype: PM RAS, No. 4471/2/15, paratypes: No 4471/2/14, 4471/2/16, 4471/2/20, 4471/2/27, 4471/2/85.

**Type locality.** Schelkovo quarry, Moscow Region; upper part of thick (2 m) unite yellow limestone, approximately 3.5 m above the top of motley shales; Amerevian Provincial Stage, Gzhelian Stage.

**Description.** High-spined shell of medium size, up to 16 slightly angular whorls, anomphalous, sutures distinct, shallowly impressed. Protoconch consist of 1.5-2 rounded, smooth whorls. Six juvenile whorls badly preserved, angular in profile, ornamented with three spiral lirae, second lira forms carina. Adult whorl face ornamented with four spiral lirae including distinct or weak sutural lira:

sutural lira placed just under suture, first lira weak, situated on mid-part of upper slope angular shelf, second lira forms distinct carina, third just above lower suture. Selenizone band situated between first and second lirae. Basal whorl side smooth with one revolving lira placed near third lira. Aperture trapezoid in shape, outer lip thin, inner lip thickened, columella long, straight. Growth lines very thin, prosocline above selenizone and prosocyrct below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** This species is the only having three mane spiral lirae on the whorl face. Thus the selenizone is placed almost on mid-part of whorl face, whereas other species of the genus possess the selenizone band shifted to upper suture.

**Measurements (mm):**

Specimen	Height	Max. diameter
4471/2/15, holotype	15.0	4.0
4471/2/16, paratype	12.0	3.0

**Material examined:** 7 specimens from type locality.

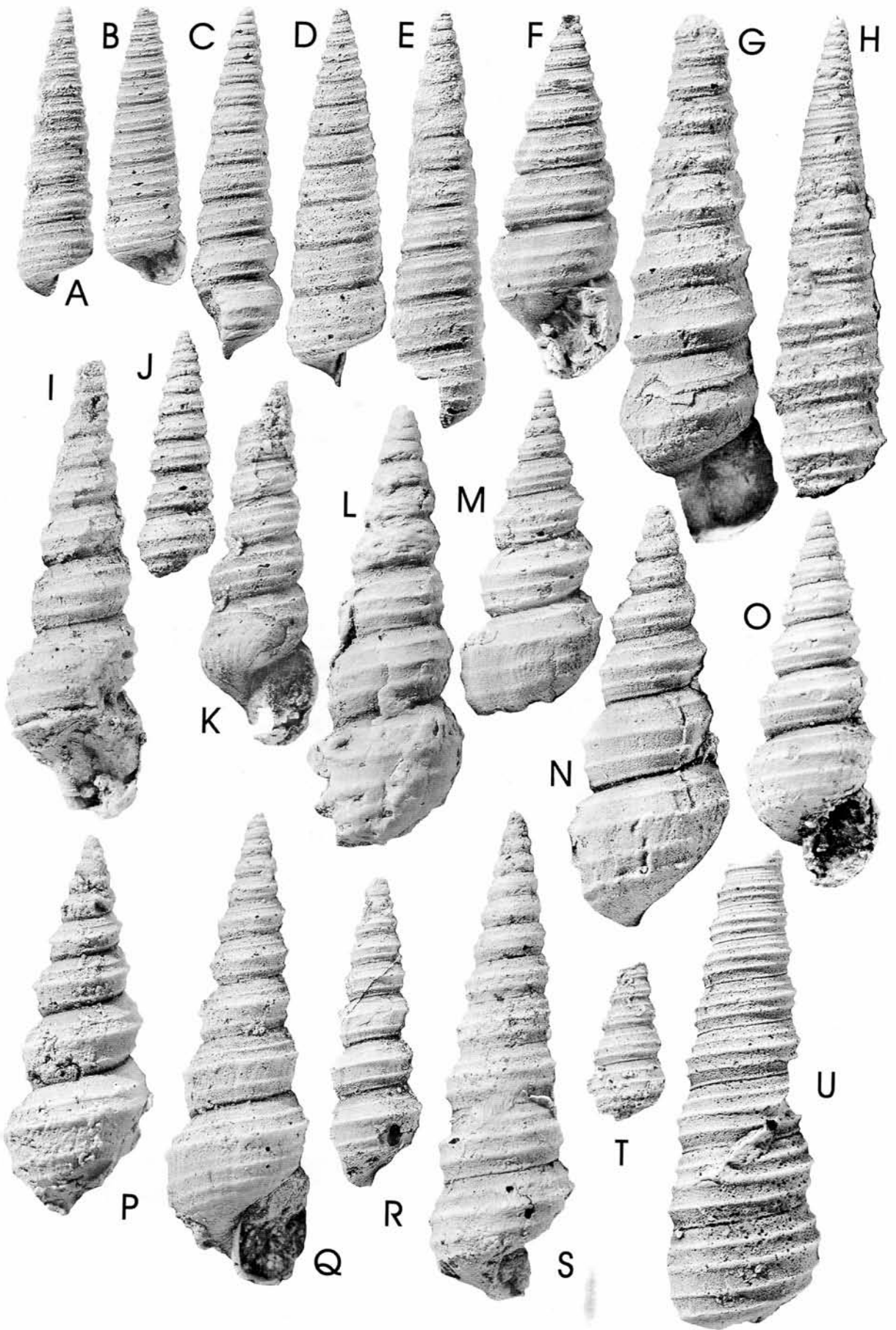
**Occurrence.** Type locality only.

**Etymology.** The species is named after Turabievo village, near which it was found.

[**Диагноз.** Раковина высоко коническая, среднего размера, из 16 слабо угловатых оборотов, без пупка, шов четкий, мелкий. Протоконх состоит из 1.5-2 округлых, гладких оборотов. Шесть ювенильных оборотов плохой сохранности, в профиле угловатые, орнаментированы тремя спиральными ребрами, второе ребро формирует киль. Боковая поверхность взрослых оборотов орнаментирована четырьмя спиральными ребрами, включая четкое или слабое подшовное ребро. Подшовное ребро расположено непосредственно около шва, первое ребро слабое, расположено посередине верхней части угловатой боковой поверхности, второе формирует четкий киль, третье — сразу над нижним швом. Полоска селенизоны расположена между первым и вторым ребром. Базальная повер-

FIG. 2. A-E — *Stegocoelia alta* Licharew, 1975,  $\times 7$ : A — No. 4471/74/237, Maleevo quarry, Korobcheevo Formation; B-E — No. 4471/79/98, No. 4471/79/254, No. 4471/79/3, 4471/79/46, Akishino quarry, Domodedovo Formation; F — *Stegocoelia klyazmaensis* sp. nov.,  $\times 8$ , holotype; G, H — *Stegocoelia turabievoensis* sp. nov.,  $\times 7$ : H — holotype, I — paratype No. 4471/2/16; Schelkovo quarry, Amerevian Provincial Stage; I-L — *Stegocoelia acuta* sp. nov.,  $\times 8$ : I, J — paratypes: No. 4471/18/147, No. 4471/18/183, K — holotype, L — paratype No. 4471/18/177, Afanasievo quarry, Ratmirovo Formation; M-O — *Stegocoelia acutiformis* sp. nov.,  $\times 7$ : M, N — paratypes: No. 4471/90/2, No. 4471/90/3, O — holotype; P-R — *Stegocoelia gzheliensis* sp. nov.,  $\times 7$ : P — paratype No. 4471/3/36; Rusavkino quarry, Rechitzian Provincial Stage, Q — No. 4471/37/1, outcrops on the bank of the Klyazma River near Amerevo village, Amerevian Provincial Stage, collected by A. P. Ivanov, R — holotype; S-U — *Stegocoelia berestovensis* Zernetskaja, 1983,  $\times 4$ : S, U — No. No. 4471/21/9, 4471/21/11; Konev Bor quarry, Korobcheevo Formation; T — No. 4471/70/40, outcrop near Korobcheevo village on the Oka River, Korobcheevo Formation.

РИС. 2. А-Е — *Stegocoelia alta* Licharew, 1975,  $\times 7$ : А — No. 4471/74/237, Малеевский карьер, коробчевская свита; В-Е — No. 4471/79/98, No. 4471/79/254, No. 4471/79/3, 4471/79/46, Акишинский карьер, домодедовская свита; F — *Stegocoelia klyazmaensis* sp. nov.,  $\times 8$ , голотип; G, H — *Stegocoelia turabievoensis* sp. nov.,  $\times 7$ : H — голотип, I — паратип No. 4471/2/16; Шелковский карьер, амереvский горизонт; I-L — *Stegocoelia acuta* sp. nov.,  $\times 8$ : I, J — паратипы: No. 4471/18/147, No. 4471/18/183, K — голотип, L — паратип No. 4471/18/177, Афанасьевский карьер, ратмировская свита; M-O — *Stegocoelia acutiformis* sp. nov.,  $\times 7$ : M, N — паратипы: No. 4471/90/2, No. 4471/90/3, O — голотип; P-R — *Stegocoelia gzheliensis* sp. nov.,  $\times 7$ : P — паратип No. 4471/3/36; Русавкинский карьер, речичкинский горизонт, Q — No. 4471/37/1, обнажение на берегу р. Клязьма около д. Амерево, амереvский горизонт, сборы А. П. Иванова, R — голотип; S-U — *Stegocoelia berestovensis* Zernetskaja, 1983,  $\times 4$ : S, U — No. 4471/21/9, 4471/21/11; карьер Конеv Бор, Коробчевская свита; T — No. 4471/70/40, обнажение около д. Коробчевево, Коробчевская свита.





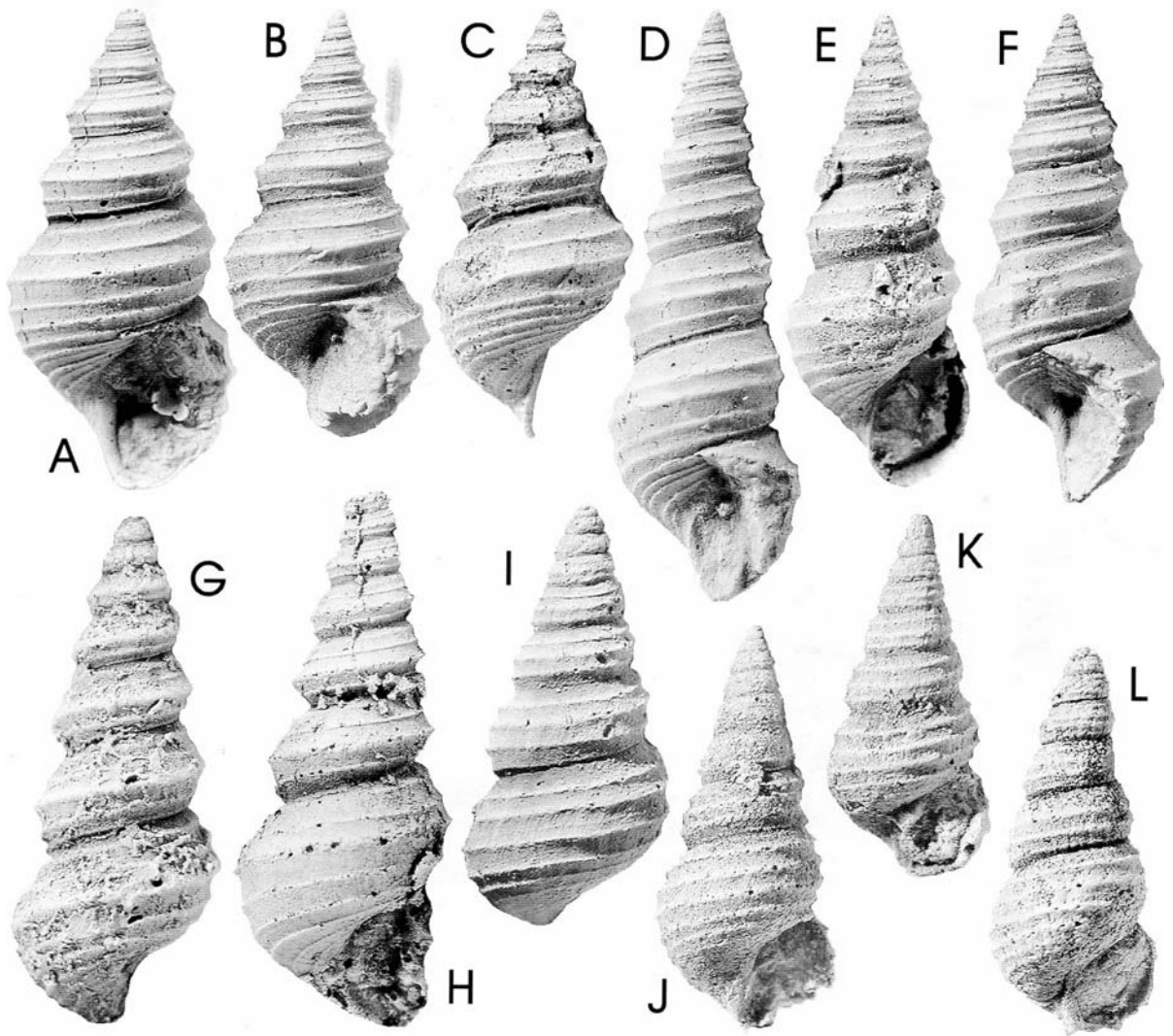


FIG. 3. A-C — *Stegocoelia knighti* (Licharew, 1975),  $\times 7$ : No. 4471/79/290, No. 4471/79/222, No. 4471/79/142, Akishino quarry, Domodedovo Formation; D-F — *Stegocoelia okaensis* sp. nov.,  $\times 7$ : D — holotype, E, F — paratypes: No. 4471/79/91, No. 4471/79/19; Akishino quarry, Domodedovo Formation; G, H — *Stegocoelia korobcheevoensis* sp. nov.,  $\times 7$ : K — paratype No. 4471/50/140, L — holotype, Domodedovo quarry, Korobcheevo Formation; I-L — *Stegocoelia laschmaensis* sp. nov.,  $\times 9$ : I — holotype, J-L — paratypes: No. 4471/77/91, No. 4471/77/30, No. 4471/77/17: Akishino quarry, Korobcheevo Formation.

FIG. 3. A-C — *Stegocoelia knighti* (Licharew, 1975),  $\times 7$ : No. 4471/79/290, No. 4471/79/222, No. 4471/79/142, Акишинский карьер, домодедовская свита; D-F — *Stegocoelia okaensis* sp. nov.,  $\times 7$ : D — голотип, E, F — паратипы: No. 4471/79/91, No. 4471/79/19; Акишинский карьер, домодедовская свита; G, H — *Stegocoelia korobcheevoensis* sp. nov.,  $\times 7$ : K — паратип No. 4471/50/140, L — голотип; I-L — *Stegocoelia laschmaensis* sp. nov.,  $\times 9$ : I — голотип, J-L — паратипы: No. 4471/77/91, No. 4471/77/30, No. 4471/77/17: Акишинский карьер, коробчевская свита.

хность гладкая, несет одно спиральное ребро, расположенное около третьего ребра. Устье трапециевидное, внешняя губа тонкая, внутренняя губа толстая. Столбик длинный, прямой. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая, с едва заметными лунами образованными линиями роста. Мантийная шель не сохранилась.]

*Stegocoelia acuta* Mazaev, sp. nov.

(Figs. 2 I-L)

**Types.** Holotype: No. 4471/18/182, paratypes: No. 4471/18/147, No. 4471/18/177, No. 4471/18/183.

**Type locality.** Afanasievo quarry, Moscow Region; lowest part of thick (2.5 m) unite light lime



mudstones; Ratmirovo Formation, Krevyakinian Provincial Stage, Kasimovian Stage.

**Description.** Small, high-spired shell, consists of at least 14 rounded whorls, anomphalous, suture grooved, deep. Protoconch badly preserved. Six juvenile whorls very slender, gently angular in profile, with three spiral lirae, second lira forms carina. Adult whorl rounded, ornamented with four spiral lirae separated by equal interspaces: sutural lira not developed, second lira on mid-whorl, fourth lira situated just near lower suture. Selenizone placed between first and second lirae. Basal whorl side gently rounded, with one revolving lira below fourth lira. Aperture suboval in shape, outer lip thin, inner lip thickened, columella long, straight. Growth lines very thin, prosocline above selenizone and prosoclyrt below selenizone. Selenizone band smooth, gently concave, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** *Stegocoelia acuta* sp. nov. is most similar to *S. acutiformis* sp. nov. and differs from it in having a slenderer spire with width/height ratio of the whorl 1.4-1.7. From *S. gzheliensis* sp. nov. this species differs in having a rounded whorl profile and equal interspaces between spiral lirae on adult whorls.

#### Measurements (mm):

Specimen	Height	Max. diameter
4471/18/182, holotype	>9.0	2.8
4471/18/147, paratype	12.0	4.0
4471/18/177, paratype	11.5	3.7
4471/18/183, paratype	6.5	2.3

**Material examined:** 29 specimens: loc. 12 — 2 specimens, loc. 18 — 24 specimens, loc. 36 — 2 specimens, loc. 87 — 1 specimen.

**Occurrence.** Central part of the Russian Plate: Myachkovian, Krevyakinian, Rechitzian and Amevian Provincial Stages.

**Etymology.** The name of the species derived from *acutus*, Latin — acute.

[**Диагноз.** Раковина маленькая, башенковидная, состоит по меньшей мере из 14 округлых оборотов, без пупка, шов каналовидный, глубокий. Протоконх плохо сохранился. Шесть ювенильных оборотов очень стройные, угловатые в профиле, орнаментированы тремя спиральными ребрами, второе ребро формирует киль. Боковая поверхность взрослых оборотов округлая, орнаментирована четырьмя спиральными ребрами с равными расстояниями между ними; подшовное ребро не развито, второе ребро расположено примерно посередине боковой поверхности оборота, четвертое ребро расположено сразу около нижнего шва. Селенизона расположена между первым и вторым ребром. Базальная поверхность округлая, несет одно спиральное ребро, расположенное под четвертым ребром. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Столбик умеренно длинный, прямой. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая, слегка вогнутая, с едва заметными лулулами, образованными линиями роста. Мантийная шель не сохранилась.]

### *Stegocoelia acutiformis* Mazaev, sp. nov.

(Figs. 2 M-O)

**Types.** Holotype: No. 4471/90/1; paratypes: No. 4471/90/2, No. 4471/90/3, No. 4471/50/4, No. 4471/90/5.

**Type locality.** Afanasievo quarry, Moscow Region; coarse grainstones below the "Turaevski dolomite" horizon, Peski Formation, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small, high-spired shell, of up to 12 angular whorls, anomphalous, suture grooved, moderately deep. Protoconch of about 2 smooth rounded whorls. One juvenile whorl slightly angular, with three spiral lirae, interspaces between first and second lirae twice wider than interspaces between second and third lirae. Adult whorl face ornamented with four spiral lirae: sutural lira not developed, first lira situated approximately the mid-part of upper slope angular shelf or slightly shifted to suture, second lira dividing whorl face into upper and lower slopes, sometimes forming carina, third lira placed on about mid-part of lower slope, fourth lira near suture. Upper and lower slopes slightly rounded. Selenizone placed between first and second lirae. Basal whorl side rounded, bears one revolving lira, which situated below fourth lira. Interspaces between lirae of equal size. Aperture suboval in shape, outer lip thin, inner lip thickened, columella moderately long, straight. Growth lines very thin, prosocline above selenizone and prosoclyrt below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit twice deeper than wide.

**Discussion.** This species is variable in the proportions of juvenile whorls and the whorl profile that may be angular to rounded on the last whorls (Figs. 2 O, P). *Stegocoelia acutiformis* sp. nov. is most similar to *S. acuta* sp. nov. and *S. gzheliensis* sp. nov. and differs in less slender shape. The whorl width/height ratio ranges from 1.7 to 1.9. This species possesses equal interspaces between spiral lirae but the interspaces between suture and first spiral lira is narrower.

#### Measurements (mm):

Specimen	Height	Max. diameter
4471/90/1, holotype	10.0	3.5
4471/90/2, paratype	9.0	3.5
4471/90/3, paratype	10.5	4.0

**Material examined:** 65 specimens: loc. 18 — 27 specimens, loc. 19 — 3 specimens, loc. 74 — 7 specimens, loc. 83 — 1 specimen, loc. 87 — 2 specimens, loc. 90 — 18 specimens, loc. 93 — 7 specimens.

**Occurrence.** Central part of the Russian Plate: Podolskian, Myachkovian, Krevyakinian Provincial Stages.

**Etymology.** The species is named after *Stegocoelia acuta* sp. nov., that is the most similar species in the shape.

[**Диагноз.** Раковина маленькая, башенковидная, из

12 угловатых оборотов, без пупка, шов каналовидный, относительно глубокий. Протококн примерно из двух гладких округлых оборотов. Один ювенильный оборот слегка угловатый, орнаментирован тремя спиральными ребрами, полоска между первым и вторым ребром в два раза шире полоски между вторым и третьим ребром. Боковая поверхность взрослых оборотов орнаментирована четырьмя спиральными ребрами: подшовное ребро неразвито, первое ребро расположено примерно посередине верхней части боковой поверхности или слегка смещено ко шву, второе — разделяет боковую поверхность оборота на верхнюю и нижнюю части и обычно формирует острый киль, третье ребро расположено примерно посередине нижней части боковой поверхности, четвертое — около нижнего шва. Селенизона расположена между первым и вторым ребром. Базальная поверхность округлая, несет одно спиральное ребро, расположенное под четвертым ребром. Расстояния между спиральными ребрами примерно равны. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Столбик умеренно длинный, прямой. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая с едва заметными лунулами, образованными линиями роста. Глубина мантийной щели в два раза больше ее ширины.]

*Stegocoelia gzheliensis* Mazaev, sp. nov.

(Figs. 2 P-R)

**Types.** Holotype: No. 4471/3/5; paratypes: No. 4471/3/3, No. 4471/3/36.

**Type locality.** Rusavkino quarry, Moscow Region; yellow limestone 0.5 m above the top of motley shales. Rechitzian Provincial Stage, Gzhelian Stage.

**Description.** Small, high-spired shell, of up to 13 sharply angular whorls, anomphalous, suture grooved, deep. Protoconch not preserved. Juvenile whorls badly preserved, apparently consist of two angular whorls with three spiral lirae, second lira forms sharp carina. Adult whorl face ornamented with four spiral lirae: sutural lira absent or weak lirae developed on last whorl, first lira situated approximately on mid-part of upper slope angular shelf, second lira at shoulder edge, third lira on the down slope angular shelf, and fourth lira near lower suture. Selenizone placed between first and second lirae. Basal whorl side bears one or two weak spiral lirae. Interspace between second and third lirae usually almost twice wider than selenizone band on last whorls. Additional fine revolving thread may be found in this interspace. Aperture suboval in shape, outer lip thin, inner lip thickened, columella moderately long, straight. Growth lines very thin, prosocline above selenizone and prosoclyt below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** This species is variable in the whorl

profile that ranges from angulated with sharp carina to shouldered on the last whorl. *Stegocoelia gzheliensis* sp. nov. is most similar to *S. acutiformis* sp. nov. but differs in having considerably slender juvenile whorls and wide interspace between second and third lirae on the last whorls, moreover the interspace between suture and first spiral lira is equal to or slightly wider than the selenizone band. From *S. acuta* sp. nov. this species differs in having sharply angular profile of both adult and juvenile whorls.

**Measurements** (mm):

Specimen	Height	Max. diameter
4471/3/5, holotype	8.0	2.5
4471/3/36, paratype	9.5	2.5
4471/37/1	12.0	4.0

**Material examined:** 11 specimens: loc. 3 — 3 specimens, loc. 4 — 3 specimens, loc. 6 — 3 specimens, loc. 37 — 1 specimen, loc. 75 — 1 specimen.

**Occurrence.** Central part of the Russian Plate: Rechitzian and Amerevian Provincial Stage.

**Etymology.** The species is named after the Gzhel District, where the species was found.

[**Диагноз.** Раковина маленькая, башенковидная, до 13 резко угловатых оборотов, без пупка, шов каналовидный, глубокий. Протококн не сохранился. Ювенильные обороты сохранились плохо, очевидно состоят из двух угловатых оборотов с тремя спиральными ребрами, второе ребро формирует резкий киль. Расстояние между первым и вторым ребром шире, чем между вторым и третьим. Боковая поверхность взрослых оборотов орнаментирована четырьмя спиральными ребрами: подшовное ребро отсутствует или слабо выражено на последнем обороте, первое ребро расположено примерно посередине верхней части резко угловатой боковой поверхности, второе — на краю плеча, третье — на нижней части боковой поверхности и четвертое — около нижнего шва. Селенизона расположена между первым и вторым ребром. Базальная поверхность несет одно или два слабых спиральных ребра. На последнем обороте расстояние между вторым и третьим ребром может быть почти вдвое шире, чем полоска селенизоны. На этом межреберном пространстве может быть расположено дополнительное тонкое нитевидное ребро. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Столбик умеренно длинный, прямой. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая, с едва заметными лунулами, образованными линиями роста. Мантийная щель не сохранилась.]

*Stegocoelia berestovensis* Zernetskaja, 1983

(Figs. 2 S-U)

*Solenospira amana* (de Konink, 1883): Yin, 1932: 18, 19, pl. II, figs. 14-17; *Stegocoelia* (*Stegocoelia*) *berestovensis*: Zernetskaja, 1983: 111, 112, pl. 63, figs. 5-7.

**Types.** Holotype: No. 1936/8, Institute of Geological Sciences, Ukrainian Academy of Sciences.

**Type locality.** Donets Basin, Berestovaya River, left bank, near Fenino village. Bashkirian Stage, limestone E<sub>1</sub><sup>4</sup>

**Description.** High-spired shell of medium size, up to 11-12 slightly angular whorls, anomphalous, sutures distinct, shallowly impressed. Protoconch not preserved. Three angular juvenile whorls badly preserved, apparently ornamented with three spiral lirae, second lira forms carina. Adult whorl face ornamented with four spiral lirae: sutural lira absent or very weak, first lira situated approximately on mid-part of upper slope angular shelf, second lira forms carina, third — on lower slope angular shelf, fourth just above lower suture or covered by next whorl. Last whorl subrounded, almost not angulated. Selenizone band smooth, situated between first and second lirae. Basal whorl side smooth. Growth lines and slit not preserved.

**Discussion.** The adult whorls of *Stegocoelia berestovensis* are very similar to those of *S. acutiformis* sp. and differ by a shallower suture and a larger whorl width/height ratio which comprise 2.0 to 2.2.

**Measurements (mm):**

Specimen	Height	Max. diameter
4471/21/11	>23.0	6.5
4471/21/9	21.5	6.0

**Material examined:** loc. 21 — 2 specimens, loc. 70 — 1 specimen.

**Occurrence.** Moscow Basin, Korobcheevo Formation, Moscovian Stage; Donets Basin, Bashkirian Stage, limestone E<sub>1</sub><sup>4</sup>; China, Penchi Series, Mokou Formation.

*Stegocoelia knighti* (Licharew, 1975).

(Figs. 3 A-C)

*Cyclozyga knighti*: Licharew, 1975: 113-114, pl. XVIII, figs. 13-15; *Stegocoelia (Stegocoelia?) compactiformis*: Licharew, 1975: 67, pl. X, figs. 3, 4; *Stegocoelia (Stegocoelia?) rara*: Licharew, 1975: 67, 68, pl. X, figs. 5, 6.

**Types.** Holotype No. 257, paratypes: No. 258, 259, 368, Central Geological Museum, St.-Peterburg, collection No. 9758.

**Type locality.** Eastern Flank of the Urals, Karabolka River, outcrops near Ust'-Karabolka village, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small, moderately high-spired shell, up to 8 sharply angular whorls, anomphalous, sutures grooved, not deep. Apical angle of about 50 degree. Protoconch of 2 smooth whorls. Three angular juvenile whorls ornamented with three spiral lirae, upper lira weak and placed just below upper suture, two other lirae are strong, closely spaced and form angular whorl profile. Additional weak sutural lira appears on last juvenile whorl. Adult whorl face ornamented with four main spiral

lirae and additional sutural lira. Sutural and first main lira near upper suture on upper slope angular shelf, second main lira at shoulder edge, third and fourth main lirae near lower suture. Selenizone placed between first (not sutural) and second main lirae, one very fine thread may be situated on selenizone band near second main lira. Basal whorl side ornamented with five revolving lirae and four additional weak threads between them on last whorl. Aperture suboval in shape, outer lip thin, inner lip thickened, columella moderately long. Growth lines very thin, prosocline above selenizone and prosoclyrt below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** This species is closely related to *S. okaensis* sp. nov. in the structure of spiral lirae and differs only by larger apical angle.

**Measurements (mm):**

Specimen	Height	Max. diameter
4471/79/222	8.0	4.0
4471/79/142	8.5	4.0
4471/22/7	5.0	3.0
4471/6/26	7.0	3.5
4471/76/9	5.0	3.0

**Material examined:** 31 specimens. Loc. 3 — 5 specimens; loc. 4 — 1 specimen; loc. 6 — 1 specimen; loc. 18 — 1 specimen; loc. 20 — 3 specimens, loc. 22 — 2 specimens; loc. 26 — 1 specimen; loc. 30 — 1 specimen, loc. 50 — 2 specimens; loc. 74 — 1 specimen; loc. 76 — 1 specimen; loc. 79 — 10 specimens; loc. 84 — 1 specimen; loc. 85 — 1 specimen.

**Occurrence.** Central part of the Russian Plate: Myachkovian Provincial Stage, Middle Carboniferous; Krevyakinian, Rechitzian and Amerevian Provincial Stage. Eastern Flank of the Urals: Myachkovian Provincial Stage.

*Stegocoelia okaensis* Mazaev, sp. nov.

(Figs. 3 D-F)

**Types.** Holotype: No. 4471/79/262, paratypes: No. 4471/79/19; 4471/79/52; 4471/79/76; 4471/79/91.

**Type locality.** Akishino quarry (near Laschma village), Ryazan Region; base of thick (5 m) unite light lime mudstones, Domodedovo Formation, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small, high-spired shell, of up to 11 sharply angular whorls, anomphalous, suture grooved, not deep. Apical angle of about 40°. Protoconch of two smooth whorls. Two or three juvenile whorls angular in profile, ornamented with three spiral lirae, upper lira weak and placed just below upper suture, two other lirae strong, closely spaced and form angular whorl profile. Additional weak sutural lira appears on last juvenile whorl. Adult whorl face ornamented with four main spiral lirae and sutural lira: sutural lira situated just below

upper suture, first main lira on the upper slope angular shelf, second main lira usually forms carina, third main lira on lower slope angular shelf, and fourth main lira near lower suture or covered by next whorl. Selenizone placed between first and second main lirae, on last whorl the interspace between sutural and first lirae almost twice wider than selenizone band. Basal whorl side bears up to five spiral lirae on last whorl. Aperture suboval in shape, outer lip thin, inner lip thickened, columella moderately long. Growth lines very thin, prosocline above selenizone and prosocyrct below selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** *Stegocoelia okaensis* sp. nov. is very similar to *S. knighti* (Licharew, 1975) in the structure of spiral lirae and differs only in having smaller apical angle. From *S. korobcheevoensis* sp. nov. it differs in having larger number of lirae on base and wide interspace between sutural and first spiral lirae.

**Measurements (mm):**

Specimen	Height	Max. diameter
4471/79/262, holotype	11.5	3.5
4471/79/19, paratype	9.0	3.5
4471/79/52, paratype	7.5	3.0
4471/79/76, paratype	8.0	2.5
4471/79/91, paratype	9.0	3.0
4471/2/12	11.5	4.5

**Material examined:** 69 specimens: Loc. 2 — 1 specimen, loc. 13 — 1 specimen, loc. 22 — 3 specimens, loc. 25 — 2 specimens, loc. 26 — 6 specimens, loc. 28 — 1 specimen, loc. 33 — 1 specimen, loc. 70 — 7 specimens, loc. 74 — 14 specimens, loc. 79 — 28 specimens, loc. 80 — 1 specimen, loc. 85 — 5 specimens.

**Occurrence.** Central part of the Russian Plate: Myachkovian, Rechitzian and Amerevian Provincial Stage.

**Etymology.** The species is named after the Oka River in basin of which the species is collected.

[**Диагноз.** Раковина маленькая, башенковидная, из 11 резко угловатых оборотов, без пупка, шов каналовидный, не глубокий. Апикальный угол примерно 40 градусов. Протококонх из двух гладких оборотов. Два или три ювенильных оборота угловатые в профиле, орнаментированы тремя спиральными ребрами, верхнее ребро слабое и расположено сразу под верхним швом, два остальных ребра сильно сближены и формируют угловатый профиль оборота. На последнем ювенильном обороте появляется слабое дополнительное подшовное ребро. Боковая поверхность взрослых оборотов орнаментирована четырьмя основными спиральными ребрами и подшовным ребром: подшовное ребро расположено непосредственно под швом, первое основное ребро — на верхней части резко угловатой боковой поверхности, второе обычно формирует киль, третье — на нижней части боковой поверхности и четвертое — около нижнего шва или скрыто под следующим оборотом. Селенизона расположена между первым и вторым ребром, на последнем обороте расстояние между подшовным и первым ребром почти в два раза шире, чем полоска

селенизоны. Базальная поверхность на последнем обороте несет до пяти спиральных ребер. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Столбик умеренно длинный. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая, с едва заметными лулулами образованными линиями роста. Мантийная щель не сохранилась.]

*Stegocoelia korobcheevoensis*

Mazaev, sp. nov.

(Figs. 3 G, H)

**Types.** Holotype: No. 4471/50/150, paratypes: No. 4471/50/140; 4471/50/145.

**Type locality.** Domodedovo quarry, Moscow Region; upper part of thick (2 m) units light limestone with corals and fusulinids; Korobcheevo Formation, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small, high-spired shell, of up to 8 angular whorls, anomphalous, sutures grooved, moderately deep. Protoconch not preserved. Juvenile whorls angular, ornamented with three spiral lirae, second lira forms carina. Adult whorl face ornamented with four main spiral lirae and additional sutural lira. Sutural lira shifted from upper suture, first main lira placed on mid-part of upper slope angular shelf, second main lira forms carina, third main lira placed on mid-part of lower slope angular shelf. Fourth main spiral lira covered by subsequent whorls or situated just above lower suture. Selenizone band placed between first and second lirae. Basal whorl side bears three spiral lirae on last whorl. Aperture suboval in shape, outer lip thin, inner lip thickened. Growth lines very thin, prosocline above and slightly prosocyrct below selenizone. Slit not preserved.

**Discussion.** *Stegocoelia korobcheevoensis* sp. nov. is very similar to *S. okaensis* sp. nov. and differs in having sutural lira shifted from suture and lesser number of spiral lirae on basal whorl side. From *S. acutiformis* sp. nov. and *S. gzheliensis* sp. nov. this species differs in having three spiral lirae on basal whorl side and well developed sutural lira.

**Measurements (mm):**

Specimen	Height	Max. diameter
4471/50/150, holotype	9.0	4.0
4471/50/140, paratype	9.5	4.0
4471/50/145, paratype	>10.0	4.5

**Material examined:** 14 specimens: Loc. 18 — 1 specimen, loc. 28 — 1 specimen, loc. 50 — 6 specimens, loc. 70 — 5 specimens, loc. 87 — 1 specimen.

**Occurrence.** Central part of the Russian Plate: Myachkovian and Krevyakinian Provincial Stage.

**Etymology.** The species is named after the Korobcheevo Formation.

[**Диагноз.** Раковина маленькая, башенковидная, из 8 угловатых оборотов, без пупка, шов каналовидный, умеренно глубокий. Протоконх не сохранился. Ювенильные обороты угловатые, орнаментированы тремя спиральными ребрами, второе ребро формирует киль. Боковая поверхность взрослых оборотов орнаментирована четырьмя основными спиральными ребрами и дополнительным подшовным ребром. Подшовное ребро сдвинуто от шва, первое основное спиральное ребро расположено посередине верхней части резко угловатой боковой поверхности, второе основное ребро формирует киль, третье основное ребро посередине нижней части боковой поверхности. Четвертое спиральное ребро перекрывается последующим оборотом или расположено сразу над нижним швом. Селенизона расположена между первым и вторым ребром. Базальная поверхность на последнем обороте несет три спиральных ребра. Устье субовальное, внешняя губа тонкая, внутренняя губа толстая. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Мантийная шель не сохранилась.]

### *Stegocoelia laschmaensis*

Mazaev, sp. nov.

(Figs. 3 J-L)

**Types.** Holotype: PM RAS, No. 4471/77/60, paratypes: No. 4471/77/17, No. 4471/77/30, No. 4471/77/53, No. 4471/77/91.

**Type locality.** Akishino quarry (near Laschma village), Ryazan Region; fine coarse grainstone with *Meekella* in upper part of Korobcheevo Formation, Myachkovian Provincial Stage, Moscovian Stage.

**Description.** Small, high-spired shell, of up to 10 rounded whorls, anomphalous, sutures grooved, not deep. Protoconch of two smooth rounded whorls. One or two juvenile whorls, gently angular in profile, ornamented with three spiral lirae, second lira forms weak carina. Adult whorl face ornamented with four spiral lirae with equal interspaces. Sutural lira absent, fourth lira situated near lower suture. Two spiral lirae placed on upper part of basal side. Selenizone situated between first and second lirae. Whorl profile rounded. Aperture subrounded in shape, parietal lip thin, columellar lip thickened, gently curved. Growth lines very thin, prosocline above selenizone and prosocyrte below

selenizone. Selenizone band smooth, with very fine lunula of growth lines. Slit not preserved.

**Discussion.** From *S. acutiformis* sp. nov. it differs in having two spiral lirae on basal side.

#### Measurements (mm):

Specimen	Height	Max. diameter
4471/77/60, holotype	5.5	2.5
4471/77/17, paratype	6.0	3.0
4471/77/30, paratype	5.5	2.5
4471/77/53, paratype	6.0	3.0
4471/77/91, paratype	7.0	3.0

**Material examined:** 19 specimens from type locality.

**Occurrence.** Type locality only.

**Etymology.** The species is named after the Laschma village, near which the species was found.

[**Диагноз.** Раковина маленькая, башенковидная, из 10 округлых оборотов, без пупка, шов каналовидный, неглубокий. Протоконх из двух гладких округлых оборотов. Один или два ювенильных оборота в профиле слабо угловатые, орнаментированы тремя спиральными ребрами, второе ребро образует слабый киль. Боковая поверхность взрослых оборотов орнаментирована четырьмя спиральными ребрами с одинаковыми межреберными расстояниями. Подшовное ребро отсутствует, четвертое ребро расположено около нижнего шва. Два спиральных ребра расположены в верхней части базальной поверхности. Селенизона расположена между первым и вторым ребром. Профиль оборотов округлый. Устье округлое, парietальная губа тонкая, колумеллярная губа утолщенная, плавно изогнутая. Линии роста очень тонкие, направлены на верхней боковой поверхности назад от шва к селенизоне, а на нижней боковой поверхности образуют плавную дугу, выгнутую и слегка наклоненную вперед от селенизоны. Селенизона гладкая, с едва заметными лулулами, образованными линиями роста. Мантийная шель не сохранилась.]

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