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Middle and Late Carboniferous gastropods from the Central part of the Russian Plate. Part 3. Microdomatidae and Anomphalidae

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Three genera *Microdoma*, *Anematina*, *and Anomphalus* are reported from the Middle and Late Carboniferous of the region for the first time. Microdomatidae and Anomphalidae are transferred to the order Trochiformes Férussac, 1822. The genus *Anematina* is assigned to the family Microdomatidae. The previously described species are revised. Seven new species (***Microdoma pagoda* sp. nov.**, ***M. laschmensis* sp. nov.**, ***M. sinelnikovae* sp. nov.**, ***M. longum* sp. nov.**, ***M. jamensis* sp. nov.**, ***Anomphalus straparoliformis* sp. nov.**, **and *A. striatus* sp. nov.**) are described. A number of studied species of *Microdoma* and *Anomphalus* are quite similar morphologically to representatives of this genus from the North American Pennsylvanian.

Средне- и позднекаменноугольные гастроподы центральной части Русской плиты. Часть 3. Microdomatidae и Anomphalidae

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Три рода — *Microdoma*, *Anematina* и *Anomphalus* — впервые отмечены в среднем и верхнем карбоне этого региона. Microdomatidae and Anomphalidae помещены в отряд Trochiformes Férussac. Род *Anematina* отнесен к семейству Microdomatidae. Проведена ревизия ранее известных видов. Описано семь новых видов: ***Microdoma pagoda* sp. nov.**, ***M. laschmensis* sp. nov.**, ***M. sinelnikovae* sp. nov.**, ***M. longum* sp. nov.**, ***M. jamensis* sp. nov.**, ***Anomphalus straparoliformis* sp. nov.**, ***A. striatus* sp. nov.** Для ряда изученных видов *Microdoma* и *Anomphalus* отмечается сходство морфологии раковины с видами из пенсильвания Северной Америки.

INTRODUCTION

This article continues the study of the Middle and Late Carboniferous gastropods from the Central part of the Russian Plate and includes descriptions of representatives of the families Microdomatidae and Anomphalidae.

The pioneer description of Russian Microdomatidae has been done by Yakowlew [1899]. He has established a new genus *Tuberculopleura* which, according to Knight [1944], is a junior synonym of *Microdoma* Meek et Worthen, 1867. Also he described four species of *Tuberculopleura* which should be referred to *Microdoma*. There were no types designated in his description, but the work contained a list of localities and figures. Major part of Yakowlew's collection is stored in the Central Geological Museum in St.-Petersburg, No. 325, all these specimens labelled by the owner. Thus, it is not difficult to distinguish those of Yakowlew's speciemens which belong to the type series.

Unfortunately, types of *Microdoma tricinc-*

tum were lost. This material was collected by N. M. Sibirtzev from Upper Carboniferous rocks of Oksko-Tzninsky Swell.

The specimens No. 188 and No. 191 were designated by me as types of *Microdoma kulogora*. This materials was collected by F. N. Tschernyschov from Sakmarian rocks of Northern part of the Russian Plate (Pinega river, Kulogory).

I designated the specimens No. 199 and No. 202 as types of *Microdoma simensis*. This materials was also collected by F. N. Tschernyschov from Upper Carboniferous rocks of the Central Urals (Sim plant).

In the same way, the specimens No. 374, No. 375, and No. 378 are designated as types of *Microdoma anomalum*. This material was collected by N. N. Yakowlew from Upper Carboniferous rocks of Donets Basin (Kamenka River). He also mentioned this species from Upper Carboniferous rocks of Oksko-Tzninsky Swell.

Another species, *Microdoma gracile,* was described by Licharev in 1967 from the Upper Carboniferous – Lower Permian of Karacha-Tyr (Ferghana Valley). He also noted (p. 45) that "It is possible that our species (*M. gracile*) is identical to *M. tricinctum* (Sibirtzev in Yakowlew), but the comparison between them is difficult. Most of originals of Yakowlew are represented by imprints from sulphur or plasticine and many sculpture patterns have lost clearness".

The study of Yakowlew's and Licharev's collections (Central Geological Museum of St.-Petersburg No. 325 and No. 8336), as well as abundant material from the Middle and Upper Carboniferous of the Moscow Basin and Oksko-Tzninsky Swell has shown that *Microdoma anomalum, M. tricinctum*, and *M. gracile* are merely the members of a *Microdoma anomalum* variability row.

Yakowlew [1899, p. 61] and Licharev [1967, p. 45] wrote that *Tuberculopleura anomala* and *Microdoma gracile* correspondingly "are quite similar to *M. conicum* Meek et Worthen, 1867". Licharev noted that "*M. gracile* might be only a variation of *M. conicum*". In fact, these species much resemble each other, and the main difference between them is the geographic distribution.

The examination of the material studied, resulted in the establishment of five new species of *Microdoma,* in addition to previously described species.

Thus, there are eight species of *Microdoma* in the European part of the former USSR, *M. simensis* (Yakowlew, 1899), *M. kulogora* (Yakowlew, 1899), *M. anomalum* (Yakowlew, 1899), ***M. pagoda* sp. nov., *M. laschmensis* sp. nov., *M. sinelnikovae* sp. nov., *M. longum* sp. nov., *M. jamensis* sp. nov.**

It should be also noted that Licharev [1975] did not report microdomas among the diverse gastropod fauna of the Karabolka River, despite this genus usually occurs in other regions abundantly.

In this paper, *Anematina permiana* (Yakowlew, 1899) is also redescribed. The originals of *A. permiana* were collected by Yakowlew in Vyksa Town, Vladimir Region, in the Gzhelian Stage rock; more precise stratigraphic position requires a special study.

I consider this genus to be placed in the Microdomatidae. Three genera: *Anematina*, *Microdoma*, and *Glyptospira*, possess similar characters and the same variation range: shell appearance, pleural angle, shell thickness, apertural profile and structure, umbilicus structure, and they differ only in disposition of sculptural elements. The first genus has no sculpture, the second has a sculpture on the lateral surface only, the third has sculptural elements on both sides and basal surfaces.

The Anomphalidae, previously not reported from the Central part of the Russian Plate, are represented here by three species: *Anomphalus rotulensis* Licharev, 1967, ***A. straparoliformis* sp. nov.,** and ***A. striatus* sp. nov.** Formerly, in 1967, Licharev described *A. rotulensis* and *A. planus* Licharev, 1967 from Southern Ferghana Valley, the former from lower part of the Upper Carboniferous and the latter from the Karachatyrian Stage, Lower Permian. In 1975, Licharev described *A. umbilicatus* Knight, 1933 from the Kasimovian Stage of the Karabolka River of the Western slope of Urals. Interestingly, this species, abundant in north American Pennsylvanian, has been encountered in the Upper Carboniferous of Urals, but absent on the Russian Plate. On the other hand, previously noted in the Upper Carboniferous of Middle Asia *A. rotulensis* was also found in the Middle and Upper Carboniferous of the Russian Plate.

MATERIAL, STRATIGRAPHIC AND GEOGRAPHIC DISTRIBUTION

All specimens treated in this study were collected in numerous quarries and outcrops in Moscow Basin and Oksko-Tzninsky Swell. The collection is stored in the Paleontological Museum of the Russian Academy of Sciences (PM RAS), collection No. 4471. All the specimens were standardly numbered. The first figure is the number of collection, the second is the number of locality, and the third is the number of specimen from the locality. The complete register of localities is given in the Supplement which, comparing to the preceding article [Mazaev, 1996], was enlarged and corrected.

All obtained gastropods are preserved as

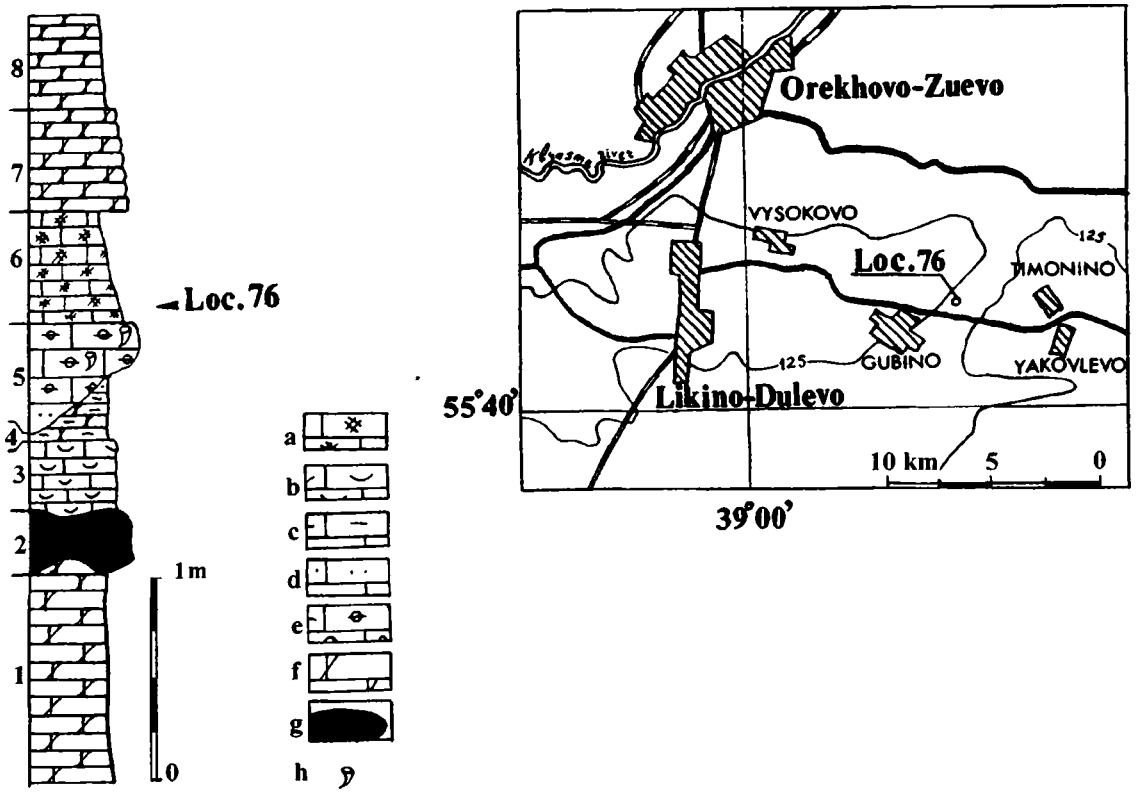


FIG. 1. Geographic position and stratigraphic section of quarry near Gubino village, Moscow Region, (loc. 76). a — mudstone, b — packstone, c — marly limestone, d — fine grainstone, e — coarse grainstone, f — dolomite, g — flint nodules, h — single corals.

РИС. 1. Географическое положение и стратиграфический разрез карьера около д. Губино, Московской обл, (loc. 76). a — мадстоун, b — пакстоун, c — известняки глинистые, d — тонкий грайнстоун, e — грубый грайнстоун, f — доломит, g — кремневые конкреции, h — одиночные кораллы.

imprints and were studied using their latex moulds. Some imprints of *Anomphalus rotulensis* and ***A. straparoliformis* sp. nov.** bear a very thin outer calcite shell layer. The inner surface of the layer is covered with scratches, which may represent dissolved pigmented strips (Figs. 7 A, B, E, F, I; 8 C-E).

The abundant material on *Anematina permiana* was collected at a newly discovered outcrop near Gubino Village. (Fig. 1). Unfortunately, the biostratigraphic position of this outcrop has not been studied and requires a more detailed investigation using foraminifers and conodonts.

222 specimens of Microdomatidae and 62 specimens of Anomphalidae have been examined. Seven species of two genera of Microdomatidae and three species belonging to one genus of Anomphalidae were identified from the studied Middle and Upper Carboniferous deposits.

The list of their occurrence is as follows: *Microdoma anomalum* — Russian Plate: Myachkovian, Krevyakinian, Khamovnikian, Rechitzian, and Amerevian Provincial Stages; Southern Ferghana Valley: lowest part of the Upper Carboniferous and Karachatyrian Stage (Asselian Stage), Lower Permian; ***M. pagoda* sp. nov.** — Russian Plate: Myachkovian Provincial Stage; ***M. laschmensis* sp. nov.** — Russian Plate: Myachkovian Provincial Stage; ***M. sinelnikovae* sp. nov.** — Russian Plate: Myachkovian Provincial Stage; ***M. longum* sp. nov.** — Russian Plate: Rechitzian and Amerevian Provincial Stages; ***M. jamensis* sp. nov.** — Russian Plate: Kaschirian and Myachkovian Provincial Stages; *Anematina permiana* — Russian Plate: Amerevian Provincial Stage; *Anomphalus rotulensis* — Russian Plate: Kaschirian, Podolskian, Myachkovian, Krevyakinian, Khamovnikian, and Rechitzian Provincial Stage, in Southern Ferghana Valley: lowest part of the Upper Carboniferous, Karachatyrian Stage (Asselian Stage), Lower Permian; ***A. straparoliformis* sp. nov.** — Russian Plate: Myachk-

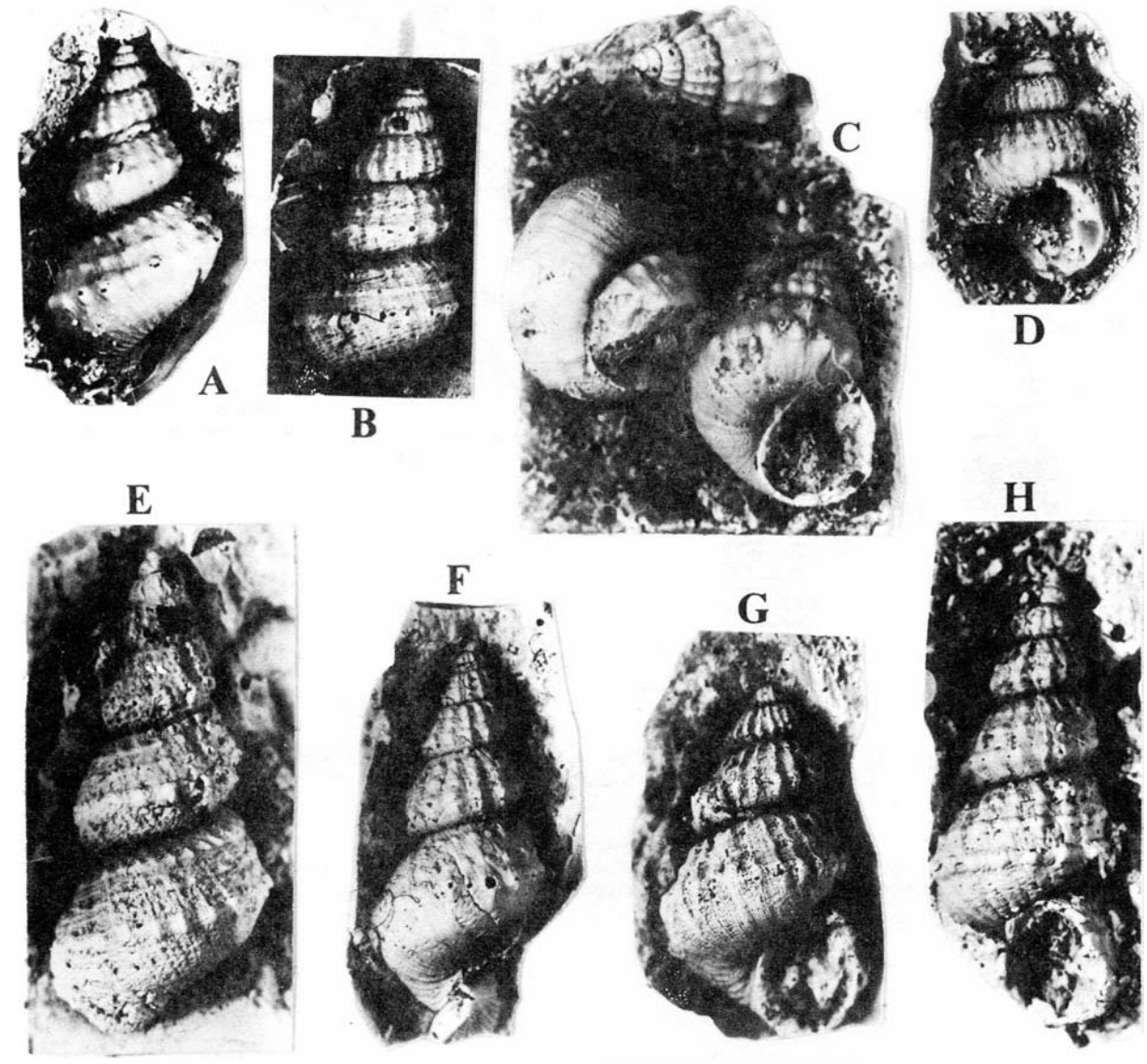


FIG. 2. *Microdoma anomalum* (Yakowlew, 1899): A, B — ×7, No. 4471/79/161, No. 4471/79/200: Akishina quarry, Ryazan Region, Myachkovian Provincial Stage; C, D — ×9; No. 4471/3/20, No.. 4471/3/16: quarry near Rusavkino village, Moscow Region, Rechitzian Provincial Stage; E, F — ×7, No. 4471/74/50, No. 4471/74/19: quarry near Maleyevo village, Ryazan Region, Myachkovian Provincial Stage; G — ×7, No. 4471/18/65: Afanasievo quarry, Moscow Region, Khamovnikian Provincial Stage; H — ×7, No. 4471/50/114: quarry near Domodedovo town, Moscow Region, Myachkovian Provincial Stage.

РИС. 2. *Microdoma anomalum* (Yakowlew, 1899): A, B — ×7, № 4471/79/161, № 4471/79/200: Акищинский карьер, Рязанская обл., мячковский горизонт; C, D — ×9, № 4471/3/20, № 4471/3/16: карьер около д. Русавкино, Московская обл., речицкий горизонт; E, F — ×7, № 4471/74/50, № 4471/74/19: Малеевский карьер, Рязанская обл., мячковский горизонт; G — ×7, № 4471/18/65: Афанасьевский карьер, Московская обл., кревякинский горизонт; H — ×7, № 4471/50/114: Домодедовский карьер, Московская обл., хамовнический горизонт.

ovian Provincial Stage; ***A. striatus* sp. nov.** — Russian Plate: Amerevian Provincial Stage.

The imprints of *Microdoma anomalum* are usually common and abundant in bioclastic carbonate beds in Middle and Upper Carboniferous rocks of the region. Their remains occur in open sea sublittoral facies which usually contaned other abundant shell material. *Microdoma jamensis* and *M. sinelnikovae* have the same facial distribution, however, the stratigraphic distribution of the latter is confined to Myatchkovian Provincial Stage. The stratigraphic and geographic distribution of *Microdoma pagoda* and *M. laschmensis* may be characterized as pointed. They occur in final phases of regressive cycles. In all cases imprints of the species were obtained from grey grainstone with abundant *Meekella* cf. *eximia*. These rocks

by many reasons may be considered as shallow, rather isolated littoral facies. Moreover, the shell material has very fine structure, therefore it could be considered as preserved *in situ*.

Microdoma longum occurs in open sea sublittoral facies as well as in littoral facies in regressive cycles. The same distribution is characteristic of *Anematina permiana*.

Species of *Anomphalus* are distributed differently from point of facial occurrence. Both *Microdoma anomalum* and species of *Anomphalus* (mostly *A. rotulensis*) occur only in open sea sublittoral facies. *Anomphalus rotulensis* is common and usually abundant, ***A. straparoliformis* sp. nov.** and ***A. striatus* sp. nov.** are rare.

Moreover, some of mentioned species had formed rather stable complexes:

Microdoma anomalum – *Anomphalus rotulensis*: open sea sublittoral facies.

Anematina permiana – *Microdoma longum*: littoral and open sea sublittoral facies.

Microdoma pagoda/M. laschmensis – *Meekella* cf. *eximia*: littoral facies of regressive cycles.

SYSTEMATIC PALEONTOLOGY

DISCUSSION. Microdomatacea Wenz, 1938 and Anomphalacea Wenz, 1938 were classified by Knight et al. [1960] outside Trochacea. McLean [1981] concluded that superfamilies Anomphalacea and Microdomatacea and some other one could possess a trochacean mantle cavity. Recently, Erwin [1988] placed Microdomatidae in Trochacea Rafinesque, 1815. Further, Hickman and McLean [1990, p. 34] excluded these taxa from trochacean gastropods. However, both *Microdoma* and *Anomphalus* have nacreous inner shell layer [Knight et al., 1960, pp. *I*242, *I*243], [Bandel, Geldmacher, 1996, p. 21, 22]. Moreover, their shells possess an archaeogastropod-type protoconch [Bandel, Geldmacher, 1996] and simple rounded aperture without slit and selenizone. Apparently, the slit could changed for a well-developed parieto-palatal notch at the bottom of sharply asymmetrical mantle cavity [Golikov, Starobogatov, 1975]. Therefore, most probably Microdomatidae and Anomphalidae belong to the oder Trochiformes Férussac, 1822. However, the taxonomic status of both families in the order is still unclear.

Family Microdomatidae Wenz, 1938

Genus *Microdoma* Meek et Worthen, 1867

Microdoma: Meek, Worthen, 1867; *Tuberculopleura*: Yakowlew, 1899; *Pleurotrochus*: Sherzer, Grabau, 1908; *Microdomus*: Cossmann, 1915; *Microdoma*: Knight et al., 1960; *Euconodoma*: Kues, 1990.

TYPE SPECIES: *Microdoma conicum* Meek et Worthen, 1867.

Microdoma anomalum (Yakowlew, 1899)

(Fig. 2 A-H)

Tuberculopleura anomala: Yakowlew, 1899: 60, 122, pl. V, fig. 27; *Tuberculopleura tricincta*: Yakowlew, 1899: 60, 122, pl. V, fig. 23; *Tuberculopleura* cf. *tricincta*: Schtukenberg, 1905: 107, pl. XII, figs. 25 a, b; *Tuberculopleura* sp.: Schtukenberg, 1905: 107, pl. XIII, figs. 1 a, b; *Microdoma gracile*: Licharev, 1967: 43, pl. X, figs. 7-16; text-fig. 11.

TYPES. Specimens No. 375, and No. 378 are designated as types series and No. 374 are designated as lectotype. The latter was figured by Yakowlew, 1899, tab. V, fig. 27. Collection No. 325, Monographical Department, Central Geological Museum, St.-Petersburg.

TYPE LOCALITY. Kamenka River, Donetz Basine. Upper Carboniferous.

DESCRIPTION. High-spired shell of small to moderate size, consists of up to 8 whorls. Pleural angle from about 20 to 40°. Suture grooved. Umbilicus very small and deep. Protoconch simple, smooth. Slightly prosocline collabral ribs on convex neanic whorl face. Subsequent whorls flat or slightly convex, bear noded collabral ribs. Adult whorls with three noded rows which usually form spiral ornament. A few specimens show both spiral and collabral ornament. Some shells have no ornament on last whorl. Base rounded, smooth or with weak collabral ribs near umbilicus. Growth lines distinct, prosocline; on base almost straight or gently opisthocyrt.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/79/20	6.0	3.5	30
4471/79/161	7.5	4.0	40
4471/3/20	4.0	2.5	35
4471/74/50	10.0	4.5	25
4471/74/19	8.0	3.5	30
4471/50/114	9.5	4.0	22
374/325 lectotype	7.5	4.5	35

COMPARISON. Most similar to *M. conicum* Meek et Worthen, 1867, from which differs in having grooved suture and basal surface with indistinct transverse costae.

MATERIAL EXAMINED. 118 specimens. Moscowian Stage: Myachkovian Provincial Stage (loc. 22 – 6 specimens; loc. 23 – 2 specimens; loc. 26 – 8 specimens; loc. 28 – 4 specimens; loc. 33 – 5 specimens; loc. 50 – 9 specimens; loc. 74 – 18 specimens loc. 79 – 12 specimens). Kasimovian Stage: Krevyakinian Provincial Stage (loc. 20 – 20

specimens); Khamovnikian Provincial Stage (loc. 18 – 15 specimens); Gzhelian Stage: Rechitzian Provincial Stage (loc. 3 – 14 specimens; loc. 17 – 2 specimens; loc. 72 – 2 specimens); Amerevian Provincial Stage (loc. 4 – 1 specimen).

OCCURRENCE. Central part of the Russian Plate; Myachkovian Provincial Stage, Moscowian Stage, Middle Carboniferous; Krevyakinian and Khamovnikian Provincial Stages, Kasimovian Stage; Rechitzian, and Amerevian Provincial Stages, Gzhelian Stage, Upper Carboniferous. Southern Ferghana Valley, Asia; the lowest part of the Upper Carboniferous and Karachatyrian Stage (Asselian Stage), Lower Permian.

Microdoma pagoda Mazaev, sp. nov.

(Fig. 3 A-J)

HOLOTYPE. PM RAS, No. 4471/68/7.

TYPE LOCALITY. Afanasievo quarry, grainstone bed with *Meekella eximia* about 8 m below the base of the "Turaevski dolomite" horizon, Moscow Region; Myachkovian Provincial Stage, Middle Carboniferous.

DESCRIPTION. High-spired shell of moderate size, consists of up to 10 whorls. Shell appearance very variable. Pleural angle from 15 to 47°. Suture grooved, not deep. Umbilicus very small and deep. Protoconch simple, smooth. Neanic whorl face flat or slightly convex, bears three rows of nodes, or sculptural elements absent. Adult whorls nearly flat, slightly convex or concave, always bear noded peripheral cord. Noded sutural cord developed to different degree or absent. Some specimens bear noded spiral mid-whorl thread or row of nodes evenly spaced between the suture and peripheral cord. Base smooth and slightly rounded. Growth lines distinct, prosocline; on base gently opisthocyrt.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/68/1 paratype	12.5	8.0	40
4471/68/4 paratype	17.0	8.5	15
4471/68/3 paratype	16.0	10.0	30
4471/77/94	8.5	5.0	40
4471/77/122	10.5	4.5	32
4471/77/143	9.0	6.0	47
4471/77/11	9.5	6.0	42
4471/80/1	25.0	11.0	15

COMPARISON. Most similar to *M. gavinae* (Kues, 1990), differs in having noded sutural cord and noded spiral mid-whorl thread on the whorl face.

MATERIAL EXAMINED. 38 specimens. Moscowian Stage: Myachkovian Provincial Stage (loc. 68 – 14 specimens; loc. 77 – 22 specimens; loc. 80 – 2 specimens)

OCCURRENCE. Central part of the Russian Plate; Myachkovian Provincial Stage, Moscowian Stage, Middle Carboniferous.

ETYMOLOGY. Named for resemblance to pagoda in outline.

[ДИАГНОЗ. Высококоническая трохусовидная раковина среднего размера, состоит примерно из 10 оборотов. Плевральный угол от 15 до 47°. Шов каналовидный, не глубокий. Пупок узкий и глубокий. Протоконх простой, гладкий. Неанические обороты плоские или немного вогнутые, гладкие или несут три ряда бугорков. Взрослые обороты плоские, немного вогнутые или выпуклые, всегда с бугорчатым периферийным валиком. Бугорчатый подшовный валик развит в разной степени или отсутствует. Некоторые образцы несут бугорчатую спиральную нить или ряд бугорков расположеные посередине между швом и периферийным валиком. Основание гладкое и округлое. Линии роста четкие, их верхняя часть наклонена вперед по ходу роста раковины; на основании слегка выгнуты в сторону противоположную росту раковины.]

Microdoma laschmensis Mazaev, sp. nov.

(Fig. 4 A-J)

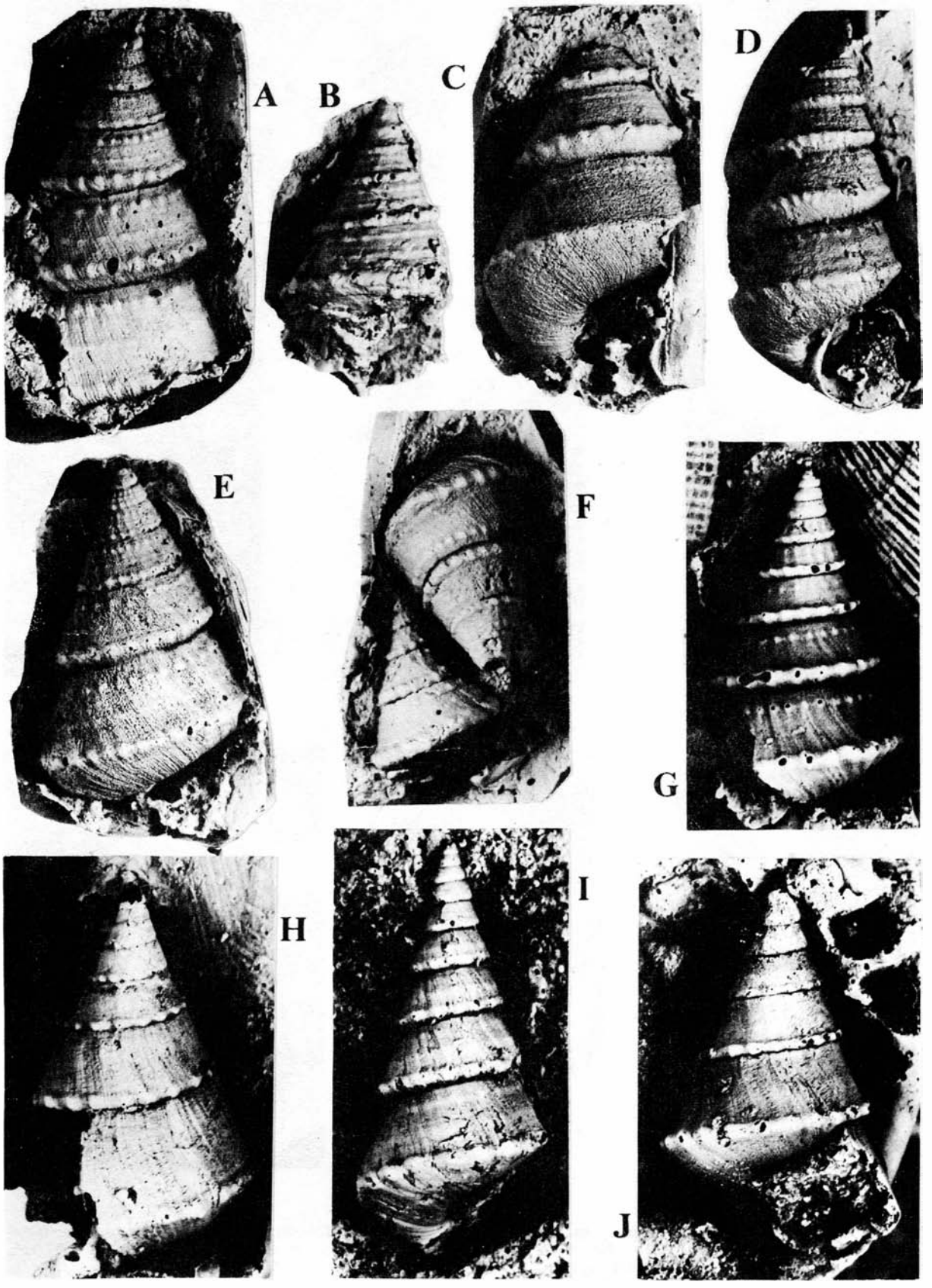
HOLOTYPE. PM RAS, No. 4471/77/26.

TYPE LOCALITY. Akishino quarry, lower fine grainstone with *Meekella eximia*, near Kasimov Town, Ryazan Region; Myachkovian Provincial Stage, Middle Carboniferous.

DESCRIPTION. Trochiform shell of small size, consists of 6 whorls. Pleural angle from 30 to 50°. Suture grooved, deep. Umbilicus small and deep. Protoconch simple, smooth. Neanic whorl face slightly convex and smooth. Adult whorls nearly flate or concave. Orna-

FIG. 3. ***Microdoma pagoda* Mazaev, sp. nov.**: A-F – ×3, holotype, No. 4471/68/7, paratypes, No. 4471/68/1, No. 4471/68/5, No. 4471/68/4, No. 4471/68/3, and No. 4471/68/2: Afanasievo quarry, Moscow Region, Myachkovian Provincial Stage; G-J – ×7, No. 4471/77/94, No. 4471/77/143, No. 4471/77/122, and No. 4471/77/11: Akishino quarry, Ryazan Region, Myachkovian Provincial Stage.

РИС. 3. ***Microdoma pagoda* Mazaev, sp. nov.**: A-F – ×3, голотип, No. 4471/68/7, паратипы, No. 4471/68/1, No. 4471/68/5, No. 4471/68/4, No. 4471/68/3 и No. 4471/68/2: Афанасьевский карьер, Московская обл., кревякинский горизонт; G-J – ×7, No. 4471/77/94, No. 4471/77/143, No. 4471/77/122 и No. 4471/77/11: Акишинский карьер, Рязанская обл., мячковский горизонт.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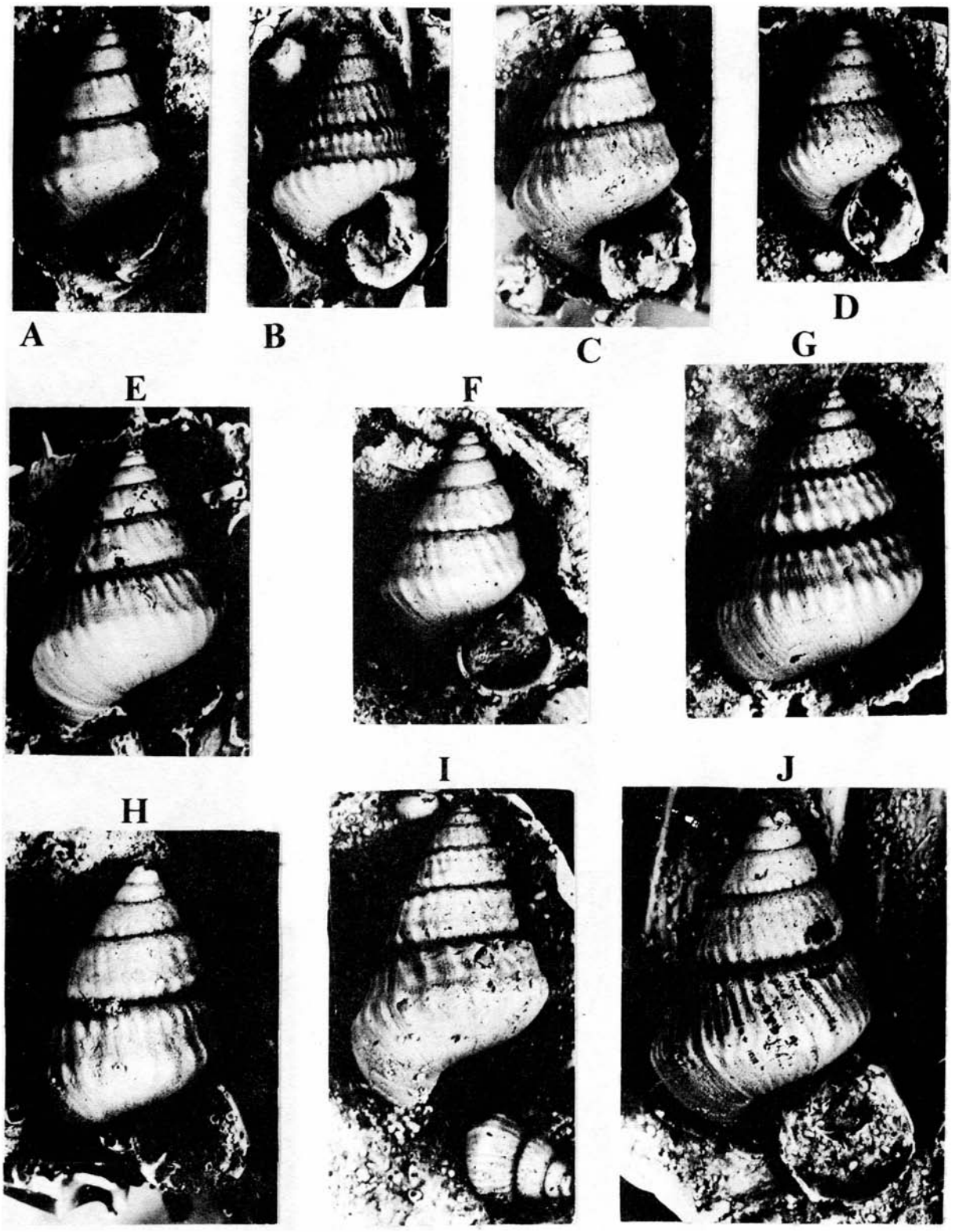


FIG. 4. ***Microdoma laschmensis*** **Mazaev, sp. nov.,** ×7: Akishino quarry, Ryazan Region, Myachkovian Provincial Stage. A — No. 4471/77/73, B — No. 4471/77/26, holotype, C — No. 4471/77/166, D — No. 4471/77/125, E — No. 4471/77/86, F — No. 4471/77/25, G — No. 4471/77/16, H — No. 4471/77/18, I — No. 4471/77/158, J — No. 4471/77/2.

РИС. 4. ***Microdoma laschmensis*** **Mazaev, sp. nov.,** ×7: Акишинский карьер, Рязанская обл., мячковский горизонт. A — № 4471/77/73, B — № 4471/77/26, голотип, C — № 4471/77/166, D — № 4471/77/125, E — № 4471/77/86, F — № 4471/77/25, G — № 4471/77/16, H — № 4471/77/18, I — № 4471/77/1586 J — 4471/77/28.

mentation consists of collabral costae or threads with nodes on its upper and lower parts. Spiral rows of nodes form sutural nodose shoulder and peripheral nodose carina. Some shells bear row of nodes evenly spaced between shoulder and peripheral carina. Number of costae from about 16 to 34 on last whorl. Some shells have no ornament on last whorl. Base smooth and rounded. Growth lines very fine, prosocline; at base almost straight.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/77/73	6.5	4.0	40
4471/77/26 holotype	6.5	3.5	35
4471/77/166	6.5	4.5	32
4471/77/125	6.0	4.0	40
4471/77/86	7.0	4.5	45
4471/77/25	6.0	4.5	50
4471/77/18	8.0	5.5	42
4471/77/158	7.5	4.5	43
4471/77/28	10.0	6.0	42

COMPARISON. Most similar to *M. simensis* (Yakowlew, 1899), differs in having smooth neanic whorls and more numerous nodes on the whorl face.

MATERIAL EXAMINED. 82 specimens from loc. 77.

OCCURRENCE. Type locality only.

ETYMOLOGY. From Laschma village, near Kasimov Town, Ryazan Region.

[ДИАГНОЗ. Маленькая трохусовидная раковина, состоит примерно из 6 оборотов. Плевральный угол изменяется от 30 до 50°. Шов каналовидный, глубокий. Пупок узкий и глубокий. Протоконх простой, гладкий. Неанические обороты слегка выпуклые и гладкие. Взрослые обороты почти плоские или вогнутые. Орнамент состоит из осевых ребер или нитей с бугорками на их верхних и нижних частях. Спиральные ряды бугорков формируют подшовный и периферийный валики. На последнем обороте количество ребер варьирует приблизительно от 16 до 34. На последнем обороте некоторых раковин орнаментация отсутствует. Основание гладкое и округлое. Линии роста очень тонкие, их верхняя часть наклонена вперед по ходу роста раковины; на основании почти прямые.]

Microdoma sinelnikovae Mazaev, sp. nov.

(Fig. 5 A-H)

HOLOTYPE. PM RAS, No. 4471/50/91.

TYPE LOCALITY. Quarry near Domodedovo Town, coarse grainstone bed about 13 m below the base of the "Turaevski dolomite" horizon, Moscow Region; Myachkovian Provincial Stage, Middle Carboniferous.

DESCRIPTION. High-spired trochiform shell of moderate size, consists of about 8-9 whorls. Pleural angle from about 30 to 40°. Suture grooved, not deep. Umbilicus narrow and deep. Protoconch simple, smooth. Neanic whorls smooth and rounded. Adolescent whorls convex, bear orthocline or slightly opisthocline collabral ribs developed only below upper suture or throughout the whorl. Adult whorls flattened; collabral ribs transform to noded sutural and peripheral cords; some specimens have sutural cord. At gerontic stage ornament lacking. Base smooth and rounded; on whorls with developed peripheral cords the base flattened-rounded. Growth lines distinct, slightly prosocline, on the gerontic stage gently sinuated below the sutural cord; on base growth lines almost straight or gently opisthocyrt.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/50/91 holotype	12.0	7.0	40
4471/50/92 paratype	19.0	8.5	30
4471/50/93 paratype	8.0	5.0	40
4471/66/3	11.5	7.0	40
4471/23/29	7.0	4.0	40
4471/23/35	14.5	8.0	35
4471/22/30	13.5	6.0	40

COMPARISON. Differs from *M. gavinae* (Kues, 1990) in having noded sutural cord and more developed collabral ornament.

MATERIAL EXAMINED. 59 specimens. Moscowian Stage, Myachkovian Provincial Stage (loc. 22 — 5 specimens, loc. 23 — 16 specimens; loc. 24 — 1 specimen; loc. 26 — 2 specimens; loc. 28 — 3 specimens; loc. 50 — 27 specimens; loc. 66 — 4 specimens; loc. 70 — 4 specimens).

OCCURRENCE. Central part of the Russian Plate; Myachkovian Provincial Stage, Moscowian Stage, Middle Carboniferous.

ETYMOLOGY. Named for Dr. V.N. Sinel'nikova.

[ДИАГНОЗ. Высококоническая трохусовидная раковина среднего размера, состоит примерно из 8-9 оборотов. Плевральный угол изменяется от 30 до 40°. Шов каналовидный, не очень глубокий. Пупок узкий и глубокий. Протоконх простой, гладкий. Неанические обороты гладкие с округлой боковой поверхностью. Юношеские обороты выпуклые, несут вертикальные или наклоненные от верхнего шва вперед осевые ребра, развитые только под верхним швом или на всей боковой поверхности оборота. Боковая поверхность взрослых оборотов уплощенная; осевые ребра превращаются в бугорчатый подшовный и надшовный валики, некоторые образцы имееют только подшовный валик. На старческой стадии орнамент исчезает. Основание гладкое и округлое; на оборотах с развитым надшовным валиком основание уплощенно-округлое. Линии роста четкие, почти вертикальные, на старческой стадии под подшовным валиком слегка изогнуты; на основании почти прямые или слегка выгнуты в сторону, противоположную росту раковины.]

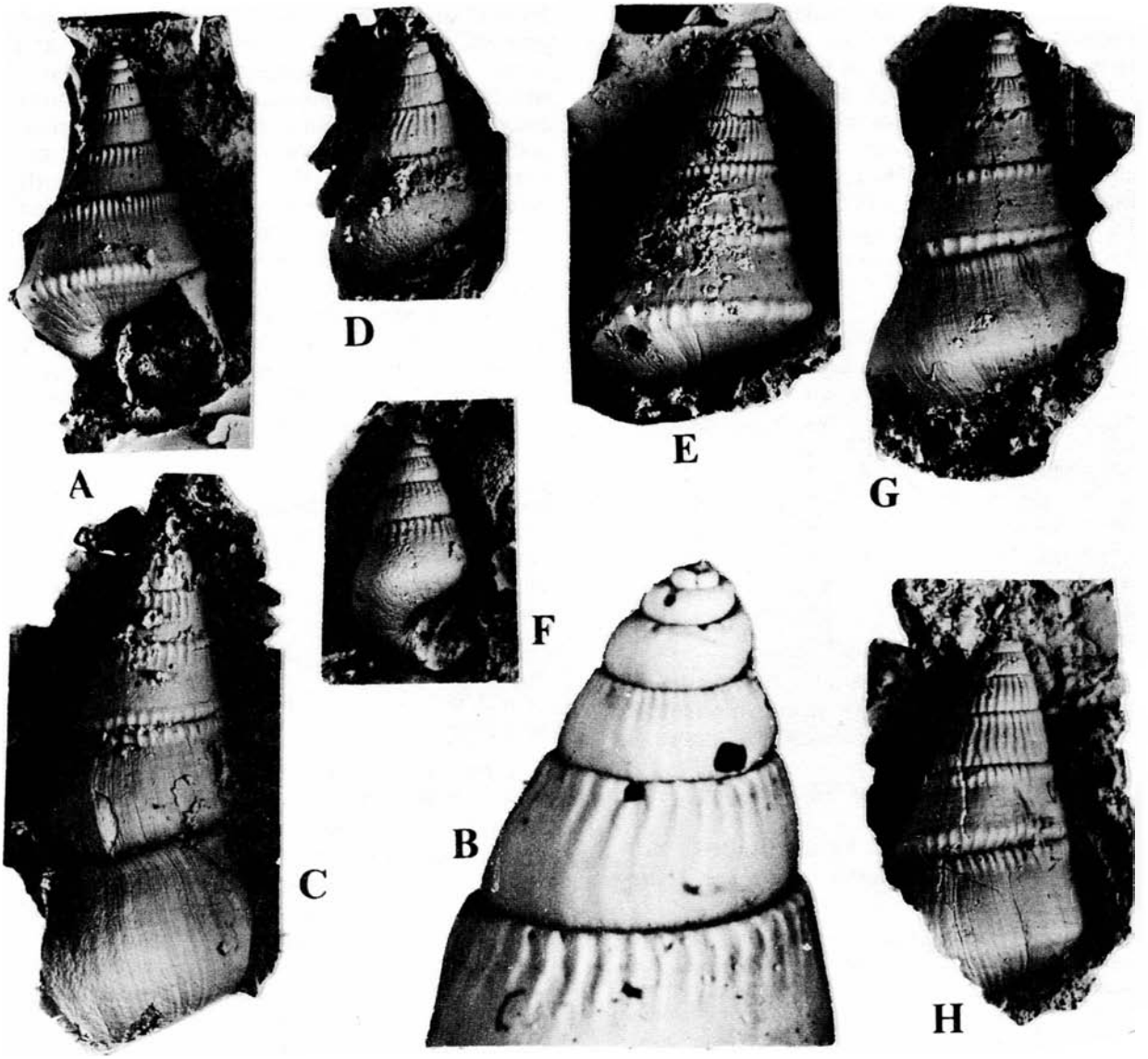


FIG. 5. ***Microdoma sinelnikovae*** **Mazaev, sp. nov.**, ×5: A, B — holotype, No. 4471/50/91: apertural side view (×5) and early whorls (×25): quarry near Domodedovo Town, Moscow Region, Myachkovian Provincial Stage; C, D — paratypes, No. 4471/50/92, No. 4471/50/93: from same locality; E — No. 4471/66/3: from same locality; F, G — No. 4471/23/29, No. 4471/23/35: quarry near Yamskoe village, Moscow Region, Myachkovian Provincial Stage; H — No. 4471/22/30: quarry near Podolsk Town, Moscow Region, Myachkovian Provincial Stage.

РИС. 5. ***Microdoma sinelnikovae*** **Mazaev, sp. nov.**, ×5: A, B — голотип, № 4471/50/91: вид со стороны устья (×5) и ранние обороты (×25): Домодедовский карьер, Московская обл., мячковский горизонт; C, D — паратипы, № 4471/50/92, № 4471/50/93: местонахождение то же; E — № 4471/66/3: местонахождение то же; F, G — № 4471/23/29, № 4471/23/35: Ямской карьер, Московская обл., мячковский горизонт; H — № 4471/22/30: Подольский карьер, Московская обл., мячковский горизонт.

Microdoma longum Mazaev, sp. nov.

(Fig. 6 A-E)

HOLOTYPE. PM RAS, No. 4471/16/2.

TYPE LOCALITY. Quarry near Dobryatino railroad station, lowest limestone bed layer No. 4, Vladimir Region; Rechitzian Provincial Stage, Upper Carboniferous.

DESCRIPTION. Small, high-spired shell, consists of about 10 whorls. Pleural angle from .about 30 to 35°. Suture grooved, not deep. Umbilicus very small. Protoconch simple, smooth. Neanic whorls smooth, convex. Adolescent whorls concave, bears orthocline or slightly opisthocline collabral ribs, nodose in their upper and lower parts. On subsequent whorls, these collabral ribs transform into

noded sutural and peripheral cords or rows of nodes. Adult whorls flattened or slightly concave in middle, gently shouldered in sutural part, bear only one noded peripheral cord. Base smooth and rounded. Growth lines distinct, straight, prosocline; on base almost straight or gently opisthocyrt.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/16/2 holotype	9.0	3.5	30
4471/16/3 paratype	6.0	3.0	30
4471/16/7 paratype	7.5	3.5	35

COMPARISON. Most similar to *M. gavinae* (Kues, 1990), from which differs in having more high-spired shell and more numerous whorls.

MATERIAL EXAMINED. 20 specimens. Gzhelian Stage: (loc. 76 — 9 specimens); Rechitzian Provincial Stage (loc. 16 — 7 specimens); Amerevian Provincial Stage (loc. 6 — 4 specimens).

OCCURENCE. Central part of the Russian Plate; Rechitzian and Amerevian Provincial Stages, Gzhelian Stage, Upper Carboniferous.

ETYMOLOGY. *Longum* (Lat.) — long.

[ДИАГНОЗ. Маленькая высококоническая раковина, состоит примерно из 10 оборотов. Плевральный угол от 30 до 35°. Шов каналовидный, неглубокий. Пупок очень маленький. Протоконх простой, гладкий. Неанические обороты гладкие с выпуклой боковой поверхностью. Юношеские обороты с вогнутой поверхностью, несут вертикальные или наклоненные от верхнего шва вперед осевые ребра, бугорчатые в их верхней и нижней частях. На следующих оборотах осевые ребра превращаются в бугорчатый подшовный и надшовный валики или ряды бугорков. Боковая поверхность уплощенная или немного вогнутая в средней части, слегка плечеобразная в подшовной части, несет только один бугорчатый периферийный валик. Основание гладкое и округлое. Линии роста четкие, прямые, наклоненные у вехнего шва вперед; на основании почти прямые или слегка выгнуты в сторону, противоположную росту раковины.]

Microdoma jamensis Mazaev, sp. nov.

(Fig. 6 F-H)

HOLOTYPE. PM RAS, No. 4471/24/29.

TYPE LOCALITY. Quarry near Domodedovo Town, about 7.5 m below base of the "Turaevski dolomite" horizon, Moscow Region; Myachkovian Provincial Stage, Middle Carboniferous,

DESCRIPTION. Small, high-spired shell, consists of up to 9 whorls. Pleural angle from 25 to 35. Suture grooved, impressed. Umbilicus unknown. Neanic whorls concave in middle, with noded shoulder and angulated periphery, bearing nodes. Adolescent whorls concave in middle, bear frequent opisthocline collabral threads with swellings in their upper and lower parts. Adult whorls also concave in middle and bear frequent opisthocline collabral fine threads lineated on basal face. Base rounded. Growth lines not preserved.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/24/29 holotype	7.5	3.0	25
4471/47/3 paratype	—	3.0	35
4471/25/55 paratype	—	2.0	25

COMPARISON. Differs from other species in having an ornament of fine frequent opisthocline collabral threads.

MATERIAL EXAMINED. 5 specimens. Moscowian Stage: Kaschirian Provincial Stage (loc. 47 — 1 specimen; loc. 81 — 2 specimens); Myachkovian Provincial Stage (loc. 24 — 1 specimen; loc. 25 — 1 specimen).

OCCURRENCE. Central part of the Russian Plate; Kaschirian and Myachkovian Provincial Stages, Moscowian Stage, Middle Carboniferous.

ETYMOLOGY. From the name of Staryi Yam village, near Domodedovo Town.

[ДИАГНОЗ. Маленькая высококоническая раковина, состоит максимум из 9 оборотов. Плевральный угол от 25 до 35°. Шов каналовидный, вдавленный. Пупок неизвестен. Неанические обороты вогнутые, с бугорчатым плечом и угловатой периферией, которая несет бугорки. Поверхность юношеских оборотов вогнутая в средней части, несет частые наклоненные от верхнего шва вперед осевые нити с утолщениями в их верхней и нижней частях. Поверхность взрослых оборотов также вогнутая в средней части, несет частые наклоненные от верхнего шва вперед тонкие осевые нити, протягивающиеся на нижнюю поверхность оборота. Основание округлое. Линии роста не сохранились.]

Genus *Anematina* Knight, 1933

Anematina: Knight et al., 1960.

TYPE SPECIES: *Anematina proutana* (Hall, 1858).

Anematina permiana (Yakowlew, 1899)

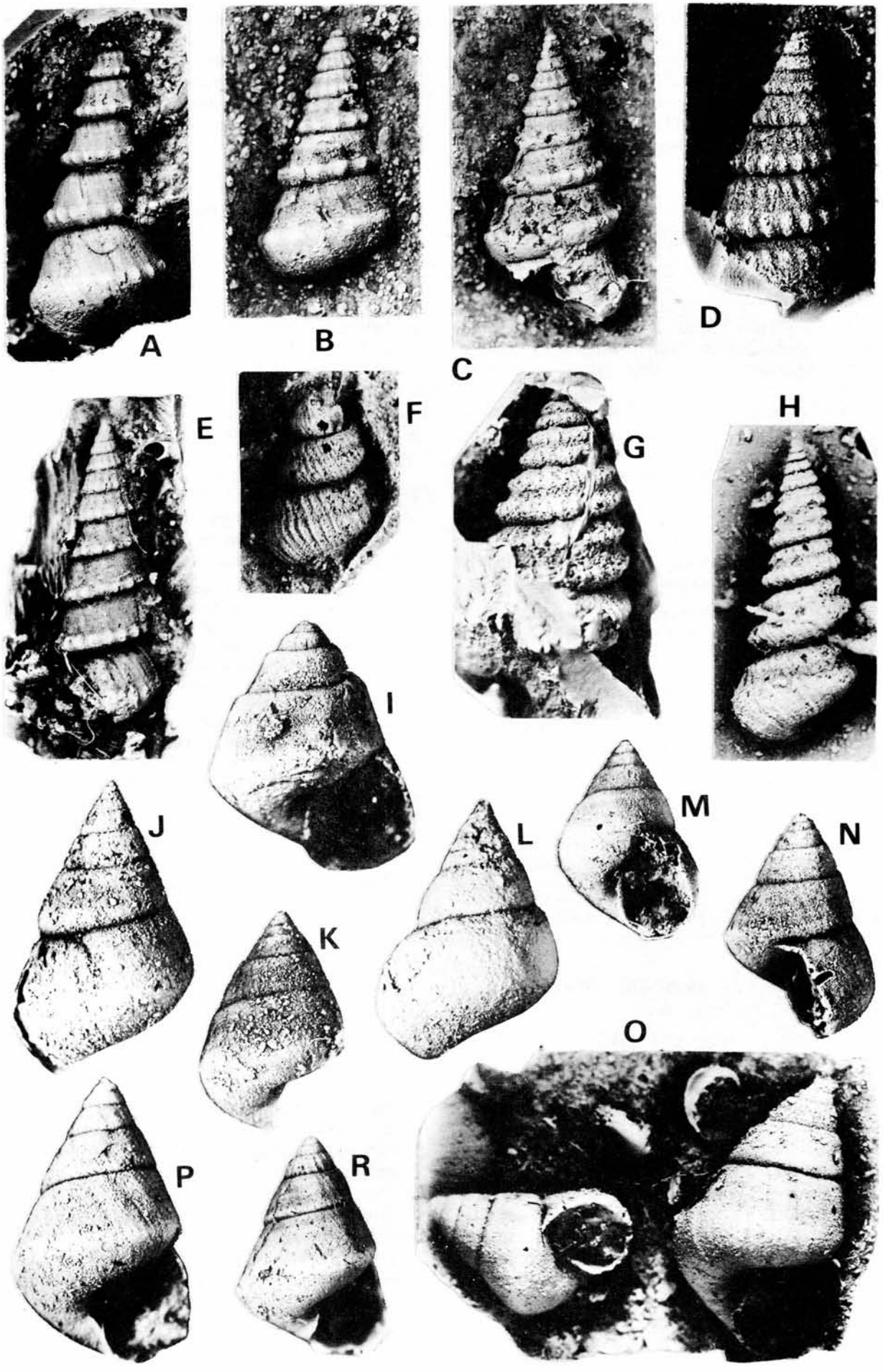
(Fig. 6 I-R)

Omphaloptycha permiana: Yakowlew, 1899: 62, 124; pl. V, fig. 19.

TYPES. Lectotype No. 207, figured by Yakowlew, 1899, tab. V, fig. 19, right. Other syntypes lost. Central Geological Museum, St.-Petersburg, collection No. 325.

TYPE LOCALITY. Quarry near Vyksa Town, Vladimir Region; Gzhelian Stage, Upper Carboniferous.

DESCRIPTION. High-spired turbiniform shell of moderate size, consists of about 7-8 whorls. Pleural angle from 45 to 60°. Suture distinct, not so deep. Umbilicus narrow and very deep.


A
B
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Protoconch simple, smooth. Neanic whorls convex, smooth, some specimens with variously developed collabral ribs. Adolescent and adult whorls smooth, without any ornamentation. Whorls faces flattened or gently rounded; some specimens have rounded sutural shoulder. Base smooth and rounded. Growth lines distinct, straight, prosocline.

Measurements:

No.	Height mm	Diameter mm	Pleural angle, °
4471/4/6	5.5	4.0	45
4471/76/6	5.5	4.0	55
4471/76/8	6.5	5.5	60
4471/76/10	8.0	5.0	55
4471/76/17	7.0	5.0	60
4471/76/20	7.5	5.0	45
207/325 lectotype	6.5	4.5	45

COMPARISON. Most similar to *A. proutana* (Hall, 1858), differs in its flattened whorl.

MATERIAL EXAMINED. 38 specimens. Gzhelian Stage: (loc. 76 — 32 specimen); Amerevian Provincial Stage (loc. 4 — 6 specimen).

OCCURRENCE. Central part of the Russian Plate; Amerevian Provincial Stage, Gzhelian Stage, Upper Carboniferous.

Family Anomphalidae Wenz, 1938

Genus *Anomphalus* Meek et Worthen, 1867

Anomphalus: Meek, Worthen, 1867; *Antirotella*: Cossmann, 1918; *Anomphalus*: Knight et al., 1960.

TYPE SPECIES: *Anomphalus rotulus* Meek et Worthen, 1867.

Anomphalus rotulensis Licharev, 1967

(Fig. 7 A-J)

Anomphalus rotulensis: Licharev, 1967: 46-47; text-fig. 13; pl. XI, figs. 1-3; pl. XII, figs. 1, 2.

TYPES. No. 103, collection No. 8336, Central Geological Museum, St.-Petersburg.

TYPE LOCALITY. Near Kizil-Kiya Town, Southern Ferghana Valley; Lower part of the Upper Carboniferous.

DESCRIPTION. Rotelliform, smooth, very thick shell, with 5-6 convex rounded whorls. Unusually for this genus pleural angle varies from 130 to 90°. Suture distinct, not impressed, disposed approximately on middle part of preceding whorl. Upper surface of whorl almost flat, gently convex, forming angle from 30 to 50 below horizontal. It passes into very gently arched outer whorl surface without any change. Outer whorl surface with rounded shoulder at middle part. Basal surface very gently arched and becomes almost flat near umbilicus. Umbilicus at adult stage varies from phaneromphalous, hemiomphalous to cryptomphalous. Some shells bear massive umbilical callus. Apertura flattened, prosocline, moderately thin, but swells in lower part of inner lip, inner part of basal lip, and at parietal angle. The latter bear channel. Protoconch simple, smooth, low spired. Growth lines lacking.

Measurements, mm:

No.	Height	Width
4471/50/12	6.5	9.0
4471/50/115	8.0	about 10.0
4471/50/112	7.5	about 10.0
4471/50/49	7.5	10.0
4471/22/43	6.0	7.0
4471/17/31	3.0	about 4.0
4471/3/33	5.0	6.0

FIG. 6. A-E — ***Microdoma longum* Mazaev, sp. nov.**: A — ×7, holotype, No. 4471/16/2: quarry near Dobryatino Station, Vladimir Region, Rechitzian Provincial Stage; B — paratype, ×9, No. 4471/16/3: from same locality; C — ×7, No. 4471/16/7: from same locality; D — ×5, No. 4471/76/23: outcrops near Gubino village, Moscow Region, Gzhelian Stage; E — ×7, No. 4471/6/29: quarry near Gzhel Station, Moscow Region, Amerevian Provincial Stage; F-H — ***Microdoma jamensis* Mazaev, sp. nov.**: F — ×8, No. 4471/25/55: quarry near Myachkovo village, Moscow Region, Myachkovian Provincial Stage; G — ×10, No. 4471/47/3: outcrops near Obraztsovo village on the bank of the Lopasnya River, Moscow Region, Kaschirian Provincial Stage; H — ×7, holotype, No. 4471/24/29: quarry near Domodedovo Town, Moscow Region, Myachkovian Provincial Stage; I-R — *Anematina permiana* (Yakowlew, 1899), ×7: I — No. 4471/76/8, J — No. 4471/76/10, K — No. 4471/76/21, L — No. 4471/76/17, M — No. 4471/76/6, N — No. 4471/76/31, O — No. 4471/76/27, P — No. 4471/76/20: outcrops near Gubino village, Moscow Region, Gzhelian Stage; R — No. 4471/4/6: quarry near Shchelkovo Town, Moscow Region, Amerevian Provincial Stage.

РИС. 6. A-E — ***Microdoma longum* Mazaev, sp. nov.**: A — ×7, голотип, No. 4471/16/2: Добрятинский карьер, Владимирская обл., речицкий горизонт; B — ×9, паратип, No. 4471/16/3: местонахождение то же; C — ×7, No. 4471/16/7: местонахождение то же; D — ×5, No. 4471/76/23: обнажение около д. Губино, Московская обл., гжельский ярус; E — ×7, No. 4471/6/29: карьер около ст. Гжель, Московская обл., амеревский горизонт; F-H — ***Microdoma jamensis* Mazaev, sp. nov.**: F — x8, No. 4471/25/55: Мячковский карьер, Московская обл., Мячковский горизонт; G — ×10, No. 4471/47/3: обнажение на р. Лопасня около д. Образцово, Московская обл., каширский горизонт; H — ×7, голотип, No. 4471/24/29: Домодедовский карьер, Московская обл., мячковский горизонт; I-R — *Anematina permiana* (Yakowlew, 1899), ×7: I — No. 4471/76/8, J — No. 4471/76/10, K — No. 4471/76/21, L — No. 4471/76/17, M — No. 4471/76/6, N — No. 4471/76/31, O — No. 4471/76/27, P — No. 4471/76/20: Московская обл., обнажение около д. Губино, гжельский ярус; R — No. 4471/4/6: Московская обл., Щелковский карьер, амеревский горизонт.

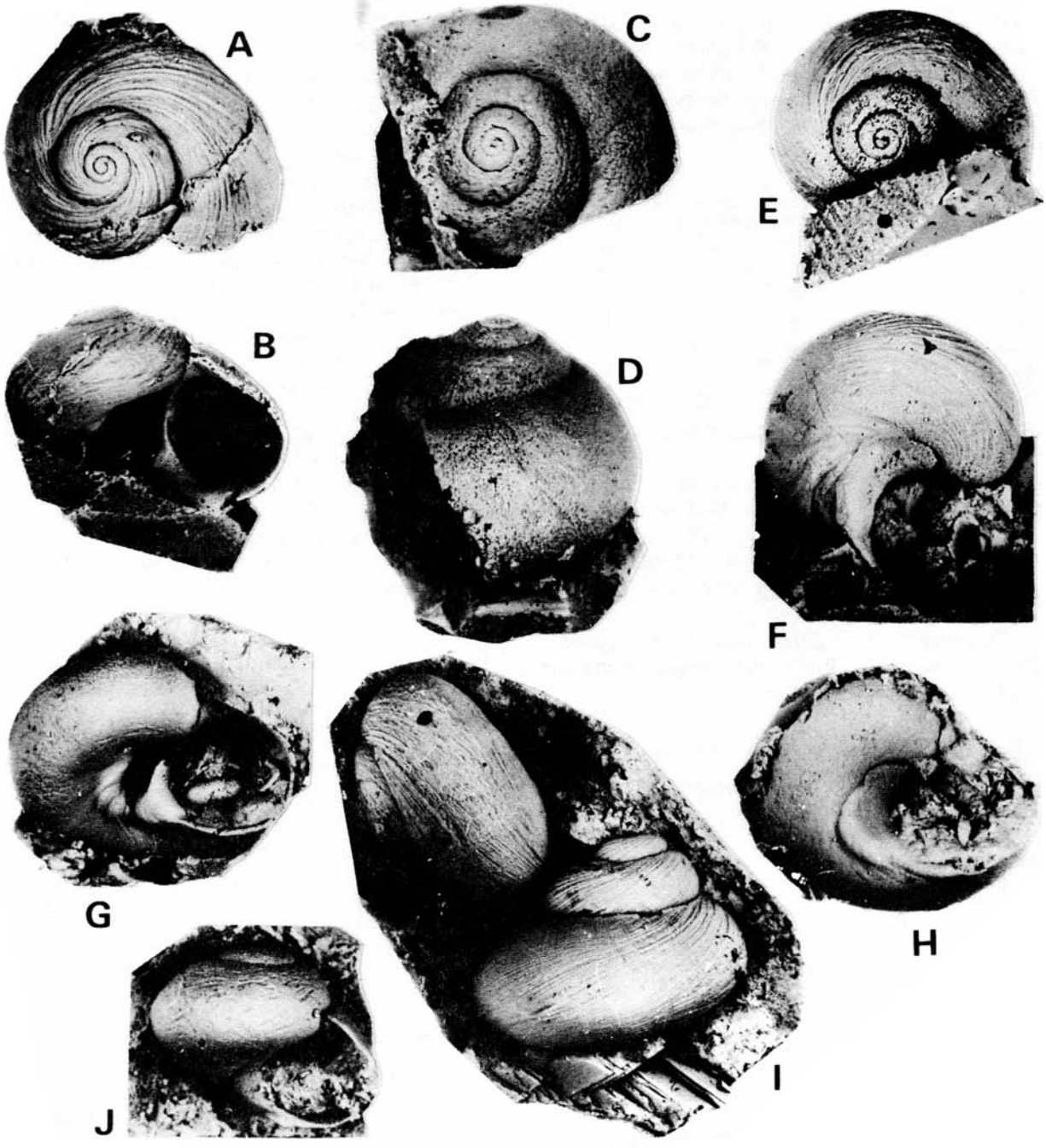


FIG. 7. *Anomphalus rotulensis* Licharev, 1967, ×5: A-B — No. 4471/50/12: top and apertural side views; quarry near Domodedovo Town, Moscow Region, Myachkovian Provincial Stage; C-D — No. 4471/50/115: top and side views; from same locality; E-F — No. 4471/50/112: top and oblique umbilical views; from same locality; G — No. 4471/50/120: oblique umbilical view; from same locality; H — No. 4471/50/49: oblique umbilical view; from same locality; I — No. 4471/22/40: side view; quarry near Podolsk Town, Moscow Region, Myachkovian Provincial Stage; J — No. 4471/22/43: apertural view; from same locality.

РИС. 7. *Anomphalus rotulensis* Licharev, 1967, ×5: A-B — № 4471/50/12: вид сверху и со стороны устья; Московская обл., Домодедовский карьер, мячковский горизонт; C-D — № 4471/50/115: вид сверху и сбоку; местонахождение то же; E-F — № 4471/50/112: вид сверху и наклонный снизу; местонахождение то же; G — № 4471/50/120: вид наклонный снизу; местонахождение то же; H — № 4471/50/49: вид наклонный снизу; местонахождение то же; I — № 4471/22/40: вид сбоку; Московская обл., Подольский карьер, мячковский горизонт; J — № 4471/22/43: вид со стороны устья; местонахождение то же.

COMPARISON. Differs from *A. rotulus* Meek et Worthen, 1867, *A. verruculiferus* (White, 1881), and *A. umbilicatus* Knight, 1933 in having more high-spired shell.

MATERIAL EXAMINED. 57 specimens. Moscowian Stage: Kaschirian Provincial Stage (loc. 39 — 6 specimens); Myachkovian Provincial Stage (loc. 22 — 7 specimens; loc. 25 — 2 specimens; loc. 26 — 5 specimens, loc. 28 — 2 specimens; loc.50 — 15 specimens; loc.70 — 1 specimen; loc.74 — 1 specimen). Kasimovian Stage: Krevyakinian Provincial Stage (loc. 20 — 8 specimens); Khamovnikian Provincial Stage (loc. 18 — 1 specimen; loc. 19 — 1 specimen). Gzhelian Stage: Rechitzian Provincial Stage (loc. 3 — 3 specimens; loc. 17 — 4 specimens; loc. 75 — 1 specimen).

OCCURRENCE. Central part of the Russian Plate; Kaschirian, Podolskian and Myachkovian Provincial Stages, Moscowian Stage, Middle Carboniferous; Krevyakinian and Khamovnikian Provincial Stages, Kasimovian Stage; Rechitzian Provincial Stage, Gzhelian Stage, Upper Carboniferous. Southern Ferghana Valley, Central Asia; lowest part of the Upper Carboniferous, Karachatyrian Stage (Asselian Stage), Lower Permian.

Anomphalus straparoliformis Mazaev, sp. nov.

(Fig. 8 A-E)

HOLOTYPE. PM RAS, No. 4471/74/43.

TYPE LOCALITY. Maleyevo quarry, lower part section, white slightly nodulated mudstone-wackestone, near Kasimov Town, Ryazan Region; Myachkovian Provincial Stage, Middle Carboniferous.

DESCRIPTION. Planorbispiral, phaneromphalous, smooth, very thin shell, with about 6 rounded whorls. Suture distinct, moderately impressed. Upper surface of whorl almost plane at early stages. At adult stage it is gently convex at very short distance from suture, then bending downward. Outer surface curved almost as part of circle. Basal surface almost flat, near umbilicus abruptly passes into vertical walls of umbilicus, forming angle of 90°. Umbilicus moderately wide, showing steps of all preceding whorls. Upper lip orthocline. Outer lip slightly prosocline. Mature aperture, except lower part of columellar lip and inner part of basal lip, flattened and moderately thin. Parietal channel not observed. Protoconch simple, smooth, low spired. Growth lines lacking.

DISCUSSION. In 1967, Licharev described a very similar species *Anomphalus planus* Licharev, 1967 from the Lower Permian of Southern Ferghana. He noted that "... there is no perfect confidence that this species belongs to the genus *Anomphalus*." (p. 47). *A. planus* and ***A. straparoliformis* sp. nov.** have a *Straparollus*-like outlines, but in fact, there is no doubt that these species belong to the genus *Anomphalus,* taking into account that their inner surface of whorl is not round in section.

Measurements, mm:

No.	Height	Width
4471/74/43 holotype	2.5	6.0
4471/26/49	—	8.5
4471/21/26	5.0	about 10.5

COMPARISON. Differs from *A. planus* Licharev, 1967 in having more rapidly expanding shell and a wider aperture; differs from *A. vanescens* Yochelson, 1956 in having more flattened upper surface of the shell.

MATERIAL EXAMINED. 3 specimens. Moscowian Stage: Myachkovian Provincial Stage loc. 21 — 1 specimen; loc. 26 — 1 specimen; loc. 74 — 1 specimen.

OCCURRENCE. Central part of the Russian Plate; Myachkovian Provincial Stage, Moscowian Stage, Middle Carboniferous.

ETYMOLOGY. Named for resemblance to *Straparollus* in the outline.

[ДИАГНОЗ. Раковина гладкая, планорбиспиральная, очень тонкая, с открытым пупком, состоящая примерно из шести округлых оборотов. Шов четкий, умеренно вдавленный. Верхняя поверхность оборота на ранних стадиях почти плоская; на взрослых стадиях немного округло-изогнутая на небольшом расстоянии от шва, затем опускается книзу. Боковая поверхность оборота правильно округлая. Нижняя поверхность оборота почти плоская, около пупка обрывисто переходит во внутренние вертикальные стенки пупка, образуя угол в 90°. Пупок умеренно широкий, через который наблюдаются ступеньки всех предыдущих оборотов. Верхняя губа присоединяется к предыдущему обороту под прямым углом. Наружная губа немного наклонена вперед. Край устья уплощенный, относительно тонкий, за исключением нижней части колумеллярной губы и внутренней части нижней губы. Париетальный канал не наблюдается. Протоконх простой, гладкий, низко завернутый. Линии роста не сохранились.]

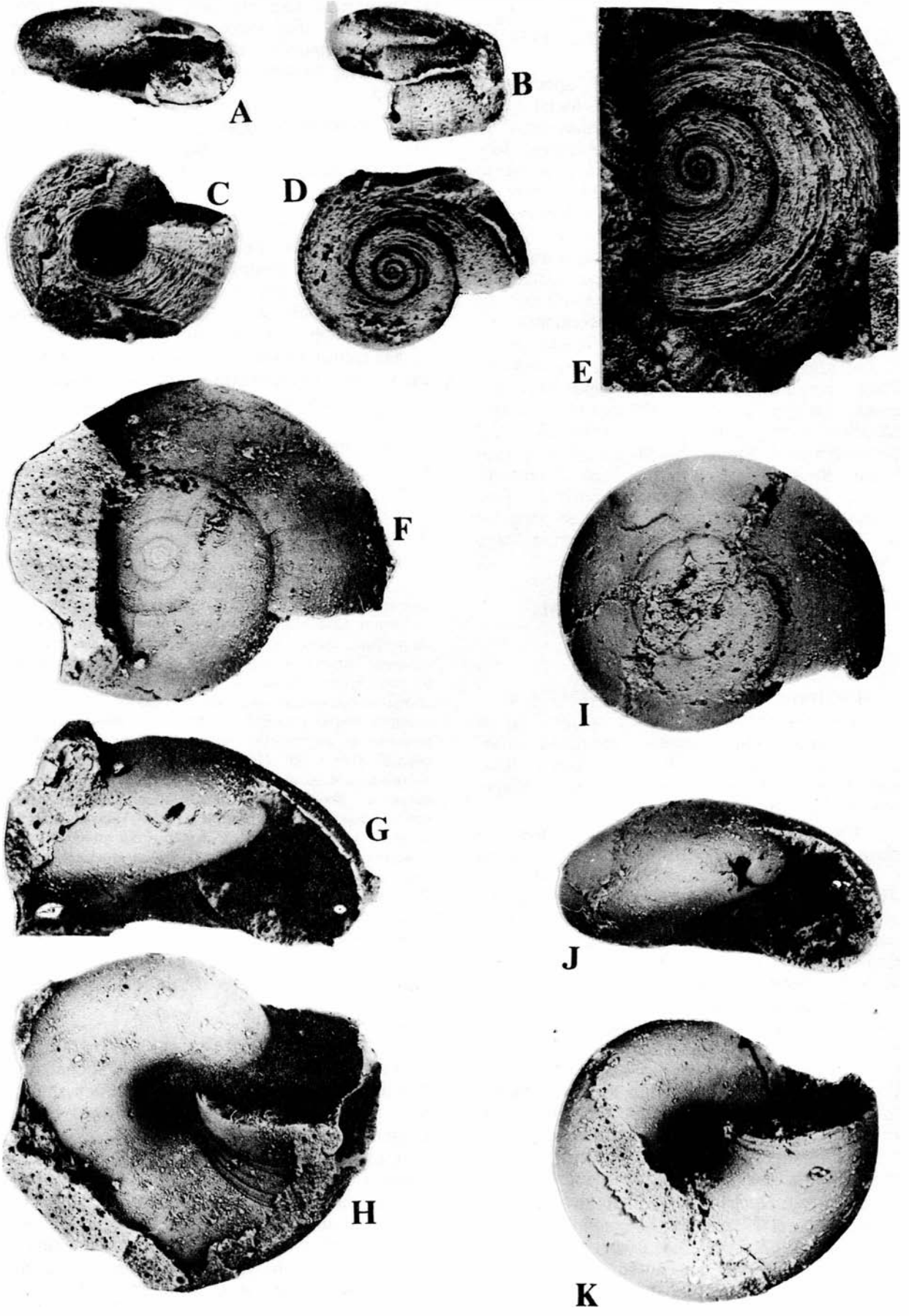
Anomphalus striatus Mazaev, sp. nov.

(Fig. 8 F-K)

HOLOTYPE. PM RAS, No. 4471/2/77.

TYPE LOCALITY. Quarry near Shchelkovo Town, 3.7 m above the top of motley shales, Moscow Region; Amerevian Provincial Stage, Upper Carboniferous.

DESCRIPTION. Planorbispiral, phaneromphalous, smooth, very thin shell, with 6.5 convex rounded whorls. Upper surface of shell evenly rounded. Suture indistinct, very shallow. Upper surface of whorl almost flat, slowly curved to periphery, forming angle of about 25° below horizontal at adult stage. It passes very gradually into outer surface. Outer surface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evenly rounded in its lower part and very gradually passes into arched basal surface. Inner whorl surface bears 7-8 very fine spiral threads. Umbilicus not wide, showing all preceding whorls. Upper and outer lips prosocline. Mature aperture very thin, undulate. Protoconch simple, smooth, low spired. Growth lines very fine.

Measurements, mm:

No.	Height	Width
4471/2/77 holotype	8.0	about 14.5
4471/2/76 paratype	7.0	12.0

COMPARISON. Differs from *A. planus* Licharev, 1967 in having a shallower suture; differs from *A. vanescens* Yochelson, 1956 in having less radius of curving of the upper shell surface.

MATERIAL EXAMINED. Two specimens were examined from the type locality.

OCCURRENCE. Central part of the Russian Plate; Amerevian Provincial Stage, Gzhelian Stage, Upper Carboniferous.

ETYMOLOGY. *Stria* (Lat.) — furrow.

[ДИАГНОЗ. Раковина гладкая, планорбиспиральная, очень тонкая, с открытым пупком, состоящая примерно из шести с половиной округлых оборотов. Верхняя поверхность раковины равномерно округлая. Шов нечеткий, очень мелкий. Верхняя поверхность оборота почти плоская, плавно изгибается к периферии, образует угол 25° с горизонталью на взрослых стадиях. Она очень плавно переходит в боковую поверхность, равномерно округлую в ее нижней части. Боковая поверхность оборота очень плавно переходит в нижнюю поверхность оборота. Последняя изогнута и плавно переходит во внутреннюю поверхность оборота, которая формирует стенки пупка и несет семь или восемь очень тонких спиральных нитей. Пупок неширокий, через него наблюдаются все предыдущие обороты. Верхняя и боковая губа наклонены вперед. Край устья волнистый, очень тонкий. Протоконх простой, гладкий, низко завернутый. Линии роста очень тонкие.]

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FIG. 8. A-E — ***Anomphalus straparoliformis* Mazaev, sp. nov.**, ×7: A-D — holotype No. 4471/74/43: apertural side, oblique top, basal side and apical views; quarry near Maleevo village, Ryazan Region, Myachkovian Provincial Stage; E — No. 4471/26/49: top view, Akishino quarry, Ryazan Region, Myachkovian Provincial Stage; F-K — ***Anomphalus striatus* Mazaev, sp. nov.**, ×5: F-H — holotype, No. 4471/2/77: apical, apertural, and basal side views; quarry near Shchelkovo Town, Moscow Region, Amerevian Provincial Stage; I-K — papatype, No. 4471/2/76: apical, apertural, and basal side views; from same locality.

РИС. 8. A-E — ***Anomphalus straparoliformis* Mazaev, sp. nov.**, ×7: A-D — голотип, No. 4471/74/43: вид со стороны устья, наклонный сверху, снизу и сверху; Малеевский карьер, Рязанская обл., мячковский горизонт; E — No. 4471/26/49: вид сверху, Акишинский карьер, Рязанская обл., мячковский горизонт; F-K — ***Anomphalus striatus* Mazaev, sp. nov.**, ×5: F-H — голотип, No. 4471/2/77: вид сверху, со стороны устья и снизу; Щелковский карьер, Московская обл., амеревский горизонт; I-K — паратип, No. 4471/2/76: вид сверху, со стороны устья и снизу; местонахождения то же.

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SUPPLEMENT

REGISTER OF LOCALITIES

Abbreviations: AR — Arkhangelsk Region; MR — Moscow Region; RR — Ryazan Region; TR — Tver Region; VR — Vladimir Region.

1. MR, quarry near Kamennaya Tyagina village. 3 m below the base of the "Turaevski dolomite" horizon. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1991-1992.

2. MR, quarry near Shchelkovo Town. 3.7 m above the top of motley shales. Amerevian Provincial Stage. Coll. A.V.Mazaev, 1982-1992.

3. MR, quarry near Rusavkino village. 0.5 m above the top of motley shales. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

4. MR, quarry near Shchelkovo Town. 4.5 m above the top of motley shales. Amerevian Provincial Stage. Coll. A.V.Mazaev, 1982-1992.

5. MR, quarry near Shchelkovo Town. 0,5 m above the top of motley shales. Amerevian Provincial Stage. Coll. A.V.Mazaev, 1991.

6. MR, quarry about 1.5 km to the north of Gzhel Station. 2 m above top of motley shales. Amerevian Provincial Stage. Coll. A.V.Mazaev, 1991.

7. MR, outcrops between "55 km" and Gzhel Stations, 150 m south of the railway. White soft limestone bed with flint nodules. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

8. MR, outcrops between "55 km" and Gzhel Stations, 150 m south of the railway. 2 m above the top of white soft limestone bed with flint nodules. Rechitzian Provincial Stage. Coll. R.V.Egorov, A.V.Mazaev 1985-1991.

9. MR, Afanasievo quarry. About 9,5 m below the base of the "Turaevski dolomite" horizon. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1991.

10. VR, the first quarry near Melehovo-Fedotovo village. Highest limestone beds. Gzhelian Stage. Coll. P.B.Kabanov, 1990.

11. VR, quarry near Georgievo village. 12 m below the base of the motley shales. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

12. VR, quarry near Georgievo village. 6,5 m below the base of the motley shales. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

13. VR, quarry near Georgievo village. Highest limestone beds. Rechitzian Provincial Stage. Collected by A.A. Shkolin, 1991.

14. MR, quarry near Konev Bor Station. Lowest part of the layer No. 11, white bioclastic packstone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1982-1992.

15. VR, quarry near Dobryatino Station. Lowest limestone bed layer 3. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

16. VR, quarry near Dobryatino Station. Lowest limestone bed layer 4. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

17. VR, quarry near Dobryatino Station. Fusuline limestone bed of lower part of section. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1991.

18. MR, Afanasievo quarry. About 5,5 m above the top of the "Turaevski dolomite" horizon. Khamovniknian Provincial Stage. Coll. A.V.Mazaev, 1987-1991.

19. MR, outcrop near Shifernaya Station, on the bank of the Medvedka River. Top of the section, white bioclastic mudstone bed. Khamovnikian Provincial Stage. Coll. A.V.Mazaev, 1991.

20. Moscow, Zamoscworechye, research of metro. Krevyakinian Provincial Stage. Coll. A.V.Mazaev, 1982-1991.

21. MR, quarry near Konev Bor Station. Layer No. 5, white bioclastic mudstone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, A.E.Oleinik, 1982-1988.

22. MR, quarry near Podolsk Town. Highest limestone beds. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

23. MR, quarry near Yamskoe village. Highest limestone beds. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

24. MR, quarry near Domodedovo Town. About 7,5 m below the base of the "Turaevski dolomite" horizon. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1982-1984.

25. MR, quarry near Myachkovo village. Myachkovian Provincial Stage. Coll. V.N. Sinel'nikova, 1952-1959.

26. RR, Kasimov quarry. Myachkovian Provincial Stage. Coll. N.V.Zernetzkaya, 1977.

27. MR, quarry near Nikitskoe village. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

28. MR, quarry near Tuchkovo Station. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

29. Moscow, Dorogomilovo, outcrops on the bank of the Moscow River. Kasimovian Stage. Coll. A.P.Ivanov, 1907.

30. MR, quarry near Kamennaya Tyagina village. 3 m above the top of the "Turaevski dolomite" horizon. Krevyakinian Provincial Stage. Coll. P.B.Kabanov, 1991.

31. Moscow, Fili, bottom of the Moscow River. Upper part of Middle or lower part of Upper Carboniferous. Coll. A.G.Kuznetzov, 1982.

32. MR, outcrops between 55 km and Gzhel Stations, 150 m south of the railway. Highest limestone beds. Rechitzian Provincial Stage. Coll. by A.P.Ivanov, 1897-1918.

33. MR, outcrops on the bank of the Rozhiayka River, near Sudakovo village. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

34. MR, quarry near Myachkovo village. Myachkovian Provincial Stage. Coll. A.P.Ivanov, 1896.

35. VR, outcrops near Egoryevo village. Upper Carboniferous. Coll. T.A.Dobrolubova, 1937.

36. MR, outcrops near Noginsk Town, Amerevian Provincial Stage. Coll. V.N.Sinel'nikova, 1967.

37. MR, outcrops on the bank of the Klyasma River near Ameryevo village. Amerevian Provincial Stage. Coll. A.P.Ivanov, 1907.

38. MR, outcrops near Kashira Town. Kashirian Provincial Stage. Coll. A.P.Ivanov, 1916.

39. Moscow, Zamoskworechye, research of metro. Kashirian Provincial Stage. Coll. A.V. Mazaev, 1982-1991.

40. MR, outcrops on the bank of the Moscow River near Lutzino village. Myachkovian Provincial Stage. Coll. A.P.Ivanov, 1907.

41. MR, quarry near Korobcheyevo village on the Oka River. Top of the section, layer of the yellow coarse grainstone. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1952-1959.

42. MR, quarry near Schurovo Station. Highest limestone beds. Podolskian Provincial Stage. Coll. A.V.Mazaev, A.E.Oleinik, 1983-1988.

43. MR, quarry near Polyany village (about 5 km south of Shurovo Station). Podolskian Provincial Stage. Coll. A.V.Mazaev, 1983-1988.

44. MR, quarry near Pirochi village. 1,5 m above the top of horizon of large flint corals. Podolskian Provincial Stage. Coll. A.V.Mazaev, 1983-1988.

45. MR, quarry near Shurovo Station. Highest limestone beds. Podolskian Provincial Stage. Coll. A.P.Ivanov, 1907.

46. TR, outcrops near Ulitino village on bank of the Volga River. Myachkovian Provincial Stage. Coll. A.P.Ivanov, 1907.

47. MR, outcrops near Obraztsovo village on the bank of the Lopasnya River. Kaschirian Provincial Stage. Coll. A.P.Ivanov, 1896.

48. MR, outcrops near Neverovo village. Khamovnikian Provincial Stage. Coll. P.A.Gerasimov, 1928.

49. MR, outcrops on the bank of the Moscow River near Kamennaya Tyagina village. Myachkovian Provincial Stage. Coll. P.A.Gerasimov, 1929.

50. MR, quarry near Domodedovo Town. About 14 m below the base of the "Turaevski dolomite" horizon, layer of the white coarse grainstone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1982-1993.

51. MR, quarry near Pirochi village. 1 m below the base of horizon of large flint corals. Podolskian Provincial Stage. Coll. A.V.Mazaev, 1983-1988.

52. MR, quarry near Afanasievo village. The packet of motley clay beds above "Turaevski dolomite" horizon. Krevyakinian Provincial Stage. Coll. A.V.Mazaev, 1983-1990.

53. RR, quarry near Scherbatovo village. Upper part of Kasimovian Stage or lower part of Gzhelian Stage. Coll. N.V.Zernetzkaya, 1977.

54. MR, quarry near Konev Bor Station. Top part of the layer No. 11, white coarse grainstone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1983-1993.

55. MR, quarry near Podolsk Town. White limestone just below the white or green marl limestone bed. Podolskian Provincial Stage. Coll. A.V.Mazaev, 1982-1984.

56. AR. Upper Carboniferous.

57. AR, left bank of the Pinega River near Rojevo village. Myachkovian Provincial Stage. Coll. P.B.Kabanov, 1991.

58. MR, quarry near Konev Bor Station. Layer No. 12, motley shales. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1983-1993.

59. MR, quarry near Peski Station. Motley shales. Myatchovian Provincial Stage. Coll. A.P.Ivanov, 1907.

60. MR, outcrops near Staraya Sitnya village, (near Stupino Town). Podolskian Provincial Stage. Coll. A.P.Ivanov, 1912.

61. MR, outcrops on the Medvedka River near Schifernaya Station. Motley shales. Khamovnikian Provincial Stage. Coll. A.P.Ivanov, 1915.

62. MR, quarry near Neverovo village. Khamovnikian Provincial Stage. Coll. A.P.Ivanov, 1915.

63. MR, quarry near Rusavkino village. About 2,5 m above the top of motley shales. Rechitzian Provincial Stage. Coll. A.P.Ivanov, 1896-1918.

64. MR, outcrops on the Medvedka River near Schifernaya Station. Motley shales. Khamovnikian Provincial Stage. Coll. A.V.Mazaev, 1983.

65. MR, quarry near Domodedovo Town. About 5,5 m below the base of the "Turaevski dolomite" horizon. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1982-1984.

66. MR, quarry near Domodedovo Town. 14 m below the base of the "Turaevski dolomite" horizon, layer of the white coarse grainstone. Myachkovian Provincial Stage. Coll. V.N.Sinel'nikova, 1958.

67. MR, quarry near Domodedovo Town. 3 m above the top of the "Turaevski dolomite" horizon, layer of the white bioclastic mudstone. Krevyakinian Provincial Stage. Coll. A.V.Mazaev, 1994.

68. MR, Afanasievo quarry. Grainstone with *Meekella eximia* below the base of the "Turaevski dolomite" horizon.

Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1987-1991.

69. Moscow, outcrops near Belokamennaya Station. Motley clay beds. Krevyakinian Provincial Stage. Coll. A.V.Mazaev, 1983.

70. MR, quarry near Korobcheyevo village on the Oka River. Top of the section, yellow coarse grainstone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1994.

71. MR, outcrops on the left bank of the Moscow River at 1 km down of the Ruza River issue. Lower part of upper *Ivanovia* biostrom. Ulitino member of Podolskian Provincial Stage. Coll. P.B.Kabanov, 1993.

72. MR, quarry near Kamennaya Tyagina village. Puckstone bed just above the "Turaevski dolomite" horizon. Krevyakinian Provincial Stage. Coll. A.S. Zubarev, 1993.

73. RR, quarry near Jambirno village. Yellow grainstone in upper part of the section. Kaschirian Provincial Stage. Coll. A.V.Mazaev, 1995.

74. RR, quarry near Maleyevo village, near Kasimov Town, low part, white slightly nodulated mudstone-wackestone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1995.

75. MR, outcrops between "55 km" and Gzhel Stations, 150 m south of the railway. Leyer 3. Rechitzian Provincial Stage. Coll. A.V.Mazaev, 1995.

76. MR, outcrops near Gubino village, 12 km east of the Likino-Dulevo Town. Gzhelian Stage. Coll. A.V.Mazaev, 1995.

77. RR, Akishino quarry. Lower fine grainstone with *Meekella eximia*. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1996.

78. RR, Akishino quarry. Middle grainstoune with colonial corals. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1996.

79. RR, Akishino quarry. Upper part of section, bioclastic wackestone. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1996.

80. RR, Akishino quarry. Upper fine grainstone with Meekella. Myachkovian Provincial Stage. Coll. A.V.Mazaev, 1996.