

New Ostracod Genera *Bathoniella* (Bathonian and Lower Callovian of the East European Platform and Northern Germany) and *Parabathoniella* (Lower and Middle Bathonian of Scotland). Part 1: Taxonomy

E. M. Tesakova^{a, b, *}

^a Lomonosov Moscow State University, Moscow, 119234 Russia

^b Geological Institute, Russian Academy of Sciences, Moscow, 119017 Russia

*e-mail: ostracon@rambler.ru

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Abstract—The stratigraphically important ostracod taxa *Palaeocytheridea milanovskyi* Lyubimova, 1955 and *P. nikitini* Lyubimova, 1955 from the lower Callovian of the East European Platform and Northern Germany are revised. *P. nikitini* is reduced to a synonym of *P. milanovskyi*. *P. milanovskyi* is proposed as the type species for the new genus *Bathoniella* from the lower Bathonian–lower Callovian (Ishmae–Calloviense zones). Three more species: *B. prima* sp. nov., *B. paenultima* sp. nov. and *B. ultima* sp. nov. are included in *Bathoniella* gen. nov. A new—bathoniellid—subtype of sexual dimorphism is described. This is also characteristic of another new genus, *Parabathoniella*, with the type species *Acanthocythere elongata* Wakefield, 1994 from the lower–middle Bathonian (Tenuiplicatus–Progracilis zones) of the Inner Hebrides, Scotland, as well as the genus *Mandelstamia* from the upper Jurassic and lower Cretaceous of Europe.

Keywords: new species, new subtype of sexual dimorphism, revision, homology

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INTRODUCTION

This paper is a continuation of the systematic study of middle Jurassic ostracods from the East European Platform based on materials from sections of the Volga Region, central regions of Russia, Ukraine and Belarus, where primary attention was paid to stratigraphically significant species. Based on the results of their revision, phylogenetic lineages were reconstructed, on the basis of which new lineage zones were established, or the revised taxa became indices of assemblage zones with a wide geographical distribution (Tesakova, 2013a, 2013b, 2014, 2022a, 2022b, 2022c, 2022d; Tesakova and Seltser, 2022).

Such index species of ostracods include *Palaeocytheridea milanovskyi* Lyubimova and *P. nikitini* Lyubimova, described by P.S. Lyubimova from the lower Callovian of the Volga Region and Obshchyi Syrt (Lyubimova, 1955, p. 38, pl. 5, figs. 5a–5c [5a, 5b, 5c in Russian]; pl. 6, figs. 1a–1d [1a, 1b, 1c, 1d in Russian]). Later, both taxa were identified by M.N. Permyakova in the same stratigraphic interval of the Dnieper–Donets Depression but assigned to the genus and subgenus *Fuhrbergiella* (*F.*) Brand et Malz (Pyatkova and Permyakova, 1978, p. 144, pl. 60, figs. 2a, 2b, 3, 4a, 4b, 5). In the “Practical Guide on the Microfauna” (Prakticheskoe..., 1999, p. 178, pl. 31, fig. 3; p. 179, pl. 34, fig. 5),

for which holotypes from Lyubimova’s type collection were re-imaged, they were assigned to *Acanthocythere* (*Protoacanthocythere*) *milanovskyi* and *Pseudoperisocytheridea nikitini*. Later, these species were assigned either to the subgenus *Protoacanthocythere* Bate (Tesakova and Seltser, 2013; Makhnach and Tesakova, 2015), or to the genus *Acanthocythere* Sylvester-Bradley (Tesakova et al., 2015, 2020; Glinskikh et al., 2022; Tesakova and Seltser, 2022).

Noteworthy, at the beginning of the study it was not clear why Lyubimova and Permyakova mentioned the co-occurrence of the species *milanovskyi* and *nikitini* in sections of Ukraine (Pyatkova and Permyakova, 1978, p. 144) and Samarskaya Luka (Repyevka Section; Lyubimova, 1955, pp. 125–127, pls. 1, 2, 5), while the author’s own material suggested different geographical ranges (Fig. 1). Single specimens from the Elatmae Zone of the Grigorovka Section (Kanav Dislocations, Dnieper–Donets Depression) were assigned to the species *nikitini* (Tesakova et al., 2015, text-fig. 1); from the Calloviense Zone in Borehole no. 792 in the Gomel District (Belarus) (Makhnach and Tesakova, 2015, text-fig. 2, pl. 3, figs. 6–9); from the Subpatruus Zone from the Mikhailovsky Mine (Kursk Region), erroneously identified as *Galliaeytheridea* aff. *spinosa* Kilenyi (Tesakova et al., 2009,



Fig. 1. Map of localities of sections and boreholes from which new ostracods of the genus *Bathoniella* gen. nov. were studied. 1, Grigorovka and Kostyanets Yar (Kanev Dislocations, Dnieper–Donets Depression); 2, Borehole no. 792 (Gomel District, Belarus); 3, Mikhailovsky Mine (Kursk Region); 4, Bartolomeevka and TETs-5 (Saratov Region); 5, Tarkhany pristan (Tetyushy District, Tatarstan); 6, Pochinki (Nizhny Novgorod Region); 7, Borehole no. 6 (Obval) (Tamala District, Penza Region); 8, boreholes no. 103 and no. 108 (Perelyub District, Saratov Region).

pl. 2, figs. 6, 7). The species *milanovskyi* is represented in collections by specimens from the Elatmae Zone of the Bartolomeevka Section (Saratov Region) (Tesakova and Seltser, 2013, p. 66, text-fig. 5, figs. 1–4, 7), Tarkhany pristan (Tetyushy District, Tatarstan) (this work) and Kostyanets Yar (Kanev Dislocations, Dnieper–Donets Depression) (this work). The resulting picture of the distribution of *milanovskyi* and *nikitini* in time and space did not provide any explanation and showed the need for a revision of these species.

Another important circumstance was the discovery of morphologically similar ostracods from the Kamennyi Ovrage and Khlebnovka formations, studied in Boreholes 103 and 108 in the Saratov Trans-Volga Region (Perelyub District, Saratov Region) (Tesakova et al., 2023). The Kamennyi Ovrage Formation, the age of which is determined by the stratigraphic position between the beds with ammonites, corresponds to the upper part of the lower Bathonian Ishmae Zone—the lower part of the upper Bathonian Calyx Zone. Based

on ammonites, the Khlebnovka Formation is assigned to the upper part of the Calyx Zone—lower Callovian Elatmae Zone (Gulyaev, 2015, 2019).

Ostracods from the Kamennyi Ovrage Formation are strikingly similar to *Acanthocythere elongata* Wakefield, 1994 from the Bathonian of Scotland (Wakefield, 1994, p. 27, pl. 4, figs. 1–9), only of smaller height, which we consider as a new species. The affinity of these species is suggested not only by their high morphological similarity but is also emphasized by their ecological adaptation to coastal environments with unstable salinity. A comparison of the ontogenies of these species showed a distant relationship, while the similar shell shape and the same ornamentation in adults have resulted from homology.

The revision by the present author, firstly, showed that assigning all these taxa to the genera and subgenera *Acanthocythere*, *A. (Protoacanthocythere)*, *Fuhrbergiella* (F.), *Palaeocytheridea* Mandelstam and, even more so, to the genus *Pseudoperissocytheridea* Man-

delstam was erroneous; secondly, it made it possible to identify a new genus *Bathoniella* with a very characteristic bathoniellid (new) subtype of sexual dimorphism; and, thirdly, based on the presence of the same bathoniellid sexual dimorphism in a morphologically similar species from synchronous deposits of Scotland, but developing as part of another parallel lineage, to establish another new genus *Parabathoniella* gen. nov.

Thus, the purpose of this study included the following: to perform a revision of the stratigraphically significant taxa *milanovskyi* and *nikitini*; identify and describe new species related to them; determine the generic affiliation of these species that evolved in the Bathonian and early Callovian in the East European Platform; determine the generic affiliation of a homologous species representing a parallel lineage in Western Europe; identify and describe a new type of sexual dimorphism that simultaneously arose in related lineages.

MATERIAL AND METHODS

The paper is based on the author's working collections, the sampling location for which, and stratigraphic reference to the ammonite scale, were published in previous papers (Tesakova et al., 2009, 2015, 2020; Tesakova, 2013a, 2014, 2022a, 2022b, 2022c, 2022d; Tesakova and Seltser, 2013, 2022; Makhnach and Tesakova, 2015).

Apart from the previously published data, ostracods from the Kostyanets Yar Section (Kanev Dislocations, Dnieper–Donets Depression) were used; for the latter the lithological log, location and ammonite datings were published by Gulyaev and Ippolitov (2021, text-figs. 1, 4). The samples for microfauna included 11 samples from the lower Callovian, Elatmae Zone (*P. elatmae* Biohorizon) that were selected and kindly provided to the author by A.P. Ippolitov (GIN). The rocks were washed using the standard method at the Geological Faculty of Moscow State University. In total, more than 100 *Bathoniella* specimens were examined.

A washed sample with a rich assemblage of ostracods and foraminifers from the Tarkhany pristan Section, Elatmae Zone, Tetyushy District, Tatarstan was kindly donated by A.A. Mironenko (GIN). Ammonites from this locality were identified by D.N. Kiselev (YSPU; pers. comm). *Bathoniella* is represented by five specimens.

Core material (30 samples weighing 250–300 g each) was provided by A.S. Zastrozhnov (Karpinsky Institute), it comes from two boreholes drilled in the Perelyub District of the Saratov Region; E.V. Shchepetova (GIN) compiled the lithological logs of the boreholes and identified formations in them. Description of Borehole no. 103 Section with the identification of formations, the position of ichnofossils and the dating of individual levels using dinocysts, foraminifera and

ammonites was done by her earlier (Shchepetova et al., 2020, 2021; in these papers this borehole was referred to as Borehole no. 1). The lithological log of Borehole no. 108 and its correlation with Borehole no. 103 were published by Tesakova et al. (2023). Deposits of the Pochinki and Kamennyi Ovrage formations were recovered in both boreholes; the Khlebnovka and Promzino formations were observed only in Borehole no. 108. Ostracods of the genus *Bathoniella* gen. nov. were found in the Kamennyi Ovrage and Khlebnovka formations (the distribution of ostracods in the sections of these boreholes will be discussed in the next paper (Tesakova et al., 2024 (in press))). All formations are dated by foraminifers and ostracods, while ammonite zones were recognized only in the Pochinki (in a narrow interval) and Promzino formations. Ammonites and corresponding zones in the lower Bathonian part of the sections were identified by D.B. Gulyaev (Commission on the Jurassic System of the Interdepartmental Stratigraphic Committee, Russia), in the middle Volgian—by M.A. Rogov (GIN). Foraminiferal assemblages were studied by M.A. Ustinova (GIN), ostracods were studied by the present author. The preservation of almost all microfauna from the sandy Kamennyi Ovrage Formation is satisfactory or poor, and specimens from clays of the Khlebnovka Formation are well preserved. Both of these formations are dated by foraminifers and ostracods; no ammonites were found in them (Tesakova et al., 2023).

Two specimens of *B. milanovskyi* (Lyubimova) come from Borehole no. 6 Section (Obval), Tamala District, Penza Region, from the interval of 349.0–350.5 m. The washed samples were provided by A.S. Alekseev (MSU). Based on foraminifers, this section interval is dated as the Beds with *Lenticulina volganica*–*Vaginulina dainae*, which correspond to the upper Bajocian–lower Bathonian, Michalskii ammonite Zone (Ustinova, 2017). This age was confirmed by ostracods, which included the zonal index *G. bathonica* (unpublished data). The presence of the late Bathonian–early Callovian species *B. milanovskyi* in this assemblage is explained by contamination during drilling.

Ostracods were photographed using a scanning electron microscope (SEM) TESCAN VEGA-II XMU and VEGA-III XMU in the instrument analytics department of the Borissiak Paleontological Institute, Russian Academy of Sciences, and their photographic images are presented on Plates I–IV.

When measuring the parameters of shells or individual valves, which were made from photographs in the ImageJ program, the following abbreviations were adopted: L—maximum length, AEH—anterior end height, MH—height in the middle part of the valve, PEH—posterior end height, T—thickness, L/AEH is the ratio of the length to the height of the anterior end, L/Hmax is the ratio of the length to the maximum height (the latter in females and immature individuals

of late stages can be at the anterior end or in the middle of the valve, in males—at the posterior end, in immature individuals of early and middle stages—is at the anterior end), juv.—juvenile individual. Anterior and posterior end height measurements were made for all specimens. The MH measurement was carried out only when the maximum height exceeded the AEH or PEH and was in the middle of the shell (or the preservation of the material did not allow the measurement of the AEH, as, for example, in specimen MGU Perehub-38 (Pl. IV, fig. 6)). When characterizing the material, the following abbreviations are accepted: C—carapace, RV—right valve, LV—left valve. The age stages of ostracods are designated as follows: ad.—adult, juv.—juvenile with molting shells from A1 (last before maturity) to A8 (first, youngest).

Ostracod collections are housed at the Department of Regional Geology and History of the Earth, Faculty of Geology, Lomonosov Moscow State University, under nos. MSU Poch and MSU Poch-2 (Pochinki, Nizhny Novgorod Region), MSU Bart (Bartolomeevka, Saratov Region), MSU Perelub (boreholes no. 103 and no. 108, Perelyub District, Saratov Region), MSU Sokur-Ya and MSU Sokur (Borehole Sokursky Tract, Saratov Region), MSU TP (Tarkhany pristan, Tetyushy District, Tatarstan), MSU Pnz-3 (Borehole no. 6 (Obval), Tamala District, Penza Region), MSU 300 (Mikhailovsky Mine, Kursk Magnetic Anomaly (KMA)), MSU KYa (Kostyanets Yar, Kanev District, Dnieper–Donets Depression), MSU Belor (Borehole no. 792, Gomel District, Belarus).

BATHONIELLID SUBTYPE OF SEXUAL DIMORPHISM

Any systematic work related to ostracods requires mandatory understanding and consideration of the type of sexual dimorphism due to the fact that in some ostracods the shells of females and males differ so much that they were described as different species (Moore, 1961; Henningsmoen, 1965; Becker, 1968a, 1968b; Ivanova, 1979; Jaanusson, 1985; Pokorný, 1998; etc.).

The entire diversity of sexual dimorphism is divided into two main infratypes—*extradomiciliary* and *domiciliary* with different types and varieties.

The first infratype includes Paleozoic crustaceans with external brood structures not associated with the shell cavity (paleocopid ostracods of the orders Hollinocopida, Beyrichicopida and Limbatulocopida (orders and superorders according to (*Prakticheskoe...*, 1990)). The second infratype includes those who carry fertilized eggs in the shell cavity, sometimes even in a special domatium chamber (from Greek *domatium*, chamber), which is typical of all Phanerozoic ostracods (platycopid Kloedenellocopida and Platycopida and podocopid Metacopida and Podocopida).

Within the domiciliary infratype Ivanova (1979, p. 11) considered four types: *aparchitid*—by the presence of swelling or expansion in the posterior part of the shell of females, *beyrichiid* (or *cruminal*; Sarv, 1966)—by the development of a convexity (*crumina*) in the anterior ventral part of the shells of females, *kloedenellid*—by the development of a cavity in the posterior part of the shell of females and *contour* (or size-proportional) dimorphism—according to differences in the outlines and sizes of the ratios of the shells of females and males.

Later, Jaanusson (1985, p. 80) identified the *cytherellid* type for the platycopid superfamilies Cavellinacea and Cytherellacea, in which the internal brood chamber of the domatium is formed (sometimes with separate nests for eggs). Jaanusson distinguished it from the kloedenellids type, in which the female shells are inflated posteriorly, as, for example, in the genera *Cyprideis*, *Limnocythere*, *Xestoleberis*, *Darwinula*, etc., although the domatium is not formed.

In Meso-Cenozoic ostracods, only a domiciliary infratype is known with the kloedenellid, cytherellid and contour types (*Prakticheskoe...*, 1989, 1999). If the first two are associated with caring for the offspring (carrying eggs until the hatching or until the first moults of juveniles), then the latter can be dictated by other needs, for example, the placement of large hemipenis and the Zenker organ of males or the ovaries of females, or to facilitate the mating process (Ivanova, 1979; Jaanusson, 1985).

Evidently, podocopids are characterized only by kloedenellid and contour types of sexual dimorphism. The kloedenellid type is very simple and allows females and males to be distinguished easily and reliably. The contour type has many variants and is ambiguous: in some species the females are larger than the males, in others they are smaller; the height and thickness of the posterior end is sometimes greater in females, and sometimes in males; the contours of the posterior end are rounded or angular in females or, conversely, in males. A striking example of high variability of the contour type is sexual dimorphism in Late Cretaceous ostracods from the Gissar-Tajik Region, described by Andreev (1966). He clearly characterized these options, focused on the differences between them, assessed their significance for taxonomy and the identification of nomenclatural units of different ranks, but did not assign his own names and did not propose a subdivision system for the contour type.

The dimorphism of the ostracods in this study should be classified as a contour type, since the sex shells differ in linear dimensions (contour), but its features are so unusual that they required special study and identification into an independent subtype. The name of the new *bathoniellid* subtype is based on the first discovery in the genus *Bathoniella* gen. nov. It is also characteristic of the genera *Parabathoniella* gen. nov. and *Mandelstamia* Lyubimova from the upper

Table 1. The greatest shell thickness and marginal figure in the dorsal view are found in representatives of the genera *Bathoniella* gen. nov. and *Parabathoniella* gen. nov.

Species	Juveniles	Males	Females
<i>B. ultima</i> sp. nov.	?	?	In the posterior third, trapezoid
<i>B. paenultima</i> sp. nov.	In the posterior third, trapezoid	In the middle, lenticular	In the posterior third, trapezoid
<i>B. milanovskyi</i> (Lyub.)	In the posterior third, trapezoid	In the middle, lenticular	In the middle, lenticular
<i>B. prima</i> sp. nov.	In the middle, lenticular	In the middle, lenticular	In the posterior third, trapezoid
<i>P. elongata</i> (Wakefield)	?	In the middle, lenticular	In the posterior third, trapezoid

Jurassic and lower Cretaceous of Europe (*Praktichesko...*, 1999, p. 61).

In ostracods with the bathoniellid subtype of sexual dimorphism, the shells of males are longer than those of females (which is also quite common in other podocypid ostracods, for example, in the genera *Schuleridea* Swartz et Swain, *Fuhrbergiella* Brand et Malz, *Macrodentina* Martin, etc.).

The height of the posterior end in males is greater than in females, which is also not uncommon (for example, in some *Glyptocythere* Brand et Malz (Brand and Malz, 1966; Tesakova, 2022d), etc.). Therefore, in lateral view, the contours of the shells of females and males with bathoniellid sexual dimorphism fit well into the usual parameters of the contour type. But the outlines of their shells in dorsal view—their *marginal figures*—differ greatly (Table 1, Fig. 2).

The lateral surface of the posterior end in males is more convex than in females, not flattened, gradually flattens towards the posterior margin; the sides of the shell converge towards the posterior margin smoothly, without a ledge; and the greatest thickness is in the middle part of the shell. Therefore, the marginal figure of all males is lenticular (elliptical) (Pl. I, figs. 12, 13; Pl. II, figs. 1a, 1b, 19; Pl. III, figs. 18, 19).

In females, the posterior end is flattened, the lateral surface of the valve is separated from the posterior end by a distinct ledge; the greatest thickness is in the posteroventral part of the valve (*P. elongata*, *B. prima* sp. nov., *B. paenultima* sp. nov., and *B. ultima* sp. nov.),

which creates a trapezoidal marginal figure (Pl. I, fig. 8b, 10; Pl. III, Fig. 17); or it is located near the middle (*B. milanovskyi*), and the marginal figure become more lenticular (Pl. I, fig. 11; Pl. II, fig. 18).

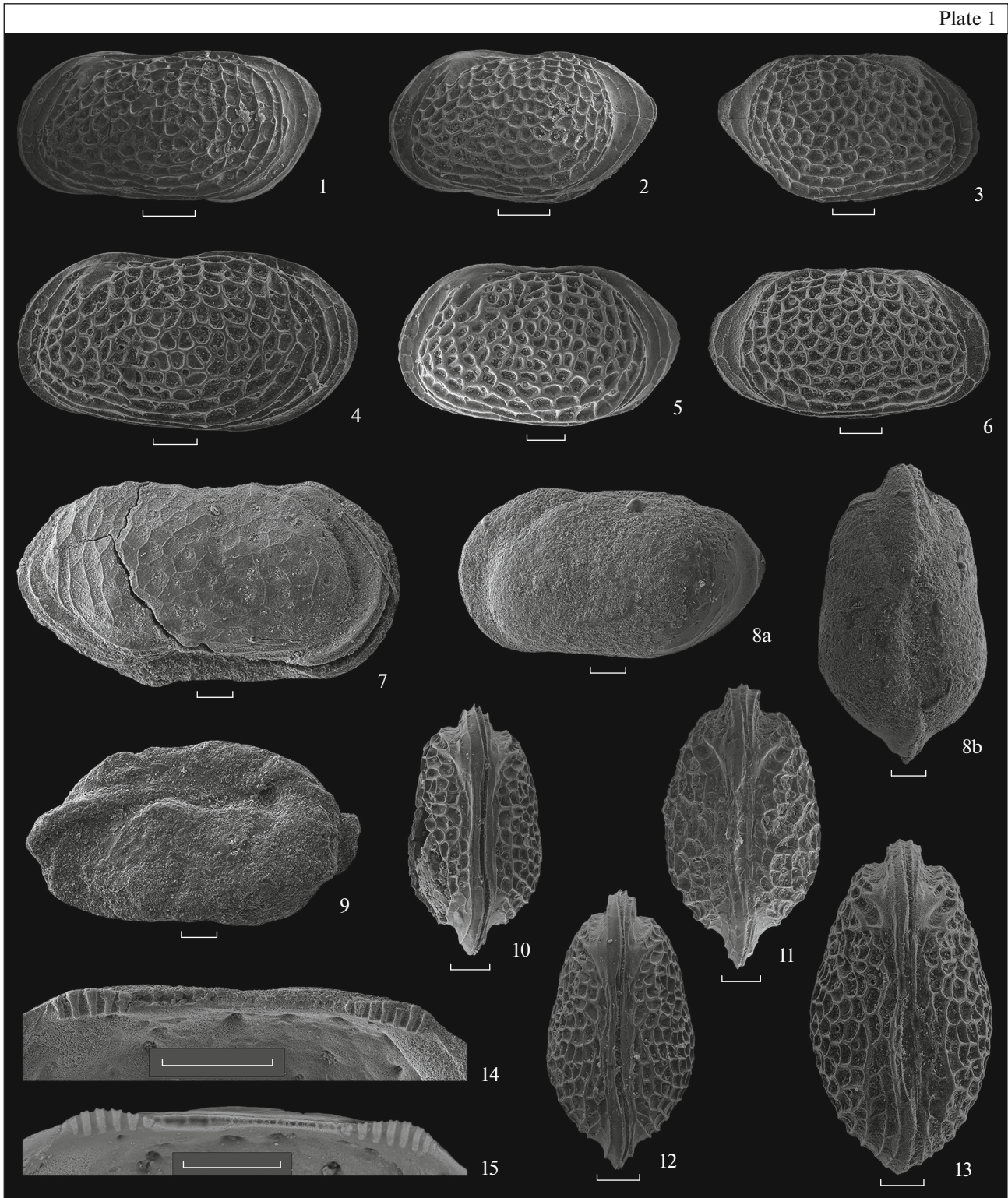
Thus, in ostracods with the bathoniellid subtype of sexual dimorphism, differences in the morphology of the posterior end of females (flattened, with a ledge) and males (not flattened, without a ledge) lead to a difference in the contour of their shells in dorsal view (in males it is always lenticular). While all other ostracods with a contour type of sexual dimorphism (albeit with flattened ends in females and males, as, for example, in *Protoacanthocythere* Bate, or with convex, without a ledge, as in females and males of *Acantocythere* Sylvester-Bradley) their marginal figures are congruent, and the sexes differ only in the length of the shell (Fig. 2). It is herein proposed to classify all ostracods with such sexual dimorphism as a *congruent* subtype. So, within the contour type, we have identified two new subtypes of sexual dimorphism, and the congruent subtype can be further subdivided into varieties.

DISCUSSION OF THE GENERIC ASSIGNMENT OF THE SPECIES STUDIED

All *Bathoniella* and *Parabathoniella*, along with characteristic sexual dimorphism, are distinguished by a fairly wide range of linear parameters, both in males and females (Table 2), which makes it difficult to determine sex by this character. This and the lenticular outline of the males in dorsal view, with the lateral

Plate I. (1–3, 10, 12, 14) from the Pochinki Section, Nizhny Novgorod Region, lower Callovian, Subpatruus Zone, *C. surensis*, *C. subpatruus* and *C. uzhovkensis* biohorizons; (4–6, 11, 13, 15) from the lower Callovian, Elatmae Zone: (4, 6, 13) from the Bartolomeevka Section, Saratov Region, (5) from the Tarkhany pristan Section, Tetyushy District, Tatarstan, (11, 15) from the Kostyanets Yar Section, Kanev District, Dnieper–Donets Depression; (7–9) from Perelyub District, Saratov Region, Kamennyi Ovrage Formation, upper part of the lower Bathonian—lower part of the upper Bathonian. (1–3, 10, 12, 14) *Bathoniella paenultima* Tesakova, sp. nov.: (1) holotype MSU Poch-2-001, C, male, left view; (2) specimen MSU Poch-24, C, female, left view; (3) specimen MSU Poch-2-188, RV, female; (10) specimen MSU Poch-2-002, C, female, dorsal view; (12) specimen MSU Poch-2-047, C, male, dorsal view; (14) specimen MSU Poch-2-186, hinge, RV, female; (4–6, 11, 13, 15) *Bathoniella milanovskyi* (Lyubimova): (4) specimen MSU Bart-29, LV, male; (5) specimen MSU TP-011, LV, female; (6) specimen MSU Bart-30, RV, female; (11) specimen MSU Kya-57a, C, female, dorsal view; (13) specimen MSU Bart-33, C, male, dorsal view; (15) specimen MSU Kya-55, hinge, RV, female; (7–9) *Bathoniella prima* Tesakova, sp. nov.: (7) specimen MSU Perelub-04, mold of C, male, right view, Borehole no. 108, depth 120.0 m, middle Bathonian, Beds with *A. baticus*; Borehole no. 103, lower Bathonian: (8) holotype MSU Perelub-53, C, female: (a) left view, (b) dorsal view, depth 201.5 m; (9) MSU Perelub-50, mold of C, female, left view (partly dorsal view), depth 197.7 m. Abbreviations here and in Plates II–IV: C, complete carapace, RV, right valve, LV, left valve, juv., juvenile. Scale bar for all figures 100 µm, except for specially indicated.

Plate 1



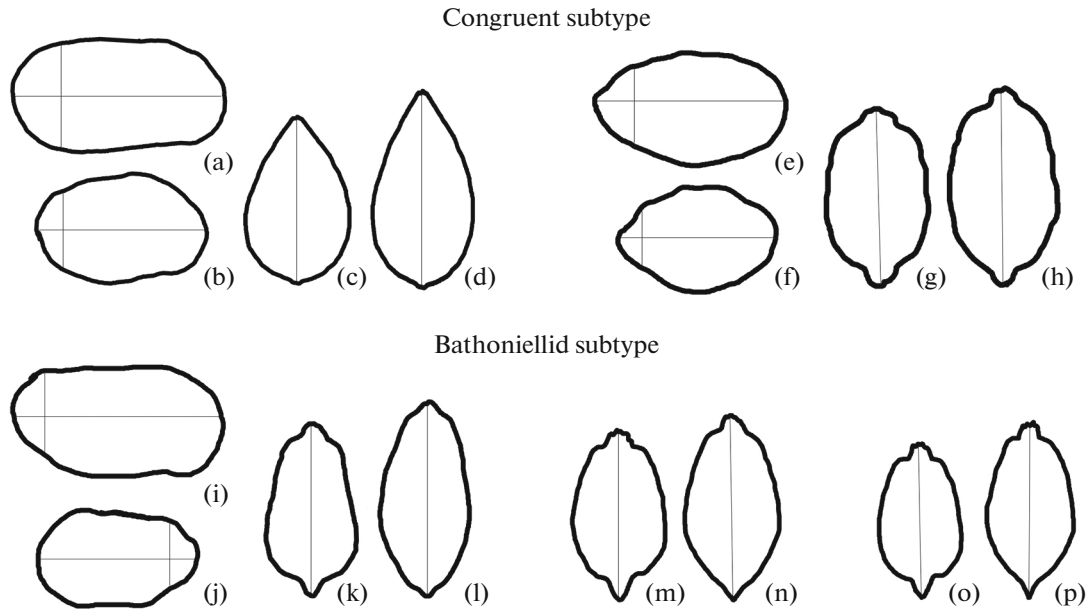


Fig. 2. Subtypes of contour type sexual dimorphism in ostracods. The length of the specimen in mm is given in parentheses. (a–h) congruent subtype: (a–d) *Acanthocythere sphaerulata* (Jones et Sherborn): (a, d) holotype BMNH no. I.1835, C, male (0.51) from the Bathonian of South England (after Sylvester-Bradley, 1956, pl. 1, fig. 1): (a) right view, (d) dorsal view; (b, c) upper Bathonian of northern France (after Sheppard, 1981, pl. 15, figs. 1, 2): (b) specimen OS 11502, RV, female (0.62), (c) specimen OS 11791, C, female (0.59), dorsal view; (e–h) *Glyptocythere tuberosa* Brand et Malz in Brand and Fahrion, upper Bajocian of northern Germany (after Brand and Malz, 1966, pl. 57, figs. 61, 63, 66, 67): (e) specimen Xe 4377, RV, male (0.69), (f) specimen Xe 4376, RV, female (0.60), (g) specimen Xe 4376, C, female (0.60), dorsal view, (h) specimen Xe 4377, C, male (0.69), dorsal view; (i–p) bathoniellid subtype: (i–l) *Parabathoniella elongata* (Wakefield) from the lower Bathonian of Scotland (after Wakefield, 1994, pl. 4, figs. 4–6, 9): (i, l) holotype OS 13816, C, male (0.89): (i) right view, (l) dorsal view; (j, k) specimen OS 13824, C, female (0.85): (j) left view, (k) dorsal view; (m, n) *Bathoniella milanovskiyi* (Lyub.): (m) specimen MSU Kya-58, C, female, dorsal view (Pl. II, fig. 18), (o) specimen MSU Kya-57, C, male, dorsal view (Pl. II, fig. 19); (o, p) *B. paenultima* sp. nov.: (o) specimen MSU Poch-094, C, female, dorsal view (Pl. III, fig. 17), (p) specimen MSU Poch-190, C, male, dorsal view (Pl. III, fig. 19).

sides gently converging posteriorly without a pronounced ledge, like in females, led to the erroneous assignment of the species *milanovskiyi* and *elongata* to the genus *Acanthocythere* (Wakefield, 1994; *Prakticheskoe...*, 1999). In *Acanthocythere*, a similar marginal figure is characteristic not only of males, but also of females, and the sexes differ only in the length of the shell (Sylvester-Bradley, 1956; Sheppard, 1981).

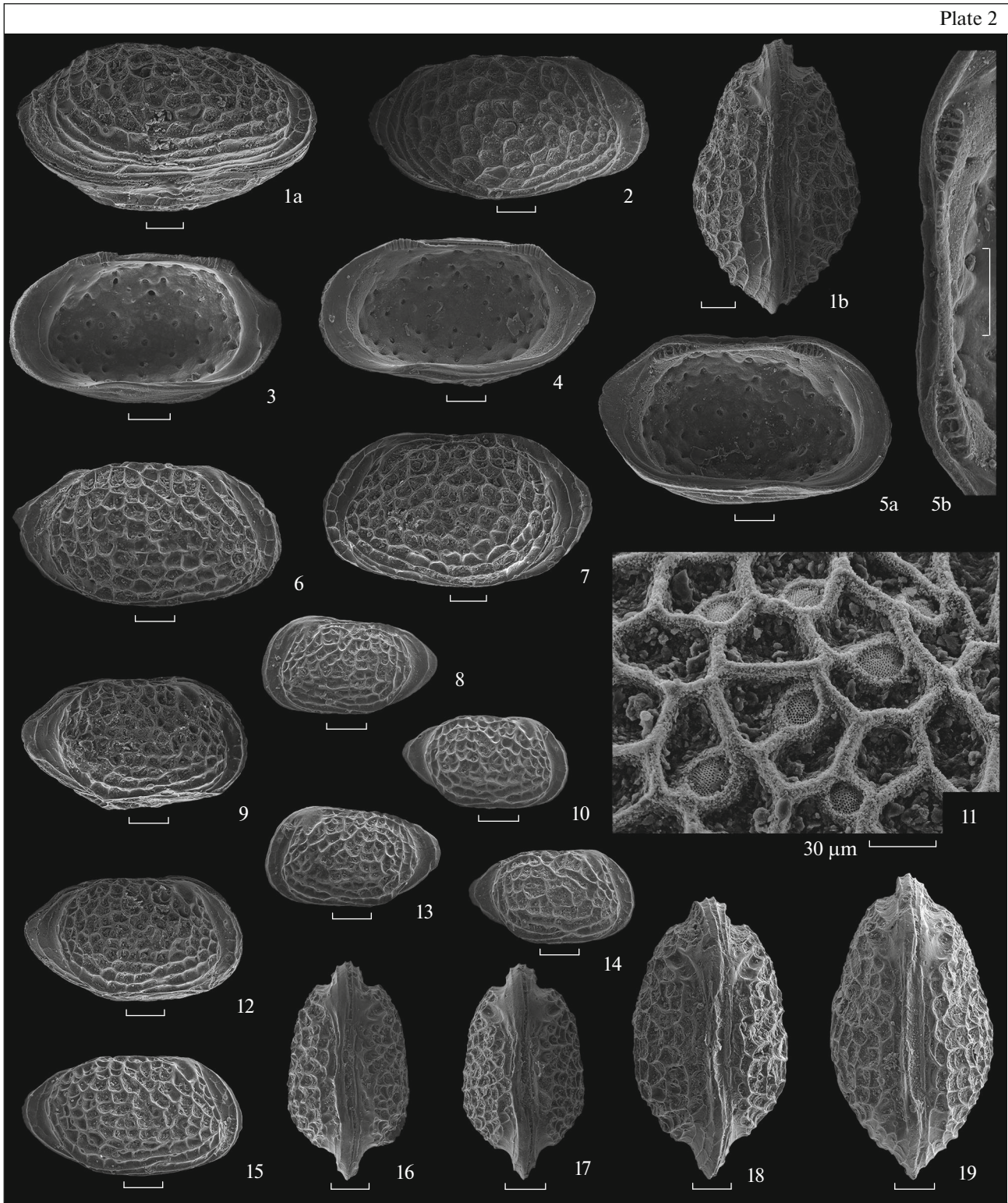
The entomodont hinge in *milanovskiyi* and *elongata* is much more similar to that of the subgenus *Protoacanthocythere* than to the very different lobodont hinge of the genus *Acanthocythere*. This was reflected in the taxonomy adopted in the “Practical

Guide ...” (*A. (P.) milanovskiyi*; *Prakticheskoe...*, 1999, p. 179), while Wakefield simply expanded the diagnosis of the genus *Acanthocythere* (with a very characteristic, but different hinge), including *Protoacanthocythere* with an entomodont hinge (*A. elongata*; Wakefield, 1994, p. 27).

Meanwhile, a revision by Whatley and Ballent (2004) showed that *Protoacanthocythere* cannot be a subgenus of the genus *Acanthocythere* due to the structure of the hinge and should be considered as a genus in its own right. They assigned *A. sphaerulata* (Jones et Sherborn, 1888) from the Bathonian of England (Sylvester-Bradley, 1956), *A. elongata* Wakefield, 1994, as

Plate II. All specimens from the lower Callovian, Elatmae Zone: (1, 4, 6–10, 12–19) from the Kostyanets Yar Section, Kanev District, (2) from the Grigorovka-1 Section, Kanev District, (3, 11) from the Bartolomeevka Section, Saratov Region, (5) from the Tarkhany pristan Section, Tetyushy District, Tatarstan. (1–19) *Bathoniella milanovskiyi* (Lyub.): (1) specimen MSU Kya-55a, C, male: (a) right view, partially from the ventral side, (b) dorsal view; (2) specimen MSU Grig-1-162, RV, male; (3) specimen MSU Bart-31, RV, female, internal view; (4) specimen MSU Kya-55, RV, female, internal view; (5) specimen MSU TP-011, LV, female: (a) internal view, (b) hinge; (6) specimen MSU Kya-65, RV, juv. A1–A2; (7) specimen MSU Kya-63, LV, female; (8) specimen MSU Kya-77, LV, juv. A5–A6; (9) specimen MSU Kya-59, C, juv. A3–A4, right view; (10) specimen MSU Kya-74, RV, juv. A5–A6; (11) specimen MSU Bart-30, RV, female, sieve pores; (12) specimen MSU Kya-61, C, juv. A3–A4, right view; (13) specimen MSU Kya-79, LV, juv. A5–A6; (14) specimen MSU Kya-70, RV, juv. A5–A6; (15) specimen MSU Kya-68, RV, juv. A3–A4; (16) specimen MSU Kya-60-a, C, juv. A3–A4, dorsal view; (17) specimen MSU Kya-61-b, C, juv. A3–A4, dorsal view; (18) specimen MSU Kya-58, C, female, dorsal view; (19) specimen MSU Kya-57, C, male, dorsal view.

Plate 2



well as *A.?* sp. A identified by Wakefield (1994) from the Bathonian of Scotland, to the genus *Acanthocythere*. The genus *Protoacanthocythere* according to these authors includes: *A. (P.) faveolata* Bate, 1963 from the Bajocian of England (Bate, 1963), *Protoacanthocythere* sp. Dépêche, 1969 from the Callovian of France (Dépêche, 1969), *A. (P.) cansona* Masumov, 1973 from the Oxfordian of Uzbekistan (Masumov, 1973), *A. (P.) archangelskyi* (Mandelstam in Lyubimova, 1955), and *A. (P.) milanovskyi* from the middle Jurassic of Russia.

It is noteworthy that R. Whatley and S. Ballent saw Uzbek and Russian ostracods only as images on published photographic plates (Masumov, 1973, p. 41, pl. 2, figs. 10, 11; *Prakticheskoe...*, 1999, p. 179, pl. 34, figs. 4, 5), where the quality of the images does not allow us to see the necessary characteristics of the genus. Therefore, we do not comment further on the Uzbek material, but Lyubimova's species, that I know from my own working collections from the type locality, are discussed.

If we consider the generic affiliation of the listed species, taking into account the hinge, features of sexual dimorphism, pore structure and ecological valency, which is reflected in the ornament, presence and structure of the eye formations, then to *Acanthocythere* with a lobodont hinge, a large eye spot and numerous simple pores located on the tops of small papillae (Whatley and Ballent, 2004, p. 91), only the type species *A. sphaerulata* can be assigned, the males of which differ from the females only in the longer shell. *Protoacanthocythere* with similar congruent sexual dimorphism, antimerodont hinge and "large, round and few simple pores" (Bate, 1963, p. 196), which, according to Tesakova, may be sieve pores, but poorly preserved in English material, includes the type species of *P. faveolata* and an unidentified specimen figured by Dépêche (1969, pl. 2, fig. 12).

SYSTEMATIC PALEONTOLOGY

The taxonomy of suprageneric taxa was adopted according to *Prakticheskoe...* (1999) and brought into conformity with the International Code of Zoological Nomenclature (International, 1999), the terminology of various elements of ostracod shells was taken from (*Prakticheskoe...*, 1989).

ORDER PODOCOPIDA SARS, 1865

SUBORDER CYTHEROCOPINA GRUENDEL, 1967

SUPERFAMILY PROGONOCYTHEROIDEA SYLVESTER-BRADLEY, 1948

Family Progonocytheridae Sylvester-Bradley, 1948

Subfamily Progonocytherinae Sylvester-Bradley, 1948

Genus *Bathoniella* gen. nov.

E t y m o l o g y. After its first appearance datum in the Bathonian.

Type species. *Palaeocytheridea milanovskyi* Lyubimova, 1955.

Description. The shell is large or medium-sized (Table 2), moderately convex, elongated-rounded-rectangular in lateral view, dimorphic: trapezoid or lenticular in dorsal view due to bathoniellid sexual dimorphism. The greatest length is in the middle of the shell height; the greatest thickness is in the middle or posteroventral part of the valve; the greatest height is in the middle or at the posterior part of the shell in adults and at the anterior end in juveniles. The left valve is slightly larger than the right one and overlaps it at the anterodorsal, posterodorsal and posteroventral angles. The anterior end is flattened; the posterior end is flattened only in females and immature specimens. A faint eye spot may be present. The flattened part of both ends is smooth or weakly reticulated, the remaining surface of the shell is ornamented with distinct quadrangular-pentagonal or polygonal cells with low muri (walls) of varying width. On the ventral side, the muri merge into longitudinal ribs which can smoothly deviate towards the dorsal side at the posterior end, parallel to its contour. There are numerous large eccentric sieve pores on the surface (Pl. II, fig. 11). The hinge is entomodont, in the right valve it is represented by large marginal teeth, dissected into five to seven parts, and a finely crenulated groove, usually widened in the anterior part (Pl. I, figs. 14, 15; Pl. II, fig. 5b; Pl. III, fig. 15b, 16b; Pl. IV, fig. 10b). The pore-canal zone is wide, without a vestibule; radial canals are thin, straight; at the anterior end there are about 10–12 of them, at the posterior end there are three canals (Pl. II, fig. 3). The adductor is represented by a subvertical straight row of four scars: two round (small upper and large lower) and two narrow elliptical ones between them (Pl. II, fig. 5a). Ante-

Plate III. All specimens come from the Pochinki Section, Nizhny Novgorod Region, lower Callovian, Subpatruus Zone, *C. surensis*, *C. subpatruus* and *C. uzhovkensis* biohorizons. (1–19) *Bathoniella paenultima* Tesakova, sp. nov.: (1) specimen MSU Poch-185, LV, female; (2) specimen MSU Poch-112, LV, female; (3) specimen MSU Poch-003, C, females, right view; (4) specimen MSU Poch-186, RV, female, internal view; (5) specimen MSU Poch-184, RV, male; (6) specimen MSU Poch-187, LV, male; (7) specimen MSU Poch-2-002, C, female, right view; (8) specimen MSU Poch-26, C, juv. A1–A2, right view; (9) specimen MSU Poch-2-004, C, juv. A1–A2: (a) left view, (b) dorsal view; (10) specimen MSU Poch-2-005, C, juv. A5–A6, left view; (11) specimen MSU Poch-169, LV, juv. A5–A6; (12) specimen MSU Poch-178, RV, juv. A7?; (13) specimen MSU Poch-2-054, C, juv. A5–A6, right view; (14) specimen MSU Poch-2-055, C, juv. A5–A6, left view; (15) specimen MSU Poch-2-114: (a) RV, female, internal view, (b) hinge; (16) specimen MSU Poch-189: (a) RV, juv. A3–A4, internal view, (b) hinge; (17) specimen MSU Poch-094, C, female, dorsal view; (18) specimen MSU Poch-2-048, C, male, dorsal view; (19) specimen MSU Poch-190, C, male, dorsal view.

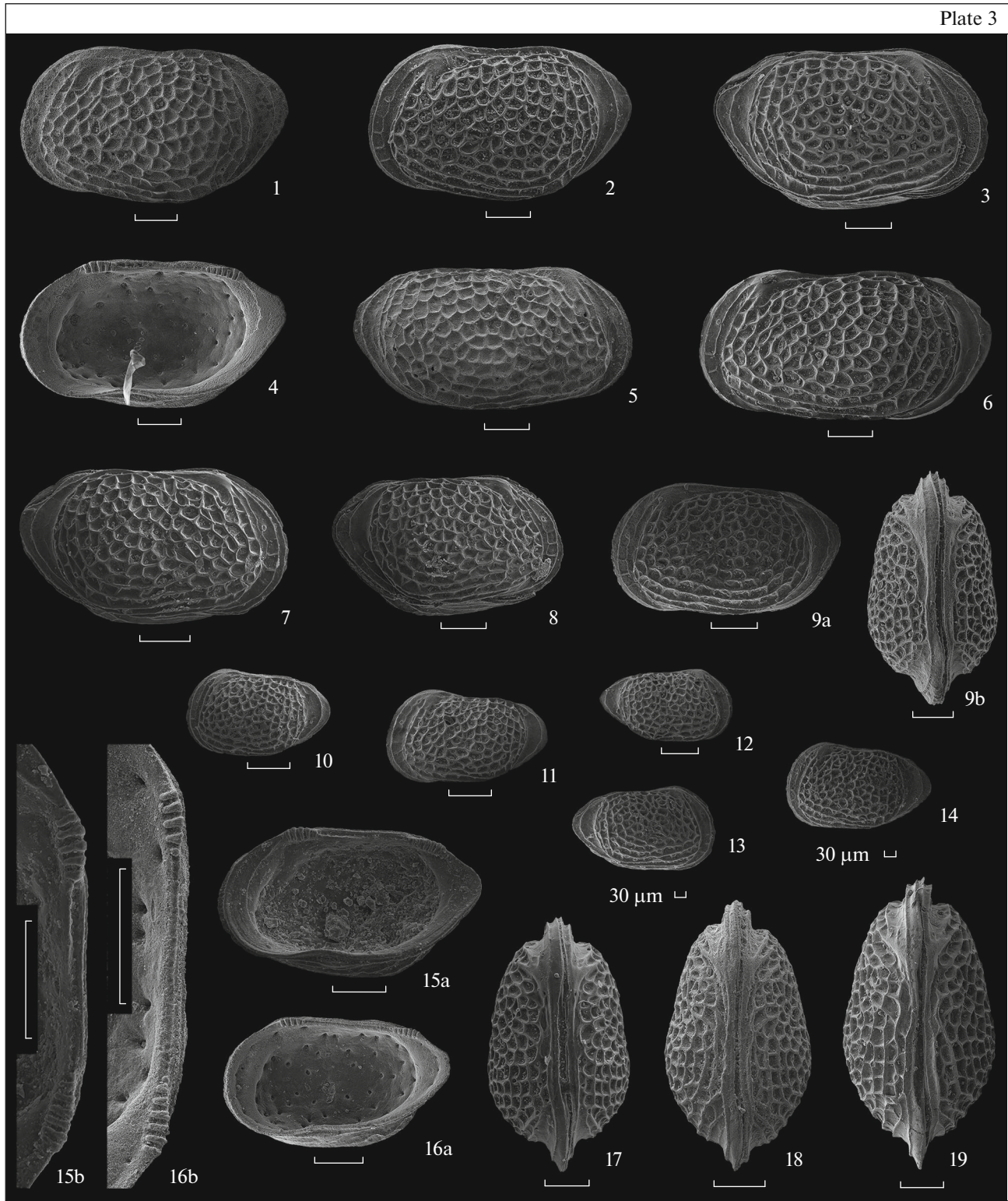


Table 2. Dimensions (in mm) of representatives of the genera *Bathoniella*, gen. nov. and *Parabathoniella*, gen. nov. (the list of species is given in stratigraphic succession)

Species	L (males)	L (females)	Hmax (males)	Hmax (females)	T (males)	T (females)
<i>B. ultima</i> sp. nov.	—	0.443–0.502	—	0.237–0.295	—	—
<i>B. paenultima</i> sp. nov.	0.586–0.644	0.538–0.583	0.297–0.327	0.315–0.338	0.324–0.342	0.299–0.330
<i>B. milanovskiyi</i> (Lyub.)	0.718–0.855	0.675–0.713	0.412–0.456	0.385–0.417	0.394–0.439	0.373–0.406
<i>B. prima</i> sp. nov.	0.988–0.989	0.720–0.871	0.452–0.470	0.423	—	0.432–0.501
<i>P. elongata</i> (Wakefield)	0.891–1.036	0.855	0.509–0.527	0.491	0.436–0.528	0.455

rior to the adductor, two scars are also distinguishable in one subvertical row—the bean-shaped antennal is located at the level of the two upper adductor scars and is turned convex towards them, and the ellipsoidal mandibular scar is located obliquely slightly below the adductor (the upper point of its outline is at the level of the lower point of the outline of the lower adductor scar).

Species composition. Type species, *B. prima* sp. nov., *B. paenultima* sp. nov., and *B. ultima* sp. nov.

Comparison. Differences from the genus *Parabathoniella* gen. nov., which is most similar in shell morphology and bathoniellid sexual dimorphism, are listed in that genus description. The genus is distinguished from all other synchronous and similar ostracods in Europe by bathoniellid sexual dimorphism and some other characters (see below).

It differs from *Protoacanthocythere* Bate from the Bajocian–Callovian of England and France (Bate, 1963, p. 195; Dépêche, 1969, pl. 2, fig. 12), which is similar in shell shape, hinge structure and reticulate sculpture: in the absence of a thick rib along the anterior and posterior margins; the absence of spines both on the muri and on the margins of the anterior and posterior ends; weak eye spots as opposed to convex eye tubercles in *Protoacanthocythere*.

From the ancestral genus *Glyptocythere* Brand et Malz from the Bajocian and Bathonian of Europe (Brand and Malz, 1962b, 1966; Pyatkova and Permyakova, 1978; Whatley and Ballent, 1996; Tesakova, 2022d; etc.), namely from its representatives with retic-

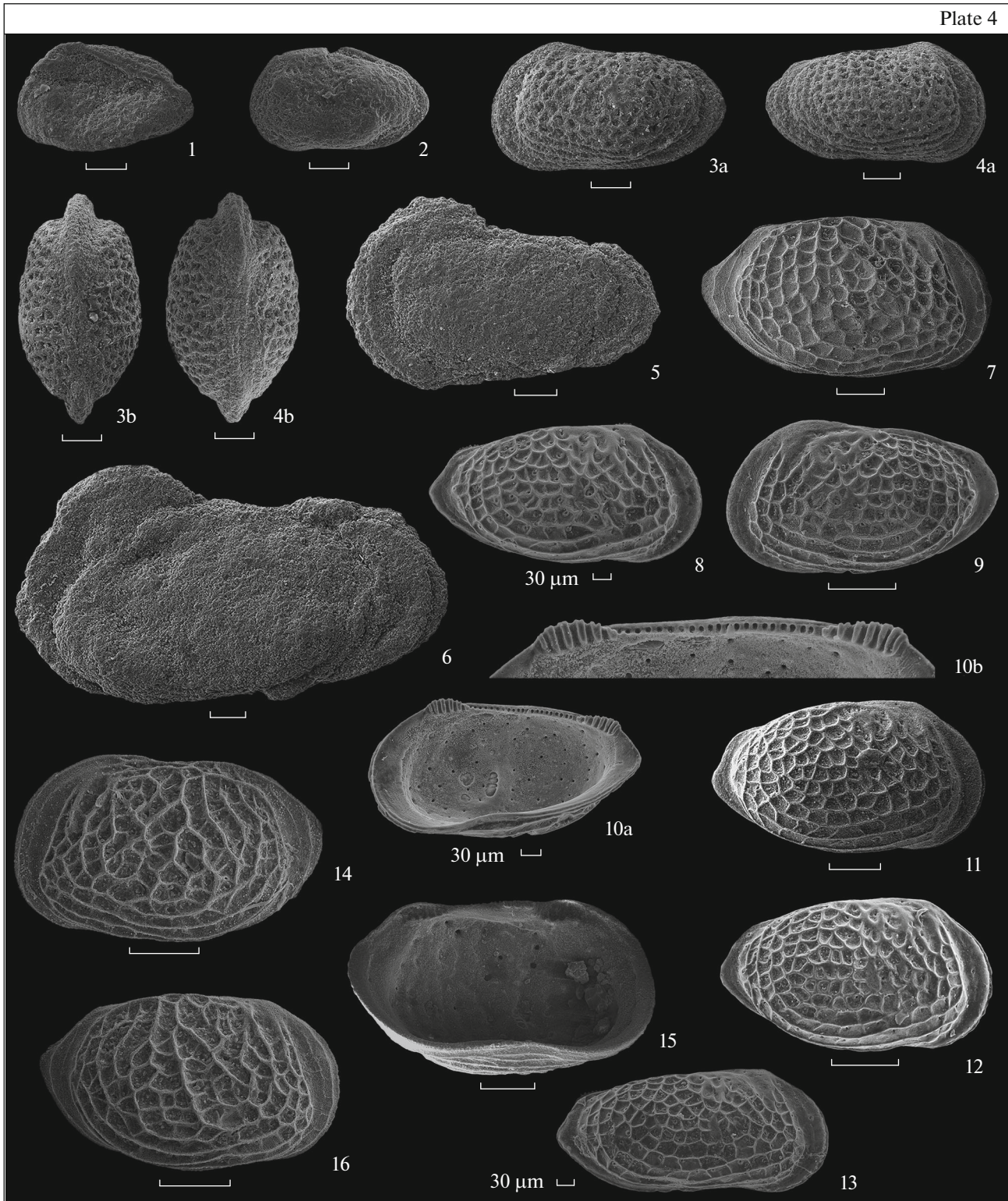
ulate ornamentation, similar to that of *Bathoniella*, differs in a thinner (gracile) hinge; randomly located cells in the middle part of the valve unlike their alignment in *Glyptocythere* in rosettes and rows, with the formation of differently directed straight and arched ribs.

The new genus differs from *Fuhrbergiella* Brand et Malz, widespread in the Bajocian–Oxfordian of Western and Eastern Europe (Brand and Malz, 1962a; Pyatkova and Permyakova, 1978; Whatley and Ballent, 2004; Tesakova and Shurupova, 2018; etc.), similar in shell shape, hinge structure, sieve pores and reticulate ornamentation, in the absence of spines on the muri and along the shell contour, the absence of muscular and eye tubercles, and a greater number of marginal canals (at the anterior end in *Bathoniella* there are 10–12 canals versus 8–9 in *Fuhrbergiella*).

The new genus is distinguished from *Acanthocythere* Sylvester-Bradley from the Bathonian of South-West England and Normandy (Sylvester-Bradley, 1956, p. 12; Sheppard, 1981, p. 94), similar to male *Bathoniella* in the shell shape (including a lenticular marginal figure in dorsal view), as well as reticulate ornamentation and ecological valency (living in shallow-water environments, including lagoonal ones), by an entomodont hinge instead of a lobodont hinge in *Acanthocythere* (Sylvester-Bradley, 1956, pl. 1, figs. 3–4; Sheppard, 1981, pl. 15, fig. 5); sieve pores instead of small simple pores located at the tops of papillae (small perforated cones) in *Acanthocythere* (Bate, 1969, pl. 11, figs. 5–6; Whatley and Ballent, 2004, p. 91); ridge-

Plate IV. (1–6) from Borehole no. 103, Perelyub District, Saratov Region, Bathonian, Kamennyi Ovrage Formation: (1, 2) upper Bathonian, (3–5) lower–middle Bathonian; (8–10, 13) Borehole no. 709, Gomel District, Belarus, lower Callovian, Calloviense Zone (Makhnach and Tesakova, 2015, pl. 3, figs. 6–9); (11, 12) from Mikhailovsky Mine Section, KMA, lower Callovian, Subpatruus Zone, Ch. saratovensis Biohorizon (Tesakova et al., 2009, pl. 2, figs. 6, 7); (14–16) from the Borehole Sokurskiy Tract Section, Saratov Region, terminal Bajocian–lower Bathonian, Michalskii Zone. (1–6) *Bathoniella prima* Tesakova, sp. nov.: (1) specimen MSU Perelub-67, C, juv. A7?, depth 175.0 m, upper Bathonian; (2) specimen MSU Perelub-69, C, juv. A7?, depth 175.0 m, upper Bathonian; (3) specimen MSU Perelub-66, C, juv. A5–A6, depth 201.5 m: (a) left view, (b) dorsal view; (4) specimen MSU Perelub-54, C, juv. A5–A6, depth 201.5 m: (a) right view, (b) dorsal view; (5) specimen MSU Perelub-42, mold of C, juv. A3–A4, left view, depth 197.7 m; (6) specimen MSU Perelub-38, mold, C, male, left view, depth 197.7 m; (7) *Bathoniella milanovskiyi* (Lyubimova), specimen MSU Pnz-3-44, RV, juv. A1–A2, Tamala District, Penza Region, Borehole no. 6 (Obval), depth 349.0–350.5 m, Bathonian; (8–13) *Bathoniella ultima* Tesakova, sp. nov.: (8) specimen MSU Belor-1-17, RV, female; (9) holotype MSU Belor-1-15, LV, female; (10) specimen MSU Belor-1-18, RV, female: (a) internal view, (b) hinge; (11) specimen MSU 300-4638, RV, female; (12) specimen MSU 300-16, RV, female; (13) specimen MSU Belor-1-16, RV, juv?; (14–16) *Glyptocythere tuberosa* (Khabarova): (14) specimen MSU Sokur-Ya-178, LV, female (L—0.415 mm, AEH—0.238 mm, Hmax—0.242 mm, PEH—0.212 mm), depth 38.6 m; (15) specimen MSU Sokur-Ya-180, LV, female, internal view (L—0.544 mm, AEH—0.275 mm, Hmax—0.3 mm, PEH—0.241 mm), depth 12.5 m; (16) specimen MSU Sokur-Ya-177, RV, female (L—0.403 mm, AEH—0.214 mm, Hmax—0.232 mm, PEH—0.172 mm), depth 16.4 m.

Plate 4



Stage	Substage	Western Europe (ammonite zones, after <i>Unifits.</i> , 2012)	Occurrences of the genera <i>Bathoniella</i> Tesakova, gen. nov. and <i>Parabathoniella</i> Tesakova, gen. nov. in Western and Eastern Europe	East European Platform (ammonite zones, after Gulyaev, 2015, 2019; Kiselev, 2022)
Callovian	Middle	Jason	<p><i>Parabathoniella elongata</i> (Wakefield)</p> <p><i>Bathoniella prima</i> Tesakova, sp. nov.</p> <p><i>B. milanovskyi</i> (Lyub.)</p> <p><i>B. paenultima</i> Tesakova, sp. nov.</p> <p><i>B. ultima</i> Tesakova, sp. nov.</p>	Jason
	Lower	Calloviense		Calloviense
		Koenigi		Koenigi
		Herveyi		Subpatruus
Bathonian	Upper	Discus		Elatmae
		Orbis		Calyx
		Hodsoni		
	Middle	Morrisi		
		Subcontractus		
		Progracilis		
	Lower	Tenuiplicatus	Ishmae	
		Zigzag	Besosovi	

Fig. 3. Stratigraphic distribution of the studied ostracods.

shaped muri instead of those formed by small papillae and tubercles in *Acanthocythere* (Sylvester-Bradley, 1956, pl. 1, figs. 1–2; Sheppard, 1981, pl. 15, fig. 1).

Remarks. The East European species *B. prima* sp. nov. appeared and evolved in the Central Russian Sea with the formation of chronospecies, each smaller than the previous one. Its direct descendant in the Elatmae Phase was *B. milanovskyi*, from which *B. paenultima* sp. nov. evolved at the beginning of the Subpatruus Phase, and from the end of the Subpatruus Phase until the Calloviense Phase there was the last member of the lineage *B. ultima* sp. nov.

Specimens of *B. milanovskyi* are known in the undivided lower Callovian of Northern Germany (Zimmermann et al., 2015).

Occurrence. Eastern Europe, from the top of the lower Bathonian to the lower Callovian inclusive (Ishmae–Calloviense zones) (Fig. 3); shallow-coastal settings of the upper subtidal and/or lagoonal. Northern Germany, in the lower Callovian.

***Bathoniella milanovskyi* (Lyubimova, 1955)**

Plate I, figs. 4–6, 11, 13, 15;
Plate II, figs. 1–19; Plate IV, fig. 7

Palaeocytheridea milanovskyi: Lyubimova, 1955, p. 38, pl. 6, figs. 1a–1d [1a, 1b, 1r in Russian]

Palaeocytheridea nikitini: Lyubimova, 1955, p. 38, pl. 5, figs. 5a–5c [5a, 5b, 5B in Russian]

Fuhrbergiella (Fuhrbergiella) milanovskyi: Pyatkova and Permyakova, 1978, p. 144, pl. 60, figs. 2a, 2b, 3.

Fuhrbergiella (F.) nikitini: Pyatkova and Permyakova, 1978, p. 144, pl. 60, figs. 4a, 4b, 5.

Acanthocythere (Protoacanthocythere) milanovskyi: Prakticheskoe..., 1999, pl. 34, fig. 5; Tesakova and Seltser, 2013, p. 66, text-fig. 5, figs. 1–4, 7; Zimmermann et al., 2015, suppl. 2, figs. 4–6.

Acanthocythere milanovskyi: Tesakova et al., 2015, text-fig. 1.

Pseudoperisocytheridea nikitini: Prakticheskoe..., 1999, pl. 31, fig. 3.

Holotype. VNIGRI no. 117-32; Samarskaya Luka, Repevka; lower Callovian (Lyubimova, 1955, p. 38, pl. 6, fig. 1a, 1b). Illustrated in *Prakticheskoe...* (1999, pl. 34, fig. 5).

Description. The shell is large and medium-sized; in lateral view, it is rounded-rectangular in females and oval in males, with parallel dorsal and ventral margins. The greatest length is at mid-height. The greatest height in males is at the posterior end (Pl. I, fig. 4), in females in the posterior part of the valve closer to the mid-valve (Pl. I, figs. 5, 6; Pl. II, figs. 6, 7), in juveniles of early stages at the anterior end (Pl. II, figs. 8, 10, 13, 14), at later stages—like in females (Pl. II, figs. 9, 12, 15). The greatest thickness in males (Pl. I, fig. 13; Pl. II, figs. 1b, 19) and females (Pl. I, fig. 11; Pl. II, fig. 18) is in the middle part of the shell, their marginal figure lenticular; in immature individuals—in the posteroventral part, and the marginal figure is trapezoidal (Pl. II, figs. 16, 17). The dorsal margin is straight, on the left valve it smoothly passes into the anterior and posterior margins, on the right—through

ledges. The ventral margin is straight, parallel to the dorsal, smoothly conjugated with the anterior and posterior margins, concave in the anterior half of the valve; on the left valves, under the concavity, a narrow sigmoidal fossa with thin notches on the sides is formed, on the right—a thickened part of the ventral margin, which enters the fossa when the valves close (Pl. II, figs. 3–5a). In females, on the outside of the valve, a posteroventral convexity hangs slightly over the ventral margin, and in lateral view, it seems that the dorsal and ventral margins diverge slightly toward the posterior end. The anterior end is high, arched, slightly oblique at the top on the left valves, more strongly on the right ones; broadly flattened. The posterior end of the females is almost equal in height to the anterior, rounded-triangular, more oblique at the top than at the bottom; on the right valves more pointed; the flattened part of the posterior end is wide and is separated from the convex part of the valve by a steep ledge (Pl. I, fig. 11; Pl. II, fig. 18). In males, the posterior end is higher than the anterior, smoothly rounded on the left valves and rounded-triangular on the right; its flattened part is narrow, adjacent to the very edge; the lateral surface of the valve passes into the posterior end smoothly, without a step (Pl. I, fig. 13; Pl. II, figs. 1b, 19). The cell muri are low, thin, roll-shaped or ridge-shaped; at the anterior and posterior ends are thread-like. The random arrangement of polygonal cells on the lateral surface of the valve and their alignment in parallel rows along the ventral and posterior margins is typical of the genus. At the antero-dorsal angle, four cells are arranged in the form of a characteristic rosette around the sieve pore.

The hinge of the right valve is represented by marginal teeth, dissected into six (anterior) and seven (posterior) toothlets each. The toothlets are of different sizes, bimodal: those adjacent to the median groove are the lowest, isometric and heart-shaped; those that are at the bend of the cardinal angles are the largest, longest, narrow, ribbon-shaped; the distal toothlets are also ribbon-like, but lower (Pl. I, fig. 15). The median groove is complicated by small pits and widened in the anterior part, forming a thickened lip.

The pits are located singly and in groups of three or four. In the widened part of the groove there is one pit and three pit-groups following it. In the narrow part of the groove there are 15–16 individual pits. On the left valve these are corresponded by a median ridge with small denticles, which in the anterior thickened part have formed three distinct large denticles (Pl. II, fig. 5b).

O n t o g e n y. Juveniles of different ages are distinguished by their smaller size, shorter height and more pointed shape of the posterior end. In dorsal view, the shells of juveniles are most convex in the posterior third and have a trapezoidal figure, while in females and males the greatest thickness is located in the middle or close to the middle, and the marginal figure is lenticular. The ratio of length to maximum height (Bmax in males is PEH, in females and juvenile A1–A2—MH, in juvenile A3–A8—AEH) fits well into the size range with the corresponding parameter in males 1.748–1.75, in females 1.667–1.753 (average 1.73), in immature females (A1–A2) 1.823–1.826, in immature males (A1–A2) 1.853, in juvenile A3–A4 1.712–1.871 and A5–A6—1.802–1.861 (there were no earlier age stages in the author's material).

The ornamentation in ontogeny develops with the loss of order, which was characteristic of the ancestors. At early stages, muri merge into weakly defined oblique and subvertical ribs in the upper half of the valve; in the middle of the front half of the valve there is a small rosette; two more rosettes, one above the other (each of four cells), are observed in the posterior half of the valve (Pl. II, figs. 8, 10, 13, 14). As they grow older, the rosettes disappear, the ribs weaken (Pl. II, figs. 9, 12, 15), and in adult representatives they can disappear completely (Pl. I, figs. 4–6; Pl. II, figs. 2, 6, 7).

The hinge of the right valve of an immature specimen consists of marginal teeth dissected into six and seven toothlets (as in mature specimens), while the groove is of equal width throughout (not thickened anteriorly) and is ornamented with 25–27 single pits of equal size.

Dimensions in mm and ratios:

Specimen no.	L	AEH	MH	PEH	T	L/AEH	L/Hmax
MSU Bart-29 LV, male	0.832	0.437	0.456	0.476	—	1.904	1.748
MSU Bart-30 RV, female	0.704	0.383	0.407	0.377	—	1.838	1.730
MSU TP-011 LV, female	0.690	0.355	0.399	0.316	—	1.944	1.729
MSU Kya-57a C, female	0.685	—	—	—	0.376	—	—
MSU Bart-33 C, male	0.793	—	—	—	0.466	—	—
MSU Kya-55 RV, female	0.667	0.360	0.356	0.305	—	1.853	1.853
MSU Kya-55a C, male	0.722	—	—	—	0.439	—	—
MSU Grig-1-162 RV, male	0.721	0.361	0.412	0.358	—	1.997	1.75
MSU Bart-31 RV, female	0.695	0.379	0.417	0.367	—	1.834	1.667
MSU Kya-65 RV, juv. A1–A2	0.623	0.309	0.342	0.271	—	2.016	1.823

MSU Kya-63 LV, female	0.688	0.354	0.379	0.332	—	1.943	1.815
MSU Kya-77 LV, juv. A5–A6	0.415	0.223	—	0.182	—	1.861	1.861
MSU Kya-59 C, juv. A3–A4	0.524	0.286	0.306	0.244	—	1.832	1.712
MSU Kya-74 RV, juv. A5–A6	0.396	0.198	0.213	0.151	—	2.0	1.859
MSU Bart-30 RV, female	0.704	0.383	0.407	0.377	—	1.838	1.73
MSU Kya-61 C, juv. A3–A4	0.521	—	—	—	0.283	—	—
MSU Kya-79 LV, juv. A5–A6	0.417	0.227	—	0.180	—	1.837	1.837
MSU Kya-70 RV, juv. A5–A6	0.400	0.211	0.222	0.150	—	1.896	1.802
MSU Kya-68 RV, juv. A3–A4	0.524	0.263	0.280	0.219	—	1.992	1.871
MSU Kya-60-a C, juv. A3–A4	0.534	—	—	—	0.299	—	—
MSU Kya-61-b C, juv. A3–A4	0.509	—	—	—	0.291	—	—
MSU Kya-58 C, female	0.692	—	—	—	0.375	—	—
MSU Kya-57 C, male	0.747	—	—	—	0.395	—	—
MSU Pnz-3-44 RV, juv. A1–A2 (female)	0.597	0.305	0.327	0.253	—	1.957	1.826

Variability. Linear dimensions vary slightly: the length of the shells of males is in the range of 0.721–0.855 mm, of females—0.675–0.713 mm; maximum height in males (PEH) is 0.412–0.456 mm, in females—0.385–0.417 mm; the shell thickness in males is 0.394–0.439 mm, of females—0.373–0.406 mm. The cell muri of specimens from the Kanev District (Pl. I, fig. 11; Pl. II, figs. 1–2, 6–10, 12–19) and specimens from the Tamala District, Penza Region (Pl. IV, fig. 7) thin and ridge-chaped, in contrast to the thicker and roll-shaped ones in specimens from the Volga Region (Pl. I, figs. 4–6, 13; Pl. II, fig. 11).

A rosette of several, usually four, cells (Pl. I, fig. 4; Pl. II, figs. 2, 6) near the anterodorsal angle is present in all studied specimens, but its distinctness may vary. In addition, the rosette may include a second sieve pore (Pl. II, figs. 6, 9, 12, 15) and/or a small deformed fifth cell (Pl. I, figs. 5–6; Pl. II, figs. 7, 8, 10, 13). Cells on the lateral surface can also be grouped by four or five into one or three rosettes, which are better visible on juveniles (Pl. II, figs. 10, 13, 14) and less distinguishable on adult specimens and late-stage juveniles (A1–A2: Pl. IV, Fig. 7).

Comparison. This species differs from *B. prima* sp. nov. in a smaller size (Table 2); more massive muri; higher posterior end and lens-shaped marginal figure of females; higher posterior end of juveniles; the greatest thickness in juveniles in the posteroventral part and their trapezoid marginal figure (vs. lenticular in juveniles of *B. prima*). It differs from *B. paenultima* sp. nov. in a larger size; a smaller posteroventral convexity in females and, as a consequence, more parallel dorsal and ventral margins in external view; lenticular rather than trapezoid marginal figure of female specimens; trapezoid rather than lenticular marginal figure of juveniles; the front tooth of the hinge, dissected into six rather than five toothlets, as in *B. paenultima*. It is distinguished from *B. ultima* sp. nov. by a significantly larger size; parallel dorsal and ventral margins (in contrast to the distinctly converging margins toward the posterior end in

female of *B. ultima*); higher and rounded posterior end of females; lenticular rather than trapezoidal marginal figure of females; the middle element of the hinge—with a widened front part versus a narrow one throughout its entire length in *B. ultima*; as well as a clear rosette of four cells near the anterodorsal angle.

Remarks. (1) It is noteworthy that, when illustrating the holotypes, Lyubimova mixed up the sexes: for the holotype *milanovskyi* the left valve of the adult female is presented (Lyubimova, 1955, pl. 6, figs. 1a, 1b), and for *nikitini*—the right valve of the adult male (pl. 5, figs. 8a, 8b). This negated the main distinguishing feature between *milanovskyi* (“the anterior and posterior ends are almost the same height, evenly rounded, and the first is flattened,” i.e., the posterior end—not flattened—descends smoothly to the margin, without a ledge) and *nikitini* (“the posterior end is the same height as the anterior one, with a clearly defined ledge, very narrowed and protruding in the middle part, oblique to the ventral margin in the lower part” (Lyubimova, 1955, p. 38).

(2) In addition, it is not clear what is considered the holotype of the species. The number was indicated in the description, but it is unknown, to which particular image on pl. 6, figs. 1a–1d [1a–1r in Russian] it belongs. Moreover, for the holotype there was no explanation as to whether it was a shell or one of the valves, female or male. The explanation of the plate says: “a—left valve from the outside, b—the same valve from the dorsal side, c [b—in Russian]—right valve from the outside, larval form, d [r—in Russian]—left valve from the outside, larval form.” Based on this, we can only assume that Lyubimova attributed the left valve of the adult female to the holotype (as a rule, new species are not described from juveniles). But the problem is that fig. 1c [1b in Russian] shows not the right valve of a juvenile specimen, but the left valve of an adult male, produced by an artist on a different scale than figs. 1a, 1b, 1d [1a, 1b, 1r in Russian]. And it was this specimen that was refigured by N.N. Koldenskaya for the “Practical Guide...” as the holotype

of *milanovskyi*, since it corresponded to Lyubimova's description much better (*Prakticheskoe...*, 1999, pl. 34, fig. 5). Kolpenskaya wrote in the explanation of the plate: "[Lyubimova, 1955, pl. VI, fig. 1, re-imaged]. Holotype, left valve (0.80): a—outside; b—hinge." Unfortunately, it was not indicated which of the four specimens (Figs. 1a–1d) from Lyubimova's plate was copied, and confusion with the holotype increased. In Lyubimova's type collection in Franke's chamber, several specimens of the same species are sometimes placed with the holotype number (both adult and juvenile, and sometimes other species too), which makes it difficult to identify the holotype (Tesakova, 2013a).

Occurrence. Within the East European Platform: in Ukraine, in the central regions of Russia (Penza, Bryansk and Kursk regions¹), in the Middle and Lower Volga Region, lower part of the lower Callovian (Elatmae Zone), and the undivided lower Callovian of Northern Germany.

Material. From the lower Callovian, Elatmae Zone: more than 110 shells and separate valves of females, males and juveniles from the Kostyanets Yar Section (this work) and another 12 specimens from the Grigorovka Section (Tesakova et al., 2015), Kanev Dislocations, Dnieper–Donets Depression; 40 specimens from the Bartolomeevka Section, Saratov Region (Tesakova and Seltser, 2013); 5 specimens from the Tarkhany pristan Section, Tetyushy District, Tatarstan; two valves from the upper Bajocian–lower Bathonian, *G. bathonica* Zone, Borehole no. 6 (Obval), depth 349.0–350.5 m (material was moved during drilling from overlying sediments), Tamala District, Penza Region. And another 27 juvenile

specimens, from the Khlebnovka Formation, Borehole no. 108, Perelyub District, Saratov Region.

Bathoniella prima Tesakova, sp. nov.

Plate I, figs. 7–9; Plate IV, figs. 1–6

Etymology. From the Latin *prima* (first).

Holotype. MSU Perelub-53, C, female, Perelyub District, Saratov Region, Borehole no. 103, depth 201.5 m, lower Bathonian (Pl. I, fig. 8).

Description. The shell is large, rounded-rectangular, with parallel dorsal and ventral margins. The greatest length is at mid-height; the greatest height is in males at the posterior end (Pl. I, fig. 7), in females in the posterior third of the valve (Pl. I, fig. 8a), in juveniles at the anterior end (Pl. IV, figs. 1–3a, 4a, 5). The greatest width in males and juveniles is in the middle part, and the marginal figure is lenticular (Pl. IV, figs. 3b, 4b), in females in the posteroventral part of the shell, and the marginal figure is trapezoidal (Pl. I, fig. 8b). The muri are thin, filamentous (Pl. I, figs. 7, 8a). It was not possible to observe the details of the structure of the entomodont hinge (see "Remarks").

Ontogeny. The shell contour in lateral view changes from rounded-triangular in juveniles of the early stages (A5–A6: pl. IV, figs. 1, 2) to rounded-quadrangular in juveniles of the middle and late stages (A3–A4: pl. IV, figs. 3a, 4a; A1–A2: Pl. IV, fig. 5) and rounded-rectangular in adults (Pl. I, figs. 7, 8a; Pl. IV, fig. 6). The increase in the height of the posterior end with each molt reduces the angle of convergence of the dorsal and ventral margins until they become parallel in adults.

Dimensions in mm and ratios:

Specimen no.	L	AEH	MH	PEH	T	L/AEH	L/Hmax
holotype MSU-Perelyub-53 C, females	0.786	0.411	0.423	0.331	0.437	1.912	1.858
MSU-Perelyub-38 C, male (crushed)	0.989	—	0.450	0.395	—	—	2.198
MSU-Perelyub-04 C, male	0.988	0.459	0.452	0.478	—	2.152	2.186
MSU-Perelyub-50 C, female	0.871	—	—	—	0.432	—	—
MSU-Perelyub-65 RV, female	0.759	—	—	—	0.251	—	—
MSU-Perelyub-39 C (crushed)	0.705	0.397	—	0.314	—	1.776	1.776
MSU-Perelyub-42 C, juv. A3–A4? (crushed)	0.669	0.363	—	0.261	—	1.843	1.843
MSU-Perelyub-47 C, juv. A3–A4 (crushed)	0.630	—	—	—	—	—	—
MSU-Perelyub-40 C, juv. A3–A4 (crushed)	0.612	—	—	—	—	—	—
MSU-Perelyub-64 LV juv. A3–A4	0.596	—	—	—	0.162	—	—
MSU-Perelyub-66 C, juv. A5–A6	0.548	0.302	—	0.232	0.289	1.814	1.814
MSU-Perelyub-54 C, juv. A5–A6	0.542	0.295	—	0.225	0.314	1.837	1.837
MSU-Perelyub-69 C, juv. A7? (crushed)	0.411	0.228	0.234	0.172	—	1.803	1.756
MSU-Perelyub-67 C, juv. A7? (crushed)	0.406	0.228	—	0.164	—	1.781	1.781
MSU-Perelyub-63 RV, juv. A8?	0.286	0.178	—	0.101	—	1.607	1.607

¹ In the lower Callovian of the Bryansk Region, abundant finds of "*F. (F.) nikitini*" (Kolpenskaya et al., 1999) were recorded, while V.N. Preobrazhenskaya indicated "*P. milanovskyi*" as a characteristic form of the lower Callovian of the Kursk Region (Preobrazhenskaya, 1964). It is not known exactly what species of *Bathoniella* these authors were dealing with, since their photographs and parameters of the shells (valves) were not given. Therefore, mention in the literature of any of these species before the author's revision should be understood as *B. ex gr. milanovskyi* with a stratigraphic range throughout the lower Callovian.

Variability. Single specimens of poorly preserved adult representatives prevented the variability of the species from being assessed.

Comparison. For comparison with *B. milanovskyi*, see description of the latter.

Remarks. (1) Most of all, in terms of shell shape and threadlike muri, the new species is similar to adult representatives of *Parabathoniella elongata* (Wakefield, 1994, p. 27, pl. 4, figs. 1, 3–9), from which it differs in smaller height (Table 2) and rounded-rectangular shells of juvenile specimens of the middle and late stages (Pl. IV, figs. 3–5), in contrast to the oval shape of the same age stages of *P. elongata* (Wakefield, 1994, p. 27, pl. 4, fig. 2).

(2) In *B. prima*, threadlike muri were observed on relatively well-preserved specimens (Pl. I, figs. 7, 8a); muri on valves and shells of poor and very poor preservation were overgrown with micrite and have a thickened, roll-shaped appearance (Pl. I, fig. 9; Pl. IV, figs. 1–4). Also hidden under the micrite are sieve pores; they were observed only on the mold of the male shell and on the posterior end of the female (Pl. I, figs. 7, 8a).

(3) Despite the fact that the hinge in *B. prima* could not be studied, its structure is assumed to be similar to that of the closest descendant of *B. milanovskyi* (see above).

Occurrence. upper part of lower Bathonian—upper Bathonian.

Material. One male shell core from Borehole no. 108; 12 shells and their cores and two separate valves of females, males and juveniles from Borehole no. 103. Almost all the material is in poor and very poor preservation from the Kamennyi Ovrage Formation in the Perelyub District of the Saratov Region.

Bathoniella paenultima Tesakova, sp. nov.

Plate I, figs. 1–3, 10, 12, 14; Plate III, figs. 1–19

Acanthocythere milanovskyi: Tesakova et al., 2020, text-fig. 3.

Etymology. From the Latin *paenultima* (penultimate).

Holotype. MSU Poch-2-001, LV, male from the Subpatruus Zone, Pochinki Section, Nizhny Novgorod Region (Pl. I, fig. 1).

Description. The shell is of medium size, rounded-rectangular or bean-shaped in lateral view and trapezoid or lenticular in dorsal view, moderately convex. The greatest length is in the middle of the height of the shell, the greatest height in the posterior third, the greatest thickness in the posterior part of the shell in females and in the mid-shell in males. The left valve slightly overlaps the right one at the anterodorsal angle and at the angles of the posterior end. In internal view, the dorsal and ventral margins are straight and parallel to each other; the ventral margin concave in the middle, closer to the anterior end; under the concavity there is a narrow sigmoidal, finely notched fossa

for receiving the thickened part of the ventral margin of the opposite valve (Pl. III, figs. 4, 15a). In lateral view, the dorsal margin is slightly concave in the middle, smoothly mates with both ends on the left valves and passes into them through small ledges on the right; in the posterior third of the valve, a ventral convexity hangs over the ventral margin—slightly in males (Pl. I, fig. 1; Pl. III, figs. 5, 6), and strongly in females (Pl. I, figs. 2, 3; Pl. III, figs. 1–3, 7), as a result of which the ventral margin appears convex in the posterior part. The anterior end is high, smoothly arched, slightly oblique in the upper part (more pronounced on the right valves). The posterior end of females is widely flattened, and this almost smooth part is separated from the lateral cellular surface by a steep ledge; combined with the greatest convexity in the posterior third of the shell, this forms a trapezoidal marginal figure in dorsal view (Pl. I, fig. 10; Pl. III, fig. 17). The posterior end of males also has a smooth surface, but it is not separated by a ledge from the rest of the valve, which is ornamented; in dorsal view, the lateral surfaces smoothly converge towards the posterior end, which, in combination with the largest convexity in the middle part of the shell, forms a lenticular marginal figure (Pl. I, fig. 12; Pl. III, figs. 18, 19); and only at the termination, the posterior end is narrowly flattened.

The ornamentation consists of cells with low ridge-shaped or roll-like muri. In the central part of the valve, the cells are arranged randomly; on the periphery they are arranged in rows parallel to the margins, and in the front part of the valve in diagonal (oblique) rows directed from the middle of the dorsal margin to the midpoint of the anterior margin. On the ventral side, the muri, merge to form thin longitudinal ribs, smoothly bending around the posterior end and reaching the dorsal margin. In the area of the anterior dorsal angle, four to five cells are grouped around one or two sieve pores in the form of a rosette.

The hinge in the right valve is represented by marginal teeth, dissected into five (anterior) and seven (posterior) ribbon-like bimodal toothlets, with a median groove complicated by three pit-groups in the widened anterior third and 13–15 separate pits in the narrow posterior part (Pl. I, Fig. 14; Pl. III, fig. 15b).

Ontogeny. Specimens of early stages are distinguished by a lower and pointed posterior end (Pl. III, figs. 10–14); in addition, in the ornamentation of some individuals (Pl. III, fig. 11) there is a discernible tendency to form a large rosette in the anterior part of the valve, while in the early stages of *B. milanovskyi* this ancient feature was well expressed. In specimens of the middle and late stages (Pl. III, figs. 8, 9, 15a), the posteroventral convexity is developed as strongly as in adults, and the cells in the central part of the valve are distributed randomly to the same extent.

When viewed from the dorsal side, the greatest thickness in shells of early stages (A5–A7) is located

near the middle, so they have a lens-shaped marginal figure (like males); a further increase in the width of the posteroventral convexity and posterior end in females forms a trapezoidal marginal figure in the last juvenile stages (A1–A4) in this sex (Pl. III, fig. 9b).

The hinge of the right valve in specimens of the middle and late stages (A1–A4) is the same as in adults

(the marginal teeth are divided into five and seven toothlets), but the groove has the same width throughout (not thickened in the front) and is ornamented with 24–27 single pits equal in size (Pl. III, Fig. 16b); in early instars (A5–A7), the number of sections of marginal teeth is reduced to four (anterior) and six (posterior), and there are about 20 pits in the groove.

Dimensions in mm and ratios:

Specimen no.	L	PEH	MH	AEH	T	L/AEH	L/Hmax
holotype MSU Poch-2-001 C, male	0.628	0.318	0.330	0.325	0.335	1.975	1.903
MSU Poch-24 C, females	0.573	0.337	0.344	0.320	–	1.700	1.665
MSU Poch-2-188 RV, female	0.571	0.291	0.324	0.245	–	1.962	1.762
MSU Poch-2-004 C, juv. A1–A2	0.538	0.331	–	0.316	0.299	1.625	1.625
MSU Poch-2-047 C, male	0.623	0.315	0.337	0.333	0.324	1.978	1.849
MSU Poch-2-185 LV, female	0.574	0.314	0.333	0.287	–	1.828	1.724
MSU Poch-2-112 LV, female	0.561	0.314	0.338	0.282	–	1.787	1.660
MSU Poch-2-003 C, female	0.558	0.313	0.332	0.299	0.341	1.783	1.681
MSU Poch-2-186 RV, female	0.568	0.299	0.315	0.272	–	1.899	1.797
MSU Poch-2-184 RV, male	0.586	0.272	0.297	0.251	–	2.154	1.973
MSU Poch-2-187 LV, male	0.624	0.310	0.327	0.312	–	2.013	1.908
MSU Poch-2-002 C, female	0.580	0.336	0.344	0.309	0.312	1.726	1.686
MSU Poch-26 C, juv. A1–A2	0.564	0.346	–	0.335	–	1.630	1.630
MSU Poch-2-005 C, juv. A5–A6	0.393	0.268	–	0.226	0.203	1.466	1.466
MSU Poch-2-169 LV, juv. A5–A6	0.348	0.199	–	0.144	–	1.749	1.749
MSU Poch-2-178 RV, juv. A7?	0.331	0.174	–	0.124	–	1.902	1.902
MSU Poch-2-054 C, juv. A5–A6	0.348	0.225	–	0.177	0.176	1.547	1.547
MSU Poch-2-055 C, juv. A5–A6	0.354	0.196	–	0.158	–	1.806	1.806
MSU Poch-2-114 RV, female	0.562	0.307	0.328	0.280	–	1.831	1.713
MSU Poch-2-189 RV, juv. A3–A4	0.434	0.220	–	0.164	–	1.973	1.973
MSU Poch-2-048 C, male	0.604	0.306	0.324	0.314	0.348	1.974	1.864
MSU Poch-2-094 C, female	0.552	–	–	–	0.304	–	–
MSU Poch-2-190 C, male	0.644	–	–	–	0.342	–	–

Variability. The linear parameters of the female and male shells, which determine their contour and marginal figure, slightly vary (L of males 0.586–0.644 mm, L of females 0.552–0.583 mm, Hmax of males 0.297–0.357 mm, Hmax of females 0.315–0.344 mm, T of males 0.324–0.348 mm, T of females 0.312–0.341 mm). The range of the parameter L/AEH or L/Hmax in males is 1.975–2.154 and 1.849–1.973, and in females 1.700–1.962 and 1.660–1.797, respectively, and this ratio allows one to clearly distinguish between sexes in adult specimens; while in juveniles of different stages these parameters can vary within very wide limits, which makes it difficult to use them to distinguish between ages and especially sex (see “Dimensions”). The diagonal rows of cells in the anterior half of the valve may be distinct or not readable at all, as

well as the thin ribs composed of muri on the ventral side and at the posterior end.

Comparison. The difference from the shell that is closest in shape and ornamentation, *B. milanovskyi* sp. nov. see in its description. From the daughter taxon *B. ultima* sp. nov. distinguished by its larger size (Table 2) and parallel dorsal and ventral margins, instead of converging towards the posterior end in *B. ultima*; high posterior end of the same height as the anterior end, in contrast to the low one in *B. ultima*; a large posteroventral convexity localized in the posterior third of the valve, in contrast to the more extensive, flattened and smoothed one developed in the posterior half of the valve in *B. ultima*. The ornamentation in the compared species is very similar, but in

the daughter taxon, muri of the cells forming the rosette near the anterodorsal angle are greatly thickened and blurred, and the rosette is almost indistinguishable. The hinge differs from *B. ultima* in having a five-membered anterior tooth and a groove widened in the anterior third, instead of a six-membered anterior tooth and a groove narrow throughout its entire length in the daughter taxon.

O c c u r r e n c e. In the East European Platform in the Middle and Lower Volga Region, lower Callovian, Subpatruus ammonite Zone, *C. surensis*, *C. subpatruus*, *C. uzhovkensis* biohorizons.

M a t e r i a l. 738 valves and shells of females, males and juveniles in good and satisfactory state of preservation from the Pochinki Section, Nizhny Novgorod Region (Tesakova et al., 2020).

***Bathoniella ultima* Tesakova, sp. nov.**

Plate IV, figs. 8–13

Galliaecytheridea aff. *spinosa* Kilenyi: Tesakova et al., 2009, pl. 2, figs. 6, 7.

Acanthocythere (*Protoacanthocythere*) *nikitini*: Makhnach and Tesakova, 2015, pl. 3, figs. 6–9.

Acanthocythere milanovskyi: Glinskikh et al., 2022, pl. 2, fig. 14; Tesakova and Seltser, 2022, pl. 5, fig. 13.

E t y m o l o g y. From the Latin *ultima* (ultimate).

H o l o t y p e. MSU Belor-1-15, LV, female, from the Gomel District, Belarus, Borehole no. 792, sample 36 (depth 283–288 m), lower Callovian, Calloviense Zone (Pl. IV, fig. 9).

D e s c r i p t i o n. Since the author's material does not contain reliable males (see "Remarks"), only females are described here. The shell is medium in size, oval in lateral view and trapezoid in dorsal view, moderately convex. The greatest length is at mid-height; the greatest height is at the anterior end or in the middle of the valve; the greatest thickness in the posteroventral part. The left valve slightly overlaps the right one at the anterodorsal and posterodorsal angles. The dorsal margin is straight, slightly inclined towards the posterior end; on the left valve it transitions smoothly to the anterior and posterior margins through a ledge; on the right valve it goes in both directions through ledges. The ventral margin is straight, converges towards the posterior end and is not parallel to the dorsal margin, it is concave in the middle part, and a narrow fossa is formed under this concavity; it goes

smoothly to both ends (Pl. IV, fig. 10a). The anterior end is high, arched, slightly beveled at the top (more pronounced on the right valves), and widely flattened. The posterior end is low, rounded-triangular, oblique at the top (more pronounced on the right valves, with a notch), flattened. In the posterior half of the valve, a large posteroventral convexity is developed, which hangs over the ventral margin, overlaps it and changes the contour of the shell in lateral view (Pl. IV, figs. 8, 9, 11, 12).

The cell muri are low and thin; on the flat and smooth surface of the anterior and posterior ends they are threadlike. The arrangement of rectangular cells in regular rows is quite distinct; they are very well maintained on the ventral side, go around the posterior end in a steep arc and reach the dorsal margin. The upper of these rows is short: one end begins at the dorsal margin, the other ends above the place where the ventral margin is concave, and the trailing cell is triangular in shape. The longitudinal row, located directly under the short one, continues not only at the posterior end, but also at the anterior one. Three or four short rows begin at the dorsal margin and extend diagonally to the middle of the anterior end. In the central part of the valve, polygonal cells are arranged randomly. The rosette at the anterodorsal angle, characteristic of the species *B. milanovskyi* and *B. paenultima*, is almost indistinguishable due to the smoothed and blurred muri of the cells that make it up. As a result, in *B. ultima*, a similar "blind spot" is formed in the area of the anterodorsal angle, behind the poorly developed eye spot.

The hinge of the right valve is represented by marginal teeth, dissected into six (anterior) and seven (posterior) toothlets each, and a median groove of the same width throughout with 21 simple pits (Pl. IV, fig. 10b). The structure of the groove (without pit-groups and expansion of the anterior part) reveals juvenile features characteristic of all immature *Bathoniella*, but it is described in adult females with a wide, fully developed pore-canal zone (specimen MSU Belor-1-18; Pl. IV, fig. 10a).

O n t o g e n y. Juveniles of different ages are distinguished by their smaller size and lower height of the posterior end. The large posteroventral convexity described in females is absent in shells of the early and middle stages and gradually increases in size in the later stages of ontogenesis.

Dimensions in mm and ratios:

Specimen no.	L	AEH	MH	PEH	T	L/AEH	L/Hmax
holotype MSU Belor-1-15 LV, female	0.472	0.295	—	0.229	—	1.60	1.60
MSU Belor-1-17 RV, female	0.462	0.267	0.271	0.202	—	1.730	1.705
MSU Belor-1-16 RV male juv.?	0.469	0.253	—	0.200	—	1.854	1.854
MSU Belor-1-18 RV, female	0.443	0.237	—	0.172	—	1.869	1.869
MSU 300-4638 RV, female	0.577	0.345	0.352	0.252	—	1.672	1.639
MSU 300-16 RV, female	0.466	0.284	—	0.210	—	1.641	1.641

Variability. Length varies in females from 0.577 to 0.443 mm. The size of the posteroventral convexity also changes slightly from large (Kursk specimens; Pl. IV, figs. 11, 12) to moderate (Belarus specimens; Pl. IV, figs. 8, 9). Otherwise, the features in the species are not variable.

Comparison. For comparison with *B. milanovskyi* sp. nov. and *B. paenultima* sp. nov., see their descriptions.

Remarks. Specimen MSU Belor-1-16 (Pl. IV, fig. 13) is an exception in the size range, as its length falls within the length range of females, but the height of the anterior and posterior ends is less. This suggests that it belongs to the male, taking into account the assumption of E. Brand and H. Maltz about the lower height of the shells of males which are of equal length to females, and their rare occurrence, which is why reliable specimens of males were not studied in the oldest taxon of the ancestral lineage of *Glyptocythere plicata* Brand et Malz (Brand and Malz, 1966, pp. 518, 519). Poor development of the abdominal convexity in specimen MSU Belor-1-16 strongly distinguishes it from adult females, which suggests an immature state of the individual and is indicated in the collection with a question mark.

Occurrence. In the East European Platform: in Belarus, in the central regions of Russia (Kursk Region) and the Lower Volga Region (Saratov Region); upper part of the Subpatruus Zone, Ch. saratovensis Biohorizon—Calloviense Zone.

Material. Six valves of females from the section of the Mikhailovsky Mine, KMA (Tesakova et al., 2009), eight valves of females and young individuals (possibly one male) from the Borehole no. 792 Section, Gomel District, Belarus (Makhnach and Tesakova, 2015); all specimens are well preserved. One poorly preserved shell comes from the TETs-5 section, Saratov Region (Tesakova and Seltser, 2022).

Genus *Parabathoniella* gen. nov.

Etymology. After homologous similarity with the genus *Bathoniella* gen. nov. and from the Latin para (near).

Type species. *Acantocythere elongata* Wakefield, 1994.

Description. Since the genus is monospecific, the description also applies to the type species (cited from Wakefield, 1994, pp. 27–28). The shell is large in size (Table 2), moderately convex, elongated, subrectangular in lateral view; the marginal figure, in top view, has an elongated elliptical shape with a wide compressed anterior marginal zone. Dimorphic with bathoniellid subtype of sexual dimorphism. The greatest length is located slightly above the middle height of the shell; the greatest height is directly behind the middle of the length in adults and at the anterior end in juveniles; greatest thickness in the posterior third of

the carapace. The left valve overlaps the right one along the ventral, anterior and posterior margins. The anterior end is high, widely rounded, with a wide flattened part; the posterior end is lower, rounded-triangular, with a narrow flattened part. The dorsal margin is almost straight, the cardinal angles are distinct. The ventral margin is slightly concave in the middle, converging towards the posterior end; when in external view, it appears to be parallel to the dorsal margin due to the ventral surface overhanging it. Near the anterodorsal angle there is a small ovoid eye spot with a short oblique groove located posterior to it. The ornamentation on the lateral surface of the valve is represented by a poorly developed mesh of the first and second order; on the ventral surface, elongated cells are arranged into subparallel ribs. A weak marginal rib is located along the anterior, posterior and ventral margins. Numerous large eccentric sieve pores (15–20 µm in diameter) are evenly distributed along the lateral surfaces of the shells; small normal pores (5 µm in diameter) are observed on the thickening of the anterior and posterior ends.

The hinge is entomodont. On the right valve it is represented by six anterior and seven posterior lateral teeth: elongated, sometimes thickened dorsally and forked at the ends. The crenulated median groove is widened in the anterior third, where a thickened lower lip is developed. There is no vestibule. The porecanal zone is moderately wide, without a vestibule; radial canals are short, straight; at the anterior end about 12–15, at the posterior end—12. The muscle scars consist of four suboval adductor scars, located in a subvertical row, and two round scars located in front of it: a large antennal scar and a medium-sized mandibular scar.

Species composition. Monotypical.

Comparison. From the homologically similar dimorphic genus *Bathoniella* gen. nov., similar in shell size and shape, hinge structure, ornamentation and bathoniellid subtype of sexual dimorphism, differs in: a larger number of marginal canals at the posterior end (12 versus three in *Bathoniella*); and the round shape of the antennal and mandibular scars versus the bean-shaped and ellipsoid in *Bathoniella*.

Additional differences from the genera *Protoacanthocythere*, *Glyptocythere*, *Fuhrbergiella* and *Acanthocythere*, which are similar in shell morphology, ornamentation and structure of the hinge, are the same as in *Bathoniella* (see the description of the latter).

Remarks. (1) M. Wakefield, like Lyubimova in the case of *B. milanovskyi*, described females and males of *elongata* as different species—*Acantocythere elongata* (Wakefield, 1994, p. 27, pl. 4, figs. 1–5) and *A.?* sp. A (p. 28, pl. 4, figs. 6–9). To *Acantocythere elongata* he assigned males (no. OS 13817, L—1.036 mm, H—0.527 mm, T—0.528 mm; no. OS 13818, L—1.0 mm, H—0.509 mm, T—0.436 mm), which can be observed in the marginal figure in dorsal view (Wake-

field, 1994, pl. 4, fig. 3), and a medium-sized male, which he chose as the holotype (no. OS 13816, L—0.891 mm, H—0.518 mm, T—0.436 mm), was mistaken for a female (pl. 4, figs 4, 5). He later reidentified the holotype as male (Wakefield, 2009, pl. 1, fig. 6). The taxon *A.?* sp. included females (no. OS 13824, L—0.855 mm, H—0.491 mm, T—0.455 mm) (pl. 4, figs. 6, 7, 9) and some males (No. OS 13823, L—0.964 mm, H—0.527 mm, T—0.491 mm) (pl. 4, Fig. 8). Thus, the specimens in the open nomenclature are herein reduced to synonymy with *Parabathoniella elongata* (Wakefield).

(2) The type species *P. elongata* is known from the Great Estuarine Group of the Inner Hebrides, from the Lealt Shale Formation, from the Kildonnan Member and Lonfearn Member. Their age, as a result of lithofacies analysis, is compared with the *Aspinctites tenuiplicatus* ammonite zones (lower Bathonian) and *Procerites progradilis* (middle Bathonian) (Wakefield, 1994, p. 3, text-fig. 1; 2009, p. 225, text-fig. 2). It is important that a large number of specimens of *P. elongata* were found in the Kildonnan Member, and only six poorly preserved specimens in the Lonfearn Member (Wakefield, 1994, pp. 27, 28). Considering that the Great Estuarine Group represents lagoonal facies with alternating more and less seaward episodes, the Lower Bathonian interval is more seaward than the middle Bathonian.

Occurrence. Western Europe, Scotland, from the upper lower to middle Bathonian (tentatively the Tenuiplicatus—Progradilis zones) (Fig. 3); shallow coastal and/or lagoonal settings.

CONCLUSIONS

Stratigraphically significant species widespread in the lower Callovian of the East European Platform are revised, and Northern Germany: *Palaeocytheridea milanovskyi* Lyubimova, 1955 and *P. nikitini* Lyubimova, 1955. The species *nikitini*, to which females were assigned, was synonymized with *milanovskyi*, described based on a male. It is shown that it was incorrect to assign these ostracods to the genera *Acanthocythere*, *Protoacanthocythere*, *Fuhrbergiella* (F.), *Palaeocytheridea*, and *Pseudoperissocytheridea*.

The species *milanovskyi* was chosen as the type for the new genus *Bathoniella*, in which a sequence of four species was established, succeeding each other in the interval from the end of the early Bathonian to the end of the early Callovian.

Based on the structural features of the posterior end of the shells of females and males of the studied species, a new—bathoniellid and congruent—subtypes of sexual dimorphism were recognized and described.

Based on the presence of bathoniellid sexual dimorphism in a morphologically similar taxon from synchronous deposits of Scotland, but developing as

part of another, parallel lineage, another new genus *Parabathoniella* gen. nov. was established.

The genus *Bathoniella* gen. nov. includes the following species: *B. prima* gen. et sp. nov. from the terminal lower—upper Bathonian, *B. milanovskyi* (Lyubimova), type, from the lower Callovian (Elatmae Zone), *B. paenultima* gen. et sp. nov. from the lower Callovian (Subpatruus Zone, C. surensis, C. subpatruus, C. uzhovkensis biohorizons) and *B. ultima* gen. et sp. nov. from the lower Callovian (Subpatruus Zone, Ch. saratovensis Biohorizon—Calloviense Zone).

To the monotypical genus *Parabathoniella* Tesakova, gen. nov. includes *P. elongata* (Wakefield, 1994) from the upper part of the lower—middle Bathonian of the Inner Hebrides, Scotland (tentatively the Tenuiplicatus—Progradilis zones).

ABBREVIATIONS AND NOTATION

The following abbreviations are used in this paper for scientific institutions: BSU (Belarusian State University, Minsk), GIN (Geological Institute, Russian Academy of Sciences, Moscow), Karpinsky Institute (A.P. Karpinsky Russian Geological Research Institute, St. Petersburg), IPGG (A.A. Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch, Russian Academy of Sciences, Novosibirsk), MSU (M.V. Lomonosov Moscow State University, Moscow), PIN (Borissiak Paleontological Institute, Russian Academy of Sciences, Moscow), VNIGRI (All-Russian Petroleum Research Exploration Institute, St. Petersburg; currently dissolved; the institute collections are transferred to All-Russian Research Geological Oil Institute, Moscow, Aprelevka Department “VNIGNI” branch office), YSPU (K.D. Ushinsky Yaroslavl State Pedagogical University, Yaroslavl).

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CONFLICT OF INTEREST

The author of this work declares that she has no conflict of interest.

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REFERENCES

- Andreev, Yu.N., Sexual dimorphism of Cretaceous ostracods from the Gissar-Tajik region, in *Iskopaemye ostrakody* (Fossil Ostracods), Kiev: Naukova Dumka, 1966, pp. 50–66.
- Bate, R.H., Middle Jurassic ostracoda from North Lincolnshire, *Bull. Brit. Mus. (Nat. Hist.) Geol.*, 1963, vol. 8, no. 4, pp. 173–219.
- Bate, R.H., Some Bathonian ostracoda of England with a revision of the Jones, 1884 and Jones et Sherborn, 1888 collections, *Bull. Brit. Mus. (Nat. Hist.) Geol.*, 1969, vol. 17, no. 8, pp. 379–437.
- Becker, G., Geschlechtsdimorphismus bei Ostracoden. I, *Nat. Museum*, 1968a, vol. 98, no. 2, pp. 47–56.
- Becker, G., Geschlechtsdimorphismus bei Ostracoden. II, *Nat. Museum*, 1968b, vol. 98, no. 3, pp. 119–132.
- Brand, E. and Malz, H., Ostracoden-Studien im Dogger, 4: *Fuhrbergiella* n. g., *Senck. Leth.*, 1962a, vol. 43, no. 1, pp. 1–39.
- Brand, E. and Malz, H., Ostracoden-Studien im Dogger, 5: *Glyptocythere* n. g., *Senck. Leth.*, 1962b, vol. 43, no. 5, pp. 433–435.
- Brand, E. and Malz, H., Die Arten der Gattung *Glyptocythere* Brand & Malz 1962 im NW-deutschen Dogger, *Senck. Leth.*, 1966c, vol. 47, nos. 5/6, pp. 481–535.
- Dépêche, F., Les ostracodes du Callovien inferieur et moyen du sondage Chonville 1 (Meurthe-et-Moselle, France), *Bull. Centre Rech. Pau-SNPA*, 1969, vol. 3, pp. 259–285.
- Glinskikh, L.A., Tesakova, E.M., and Seltser, V.B., Biostratigraphy of the Lower–Middle Callovian of the Saratov area (Volga Region) inferred from microfauna, *Stratigr. Geol. Correl.*, 2022, vol. 29, pp. S57–S67.
- Gulyaev, D.B., Ammonites and infrazonal stratigraphy of the Lower Bathonian *Besnosovi* Zone of the Russian Plate, *Stratigr. Geol. Correl.*, 2019, vol. 27, no.1, pp. 95–117.
- Gulyaev, D.B., Stratigraphy of Bathonian–Callovian boundary deposits of the European Russia, in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. Shestoe Vseross. soveshch., 15–20 sentyabrya 2015 g., Makhachkala. Nauchn. mater.* (Proc. VI All-Russ. Conf. “Jurassic System of Russia: Problems of Stratigraphy and Paleogeography”), Makhachkala: ALEF, 2015, pp. 94–101.
- Gulyaev, D.B. and Ippolitov, A.P., Lower Callovian of Kanev Dislocations, Cherkasy Oblast, Ukraine: ammonites and stratigraphy, *Stratigr. Geol. Correl.*, 2021, vol. 29, no. 7, pp. 767–847.
- Henningsmoen, G., On certain features of palaeocope ostracodes, *Geol. Fören. Stockholm Förhandl.*, 1965, vol. 86, no. 4, pp. 329–394.
- International Code of Zoological Nomenclature*, 4th ed., London: International Trust for Zoological Nomenclature, 1999.
- Ivanova, V.A., *Ostrakody rannego i srednego ordovika. Podotryad Hollinomorpha* (Early and Middle Ordovician Ostracodes. Suborder Hollinomorpha), Moscow: Nauka, 1979 [in Russian].
- Jaanusson, V., Functional morphology of the shell in platycope ostracodes – a study of arrested evolution, *Lethaia*, 1985, vol. 18, no. 1, pp. 73–84.
- Kiselev, D.N., *Ammonity i infrazonal'naya stratigrafiya boreal'nogo i subboreal'nogo bata i kelloveya* (Ammonites and Infrazonal Stratigraphy of the Boreal and Subboreal Bathonian and Callovian), Moscow: GEOS, 2022 [in Russian].
- Kolpenskaya, N.N., Bystrova, V.V., Nikiforova, E.V., Ovchinnikova, L.L., and Sochevanova, O.A., Advances in biostratigraphy of sedimentary basins based on data on Mesozoic microfossils, in *Neftegazovaya geologiya na rubezhe vekov. Prognoz, poiski, razvedka i osvoenie mestorozhdenii. Doklady yubileinoi konferentsii v trekh tomakh. T. 2. Stratigrafiya, obshchaya geologiya, regional'nyi prognoz* (Oil and Gas Geology at the Turn of the Centuries. Prognosis, Prospecting, Exploration, and Development of Deposits. Proc. Jubilee Conf. (in 3 vols). Vol. 2: Stratigraphy, Geology, and Regional Prognosis), St. Petersburg: Izd. Vseross. Neft. Nauchno-Issled. Geol. Inst., 1999, pp. 67–82.
- Lyubimova, P.S., Ostracods from the Mesozoic deposits of the Middle Volga Region and Obshchyi Syrt, in *Tr. VNIGRI* (Trans. All-Russ. Petrol. Res. Explor. Inst. New Ser.), 1955, vol. 84, pp. 3–190.
- Makhnach, V.V. and Tesakova, E.M., Palaeogeographic reconstructions of the natural environment in southeast Belarus during the Bathonian–Oxfordian ages, *Moscow Univ. Geol. Bull.*, 2015, vol. 70, no. 2, pp. 159–170.
- Masumov, A.S., *Yurskie ostrakody Uzbekistana* (Jurassic Ostracods of Uzbekistan), Tashkent: Fan, 1973 [in Russian].
- Moore, R.C., *Treatise Part Q, Arthropoda 3 – Crustacea, Ostracoda*, Lawrence, Kansas: Geol. Soc. Am., Univ. Kansas Press, 1961.
- Pokorny, V., Ostracodes, in *Introduction to Marine Micro-paleontology*, New York: Elsevier Science, 1998.
- Prakticheskoe rukovodstvo po mikrofaune SSSR. T. 3. Ostrakody kainozoya* (Practical Guide on the Microfauna of the USSR. Vol. 3: Ostracods of the Cenozoic), Sokolov, B.S. Ed., Leningrad: Nedra, 1989 [in Russian].
- Prakticheskoe rukovodstvo po mikrofaune SSSR. T. 4. Ostrakody paleozoya* (Practical Guide on the Microfauna of the USSR. Vol. 4: Ostracods of the Paleozoic), Sokolov, B.S. Ed., Leningrad: Nedra, 1990 [in Russian].
- Prakticheskoe rukovodstvo po mikrofaune. T. 7. Ostrakody mezozoya* (Practical Guide on the Microfauna of the USSR. Vol. 7: Ostracods of the Mesozoic), Sokolov, B.S. Ed., St. Petersburg: Vseross. Nauchno-Issled. Geol. Inst., 1999 [in Russian].
- Preobrazhenskaya, V.N., Significance of ostracods for the Jurassic stratigraphy of the KMA, in *Geologiya i poleznye iskopaemye tsentral'no-chernozemnykh oblastei. Tr. mezhdobl. geol. soveshch.* (Trans. Interreg. Geol. Conf. “Geology and

- Mineral Resources of the Central Black Earth Regions*"), Voronezh: Izd. Voronezh. Univ., 1964, pp. 179–183.
- Pyatkova, D.M. and Permyakova, M.N., *Foraminifery i ostrakody yury Ukrainy* (Jurassic Foraminifers and Ostracods of Ukraine), Kiev: Naukova dumka, 1978 [in Russian].
- Sarv, L.I., Sexual dimorphism in ancient Paleozoic ostracods, in *Iskopaemye ostrakody* (Fossil Ostracods), Kiev: Naukova dumka, 1966, pp. 14–21.
- Shchepetova, E.V., Baraboshkin, E.Yu., Aleksandrova, G.N., Rogov, M.A., and Zastrozhnov, A.S., The U-shaped spreiten-burrows filled by pellets in the Bathonian of the Saratov Volga Region and their significance for reconstruction of sedimentary environments, in *Paleontologiya, stratigrafiya i paleogeografiya mezozoya i kainozoya boreal'nykh raionov. Materialy nauchn. onlain-sess., 19-22 aprelya 2021 g.* (Proc. Online Sci. Sess. "Paleontology, Stratigraphy, and Paleogeography of Mesozoic and Cenozoic in Boreal Regions", April 19–22, 2021), Lebedev, N.K., Goryachev, A.A., Dzyuba, O.S., and Shurygin, B.N., Eds., Novosibirsk: Inst. Neftegaz. Geol. Geofiz. Sib. Otd. Ross. Akad. Nauk, 2021, pp. 202–207.
- Shchepetova, E.V., Rogov, M.A., Gulyaev, D.B., Zastrozhnov, A.S., Tesakov, E.M., Ustinova, M.A., and Kostyleva, V.V., Lithostratigraphy, sedimentology and sedimentation conditions of the Bajocian–Bathonian sediments of the Saratov Volga region: Preliminary results, in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. Mater. VIII Vseross. soveshch. s mezhd. uchastiem. Onlain-konf., 7–10 sentyabrya 2020 g.* (Proc. VIII All-Russ. Conf. with Int. Participation "Jurassic System of Russia: Problems of Stratigraphy and Paleogeography". September 7–10, 2020), Zakharov, V.A., Rogov, M.A., Shchepetov, E.V., and Ippolitov, A.P., Eds., Syktyvkar: Inst. Geol. Komi NTs UrO RAN, 2000, pp. 255–261.
- Sheppard, L.M., *Middle Jurassic Ostracoda from Southern England and Northern France. Thesis PhD*, Univ. London, 1981.
- Sylvester-Bradley, P.C., The structure, evolution and nomenclature of the ostracod hinge, *Bull. Brit. Mus. (Nat. Hist.) Geol.*, 1956, vol. 3, no. 1, pp. 1–21.
- Tesakova, E.M., Ostracods of the genus *Palaeocytheridea* Mandelstam, 1947 in the Middle and Upper Jurassic of Europe: 1. Development of ideas on the content of the genus and the results of its revision, *Paleontol. J.*, 2013, vol. 47, no. 3, pp. 256–271.
- Tesakova, E.M., Ostracods of the genus *Palaeocytheridea* Mandelstam, 1947 in the Middle and Upper Jurassic of Europe: 2. Description of taxa, *Paleontol. J.*, 2013b, vol. 47, no. 5, pp. 485–494.
- Tesakova, E.M., Ostracods of the genus *Palaeocytheridea* Mandelstam in the Middle and Upper Jurassic of Europe: 3. Stratigraphy and paleobiogeography, *Paleontol. J.*, 2014, vol. 48, no. 1, pp. 53–57.
- Tesakova, E.M., Late Bajocian and Early Bathonian ostracods of the Russian Plate. Part I: Genera *Plumhoffia* Brand and *Aaleniella* Plumhoff, *Paleontol. J.*, 2022a, vol. 56, pp. 173–186.
- Tesakova, E.M., Late Bajocian and Early Bathonian Ostracods of the Russian Plate. Part II. Genera: *Procytherura* Whatley, *Pseudohutsonia* Wienholz, *Acrocythere* Neale, *Nanacythere* Herrig and *Trachycythere* Triebel et Klingler, *Paleontol. J.*, 2022b, vol. 56, no. 3, pp. 250–262.
- Tesakova, E.M., Late Bajocian and Early Bathonian ostracods of the Russian Plate. Part III. Genera *Camptocythere* Triebel and *Procytheridea* Peterson, *Paleontol. J.*, 2022c, vol. 56, no. 4, pp. 400–411.
- Tesakova, E.M., Late Bajocian and Early Bathonian Ostracods of the Russian Plate. Part IV. The Lineage *Glyptocythere aspera* (Khabarova) → *G. bathonica* sp. nov., *Paleontol. J.*, 2022d, vol. 56, no. 6, pp. 646–662.
- Tesakova, E.M. and Seltser, V.B., New Callovian–Lower Oxfordian ostracods from the Russian Plate (genera *Camptocythere* Triebel and *Procytherura* Whatley) and their stratigraphic significance, *Paleontol. J.*, 2022, vol. 56, no. 5, pp. 526–547.
- Tesakova, E.M. and Seltser, V.B., Ostracods and ammonites of the Lower Callovian of the Bartolomeevka section (Saratov Region), *Byull. Mosk. Obshch. Ispyt. Prir.*, 2013, vol. 88, no. 2, pp. 50–68.
- Tesakova, E.M. and Shurupova, Ya.A., Ostracod analysis of Callovian and Lower Oxfordian deposits of the Mikhailovtsement Section (Ryazan Region): methods and results, *Paleontol. J.*, 2018, vol. 52, no. 13, pp. 1547–1568.
- Tesakova, E.M., Strezh, A.S., and Gulyaev, D.B., New ostracods from the Lower Callovian of the Kursk oblast, *Paleontol. J.*, 2009, no. 3, pp. 25–36.
- Tesakova, E.M., Ippolitov, A.P., and Gulyaev, D.B., Ostracod-based reconstruction of Early Callovian Events in the Kanev dislocation area (preliminary data), in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. Shestoe Vseross. soveshch., Makhachkala, 15-20 sentyabrya 2015 g. Nauchn. mater.* (Proc. VI All-Russ. Conf. "Jurassic System of Russia: Problems of Stratigraphy and Paleogeography", September 15–20, 2015. Makhachkala), Zakharov, V.A., Rogov, M.A., and Ippolitov, A.P., Eds., Makhachkala: ALEF, 2015, pp. 273–277.
- Tesakova E.M., Glinskikh, L.A., Fedyavskii, A.G., Mironenko, A.A., and Ippolitov, A.P., Microfossils from Lower Callovian Subpatruus Ammonite Zone (Nizhny Novgorod oblast), in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. Mater. VIII Vseross. soveshch. s mezhd. uchastiem. Onlain-konf., 7-10 sentyabrya 2020 g.* (Proc. VIII All-Russ. Conf. with Int. Participation "Jurassic System of Russia: Problems of Stratigraphy and Paleogeography". September 7–10, 2020), Zakharov V.A., Rogov, M.A., Shchepetov, E.V., and Ippolitov, A.P., Eds., Syktyvkar: Inst. Geol. Komi NTs UrO RAN, 2020, pp. 222–230.
- Tesakova, E.M., Ustinova, M.A., Gulyaev, D.B., Shchepetova, E.V., Rogov, M.A., and Zastrozhnov, A.S., Biostratigraphy of the Kamennyi Ovrage Formation of the Saratov Trans-Volga region based on ostracods, in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. Mater. IX Vseross. soveshch. s mezhd. uchastiem, Syktyvkar, 9-16 sentyabrya 2023 g.* (Proc. IX All-Russ. Conf. with Int. Participation "Jurassic System of Russia: Problems of Stratigraphy and Paleogeography". Syktyvkar, September 9–16, 2023), Rogov, M.A., Shchepetov, E.V., Ippolitov, A.P., and Tesakova, E.M., Eds., Syktyvkar: Inst. Geol. Komi NTs UrO RAN, 2023, pp. 154–160.

Tesakova, E.M., Ustinova, M.A., Gulyaev, D.B., Rogov, M.A., Shchepetova, E.V., Lutikov, O.A., and Zastrozhnov, A.S., Paleontological characteristics of Jurassic sediments of Saratov Trans-Volga Region by well core and new data on the biostratigraphy of the Kamennyi Ovrage Formation, *Stratigr. Geol. Correl.*, 2024 (In press).

Unifitsirovannaya regional'naya stratigraficheskaya skhema yurskikh otlozhenii Vostochno-Evropeskoj platformy (14 listov). Ob'yasnitel'naya zapiska (Unified Regional Stratigraphic Scheme of Jurassic Deposits of the East European Platform (14 Sheets). Explanatory Note), Moscow: PIN RAN-FGUP VNIGNI, 2012 [in Russian].

Ustinova, M.A., Upper Bajocian-Lower Bathonian foraminifers of the Penza oblast, in *Yurskaya sistema Rossii: problemy stratigrafii i paleogeografii. VII Vseross. soveshch., Moskva, 18-22 sentyabrya 2017 g. Nauchn. mater.* (Proc. VII All-Russ. Conf. "Jurassic System of Russia: Problems of Stratigraphy and Paleogeography". Moscow, September 18–22, 2017), Zakharov, V.A., Rogov, M.A., and Shchepetov, E.V., Eds., Moscow: Geol. Inst. Ross. Akad. Nauk, 2017, pp. 225–229.

Wakefield, M.I., Middle Jurassic (Bathonian) ostracoda from the Inner Hebrides, Scotland, *Scotland, Palaeontogr. Soc. Monogr.*, 1994, Publ. no. 596, part of vol. 148, pp. 1–89.

Wakefield, M.I., Bathonian of the Inner Hebrides, Scotland, in *Ostracods in British Stratigraphy*, Whittaker, J.E. and Hart, M.B., Eds., *Micropalaeontol. Soc. Spec. Publ.*, Geol. Soc. London, 2009, pp. 225–240.

Whatley, R.C. and Ballent, S., A review of the Mesozoic ostracod genus *Progonocythere* and its close allies, *Palaeontology*, 1996, vol. 39, pp. 919–939.

Whatley, R.C. and Ballent, S., A review of the Mesozoic ostracod genus *Lophocythere* and its close allies, *Palaeontology*, 2004, vol. 47, pp. 81–108.

Zimmermann, J., Franz, M., Heunisch, C., Luppold, F.W., Mönnig, E., and Wolfgramm, M., Sequence stratigraphic framework of the Lower and Middle Jurassic in the North German Basin: Epicontinental sequences controlled by Boreal cycles, *Palaeogeogr., Palaeoclimatol., Palaeoecol.*, 2015, vol. 440, pp. 395–416.

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