Invertebrate Zoology, 2025, 22(2): 288–303

Redescription of valves and carapaces of *Cytherissa compta* Mazepova, 1990 and *Cytherissa uvaeformis* Mazepova, 1990 (Ostracoda: Podocopida: Cytherideidae) from Lake Baikal

T.M. Alekseeva*, R.S. Krivorotkin, O.A. Timoshkin

Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, Ulan-Batorskaya St., 3, Irkutsk 664033 Russia.
Tatyana Alekseeva: atm171@mail.ru https://orcid.org/0000-0001-8928-1491
Roman Krivorotkin: roman_bio@mail.ru https://orcid.org/0000-0002-2567-6600
Oleg Timoshkin: tim@lin.irk.ru https://orcid.org/0000-0001-6476-0074
** Corresponding author*

ABSTRACT: The ostracod fauna of Lake Baikal is extremely diverse and has a very high level of endemism, but the main taxonomic works were performed in the last century. The differences between some species are sometimes really minor, but in some cases it is obvious that the authors were dealing with more than one species. Most Baikalian species need to be studied at a modern level, using scanning electron microscopy. Illustrated redescriptions of the structure of females and males of two rare and poorly studied endemic species of Lake Baikal from the genus *Cytherissa* Sars, 1925 have been prepared: *C. compta* Mazepova, 1990 and *C. uvaeformis* Mazepova, 1990. The morphology of the shells of both species has been studied in detail using a scanning electron microscope. The work is based on unique collections of type specimens and taxocenoses of Baikal ostracods collected by the famous Lake Baikal investigator G.F. Mazepova; lectotypes and paralectotypes have been isolated from among the syntypes for both species.
How to cite this article: Alekseeva T.M., Krivorotkin R.S., Timoshkin O.A. 2025. Redescription of valves and carapaces of *Cytherissa compta* Mazepova, 1990 and *Cytherissa uvaeformis* Mazepova, 1990 (Ostracoda: Podocopida: Cytherideidae) from Lake Baikal // Invert. Zool. Vol.22. No.2. P.288–303. doi: 10.15298/invertzool.22.2.06

KEY WORDS: morphology, Ostracoda, *Cytherissa*, Baikal endemics, rare species.

Переописание створок и раковин *Cytherissa compta* Mazepova, 1990 и *Cytherissa uvaeformis* Mazepova, 1990 (Ostracoda: Podocopida: Cytherideidae) из озера Байкал

Т.М. Алексеева*, Р.С. Кривороткин, О.А. Тимошкин

Лимнологический институт Сибирского отделения Российской Академии наук, ул. Улан–Баторская, 3, Иркутск 664033 Россия.
** ответственный за переписку: atm171@mail.ru*

РЕЗЮМЕ: Фауна остракод оз. Байкал крайне разнообразна и обладает очень высоким уровнем эндемизма, но основные таксономические работы выполнены в прошлом веке. Различия между некоторыми видами иногда действительно незначительны, но в некоторых случаях очевидно, что авторы имели дело с несколькими видами. Большинство байкальских видов нуждаются в исследовании на современном уровне, с применением сканирующей электронной микроскопии. Подготовлены

иллюстрированные переописания строения самок и самцов двух редких и слабоизученных эндемичных для Байкала видов из рода *Cytherissa* Sars, 1925: *C. compta* Mazepova, 1990 и *C. uvaeformis* Mazepova, 1990. Морфология раковин обоих видов подробно изучена с использованием сканирующего электронного микроскопа. Работа выполнена на основе уникальных коллекций типовых экземпляров и таксоценозов байкальских остракод, созданных известным ученым-байкловедом Г.Ф. Мазеповой; из числа синтипов для обоих видов выделены лектотипы и паралектотипы.
Как цитировать эту статью: Alekseeva T.M., Krivorotkin R.S., Timoshkin O.A. 2025. Redescription of valves and carapaces of *Cytherissa compta* Mazepova, 1990 and *Cytherissa uvaeformis* Mazepova, 1990 (Ostracoda: Podocopida: Cytherideidae) from Lake Baikal // Invert. Zool. Vol.22. No.2. P.288–303. doi: 10.15298/invertzool.22.2.06

КЛЮЧЕВЫЕ СЛОВА: морфология, Ostracoda, *Cytherissa*, байкальские эндемики, редкие виды.

Introduction

Ancient lakes are unique places for the study of evolutionary processes due to their high levels of endemic biodiversity (Martens, 1997). Lake Baikal is one of two tens of ancient lakes. Even among them, it stands out due to its antiquity (formed about 28 million years ago) and the presence of a cold and oxygenated abyssal zone (with a maximum depth of more than 1600 m) (Sherbakov, 1999; Sherstyankin, Kuimova, 2006). A set of these specific conditions has created an amazing fauna of Baikal ostracods, more than 90% of them are endemics (Mazepova, 2001). At present, more than 2330 non-marine ostracod species have been described (Meisch *et al*., 2019) and about 1/4 of them are known from ancient lakes (Martens *et al*., 2008).

Ostracods from Lake Baikal are one of the most numerous but insufficiently studied groups of crustaceans nowadays. To date, more than 160 species and subspecies have been described for this lake (Bronstein, 1930, 1947; Martens, Mazepova, 1992; Martens *et al*., 1992a, b; Mazepova, 1982, 1984, 1990, 2001, 2011; Karanovic, Sitnikova, 2017; Meisch *et al*., 2019), about 1/3 of which belong to the genus *Cytherissa* Sars, 1925 of the family Cytherideidae Sars, 1925. Of the 50 species of the genus, 48 ones are autochthonous endemics of Lake Baikal (Mazepova, 2001, 2006; Meisch *et al*., 2019), this illustrates an impressive species distribution. The limb structure of species of the genus is quite conservative, but species differ by the main taxonomic feature — shell structure (Mazepova, 1990). Due to this fact, the whole Baikalian *Cytherissa* systematics is built on the basis of data on shell structure (Bronstein, 1947; Mazepova, 1990).

Recently, using molecular biology methods, it was found out that the species diversity of Baikalian *Cytherissa* is at least twice as high as is known for the present time (Schön *et al*., 2017); ancestral *Cytherissa* probably expanded in Lake Baikal about 5–8 million years ago (Schön, Martens, 2012). In the presence of two morphologically similar species from extremely distant points of Lake Baikal, a big problem is the difficulty to find out, which of them the author meant. This problem can be solved only by using type material. Obviously, morphological revision of the Baikalian *Cytherissa* fauna at the modern level using SEM is a very urgent problem; it is known that the features of the shell microstructure can be almost indistinguishable on the light microscope.

Of 56 species and subspecies of Baikalian *Cytherissa*, at least 22 (according to descriptions) have various protrusions on the surface of the valves (Mazepova, 1990). Most often, the shape of protrusions is hemispherical, but there are ear-shaped, wing-shaped, finger-shaped ones, etc. Many primary descriptions lack information on the location and number of these protrusions (although it is often the main taxonomic features) — it is shown only in the figures. For more detailed description of protrusions arrangement, it is necessary to use a convenient system of its numbering. To date, for species of the genus *Cytherissa* (specifically the Palaearctic *C. lacustris* (Sars, 1863)), a system has been shown (Danielopol *et al*., 1990), in which protrusions are consecutively numbered (along the dorsal margin from its posterior part to its anterior part,

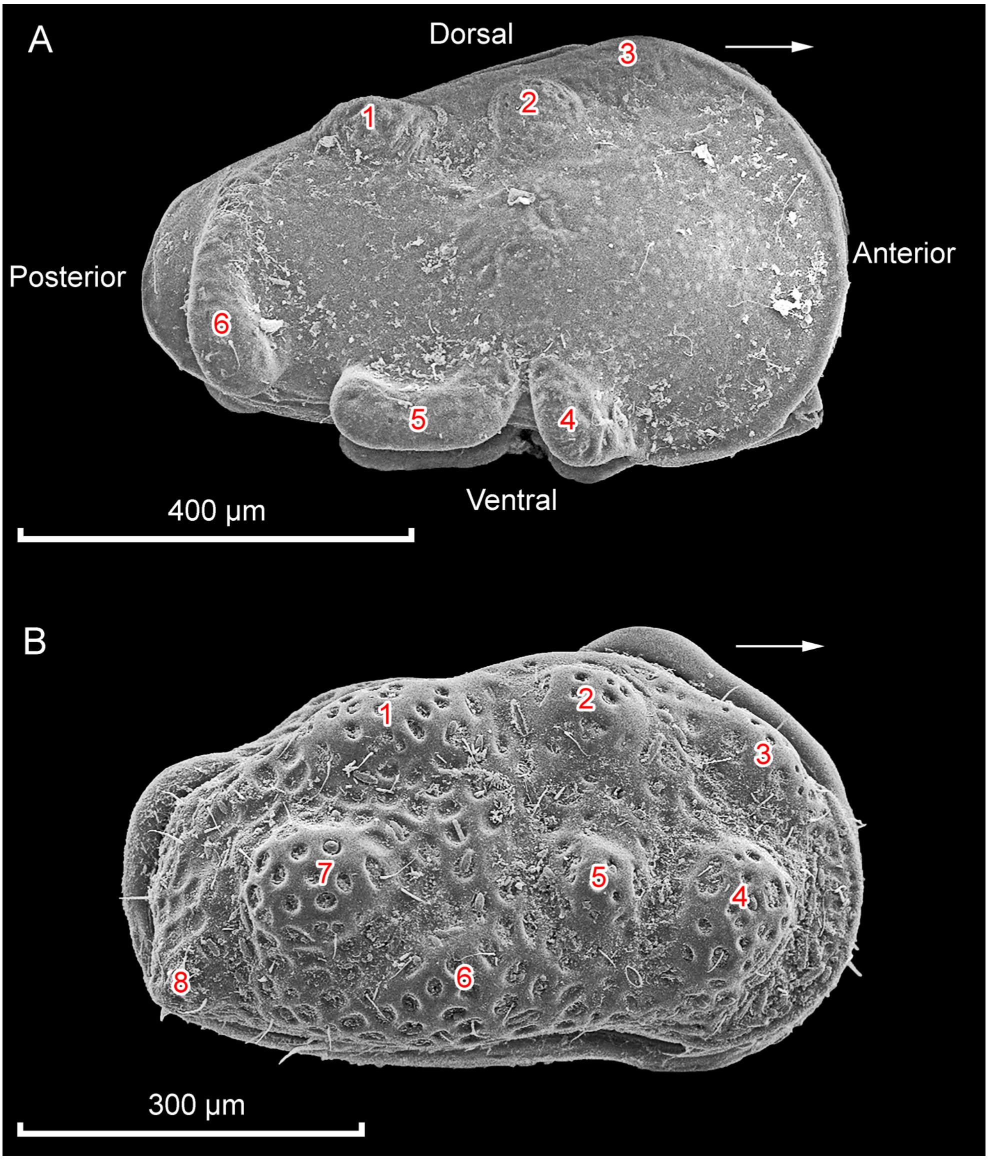

Fig. 1. Numbering of protrusions of *Cytherissa compta* Mazepova, 1990 (A) and *C. uvaeformis* Mazepova, 1990 (B) according to Danielopol *et al*. (1990). The arrows show the anterior end of the body.
Рис. 1. Нумерация выступов *Cytherissa compta* Mazepova, 1990 (A) и *C. uvaeformis* Mazepova, 1990 (B) по Danielopol *et al*. (1990). Стрелками показан передний конец тела.

then to the anterior part of the ventral margin, to the center of the valve and to the posterior part of the ventral margin, i.e., clockwise). In this work, we use it (Fig. 1) due to the absence of a more convenient system, which can be developed only when generalizing all Baikal species after their detailed redescription. The disadvantage of this system is a difficult comparison of morphologically similar species. If two species differ in the absence of a particular protrusion, the existing numbering is simply shifted by one value and makes interspecific comparison not very convenient. To make such numbering convenient, a notional "most protruding" species is needed as a basis, in comparison with which protrusions could be present, shifted in some direction, fused together, or absent at all. At present, none of the described species can be successfully used as a reference for this purpose. The formation of a new convenient numbering system is possible only after a more complete revision of the Baikalian *Cytherissa* fauna.

The present work is a continuation of G.F. Mazepova's fundamental research on the biodiversity of endemic Baikalian ostracods and is devoted to the modern revision, as well as to the preservation of the collection of type specimens of this famous Lake Baikal investigator. Syntypes of *C. compta* and *C. uvaeformis* from the taxonomic collection of G.F. Mazepova were used for this study.

Characterization of the special importance of this work due to decalcification of shells and description of the collections of G.F. Mazepova are given in the other work (Alekseeva *et al*., 2025a).

The purpose of this article is to give an illustrated redescription of the morphology of valves and carapaces of females and males of rare and insufficiently studied species — *C. compta* and *C. uvaeformis*, to isolate lectotypes and paralectotypes.

Materials and methods

Individuals and mounts were examined using Olympus CX21 and Nikon Optiphot–2 microscopes. Microphotographs were made using a ToupCam 5.1 Mp Videocular and Levenhuk lite program. All drawings were prepared with a Nikon Drawing Tube. SEM photographs were made using the FEI Company Quanta 200 microscope, which is part of the Electron Microscopy Collective Instrumental Center at LIN SB RAS. The methodology was described in detail in the other work (Alekseeva *et al*., 2025a).

In the description of species, in the "Material" section, the following abbreviations are used to indicate the type of whole mount: 1) "wm" — whole mount of limbs and/or valves of ostracods in Fore-Berlese or Hoyer's fluid; 2) "dwm" — dehydrated whole mount — micropaleontological slide with dried whole individuals and/or individual valves; 3) "swm" — sputtering whole mount — aluminum stub with shells, valves and limbs of ostracods sputtered with gold for SEM study.

All material, including type specimens (lectotypes and paralectotypes), is stored in the Laboratory of Aquatic Invertebrate Biology, Limnological Institute, Siberian Branch of the Russian Academy of Sciences, Irkutsk.

Abbreviations used in text and figures. Descriptive terminology and abbreviations according to Broodbakker & Danielopol (1982), Meisch (1996), Karanovic (2012): A1 — antennule; A2 — antenna; Md — mandible; Mxl — maxillule; H — height; L — length; L5, L6, L7 — 5, 6, 7 legs; LV — left valve; RV — right valve.

Results

Order Podocopida Sars, 1866
Family Cytherideidae Sars, 1925
Genus *Cytherissa* Sars, 1925
Cytherissa compta Mazepova, 1990
Figs 1A; 2–6; 11A, C; 12A.

MATERIAL. 29 individuals were studied: 21 females and 8 males. All ostracods belong to the type series and were collected in Lake Baikal, Maloye Morye Strait, near Ugungoi Island (approximate coordinates 53°07′56″N 106°59′02″ E), on August 4, 1968, depth of 55 m, silt with sand and detritus, sample No. 155 from the collection of taxocenoses of G.F. Mazepova. Lectotype No. O5 (♀) and paralectotype No. 1 (♂): dwm No. O1-040868. Paralectotype No. (♂): dwm No. O2-040868. Paralectotypes Nos 3–16 (14♀♀): dwm No. O3-040868. Paralectotypes Nos 17–24 (4♀♀4♂♂): swm No. x993. Paralectotype No. 25 (♂): swm No. x993 (valves) and wm No. O4-040868 (limbs). Paralectotype No. 26 (♂): swm No. x993 (valves) and wm No. O5-040868 (limbs). Paralectotype No 27 (♀): swm No. x993 (valves) and wm No. O6-040868 (limbs). Paralectotype No. 28 (♀): swm No. x993 (valves) and wm No. O7-040868 (limbs).

TYPE LOCALITY. Lake Baikal, Maloye Morye Strait, near Ugungoi Island.

DESCRIPTION. FEMALE. Shell elongate-ovate (Figs 2A–D; 3A–F); L = 720–780 μm (average 750 μm, n = 9), greatest H = 430–460 μm (average 445 μm, n = 9), located on posterior border of anterior 1/4 L. Dorsal margin straight, height of shell gently decreasing from anterior end to posterior end. Anterior end of shell widely rounded, posterior end more narrowly rounded. Ventral margin both on outer and inner sides concave equally on both valves. Shell with six protrusions on both valves (Fig. 1A). Three protrusions (Nos 1–3) located along dorsal margin, only one of them extending beyond edge of valves (No. 1). Protrusion No. 3 very weakly expressed and most distinctly visible on dorsal side (Fig. 3D). Two protrusions (Nos 4 and 5) located in medial part of ventral margin and distinctly extend beyond edge of valves. Protrusion No. 6 located perpendicular to ventral margin and running from dorsal margin to ventral margin, where it extends beyond edge of valves. Aggregation of protrusions Nos 4–6 forms "platform-like" structure on ventral view (Fig. 3C). On inner side of valves, all protrusions are hollow, i.e., formed by invagination rather than by increas-

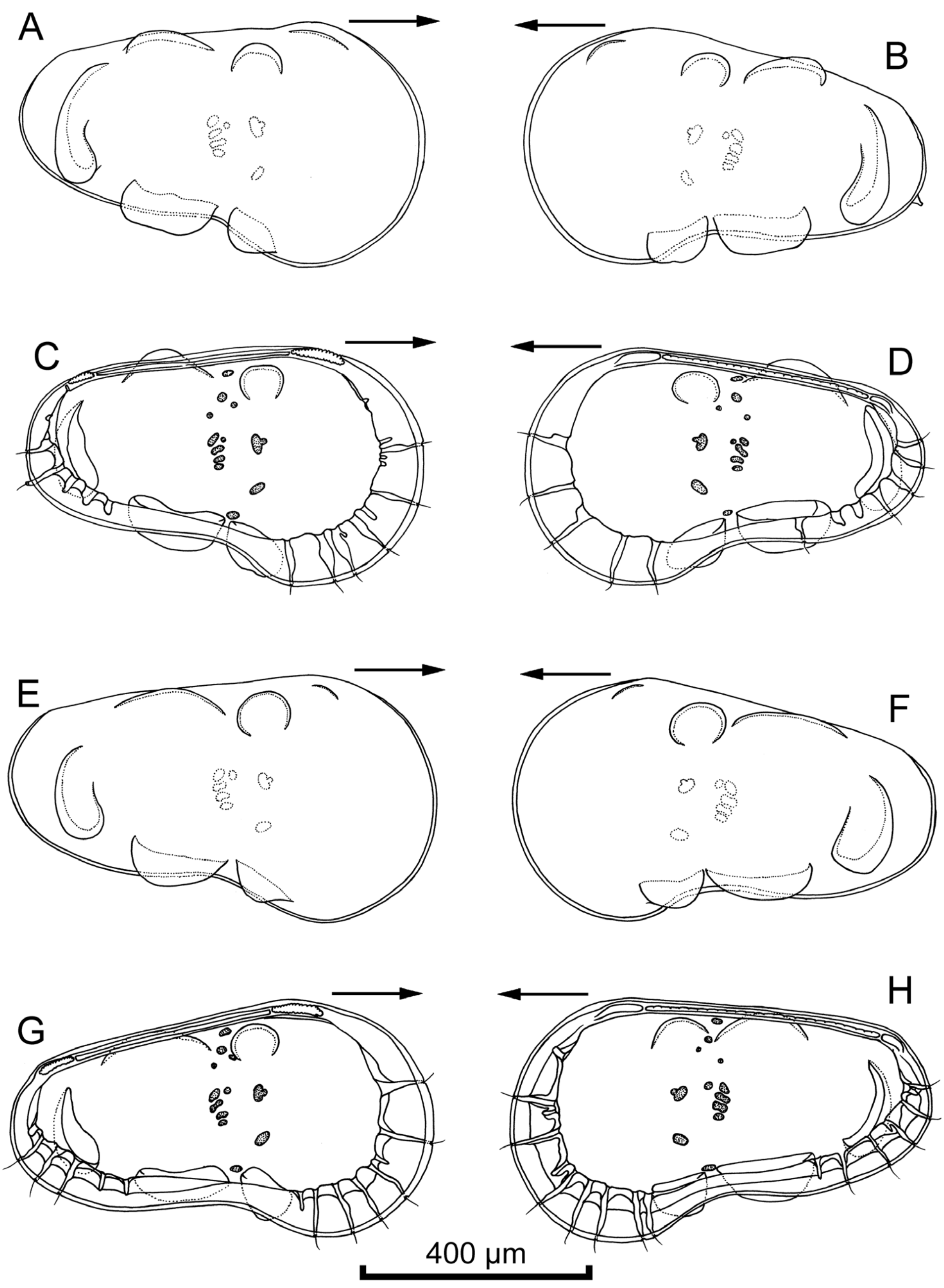

Fig. 2. *Cytherissa compta* Mazepova, 1990, schematic drawings of RV (A, D, E, H) and LV (B, C, F, G) of females (A–D) and males (E–H), outer (A, B, E, F) and inner (C, D, G, H) sides, laterally. Arrows show the anterior end of the body. Normal pore canals are not drawn, only central muscle scars are imprinted.
Рис. 2. *Cytherissa compta* Mazepova, 1990, схематичные рисунки RV (A, D, E, H) и LV (B, C, F, G) самок (A–D) и самцов (E–H) с внешней (A, B, E, F) и внутренней стороны (C, D, G, H), латерально Стрелками показан передний конец тела. Нормальные поровые каналы не прорисованы, даны отпечатки только центральных мышц-замыкателей.

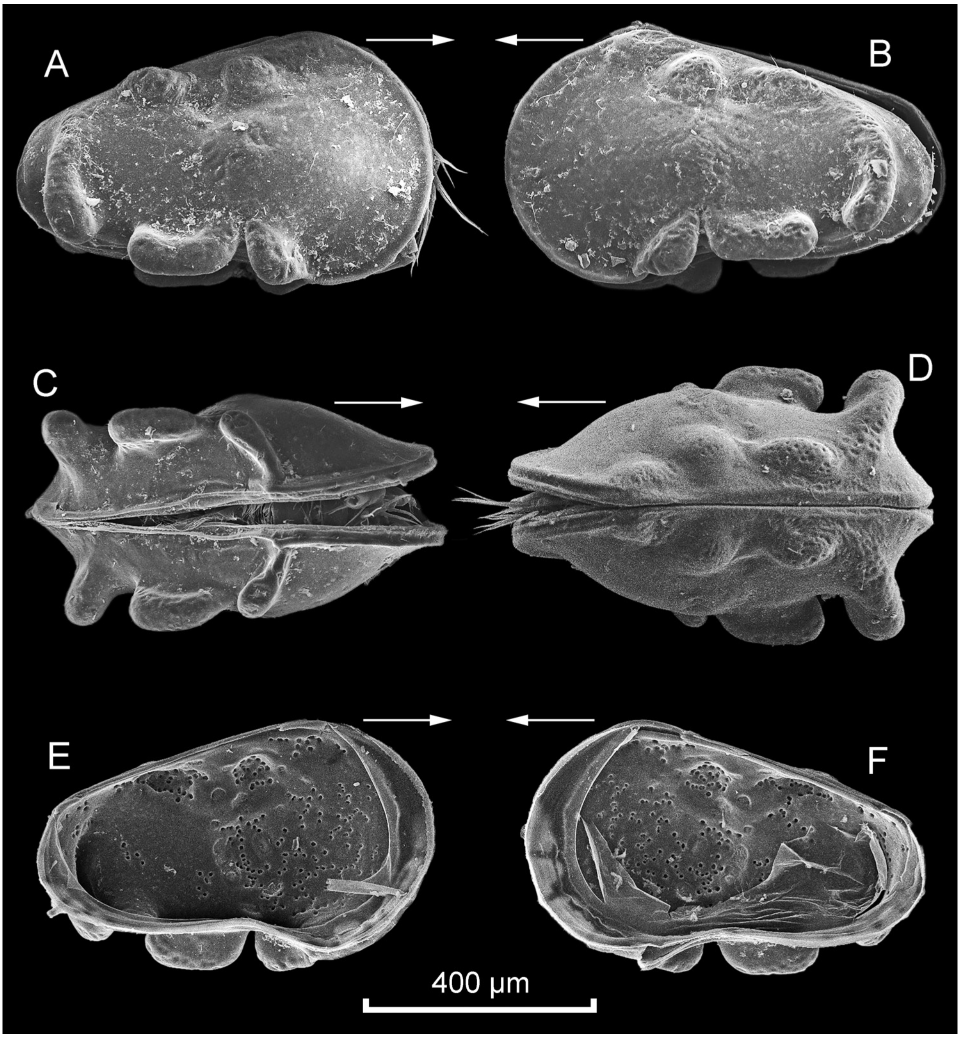

Fig. 3. *Cytherissa compta* Mazepova, 1990, SEM photographs of shells (A–D) and of individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV laterally, inner side; F — RV laterally, inner side. Arrows show the anterior end of the body.
Рис. 3. *Cytherissa compta* Mazepova, 1990, СЭМ фотографии раковин (A–D) и отдельных створок (E, F) самок: A, B — латерально; C — вентрально; D — дорсально; E — LV латерально, с внутренней стороны; F — RV латерально, с внутренней стороны. Стрелками показан передний конец тела.

ing thickness of valves. LV and RV symmetrical: LV slightly overlap RV at ventral margin. Inner lamella is relatively broad. Marginal pore canals are very sparse, sometimes branching, and may be long and reach margin of inner plate and end in sensilla, or it may be short and open on outer side of valve (considerably short of inner lamella). Number of long canals of inner lamella is 8–10, and number of short canals (ending before edge of inner lamella) is 5–10. Canal pores in center of valves (normal pore canals) are sieve (belong to the B-type according Puri & Dickau (1969)), in anterior part of valve center it is very numerous and its arrangement forms complex pattern (Figs 5A–H; 6A, B). All pore canals in center of valves studied by us did not branch — one canal opening on inner side corresponds to one sieve pore (Fig. 6B). There are at least 260–280 sieve pores on outer side of each valve (it is not possible to give an exact number); number of canal apertures on inner side is almost the same. Sensillae of valve surface relatively sparse, and usually near sieve pores (Fig. 5F, H). Hinge teeth on LV very thin and elongate,

Fig. 4. *Cytherissa compta* Mazepova, 1990, SEM photographs of shells (A–D) and of individual valves (E, F) of males: A, B — laterally; C — ventrally; D — dorsally; E — LV laterally, inner side; F — RV laterally, inner side. Arrows show the anterior end of the body.
Рис. 4. *Cytherissa compta* Mazepova, 1990, СЭМ фотографии раковин (A–D) и отдельных створок (E, F) самцов: A, B — латерально; C — вентрально; D — дорсально; E — LV латерально, с внутренней стороны; F — RV латерально, с внутренней стороны. Стрелками показан передний конец тела.

hardly noticeably crenulated, bar on RV, very weakly crenulated; all hinge elements very small and thin. Microrelief of valve surface is heterogeneous, consisting of small rounded and oval depressions (Figs 5A, B, D; 6C) located on all protrusions, mainly on its dorsal side. Closer protrusion is to posterior part of shell, more pronounced is a microrelief on it (Fig. 3D). In central part of valves from outer side, in place of adductor muscles scars, there are small depressions repeating its internal arrangement. In some places, there are rounded dimples of small diameter and depth in center of valves (Fig. 5E). At least on frontal margin and protrusions Nos 4–6, there is a relief of very small regularly arranged hemispheres (Fig. 6E, F). Rest of valve is smooth, without a microrelief. Greatest width (both ventral and dorsal sides; excluding protrusions) is at a site slightly anterior to middle L of shell; including protrusions, site of greatest width is located at site of protrusion No. 6 (Fig. 3C, D). A1, A2, Md, Mxl, L5–L7 (Fig. 5I) as in *Cytherissa latirecta* Mazepova, 1985 (Alekseeva *et al*., 2025b).

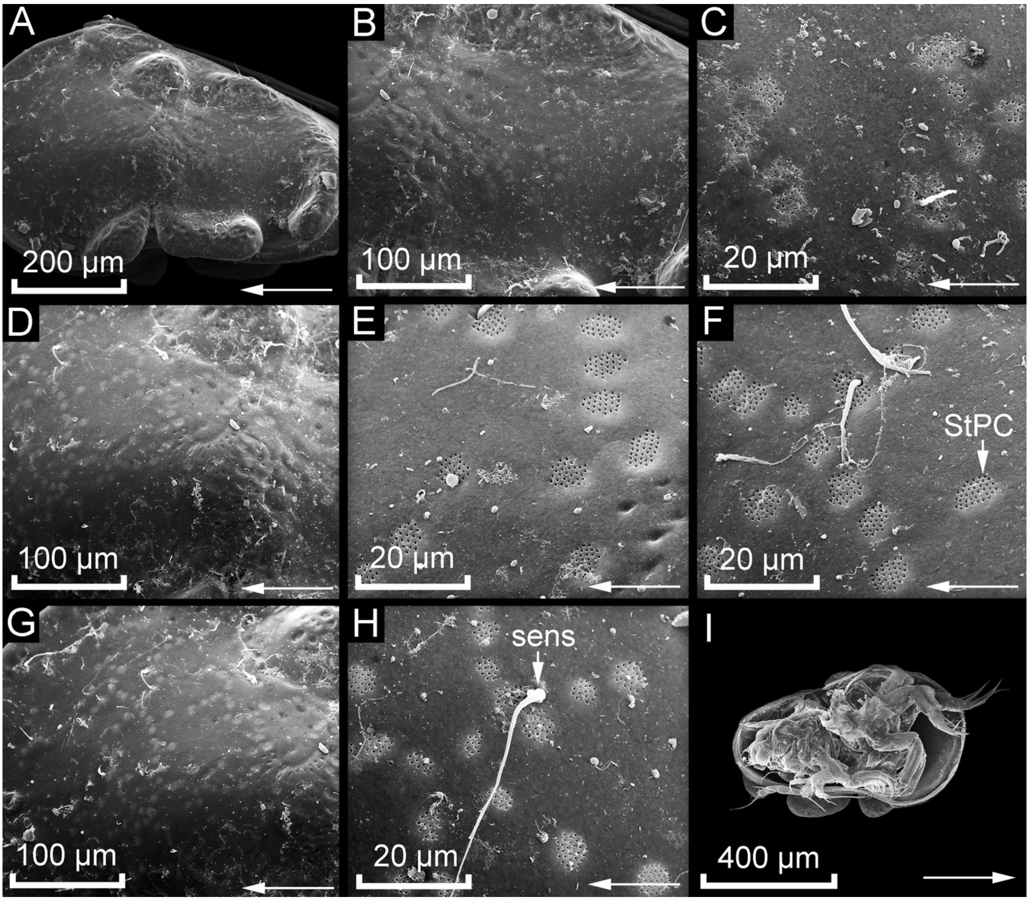

Fig. 5. *Cytherissa compta* Mazepova, 1990, SEM photographs of some elements of the outer microrelief of female shell, laterally (A–H), and the external appearance of the soft body (I): A — central part of LV; B — central part of LV with sieve-type normal pore canals; C, E, F, H — sieve-type normal pore canals and sensillae in the center of valves; D, G — anterior part of LV with pattern of sieve-type normal pore canals; I — body in LV. Arrows show the anterior end of the body.
Abbreviations: sens — sensilla; StPC — sieve-type normal pore canals.

Рис. 5. *Cytherissa compta* Mazepova, 1990, СЭМ фотографии некоторых элементов наружного микрорельефа раковины самок, латерально (A–H), а также внешний вид мягкого тела (I): A — центральная часть LV; B — центральная часть LV с ситовидными поровыми каналами; C, E, F, H — ситовидные поровые каналы и сенсиллы в центре створок; D, G — передняя часть LV с рисунком ситовидных поровых каналов; I —тело в LV. Стрелками показан передний конец тела.
Обозначения: sens — сенсилла; StPC — ситовидные поровые каналы.

MALE. Shell slightly longer and lower than in female (Figs 2E–H; 4A–F): L = 750–800 μm (average 775 μm, n = 9), greatest H = 420–450 μm (average 435 μm, n = 9). It differs from female by significantly less pronounced dorsal protrusions Nos 1–2, and protrusion No. 3 barely visible. On dorsal and ventral sides (Fig. 4C, D), all protrusions are less pronounced than in female but have a more expressed microrelief, at least on ventral side (Fig. 6C, D). There are at least 410–430 sieve pores on outer side of each valve (same number of canals on inner side), almost twice more as in female. Otherwise, shape and relief of shell is as in female. A1, A2, Md, Mxl, both legs L5 and L7, right leg L6 and proximal segment of left L6, as in *C. latirecta* (Alekseeva *et al*., 2025b). Geniculate legs on left side of body.

L6. Left leg (Fig. 11A). Endopod two-segmented, first segment twice as long as second one, without seta. Distal end of endopod with triangular projection.

Hemipenis (Fig. 12A) small, triangular, outer appendage flattened, inner appendage pointed. Hemipenis sizes in quiescent state (n = 1): length — 270 μm;

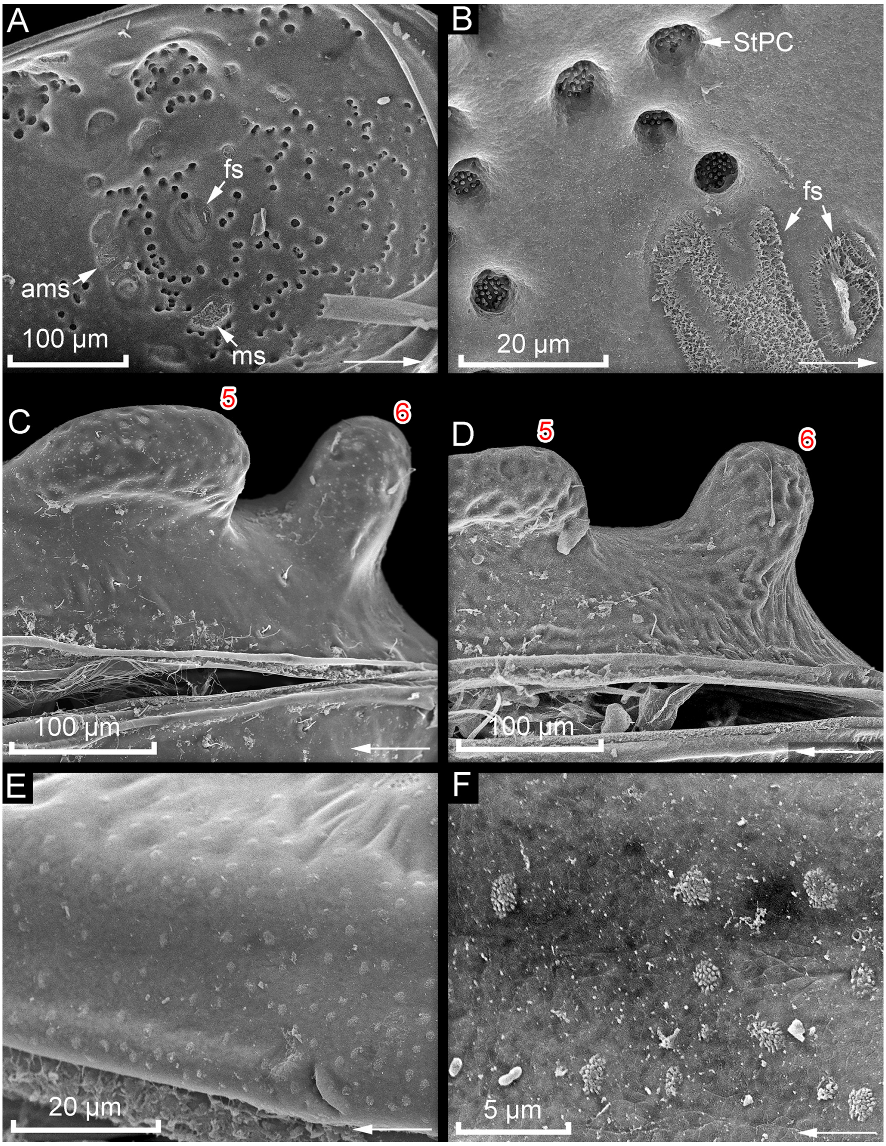

Fig. 6. *Cytherissa compta* Mazepova, 1990, SEM photographs of some elements of the shell structure of females (A–C, E, F) and males (D): A — central part of LV, laterally, inner side; B – sieve-type normal pore canals on LV, inner side; C, D — posterior part of the shell, ventrally; E — anterior part of RV, dorsally; F — protuberances on surface of the valves in anterior part of RV, dorsally. Arrows show the anterior end of the body. Numbers indicate protrusions according to Danielopol *et al*. (1990) (see Fig. 1).

Abbreviations: ams — adductor muscle scars; fs — frontal scars; ms — mandibular scars; StPC — sieve-type normal pore canals.

Рис. 6. *Cytherissa compta* Mazepova, 1990, СЭМ фотографии некоторых элементов строения раковины самок (A–C, E, F) и самцов (D): A —центральная часть LV, латерально, с внутренней стороны; B — ситовидные поровые каналы на LV с внутренней стороны; C, D — задняя часть раковины, вентрально; E — передняя часть RV, дорсально; F — выступы на поверхности створок в передней части RV, дорсально. Стрелками показан передний конец тела. Цифрами обозначены выступы согласно Danielopol *et al*. (1990) (см. рис. 1).

Обозначения: ams — отпечатки мышц-замыкателей; fs — передние отпечатки; ms — мандибулярные отпечатки; StPC — ситовидные поровые каналы.

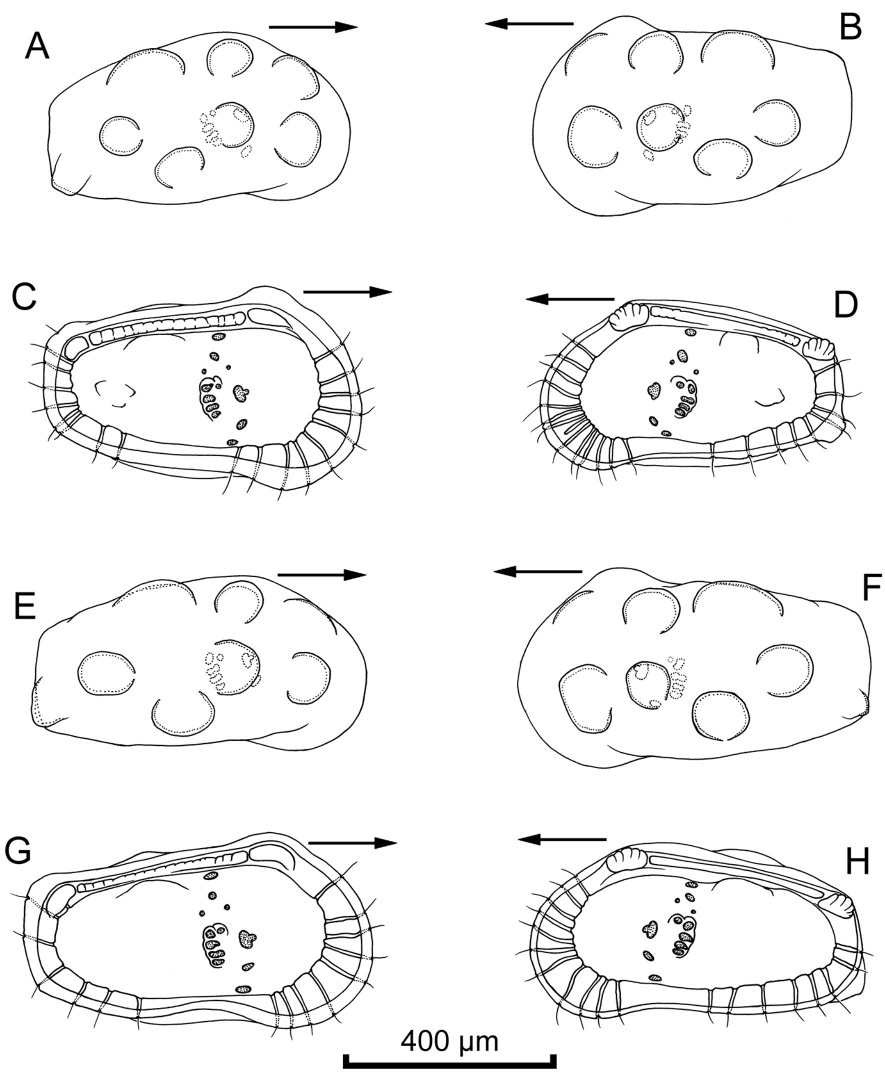

Fig. 7. *Cytherissa uvaeformis* Mazepova, 1990, schematic drawings of RV (A, D, E, H) and LV (B, C, F, G) of females (A–D) and males (E–H), outer (A, B, E, F) and inner sides (C, D, G, H), laterally. Arrows show the anterior end of the body.

Рис. 7. *Cytherissa uvaeformis* Mazepova, 1990, схематичные рисунки RV (A, D, E, H) и LV (B, C, F, G) самок (A–D) и самцов (E–H) с внешней (A, B, E, F) и внутренней сторон (C, D, G, H), латерально. Стрелками показан передний конец тела.

greatest width — 215 μm; diameter of copulatory process — 55–65 μm.

Brush organ (Fig. 11C) with two segments, each bearing eight distal setae. Length/width ratio of each segment 4 : 1.

GEOGRAPHIC DISTRIBUTION. Baikalian endemic, found almost all over the lake (11–100 m depth). For details of distribution see Mazepova (1990). It inhabits silty sands, muds with detritus and stones mixed with other substrates.

Cytherissa uvaeformis Mazepova, 1990
Figs 1B, 7–10; 11B; 12B.

MATERIAL. 29 individuals were studied: 18 females and 11 males. All ostracods were collected in Lake Baikal, Maloye Morye Strait, near Ulan-Baisan Cape (approximate coordinates 53°19′22″N, 107°38′54″ E), on August 13, 1968, depth 28 m, sand, sample No. 175 from the collection of taxocenoses of G.F. Mazepova. Lectotype No. O6

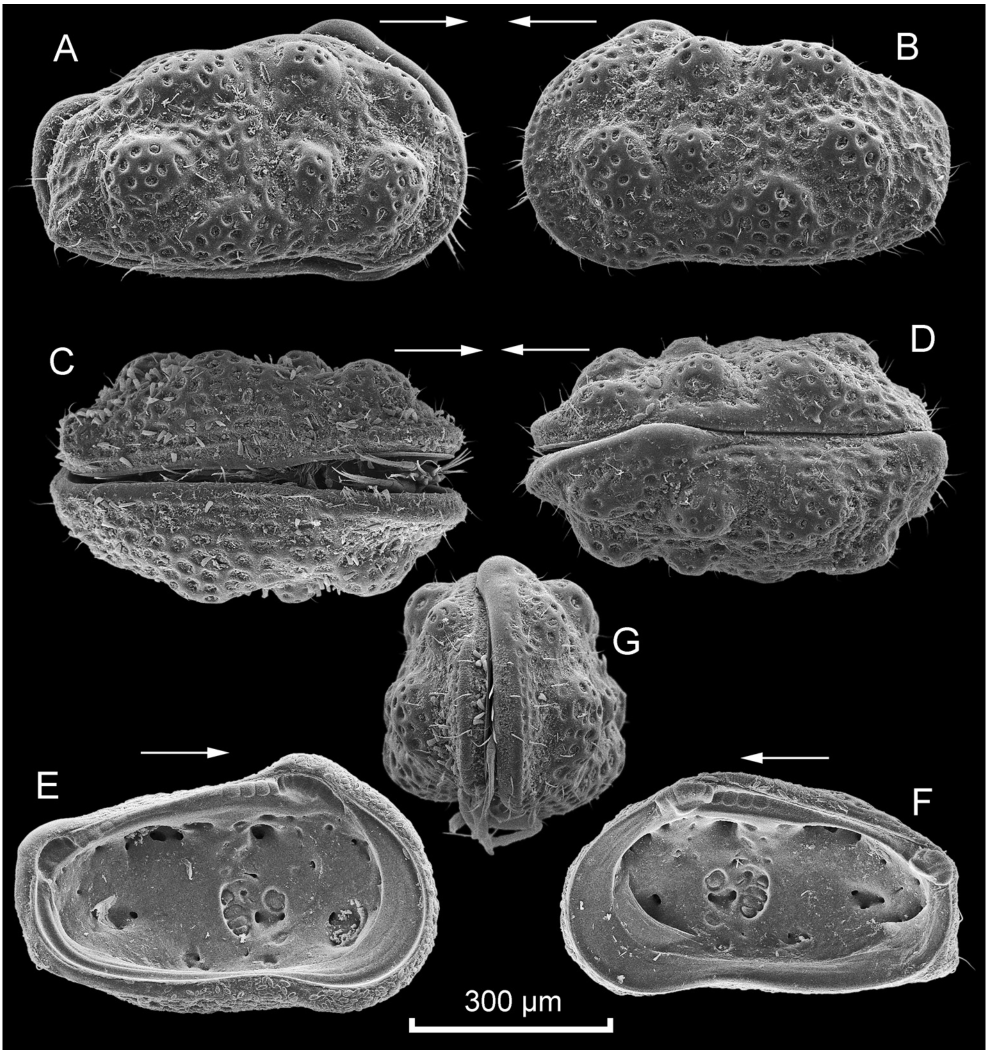

Fig. 8. *Cytherissa uvaeformis* Mazepova, 1990, SEM photographs of shells (A–D, G) and individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV laterally, inner side; F — RV laterally, inner side; G — frontally. Arrows show the anterior end of the body.

Рис. 8. *Cytherissa uvaeformis* Mazepova, 1990, СЭМ фотографии раковин (A–D, G) и отдельных створок (E, F) самок: A, B — латерально; C — вентрально; D — дорсально; E — LV латерально, с внутренней стороны; F — RV латерально, с внутренней стороны; G — фронтально. Стрелками показан передний конец тела.

(♀) and paralectotype No. 1 (♂): dwm No. O17-130868. Paralectotypes Nos 2–4 (3♂♂): dwm No. O18-130868. Paralectotypes No. 5 (♂): dwm No. O18-130868 (valves) and wm No. O21-130868 (limbs). Paralectotypes Nos 6–16 (11♀♀): dwm No. O19-130868. Paralectotypes Nos 17–25 (5♀♀4♂♂): swm No. 19160. Paralectotype No. 26 (♂): swm No. 19160 (valves) and wm No. O20-130868 (limbs). Paralectotype No. 27 (♀): swm No. 19160 (valves) and wm No. O22-130868 (limbs). Additional material: individual No. 1 (♂): swm No. 19160 (valves) and wm No. O23-130868 (limbs).

TYPE LOCALITY. Lake Baikal, Maloye Morye Strait, near Ulan-Baisan Cape.

DESCRIPTION. FEMALE. Shell elongate-trapezoidal (Figs 7A–D; 8A–F); L = 625–660 μm (average 640 μm, n = 10), greatest H = 375–400 μm (average 390 μm, n = 10), located on posterior border of anterior 1/4 L. Anterior end of shell broadly rounded, posterior end almost straight, barely noticeably rounded.

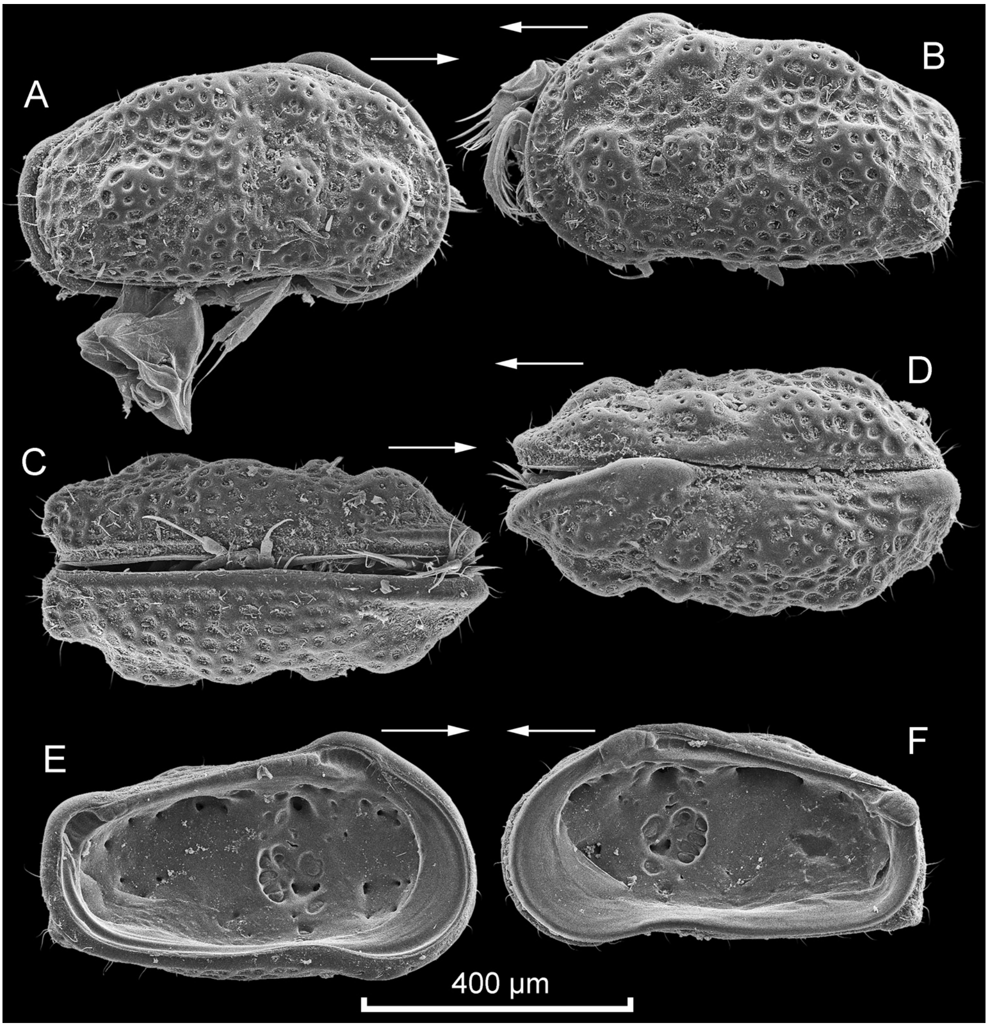

Fig. 9. *Cytherissa uvaeformis* Mazepova, 1990, SEM photographs of shells (A–D) and individual valves (E, F) of males: A, B — laterally; C — ventrally; D — dorsally; E — LV laterally, inner side; F — RV laterally, inner side. Arrows show the anterior end of the body.
Рис. 9. *Cytherissa uvaeformis* Mazepova, 1990, СЭМ фотографии раковин (A–D) и отдельных створок (E, F) самцов: A, B — латерально; C — вентрально; D — дорсально; E — LV латерально, с внутренней стороны; F — RV латерально, с внутренней стороны. Стрелками показан передний конец тела.

Ventral margin on both valves internally concave, on outer side distinctly concave only on RV, and very slightly concave on LV. Dorsal margin uneven due to protrusions (Fig. 8A, B). Shell with eight protrusions on both valves (Fig. 1B): protrusions Nos 1 and 2 on dorsal margin; No. 3 on dorso-anterior margin; No. 4 on medial-anterior margin; No. 5 near central part of valves; No. 6 in center of ventral margin; No. 7 slightly posteriorly beyond central part of valves; No. 8 on ventro-posterior part (more pronounced on RV than on LV). On inner side of valves there are small depressions on places of all protrusions. Walls of valves very thick and dense (Fig. 10D–F). LV and RV asymmetrical: LV overlaps RV throughout except at most anterior margin. Inner lamella relatively broad. Marginal pore canals relatively sparse, not branching, most often reaching edge of inner lamella (in rare cases canal may open earlier, not reaching edge of inner lamella) and end with sensilla. Number of canals of inner lamella (marginal pore canals) is 18–23. Unlike previous species, normal pore canals of *C. uvaeformis* branching in center of valves, ending in sieve pores (belong to the B-type according Puri & Dickau (1969)). One canal aperture on inner side corresponds to outlet with 1–4 sieve pores

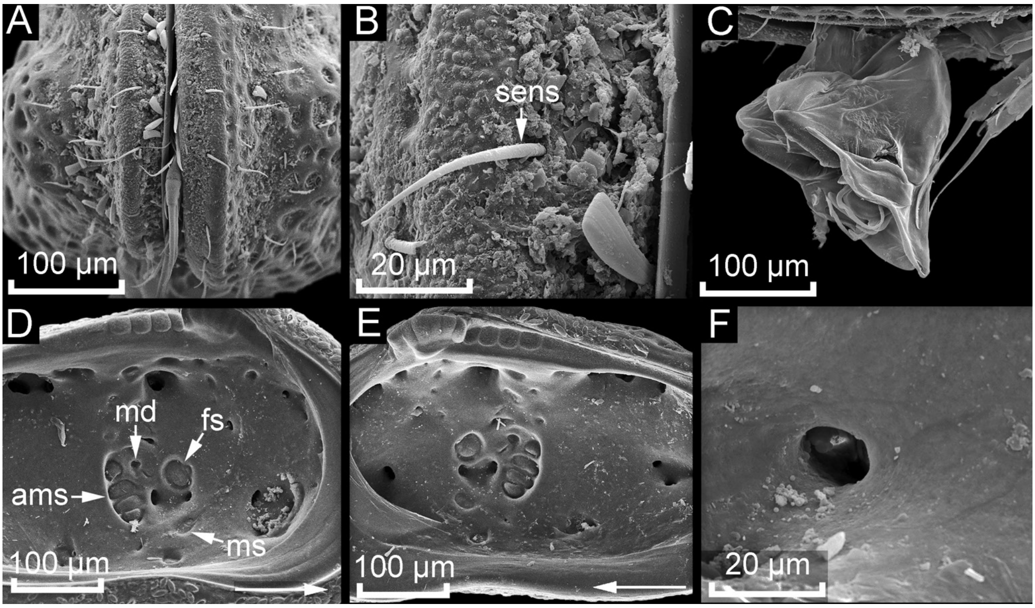

Fig. 10. *Cytherissa uvaeformis* Mazepova, 1990, SEM photographs of some structural elements of females (A, B, D–F) and males (C): A — anterior part of the shell, frontally; B — margin of anterior part of the shell, frontally; C — hemipenis; D — central part of LV, inner side; E — central part of RV, inner side; F — sieve-type normal pore canal in posterior part of LV, inner side. Arrows show the anterior end of the body.
Abbreviations: ams — adductor muscle scars; fs — frontal scars; md — median depression; ms — mandibular scars; sens — sensilla.

Рис. 10. *Cytherissa uvaeformis* Mazepova, 1990, СЭМ фотографии некоторых элементов строения самок (A, B, D–F) и самцов (C): A — передняя часть раковины, фронтально; B — край передней части раковины, фронтально; C — гемипенис; D — центральная часть LV с внутренней стороны; E — центральная часть RV с внутренней стороны; F — ситовидный поровый канал в задней части LV с внутренней стороны. Стрелками показан передний конец тела.
Обозначения: ams — отпечатки мышц-замыкателей; fs — передние отпечатки; md — центральное углубление; ms — мандибулярные отпечатки; sens — сенсилла.

on outer side; in general, there are at least 50–60 sieve pores on outer side of each valve, and canal apertures on inner side more than 25. Sensillae of valve surface relatively numerous. Hinge teeth on RV (Fig. 10E), very strong and thick, crenulated, bar on LV, crenulated in anterior and posterior parts (Fig. 10D); all hinge elements very strong. Microrelief of valve surface heterogeneous, consisting of small rounded and oval deep cells located on all protrusions. In areas between protrusions cells are less deep, and in most posterior and anterior parts of shells it is slightly flattened. In anterior part of valves, there are strips at its margin without cellular or pitted microrelief (Fig. 10A) but with very small hemispherical protuberances (Fig. 10B). Greatest width (both from ventral and dorsal sides, excluding protrusions) at area located slightly behind middle L of shell; including protrusions place of greatest width located at place of protrusions Nos 5 and 7. A1, A2, Md, Mxl, L5–L7 as in *C. latirecta* (Alekseeva *et al*., 2025b).

MALE. Shell slightly lower than in female (Figs 7E–H; 9A–F): L = 630–660 µm (average 645 µm, n = 10), greatest H = 360–390 µm (average 375 µm, n = 10). Differs from female by much lower expression of most protrusions, except for protrusion No. 8, which is more pronounced on ventral side than in females and has greater symmetry between valves (Fig. 9C). Shell shape and relief as in females. A1, A2, Md, Mxl, both legs L5 and L7, left leg L6 and first segment of right leg L6 as in *C. latirecta* (Alekseeva *et al*., 2025b). Geniculate legs on right side of body. Brush organ as in previous species.

L6. Right leg (Fig. 11B). Endopod one-segmented, without seta. Distal end of endopod with triangular projection.

Hemipenis (Figs 10C; 12B) small, triangular, very similar in structure and size to previous species, outer appendage slightly narrower and sharper at end, inner appendage pointed. Sizes of hemipenis in quiescent state (n = 1): length — 255 µm; greatest width — 200 µm; diameter of copulatory process — 60–65 µm.

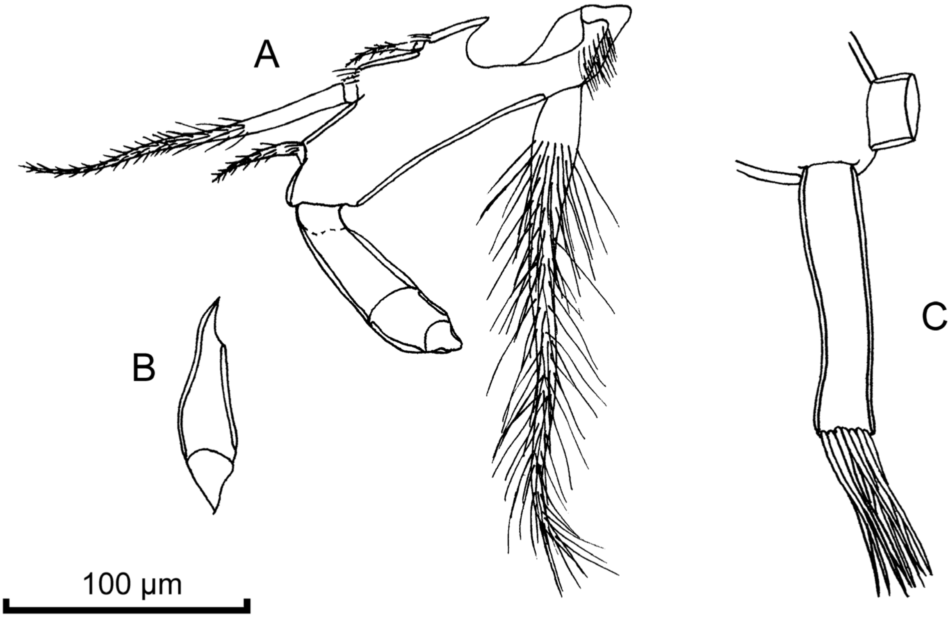

Fig. 11. *Cytherissa compta* Mazepova, 1990 (A, C) and *C. uvaeformis* Mazepova, 1990 (B), drawings of males limbs: A — left L6; B — distal segment of right L6; C — brush organ (only one segment is depicted).
Рис. 11. *Cytherissa compta* Mazepova, 1990 (A, C) и *C. uvaeformis* Mazepova, 1990 (B), рисунки конечностей самцов: A — левая L6; B — дистальный сегмент правой L6; C — щетковидный орган (изображен только один сегмент).

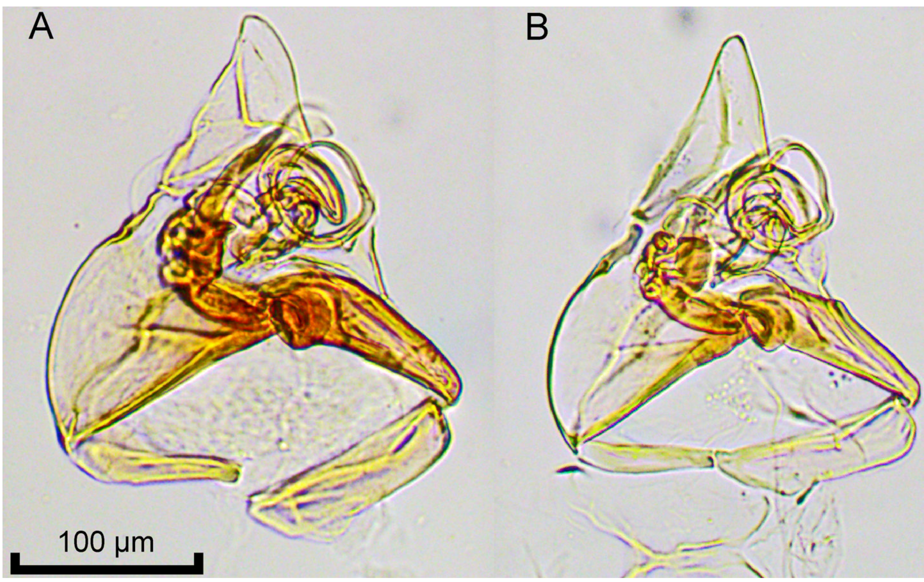

Fig. 12. *Cytherissa compta* Mazepova, 1990 (A) and *C. uvaeformis* Mazepova, 1990 (B), microphotographs of male hemipenises.
Рис. 12. *Cytherissa compta* Mazepova, 1990 (A) и *C. uvaeformis* Mazepova, 1990 (B), микрофотографии гемипенисов самцов.

GEOGRAPHIC DISTRIBUTION. Baikalian endemic, found in North, Central and South Baikal, particularly in the Maloye Morye Strait (depths 10–100 m). For details of distribution see Mazepova (1990). It inhabits sands, sands with algae (charas, draparnaldia and filamentous algae) and sands with detritus.

Discussion

From the above redescriptions, it can be concluded that the size and structure of the hemipenis cannot always serve as a reliable systematic feature (Alekseeva *et al*., 2025b), since the redescribed *C. compta* and *C. uvaeformis* are very similar in all main sizes and structure (Fig. 12). The shell morphology of the two species differs considerably, especially in the structure of the hinge, the teeth of which are located in *C. compta* on the LV (Fig. 3E) and in *C. uvaeformis* on the RV (Fig. 8F). Both species may well belong to two different evolutionary branches of Baikalian *Cytherissa* (Mazepova, 1990). Most probably, the hemipenis similarity is not due to parallel microevolution rather than to close affinity, but is associated with similar sexual selection. In ostracods of this group, the differences in the morphology of the valves and carapace are much more variable than the soft part structure.

The number of normal pores on the outer surface of the valves and the corresponding number of normal pore canals on the valves from the inner side can be additional systematic features when comparing Baikalian species of the genus. These features are difficult to study and can be reliably studied only on a light microscope, as there is a possibility to change the position of the shell of one particular individual. Large density of valves of some species and location of normal pores in inconvenient for studying places (on protrusions) do not allow to speak absolutely accurately about their number. But even approximate data on their number can be used for systematics. Thus, in females of *C. compta* at least 260–280 normal pores were found on the outer side of each valve (in males — 410–430), and in females of *C. uvaeformis* — at least 50–60 (in males — the same number). The apertures of normal pore canals on the inner side are difficult to study for the same reasons, but in females of *C. compta* their number on each valve is at least 260–280 (in males — 410–430), and in females of *C. uvaeformis* — a little more than 25 (in males — the same number). In both species, normal pore canals belong to the B-type sieve pore canals (Puri, Dickau, 1969). The reasons for such a large difference in the number of normal pores in different-sexed individuals of *C. compta*, as well as in its difference in individuals of the two species, are still unknown. It can be assumed that it is related to the chemosensory function of pores and to the peculiarities of the autecology of males of *C. compta* or the species as a whole (*C. compta* inhabits muddy substrates; *C. uvaeformis* inhabits sandy substrates).

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

Acknowledgements. The authors thank the staff of the Electron Microscopy Center, which is part of the Collective Instrumental Center "Ultramicroanalysis" at the Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, for their help in preparing SEM photographs (FEI Company Quanta 200 microscope).

We are grateful to Yu.V. Kaplyukova, staff interpreter at the Limnological Institute of SB RAS, for checking the English text of the manuscript.

Preparation of the type collection, analysis of the material, and writing of the article were carried out within the framework of the project No. 0279-2021-0007 "Integrated studies of the coastal zone of Lake Baikal: long-term dynamics of communities under the influence of various environmental factors and biodiversity; causes and consequences of negative environmental processes" (supervised by O.A. Timoshkin).

References

Alekseeva T.M., Krivorotkin R.S., Koroleva A.G., Timoshkin O.A. 2025a. [Description of *Candona fuscorara* sp. n. with 18s rRNA data and redescription of *Candona uschunica* Mazepova 1990 (Ostracoda, Podocopida, Candonidae) from lake Baikal] // Zool. Zhurn. Vol.104. No.1. P.16–39 [in Russian, with English summary].

Alekseeva T.M., Krivorotkin R.S., Timoshkin O.A. 2025b. [Redescription of *Cytherissa pennata* Mazepova 1990 and *Cytherissa latirecta* Mazepova 1985 (Ostracoda, Podocopida, Cytherideidae) from Lake Baikal] // Zool. Zhurn. Vol.104. No.2. P.3–19 [in Russian, with English summary].

Bronstein Z.S. 1930. [Towards the knowledge of the Ostracoda fauna of Lake Baikal] // Trudy Komissii po izucheniyu oz. Baikal. Vol.3. P.117–157 [in Russian].

Bronstein Z.S. 1947. [Ostracoda of freshwaters] // Fauna SSSR. Rakoobraznye. Vol.2. No.1. Moscow-Leningrad: Izd-vo Akademii nauk SSSR. 339 p. [In Russian]

Broodbakker N.W., Danielopol D.L. 1982. The chaetotaxy of Cypridacea (Crustacea, Ostracoda) limbs: proposal for a descriptive model // Bijdragen tot de Dierkunde. Vol.52. No.2. P.103–120.

Danielopol D.L., Olteanu R., Löffler H., Carbonel P. 1990. Carapace morphology of *Cytherissa lacustris* (Cytherideidae): its interest for the systematics and the phylogeny of the group // Bull. Inst. Gèol. Bassin d`Aquitaine, Bordeaux. Vol.47. P.27–53.

Karanovic I. 2012. Recent freshwater ostracods of the world. Crustacea, Ostracoda, Podocopida. Berlin-Heidelberg: Springer. 608 p. https://doi.org/10.1007/978-3-642-21810-1

Karanovic I., Sitnikova T.Ya. 2017. Morphological and molecular diversity of Lake Baikal candonid ostracods, with description of a new genus // ZooKeys. Vol.684. P.19–56. https://doi.org/10.3897/zookeys.684.13249

Martens K. 1997. Speciation in ancient lakes // Trends in Ecology and Evolution. Vol.12. No.5. P.177–182. https://doi.org/10.1016/S0169-5347(97)01039-2

Martens K., Schön I., Meisch C., Horne D.J. 2008. Global diversity of ostracods (Ostracoda, Crustacea) in freshwater // Hydrobiologia. Vol.595. P.185–193. https://doi.org/10.1007/s10750-007-9245-4

Martens K., Mazepova G.F. 1992. On *Limnocythere baikalensis* n. sp. from Lake Baikal (Siberia, U.S.S.R.), with notes on the position of the *L. goersbachensis* – group (Crustacea, Ostracoda, Limnocytheridae) // Archiv für Hydrobiologie, Suppl. Vol.90. No.1. P.115–131.

Martens K., Noskova I.N., Mazepova G.F. 1992a. On *Pseudocandona gajewskajae* Bronstein, 1947 // A Stereo-Atlas of Ostracod Shells. Vol.19. No.12. P.49–56.

Martens K., Noskova I.N., Mazepova G.F. 1992b. On *Pseudocandona ceratina* Mazepova, 1982 // A Stereo-Atlas of Ostracod Shells. Vol.19. No.11. P.41–48.

Mazepova G.F., 1982. [New species of endemic ostracods (Ostracoda, Candonini) from Lake Baikal] // Novoye o faune Baikala. Novosibirsk: Nauka. P.99–140 [in Russian].

Mazepova G.F., 1984. [New endemic shell crustaceans (Ostracoda)] // Sistematika i evolyutsiya bespozvonochnykh Baikala. Novosibirsk: Nauka. P.15–75 [in Russian].

Mazepova G.F., 1990. [Shell crustaceans (Ostracoda) of Lake Baikal]. Novosibirsk: Nauka. 472 p. [In Russian]

Mazepova G.F. 2001. [Ostracods (Ostracoda)] // O.A. Timoshkin et al (eds.). Annotirovannyi spisok fauny ozera Baikal i ego vogosbornogo basseina. Novosibirsk: Nauka. Vol.1. P. 510–557 [in Russian].

Mazepova G.F. 2006. Ostracoda of Lake Hovsgol, Mongolia // The Geology, Biodiversity and Ecology of Lake Hovsgol (Mongolia). Backhuys Publisher Leiden. P.217–232.

Mazepova G.F. 2011. [New species of shell crustaceans (Crustacea, Ostracoda, Podocopida, Candonidae) from Lake Baikal] // O.A. Timoshkin et al (eds.). Annotirovannyi spisok fauny ozera Baikal i ego vogosbornogo basseina. Novosibirsk: Nauka. Vol.2. P.1255–1269 [in Russian].

Meisch C. 1996. Contribution to the taxonomy of *Pseudocandona* and four related genera, with the description of *Schellencandona* n. gen., a list of the Candoninae genera, and a key to the European genera of the subfamily (Crustacea, Ostracoda) // Bulletin de la Société des Naturalistes Luxembourgeois. Vol.97. P.211–237.

Meisch C., Smith R.J., Martens K. 2019. A subjective global checklist of the extant non-marine Ostracoda (Crustacea) // European Journal of Taxonomy. Vol.492. P.1–135. https://doi.org/10.5852/ejt.2019.492

Puri H.S., Dickau B.E. 1969. Use of normal pores in taxonomy of Ostracoda // Transactions Gulf Coast Association of Geological Societies. Vol.19. P.353–367.

Schön I., Martens K. 2012. Molecular analyses of ostracod flocks from Lake Baikal and Lake Tanganyika // Hydrobiologia. Vol.682. P.91–110. https://doi.org/10.1007/s10750-011-0935-6

Schön I., Pieri V., Sherbakov D.Yu., Martens K. 2017. Cryptic diversity and speciation in endemic *Cytherissa* (Ostracoda, Crustacea) from Lake Baikal // Hydrobiologia. Vol.800. P.61–79. https://doi.org/10.1007/s10750-017-3259-3

Sherbakov D.Yu., 1999. Molecular phylogenetic studies on the origin of biodiversity in Lake Baikal // Trends in Ecology and Evolution. Vol.14. No.3. P.92–95. https://doi.org/10.1016/S0169-5347(98)01543-2

Sherstyankin P.P., Kuimova L.N. 2006. Hydrophysical processes in Lake Baikal in its transition from subtropical to modern climates // Hydrobiologia. Vol.568. No.S1. P.253–257. https://doi.org/10.1007/s10750-006-0306-x

Responsible editor E.N. Temereva