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Redescription of four ostracod species (Ostracoda: Podocopida: Cytherideidae) of the genus *Cytherissa* Sars, 1925 from Lake Baikal

Переописание четырех видов остракод (Ostracoda: Podocopida: Cytherideidae) рода *Cytherissa* Sars, 1925 из озера Байкал

T.M. Alekseeva*, R.S. Krivorotkin, O.A. Timoshkin
Т.М. Алексеева*, Р.С. Криворотkин, О.А. Тимошкин

Limnological Institute, Siberian Branch, Russian Academy of Sciences, Ulan-Batorskaya str., 3, Irkutsk 664033 Russia.
Лимнологический институт СО РАН, ул. Улан-Баторская, 3, Иркутск 664033 Россия.
Tatyana Alekseeva: atm171@mail.ru ORCID https://orcid.org/0000-0001-8928-1491
Roman Krivorotkin: roman_bio@mail.ru ORCID https://orcid.org/0000-0002-2567-6600
Oleg Timoshkin: tim@lin.irk.ru ORCID https://orcid.org/0000-0001-6476-0074
* Corresponding author

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

ABSTRACT. Illustrated redescriptions of structure of females and males of four species of the genus *Cytherissa* Sars, 1925: *C. truncata* Bronstein, 1930, *C. parallela* Bronstein, 1947, *C. lata* Bronstein, 1930 and *C. sinistrodentata* Bronstein, 1930 are presented. Neotypes were identified for all species. The shell structure of these species has been studied in detail using light and scanning electron microscopy. Data on the structure of male hemipenis, brush organs and right L6 of males are presented. All species are endemics of Lake Baikal and are well distinguished from each other by shell structure. The work is based on the rich collections of Lake Baikal ostracods collected by G.F. Mazepova.

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РЕЗЮМЕ. Даны иллюстрированные переописания строения самок и самцов четырех видов рода *Cytherissa* Sars, 1925: *C. truncata* Bronstein, 1930, *C. parallela* Bronstein, 1947, *C. lata* Bronstein, 1930 и *C. sinistrodentata* Bronstein, 1930. Для всех видов обозначены неотипы. Строение раковин исследованных видов подробно изучено с использованием световой и сканирующей электронной микроскопии. Представлены данные о строении гемипенисов самцов, щетковидных органов и правой L6 самцов. Все виды являются эндемиками озера Байкал и хорошо отличаются между собой строением раковин. Работа выполнена на основе богатейших коллекций остракод озера Байкал, собранных Г.Ф. Мазеповой.

Introduction

Lake Baikal is home to more than 49 endemic species of ostracods of the genus *Cytherissa* Sars, 1925 [Mazepova, 1990, 2001; Meisch *et al*., 2019; Alekseeva *et al*., 2025c]; this entire unique fauna needs revision at the modern level [Karanovic, 2012; Alekseeva *et al*., 2025a, b, c]. One of the most difficult groups of Baikalian *Cytherissa* to study are species lacking striking morphological characters like bizarre protrusions, which often make identification much easier. Some "smooth-shell" endemic species of ostracods are so similar to each other in shape and shell structure that in some cases available diagnoses at the modern level are not convincing [Karanovic, 2012]. However, it has recently been shown that the real diversity of *Cytherissa* in Lake Baikal is at least twice higher as currently known [Schön *et al*., 2017]. All subspecies taxa of this group are most likely separate species.

The present work is a continuation of G.F. Mazepova's fundamental research on the biodiversity of endemic Baikalian ostracods and is devoted to modern revision and saving of ostracods collections of this famous biologist who studied local fauna. The specimens of *Cytherissa lata* Bronstein, 1930, *C. parallela* Bronstein, 1947, *C. sinistrodentata* Bronstein, 1930, and *C. truncata* Bronstein, 1930 from the taxonomic collection of G.F. Mazepova were used for this study. The catalogue of the type collection [Mazepova, 2001] designated syntypes for these species, which cannot be real syntypes in the sense of the International Code of Zoological Nomenclature [1999], because samples with these specimens were taken much later (in 1968 and 1971) than the publications of the original descriptions in 1930 and 1947 [Alekseeva *et al*., 2025b]. Consequently, these specimens cannot be a type material, but neotypes can be isolated from them.

A characteristic of the special relevance of this work in view of the decalcification of shells and a description of the G.F. Mazepova collections are given in the other publications [Alekseeva *et al*., 2025a, b].

The purpose of this paper is to give a redescription of the structure of females and males of four endemic Baikalian species of the genus *Cytherissa*: *C. lata*, *C. parallela*, *C. sinistrodentata*, and *C. truncata*; to isolate the neotypes.

Materials and methods

Ostracods were dissected according to the generally accepted technique [Bronstein, 1947]. Three types of whole mounts were prepared, each with a different numbering system. The first type of whole mounts was made using Hoyer's fluid. Mounts were dried in a drying oven at 54°C for one week and kept at room temperature for several months, then the edges of the mount and the data label were coated with Canadian balsam and re-dried in a drying oven under the same conditions. The second type of mounts is micropaleontological slides with deep cavities and a cover glass embedded in them. Dried ostracod shells and/or valves were placed in the cavity. The ostracods were dried in a drying oven at 45°C for one week. The third type of mounts is aluminum stubs (with sputtering) for SEM with dried limbs, valves and shells. Individuals and mounts were examined using Olympus CX21, Nikon Optiphot-2 light microscopes. Microphotographs were taken using a ToupCam 5.1 Mp digital videocular and Levenhuk lite program. All drawings were prepared using Nikon Drawling Tube. SEM photographs were taken on an FEI Company Quanta 200 microscope, which is part of the Electron Microscopy Center at LIN SB RAS.

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.

Descriptive terminology and abbreviations are given in accordance to Broodbakker & Danielopol [1982], Meisch [1996], Karanovic [2012]: A1 — antennule; A2 — antenna; H — greatest height; L — length; L5, L6, L7 — 5th, 6th, and 7th legs; LV — left valve; Md — mandible; Mxl — maxillule; RV — right valve. Abbreviations for indication of muscle scars (Fig. 23B): ams — adductor muscle scars; fs — frontal scars; md — median depression; ms — mandibular scar.

All material, including type specimens (neotypes), is deposited in the Laboratory of Aquatic Invertebrate Biology, Limnological Institute, Siberian Branch of the Russian Academy of Sciences, Irkutsk, Russia.

Results

Order Podocopida Sars, 1866
Family Cytherideidae Sars, 1925
Genus *Cytherissa* Sars, 1925
Cytherissa truncata Bronstein, 1930
Figs 1–6; 21E–H; 22D; 23A, B; 24C, F.

MATERIAL. Forty one individuals were examined: 18 females and 23 males. All ostracods were collected in Lake Baikal, Maloye More Strait, near Ulan-Baisan Cape (second name Zantyk Cape) (approximate coordinates: 53°19′33.1″ N, 107°38′38.7″ E), 13 August 1968, depth 25 m, sand, sample No. 175 from the collection of taxocenoses of G.F. Mazepova.

Type material. Neotype No. O2 (♀): dwm No. O1-130868.

Additional material. Individual No. 1 (♂): dwm No. O1-130868. Individuals Nos. 2–13 (6 ♀♀ 6 ♂♂): dwm No. O2-130868. Individuals Nos. 14–28 (5♀♀ 10 ♂♂): dwm No. O3-130868. Individuals Nos. 29–36 (4 ♀♀ 4 ♂♂): swm No. x948. Individual No. 37 (♀): swm No. x948 (valves) and wm No. O4-130868 (limbs). Individual No. 38 (♀): swm No x948 (valves) and wm No. O5-130868 (limbs). Individual No. 39 (♂): swm No. x948 (valves) and wm No. O6-130868 (limbs). Individual No. 40 (♂): swm No. x948 (valves) and wm No. O7-130868 (limbs).

Type locality. Lake Baikal, Maloye More Strait, near Ulan-Baisan Cape (Zantyk).

DESCRIPTION. Female.

Shell (Figs 1A–D; 2A–F) trapezoidal-rounded: L = 1035–1085 µm (average 1055 µm, n = 10), largest H = 770–790 µm (average 780 µm, n = 10), located slightly anteriorly to anterior 1/3 of L. Dorsal margin slightly convex at center. Anterior end of shell broadly rounded, posterior end almost straight, more weakly rounded. LV slightly overlaps RV throughout (Fig. 2A, B), but most distinctly in anterior and posterior parts of dorsal margin (valves almost identical in center of dorsal margin). Ventral margins of both valves equally concave on inner side. On outer side, ventral margin of RV as concave as on inner side, while on LV almost straight. Inner lamella broad (Fig. 2E, F). Marginal pore canals relatively sparse, reaching margin of inner lamella and ending in sensilla. Inner lamella of each valve with 16–17 marginal pore canals. Pore canals of outer lamella sieve-type, branching, grouped (up to five canals in group (Fig. 5A–I)), rarely single; each canal with one sensilla. Outer lamella of each valve with 160–190 pore canals. Inner side of each valve with 55–60 canal apertures. Hinge teeth on RV, distinctly crenulated (Fig. 6A, B); bar on LV, crenulated (Fig. 6C, D). Posterior hinge tooth on RV slightly extending beyond valve margin (Fig. 6B). Microrelief of valve surface generally homogeneous, consisting of small circular pits (Fig. 4B–E) covering almost entire surface of shell, except for areas near edge of valves, as well as center of valves at sites with adductor muscle scars on inner side (Fig. 4A). Site of greatest width (dorsal and ventral sides) of shell weakly pronounced and observed in center (Fig. 2C, D), shell oval.

A1. Five-segmented. First segment without setae, with group of pseudochaetae. Second segment with one distal seta, two long pseudochaete groups and one short pseudochaete group. Third segment with one claw and row of very small pseudochaetae. Fourth segment with three long claws (at base of one of them row of spines) and two setae of different lengths. Fifth segment with one claw and seta basally fused with stick-shaped aesthetasc.

A2. Five-segmented. Coxal segment bare. Basal segment with three groups of pseudochaetae (one of them with very long). Exopod in form of small plate with spinneret seta reaching end of third endopodal segment. Spinneret seta with long cuticular duct running from tip and extending from coxal segment into body; duct connects with large oval-shaped spinneret gland. Endopod three-segmented. First endopodal segment with one distal seta and long pseudochaete group. Second segment with long pseudochaete group, two anteromedial setae, three posterior-medial setae and two posterior-distal setae and aesthetasc. Distal segment with two claws and one seta.

Md. Coxa with three setae (two of them at base of gnathobase) and two rows of pseudochaetae. Bronchial plate with five finely feathered setae. Palp three-segmented. First segment with two setae and group of pseudochaetae. Second segment long (two fused segments without clear separation), with one anteromedial seta, four posterior-medial setae, seven anterodistal setae,

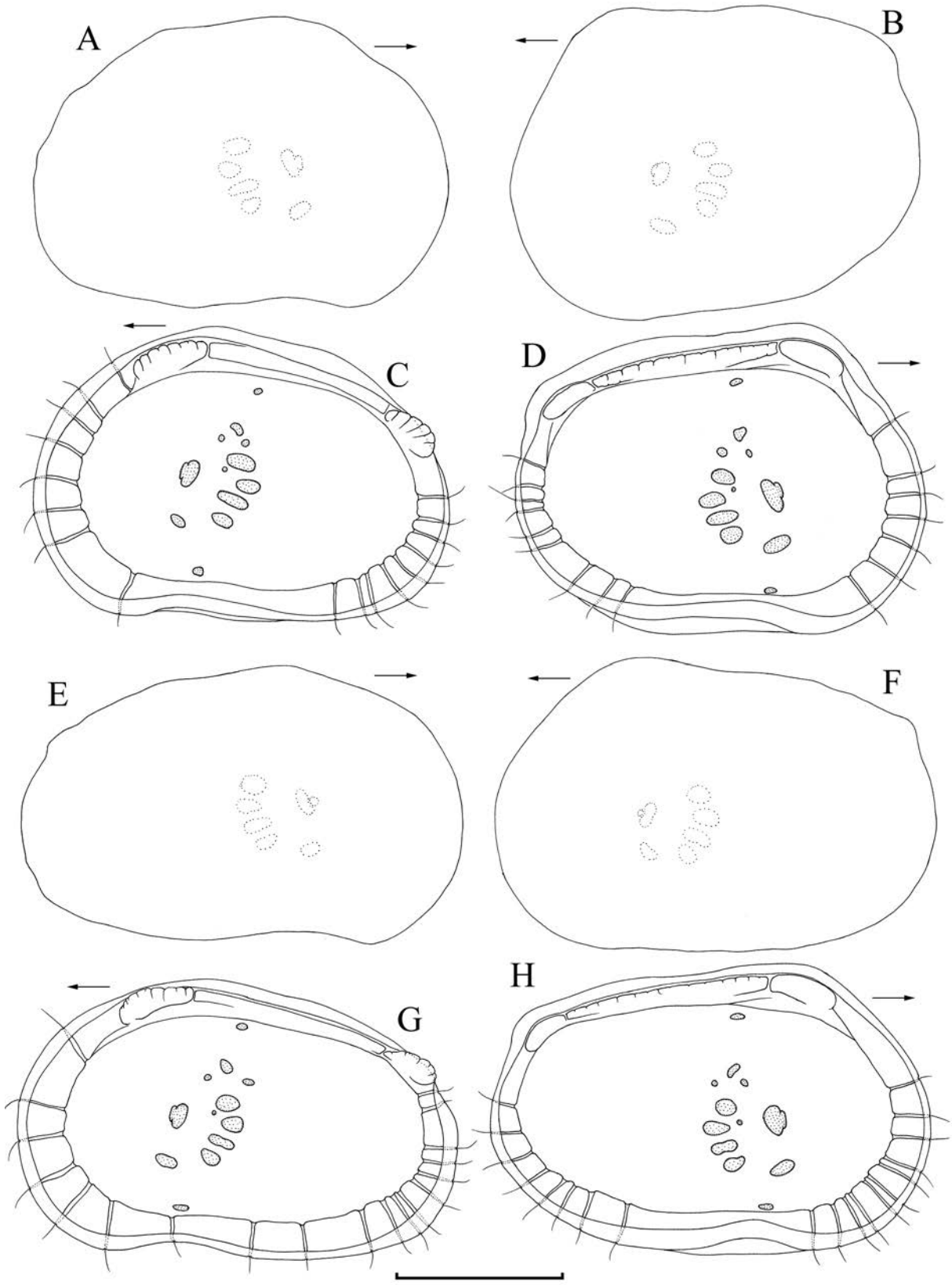

Fig. 1. *Cytherissa truncata* Bronstein, 1930, schematic drawings of RV (A, C, E, G) and LV (B, D, F, H) of females (A–D) and males (E–H,) outer (A, B, E, F) and inner (C, D, G, H) sides, laterally. The arrows show the anterior end of the body. Scale 400 μm.

Рис. 1. *Cytherissa truncata* Bronstein, 1930, схематичные рисунки RV (A, C, E, G) и LV (B, D, F, H) 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. Масштаб 400 мкм.

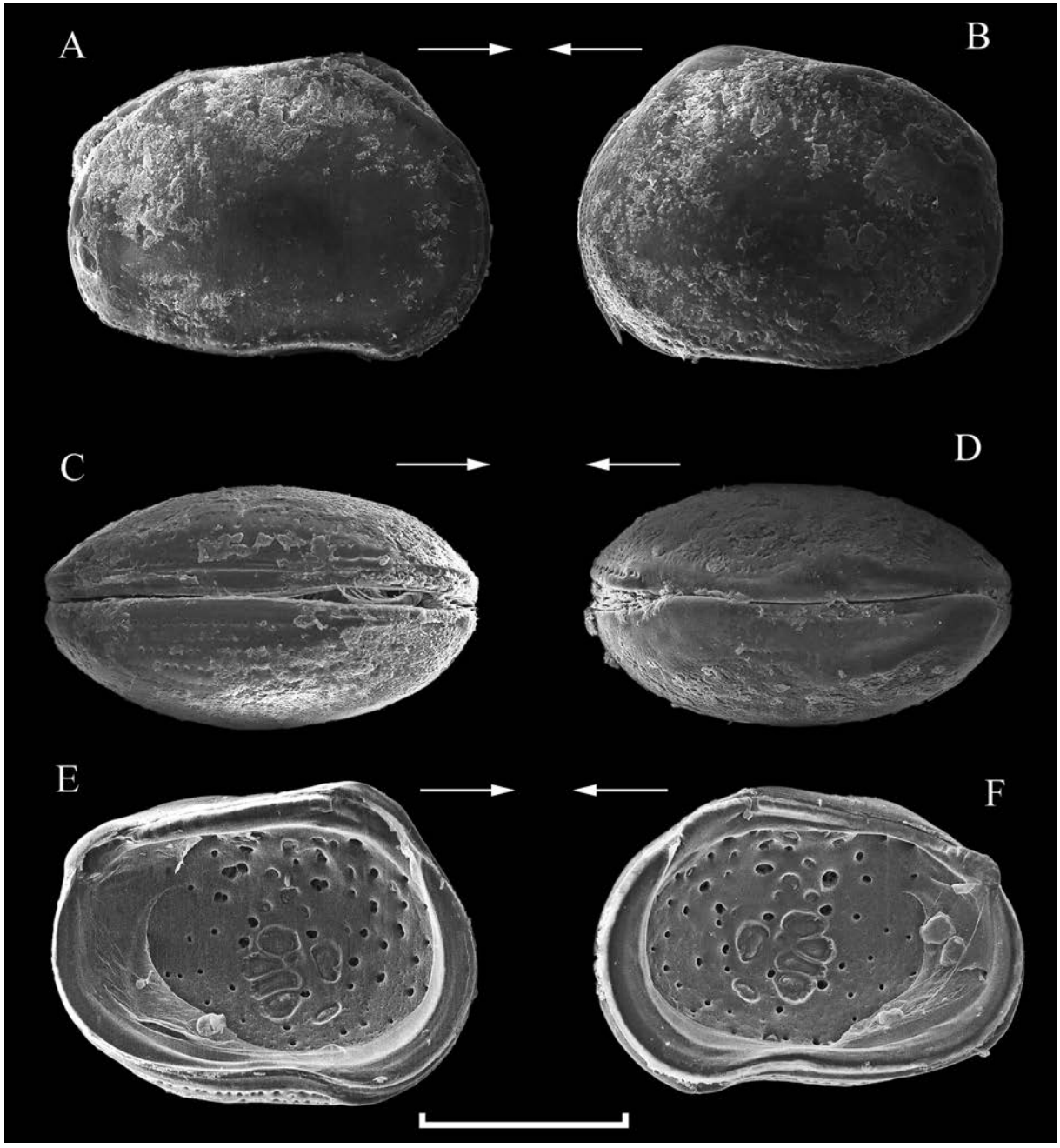

Fig. 2. *Cytherissa truncata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 2. *Cytherissa truncata* Bronstein, 1930, 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. Масштаб 500 мкм.

four posterior-distal setae, and four groups of pseudochaetae. Distal segment with four setae.

Mxl. Protopod with one row of pseudochaetae. First endite with 8 setae. Second endite with 9 setae. Third endite with 8 setae. Palp two-segmented. First segment with six distal setae and row of pseudochaetae. Second segment with three setae. Bronchial plate with 17 plumed setae and three rows of pseudochaetae.

L5. Protopod with five pappose setae: one small antero-proximal, one antero-medial, two antero-distal, one thick long posterior-proximal (often interpreted as exopod, Karanovic, 2012) and 8 groups of pseudochaetae. Endopod three-segmented. First segment with one pappose anterodistal seta and three groups of pseudochaetae. Second segment with group of pseudochaetae. Third segment with distal claw and group of pseudochaetae at its base. Distal segments of L5 separated.

L6. Protopod with four pappose setae: one small antero-proximal, one anteromedial, one antero-distal, one thick long posteriorly proximal (exopod) and five groups of pseudochaetae. Endopod three-segmented. First segment with one pappose

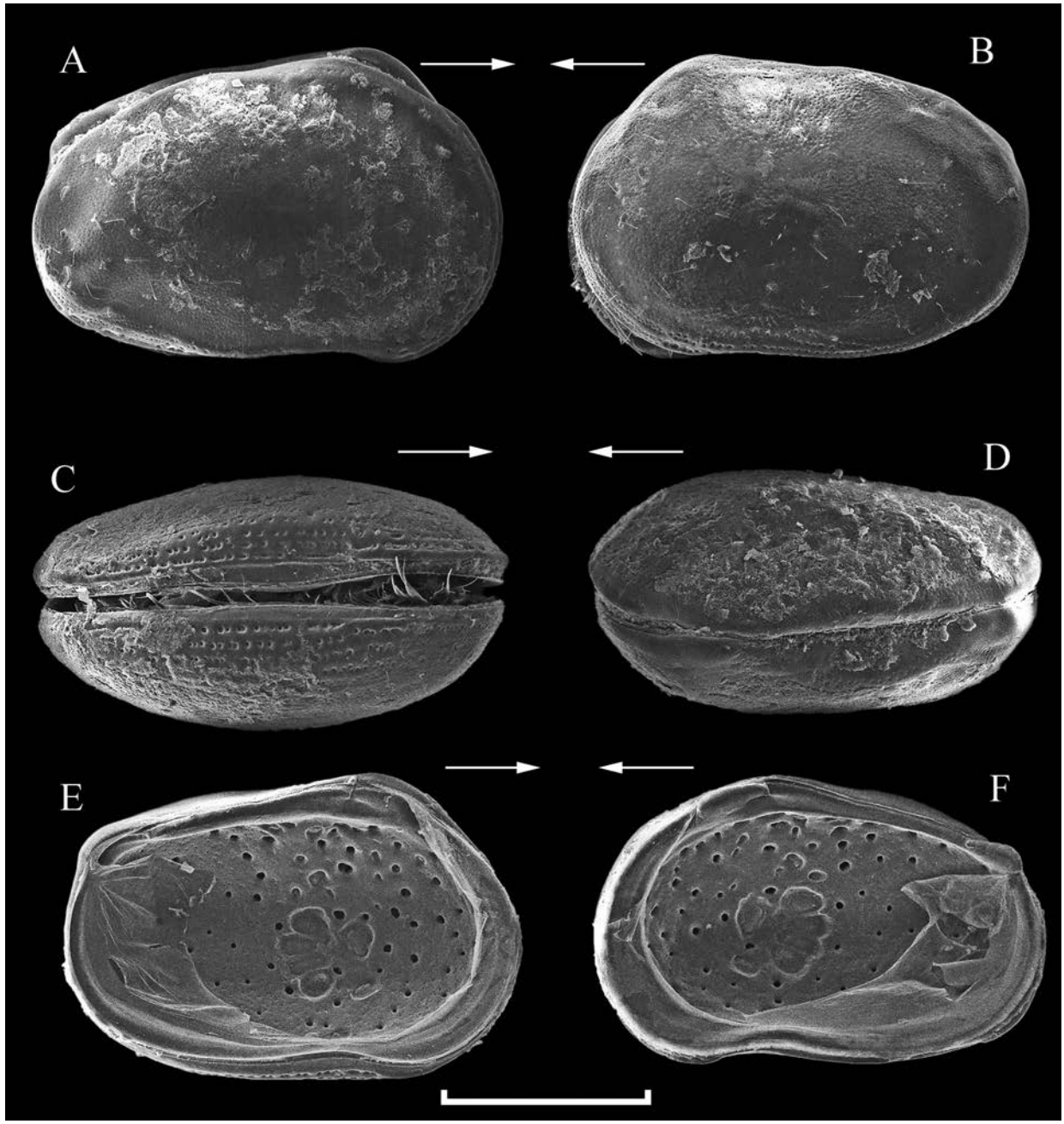

Fig. 3. *Cytherissa truncata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of males: A, B — laterally; C — ventrally; D — dorsally; E — LV laterally, inner side; F — RV laterally, inner side. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 3. *Cytherissa truncata* Bronstein, 1930, 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. Масштаб 500 мкм.

anterodistal seta and four groups of pseudochaetae. Second segment with two groups of pseudochaetae. Third segment with distal claw and two groups of pseudochaetae at its base. Distal segments of L6 separated.

L7. Protopod with four pappose setae: one small antero-proximal, one anteromedial, one antero-distal, one antero-distal, one posterior proximal (exopod) and six groups of pseudochaetae. Endopod three-segmented. First segment with one pappose anterodistal seta and six groups of pseudochaetae. Second segment with two groups of pseudochaetae. Third segment with distal claw and two groups of pseudochaetae. Distal segments of L7 separated.

UR in form of two small setae.

Male.

Shell (Figs 1E–H; 3A–F) slightly longer and lower than in female: L = 1115–1150 μm (average 1130 μm, n = 10), H = 730–745 μm (average 735 μm, n = 10). RV with small, weakly pronounced protrusion at posterior ventral margin (Fig. 3A, C). Hinge teeth and bar slightly smaller than in female and weakly crenulated (Fig. 6E–H). Other morphological features of shell

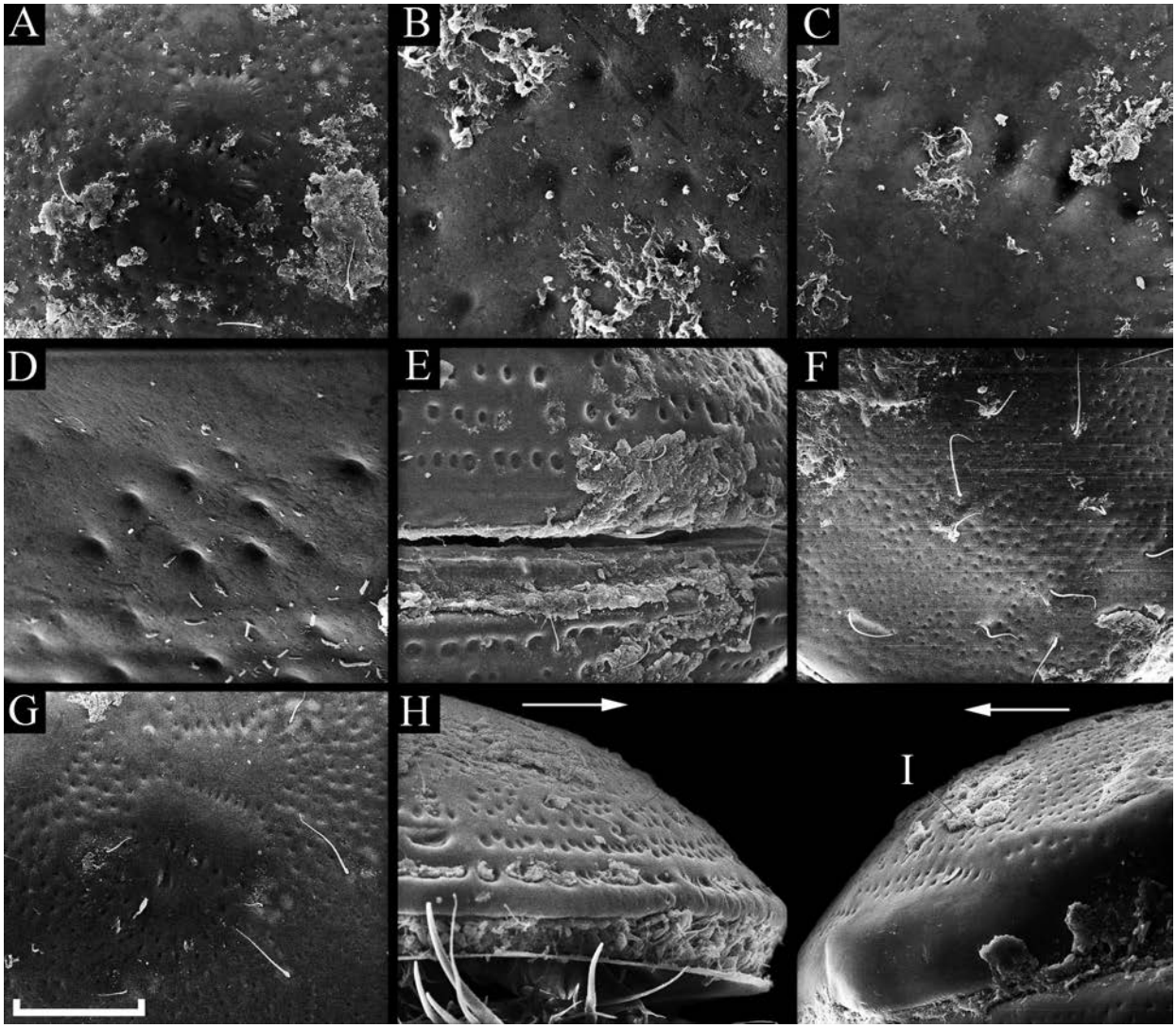

Fig. 4. *Cytherissa truncata* Bronstein, 1930, SEM photographs of some elements of shell structure of females (A–E) and males (F–I): A, B, G — microrelief at center of LV; D — microrelief near dorsal margin, dorsally; E — microrelief near central part of ventral margin, ventrally; F — microrelief at center of RV; H — microrelief near anterior part of ventral margin, ventrally; I — microrelief at posterior part of dorsal margin, dorsally. In H, I the arrows show the anterior end of the body. Scale, μm: A, E–I — 100; B–D — 20.

Рис. 4. *Cytherissa truncata* Bronstein, 1930, СЭМ-фотографии некоторых элементов строения раковины самок (A–E) и самцов (F–I): A, B, G — микрорельеф в центре LV; D — микрорельеф вблизи спинного края, дорсально; E — микрорельеф вблизи центральной части брюшного края, вентрально; F — микрорельеф в центре RV; H — микрорельеф вблизи передней части брюшного края, вентрально; I — микрорельеф в задней части спинного края, дорсально. На H, I стрелками показан передний конец тела. Масштаб, мкм: A, E–I — 100; B–D — 20.

structure, microrelief (Fig. 4F–I), A1, A2, Md, Mxl, left legs L5 and L6, UR as in female. Transformed male geniculate legs on the right side. Spinneret seta of A2 reaching mid-length of claws of third endopodal segment. Distal segments of non-geniculate L5 partially fused.

L5. Right leg. Protopod with five pappose setae: one small antero-proximal, one antero-medial, two antero-distal, one thick long posterior-proximal (exopod) and 10 groups of pseudochaetae. Endopod one-segmented, with one anteromedial seta, distal curved claw and five groups of pseudochaetae.

L6. Right leg. Protopod with three pappose setae and four groups of pseudochaetae. Endopod indistinctly three-segmented (Fig. 24C), distal part triangular.

L7 as in female but with group of long pseudochaetae on protopod.

Hemipenis (Fig. 22D) triangular, outer appendage very long, sabre-shaped. Size of hemipenis in quiescent state (n = 1): length — 535 μm; greatest width — 350 μm; diameter of copulatory process — 115–125 μm.

Brush organ. Each ramus with 12 apical setae (Fig. 24F) and two rows of small pseudochaetae (medially and subapically). Length to width ratio of segment 5 : 1.

DISTRIBUTION. Endemic of Lake Baikal, found in all basins and in the Maloye More Strait at depths from 5 to 100 m (for details see Mazepova [1990: 337]). It inhabits sand with macrophyte thickets, silty sand, rarely on stones.

Cytherissa parallela Bronstein, 1947
Figs 7–9, 21I–L; 22C; 23C, D; 24D, G.

MATERIAL. Twenty four specimens were studied: 9 females and 15 males were collected in Lake Baikal, shallow water at the Selenga

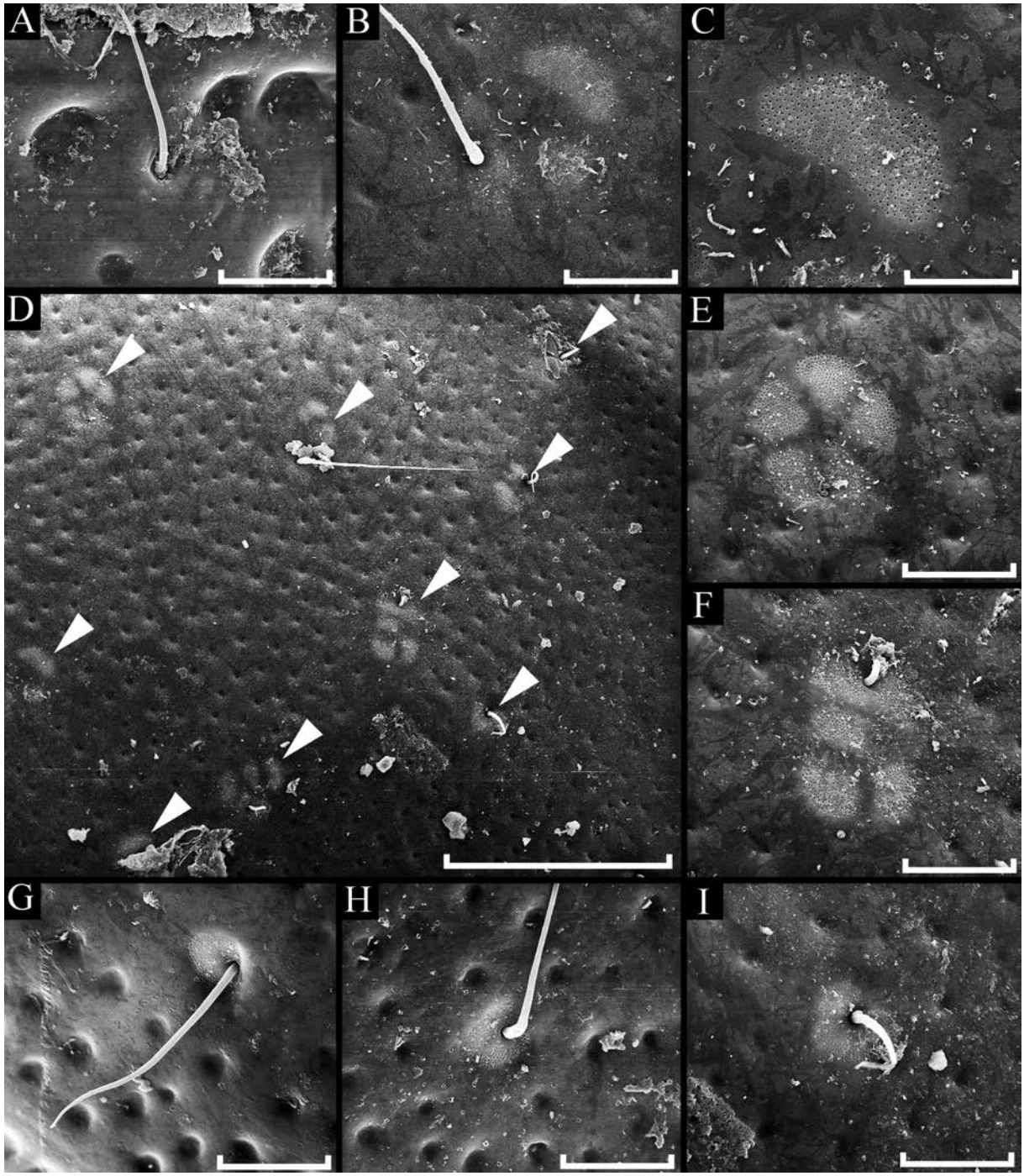

Fig. 5. *Cytherissa truncata* Bronstein, 1930, SEM photographs of the arrangement of sensillae (D) among group (B–F) and single (A, G–I) sieve pores on LV of male (B–I) and near ventral margin of LV of female (A). In D, the arrows show the location of the sieve pores. Scale, μm: A, B, E–I — 20; C — 10; D — 100.

Рис. 5. *Cytherissa truncata* Bronstein, 1930, СЭМ-фотографии расположения сенсилл (D) среди групповых (B–F) и одиночных (A, G–I) ситовидных пор на LV самца (B–I) и вблизи брюшного края самок (A). На D стрелками показано расположение ситовидных пор. Масштаб, мкм: A, B, E–I — 20; C — 10; D — 100.

River estuary (approximate coordinates: 52°24′53.14″ N 106°34′49.1″ E), 30 July 1971, depth 14 m, silty sand, sample No. 321 from the collection of taxocenoses of G.F. Mazepova.

Type material. Neotype No. O3 (♀): dwm No. O21-300771.

Additional material. Individual No. 1 (♂): dwm No. O21-300771. Individuals Nos. 2, 3 (2 ♀♀): dwm No. O22-300771. Individuals Nos. 4–11 (8♂♂): dwm No. O23-300771. Individuals Nos. 12–19 (4 ♀♀ 4 ♂♂): swm No. x970. Individual No. 20 (♀): swm No. x970 (valves) and wm No. O24-300771 (limbs). Individual No. 21 (♀): swm No. x970 (valves) and wm No. O25-300771 (limbs). Individual No. 22 (♂): swm No. x970 (valves) and wm No. O26-300771 (limbs). Individual No. 23 (♂): swm No. x970 (valves) and wm No. O27-300771 (limbs).

Type locality. Lake Baikal, shallow water at the Selenga River estuary.

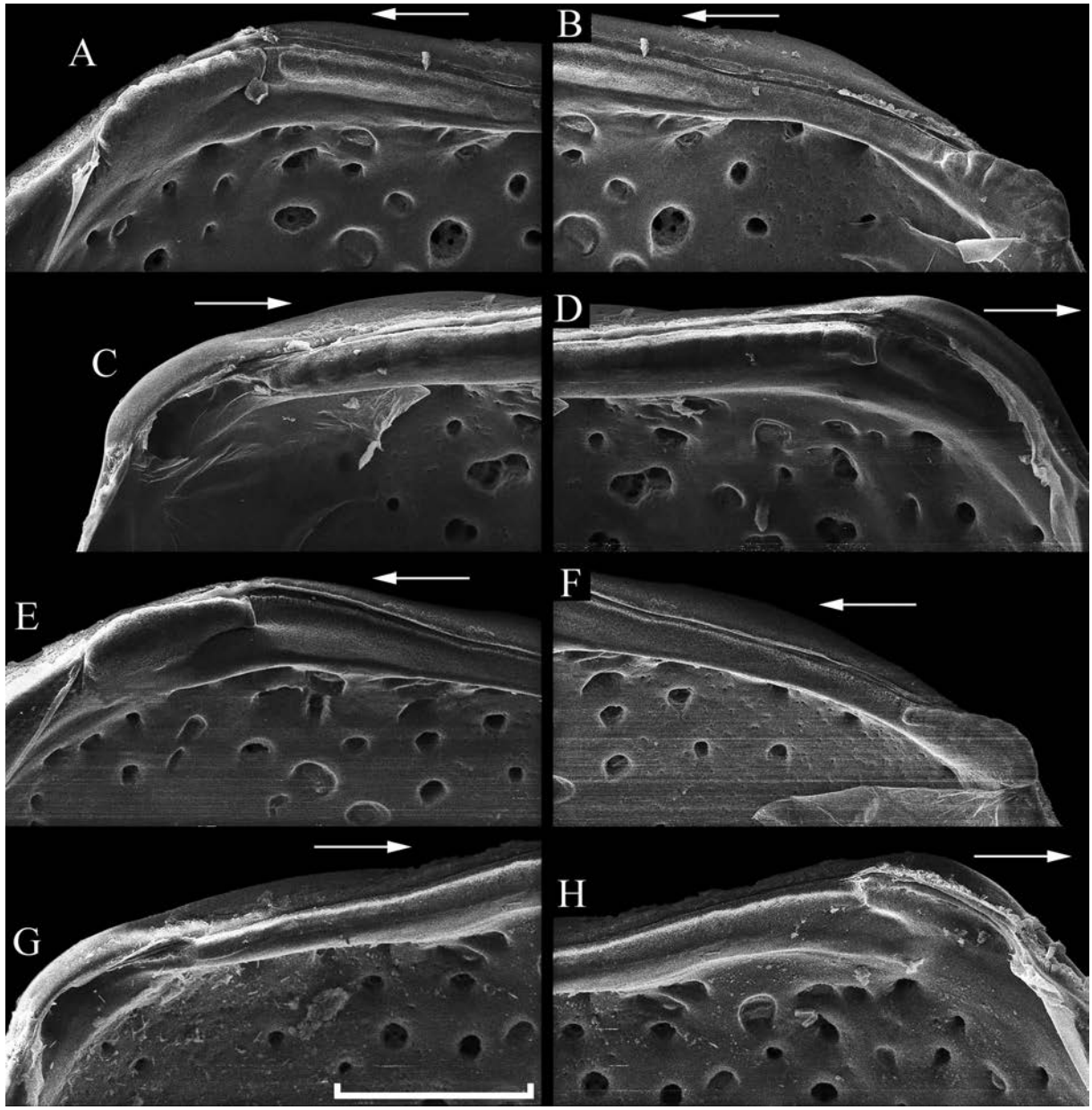

Fig. 6. *Cytherissa truncata* Bronstein, 1930, SEM photographs of hinge elements of RV (A, B, E, F) and LV (C, D, G, H) of females (A–D) and males (E–H), inner side. The arrows show the anterior end of the body. Scale 200 μm.

Рис. 6. *Cytherissa truncata* Bronstein, 1930, СЭМ-фотографии элементов строения замка RV (A, B, E, F) и LV (C, D, G, H) самок (A–D) и самцов (E–H) с внутренней стороны. Стрелками показан передний конец тела. Масштаб 200 мкм.

DESCRIPTION. Female.

Shell (Figs 7A–D; 8A–F) rectangle, with smoothed corners: L = 950–990 μm (average 970 μm, n = 6), greatest H = 595–620 μm (average 610 μm, n = 6). Site of greatest H very weakly pronounced and located approximately in anterior 1/3 of L. Dorsal margin with small protrusion in posterior 1/3 L (Fig. 8B). Anterior end of shell rounded, posterior end almost straight, rounded more weakly. LV slightly overlapping RV throughout (Fig. 7A, B), but most distinctly in anterior and posterior parts of dorsal margin and on ventral margin. Ventral margins of both valves almost equally concave on inner side. On outer side, ventral margin of RV concave almost as much as on inner side, while on LV almost straight. Inner lamella broad (Fig. 8E, F). Marginal pore canals of inner lamella relatively sparse, reaching margin of inner lamella and ending in sensilla. Inner lamella of each valve with 12–14 marginal pore canals. Pore canals of outer lamella sieve-type, branching, grouped (up to four canals in group), near margin of valves single; each canal with one sensilla. Outer lamella of each valve with 75–85 pore canals. Inner side of each valve with 40–50 canal apertures. Hinge teeth on RV, crenulated; bar on LV, crenulated. Posterior hinge tooth of RV extends beyond edge of valve (Fig. 8F). Microrelief of outer surface of valves heterogeneous: ventral, anterior and posterior margins with small round pits; central and dorsal parts of valves almost smooth, with rare single weakly pronounced round pits. Site of greatest width (dorsal and ventral sides) of shell weakly pronounced and observed in center (Fig. 8C, D), shell elongate-oval. A1, A2, Md, Mxl, L5–L7 as in female *C.*

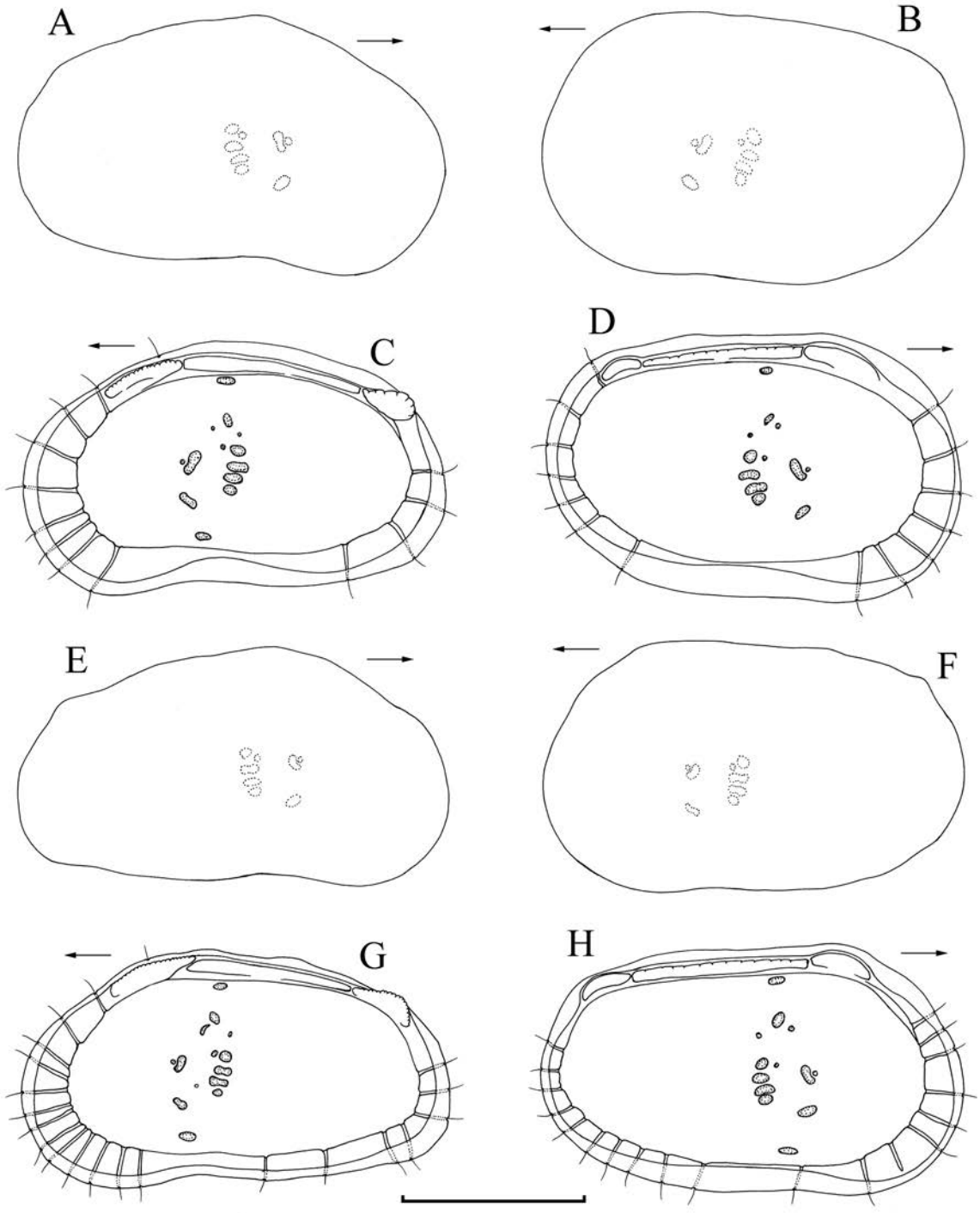

Fig. 7. *Cytherissa parallela* Bronstein, 1947, schematic drawings of RV (A, C, E, G) and LV (B, D, F, H) of females (A–D) and males (E–H), outer (A, B, E, F) and inner sides (C, D, G, H), laterally. The arrows show the anterior end of the body. Scale 400 μm.

Рис. 7. *Cytherissa parallela* Bronstein, 1947, схематичные рисунки RV (A, C, E, G) и LV (B, D, F, H) 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. Масштаб 400 мкм.

truncata, but distal segments of L5 partially fused. Spinneret seta of A2 reaching end of third endopodal segment.

Male.

Shell (Figs 7E–H; 9A–F) slightly longer and lower than in female: L = 980–1040 μm (average 1000 μm, n = 10), H = 560–590 μm (average 575 μm, n = 10). RV with protrusion at posterior part of ventral margin (Fig. 9A, C). Inner lamella of each valve with about 20 marginal pore canals. Hinge teeth and bar smaller than in female, weaker crenulated (Fig. 9E, F). Other morphological features of shell structure, A1, A2, Md, Mxl, left legs L5 and L6 as in female; right leg L5, protopod of right L6 and both legs L7 as in male *C. truncata*. Transformed male

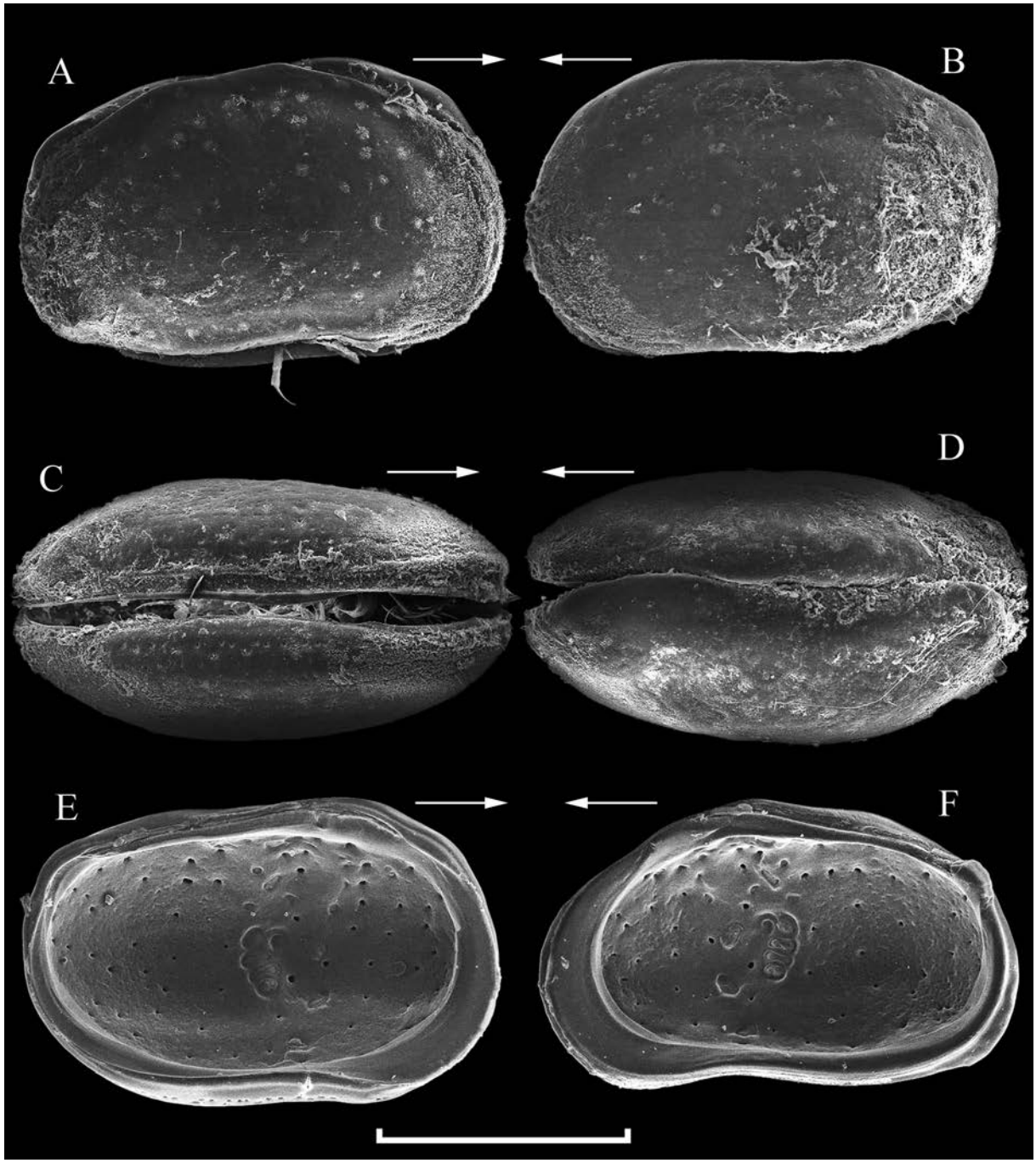

Fig. 8. *Cytherissa parallela* Bronstein, 1947, SEM photographs of shells (A–D) and individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 8. *Cytherissa parallela* Bronstein, 1947, 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. Масштаб 500 мкм.

geniculate legs on the right side. Spinneret seta of A2 reaching end of aestetasc of second endopodal segment.

L6. Right leg. Endopod distinctly two-segmented (Fig. 24D), with small distal projection.

Hemipenis (Fig. 22C) triangular, appendage triangular. Size of hemipenis in quiescent state (n = 1): length — 360 μm; greatest width — 290 μm; diameter of copulatory process — 140–145 μm.

Brush organ. Each ramus with 13 apical setae, two rows of small pseudochaetae (medially and subapically) (Fig. 24G). Length to width ratio of segment 4 : 1.

REMARKS. The redescription is especially relevant in the view of the work of Schön *et al*. [2017], which states that three species morphologically defined by the authors as *C. parallela* genetically turned out to be different. The same is shown for individuals of the species *C. lata* and *C. sinistrodentata* (see below), each consisting of at least two species [op. cit.].

Fig. 9. *Cytherissa parallela* Bronstein, 1947, 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. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 9. *Cytherissa parallela* Bronstein, 1947, 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. Масштаб 500 мкм.

DISTRIBUTION. Endemic to Lake Baikal, found in all basins and in the Maloye More Strait at depths from 1.5 to 70 m (for details see Mazepova [1990: 327]). It inhabits sand, silty sand, sand with detritus and macrophyte thickets.

Cytherissa lata Bronstein, 1930
Figs 10–14; 21M–P; 22A; 23E, F; 24A, E.

MATERIAL. Twenty one specimens were studied: 10 females and 11 males collected in Lake Baikal, Maloye More Strait, near Ulungoi (Ogoi) Island (approximate coordinates: 53°08′18.5″ N, 107°01′01.6″ E), 4 August 1968, depth 55 m, silt with coarse sand and detritus, sample No. 155 from the collection of taxocenoses of G.F. Mazepova.

Type material. Neotype No. O4 (♀): dwm No. O8-040868.

Additional material. Individual No. 1 (♂): dwm No. O8-040868. Individuals Nos. 2–8 (3 ♀♀ 4 ♂♂): dwm No. O9-040868. Individuals Nos. 9–16 (4 ♀♀ 4 ♂♂): swm No. x971. Individual No. 17 (♀): swm No. x971 (valves) and wm No. O10-040868 (limbs). Individual No. 18 (♀): swm No. x971 (valves) and wm No. O11-040868 (limbs). Individual No. 19 (♂): swm No. x971 (valves) and wm No. O12-040868

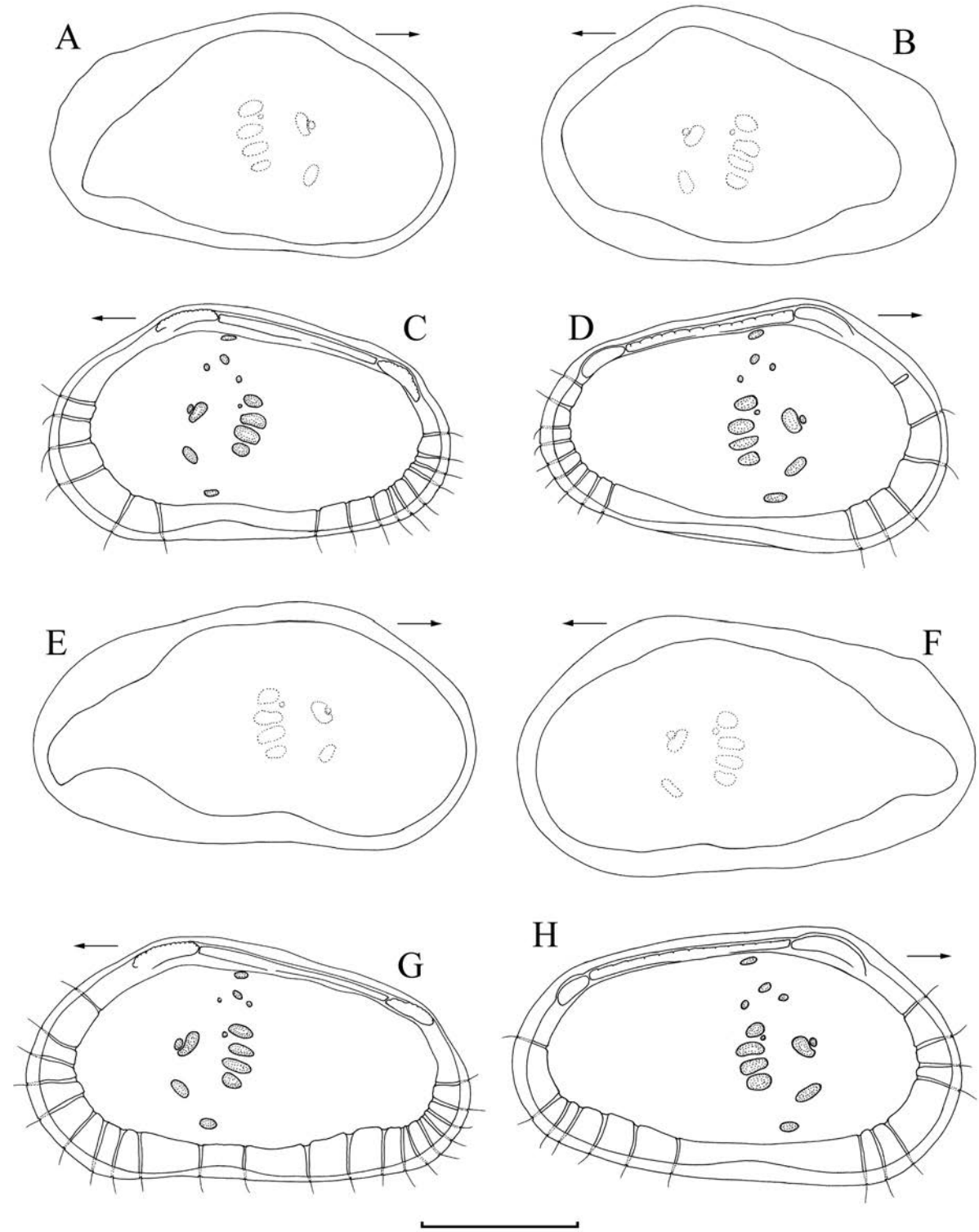

Fig. 10. *Cytherissa lata* Bronstein, 1930, schematic drawings of RV (A, C, E, G) and LV (B, D, F, H) of females (A–D) and males (E–H), outer (A, B, E, F) and inner sides (C, D, G, H), laterally. The arrows show the anterior end of the body. Scale 400 μm.

Рис. 10. *Cytherissa lata* Bronstein, 1930, схематичные рисунки RV (A, C, E, G) и LV (B, D, F, H) 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. Масштаб 400 мкм.

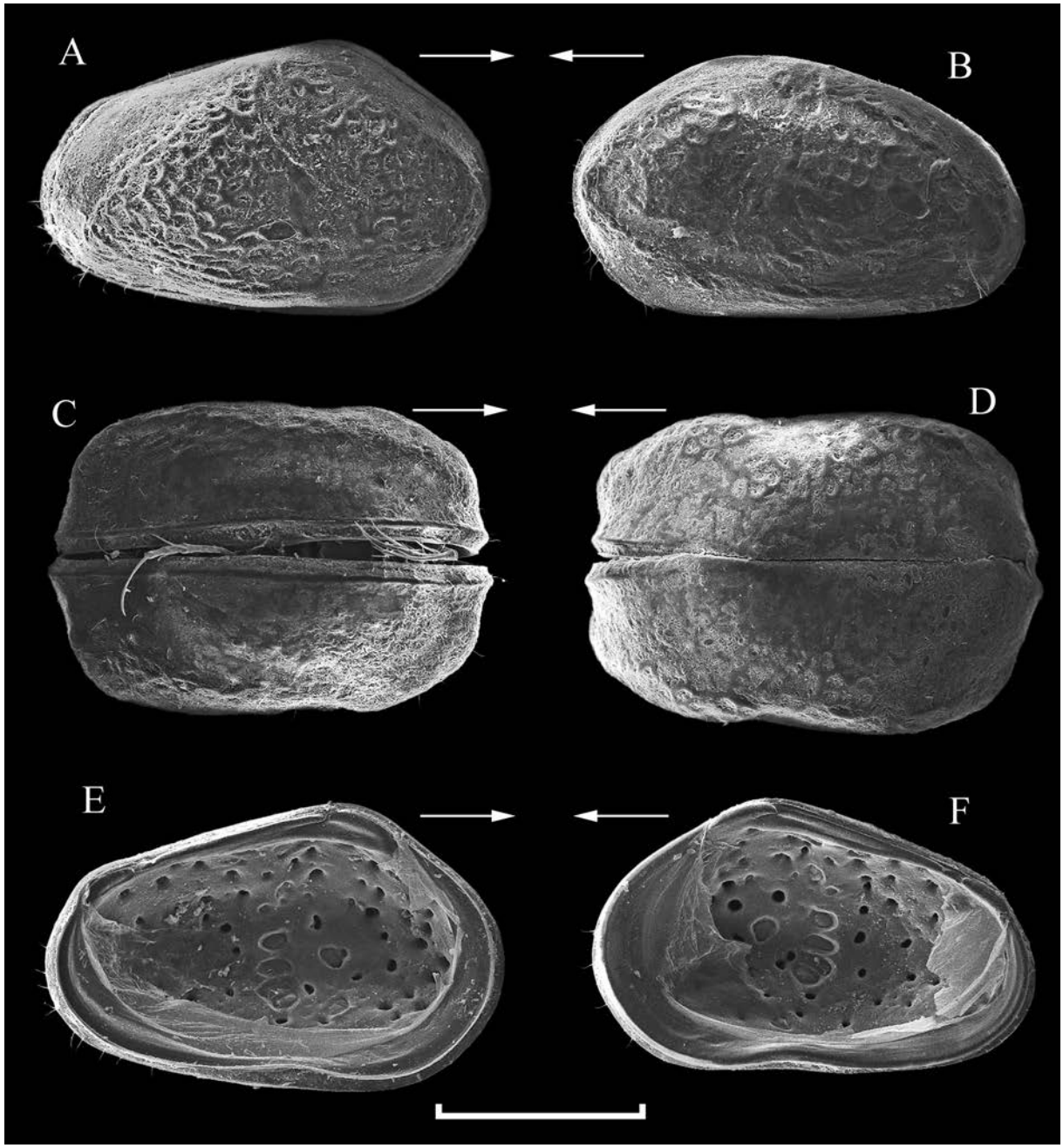

Fig. 11. *Cytherissa lata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 µm.

Рис. 11. *Cytherissa lata* Bronstein, 1930, 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. Масштаб 500 мкм.

(limbs). Individual No. 20 (♂): swm No. x971 (valves) and wm No. O13-040868 (limbs).

Type locality. Lake Baikal, Maloye More Strait, near Ulungoi Island.

DESCRIPTION. Female.

Shell (Figs 10A–D; 11A–F) elongate-ovate: L = 1050–1120 µm (average 1190 µm, n = 10), largest H = 650–700 µm (average 680 µm, n = 10), located in anterior 1/3 of L. Dorsal margin almost straight. Anterior end of shell very broadly rounded, posterior end more weakly rounded. LV slightly overlaps RV on dorsal and ventral margins (Fig. 11A, B). Ventral margins of both valves equally concave on inner side, and ventral margins of outer side straight, not concave. Inner lamella broad. Marginal pore canals of inner lamella relatively sparse, reaching edge of inner lamella and ending in sensilla. Inner lamella of each valve with 15–16 marginal pore canals. Pore canals of outer lamella sieve-type, branching, grouped (up to eight canals in group), near margin of valves single; each canal with one sensilla. Outer lamella of each valve with 215–225 pore canals. Inner side of each valve with 45–50 canal apertures. Hinge teeth on

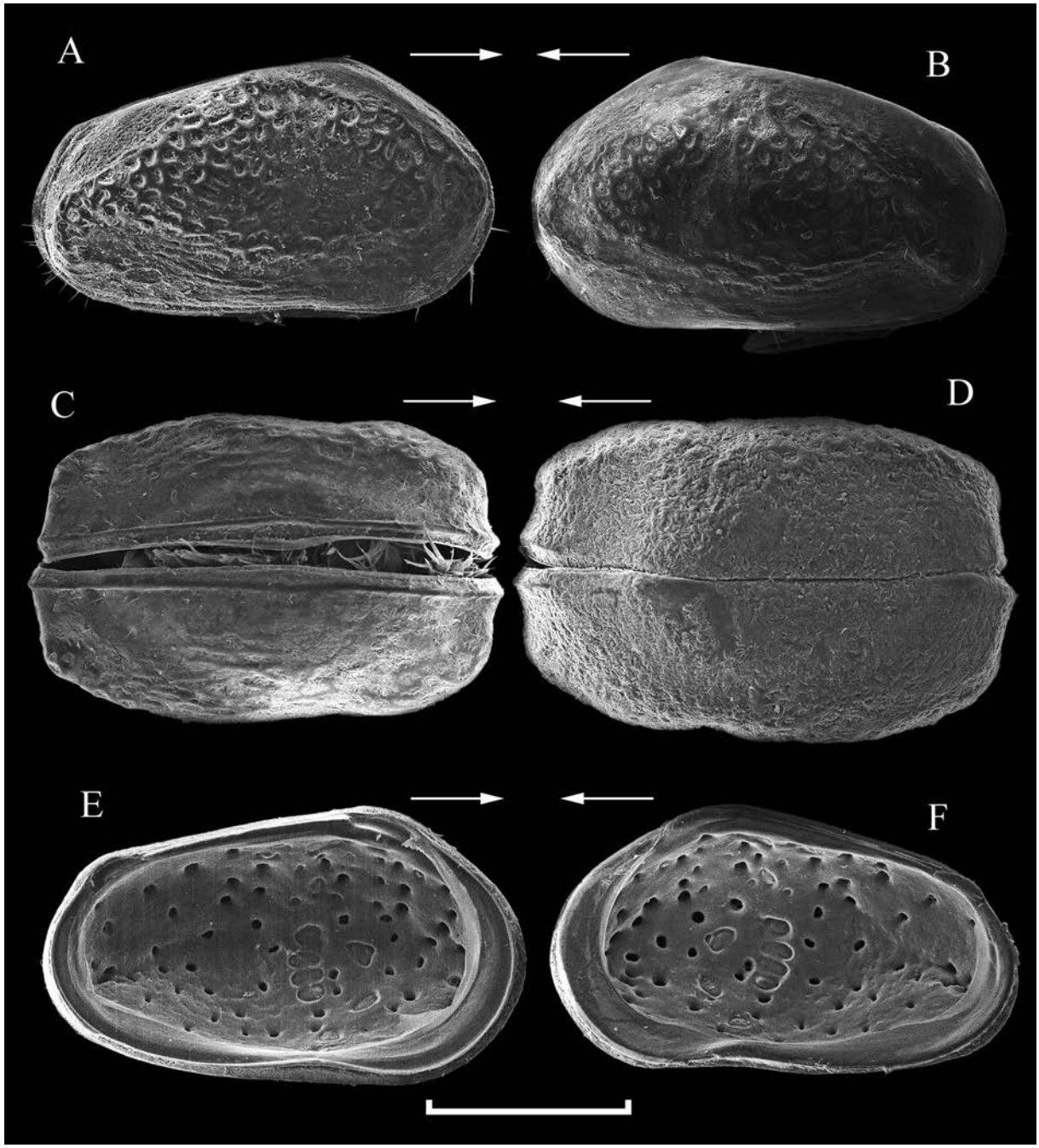

Fig. 12. *Cytherissa lata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of males: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 12. *Cytherissa lata* Bronstein, 1930, 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. Масштаб 500 мкм.

RV, weakly crenulated (Fig. 14A, B); bar on LV (Fig. 14C, D), weakly crenulated. Microrelief of outer valve surface heterogeneous: pronounced large cells in center of valves (as in males in Fig. 13A–C), which smooth out closer to margins of valves. Dorsally and ventrally shell rectangular (due to parallel lateral sides) with smoothed corners, site of greatest width weakly pronounced (Fig. 11C, D). Little narrowing slightly anterior to center of valves, most clearly visible in dorsal view (Fig. 11D). A1, A2, Md, Mxl, L5–L7 as in female *C. truncata*, but distal segments of L5 partially fused. Spinneret seta of A2 reaching end of third endopodal segment.

Male.

Shell (Figs 10E–H; 12A–F; 13A–F; 14E–H) as large as female: L = 1170–1220 μm (average 1190 μm, n = 10), largest H = 650–690 μm (average 670 μm, n = 10). Dorsally and ventrally, shell more elongated than in female. In ventral view microrelief more pronounced in male (Fig. 12C) than in female (Fig. 11C). Other morphological features of shell structure, A1,

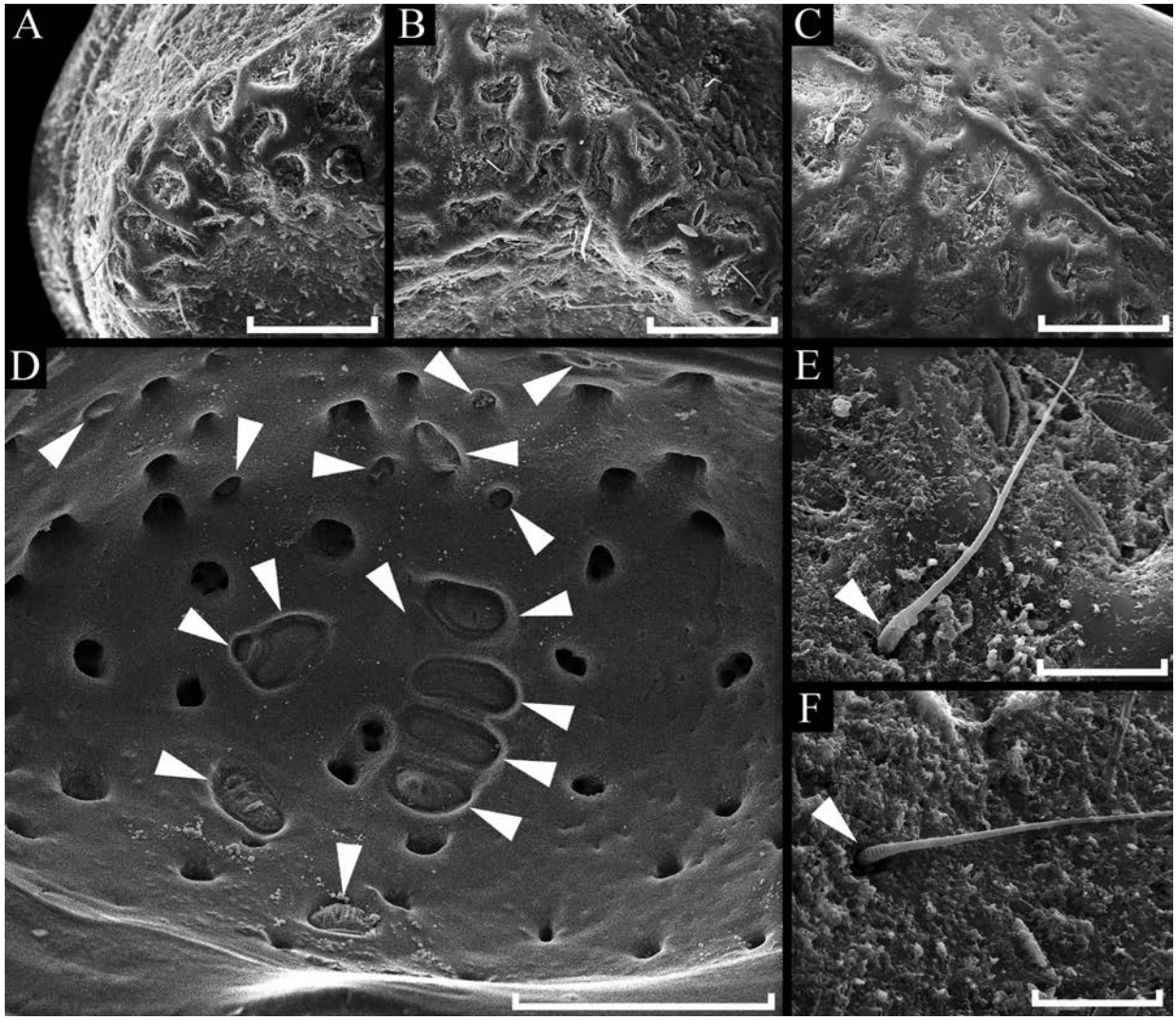

Fig. 13. *Cytherissa lata* Bronstein, 1930, SEM photographs of some elements of shell structure of males: A — posterior part of RV, laterally; B, C — posterior part of LV, laterally; D — central part of RV, inner side; E, F — sensillae. In D, arrows show the muscle scars; in E, F, arrows show the flexible part of the sensillae. Scale, μm: A–C — 100; D — 200; E, F — 20.

Рис. 13. *Cytherissa lata* Bronstein, 1930, СЭМ-фотографии некоторых элементов строения раковины самцов: A — задняя часть RV, латерально; B, C — задняя часть LV, латерально; D — центральная часть RV с внутренней стороны; E, F — сенсиллы. На D стрелками показаны отпечатки мышц-закмыкателей; на E, F стрелками показана гибкая часть сенсилл. Масштаб, мкм: A–C — 100; D — 200; E, F — 20.

A2, Md, Mxl, left legs L5 and L6 as in female. Right leg L5, protopod of right L6 and both legs L7 as in male *C. truncata*. Transformed male geniculate legs on the right side. Spinneret seta of A2 reaching end aestetasc of second endopodal segment.

L6. Right leg (Fig. 24A). Endopod two-segmented, with small seta between segments; apical part with claw-like projection.

Hemipenis (Fig. 22A) triangular, outer appendage triangular, with oblique main axis. Size of hemipenis in quiescent state (n = 1): length — 500 μm; greatest width — 370 μm; diameter of copulatory process — 215 μm.

Brush organ. Each ramus with 14 apical setae, two rows of small pseudochaetae medially and subapically (Fig. 24E). Length to width ratio of segment 3.8 : 1.

DISTRIBUTION. Endemic to Lake Baikal, found in all basins and in the Maloye More Strait at depths from 1.5 to 300 m (for details see Mazepova [1990: 348]). It inhabits silt, sand, silty sand, gravel and stones.

Cytherissa sinistrodentata Bronstein, 1930
Figs 15–20; 21A–D; 22B; 23G, H; 24B.

MATERIAL. Fifty seven specimens were studied: 27 females and 30 males collected in Lake Baikal, Maloye More Strait, near Ulan-Baisan Cape (second name Zantyk Cape) (approximate coordinates: 53°19′33.1″ N, 107°38′38.7″ E), 13 August 1968, depth 25 m, sand, sample No. 175 from the collection of taxocenoses of G.F. Mazepova.

Type material. Neotype No. O5 (♀): dwm No. O10-130868.

Additional material. Individual No. 1 (♂): dwm No. O10-130868. Individuals Nos. 2–17 (16 ♀♀): dwm No. O11-130868. Individuals Nos. 18–35 (18 ♂♂): dwm No. O12-130868. Individuals Nos. 36–56 (10 ♀♀ 11 ♂♂): swm No. 19156 (shells, valves and bodies). Limbs of individuals Nos. 53–56 (2 ♀♀ 2 ♂♂): wm No. O13-130868 to wm No. O16-130868.

Type locality. Lake Baikal, Maloye More Strait, near Ulan-Baisan Cape (Zantyk).

DESCRIPTION. Female.

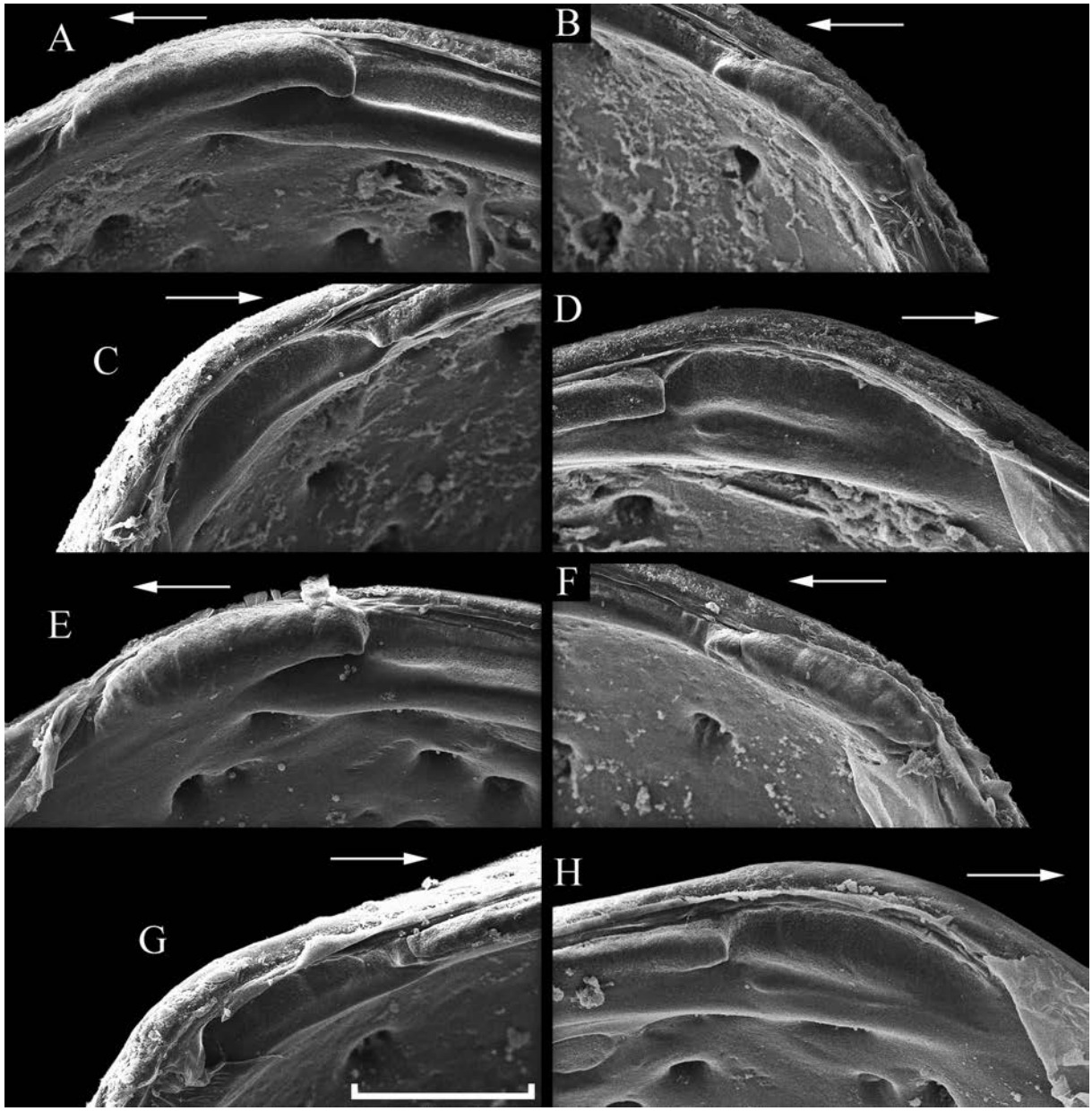

Fig. 14. *Cytherissa lata* Bronstein, 1930, SEM photographs of hinge elements of RV (A, B, E, F) and LV (C, D, G, H) of females (A–D) and males (E–H), inner side. The arrows show the anterior end of the body. Scale 100 μm.

Рис. 14. *Cytherissa lata* Bronstein, 1930, СЭМ-фотографии элементов замка RV (A, B, E, F) и LV (C, D, G, H) самок (A–D) и самцов (E–H) с внутренней стороны. Стрелками показан передний конец тела. Масштаб 100 мкм.

Shell (Figs 15A–D; 16A–F) ovoid: L = 995–1050 μm (average 1020 μm, n = 10), largest H = 720–765 μm (average 750 μm, n = 10), located slightly posterior to anterior 1/3 of L. Dorsal margin nearly straight, with little convexity in center. Anterior end of shell broadly rounded, posterior end more weakly rounded. Ventral margins of both valves almost equally concave on inner side. Ventral margins of valves almost straight on outer side. RV slightly overlaps LV in anterior and posterior part of dorsal margin. Inner lamella broad. Marginal pore canals of inner lamella relatively sparse, reaching margin of inner lamella and ending in sensilla. Inner lamella of each valve with 11–13 marginal pore canals. Pore canals of outer lamella sieve-type, branching, grouped (up to twelve canals in group), near margin of valves single; each canal with one sensilla. Outer lamella of each valve with 380–400 pore canals. Inner side of each valve with 60–65 canal apertures. Hinge teeth on LV, slightly crenulated (Fig. 19A, B); bar on RV (Fig. 19C, D), slightly crenulated. Microrelief of outer valve surface heterogeneous. Almost entire surface of valves with well-defined grooves dividing outer surface of shell into rhomboidal areas (Fig. 18A, B). One continuous (marginal) and several discontinuous rows of rounded pits near ventral margins of both valves (Fig. 18C). Rhomboidal microrelief not pronounced on dorsal surface, and pits completely absent. Lateral sides of both valves straight, almost parallel to each other, shell on ventral and dorsal views almost rectangular, with smoothed corners, and site of greatest width not clearly pronounced (Fig. 16C, D). A1, A2, Md (Fig. 20B), Mxl, L5–L7 as in female *C. truncata* (distal segments

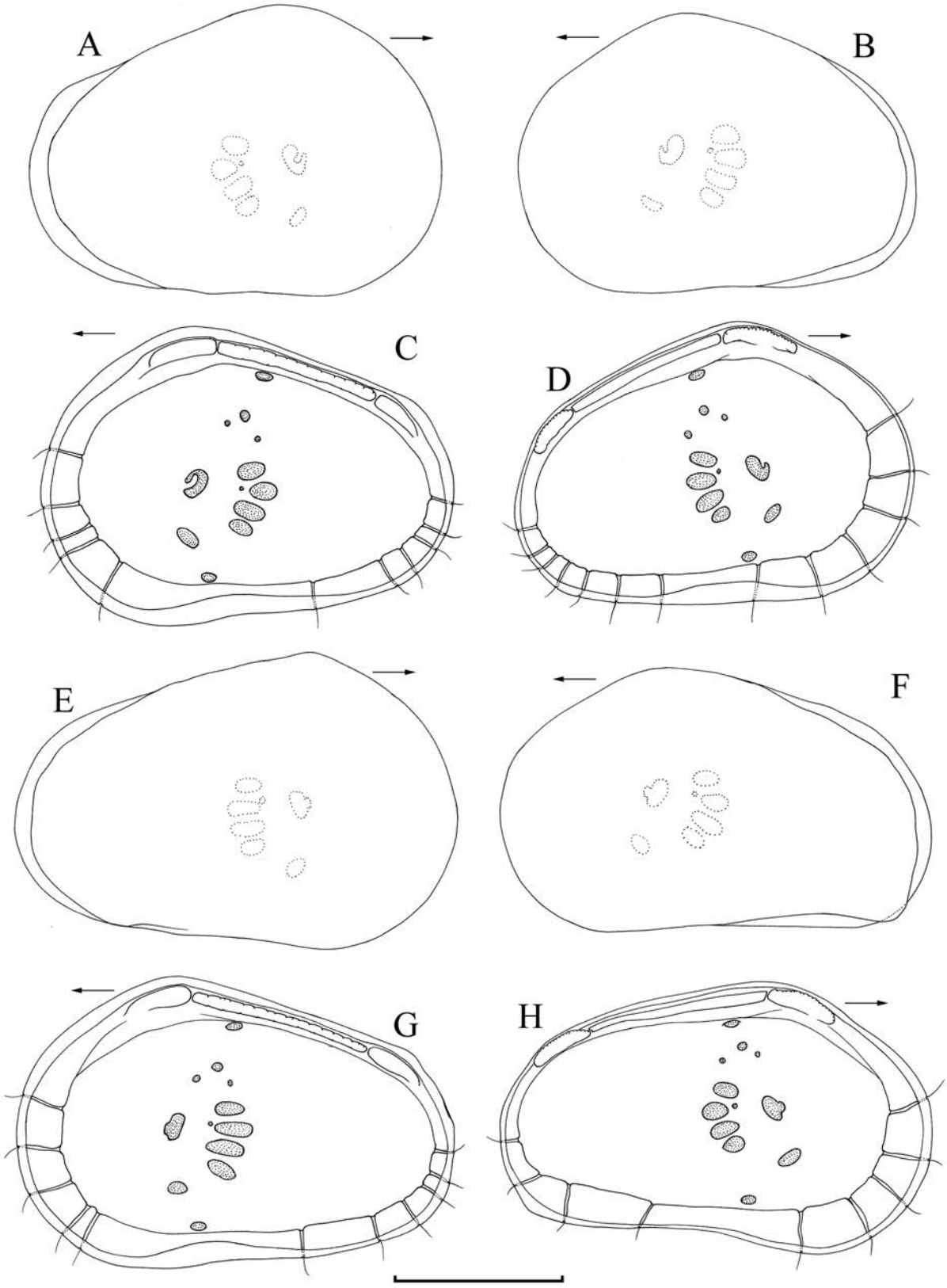

Fig. 15. *Cytherissa sinistrodentata* Bronstein, 1930, schematic drawings of RV (A, C, E, G) and LV (B, D, F, H) of females (A–D) and males (E–H), outer (A, B, E, F) and inner side (C, D, G, H), laterally. The arrows show the anterior end of the body. Scale 400 μm.

Рис. 15. *Cytherissa sinistrodentata* Bronstein, 1930, схематичные рисунки RV (A, C, E, G) и LV (B, D, F, H) 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. Масштаб 400 мкм.

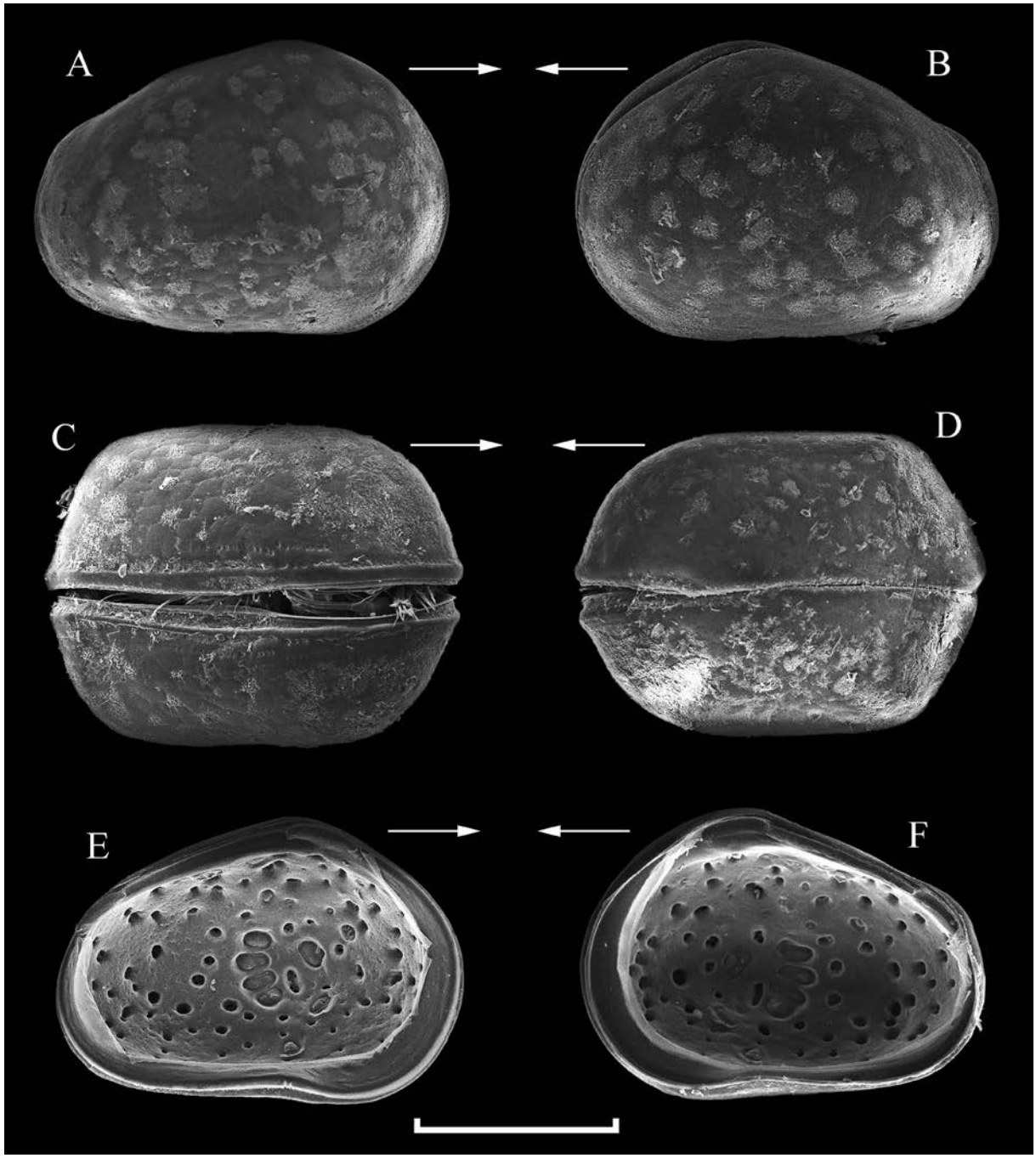

Fig. 16. *Cytherissa sinistrodentata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of females: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 µm.

Рис. 16. *Cytherissa sinistrodentata* Bronstein, 1930, 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. Масштаб 500 мкм.

of L5 separated). Spinneret seta of A2 reaching end of third endopodal segment.

Male.

Shell (Figs 15E–H; 17A–F; 19E–H) slightly longer and lower than in female: L = 1060–1110 µm (average 1085 µm, n = 10), H = 715–745 µm (average 730 µm, n = 10). In dorsal and ventral views, shell more elongated than in female. Other morphological features of shell structure, A1 and A2 (Fig. 20C), Md, Mxl (Fig. 20A), right legs L5 and L6 (Fig. 20D) as in female; left leg L5, protopod of left L6 of same structure as right legs of male *C. truncata*; both legs L7 and brush organ as in male *C. truncata*. Transformed male geniculate legs on the left side. Spinneret seta of A2 reaching end of aestetasc of second endopodal segment.

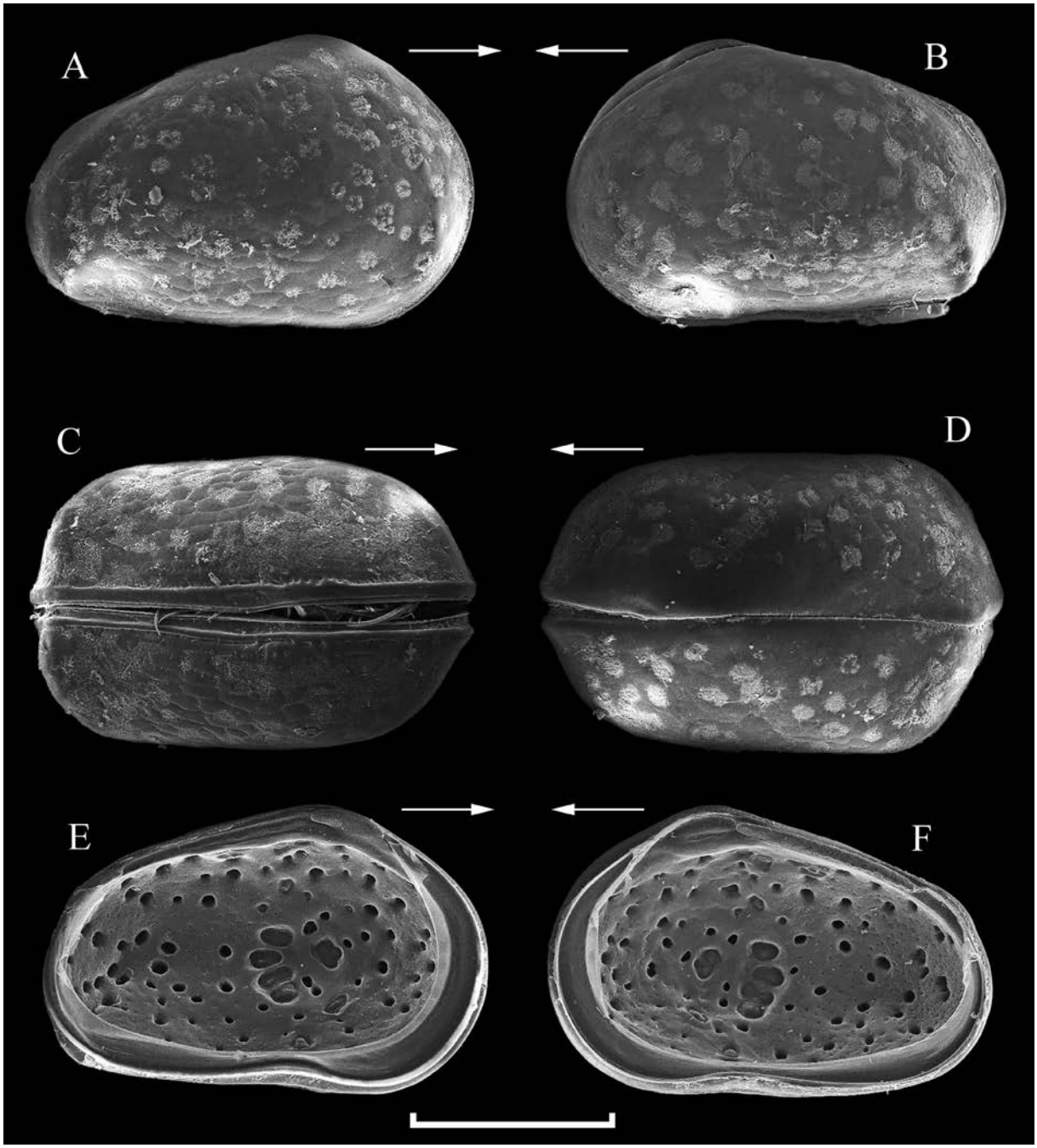

Fig. 17. *Cytherissa sinistrodentata* Bronstein, 1930, SEM photographs of shells (A–D) and individual valves (E, F) of males: A, B — laterally; C — ventrally; D — dorsally; E — LV, laterally, inner side; F — RV, laterally, inner side. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 17. *Cytherissa sinistrodentata* Bronstein, 1930, 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. Масштаб 500 мкм.

L6. Left leg (Fig. 20E). Endopod three-segmented (Fig. 24B), with seta between first and second segment; boundary between second and third segment indistinct; apical part of endopod with curved outgrowth.

Hemipenis (Figs 20F–I; 22B) large, triangular, main axis of outer appendage oblique in distal part. Size of hemipenis in quiescent state (n = 1): length — 500 μm; greatest width — 390 μm; diameter of copulatory process — 140–150 μm.

REMARKS. We suppose the similarity in shell shape of *C. sinistrodentata* and *C. lata* on the ventral and dorsal sides is a consequence of parallel microevolution rather than close affinity, although it may be proved or disapprove only with molecular analysis. The species differ well in hinge structure (*C. lata* has teeth on RV and *C. sinistrodentata* has teeth on LV) and microrelief (pitted in *C. lata* and convex rhomboidal in *C. sinistrodentata*). As we briefly noted in other works [Alekseeva

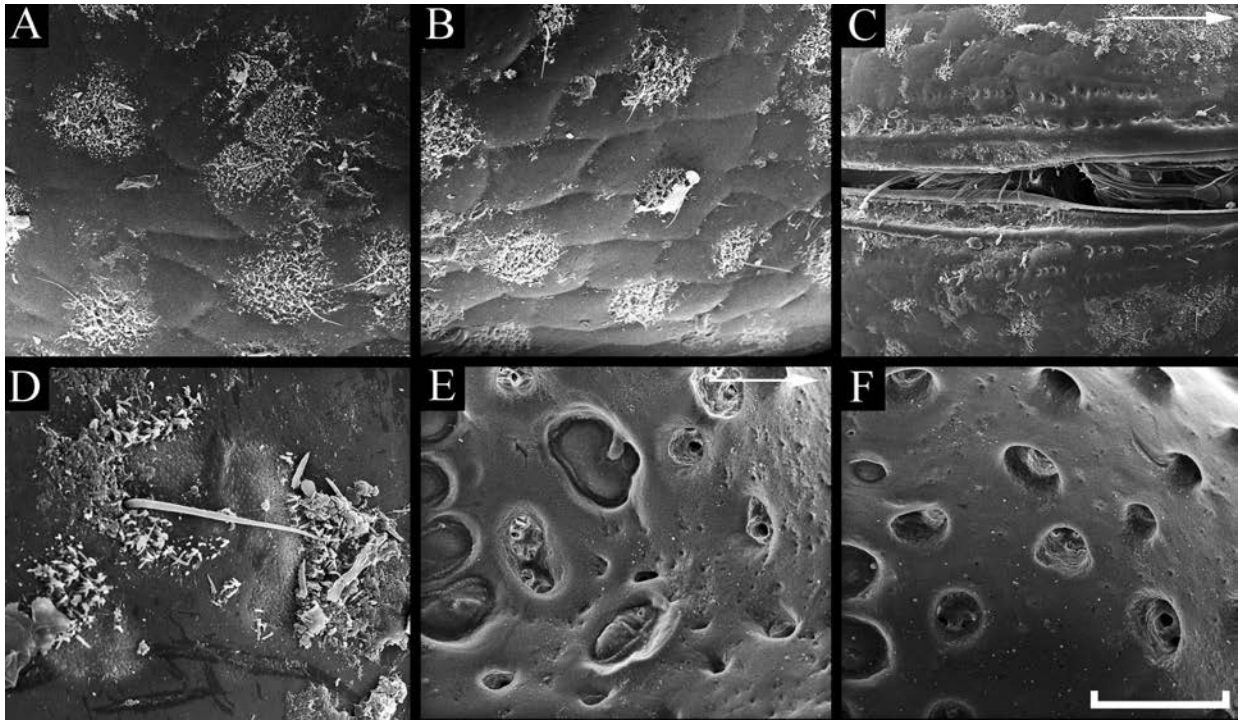

Fig. 18. *Cytherissa sinistrodentata* Bronstein, 1930, SEM photographs of some elements of shell structure of females: A, B — microrelief in center of valves; C — microrelief of valve margin, ventrally; D — sensilla and sieve pores; E — center of LV, inner side; F — sieve pores in posterior part of the RV, inner side. The arrows show the anterior end of the body. Scale, μm: A, B, F — 100; C, E — 200; D — 20.

Рис. 18. *Cytherissa sinistrodentata* Bronstein, 1930, СЭМ-фотографии некоторых элементов строения раковины самок: A, B — микрорельеф в центре створок; C — микрорельеф края створок, вентрально; D — сенсилла и ситовидные поры; E — центр LV с внутренней стороны; F — ситовидные поры в задней части RV с внутренней стороны. Стрелками показан передний конец тела. Масштаб, мкм: A, B, F — 100; C, E — 200; D — 20.

et al., 2025b, c], in species with a "left-hinged" shell (the hinge teeth are on the left valve), the geniculate legs of the males are located on the left side. In "right-hinged" species, the geniculate legs of the males are on the right side.

DISTRIBUTION. Endemic of Lake Baikal, found in all basins at depths from 1.5 to 300 m (for details see Mazepova, [1990: 348]). It inhabits silt, sand, silty sand, gravel and stones.

The species considered above differ among themselves not only in size, valve outlines (Fig. 21A–P) and microrelief features, but also in the degree of development of adductor muscle scars (Fig. 23A–H). In all species studied, the number of central scars is the same and equals 9: they may be fused, but the outlines are clearly distinguishable (Fig. 23B, D, F, H show only 8 central scars without one mandibular scar). The medial depression in all species is in the form of a small rounded scar, but in *C. truncata* and *C. parallela* it appears deeper (Fig. 23B, D). The frontal scars in *C. truncata* and *C. sinistrodentata* are distinctly fused (Fig. 23B, H); in *C. lata* there is a slight separation (Fig. 23F), and in *C. parallela* the frontal scars are distinctly separated. Note that the SEM photograph of LV clearly shows that *C. truncata*, *C. parallela* and *C. lata* have a bar and sockets for hinge teeth on this valve (Fig. 23A, C, E), while in contrast *C. sinistrodentata* has hinge teeth and a groove for the bar (Fig. 23G). They probably belong to two different lineages of Baikalian *Cytherissa* [Mazepova, 1990], since the hinge structure is a very important systematic feature.

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. We sincerely appreciate the assistance of Ph.D. M.J. Grygier (National Museum of Marine Biology & Aquarium, Taiwan), a member of the International Commission on Zoological Nomenclature.

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

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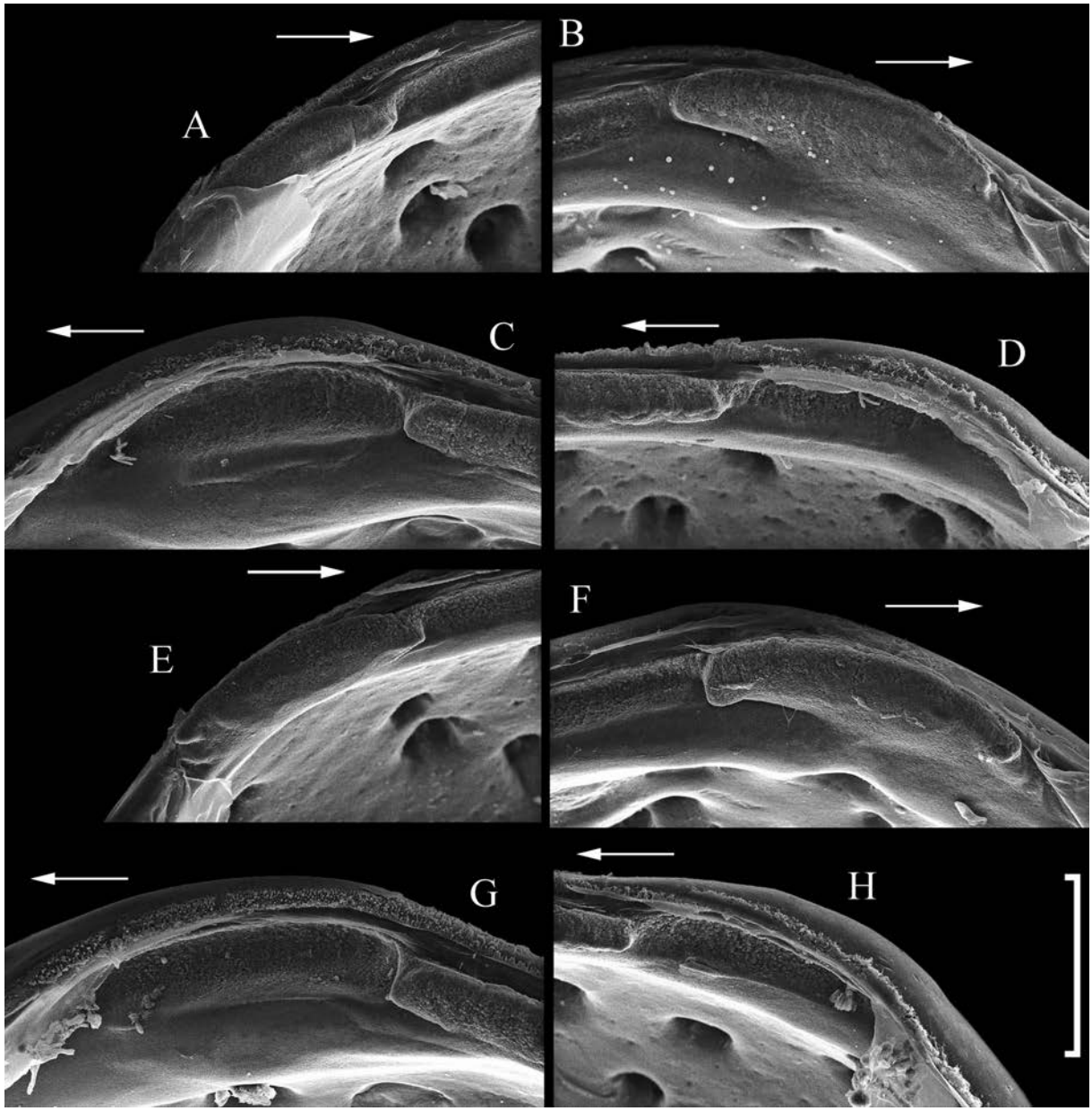

Fig. 19. *Cytherissa sinistrodentata* Bronstein, 1930, SEM photographs of hinge elements of RV (C, D, G, H) and LV (A, B, E, F) of females (A–D) and males (E–H), inner side. The arrows show the anterior end of the body. Scale 100 μm.

Рис. 19. *Cytherissa sinistrodentata* Bronstein, 1930, СЭМ-фотографии элементов замка RV (C, D, G, H) и LV (A, B, E, F) самок (A–D) и самцов (E–H) с внутренней стороны. Стрелками показан передний конец тела. Масштаб 100 мкм.

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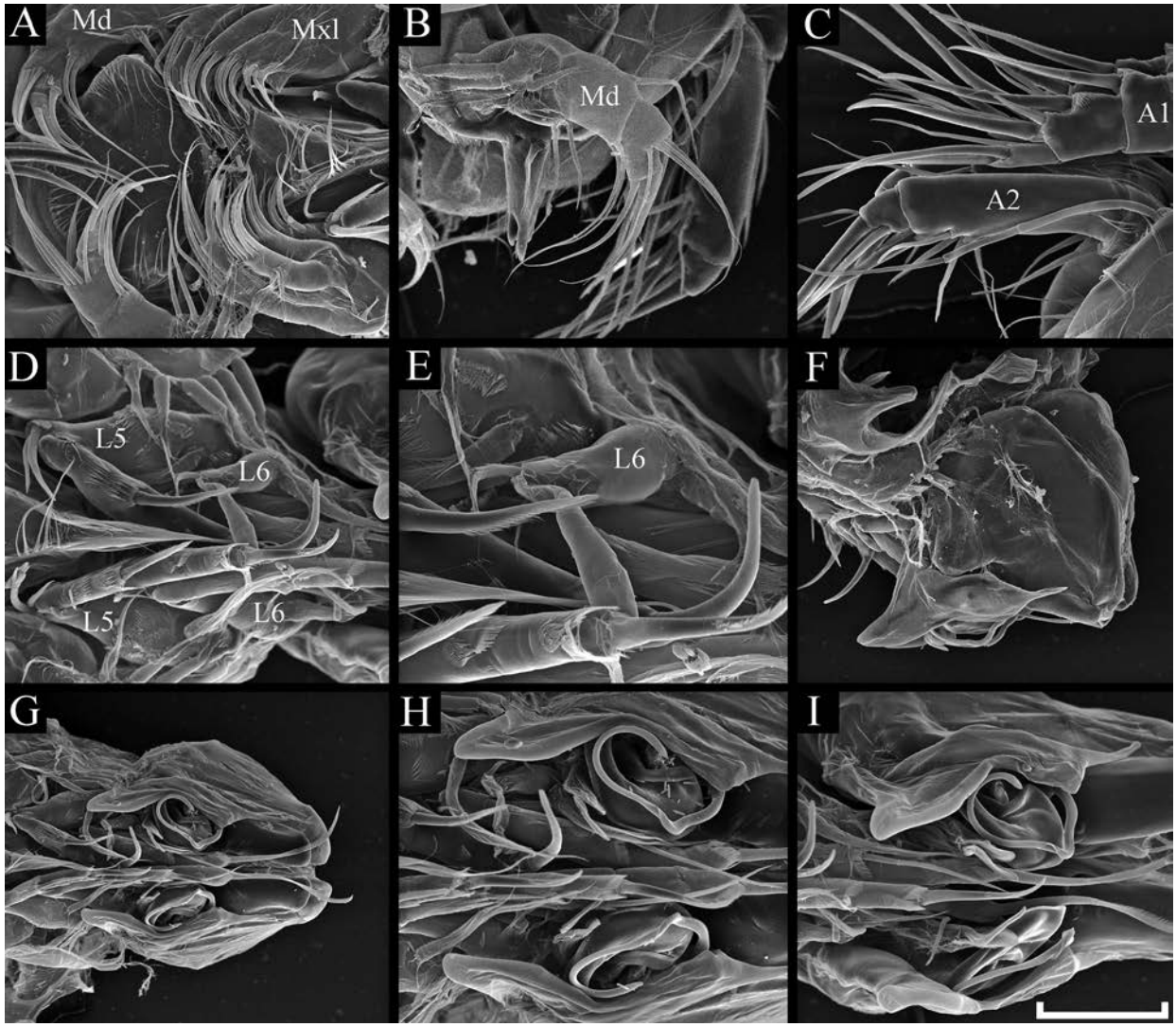

Fig. 20. *Cytherissa sinistrodentata* Bronstein, 1930, SEM photographs of some elements of body structure of females (B) and males (A, C–I): A — palp and endites of Mxl; B — palp and gnathobase of Md; C — distal segments of A1 and A2; D — L5–L7, ventrally; E — right L6; F — hemipenis, laterally; G–I — hemipenis and its appendages, ventrally. Scale, μm: A–D — 100; E, H, I — 50; F, G — 200.

Рис. 20. *Cytherissa sinistrodentata* Bronstein, 1930, СЭМ-фотографии некоторых элементов строения тела самок (B) и самцов (A, C–I): A — пальпа и эндиты Mxl; B — пальпа и гнатобаза Md; C — дистальные сегменты A1 и A2; D — L5–L7, вентрально; E — правая L6; F — гемипенис, латерально; G–I — гемипенис и его придатки, вентрально. Масштаб, мкм: A–D — 100; E, H, I — 50; F, G — 200.

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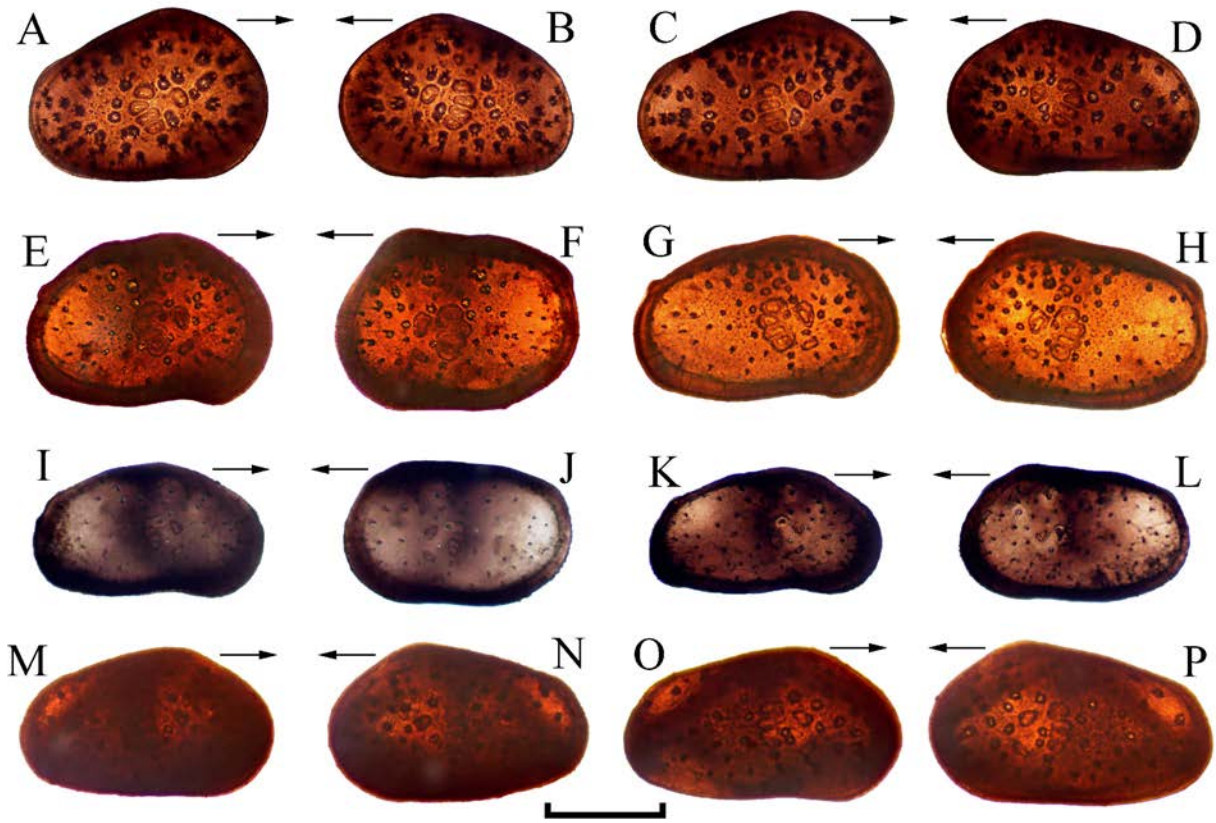

Fig. 21. *Cytherissa truncata* Bronstein, 1930 (E–H), *C. parallela* Bronstein, 1947 (I–L), *C. lata* Bronstein, 1930 (M–P) and *C. sinistrodentata* Bronstein, 1930 (A–D), microphotographs of valves of females (A, B, E, F, I, J, M, N) and males (C, D, G, H, K, L, O, P), laterally, in transmitted light. The arrows show the anterior end of the body. Scale 500 μm.

Рис. 21. *Cytherissa truncata* Bronstein, 1930 (E–H), *C. parallela* Bronstein, 1947 (I–L), *C. lata* Bronstein, 1930 (M–P) и *C. sinistrodentata* Bronstein, 1930 (A–D), микрофотографии створок самок (A, B, E, F, I, J, M, N) и самцов (C, D, G, H, K, L, O, P), латерально, в проходящем свете. Стрелками показан передний конец тела. Масштаб 500 мкм.

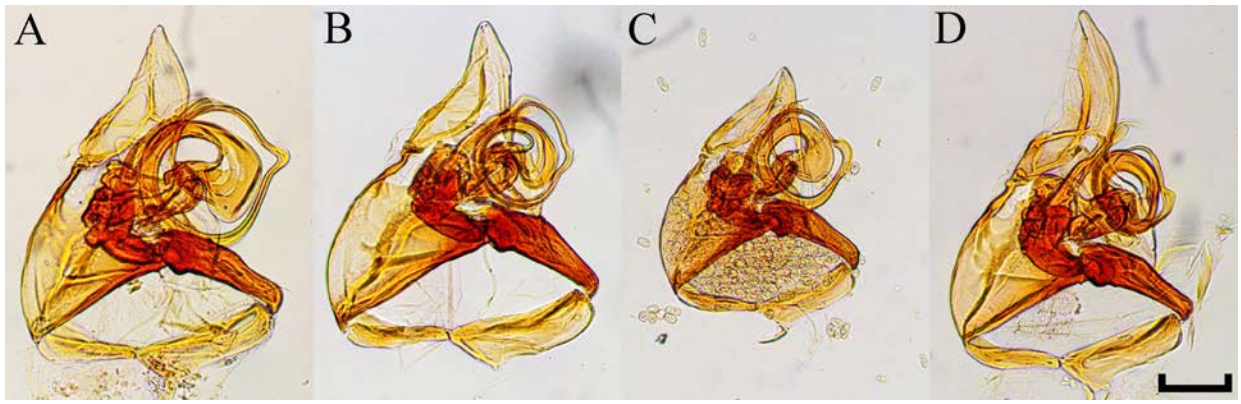

Fig. 22. *Cytherissa lata* Bronstein, 1930 (A), *C. sinistrodentata* Bronstein, 1930 (B), *C. parallela* Bronstein, 1947 (C) and *C. truncata* Bronstein, 1930 (D), microphotographs of male hemipenis. Scale 100 μm.

Рис. 22. *Cytherissa lata* Bronstein, 1930 (A), *C. sinistrodentata* Bronstein, 1930 (B), *C. parallela* Bronstein, 1947 (C) и *C. truncata* Bronstein, 1930 (D), микрофотографии гемипенисов самцов. Масштаб 100 мкм.

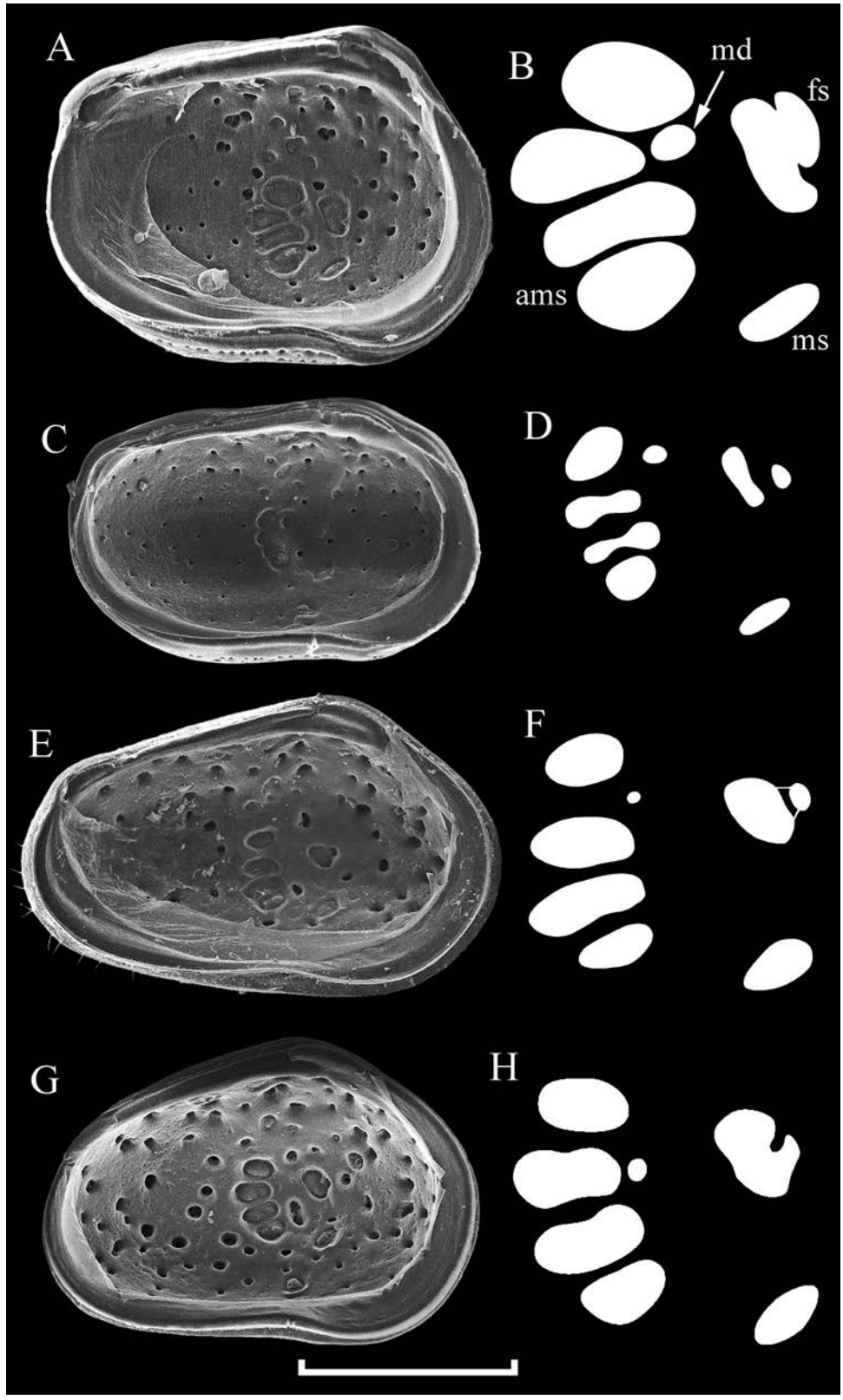

Fig. 23. *Cytherissa truncata* Bronstein, 1930 (A, B), *Cytherissa parallela* Bronstein, 1947 (C, D), *C. lata* Bronstein, 1930 (E, F) and *C. sinistrodentata* Bronstein, 1930 (G, H), SEM photographs of LV (A, C, E, G) and drawings of adductor muscle scars (B, D, F, H) in center of LV, inner side. Scale, μm: A, C, E, G — 500; B, D, F, H — 165.

Рис. 23. *Cytherissa truncata* Bronstein, 1930 (A, B), *Cytherissa parallela* Bronstein, 1947 (C, D), *C. lata* Bronstein, 1930 (E, F) и *C. sinistrodentata* Bronstein, 1930 (G, H), СЭМ-фотографии LV (A, C, E, G) и рисунки отпечатков мышц (B, D, F, H) в центре внутренней поверхности LV. Масштаб, мкм: A, C, E, G — 500; B, D, F, H — 165.

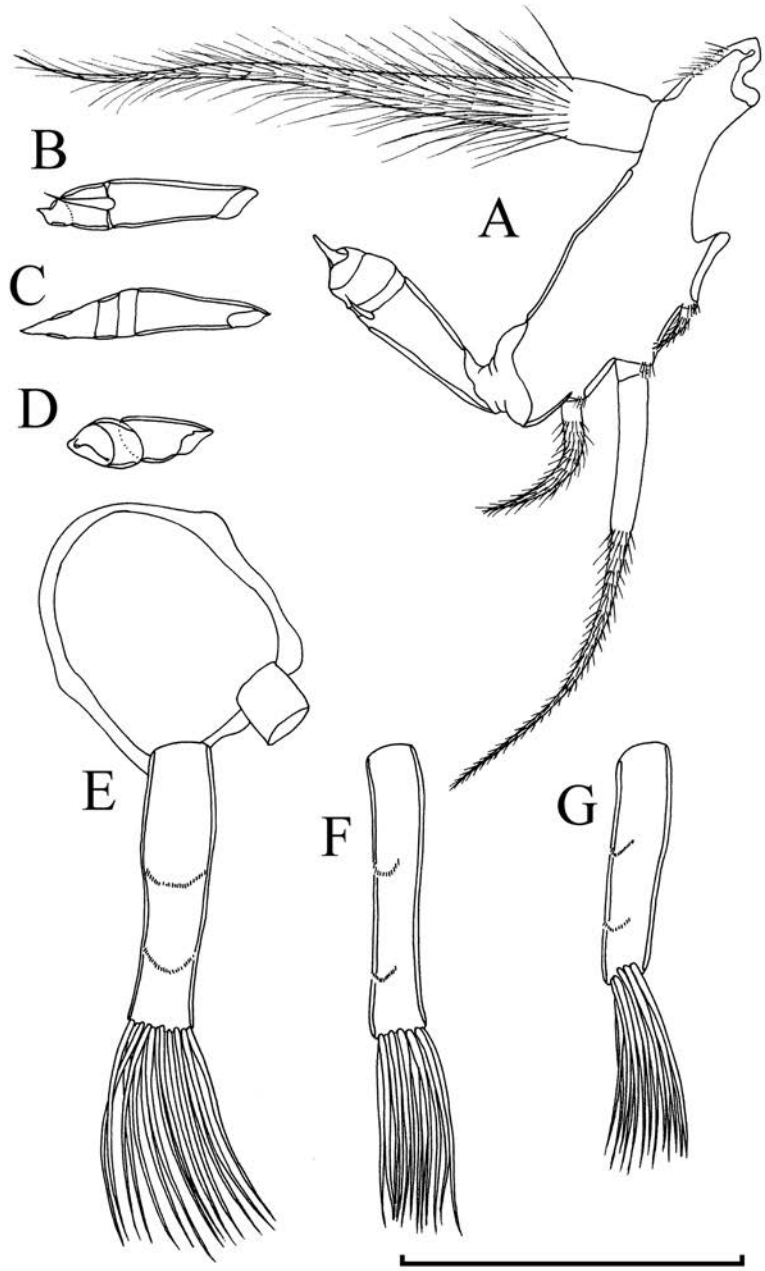

Fig. 24. *Cytherissa truncata* Bronstein, 1930 (C, F), *C. parallela* Bronstein, 1947 (D, G), *C. lata* Bronstein, 1930 (A, E) and *C. sinistrodentata* Bronstein, 1930 (B), drawings of right L6 (A), right L6 without proximal segment (B–D) and brush organ (E–G). E–G shows only one ramus. Scale 100 μm.

Рис. 24. *Cytherissa truncata* Bronstein, 1930 (C, F), *C. parallela* Bronstein, 1947 (D, G), *C. lata* Bronstein, 1930 (A, E) и *C. sinistrodentata* Bronstein, 1930 (B), рисунки правой L6 (A), правой L6 без проксимального сегмента (B–D) и щетковидного органа (E–G). На E–G изображена только одна ветвь. Масштаб 100 мкм.