Superfamily Cytheroidea Baird 1850 (Suborder Cytherocopina Gründel 1967)

According to Liebau (2005), the suborder Cytherocopina is subdivided into two infraorders: Archaeocytherinina Liebau 1991 and Nomocytherinina Liebau 1991. However, at least three superfamilies cannot fit into either of the proposed infraorders, so this systematic division is not widely accepted and will not be considered here.

Suborder Cytherocopina contains about 15 superfamilies, most of which are known only after fossils, and only the superfamily Cytheroidea has representatives in freshwater ecosystems.

Diagnosis (after Horne et al. 2002): Carapace mostly 1 mm long or less, shape extremely variable (elongate, quadrate, round, etc.) (Figs. 1 and 2). Valves smooth or strongly ornamented with spines, nodes, ridges, alae, etc. (Figs. 1–3). Valves usually with well-developed fused zone and CIL, often with selvages and lists. Hinge well developed, complex, and rarely adont (Fig. 4). CMS pattern consists of four or five scars in a vertical row (Figs. 5a, b and 6b). Sieve pores present (Fig. 6a) or absent. Females with seven pairs of appendages, UR reduced. A1 5- to 7-segmented (Figs. 8 and 6e). Exopod on A2 representing a segmented or unsegmented spinneret seta connected to a gland at the base of the limb, sometimes sexually dimorphic (Fig. 7). Md vibratory plate with up to seven setae (Fig. 9). Mxl with a large vibratory plate (Fig. 10) bearing .unreflexed setae and up to four reflexed setae. Male brush-shaped organ present (Fig. 11d). L5, L6, and L7 walking legs, sometimes sexually dimorphic (Figs. 12 and 6c, d, g). Hemipenis with sperm pump incorporated (no Zenker organ) (Figs. 13, 14, 6d). In males, UR incorporated in hemipenis. Females sometimes with extended posterior brood chamber.

The following families are represented in the freshwater ecosystems: Cytherideidae, Entocytheridae, Kliellidae, Leptocytheridae, Limnocytheridae, and Loxoconchidae. In the publication of Martens et al. (2007), families Cytheruridae and Xestoleberididae were included in the list of ostracod families with recent freshwater representatives. However, all these species have been found in highly saline waters, such as marine bays, estuarine waters, mangroves, and at the most brackish waters; therefore, they are not included in this book.

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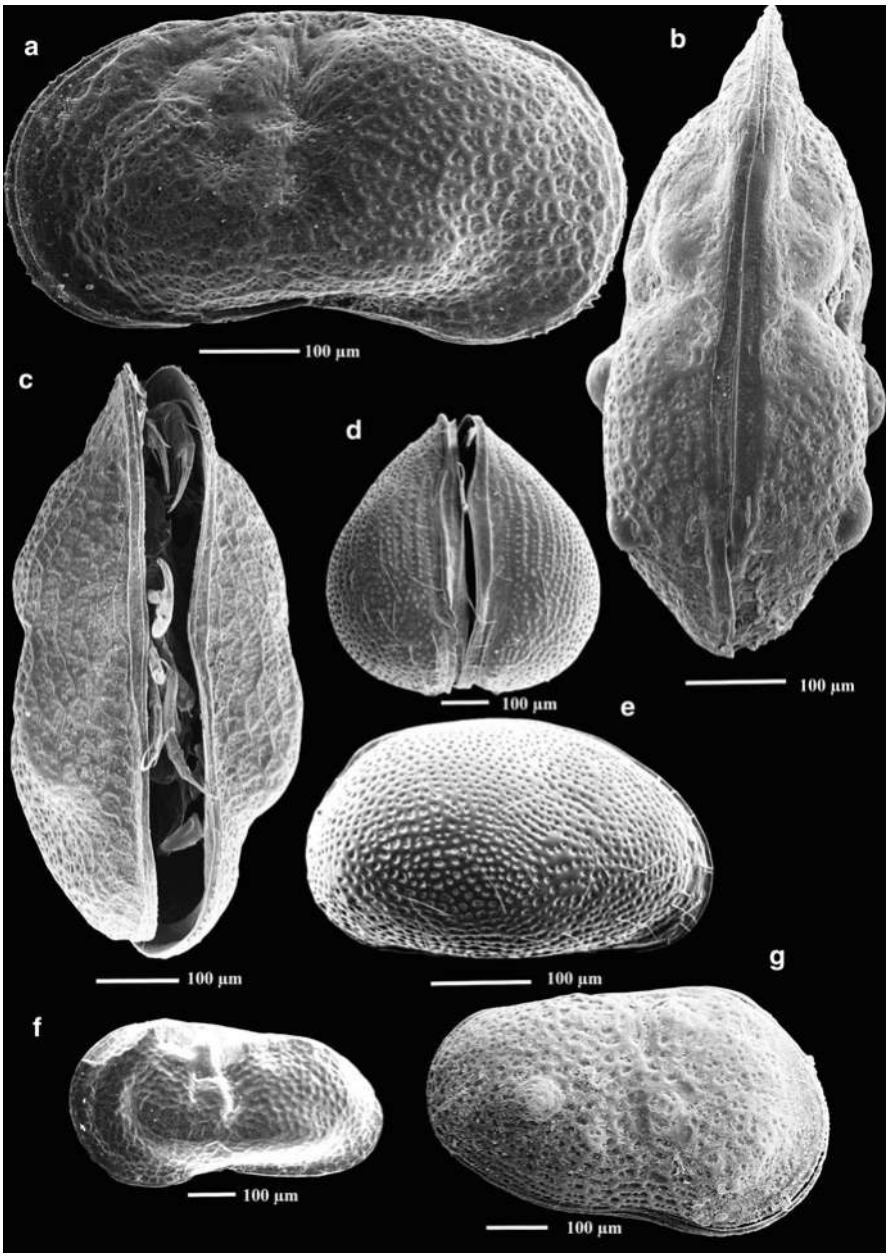

Fig. 1 SEM: (**a**, **b**, **c**) *Limnocythere inopinata* (Baird 1843a); (**d**, **e**) *Metacypris cordata* Brady and Robertson 1870; (**f**) *Leucocythere mirabilis* Kaufmann 1892; (**g**) *Cytherissa lacustris* Sars 1863: (**a**, **f**) lateral view from the left side; (**b**) dorsal view; (**c**, **d**) ventral view; (**e**, **g**) lateral view from the right side. Photos: D. Keyser

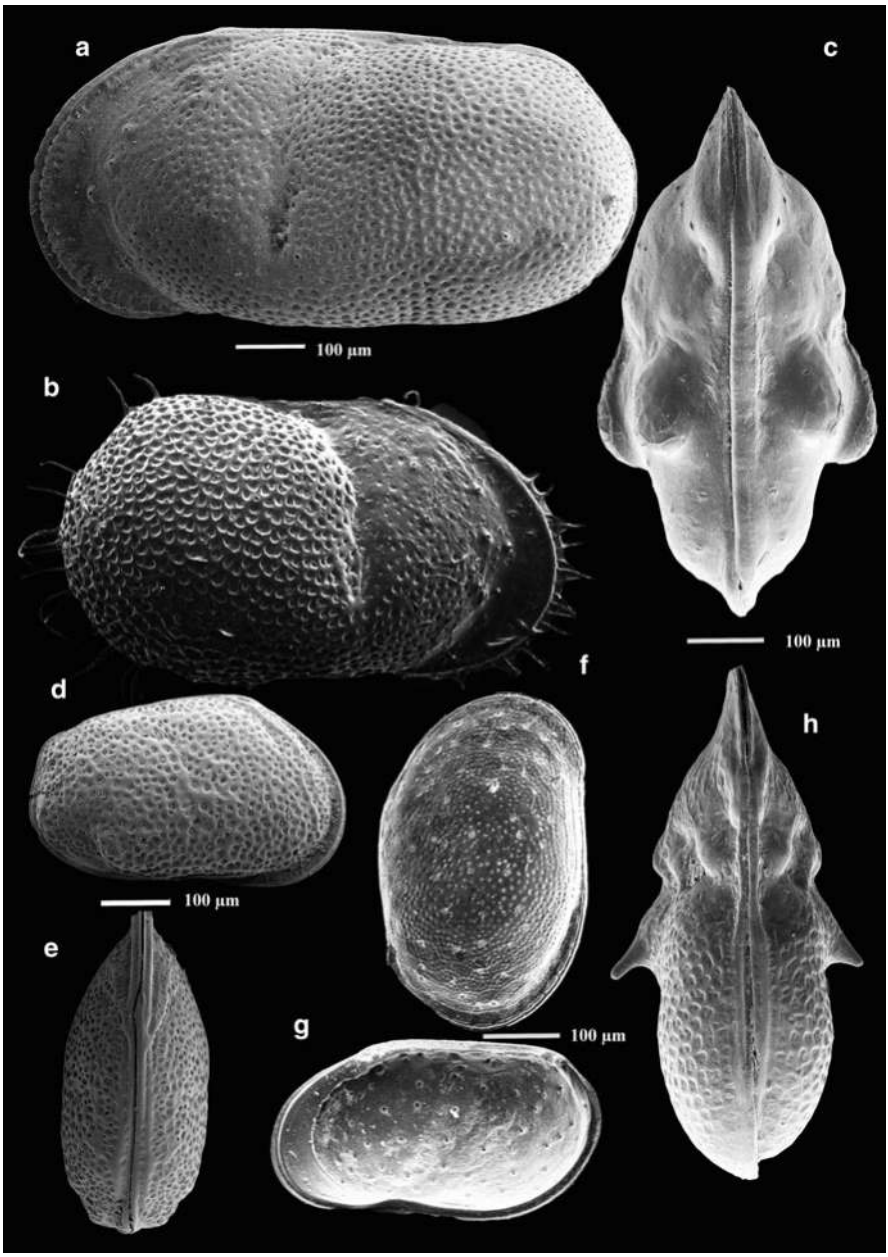

Fig. 2 SEM: (**a**) *Gomphocythere sp.*; (**b**) *Cytheridella sp.*; (**c**) *Paralimnocythere karamani* (Petkovski 1960a); (**d**, **e**) *Cytheromorpha fuscata* (Brady 1869); (**f**, **g**) *Loxoconcha elliptica* Brady 1868; (**h**) *Limnocythere scutariense* Petkovski 1961: (**a**) LV, outside view; (**b**, **d**, **f**) RV, outside view; (**c**, **e**, **h**) dorsal view; (**d**), RV, inside view. Photos: D. Keyser.

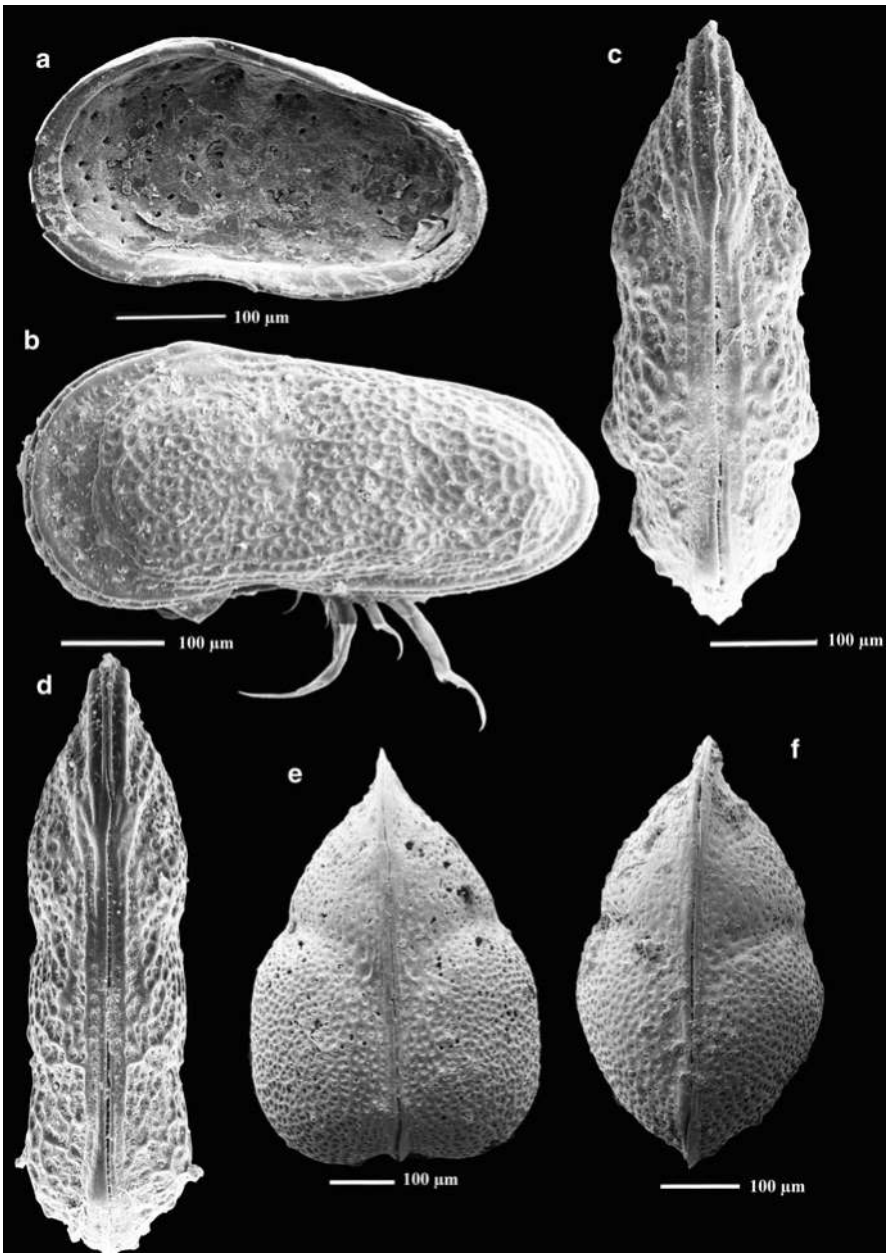

Fig. 3 SEM: (**a**) *Cytherissa lacustris* Sars 1863; (**b**–**d**) *Leptocythere ostrovskensis* Petkovski and Keyser 1992; (**e**, **f**) *Gomphodella sp.*: (**a**) RV, inside view; (**b**) lateral view from the right side; (**c**, **e**) dorsal view, ♀; (**d**, **f**) dorsal view, ♂. Photos: D. Keyser

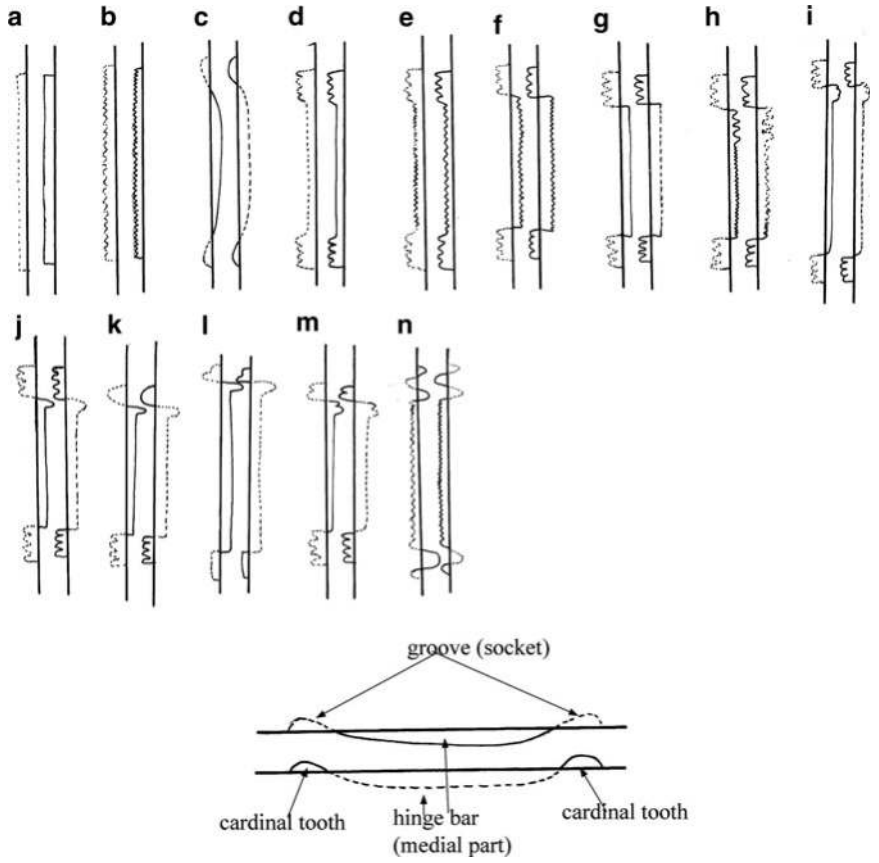

Fig. 4 Hinge types (**a**) adont; (**b**) prionodont; (**c**) lophodont; (**d**)–(**g**) merodont types; (**h**) entomodont; (**i**) lobodont; (**k**)–(**l**) amphidont types; (**m**) schizodont; (**n**) gongylodont. Modified after Scott (1961)

Key to the families with freshwater representatives

1. Male L6 asymmetrical, those on the left side normally developed, on the right side transformed ..... Cytherideidae Sars 1925

– Male L6 not asymmetrical, but sometimes transformed 2

2. Mxl with only one masticatory lobe (Fig. 10e) ..... Entocytheridae Hoff 1942

– Mxl with three masticatory lobes (Fig. 10c) 3

3. Mxl vibratory plate reduced and with only two or three setae...Kliellidae Schäfer 1945

– Mxl vibratory plate not reduced and with numerous setae (Fig. 10f) 4

4. Terminal segment of A2 with three claws (Fig. 7a, d) ... Limnocytheridae Klie 1938a

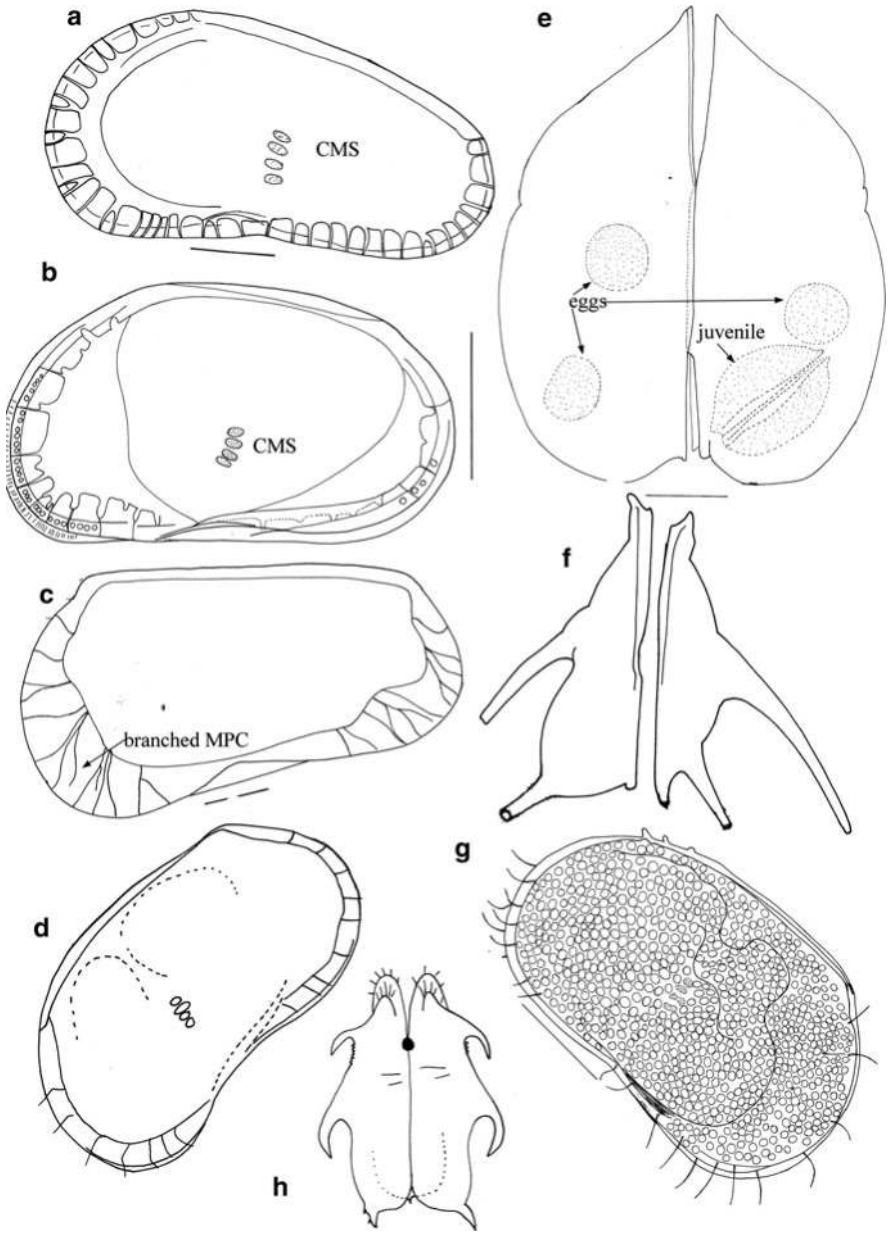

Fig. 5 Line drawings: (**a**) *Leptocythere pseudoproboscidea* Karanovic and Petkovski 1999a; (**b**) *Pseudolimnocythere hartmanni* Danielopol 1979; (**c**) *Paralimnocythere karamani* (Petkovski 1960a); (**d**) *Koranocythere ugiensis* Martens 1996; (**e**) *Gomphodella hirsuta* Karanovic 2006a; (**f**) *Kovalacythereis braconensis* Wouters 1979; (**g**) *Limnocythere dorsosicula* De Deckker 1982c; (**h**) *Neolimnocythere hexaceros* Delachaux 1927: (**a**–**c**) RV inside view; (**d**, **g**) carapace outside view; (**e**, **f**, **h**) carapace, dorsal view. Scales = 0.1 mm. (**d**) modified after Martens (1996): p. 57, Fig. 3a; (**f**) modified after Wouters and Martens (2000): p. 214, Plate 4, Fig. 5; (**h**) modified after Delachaux 1928: p. 73, Fig. 46

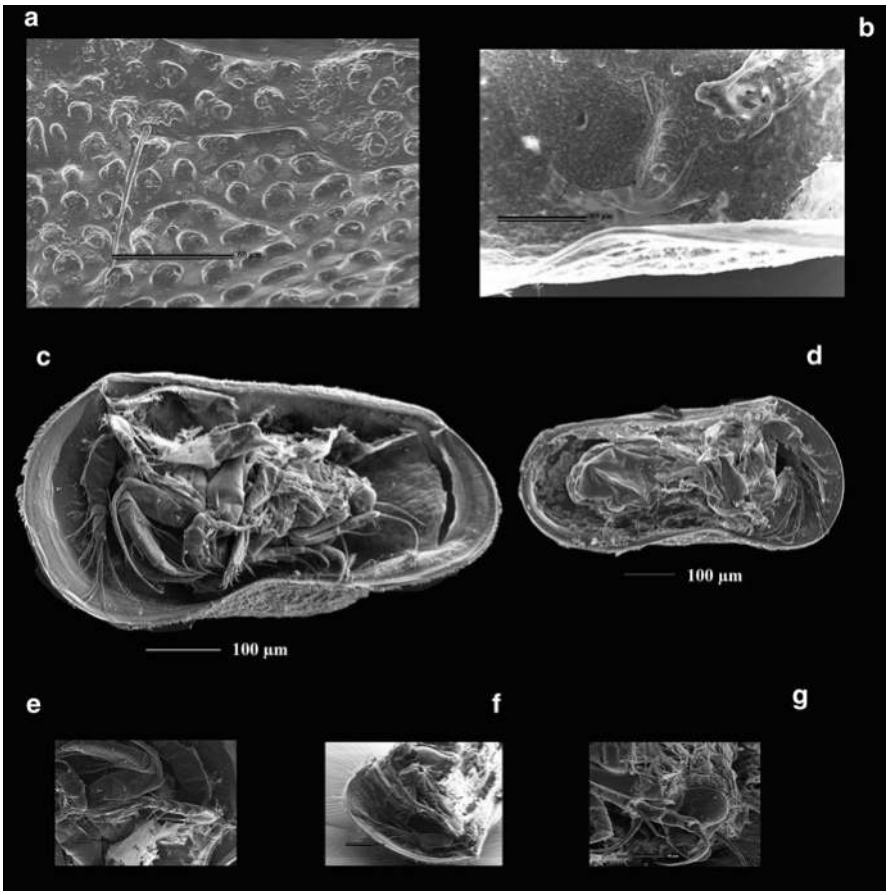

Fig. 6 SEM: (**a**) *Gomphodella aurea* Karanovic 2009; (**b–g**) *Paralimnocythere karamani* (Petkovski 1960a): (**a**) detail of the surface; (**b**) CMS; (**c**) ♀, inside view; (**d**) ♂, inside view; (**e**) A1; (**b**) frontal view; (**g**) genital field of ♀

– Terminal segment of A2 with two claws (Fig. 7g) 5

5. Md vibratory plate with only two setae .....Leptocytheridae Hanai 1957

– Md vibratory plate with four setae ..... Loxoconchidae Sars 1925

1 Family Cytherideidae Sars 1925

Diagnosis (after Hartmann and Puri 1974 and Meisch 2000): Carapace ovate, reniform, or quadrate. Valves heavily calcified, often ornamented. Vestibulum sometimes absent. MPC numerous, straight or bifurcate, often long. Four CMS

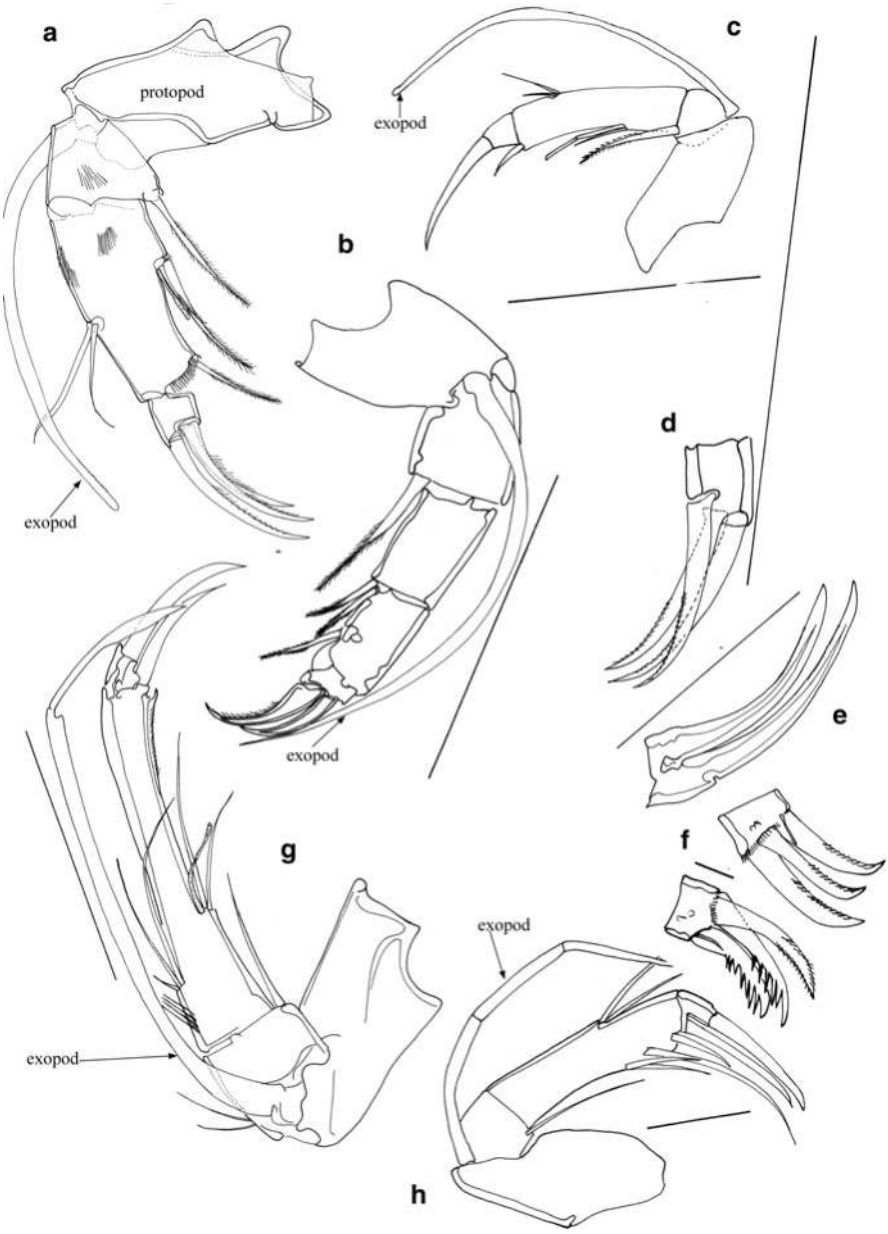

Fig. 7 Line drawings: **(a)** *Limnocythere dorsosicula* De Deckker 1982a, b, c; **(b)** *Entocythere donnaldsonensis* Klie 1931a, b; **(c)** *Dolekiella europea* Gidó et al. 2007; **(d)** *Gomphodella glomerosa* Karanovic 2006a; **(e)** Cyprideis inermis Klie 1939a, b, c, d, e, f, g; **(f)** *Intrepidocythere ibipora* Pinto et al. 2008; **(g)** *Loxoconcha dimorpha* Hartmann 1959; **(h)** *Archeocyprideis tuberculata* Ducasse and Carbonel 1994: A2. Scales: a, b, d, e, g = 0.1 mm; c ¼ 0.05 mm; f = 10 mm; h = 50 mm. (c) modified after Gidó et al. (2007): p. 112, Fig. 4b; (**f**) modified after Pinto et al. (2008): p. 34, Fig. 2b, c; (**h**) modified after Wouters and Martens (2000): p. 209, Plate 1, Fig. 4

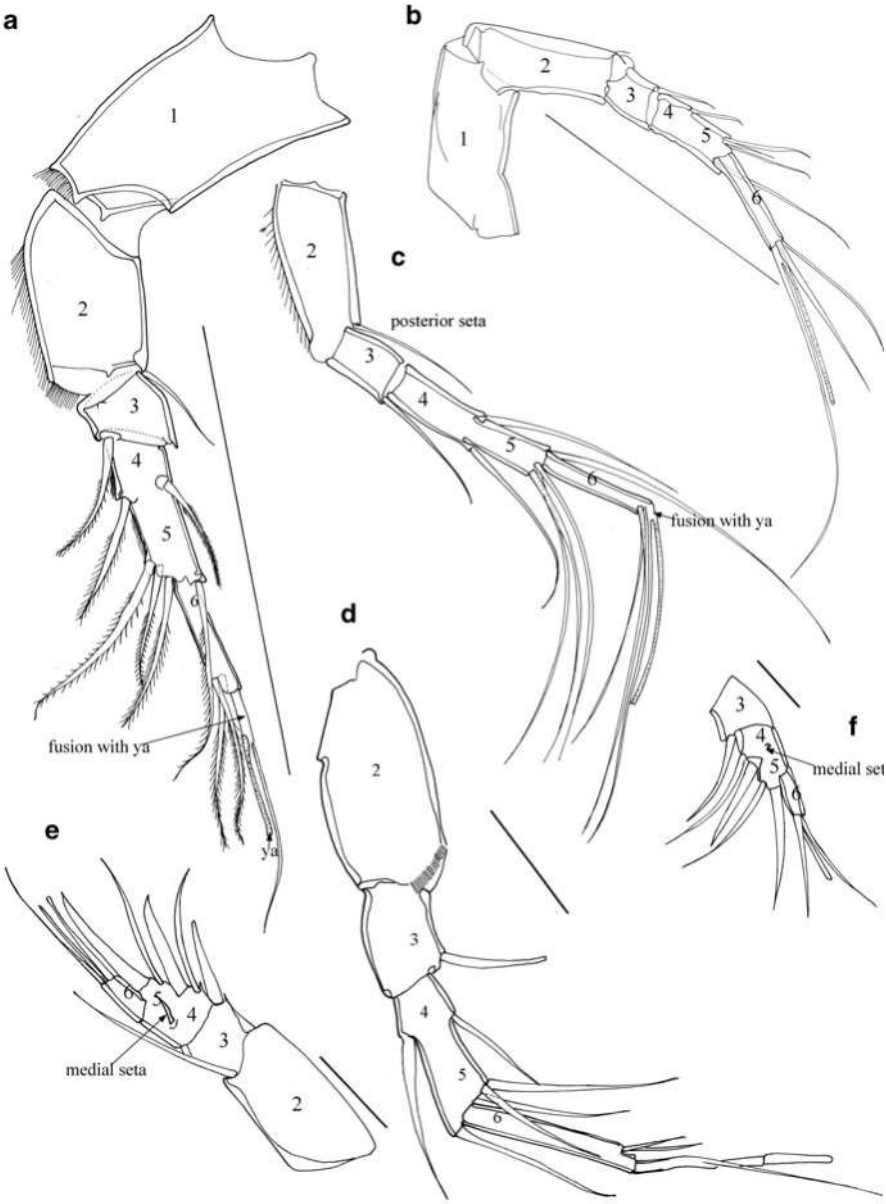

Fig. 8 Line drawings: **(a)** *Limnocythere dorsosicula* De Deckker 1982a, b, c; **(b)** *Gomphodella glomerosa* Karanovic 2006a; **(c)** *Pseudolimnocyhtere hartmanni* Danielopol 1979; **(d)** *Kiwicythere anneari* Martens 1992a, b, c; **(e)** *Romecytheridea longior* Wouters and Martens 1999; **(f)** *Tanganyikacythere fulgens* Wouters and Martens 2007: A1. Scales: a–c = 0.1 mm; d = 29 mm; e, f = 50 mm. (**d**) modified after Martens (1992a, b, c): p. 150, Fig. 14c; (**e**) modified after Wouters and Martens (1999): p. 69, Plate 1, Fig. 3; (**f**) modified after Wouters and Martens (2007): p. 149, Plate 1, Fig. 3

Fig. 9 Line drawings: (**a**) *Gomphodella glomerosa* Karanovic 2006a; (**b**) *Gomphocythere angulata* Lowndes 1932a; (**c**) *Kovalevskiella rudjakovi* (Danielopol 1970); (**d**) *Afrocythere rostrata* Klie 1935a; (**e**) *Entocythere donnaldsonensis* Klie 1931a. **a**, **e**, Md; **b**, **c**, **d**, Md-palp. Scales = 0.1 mm

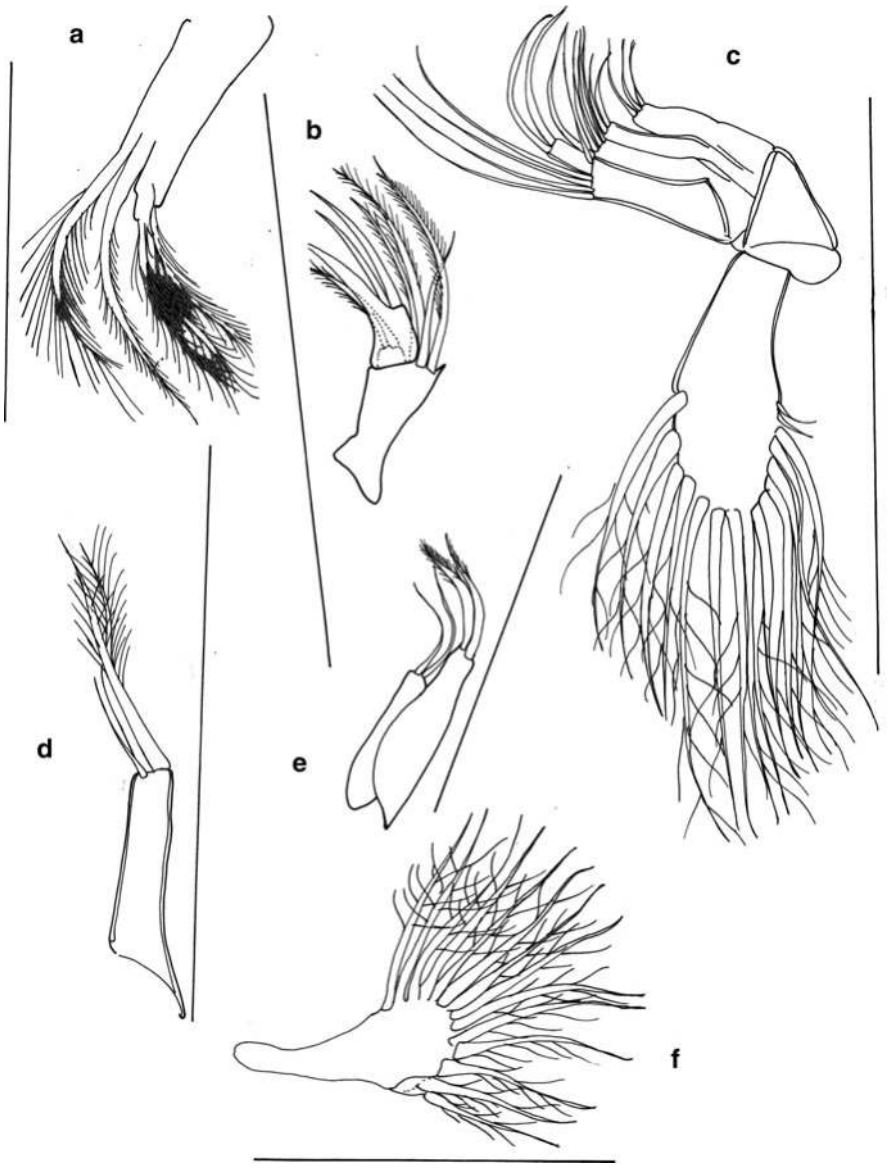

Fig. 10 Line drawings: (**a**) *Gomphocythere angulata* Lowndes 1932a; (**b**) *Limnocythere dorsosicula* De Deckker 1982c; (**c**) *Pseudolimnocythere hartmanni* Danielopol 1979; (**d**) *Kovalevskiella rudjakovi* (Danielopol 1970); (**e**) *Entocythere donnaldsonensis* Klie 1931a; (**f**) *Leptocythere pseudoproboscidea* Karanovic and Petkovski 1999a. **a**, **b**, **d**, Mxl-palp; **d**, Mxl; **e**, Mxl-palp and masticatory process; **f**, branchial plate. Scales = 0.1 mm

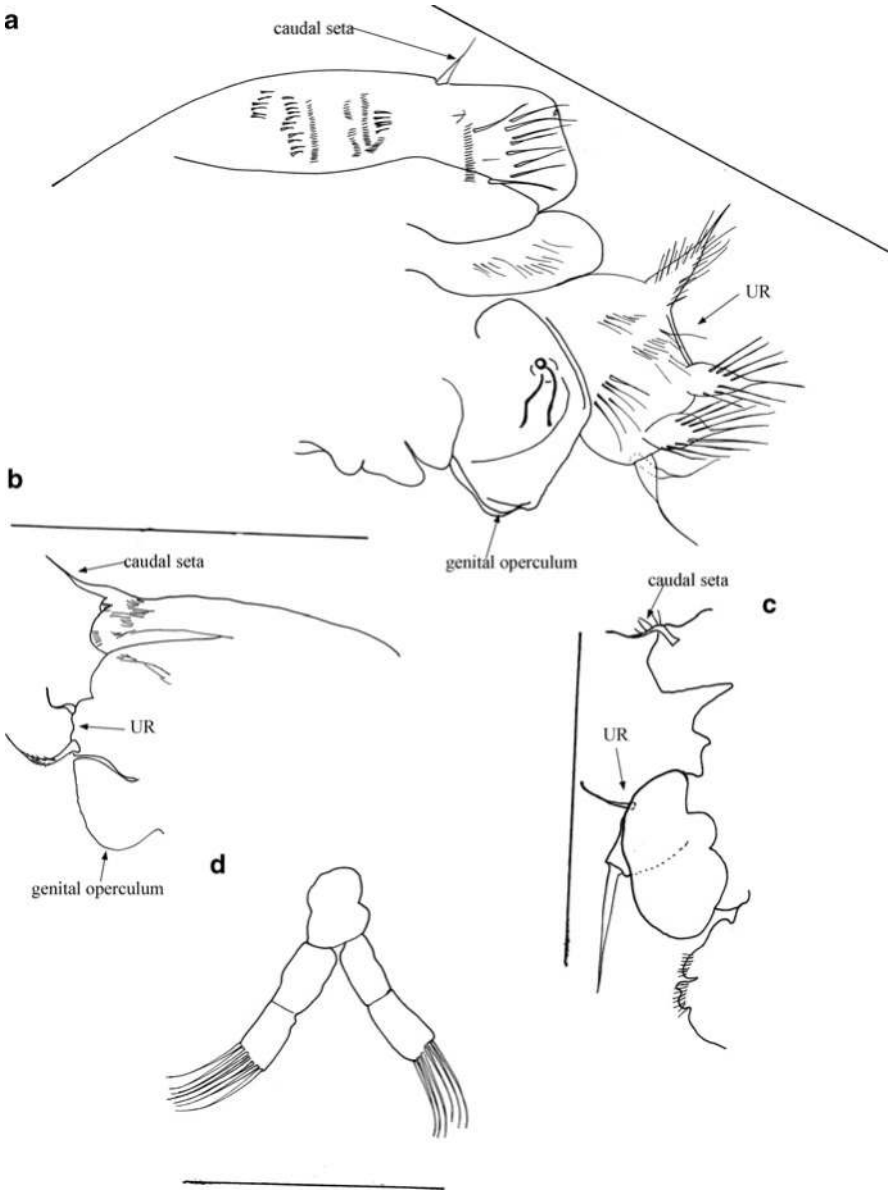

Fig. 11 Line drawings: (**a**) *Gomphodella glomerosa* Karanovic, 2006a; (**b**) *Leptocythere pseudoproboscidea* Karanovic and Petkovski 1999a; (**c**, **d**) *Paralimnocythere karamani* (Petkovski 1960a): (**a**, **b**, **c**) UR and posterior part of the body, ♀; (**d**) brush organ, ♂. Scales = 0.1 mm

Fig. 12 Line drawings: (**a**, **b**) *Leucocythere mirabilis* Kaufmann 1892; (**c**) *Entocythere donnaldsonensis* Klie 1931a; (**d**) *Ovambocythere milani* Martens 1989a; (**e**, **f**) *Cyprideis inermis* Klie 1939g; (**g**, **h**) *Archeocyprideis tuberculata* Ducasse and Carbonel 1994; (**i**, **j**, **k**) *Limnocythere dorsosicula* De Deckker 1982c; (**l**) *Cytheridella damasi* Klie 1944: **a**, **l**, L7 ♀; **b**, **c**, **d**, L7, ♂; **e**, **f**, **g**, **h**, left and right L5, ♂; **i**, **j**, **k**, L5-L7, ♀. Scales: **a**, **b** = 83 μm; **c**, **e**, **f**, **i**, **j**, **k** = 0.1 mm; **d** = 31 μm; **g**, **h** = 50 μm. (**a**, **b**) modified after Danielopol et al. (1989): p. 83, Fig. 19c, g; (**d**) modified after Martens (1989a): p. 382, Fig. 2c; (**g**, **h**) modified after Wouters and Martens (2000): p. 209, Plate1, Figs. 7, 8

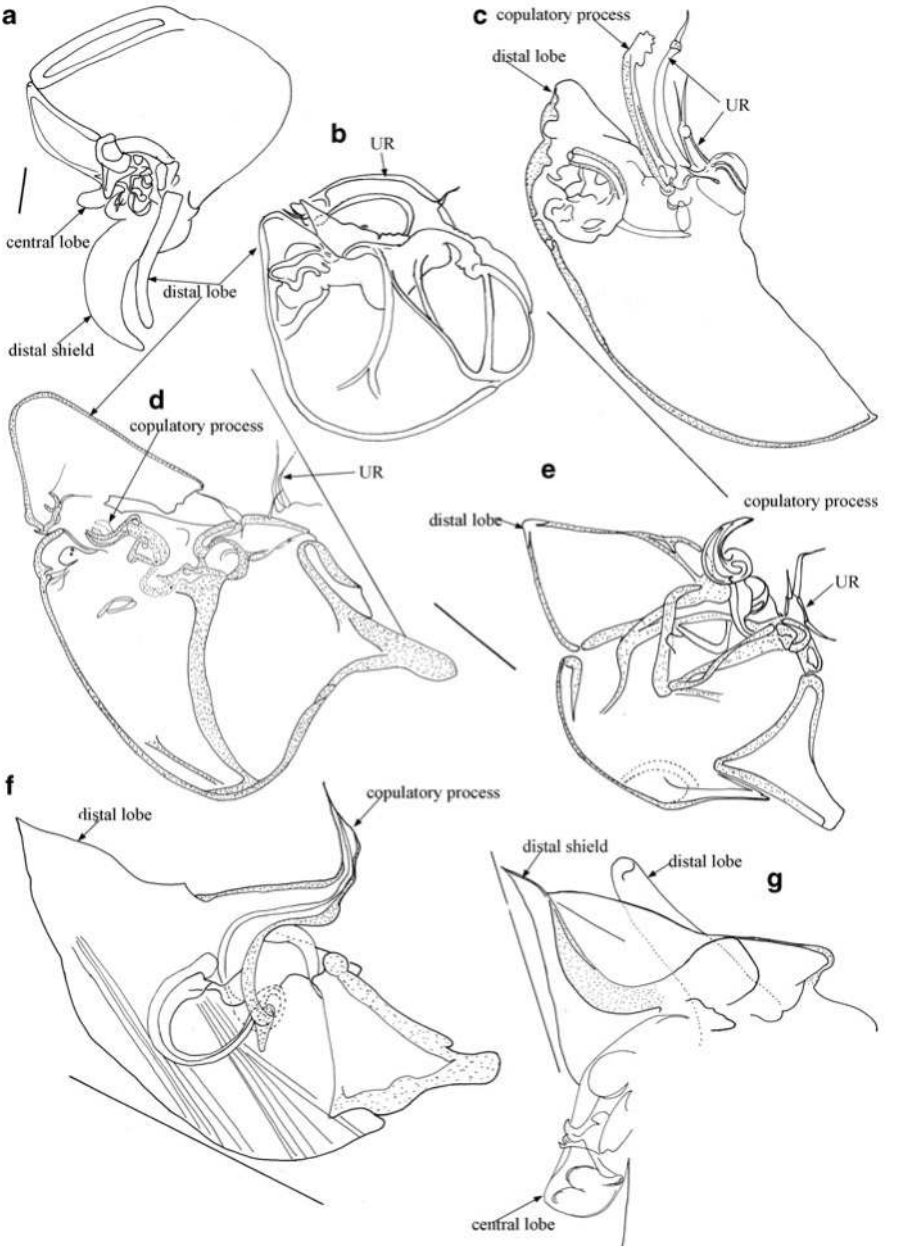

Fig. 13 Line drawings: (**a**) *Tanganyikacythere fulgens* Wouters and Martens 2007; (**b**) *Paracythereis impudica* Delachaux 1928; (**c**) *Entocythere donnaldsonensis* Klie 1931a; (**d**) *Gomphodella hirsuta* Karanovic 2006a; (**e**) *Koranocythere ugiensis* Martens 1996; (**f**) *Leptocythere pseudoproboscidea* Karanovic and Petkovski 1999a; (**g**) *Cyprideis inermis* Klie 1939g: Hemipenis. Scales: **a** = 50 μm; **c**, **d**, **f**, **g** = 0.1 mm; **e** = 33 μm. (**a**) modified after Wouters and Martens (2007): p. 149, Plate 1, Fig. 11; (**b**) modified after Delachaux (1928): p. 77, Fig. 14; (**e**) modified after Martens (1996): p. 57, Fig. 3f

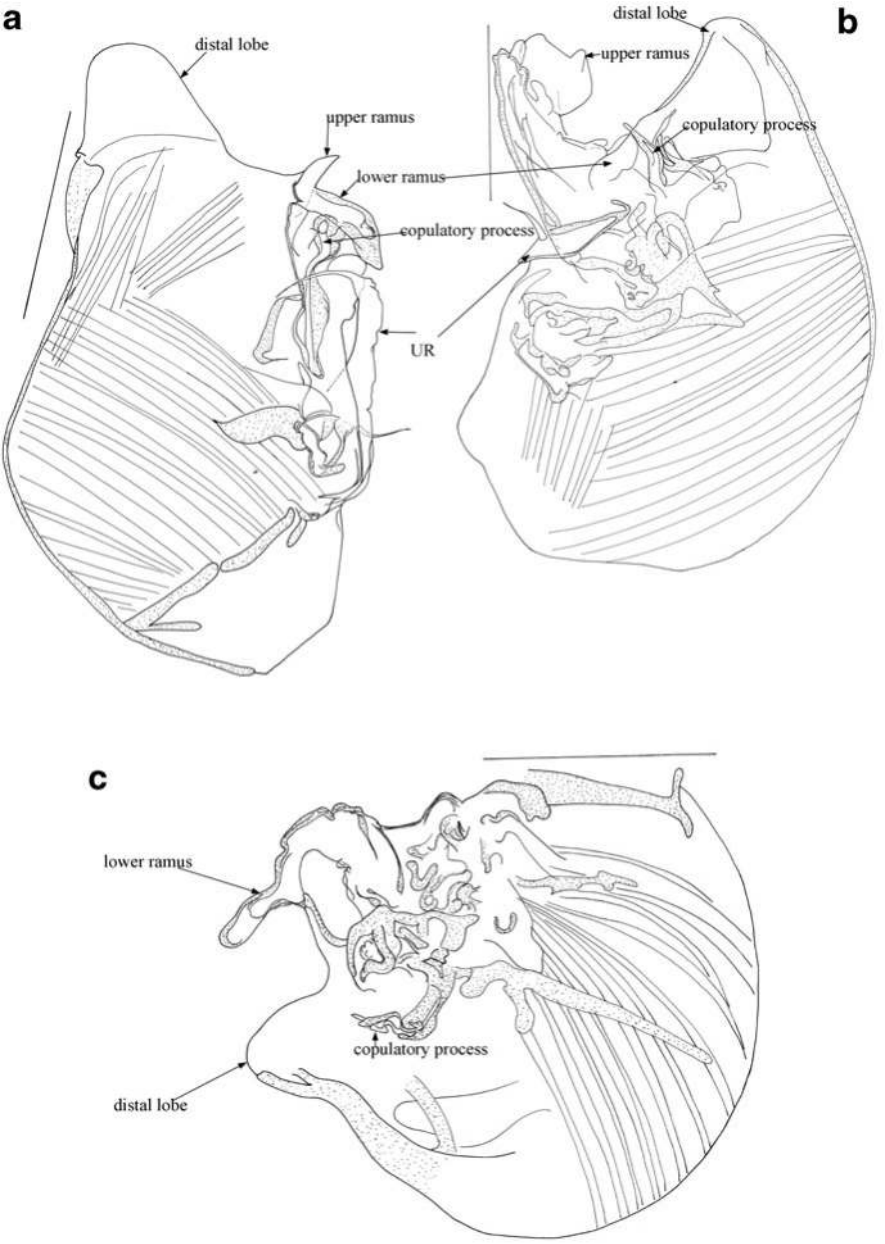

Fig. 14 Line drawings: (**a**) *Paralimnocythere ochridense* (Klie 1934a); (**b**) *Limnocythere neotropica* Klie 1934a (**c**) *Limnocythere coelebs* Klie 1944: Hemipenis. Scales = 0.1 mm

arranged in a vertical row. A1 5-segmented. A2 with exopod well developed. Md-palp 3-segmented. UR small. Females of some genera with brooding pouch. Male L6 asymmetrical; those on the left side of the body normally developed and those on the right side transformed. Hemipenis with large basal capsule and a bilobate distal process.

Type genus: *Cytheridea* Bosquet 1852

Systematics
According to Hartmann and Puri (1974), the family is divided into three subfamilies: Cytherideinae Sars 1925, Schulerideinae Mandelstam 1959, and Cuneocytherinae Mandelstam 1960. Only the first subfamily has living representatives and will be dealt with further in the book.

1.1 Subfamily Cytherideinae Sars 1925

Diagnosis: Since this is the only subfamily of the family Cytherideidae that has living representatives, its diagnosis is the same as that for the family.

Type genus: *Cytheridea* Bosquet 1852

Other genera: There are approximately 50 genera assigned to this subfamily, most of which are from Tertiary and Mesozoic, or inhabit only brackish and marine environments. Only the following genera can be found in freshwater ecosystems: *Archeocyprideis* Ducasse and Carbonel 1994, *Cyprideis* Jones 1857, *Cytherissa* Sars 1925, *Kavalacythereis* Wouters 1979, *Mesocyprideis* Wouters and Martens 1992, *Romecytheridea* Wouters 1988, *Romeis* Sywula 1970a, and *Tanganyikacythere* Ducasse and Carbonel 1993.

Ecology and distribution
Representatives of the subfamily Cytherideinae live in both marine and continental waters. They live on various substrates from fine-grained sediments to coarse sand (Danielopol and Tetart 1990). With the exception of a couple of species from the genera *Cyprideis* Jones 1857 and *Cytherissa* Sars 1925, species inhabit lakes, being especially diverse in ancient lakes such as Baikal and Tanganyika (Mazepova 1990; Wouters and Martens 1992, 1994, 1999, 2000, 2001, 2007).

Key to the genera

1. Terminal segment of A2 with three claws . . . . . .*Cytherissa* Sars 1925

– Terminal segment of A2 with two claws (Fig. 7e) 2

2. Left and right L5 in males indistinctly asymmetrical (Fig. 12g, h) 3

– Left and right L5 in males distinctly asymmetrical (Fig. 12e, f) 5

3. Valves smooth with distinct lateral long projections (Fig. 5f) . . . *Kavalacythereis* Wouters 1979

– Valves sometimes smooth but never with long lateral projections 4

4. Exopod of A2 2-segmented . . . . . .*Mesocyprideis* Wouters and Martens 1992

– Exopod on A2 3-segmnted (Fig. 7h) . . . *Archeocyprideis* Ducasse and Carbonel 1994

5. Medial seta on fourth segment on A1 medium size (about half L of terminal segment) (Fig. 7e) . . . . . *Romecytheridea* Wouters 1988

– Medial seta on the fourth segment on A1 very small (1/10–1/15 of L of terminal segment) (Fig. 8f) 6

6. Hemipenis with central lobe small and hook like (Fig. 13a) . . . *Tanganyikacythere* Ducasse and Carbonel 1993

– Hemipenis with central lobe large and club shaped (Fig. 13g) . . . *Cyprideis* Jones 1857

***Archeocyprideis* Ducasse and Carbonel 1994**

Diagnosis (after Wouters and Martens 2000): Valves elongated with bluntly pointed, triangular posterior margin; hinge tripartite, median element bipartite with short antero-median element; valve surface ornamented with pits and nodes, or smooth; vestibulum absent; medial seta on the fourth segment of A1 medium size; exopod of A2 3-segmented, terminal segment short (Fig. 7h). L5 in males weakly asymmetrical, right one being only slightly broader than the left one (Fig. 12g, h). Distal shield of hemipenis with anvil-shaped terminal margin; central lobe club shaped.

Type (and only) species: *A. tuberculata* Ducasse and Carbonel 1994

Species list with type locality and type material

A. tuberculata Ducasse and Carbonel 1994. Mutanbala River mouth, Burton Bay, Lake Tanganyika, DR Congo, 04°19′S 29°05′E: Repository of the type material unknown.

Remarks, Ecology, and Distribution

This monospecific genus seems to be endemic to Lake Tanganyika. The original description was based on the subfossil specimens (Ducasse and Carbonel 1994). Later on, Wouters and Martens (2000) collected more material from different localities in Lake Tanganyika and described the soft parts of the species. They have also collected one more new species from the same genus, which has not been described so far.

***Cyprideis* Jones 1857**

Diagnosis (after Wouters and Martens 1999): Rounded valves, hinge tripartite, medial element bipartite, valves smooth to ornamented with pits and/or nodes. Medial seta on fourth segment of A1 very small (1/10–1/15 L of terminal segment). Exopod on A2 3-segmented (Fig. 7e). Asymmetry in male L5 very strong, with large subquadrate terminal segments on the right leg (Fig. 12e, f). Female carapace with a weakly inflated posterior brood chamber.

Type species: *C. torosa* (Jones 1850)

Species list with type locality and type material

1. *C. aciculata* Wouters and Martens 2007. W of Sumbu, Chimba, Lake Tanganyika, Zambia, 08°25′29″S 30°27′27″E: Holotype (♂), RBINS – O.C. 2946a, 2946b.
2. *C. loricata* Wouters and Martens 2001. Gitaza, Lake Tanganyika, Burundi, 03°37′02″S 29°20′46″E: Holotype (♂), RBINS – O.C. 2314a, 2314b, 2314c.
3. *C. mastai* Wouters and Martens 1994. Delta of the River Nyengwe, Lake Tanganyika, Burundi, 04°10’50″S, 29°30’20″E: Holotype (♂), RBINS – O.C. 1753b.
4. *C. profunda* Wouters and Martens 1999. Bay S of Cape Kibwesa, Lake Tanganyika, Tanzania, 06°30′01″S 29°57′19″E; Holotype (♂), RBINS – O.C. 2263a, 2263b.
5. *C. rumongensis* Wouters and Martens 1994. Delta of River Dama, near Rumoge, Lake Tanganyika, Burundi, 03′58″21″S 29°26′15″E: Holotype (♂), RBINS – O.C. 1765a.
6. *C. spatula* Wouters and Martens 1999. Village Kaparamsenge, Tanzania, Lake Tanganyika, 05°48′32″S 29°56′43″E: Holotype (♂), RBINS – O.C. 2249a, 2249b.
7. *C. torosa* (Jones 1850). England, UK. No more details on the locality. Repository of the type material unknown.
   Syn.: *C. littoralis* (Brady 1870b); *C. padaschenkoi* (Daday 1909); *C. aegyptiaca* (Daday 1910b).

Key to the species

1. Valves strongly ornamented 2
– Valves smooth or at the most pitted 3
2. Dorsal and ventral margin tapering toward the posterior end ... *C. loricata* Wouters and Martens 2001
– Dorsal and ventral margin almost parallel ..... *C. aciculata* Wouters and Martens 2007
3. RV with postero-ventral spine ..... *C. torosa* (Jones 1850)
– RV without postero-ventral spine 4

4. Valves strongly pitted ..... *C. profunda* Wouters and Martens 1999
– Valves finely pitted or smooth 5
5. Dorsal and ventral margin parallel ..... *C. spatula* Wouters and Martens 1999
– Dorsal and ventral margin tapering 6
6. Valves subtrapezoidal ..... *C. mastai* Wouters and Martens 1994
– Valves elongated ..... *C. rumongensis* Wouters and Martens 1994

Remarks
Cyprideis torosa (Jones 1850) is a very variable species. Some specimens bear nodes and some are without nodes on their carapace. There are two opinions regarding the cause of the nodes. One is that this is genetically influenced, and the other that it is influenced by the change in the salinity (nodes develop in less saline waters). For a detail discussion on the problem, see Meisch (2000) and Keyser (2005).

Ecology and Distribution (Fig. 15)
Cyprideis torosa (Jones 1850) can be found in a wide salinity range, but it mainly occurs in high saline and brackish waters, although it can be found in pure freshwater lakes (Klie 1938a). Other species of the genus live in freshwater lakes. *Cyprideis torosa* has a wide distribution, while the rest of the species are endemic to Lake Tanganyika.

Fig. 15 Distribution of *Cyprideis* Jones 1857: Numbers correspond to the species list. *Note*: Wide range of distribution of Cyprideis torosa (Jones 1850) not shown

***Cytherissa* Sars 1925**

Diagnosis (after Meisch 2000): Carapace wedge shaped in lateral view, anteriorly higher than posteriorly (Figs. 1g and 3a). Valves strongly calcified, and surface strongly ornamented. Terminal segment of A2 with two claws. Medial and lateral processes on the hemipenis short. UR with two short setae. Female genital lobe prominent. Carapace of female lacking brood chamber.

Type species: *C. lacustris* (Sars 1863)

Species list with type locality and type material

The repository of the type material of the *Cytherissa* Sars 1925 species from the Baikal Lake is not known.

Other species: *C. angustimarginata* Mazepova, 1990; *C. anisoptera* Mazepova, 1990; *C. attenuata* Mazepova, 1984; C. *baikalensis* Bronstein, 1930; *C. bisetosa* Mazepova, 1984; C. *burchani* Mazepova, 1990; *C. calva* Mazepova, 1990; *C. compta* Mazepova, 1990; *C. confilis* Mazepova, 1990; *C. crepera* Mazepova, 1990; *C. cymulata* Mazepova, 1984; *C. cytheriformis* Bronstein, 1947; *C. derupta* Mazepova, 1990; *C. dextima* Mazepova, 1984; *C. donquixotei* Mazepova, 1990; *C. dubitabilis* Bronstein, 1947; *C. elongata* Bronstein, 1947; *C. excelsa* Mazepova, 1990; *C. excelsiformis* Mazepova, 1990; C. *fuscata* Bronstein, 1947; *C. galyschkinae* Mazepova, 1990; *C. glomerata* Mazepova, 1990; *C. interposita* Bronstein, 1947; *C. lata* Bronstein, 1930; *C. latirecta* Mazepova 1985; *C. latiundata* Mazepova, 1985; *C. magna* Mazepova, 1990; *C. microexculpta* Mazepova, 1984; *C. minor* Mazepova, 1990; *C. mirabilis* Bronstein, 1947; *C. multipora* Mazepova, 1984; *C. nana* Mazepova, 1984; *C. neobaikaliensis* Mazepova, 1984; *C. ovata* Bronstein, 1947; *C. parallela* Bronstein, 1947; *C. parva* Mazepova, 1984; *C. pennata* Mazepova, 1990; *C. placida* Mazepova, 1990; *C. pusilla* Mazepova, 1985; *C. pterygdota* Bronstein, 1947; *C. puscharevi* Mazepova, 1990; *C. sernovi* Bronstein, 1930; *C. cinistra* Mazepova, 1984; *C. sinistrodentata* Bronstein, 1930; *C. ssorensis* Mazepova, 1990; *C. tenella* Mazepova, 1984; *C. triangulata* Bronstein, 1947; *C. truncta* Bronstein, 1930; *C. tuberculata* Bronstein 1930; *C. ushkani* Mazepova, 1990; *C. uvaeformis* Mazepova, 1990; C. *verrucosa* Mazepova, 1990.

Remarks, Ecology, and Distribution

With the exception of *Cytherissa lacustris* (Sars 1863), all the other species are endemic to Lake Baikal. Most of the Baikal species are described only on the basis of the carapace appearance, and a key to their identification is provided in Mazepova (1990). The differences between some species are sometimes really small, but in some cases it is obvious that the author was dealing with more than one species. Therefore, it is very hard to provide an accurate key to the species of the genus without a thorough revision on the type material. Based on molecular data, Schön et al. (2000) suggested the presence of at least two separate lineages in Lake Baikal, which are not congruent with those postulated by Danielopol et al.

(1990) based on morphological data. On the contrary, *C. lacustris* is widely distributed in the sublittoral and profundal zones of cold deep lakes, shallow ponds, and swamps. It can also be found in slightly saline waters. It is generally distributed in the Holarctic.

***Kavalacythereis* Wouters 1979**

Diagnosis (after Wouters and Martens 2000): Medium-sized to large valves with postero-dorsal and ventro-lateral hollow spines (Fig. 5f); large anterior and posterior vestibulum; numerous compound MPC; hinge tripartite. Brood pouch of female elongate. Anterior flange strongly developed. Spiky hairs on anterior and posterior margin absent. A2 exopod 3-segmented; medial seta on the fourth segment of A1 short to medium size; dimorphism between left and right male L5 indistinct. Hemipenis with elongate triangular dorsal shield, small copulatory process, and hook-like central lobe.

Type (and only) species: *K. braconensis* Wouters 1979

Species list with type locality and type material

K. braconensis Wouters 1979. Bracone Bay, Kavala Island, Lake Tanganyika, DR Congo, 05°39'S 29°25'E: Holotype (♂, RV), RBINS – O.C. 1048.

Ecology and Distribution

The species was collected from several localities in Lake Tanganyika (Wouters 1979; Wouters and Martens 2000).

***Mesocyprideis* Wouters and Martens 1992**

Diagnosis (after Wouters and Martens 2001): Valves subtrapezoidal, ornamented with pits or nodes; caudal process and ventro-lateral ala more or less developed; hinge mostly tripartite. Medial seta on the fourth segment of A1 very long (three times L of terminal segment). Exopod of A2 2-segmented. Male L5 almost symmetrical. Female with a brood chamber.

Type species: *M. irsacae* (Kiss 1959a)

Species list with type locality and type material

1. *M. irsacae* (Kiss 1959a). Shallow water between emerging macrophytes, opposite beach at Uvira, Lake Tanganyika, DR Congo, 03°24′23″S 29°08′06″E: Holotype was not designated, type material (syntypes) contains various specimens dissected on three slides and deposited at RMCA – RC.05329.
2. *M. nitida* Wouters and Martens 2001. River Mitumba, Ngombe National Park, Lake Tanganyika, Tanzania, 04°38′22″S 29°37′45″E: Holotype (♂), RBINS – O.C. 2326a, 2326b.
3. *M. pila* Wouters and Martens 1999. Bay S of Karema, Lake Tanganyika, Tanzania, 06°52′S 30°32′E: Holotype (♂), RBINS – O.C. 2272a, 2272b.

Key to the species

1. Valves very lightly ornamented, distal shield of hemipenis very large with a prolonged triangular extremity ..... *M. nitida* Wouters and Martens 2001

– Valves heavily calcified and strongly ornamented, hemipenis without a prolonged triangular extremity 2

2. Caudal process on the valves in dorsal view very well developed ... *M. pila* Wouters and Martens 1999

– Caudal process on the valves in dorsal view very small ... *M. irsacae* (Kiss 1959a)

Ecology and Distribution (Fig. 16)
The species are endemic to Lake Tanganyika.

***Romecytheridea* Wouters 1988**

Diagnosis (after Wouters and Martens 2001): Elongated valves, hinge tripartite, median element bipartite; valve surface ornamented with pits or nodes. Anterior marginal rim present in some species. Medial seta on the fourth segment of A1 medium sized (approximately ½ L of terminal segment) (Fig. 8e). L5 in males symmetrical. Female with a brood chamber.

Type species: *R. tenuisculpta* (Rome 1962)

Species list with type locality and type material

1. *R. ampla* Wouters 1988. Bay of Bracone, Isle of Kavala, Lake Tanganyika, DR Congo, 05°39′S 29°22′E: Holotype (♀), RBINS – O.C. 1295.

Fig. 16 Distribution of *Mesocyprideis* Wouters and Martens 1992: Numbers correspond to the species list

2. *R. bacata* Wouters and Martens 2007. Chimba, W of Sumbu, Lake Tanganyika, Zambia, 08°25′29″S 30°27′27″E: Holotype (♂), RBINS – O.C. 2966a, 2966b.
3. *R. belone* Wouters and Martens 2001. Punda Point, Kipili mainland, Lake Tanganyika, Tanzania, 07°26′39″S 30°35′32″E: Holotype (♂), RBINS – O.C. 2291a, 2291b.
4. *R. longior* Wouters and Martens 1999. Village Karonda, Lake Tanganyika, Burundi, 04°04′33″S 29°29′30″E: Holotype (♂), RBINS – O.C. 2240a, 2240b.
5. *R. plegma* Wouters and Martens 2001. Mtosi Bay, Lake Tanganyika, Tanzania, 07°35′S 30°39′E: Holotype (♂), RBINS – O.C. 2303a, 2303b.
6. *R. tenuisculpta* (Rome 1962). Kalemie, 1 km from the coast of Lake Tanganyika, DR Congo, 05°56′S 29°11′E: Holotype (♀, carapace), RBINS – O.C. 1295.

Key to the species

1. Postero-ventral hollow tubercles absent in female 2

– Postero-ventral hollow tubercles present in female 3

2. Anterior marginal rim absent ..... *R. longior* Wouters and Martens 1999

– Anterior marginal rim present ..... *R. plegma* Wouters and Martens 2001

3. MPC not branched ..... *R. bacata* Wouters and Martens 2007

– MPC branched 4

4. Dorsal shield of hemipenis with needle-shaped process. . .*R. belone* Wouters and Martens 2001

– Dorsal shield of hemipenis distally rounded 5

5. Vestibulum very poorly developed (almost absent), MPC long, nodes on the carapace poorly developed ..... *R. tenuisculpta* (Rome 1962)

– Vestibulum clearly visible, MPC short, nodes on the carapace well pronounced ..... *R. ampla* Wouters 1988

Ecology and Distribution (Fig. 17)
The species are endemic to Lake Tanganyika.

***Romeis* Sywula 1970a**

Diagnosis (modified after Sywula 1970a): Female carapace club shaped, with distinct eye spot, and sides undulated. Surface of the carapace with ridges, reticulated or pitted; several postero-ventral spines present. MPC simple. A1 5-segmented. Terminal segment of A2 with only two claws. One pair of appendages inserted between and somewhat behind Mxl: these appendages are 2-segmented, distally with several claws and one long seta. Penultimate segment of L5 subdivided. UR with two setae.

Type (and only) species: *R. rivulorum* (Rome 1970)

Fig. 17 Distribution of *Romecytheridea* Wouters 1988: Numbers correspond to the species list

Species list with type locality and type material
R. rivulorum (Rome 1970). Stream, Enfants Noyés, Boitsfort, Belgium, 50°48′36″N 04°24′12″E: Holotype (♀), RBINS – I.G. 13421.

Remarks
Romeis rivulorum (Rome 1970) was originally described in the genus *Cythereis* Jones 1849 from a freshwater body in Belgium (Rome 1943). Meisch (2000) argues that the species was probably erroneously introduced by Dr Rome from marine material into one of his freshwater samples. When erecting the genus, Sywula (1970a) was not certain if it belongs to the subfamily Cytherideinae at all.

***Tanganyikacythere* Ducasse and Carbonel 1993**
Diagnosis (after Wouters and Martens 1994): Valves spherical. Hinge on the RV completely positive or with maximum 2–3 small sockets in the anterior part of the median element. Fused zone with many long, sometimes branched pore canals. Female with small UR. L5 and L6 in males extremely asymmetrical. Hemipenis with central lobe small and hook like (Fig. 13a).

Type species: *T. burtonensis* Ducasse and Carbonel 1993

Species list with type locality and type material
1. *T. burtonensis* Ducasse and Carbonel 1993. Burton Bay, Lake Tanganyika, Zaire, 04°19′S 29°05′E: Holotype (carapace), DGOUB – C.O. 4895.

   Syn.: *T. mondegueri* Ducasse and Carbonel 1993

2. *T. caljoni* Wouters and Martens 1994. Bay in front of Koronda Village, Lake Tanganyika, Burundi, 04°05′13″S 29°29′41″E: Holotype (♂), RBINS – O.C. 1748a, 1748b.

Fig. 18 Distribution of *Tanganyikacythere* Ducasse and Carbonel 1993: Numbers correspond to the species list

3. *T. fulgens* Wouters and Martens 2007. Chimba, W of Sumbu, Lake Tanganyika, Zambia, 08°25′29″S 30°27′27″E: Holotype (♂), RBINS – O.C. 2930a, 2930b.

Key to the species

1. Hinge completely positive in the RV and completely negative in the LV 2

– Hinge not completely positive in the RV or completely negative in the LV ... *T. caljoni* Wouters and Martens 1994

2. Central lobe of the hemipenis has a suboval shape and is slightly curved ... *T. fulgens* Wouters and Martens 2007

– Central lobe of hemipenis hook like ... *T. burtonensis* Ducasse and Carbonel 1993.

Ecology and Distribution (Fig. 18)
The species are endemic to Lake Tanganyika.

2 Family Entocytheridae Hoff 1942

Diagnosis (after Hartmann and Puri 1974 and Meisch 2000): Carapace reniform to elliptical in lateral view, laterally compressed in dorsal view. Carapace weakly calcified. Carapace with or without protuberances, and with or without submarginal setae. Eyes, when present, fused and pigmented. A1 6- or 7-segmented. A2 endopod 4-segmented with two claws on the terminal segment (Fig. 8b). Md-palp 2-segmented (all segments fused, except the distal one) (Fig. 9e). Mxl with only one

masticatory lobe. L5, L6, and L7 walking legs, each terminating in large curved claws (Fig. 12c). Hemipenis complex with a clasping apparatus, two lobes, and a flagellum (Fig. 13c).

Type genus: *Entocythere* Marshall 1903

Systematics
According to Hartmann and Puri (1974), the family is divided into four subfamilies: Entocytherinae Hoff 1942; Sphaeromicolinae Hart 1962; Microsyssitrinae Hart et al. 1967; and Notocytherinae Hart and Hart 1967.

Ecology
All entocytherids are symbionts on the body and appendages of isopods, amphipods, and decapods living in fresh, brackish, or marine waters. They feed on food debris of their hosts.

3 Family Kliellidae Schäfer 1945

Diagnosis (after Hartmann and Puri 1974): Valves elongated, chitinous or very weakly calcified. Anterior end broader than posterior. Surface smooth or with fine ribs. CIL is narrow or completely absent. MPC not visible. Hinge is adont or lophodont. A1 6- or 5-segmented, and A2 4-segmented with small exopod. Md-palp 3-segmented. Vibratory plate on Md reduced, and that of Mxl with only one or two lateral setae. L5–L7 symmetrical and without setae. UR and brush-shaped organ missing.

Type genus: *Kliella* Schäfer 1945

Systematics
The family has only two recent genera: *Kliella* Schäfer 1945 and *Nannokliella* Schäfer 1945.

Key to the genera

1. A1 5-segmented ..... *Kliella* Schäfer 1945

– A1 6-segmented ..... *Nannokliella* Schäfer 1945

Ecology and Distribution
The only two representatives of this family so far have been collected only once from the subterranean waters of Greece.

***Kliella* Schäfer 1945**
Diagnosis (modified after Schäfer 1945): Carapace elongated, smooth. No eyes present. A1 5-segmented. Endopod A2 4-segmented. Terminal segment with two claws and one seta.

Type (and only) species: *K. hyaloderma* Schäfer 1945

Species list with type locality and type material
K. hyaloderma Schäfer 1945. Well in the village Armeni, Greece, 35°25′N 24°09′E: Repository of the type material unknown.

***Nannokliella* Schäfer 1945**
Diagnosis (modified after Schäfer 1945): Carapace elongated, ornamented with longitudinal ridges. A1 6-segmented. Endopod A2 3-segmented, terminal segment with two claws.

Type (and only) species: *N. dictyoconcha* Schäfer 1945

Species list with type locality and type material
N. dictyoconcha Schäfer 1945. Well in the village Armeni, Greece, 35°25′N 24°09′E: Repository of the type material unknown.

4 Family Leptocytheridae Hanai 1957

Diagnosis (after Hartmann and Puri 1974): Elongated carapace, well calcified, with smooth or ornamented surface (Fig. 3b–d). CMS consisting of four scars in a row and the fifth V-shaped in front. CIL broad but irregular. MPC long and branched (Fig. 5a). Hinge merodont to entomodont. A1 5-segmented. A2 with two terminal claws. Exopod well developed. Vibratory plate on Md with one main and one secondary seta. Md-palp short, penultimate segment not longer than other segments. Vibratory plate of Mxl (Fig. 10f) with only one type of setae. L5–L7 walking legs, progressively enlarging from L5 to L7. Anterior margin of basal segment with only one seta. UR with two setae (Fig. 11b). Distal part of hemipenis with two lobes (Fig. 13f).

Type genus: *Leptocythere* Sars 1928

Systematics
The family has only four extant genera: *Callistocythere* Ruggieri 1953, *Cluthia* Neale 1973, *Leptocythere* Sars 1928, and *Tanella* Kingma 1948.

Ecology and Distribution
Most of the species of the family live in brackish and marine waters, with the exception of *Leptocythere* Sars 1928 which has some species that are found in freshwater ecosystems. The family has a worldwide distribution.

***Leptocythere* Sars 1928**
Diagnosis: Carapace oblong, elongate, moderately compressed laterally; anterior end broadly rounded, posterior end postero-ventrally rounded, subacute postero-

dorsally. Dorsal margin slightly convex to almost straight, ventral margin distinctly sinuous. Maximum H anteriorly, and equal to less than half L. Carapace smooth or ornamented. CIL widest anteriorly and postero-ventrally. Anterior CIL well developed. Marginal pore canals few, typically branching (bi-, tri-, or polyfurcate). A1 5-segmented. A2 with two terminal claws. Exopod well developed. Vibratory plate on Md with one main and one secondary seta. Md-palp short, penultimate segment not longer than other segments. Vibratory plate of Mxl with only one type of setae. L5–L7 walking legs, progressively enlarging from L5 to L7. Anterior margin of basal segment with only one seta. UR with two setae. Distal part of hemipenis with two lobes.

Type species: *L. pellucida* (Baird 1850) (a marine species)

Freshwater species list with type locality and type material

1. *L. angulata* Klie 1939b. Ohrid Lake, Macedonia, 41°02′N 20°42′E: Syntypes, ZMK – UR-41.
2. *L. fluviatilis* Klie 1939b. Novo Mesto, River Krka, Slovenia, 45°48′19″N 15°10′15″E: Syntypes, ZMK – UR-37.
3. *L. karamani* Klie 1939b. Ohrid Lake, Macedonia, 41°02′N 20°42′E: Syntypes, ZMK – UR-39.
4. *L. ostrovskensis* Petkovski and Keyser 1992. Lake Ostrovo, Greece, 40°44′N 21°48′E: Holotype (♀), NHMS – collection number unknown; Paratypes, ZMH – K-35 297.
5. *L. prespensis* Petkovski 1959a. Lake Prespa, Macedonia, 40°54′N 21°02′E: Repository of the type material unknown.
6. *L. proboscidea* Klie 1939b. Ohrid Lake, Macedonia, 41°02′N 20°42′E: Syntypes, ZMK – UR-36.
7. *L. pseudoproboscidea* Karanovic and Petkovski 1999a. Spring Mareza, Podgorica, Skadar Valley, Montenegro, 42°26′N 19°16′E: Holotype (♂), ZMH – K-42 378.

Key to the species

1. Valve surface sculptured with wide, deep, and clearly outlined pits 2
– Valve surface sculptured with much smaller, not very deep and not clearly outlined pits 3
2. Females in dorsal view with quadrate posterior end ... *L. angulata* Klie 1939b
– Females in dorsal view with rounded posterior end ... *L. karamani* Klie 1939b
3. Females in dorsal view with a clear caudal process 4
– Females in dorsal view without a caudal process ..... *L. fluviatilis* Klie 1939b
4. Females in dorsal view with clear lateral extremities (nodes) (on the anterior and posterior third of carapace) ..... *L. ostrovskensis* Petkovski and Keyser 1992

Fig. 19 Distribution of *Leptocythere* Sars 1928: Numbers correspond to the species list

– Females in dorsal view without lateral extremities 5

5. Proximal part of the distal lobe of the hemipenis with a long, distally rounded projection .....*L. prespensis* Petkovski 1959a

– Proximal part of the distal lobe of the hemipenis with a very small distally pointed projection, or without projection at all 6

6. Females in dorsal view constricted on the first and the last third ... *L. proboscidea* Klie 1939b

– Females in dorsal view constricted only medially ... *L. pseudoproboscidea* Karanovic and Petkovski 1999a

Ecology and Distribution (Fig. 19)
With an exception of *L. pseudoproboscidea* Karanovic and Petkovski 1999a, which has been found in a spring (Karanovic and Petkovski 1999a), and *L. fluviatilis* Klie 1939b, which was collected in the river (Klie 1939b), all the other species have so far been found in lakes (Klie 1939b; Petkovski 1959a, b; Petkovski and Keyser 1992). All the species are endemic to the Balkan Peninsula and have a restricted distribution.

5 Family Limnocytheridae Klie 1938a

Diagnosis (after Hartmann and Puri 1974 and Meisch 2000): Valves reniform in lateral view, elliptical, and sometimes slender. Valves relatively weakly ornamented with tubercles, pits, horn-like processes, and weak reticulation. MPC sometimes very long and branched. CMS consisting of a vertical row of four scars.

A1 5- or 6-segmented. Terminal aesthetasc basally fused with the neighboring seta. A2 with three claws on the terminal segment. Md-palp straight. L5–L7 walking legs, 4-segmented. Male copulatory tube very short. Females with a brood chamber (Timiriaseviinae) or without a brood chamber (Limnocytherinae).

Type genus: *Limnocythere* Brady 1867

Systematics
The family is divided into two subfamilies: Limnocytherinae Klie 1938a and Timiriaseviinae Mandelstam 1960.

Key to the subfamilies

1. Valve shape slender (no brooding chamber), terminal segment on A1 long, distal part of hemipenis immobile (Figs. 5g, 8a, 14b, c) ..... Limnocytherinae

– Valves swollen (brooding chamber present), terminal segment of A1 short, distal part of hemipenis moveable (Figs. 5e, 8b, 13d) ..... Timiriaseviinae

5.1 Subfamily Limnocytherinae Klie 1938a

Diagnosis (after Meisch 2000): Valves with one or two dorso-median transverse groves, with or without more or less well-developed tubercles (Figs. 1a–c, f and 2c, h). Male carapace often larger than female and/or expanded posteriorly; brood chamber absent in females. Terminal segment of A1 long (longer than penultimate); fused part of the terminal aesthetasc with the neighboring seta on A1 long (longer than the W of aesthetasc) (Fig. 8a).

Systematics
The subfamily is divided into three tribes: Limnocytherini Klie 1938a, Leucocytherini Danielopol and Martens 1989 (in Danielopol et al. 1989), and Dinarocytherini Krstić 1987. The last tribe comprises exclusively fossil taxa. The genus *Korannocythere* Martens 1996 was originally included in the tribe Limnocytherini (Martens 1996), but later on, Martens (2000) excluded it from this tribe because of the peculiar combination of the soft part morphology (resembling Leucocytherini) and hinge structure (Limnocytherini). *Korannocythere* is here also kept separately.

Key to the (recent) tribes and one genus

1. Hinge bar crenulated ..... Leucocytherini Danielopol and Martens 1989

– Hinge bar smooth 2

2. Clasping organ on hemipenis absent (Fig. 13e) ... *Korannocythere* Martens 1996

– Clasping organ on hemipenis present (Fig. 14) ..... Limnocytherini Klie 1938a

***Korannocythere* Martens 1996**
Diagnosis (after Martens 1996): Valves almost without sexual dimorphism, hinge nearly adont (anterior cardinal tooth in RV absent, posterior cardinal tooth in RV minute or absent, hinge bar in LV smooth) (Fig. 5d). Surface of the valves often sculptured. MPC few, short and straight. Exopod A2 shorter in males than in females. Hemipenis simple, no clasping organ present. UR with short base and three setae. Copulatory process simple.

Type species: *K. devriesi* Martens 1996

Species list with type locality and type material
1. *K. devriesi* Martens 1996. Sandstone rock pools, top of Korannaberg, Excelcior district, Eastern Free State, South Africa, 28°51′13″S 27°13′51″E: Holotype (♂), AM – OST1A.
2. *K. hamerae* Martens 1996. Echibini minor, Loteni, KwaZulu-Natal, South Africa, 29°23′01″E 29°32′29″: Holotype (♂), AM – OST2A.
3. *K. ugiensis* Martens 1996. Rock pool on top of Prentjiesberg, near Ugie, S Drakensberg, Eastern Cape, South Africa, 31°12′S 28°14′E: Holotype (♂), AM – ECR.160A.

Key to the species
1. Apical seta on the second segment of A1 absent . . . *K. hamerae* Martens 1996

– Apical seta on the second segment of A1 present 2

2. Exopod A2 in females reaching tip of penultimate segment, tip of copulatory process on hemipenis dilated . . . . . *K. devriesi* Martens 1996

– Exopod A2 in females reaching tip of terminal segment, tip of copulatory process on hemipenis pointed . . . . . *K. ugiensis* Martens 1996

Ecology and Distribution (Fig. 20)
All three species have been found in temporary rock pools, and they are endemic to southern Africa.

5.1.1 Tribe Leucocytherini Danielopol and Martens 1989 (in Danielopol et al. 1989)

Diagnosis (after Danielopol et al. 1989 and Martens 1996): Carapace with two sulci near CMS and one sulcus in the anterior third. Hinge lophodont with crenulate hinge bar. MPC straight and simple. A1 and L7 (Fig. 12a, b) often sexually dimorphic. Copulatory process on the hemipenis spirally shaped.

Type genus: *Leucocythere* Kaufmann 1892

Fig. 20 Distribution of *Korannocythere* Martens 1996: Numbers correspond to the species list

Other (recent) genera: *Athalocythere* Schornikov 1986, *Ovambocythere* Martens 1989a, and *Potamocythere* Schornikov 1986.

Key to the genera

1. L7 sexually dimorphic (Fig. 12a, b) ..... *Leucocythere* Kaufmann 1892

– L7 not sexually dimorphic 2

2. Terminal claw of L7 in males long and transformed in flagellum (Fig. 12g) ... *Ovambocythere* Martens 1989a

– Terminal claw of L7 in males normally developed ... *Potamocythere* Schornikov 1986

Remarks

The genus *Athalocythere* Schornikov 1986, from Lake Khanka in Russia (Schornikov 1986), was described only on the basis of the female, and therefore the possible sexual dimorphism in the appearance of the L7 is not known. This genus is indeed very closely related to the genus *Leucocythere* Kaufmann 1892, and further revisions might find that it is its junior synonym.

***Athalocythere* Schornikov 1986**

Diagnosis (modified after Schornikov 1986): Frontal end of carapace wide, caudal end narrow. Anterior cardinal tooth on the hinge absent. CIL narrow, MPC short and straight. Carapace with several nodes.

Type (and only) species: *A. chankensis* Schornikov 1986

Species list with type locality and type material

A. chankensis Schornikov 1986. Lake Kanka, Russia, 44°56′N 132°24′E: Holotype (♀), ZISP – 54640.

Ecology and Distribution
The species has been found only in its type locality.

***Leucocythere* Kaufmann 1892**
Diagnosis (after Danielopol et al. 1989): Carapace weakly calcified (Fig. 1f) with sexual dimorphism in size and shape. Females with pedomorphic shape and of smaller size than males. Sexual dimorphism present in the appearance of both A1 and L7. Hemipenis with reduced clasping organs.

Type species: *L. mirabilis* Kaufmann 1892

Species list with type locality and type material
1. *L. algeriensis* Martens 1989 (in Danielopol et al. 1989). Drying pool in temporary river system, Oued Tesselata, Tassili-n-Ajjer, Algeria, 26°03′N 08°20′E: Holotype (♂), RBINS – O.C. 1471.
2. *L. helenae* Martens 1991a. Semi-permanent pool, Jameson Dam, Eastern Cape Province, South Africa, 33°19′20″ 26°27′05″E: Holotype (♂), RBINS – LEN.21A.
3. *L. mirabilis* Kaufmann 1892. Lake Geneva, Switzerland, 46°25′N 06°30′E: Repository of the type material unknown.

Key to the species
1. A group of long setae on the third segment of the male L7 present . . . *L. mirabilis* Kaufmann 1892

– A group of long setae on the third segment of the male L7 absent 2

2. More distal seta (“furcal seta”) on the hemipenis strong and long . . . *L. algeriensis* Martens 1989 (in Danielopol et al. 1989)

– More distal seta (“furcal seta”) on the hemipenis short and weak . . . *L. helenae* Martens 1991a

Ecology and Distribution (Fig. 21)
While both *L. algeriensis* Martens 1989 (in Danielopol et al. 1989) and *L. helenae* Martens 1991a have been collected from their type localities only, *L. mirabilis* Kaufmann 1892 has a much wider distribution, and it has been found usually in lakes.

***Ovambocythere* Martens 1989a**
Diagnosis (after Martens 1989a): Valves with pronounced sexual dimorphism. Valves surface pitted. Hinge anti-merodont, but with bar of the RV weakly crenulated and the bar of the LV set with shallow vertical depression, both posterior and anterior teeth prominent. L7 without sexual dimorphism except that, terminal claw flagellum

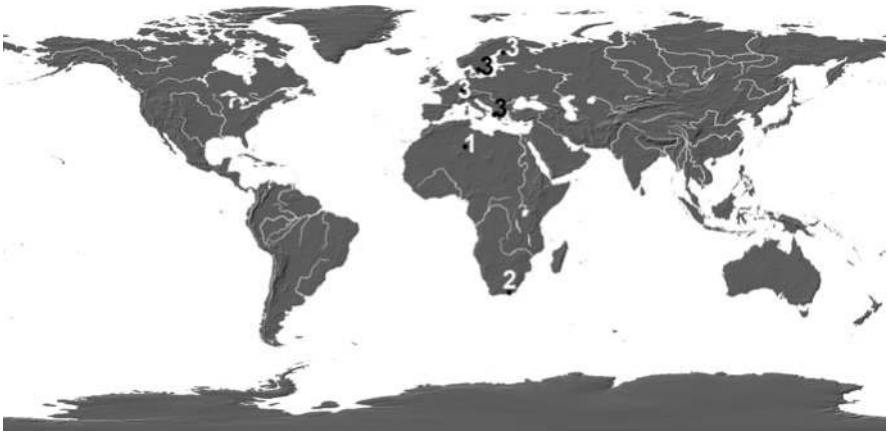

Fig. 21 Distribution of *Leucocythere* Kaufmann 1892: Numbers correspond to the species list

like in males. Hemipenis large, with UR consisting of two setae and a hook-like structure. Movable trabecule present.

Type (and only) species: *O. milani* Martens 1989a

Species list with type locality and type material
O. milani Martens 1989a. Temporary pool, next to the road Oshakati – Tsumeb, Namibia, 18°29′S 16°50′E: Holotype (♂), SMW – 51353–4.

Ecology and Distribution
The species has been collected only once from its type locality. Description of the species is based on animals raised from dried mud samples (Martens 1989a).

***Potamocythere* Schornikov 1986**
Diagnosis (after Schornikov 1986): Sexual dimorphism not clearly pronounced. Valve surface covered with deep pits. Hinge anti-merodont. L7 without sexual dimorphism, terminal claw normally developed in both sexes. Movable trabecule on hemipenis not observed.

Type (and only) species: *P. murgabensis* Schornikov 1986.

Species list with type locality and type material
P. murgabensis Schornikov 1986. River Murgab, Tajikistan, 38°97′N 73°51′E: Holotype (♂), ZISP – 54639.

Ecology and Distribution
The species has been collected from River Murgab (Tajikistan) and its tributaries.

5.1.2 Tribe Limnocytherini Klie 1938a.

Diagnosis (after Danielopol et al., 1989 and Martens, 2000): Carapace strongly calcified, sexually dimorphic in lateral view (Fig. 6c, d). Females without brooding chamber. Hinge anti-merodont, hinge bar smooth. Copulatory process never spiraled.

Type genus: *Limnocythere* Brady 1867

Other genera: *Galolimnocythere* Schornikov 1973, *Kiwicythere* Martens 1992a, *Limnocytherina* Negadaev-Nikonov 1967, *Neolimnocythere* Delachaux 1928, *Paracythereis* Delachaux 1928, and *Paralimnocythere* Carbonnel 1969.

Key to the genera

1. MPC branched (Fig. 5c) 2
– MPC straight 3
2. Apical seta on the second segment of A1 absent (Fig. 8d) . . . *Kiwicythere* Martens 1992a
– Apical seta on the second segment of A1 present . . . *Paralimnocythere* Carbonnel 1969
3. UR on hemipenis large to very large over passing tip of distal lobe 4
– UR on hemipenis sometimes enlarged, but not that much (Fig. 14) . . . *Limnocythere* Brady 1867, *Limnocytherina* Negadaev-Nikonov 1967, and *Galolimnocythere* Schornikov 1973
4. Carapace with lateral projections (Fig. 5h) . . . *Neolimnocythere* Delachaux 1928
– Carapace without lateral projections. . . . . *Paracythereis* Delachaux 1928

Remarks

Danielopol et al. (1989) revised the systematics of the subfamily Limnocytherinae and recognized *Limnocytherina* Negadaev-Nikonov 1967 as a subgenus of *Limnocythere* Brady 1867. The authors pointed out some very important characters of the hemipenis as distinguishing features between the two subgenera. Later on, Martens (1996, 2000) elevated *Limnocytherina* to the rank of genus based on the same hemipenis characters. However, the author did not make any new combinations for the species already described in the genus *Limnocythere* with a clear, *Limnocytherina* type of the hemipenis. Because of this, I am here giving one key for both genera. This complex needs revision, since it is not always clear if the enlarged parts of hemipenis drawn by the authors represent upper ramus or lower ramus. Transformed UR setae on the hemipenis are not always described, and many species are known only after females. Since in this book I refrain from new systematic rearrangements, I am not proposing any new combination, but I am sure, based on the morphology and geographical distribution,

that both genera will undergo systematic revisions in the future. The genus *Galolimnocythere* Schornikov 1973 is also described originally as a subgenus of *Limnocythere*, and elevated to the genus rank by Martens (1996, 2000). The differences are not quite clear, but Schornikov (1973) points out that L7 in males is the shortest of all thoracopods, while in females both L6 and L7 are of the same size. Schornikov (1973) further claims that in the genus *Limnocythere*, L7 is the largest limb, which is not always true, as in the *L. stationis* Vávra 1891, the L7 is the shortest limb, but in contrast to *Galolimnocythere*, in *L. stationis*, both males and females have this leg shorter than L6. It is worth noticing that in *Limnocythere sanctipatricii* (Brady and Robertson 1869), which has been assigned to the genus *Limnocytherina* Negadaev-Nikonov 1967, the L7 is the longest in both sexes. The soft part morphology of the entire subgenus *Limnocytherina* was based on the redescription of this species by Danielopol et al. (1989). However, these authors and many after them (Martens 1990, 1992a, 1996, 2000) consider the appearance of hemipenis as the distinguishing feature between *Limnocythere* and *Limnocytherina*. It is, therefore, obvious that the entire complex *Limnocytherina–Limnocythere–Galolimnocythere* needs a revision and reevaluation of the characters.

***Galolimnocythere* Schornikov 1973**

Diagnosis: In lateral view, anterior end is broader than posterior one. CIL narrow, MPC short and straight. A1 5-segmented. Posterior seta on the second segment of A1 present. No sexual dimorphism in appearance of thoracopods. L7 in males being the shortest of all thoracopods, in females this thoracopod is same as L6. UR on hemipenis small.

Type species: *G. sarsi* Schornikov 1973

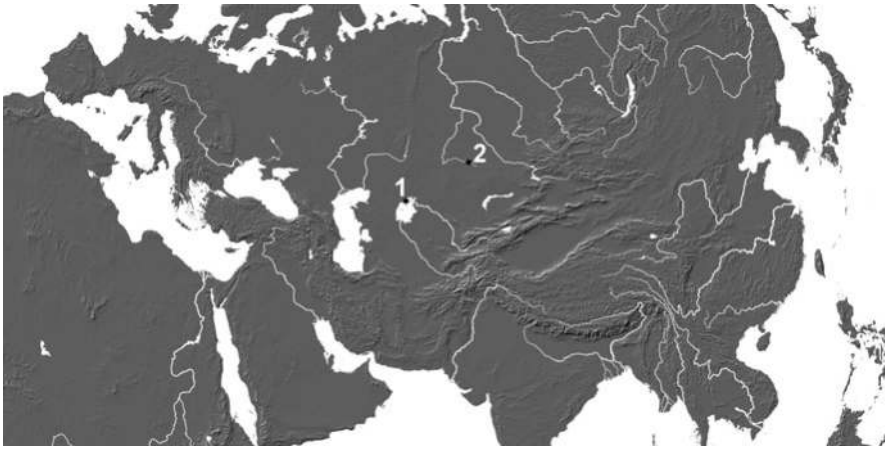

Fig. 22 Distribution of *Galolimnocythere* Schornikov 1973: Numbers correspond to the species list

Species list with type locality and type material
1. *G. aralensis* Schornikov 1973. Aral Sea, 46°12′N 59°54′E: Holotype (♀), *IMB-RAS* – 476–477.
2. *G. sarsi* Schornikov 1973. Lake, Akmolinsk, Kazakhstan, 51°09′N 71°27′E: Holotype (♂), *IMB-RAS* – 54331.

Key to the species
1. Carapace ornamented with very large pits ..... *G. aralenis* Schornikov 1973

– Carapace smooth ..... *G. sarsi* Schornikov 1973

Remarks
According to the drawings provided by Schornikov (1973), *G. aralensis* Schornikov 1973 has a crenulated hinge bar, what would place it in the tribe Leucocytherini (Danielopol et al. 1989). This, and the fact that there is already a genus *Korannocythere* Martens 1996 without a clear position in either of the two tribes, suggests that the subfamily Limnocytherinae needs a revision.

Ecology and distribution
The species have only been found from their respective type localities (Fig. 22).

***Kiwicythere* Martens 1992a**
Diagnosis (after Martens 1992a): MPC branched. A1 without posterior seta on the second segment (Fig. 8d). Respiratory plate of Mxl elongated. L5 very small. Hemipenis without additional lobes near distal lobe. Distal lobe large; UR extremely long, with separate top on one of the setae. Upper ramus elongated lobe, copulatory process small.

Type species: *K. anneari* Martens 1992a

Species list with type locality and type material
1. *K. anneari* Martens 1992a. Lake Tenants, Chatham Island, New Zealand, 43°50′S 175°26′E: Holotype (♂), New Zealand Geological Survey (New Zealand, Lower Hut) – 1169/1-2.
2. *K. vulgaris* (McKenzie and Swanson 1981). Limestone pit, SE end of the Crown Terrace, Kawarau Gorge, South Island, New Zealand, 45°00′S 168°54′E: Holotype (carapace), NZGSW – TO 1135.2–15.

Key to the species
1. Dorsal margin asymmetrically arched (RV having almost straight dorsal margin, LV having arched/rounded dorsal margin) ... *K. vulgaris* (McKenzie and Swanson 1981)

– Dorsal margin symmetrically arched .....*K. anneari* Martens 1992a

Ecology and distribution (Fig. 23)
Both species are only known from their type localities.

Fig. 23 Distribution of *Kiwicythere* Martens 1992a: Numbers correspond to the species list

***Limnocythere* Brady 1867 [Syn: *Limnicytheridea* G.W. Müller 1912; *Acanthopus* Vernet 1878]**

Diagnosis (after Martens 1990): Valves elongated, with apparent sexual dimorphism in valve shape (males more elongated and often expanded posteriorly and mostly longer than females), with radial pore canals not branched. In dorsal view, carapace with anterior end compressed, sometimes building a rostrum; posterior side always with LV overlapping RV. Hemipenis with three setae on UR, lower ramus consisting of a lateral process and a prominent, hook-like process, with upper ramus either reduced to an elongated tentacle or completely absent and with a movable trabecule. A1 and L6 without special features.

Type species: *L. inopinata* (Baird 1843a)

Species list with type locality and type material

1. *L. aethiopica* Klie 1934a. Banaghar Pan 3, Lake Chrissie area, Mpumalanga, South Africa, 25°21′39″S 30°22′39″E: Lectotype (♂), ZMK – UR-77.
2. *L. africana* Klie 1939a. Lake Turkana, Kenya, 03°38′20″N 36°00′E: Holotype (♂), ZMK – UR-78.
3. *L. arthuri* Löffler 1961a. Puddle, Villarica, Chile, 39°16′46″S 72°13′33″W: Holotype not originally designated, NHMV – collection numbers unknown.
4. L. *aspera* Henry 1923. Byron Bay, NSW, Australia, 28°38′35″S 153°36′43″E: Holotype, AMS – P.6117.

5. *L. atacamae* Brehm 1935: Chiu-Chiu, W Atacama, Peru, 22°00′40″S 68°35′49″W. Holotype not originally designated, repository of the type material unknown.
6. *L. baikalensis* Martens and Mazepova 1992. Chivyrkui Bay, Cape Irkana, N basin of Lake Baikal, Russia, 55°51′17″N 111°13′58″E: Holotype (♂), RBINS – O.C. 1561.
7. *L. balatonica* Daday 1900. Lake Balaton, Hungary, 46°49′N 17°44′E: Holotype is not designated. A couple of type specimens are deposited in HMNH – IV-414. List of other specimens can be found in Forró et al. (1987).
8. *L. borisi* Martens 1990. Lake (Hora) Abijata, Ethiopia, 07°36′58″N 38°36′E: Holotype (♂), RMCA – 56.657.
9. *L. camera* Delorme 1967: Rocky Lake, Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – Ao-319.
10. *L. ceriotuberosa* Delorme 1967: Rocky Lake, Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – Ao-320.
11. *L. coelebs* Klie 1944. Lake Edward, near Kamande, Zaire, 00°35′17″S 29°17′23″E: Lectotype (♂), ZMK – UR-71.
12. *L. conifera* Brehm 1950. Cleveland Lagoon, Tasmania, Australia, 41°47′S 147°22′. Holotype not designated, repository of the type material unknown.
13. *L. cyphoma* Smith and Janz 2009. Lake Biwa, E side of the N basin, Japan, 35°09′52.0″N 136°03′44.2″E: Holotype (♂), LBM – 1430003517.
14. *L. dadayi* Martens 1990. Lake Rukwa, Tanzania, 07°59′30″S 32°17′06″E: Holotype (♂), HMNH – IV/P.393.
15. *L. dorsosicula* De Deckker 1981c. Lake Terangpom, W of Lake Corangamite, W Victoria, Australia, 38°09′51″S 143°24′04″E. Holotype (♂), NMV – J1134-1162.
16. *L. dubiosa* Daday 1903. İsnik-Gölü, Bursa, Turkey, 40°26′N 29°31′E: Holotype is not designated. A couple of type specimens are deposited in HMNH – IV-416. List of other specimens can be found in Forró et al. (1987).
17. *L. fijiensis* Brady 1890. Between tide-marks on Luvuka Island (formerly Levuka Island), Western Fiji Islands, 17°39′S 177°16′E: Syntypes, HM – NEWHM:1.18.28.
18. *L. floridensis* Keyser 1975. Everglades National Park, Florida, USA, 25°17′N 80°53′W: Holotype (♂), ZMH – K30 334.
19. *L. friabilis* Benson and Macdonald 1963. Holocene deposits, Lake Erie, North America, 42°10′N 80°51′W: Holotype not designated, repository of the type material unknown.
    Syn.: *L. chippewaensis* Staplin 1963a
20. *L. fude* Smith and Janz 2009. Lake Biwa, N basin off W shore, Japan, 35°17′09.3″N 136°01′58.5″E: Holotype (♂), LBM – 1430003507.
21. *L. gibbosa* Sywula 1970b. Jebbel Mara, Deriba Lakes, Sudan, 12°58′N 24°16′E: Holotype (♂), ZIPAS – collection number unknown.
22. *L. hungarica* Daday 1900. Bugac, Hungary, 46°41′12″N 19°41′E: Holotype is not designated. A couple of type specimens are deposited in HMNH – IV-419. List of other specimens can be found in Forró et al. (1987).

23. *L. inopinata* (Baird 1843a). Type locality not clearly marked. Baird (1843a, b) said that the species occurs in Middlesex (51°30′N 00°22′W), England, UK. Holotype not designated, repository of the type material not known.
Syn.: *L. incisa* Dahl 1888; *L. balatonica* Daday 1900a; *L. mongolica* Daday 1901a; *L. sappaensis* Staplin 1963a.
24. *L. iowensis* Danforth 1948. Clay County, Iowa, USA, 43°07′37″N 95°07′00″W: Holotype (?), SM – 90721.
25. *L. itasca* Cole 1949. Lake Itasca, Clearwater County, Minnesota, USA, 47°13′01″N 95°12′27″W: Holotype (♂), SM – 88500.
26. *L. jocquei* Martens 1990. Lake Malawi, near Chintcheche village, Malawi, 11°50′09″S 34°10′29″E: Holotype (♂), RMCA – 56.667.
27. *L. kamiyai* Smith and Janz 2009. Lake Biwa, E shore, Japan, 35°02′01.5″N 135°54′36.5′E: Holotype (♂), LBM – 1430003503.
28. *L. levigatus* Smith and Janz 2009. Lake Biwa, E side of N basin, Japan, 35°13′54.1″N 135°57′49.6″E: Holotype (♂), LBM – 1430003509.
29. *L. michaelseni* Daday 1910a: Lake Rikwa, Tanzania, 07°59′30″S 32°17′06″E: Lectotype (♂), HMNH – IV/P.380.
30. *L. milta* De Deckker 1981a: Lake Werowrap, Red Rock area, near Colac, W Victoria, Australia, 38°15′23″S 143°29′35″E: Holotype (♀), NMV – J1134-J1162.
31. *L. minor* Lindroth 1953. Lake Turkana, Kenya, 03°38′20″N 36°00′E: Holotype not designated, type material deposited in ZMU.
32. *L. mongolica* Daday 1901a. Chermin(?) Tsagaan Nuur, Mongolia, coordinates unknown: Holotype is not designated. A couple of type specimens are deposited in HMNS – IV-429. List of other specimens can be found in Forró et al. (1987).
33. *L. mowbrayensis* Chapman 1914. Late Pleistocene deposit at Mowbray swamp, NE Tasmania, Australia, 40°50′55″S 145°04′56″E: Lectotypes, NMV – collection numbers unknown.
34. *L. neotropica* Klie 1934a. Barra St. Lucia, Rio de la Plata, Argentina, 34°12′51″S 59°04′44″W: Syntypes, ZMK – UR-762.
35. *L. notodonta* Vávra 1906. Garut, West Java, Indonesia, 07°14′54″S 107°54′34″E: Holotype not designated, repository of the type material unknown.
36. *L. opesta* (Brehm 1939c). Petén Lake, Guatemala, 16°58′N 89°49′W: Holotype not designated, repository of the type material unknown.
37. *L. ornata* Furtos 1933. East Harbor, Lake Erie, Ohio, USA, 41°32′20″N 82°48′05″W: Holotype not designated, paratypes deposited in SM – 67892.
38. *L. oughtoni* Tressler 1957. Goulet Island, Great Slave Lake, Canada, 61°46′N 113°58′W: Holotype (♀), SM – 100871.
39. *L. paranensis* Ferguson 1967a. Laguna Los Espejos, Santa Fe, Argentina, 31°38′S 60°42′W: Holotype (♂), SM – 112990.
40. *L. paraornata* Delorme 1971. Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – 27527.

41. *L. parascutarense* Delorme 1971. Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – 27535.
42. *L. porphyretica* De Deckker 1981a. Roadside pool, 2.5 km W of Lake Grace township, WA, Australia, 33°06′12″S 118°25′24″E: Holotype (♂), AMS – P.28625.
43. *L. posterolimba* Delorme 1967. Rocky Lake, Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – Ao-348.
44. *L. pseudoreticulata* Staplin 1963a. Havana Quadrangle, Fulton County, Illinois, USA, 40°29′28″N 89°35′48″W: Holotype was illustrated in Staplin (1963a), but repository and collection numbers are unknown.
45. *L. reticulata* Sharpe, 1897. Urbana, Illinois, USA, 40°06′57″N 88°13′82W: Holotype not designated, repository of type material unknown.
46. *L. robusta* Delorme 1967. Rocky Lake, Saskatchewan Lakes, Canada, 45°04′N 82°27′W: Holotype (♀), GMUS – Ao-354.
47. *L. royi* Hartmann 1959. Lake Nicaragua, Granada, Nicaragua, 11°37′51″N 85°21′39″W: Syntype (?), ZMH – K-28 235.
48. *L. sanctipatricii* (Brady and Robertson 1869). Lough Moher, Mayo, Ireland, 53°58′N 09°29′W. Holotype not designated, repository of type material unknown.
49. *L. scutariense* Petkovski 1961. Skadar Lake, Montenegro, 42°11′17″N 19°18′54″E. Holotype not designated, NHMS – collection numbers unknown.
50. *L. sharpei* Staplin 1963a. Havana Quadrangle, Fulton County, Illinois, USA, 40°29′28″N 89°35′48″W: Holotype was illustrated in Staplin (1963a, b), but repository and collection numbers are unknown.
51. *L. staplini* Gutentag and Benson 1962. Meade County, Kansas, USA, 37°16′N 100°21′W: Holotype (valves), DGUK – 717563.
52. *L. stationis* Vávra 1891. Czech Republic (49°51′N 13°34′E). Holotype not designated, repository of the type material unknown.
53. *L. thomasi* Martens 1990. Lake Zway, Ethiopia, 07°59′58″N 38°50′E: Holotype (♂), RMCA – 56.661.
54. *L. titicaca* Lerner-Seggev 1973. Lake Titicaca, Huarina, Bolivia, 16°11′49″S 68°36′14″W: Holotype (♀), SM – 137487.
55. *L. tudoranceai* Martens 1990. Dam near the village Eunda, Omusati, Namibia, 17°30′58″S 14°37′51″E: Holotype (♂), SMW – 51394.
56. *L. varia* Staplin 1963a. Havana Quadrangle, Fulton County, Illinois, USA, 40°29′28″N 89°35′48″W: Holotype was illustrated in Staplin (1963a, b) but repository and collection numbers are unknown.
57. *L. verrucosa* Hoff 1942. West Loon Lake, Lake County, Illinois, USA, 42°29′21″N 87°18′36″W: Holotype (♂), SM – 81986.

Key to the species

1. In lateral view, one or both valves with distinct spines on the postero-dorsal margin 2

– In lateral view, no distinct spines present on the postero-dorsal margin 6

2. L7 the largest thoracopod ..... *L. dorsosicula* De Deckker 1981c

– L7 the smallest thoracopod 3

3. Carapace smooth, or very poorly ornamented ... *L. levigatus* Smith and Janz 2009

– Carapace harshly ornamented 4

4. Distal lobe of hemipenis triangular ..... *L. stationis* Vávra 1891

– Distal lobe on hemipenis different 5

5. Distal lobe on hemipenis with flat distal margin, quadriform appearance ... *L. kamiyai* Smith and Janz 2009

– Distal lobe on hemipenis with lateral elongation ... *L. fude* Smith and Janz 2009

6. Females with inflated postero-ventral margin on valves 7

– Postero-ventral margin on valves not inflated in females 12

7. Greatest H behind the middle 8

– Greatest H in the middle or in front of the middle 9

8. Carapace smooth or very lightly ornamented ..... *L. aethiopica* Klie 1934a

– Carapace harshly ornamented ..... *L. borisi* Martens 1990

9. Greatest H clearly marked and being situated frontally, and dorsal margin sloping gradually toward posterior end ..... *L. jocquei* Martens 1990

– Greatest H not clearly pronounced on valves and dorsal margin almost flat ... 10

10. Lateral lobe of hemipenis sickle shaped, reaching up to or beyond the tip of the hemipenis ..... *L. michaelseni* Daday 1910a

– Lateral lobe shorter 11

11. UR seta f1 longer than lateral lobe and almost reaching the tip of the hemipenis ..... *L. dadayi* Martens 1990

– UR seta f1 much shorter ..... *L. thomasi* Martens 1990

12. Postero-ventral margin clearly serrated ..... *L. inopinata* (Baird 1843a)

– Postero-ventral margin not serrated 13

13. UR setae on hemipenis very strongly developed, strongly sclerified, and prominent 14

– UR setae on hemipenis small, not so prominent and not strongly sclerified . 27

14. In females, in lateral view, greatest H lying behind the middle 15
– In females, in lateral view, greatest H lying in front or in the middle 16
15. Dorsal margin of LV highly arched ... *L. staplini* Gutentag and Benson 1962
– Dorsal margin of LV not highly arched ..... *L. parascutarense* Delorme 1971
16. Carapace smooth (or very poorly ornamented) 17
– Carapace well ornamented 21
17. In lateral view, male valve with posterior end of valves being much higher than anterior, and dorsal margin posteriorly highly arched 18
– In lateral view, both anterior and posterior ends are equally high 19
18. Postero-ventral margin in male enlarged ..... *L. royi* Hartmann 1959
– Postero-ventral margin in male not enlarged ... *L. titicaca* Lerner-Seggev 1973
19. Distal lobe of hemipenis being very small and rounded ... *L. dubiosa* Daday 1903
– Distal lobe of hemipenis being prominent and triangular 20
20. Lower ramus of hemipenis distally inflated and enlarged ... *L. neotropica* Klie 1934a
– Lower ramus of hemipenis rounded distally, but not inflated ... *L. arthuri* Löffler 1961a
21. In dorsal view, several bumps are present which extend laterally beyond the margins of the carapace 22
– In dorsal view, sometimes bumps are present, but being very small and not extending beyond the margins of the carapace 26
22. Some of the bumps are transformed into alae, which are distally pointed ... 23
– All bumps rounded 25
23. Lower ramus on hemipenis very prominent and extending far beyond hemipenis 24
– Lower ramus on hemipenis quite small..... *L. mowbrayensis* Chapman 1914
24. Lower ramus on hemipenis bent downward and lateral alae quite small ... *L. ornata* Furtos 1933
– Lower ramus on hemipenis turned upward and lateral alae very long ... *L. scutariense* Petkovski 1961
25. Distal lobe of the hemipenis triangular ..... *L. verrucosa* Hoff 1942
– Distal lobe of the hemipenis quadriform ... *L. porphyretica* De Deckker 1981a

26. In lateral view, ventral margin considerably concave around the mouth region and MPC frontally all equally long . . . *L. sanctipatricii* (Brady and Robertson 1869)

– In lateral view, ventral margin almost straight around the mouth region, MPC unequally long frontally . . . . . *L. floridensis* Keyser 1975

27. In lateral view, dorsal margin in females slightly rounded in the frontal part . . . 28

– In lateral view, dorsal margin in females flat 29

28. In dorsal view, anterior end beak like and extended . . . *L. gibbosa* Sywula 1970b

– In dorsal view, anterior end pointed, but not extended . . . *L. cyphoma* Smith and Janz 2009

29. Carapace poorly ornamented . . . . . *L. africana* Klie 1939a

– Carapace strongly ornamented 30

30. Ventral margin in males not inflated . . . *L. baikalensis* Martens and Mazepova 1992

– Ventral margin in males inflated 31

31. In dorsal view, posterior end of carapace inflated in males . . . *L. tudoranceai* Martens 1990

– In dorsal view, male carapace more slender 32

32. Glans complex on hemipenis consisting of different lobes and a dorsal hook . . . *L. minor* Lindroth 1953

– Glans complex on hemipenis small . . . . . *L. coelebs* Klie 1944

Remarks
Many of the species described from North America were transferred in the subgenus *Limnocytherina* Negadaev-Nikonov 1967 by Delorme (1971). The author has provided very brief descriptions and affiliations and has presented each species with photographs of the soft parts, which are insufficient for most of them to be properly identified.

Species not included in the key:
L. aspera Henry 1923; *L. atacamae* Brehm 1935; *L. balatonica* Daday 1900; *L. conifera* Brehm 1950; *L. camera* Delorme 1967; *L. ceriotuberosa* Delorme 1967; *L. friabilis* Benson and Macdonald 1963; *L. hungarica* Daday 1900; *L. iowensis* Danforth 1948; *L. itasca* Cole 1949; *L. milta* De Deckker 1981a; *L. mongolica* Daday 1901a; *L. notodonta* Vávra 1906; *L. opesta* Brehm 1939c; *L. oughtoni* Tressler 1957; *L. paranensis* Ferguson 1967a; *L. paraornata* Delorme 1971;

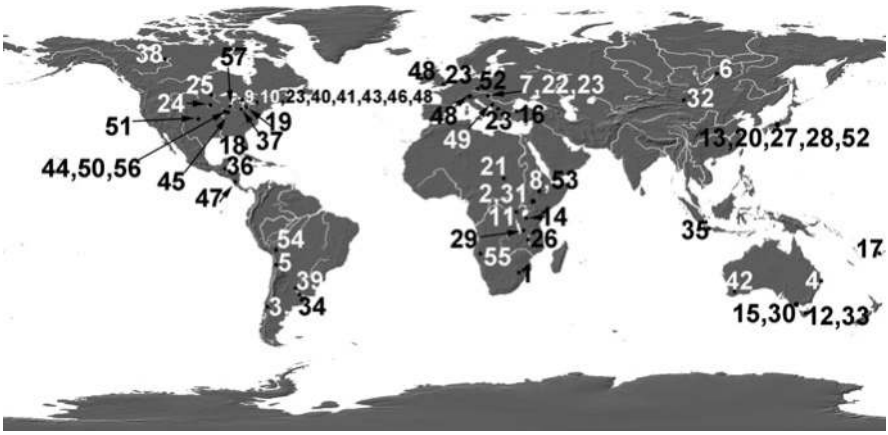

Fig. 24 Distribution of *Limnocythere* Brady 1867: Numbers correspond to the species list

L. posterolimba Delorme 1967; *L. reticulata* Sharpe 1897; *L. pseudoreticulata* Staplin 1963a; *L. robusta* Delorme 1967; *L. sharpei* Staplin 1963a; *L. staplini* Gutentag and Benson 1962; and *L. varia* Staplin 1963a.

Ecology and distribution (Fig. 24)
The species can most commonly be found in lakes and permanent small water bodies. Most of the species have restricted distribution, with the exception of *L. inopinata* (Baird 1843a), *L. stationis* Vávra 1891, and *L. sanctipatrici* (Brady and Robertson 1869) which have a Holarctic distribution.

***Neolimnocythere* Delachaux 1928**
Diagnosis: MPC straight, carapace with many lateral projections. UR on hemipenis strongly developed, with setae reaching the tip of distal lobe on hemipenis.

Type species: *N. hexaceros* Delachaux 1928

Species list with type locality and type material
1. *N. erinacea* Delachaux 1928. Lake Heron, Peru, 11°01′22″S 76°25′43″W: Holotype not designated, repository of the type material unknown.
2. *N. hexaceros* Delachaux 1928. Lake Heron, Peru, 11°01′22″S 76°25′43″W: Holotype not designated, repository of the type material unknown.

Key to the species
1. Carapace with six lateral projections ..... *N. hexaceros* Delachaux 1928

– Carapace with numerous small, spine-like projections . . . *N. erinacea* Delachaux 1928

Ecology and distribution
Both species have been found so far only in the type locality.

Paracythereis **Delachaux 1928**
Diagnosis: MPC straight, carapace without lateral projections. UR on hemipenis strongly developed, with setae reaching the tip of distal lobe on hemipenis.

Type (and only) species: *P. impudica* Delachaux 1928

Species list with type locality and type material
P. impudica Delachaux 1928. Lake Heron, Peru, 11°01′22″S 76°25′43″W: Holotype not designated, repository of the type material unknown.

Ecology and distribution
The species has been found so far only in the type locality.

Paralimnocythere **Carbonnel 1969**
Diagnosis (according to Martens 1992a): MPC branched, inner margin running regularly. RV with both anterior and posterior cardinal teeth present or with hinge completely adont. Surface of the valves with prominent ridges, tubercles, and ala. A1 with apical seta on the second segment. Mxl-palp with rectangular terminal segment. L5, L6, and L7 with very small or absent ventral setae on the basal segments. Hemipenis with one or two additional lobes near distal lobe. Distal lobe relatively small.

Type species: *P. bouleigensis* Carbonnel 1965 (fossil)

Species list with type locality and type material
1. *P. alata* (Klie 1939b). Lake Ohrid, Macedonia, 41°06′N 20°43′E: Syntypes, ZMK – UR-76.
2. *P. compressa* (Brady and Norman 1889). Whitefield Lock, Wigtownshire, Scotland, UK, 52°28′N 01°54′W: Lectotype (♂), BM – 1992.61.
3. *P. diebeli* (Petkovski 1969a). Belimbegovo near Skopje, Macedonia, 41°59′N 21°26′E: Holotype not designated, NHMS – collection numbers unknown.
4. *P. georgevitschi* (Petkovski 1960a). Lake Ohrid, Macedonia, 41°06′N 20°43′E: Holotype not designated, NHMS – collection numbers unknown.
5. *P. karamani* (Petkovski 1960a). Type locality is not clearly designated, Petkovski (1960a, b) mentions both Prespa and Ohrid Lake, not clearly saying which one of the lakes is the type locality. Holotype not designated, NHMS – collection numbers unknown.
6. *P. messanai* Martens 1992a. River sediments in Torrente Mugnone, Firenze, Italy, 43°48′13″N 11°14′49″E: Holotype (♂), RBINS – MF.1307.
7. *P. ochridensis* (Klie 1934a). Lake Ohrid, Macedonia, 41°06′N 20°43′E: Syntypes, ZMK – UR-73.
8. *P. psammophila* (Flössner 1965). Großer Stechlinsee, Germany, 53°08′59″N 13°02′E: Holotype not designated, repository of the type material unknown.

9. *P. relicta* (Lilljeborg 1863). Uppsala, Sweden, 59°53′N 17°36′E: Lectotype (♀), BM – M.3401. The lectotype was never designated, but Martens (1992a) suggested that the material deposited in BM should be a name-bearing type. The original material labeled as types is deposited in ZMU (3386) but contains only very poorly preserved specimens (Martens 1992a).
10. *P. slavei* (Petkovski 1969a). Lake Ohrid, Macedonia, 41°06′N 20°43′E: Holotype not designated, NHMS – collection numbers unknown.
11. *P. umbonata* (Klie 1939b). Lake Ohrid, Macedonia, 41°06′N 20°43′E: Syntypes, ZMK – UR-72 and 74.

Key to the species

1. In dorsal view, both females and males with prominent lateral projections (alae) which are almost at right angle with the central axis of the carapace (not sloping) ..... *P. umbonata* (Klie 1939b)

– In dorsal view, alae absent, or, if present in both males and females always sloping toward the anterior end, and extending toward the posterior end 2

2. In dorsal view, no lateral projections so that both lateral margins slope gently toward the anterior and posterior ends 3

– In dorsal view, lateral projections are prominent so that both lateral margins slope more or less gently toward the anterior end, but with a clear cut-off at the end of the projection toward the posterior end 5

3. Additional distal lobe on hemipenis present 4

– Additional distal lobe on hemipenis absent ... *P. messanai* Martens 1992a

4. Main distal lobe with rounded distal margin and with additional lobe bulb like ..... *P. diebeli* Petkovski 1969a

– Main distal lobe with straight distal margin and additional lobe triangular ... *P. slavei* Petkovski 1969a.

5. In dorsal view, females with two lateral projections on each side 6

– In dorsal view, females with one lateral projection on each side 9

6. Additional distal lobe on hemipenis below the main one (on the side of the copulatory process) present ..... *P. ochridense* (Klie 1934a)

– Additional distal lobe on hemipenis below the main one (on the side of the copulatory process) absent 7

7. Species less than 0.6 mm long and short (L less than two times H) ... *P. compressa* (Brady and Norman 1889)

– Species more than 0.61 mm long and elongated (L more than 2.2 times H) ... 8

8. In dorsal view, anterior and posterior end elongated, thin and narrow... *P. psammophila* (Flossner 1965)

– In dorsal view, both ends much shorter and not so thin ... *P. karamani* (Petkovski 1960a)

9. Distal lobe on hemipenis with evenly rounded distal margin 10

– Distal lobe with triangular distal margin ..... *P. relicta* (Lilljeborg 1863)

10. In dorsal view, each valve with one rounded bulge (which not extending lateral margins) present on the last third of carapace L ... *P. georgevitschi* (Petkovski 1960a)

– In dorsal view, each valve with one rounded bulge (which not extending lateral margins) present on the last third of carapace L ..... *P. alata* (Klie 1939b)

Remarks
Although *P. relicta* (Lilljeborg 1863) and *P. diebeli* (Petkovski 1969a) should be easily separated based on the carapace appearance, the first one having more cuneiform anterior end of carapace in dorsal view, while the hemipenis is extremely similar in both species. Martens (1992a) redescribed *P. relicta,* and the illustration of the hemipenis he provided is similar to the one provided by Petkovski (1969a) for *P. diebeli*. On the contrary, Petkovski (1969a) illustrated the hemipenis of *P. relicta*, which is different from the one illustrated by Martens (1992a). Since Martens (1992a) was dealing with the type material, there is no doubt regarding the species he illustrated. It is possible that the drawings in Petkovski (1969a) were erroneously labeled, and the problem should be resolved by checking the type material of *P. diebeli* and the material of *P. relicta* Petkovski (1969a) used for the illustration.

Ecology and distribution (Fig. 25)
The species can be found in open water bodies, like lakes, or in springs and rivers, and are restricted to Europe.

5.2 Subfamily Timiriaseviinae Mandelstam 1960

Diagnosis (after Martens 2003a): Carapace with important sexual dimorphism, i.e., females strongly inflated posteriorly in dorsal view, forming externally visible brooding chamber (Fig. 3e, f). Hinge adont or (inverse) lophodont. A1 with terminal segment shorter than penultimate one (Fig. 8b). Fused part of A1 aesthetasc short. Md-palp either straight or knee like (Fig. 9a–d). Mxl-palp weakly sclerified, mostly undivided and with a reduced number of apical and lateral setae (Fig. 10a, d). L7 is the largest thoracopod. Distal lobe on hemipenis moveable (Fig. 13d).

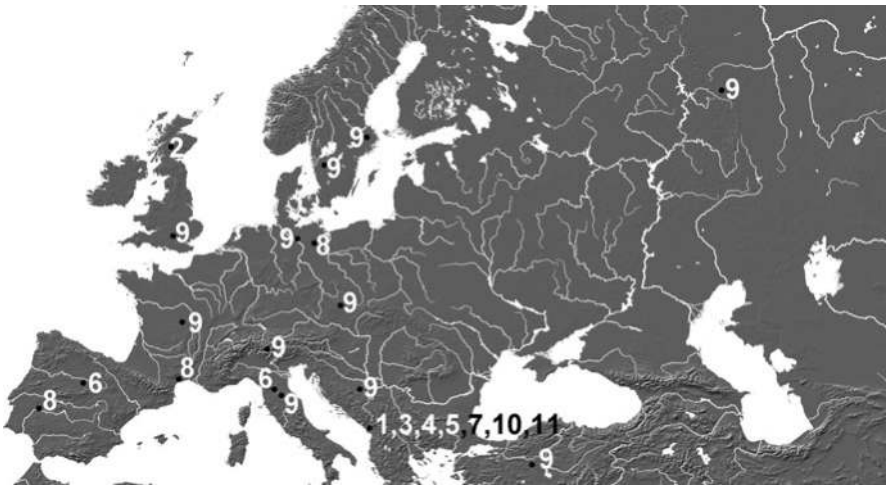

Fig. 25 Distribution of *Paralimnocythere* Carbonnel 1969: Numbers correspond to the species list

Type genus: *Timiriasevia* Mandelstam 1947 (fossil genus)

Key to the genera

1. Md-palp with only two distinct segments, penultimate one very broad (knee-like type) (Fig. 9d) 2

– Md-palp with last three segments normally developed (straight type) (Fig. 9a–c) 3

2. L7 transformed, curved, and shorter than that in the other two thoracopods (Fig. 12l) . . . . . *Cytheridella* Daday 1905

– L7 not transformed, being the longest of the three thoracopods . . . *Afrocythere* Klie 1935a

3. Terminal segment of A2 with only one claw (Fig. 42c of chapter "Introduction"). . . *Dolekiella* Gidó, Artheau, Colin, Danielopol, and Marmonier 2007

– Terminal segment of A2 with three claws (Fig. 42c of chapter "Introduction"). . . 4

4. Posterior seta on the second segment of A1 absent (Fig. 8b) . . . *Gomphodella* De Deckker 1981b

– Posterior seta on the second segment of A1 present 5

5. Hinge inverse lophodont 6

– Hinge lophodont 7

6. Terminal segment of Md-palp normally developed, Mxl-palp with more than two papoose setae (Fig. 10a) .....*Gomphocythere* G. O. Sars 1924

– Terminal segment of Md-palp very small, Mxl-palp with only two papoose setae (Fig. 10d) .....*Kovalevskiella* Klein 1963

7. A2 sexually dimorphic (most posterior of distal claws strongly serrated in males), both sexes with two additional setae on distal segment of the same appendage (Fig. 7f) 8

– A2 not sexually dimorphic and without two additional setae on distal segment .....*Metacypris* Brady and Robertson 1870

8. Male A2 with only one claw on terminal segment strongly serrated ... *Elpidium* Müller 1880

– Male A2 with all three claws on the terminal segment strongly serrated ... *Intrepidocythere* Pinto et al. 2008

***Afrocythere* Klie 1935a**

Diagnosis (modified after Martens 1995): Hinge adont; Md-palp with only two distinct segments, penultimate one very broad (knee-like type) with bifurcate setae. L7 being the longest of legs.

Type (and only) species: *A. rostrata* Klie 1935a

Species list with type locality and type material

A. rostrata Klie 1935a. Tambacounda (original name Botou), Senegal, 13°49'N 13°35'W: Syntypes (♀), ZMK – UR-305, 306.

Ecology and distribution

The species was collected from a lake and was also found in the localities in the proximity of the type locality (Klie 1935a).

***Cytheridella* Daday 1905 [Syn: *Onychocythere* Tressler 1939]**

Diagnosis (modified after Martens 1995): Hinge adont; Md-palp with only two distinct segments, penultimate one very broad (knee-like type); L7 transformed, curved, and shorter than that in the other two thoracopods.

Type species: *C. ilosvayi* Daday 1905

Species list with type locality and type material

1. *C. damasi* Klie 1944. Kibuga Lake, Uganda, 00°53′04″N 31°44′03″E: Syntypes (♀), ZMK – UR-300.

2. *C. ilosvayi* Daday 1905. Villa Sana, Baches Paso Ita, Paraguay, 22°49′S 57°05′W: Type (?), HMNH – IV/P-182.
3. *C. monodi* Klie 1936a. Crater lake Mfou, near Bafoussam, Cameroon, 05°28′N 10°25′E: Syntypes, ZMK – UR-301.
4. *C. tepida* Victor 1987. Wikki warm springs, Yankari Game Reserve, Bautchi State, N Nigeria, 09°45′N 10°31′E: Holotype (♀), BM – 1985, 382.

Key to the species

1. UR absent 2
– UR present 3
2. Distal lobe of hemipenis pointed; upper ramus of clasping organ small, not extending or overlapping distal lobe..... *C. monodi* Klie 1936a
– Distal lobe of hemipenis blunt; upper ramus of clasping organ elongated, overlapping, and surpassing distal lobe ..... *C. tepida* Victor 1987
3. Ventral side of distal lobe of hemipenis with a long flagellum-like extension ... *C. ilosvayi* Daday 1905
– Ventral side of distal lobe of hemipenis without a long flagellum-like extension ..... *C. damasi* Klie 1944

Ecology and Distribution (Fig. 26)
The species live in open water bodies and are distributed only in Africa and South America.

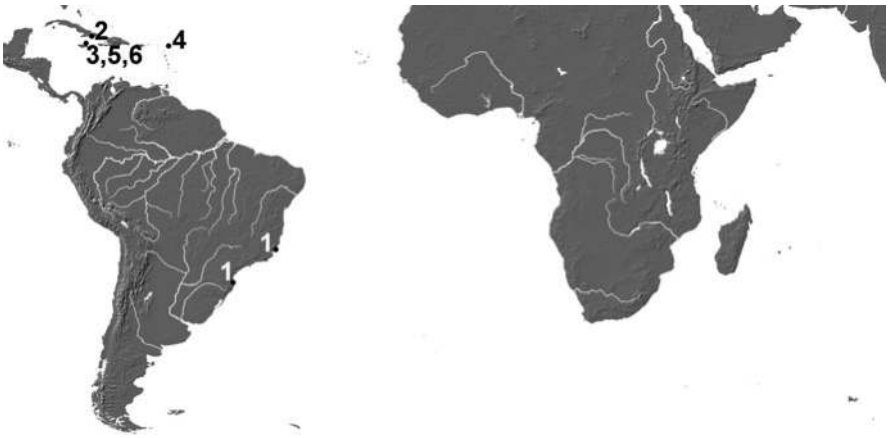

Fig. 26 Distribution of *Cytheridella* Daday 1905: Numbers correspond to the species list

***Dolekiella* Gidó, Artheau, Colin, Danielopol, and Marmonier 2007**
Diagnosis (modified after Gidó et al. 2007): Hinge lophodont. Terminal segment of A2 with only one claw. Terminal segment of the Md-palp bearing a claw which is transformed in a serrated spatula-shaped process.

Type (and only) species: *D. europea* Gidó, Artheau, Colin, Danielopol, and Marmonier 2007

Species list with type locality and type material
D. europea Gidó, Artheau, Colin, Danielopol, and Marmonier 2007. Calmeilles village, Languedoc-Roussillon, S France, 42°33′05″N 02°40′17″E: Holotype (♂), NHMV – 20711.

Ecology and distribution
The species is a stygobiont and is found in wells in southern France.

***Elpidium* Müller 1880**
Diagnosis (modified after Colin and Danielopol 1980): Valves weakly ornamented. Hinge adont or lophodont. A2 sexually dimorphic; in males, distal claws strongly serrated. Md-palp normally developed.

Type species: *E. bromeliarum* Müller 1880

Species list with type locality and type material
1. *E. bromeliarum* Müller 1880. Itajaí, Santa Catarina, Brazil, 26°55′S 48°40′W: Neotype (♀), Paleontological Museum UFRGS – MP-0-277.
2. *E. inaequivalvis* Danielopol 1980a, b (in Colin and Danielopol 1980). Gran Piedra, Cuba, 20°00′17″N 75°37′35″W: Holotype not designated, NHMV.
3. *E. laesslei* (Tressler 1956). St. Andrews Parish, Blue Mountains, Jamaica, 18°41′38″N 76°40′08″W: Holotype (♀), SM – 99387.
4. *E. maricaoensis* (Tressler 1941). Maricao National Forest, Puerto Rico, 18°11′05″N 60°59′01″W: Holotype (♀), SM – 80029.
5. *E. pintoi* Danielopol 1980 (in Colin and Danielopol 1980). Rio Indio, Cuba, 20°00′N 75°37′W: Holotype not designated, NHMV.
6. *E. purperi* Danielopol 1980a, b (in Colin and Danielopol 1980). Siboney, Cuba, 20°00′N 75°37′W: Holotype not designated, NHMV.

Key to the species
1. In dorsal view, valves asymmetrical … *E. inaequivalvis* Danielopol 1980a, b (in Colin and Danielopol 1980)

– Valves symmetrical in dorsal view 2

2. Distal lobe of hemipenis triangular 3

– Distal lobe of hemipenis square shaped 5

3. Carapace surface pitted ..... *E. laesslei* (Tressler 1956)

– Carapace surface smooth 4

4. Distal lobe of hemipenis narrow, with narrow and pointed tip ... *E. purperi* Danielopol 1980 (in Colin and Danielopol 1980)

– Distal lobe of hemipenis wide ... *E. pintoi* Danielopol 1980a, b (in Colin and Danielopol 1980)

5. Distal lobe of hemipenis with rounded margins . . *E. bromeliarum* Müller 1880

– Distal lobe of hemipenis with pointed margins and somewhat elongated tips ... *E. maricaoensis* (Tressler 1941)

Ecology and distribution (Fig. 27)
The species live predominantly in the water retained in bromeliad cups and are distributed in the Central and South America.

***Gomphocythere* Sars 1924**
Diagnosis (modified after Martens 2003a): Hinge inverse lophodont with posterior cardinal tooth on LV mostly larger than anterior one. Ventral side of carapace in most species set with ridges. CIL narrow. L7 is the longest and most elongated walking leg. Posterior part of female abdomen with one or two caudal complexes, each consisting of two setae and three setose lobes, and dorsally with a plump caudal seta. Hemipenis with a large, articulated distal lobe, without a lateral seta.

Type species: *G. obtusata* (Sars 1910)

Species list with type locality and type material

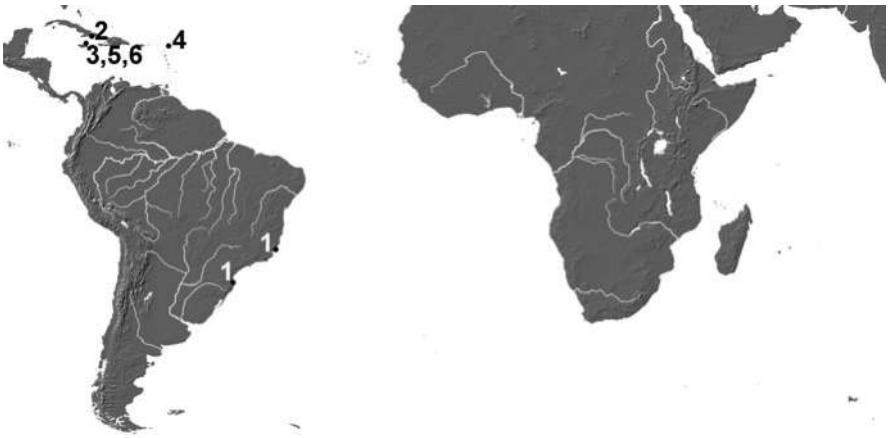

Fig. 27 Distribution of *Elpidium* Müller 1880: Numbers correspond to the species list

1. *G. aethiopsis* Rome 1970. Lake Biete Mengest, near Debre Zeit, S of Addis Abeba, Ethiopia, 09°01′N 38°45′E: Holotype not designated, repository of type material unknown.
2. *G. alata* Rome 1962. Burton Bay, Lake Tanganyika, DR Congo, 04°19′S 29°05′E: Holotype (♂), RBINS – 525037, 525038.
3. *G. angulata* Lowndes 1932a. Lake Ziway, Ethiopia, 08°00′N 38°49′E: Holotype not designated, repository of type material unknown.
4. *G. angusta* Klie 1939a. Elgon, Koitobos, Kenya, 01°22′25″S 35°44′22″E: Syntypes, ZMK – UR-308, 310, 311.
5. *G. australica* Hussainy 1969. Lake Purumbete, Victoria, Australia, 38°16′56″S 143°14′03″E: Holotype (♀), NMV – J-194.
6. *G. capensis* (Müller 1914). Chapmans Bay, Kapland, South Africa, 34°04′S 18°21′E: Holotype not designated, repository of the type material unknown.
7. *G. coheni* Park and Martens 2001. Delta of Dama River, near Rumonge, Lake Tanganyika, Burundi, 03°58′18″S 29°26′15″E: Holotype (♂), RBINS – O.C. 2347.
8. *G. cristata* Rome 1962. Kalemie, Lake Tanganyika, DR Congo, 05°55′47″S 29°10′33″E: Holotype (♂), RBINS – O.C. 659.
9. *G. curta* Rome 1962. Shore of Edith Bay, Lake Tanganyika, Tanzania, 06°29′57″S 29°57′09″E: Holotype (♀), RBINS – O.C. 670.
10. *G. downingi* Park and Martens 2001. Bay S of Karema, Lake Tanganyika, Tanzania, 06°52′S 30°32′E: Holotype (♂), RBINS – O.C. 2332.
11. *G. duffi* (Hornibrook 1955). Pyramid Valley Swamp, Canterbury, New Zealand, 42°58′04″S 172°36′04″E: Holotype (♀, valves only), NZGSW – collection number unknown.
12. *G. emrysi* Martens 2003a. SE arm of Lake Malawi, Malawi, 14°18′395″S 35°09′149″E: Holotype (♂), RBINS – O.C. 2452.
13. *G. huwi* Martens 2003a. Domira Bay, Lake Malawi, Malawi, 13°26′307″S 34°22′530″E: Holotype (♂), RBINS – O.C. 2480.
14. *G. irvinei* Martens 2003a. Metangula, Lake Malawi, Mozambique, 12°38′531″S 34°46′685″E: Holotype (♂), RBINS – O.C. 2460.
15. *G. lenis* Rome 1962. Burton Bay, Lake Tanganyika, DR Congo, 04°19′S 29°05′E: Holotype (♀), RBINS – O.C. 668.
16. *G. lisae* Martens 2003a. Metangula, Lake Malawi, Mozambique, 12°38′531″S 34°46′685″E: Holotype (♂), RBINS – O.C. 2490.
17. *G. obtusata* (Sars 1910). Bukobe, Lake Victoria, Tanzania, 01°19′20″S 31°48′28″E: Holotype not designated, NHMO.
18. *G. ortali* Martens 1993. Nahal Dan, spring and river, N Israel, 35°37′33″N 33°15′29″E: Holotype (♂), RBINS – O.C. 1698.
19. *G. parcedilatata* Rome 1977 (in Rome and De Decker 1977). Ishungu Basin, DR Congo, 02°17′00″S 28°57′00″E: Holotype (♂), RBINS – O.C. 773.
20. *G. piriformis* Martens 2003a. Metangula, Lake Malawi, Mozambique, 12°38′537″S 34°46′345″E: Holotype (♂), RBINS – O.C. 2470.

21. *G. problematica* (Brehm 1932a). Waimate Gorge, Canterbury, New Zealand, 44°44′25″S 171°02′30″E. Holotype not designated, repository of the type material unknown.
22. *G. simplex* Rome 1962. Sumbu Bay, Lake Tanganyika, Zambia, 08°29′S 30°28′E: Holotype (♀), RBINS – O.C. 667.
23. *G. wilsoni* Park and Martens 2001. Bay S of Karema, Lake Tanganyika, Tanzania, 06°52′S 30°32′E: Holotype (♂), RBINS – O.C. 2345.
24. *G. woutersi* Park and Martens 2001. Bay S of Karema, Lake Tanganyika, Tanzania, 06°52′S 30°32′E: Holotype (♂), RBINS – O.C. 2358.

Key to the species

1. Ventro-lateral expansions on carapace present (sometimes visible as distinct alae in dorsal view) 2
– Ventro-lateral expansions on carapace absent 10
2. In lateral view, ventro-lateral expansions triangular, and overlapping ventral margins ..... *G. alata* Rome 1962
– In lateral view, ventro-lateral expansions rounded and sometimes overlapping ventral margin 3
3. Female with posterior end of body with four hirsute UR lobes ... *G. coheni* Park and Martens 2001
– Female with posterior end of body with three hirsute UR lobes 4
4. Distal lobe of hemipenis without a thumb-like protrusion on dorsal side 5
– Distal lobe of hemipenis with a thumb-like protrusion on dorsal side 6
5. Dorsal margin of carapace rounded ..... *G. duffi* (Hornibrook 1955)
– Dorsal margin of carapace straight ..... *G. cristata* Rome 1962
6. Distal lobe of hemipenis quite narrow, especially in its most distal part, and with a steep dorsal margin ..... *G. downingi* Park and Martens 2001
– Distal lobe of hemipenis wide in its most distal part and with a more flat dorsal margin 7
7. Thumb-like protrusion on distal lobe of hemipenis curved 8
– Thumb-like protrusion on distal lobe of hemipenis straight ... *G. emrysi* Martens 2003a
8. Dorsal margin of distal lobe of hemipenis serrated (ridged) in the area between thumb-like process and apex ..... *G. angulata* Lowndes 1932a
– Dorsal margin of distal lobe of hemipenis smooth 9
9. A1 with incompletely divided penultimate segment ... *G. parcedilatata* Rome 1977 (in Rome and De Decker 1977)

– A1 with a completely divided penultimate segment ... *G. aethiopsis* Rome 1970

10. In lateral view, dorsal margin of both valves rounded ....*G. lenis* Rome 1962

– In lateral view, dorsal margin of both valves straight or slightly concave in the middle 11

11. Carapace ornamented with pits and small nodules all over the surface ... *G. woutersi* Park and Martens 2001

– Carapace without nodules on the surface 12

12. Distal lobe of hemipenis with a very narrow distal part and a steep dorsal margin ..... *G. australica* Hussainy 1969

– Distal lobe of hemipenis with a broad distal part and a flat dorsal margin ... 13

13. Brood chamber prominent and sexual dimorphism clear 14

– Brood chamber not so prominent and sexual dimorphism not clear 15

14. Penultimate segment of A1 completely divided 16

– Penultimate segment of A1 not divided or partially divided 17

15. Thumb-like process on hemipenis not distinct ... *G. piriformis* Martens 2003a

– Thumb-like process on hemipenis prominent ..... *G. obtusata* (Sars 1910)

16. Two distal setae on anterior side of penultimate segment of A claw like ... *G. irvinei* Martens 2003a

– Two distal setae on anterior side of penultimate segment of A1 thin ... *G. capensis* (Müller 1914)

17. Penultimate segment of A1 not completely divided 18

– Penultimate segment of A1 divided 20

18. Thumb-like structure on distal lobe of hemipenis well developed ... *G.angusta* Klie 1939a

– Thumb-like structure on distal lobe of hemipenis not developed 19

19. Distal setae on penultimate segment of A1 thin .....*G. ortali* Martens 1993

– Distal setae on penultimate segment of A1 claw like ... *G. wilsoni* Park and Martens 2001

20. Lower ramus of the clasping organ of hemipenis blunt ... *G. lisae* Martens 2003a

– Lower ramus of the clasping organ of hemipenis pointed ... *G. huwi* Martens 2003a

Species not included in the key
The following three species have not been included in the key: *G. simplex* Rome 1962, *G. curta* Rome 1962, and *G. problematica* (Brehm 1932a). The former two species were described from Lake Tanganyika (Rome 1962). The New Zealand species, *G. problematica*, closely resembles *G. australica*, but their possible synonymy needs to be examined further, because males of *G. problematica* have not been described (Brehm 1932a).

Ecology and distribution (Fig. 28)
Species of this genus live mostly in lakes, and most of them are endemic to Lake Tanganyika. Africa is the center of the genus' biodiversity. The northernmost point of the genus' distribution is Israel.

***Gomphodella* De Deckker 1981b**
Diagnosis (modified after Karanovic 2006a): Hinge lophodont, surface of the carapace usually heavily ornamented and hirsute. Second segment of A1 without posterior seta. Vibratory plate of Md with three setae. Setae on the penultimate and terminal segments of Md-palp transformed into thick claws. Females with two UR. Distal lobe of hemipenis prominent, triangular, and movable.

Type species: *G. maia* De Deckker 1981b

Species list with type locality and type material
1. *G. aura* Karanovic 2009. Weelamurra Creek, Pilbara region, WA, Australia, 22°05′46″S 117°42′23″E: Holotype (♀), WAM – C35715.
2. *G. glomerosa* Karanovic 2006a. Pump 1, Lake Violet borefield, Willuna, Murchison region, WA, Australia, 26°40′S 120°14′E: Holotype (♀), WAM – C28377.

Fig. 28 Distribution of *Gomphocythere* G. O. Sars 1924: Numbers correspond to the species list

3. *G. hirsuta* Karanovic 2006a. Newman bore near W126, Newman borefield, Pilbara region, WA, Australia, 23°15'S 119°53'E: Holotype (♀), WAM – C28386.
4. *G. martensi* Karanovic 2009. Bore GFS004, Ballards Well, Pilbara region, WA, Australia, 22°55′49.2″S 115°42′33.9″E: Holotype (♂), WAM – C35716.
5. *G. maia* De Deckker 1981b. Fresh Dip Lake, near Robe, SA, Australia, 35°15′42″S 139°48′42″E: Holotype (♂), SAM – collection number unknown.
6. *G. pilbarensis* Karanovic 2009. Bore MBSLK 316, Bamboo Creek, Pilbara region, WA, Australia, 20°56′06.8″S 119°51′03″E: Holotype (♀), WAM – C35717.
7. *G. quasihirsuta* Karanovic 2009. Bore UAR002, Round Well, Pilbara region, WA, Australia, 22°53′14.2″S 115°28′44.9″E: Holotype (♂), WAM – C35719.
8. *G. yandii* Karanovic 2006a. Bore MS-10, Yandi, Murchison region, WA, Australia, 27°45′S 114°49′E: Holotype (♀), WAM – C33469.

Key to the species

1. Posterior seta on the fourth segment of A1 (segment sometimes fused with the fifth) present ..... *G. maia* De Deckker 1981b

– Posterior seta on the fourth segment of A1 (segment sometimes fused with the fifth) absent 2

2. L6 and L7 without seta on the second segment 3

– L6 and L7 with one seta on the second segment 4

3. In lateral view, each valve with a flat, wide wing that overlaps the ventral margin, which has a peripheral channel dividing the wing into two ledges ... *G. yandii* Karanovic 2006a

– No lateral wings, ventral margin clearly visible ... *G. pilbarensis* Karanovic 2009

4. In dorsal view, carapace with a broad, transparent aura ... *G. aura* Karanovic 2009

– No aura on carapace present 5

5. Carapace in dorsal view with a well-chitinized frame ... *G. glomerosa* Karanovic 2006a

– No chitinized frame on carapace present 6

6. Surface of carapace with square-shaped protuberances situated along the lateral margins .....*G. martensi* Karanovic 2009

– No such protuberances present 7

7. UR with two lobes ..... *G. quasihirsuta* Karanovic 2009

– UR with three lobes ..... *G. hirsuta* Karanovic 2006a

Fig. 29 Distribution of *Gomphodella* De Deckker 1981b: Numbers correspond to the species list

Ecology and distribution (Fig. 29)
Except for the type species of the genus which has been found in open water bodies and in caves, all the other species live in the subterranean waters. All the species are endemic to Australia, and only *G. maia* De Deckker 1981a has been found outside Western Australia.

***Intrepidocythere* Pinto, Rocha, and Martens 2008**
Diagnosis (modified after Pinto et al. 2008): Carapace smooth, hemipenis with fusion of several structures (including the copulatory process and triangular distal lobe). First segment of A1 bearing a subapical expansion with a tuff of tiny setules on dorsal margin. A2 sexually dimorphic: in males, two of three claws strongly serrated. In both sexes, terminal segment of A2 with a small hyaline lobe.

Type (and only) species: *I. ibipora* Pinto, Rocha, and Martens 2008

Species list with type locality and type material
I. ibipora Pinto, Rocha, and Martens 2008. Parque Estadual da Serra do Mar Núcleo Cunha/Indaiá, Municipality of Cunha, São Paulo State, Brazil, 23°14′03.3″S 45°01′23″W: Holotype (♂), MZUSP – 18479.

Ecology and distribution
The species has been found only once, in a semi-terrestrial habitat (leaf litter).

***Kovalevskiella* Klein 1963**
Diagnosis: Small animals with heavily ornamented valves. Hinge inverse lophodont. One sulcus present on carapace, situated medially. No sexual dimorphism in the morphology of A2. Mxl-palp with only two papoose setae. Terminal segment of Md-palp minute.

Type species: *K. turianensis* Klein 1963 (fossil species)

Species list with type locality and type material
1. *K. bulgarica* (Danielopol 1970). Well in village Simitli, Blagoevgrad, Bulgaria, 41°53′25″N 23°06′49″E: Holotype (not designated), NHMV.
2. *K. cvetkovi* (Danielopol 1969b). Village Sinemoretz, Burgas, Bulgaria, 42°29′48″N 27°28′23″E: Holotype (not designated), NHMV.
3. *K. dani* Karanovic 2003a. Freshwater well, village Petra, Lesbos, Greece, 39°19′38″N 26°10′38″E: Holotype (♀), WAM C28375.
4. *K. phreaticola* (Danielopol 1965). Cave Vadu Crişului, Romania, 46°59′15″N 22°30′58″E: Holotype (♀), BM – 1965 4.5.2.
5. *K. rudjakovi* (Danielopol 1969b).Krasnoalexandrovskaia, Tuapse, Transcaucasia, Russia, 44°06′10″N 39°04′31″E: Holotype not designated, repository of the type material unknown.

Key to the species

1. A1 5-segmented ..... *K. rudjakovi* (Danielopol 1969b)

– A1 6-segmented 2

2. Second segment of Md-palp without setae ..... *K. dani* Karanovic 2003a

– Second segment of Md-palp with one seta 3

3. A2 on the second segment with two setae antero-medially ... *K. bulgarica* (Danielopol 1970)

– A2 on the second segment with only one antero-medial seta 4

4. Fourth segment of A1 with two posterior setae ... *K. cvetkovi* (Danielopol 1970)

– Fourth segment of A1 with one posterior seta ... *K. phreaticola* (Danielopol 1965)

Ecology and distribution (Fig. 30)
All the species described so far are found in the subterranean waters. Their distribution is limited to the Balkan Peninsula and Transcaucasia.

***Metacypris* Brady and Robertson 1870 [Syn:*Thaicythere* Savatenalinton, Borgonie and Martens 2008]**

Diagnosis (modified after Colin and Danielopol 1980): Valves moderately ornamented (Fig. 1d, e). Hinge adont or lophodont. A2 not sexually dimorphic. Md-palp normally developed. L7 is the largest leg; posterior part of female abdomen with two caudal rami, each bearing two setae and three lobes.

Type species: *M. cordata* Brady and Robertson 1870

Fig. 30 Distribution of *Kovalevskiella* Klein 1963: Numbers correspond to the species list

Species list with type locality and type material

1. *M. cordata* Brady and Robertson 1870. Bed of sluggish flowing River Nene, between Peterborough and Whittlesey, Cambridgeshire, England, UK, 52°34′N 00°11′W: Types in the Brady Collection, HM – collection numbers unknown.
2. *M. digitiformis* Smith and Hiruta 2004. Marshland in Kushiro, Shitsugen National Park, Hokkaido, Japan, 43°06′10″N 144°20′30″E: Holotype (♂), ZIHU – 2063.
3. *M. srisumonae* (Savatenalinton, Borgonie, and Martens 2008). Nalao natural spring, Chaiyaphum Province, Thailand, 16°15′52.5″N 100°16′53.3″E: Holotype (♂), RBINS – O.C. 2924.

Key to the species

1. Upper ramus on hemipenis well developed 2

– Upper ramus on hemipenis reduced ... *M. srisumonae* (Savatenalinton, Borgonie, and Martens 2008)

2. Upper ramus triangular, with short tip ... *M. cordata* Brady and Robertson 1870

– Upper ramus triangular, with elongated tip ... *M. digitiformis* Smith and Hiruta 2004

Ecology and distribution (Fig. 31)

The species can be found in diverse type of freshwater bodies. The type species has been found in several localities in Europe, and it is a typical inhabitant of marginal vegetation and root masses on the edge of small lakes. The other two species are known only from their respective type localities.

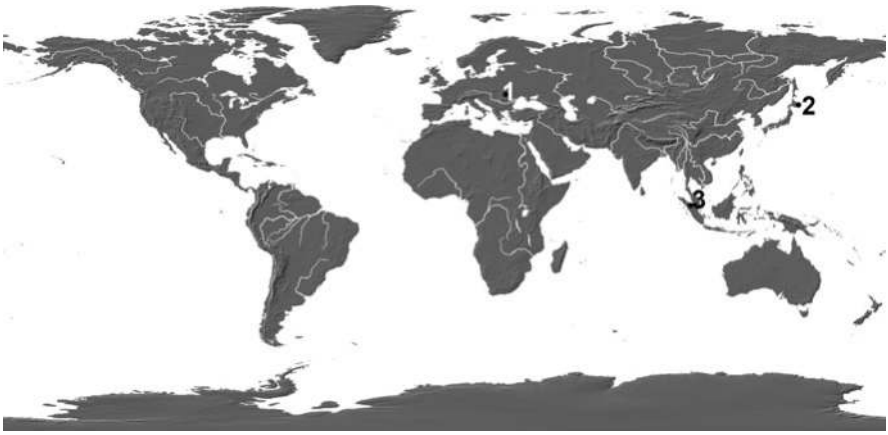

Fig. 31 Distribution of *Metacypris* Brady and Robertson 1870: Numbers correspond to the species list

6 Family Loxoconchidae Sars 1925

Diagnosis (after Savatenalinton and Martens 2009a): Carapace in lateral view reniform, ovate, rhomboidal, quadrate, rectangular, or subtriangular, sometimes with a caudal process (Fig. 2d–g). Valves smooth, pitted, or reticulated, sometimes with tubercles/or alae. Inner lamella relatively broad; MPC few, usually simple but occasionally branching; anterior and posterior vestibule usually present. Muscle scar pattern set with a vertical and arcuate row of four CMS, frontal scars U-, V-, Y-, C-shaped or subtriangular, sometimes with a second small, rounded scar in front; sometimes Md scars are visible. A1 with five or six segments. Endopod A2 2- or 3-segmented, two terminal claws on distal segment (Fig. 42g of chapter "Introduction"). Exopod of A2 mostly 2-segmented. Vibratory plate on Md-palp with four setae. Vibratory plate on Mxl with a single aberrant seta. L5–L7 slender. UR with two or three setae.

Type genus: *Loxoconcha* Sars 1866

Other (freshwater) genera: *Cytheromorpha* Hirschmann 1909, *Pseudolimnocythere* Klie 1938b, and *Sanyuania* Zhao and Han 1980.

Remarks
According to Savatenalinton and Martens (2009a), family Loxoconchidae has 22 recent genera, most of which live only in marine and brackish waters. The only exceptions are the four genera listed above. Even these genera have most representatives in marine and brackish environments, and only six species are known so far from the freshwater ecosystems.

Key to the genera with freshwater representatives (valid only for the freshwater species)

1. Penultimate segment of A1 divided ..... *Cytheromorpha* Hirschmann 1909
– Penultimate segment of A1 not divided (Fig. 8c) 2
2. Terminal segment of A1 with four setae..... *Pseudolimnocythere* Klie 1938b
– Terminal segment of A1 with three setae 3
3. Second segment of A2 with two posterior setae and one aesthetasc (Fig. 7g) ... *Loxoconcha* Sars 1866
– Second segment of A2 with one posterior seta and one aesthetasc ... *Sanyuania* Zhao and Han 1980

***Cytheromorpha* Hirschmann 1909**

Diagnosis: Carapace elongated. Penultimate segment of A1 subdivided, no posterior medial setae on the penultimate segment of A1, terminal segment with three setae. Exopod on A2 divided. Second endopodal segment of A2 posteriorly with two setae and aesthetasc, same segment anteriorly with two setae.

Type species: *C. fuscata* (Brady 1869)

Species list with type locality and type material
C. fuscata (Brady 1869). River Scheldt, Belgium, 51°17′N 03°49′E: Holotype not designated, repository of the type material unknown.

Ecology and distribution
Only the type species can be found in fresh water. This species has a Holarctic distribution, and lives in brackish waters as well.

***Loxoconcha* Sars 1866**

Diagnosis: Carapace rhomboidal, ovate, or elongate, mostly with rather inflated valves. Anterior end rounded, posterior end upwardly rounded, in some forms with clear caudal process. Surface smooth or pitted. Inner lamella wide anteriorly, less wide in posterior and ventral regions. CIL moderately wide anteriorly, narrow posteriorly. Line of concrescence running subparallel to outer margin. MPC simple, straight, and widely (more or less evenly) spaced. Hinge of aberrant amphidont type. Normal pores of sieve type. Penultimate segment of A1 undivided, terminal segment with four setae.

Type species: *L. rhomboidea* (Fischer 1855) (marine species)

Species list with type locality and type material
1. *L. elliptica* Brady 1868. Arnold's pools, Guernsey, 49°27′25″N 02°33′42″W: Lectotype, HM – NEWHM:1.14.11.
2. *L. galilea* Lerner-Seggev 1968. Lake Tiberias, Israel, 32°47′59″N 35°35′00″E: Holotype not designated, repository of the type material unknown.

Key to the species
1. Exopod of A2 divided ..... *L. galilea* Lerner-Seggev 1968
– Exopod of A2 undivided ..... *L. elliptica* Brady 1868

Ecology and distribution
Loxoconcha galilea Lerner-Seggev 1968 has been so far found only in Lake Tiberias (=Sea of Galilee), while *L. elliptica* Brady 1868 is distributed in the northern Europe, mostly living in the brackish waters but occasionally recorded in coastal freshwater.

***Pseudolimnocythere* Klie 1938b**
Diagnosis (modified after Danielopol 1979): Small animals (0.3–0.4 mm), no sexual dimorphism. Carapace ornamented with rounded pits. CIL wide, MPC branched. A1 5-segmented; exopod of A2 undivided. Second segment of A2 posteriorly with two setae and one aesthetasc, anteriorly with two setae.

Type species: *P. hypogea* Klie 1938b

Species list with type locality and type material
1. *P. hartmanni* Danielopol 1979. Well, Agios Georgios, Euboea, Greece, 38°05′32″N 24°34′42″E: Holotype (♂), LIM – collection number unknown.
2. *P. hypogea* Klie 1938b. Well, Bari, Italy, 41°07′32″N 16°52′09″E: Syntypes, ZMK – UR-86, 87.

Key to the species
1. Exopod of A2 exceeding distal segment ..... *P. hypogea* Klie 1938b
– Exopod of A2 only slightly exceeding penultimate segment ... *P. hartmanni* Danielopol 1979

Ecology and distribution (Fig. 32)
Both species live in the subterranean, sometimes slightly brackish waters. *Pseudolimnocythere hypogea* Klie 1938b is endemic to the Apennine Peninsula; *P. hartmanni* Danielopol 1979 is endemic to Greece.

***Sanyuania* Zhao and Han 1980** Diagnosis (after Savatenalinton and Martens 2009a): Carapace small (0.28–0.35 mm), in lateral view subovate to subtriangular, anterior margin broadly rounded, posterior margin rounded to bluntly pointed. In dorsal view, laterally compressed and with pointed ends. Valve surface smooth or pitted. A1 5- or 6-segmented.

Fig. 32 Distribution of *Pseudolimnocythere* Klie 1938b: Numbers correspond to the species list

Type species: *S. parodies* Zhao and Han 1980 (fossil species)

Other (freshwater, recent) species: *S. segersi* Savatenalinton and Martens 2009a

Species list with type locality and type material
S. segersi Savatenalinton and Martens 2009a. Lopburi River, Muang District, Lopburi Province, Thailand, 14°47′55.5″N 100°38′29.8″E: Holotype (♀), RBINS – O.C. 3014.

Ecology and distribution
Known only from the type locality.