

Three new species of the *Cyprideis* species flock (Crustacea, Ostracoda) of Lake Tanganyika (East Africa)

by Karel WOUTERS & Koen MARTENS

Abstract

Three new species, belonging to three genera, of ostracods from Lake Tanganyika are described: *Tanganyikacythere fulgens* sp. nov., *Cyprideis aciculata* sp. nov. and *Romecytheridea bacata* sp. nov. The *Cyprideis* species flock of Tanganyika now consists of 20 formally described species (all endemic) in 6 genera (5 endemic). There is mounting evidence that there might be higher numbers of cryptic species in this flock than was previously assumed. Especially the genera *Romecytheridea* (derived) and *Cyprideis* (ancestral) are most speciose.

Key words: taxonomy, morphology, ancient lakes, speciation, *Cyprideis*, species flock, Ostracoda.

INTRODUCTION

The ancient Lake Tanganyika comprises at least five separate ostracod radiations (MARTENS, 1994), of which the *Cyprideis* species flock has most intensively been studied (ROME 1962, KISS 1959, WOUTERS 1979, 1988a, b, WOUTERS & MARTENS 1992, 1994, 1999, 2001, DUCASSE & CARBONEL 1993, 1994). The present paper presents 3 new species in 3 genera, bringing the total number of formally described species to 20 (all endemic) in 6 genera (5 endemic). Extant collections from various expeditions contain an unknown number of more undescribed taxa in this species flock, albeit mostly in insufficient numbers to allow confident characterisation. Moreover, the present new taxa all originate from a single sample, from an area which had previously already been sampled. All this shows that there is ample potential to find more new taxa within the Tanganyikan *Cyprideis*-species flock.

TERMINOLOGY AND ABBREVIATIONS

The morphology of the copulatory organ of *Cyprideis* and related genera is complex and sometimes difficult to interpret with light microscopy. Therefore, some descriptive terms for parts of the hemipenis anatomy, important for taxonomic discrimination, were introduced by WOUTERS & MARTENS (1994, 1999, 2001). These are again used here. The distal part of the hemipenis consists of two lobes, a larger one, the distal shield (DS) and a smaller one, the distal lobe (DL). The central part of the hemipenis is very complex, and has, among other structures, a ventrally oriented lobe, here called the central lobe (CL), which can be hook-like, club-like or hammer-like in appearance. The fourth structure is the actual copulatory process (cp). As maxillule and mandible appear to have no specific features in the present species flock (see descriptions in WOUTERS & MARTENS, 1994, 1999), they are not described, nor illustrated for the three new species described herein. Line drawings of the hinge of the valves, finally, illustrate the negative parts (the sockets) in black, the positive parts (the teeth) in white. The studied material is curated in the Ostracod Collection (O.C.) of the Royal Belgian Institute of Natural Sciences, Brussels (Belgium).

TAXONOMIC DESCRIPTIONS

Subclass Ostracoda LATREILLE, 1806

Order Podocopida G.W. MÜLLER, 1894

Suborder Podocopina G.W. MÜLLER, 1894

Infraorder Cytherocopina GRÜNDEL, 1967

Superfamily Cytheroidea BAIRD, 1850

Family Cytherideidae SARS, 1925

Subfamily Cytherideinae SARS, 1925

Tribe Cyprideidini KOLLMANN, 1960

Genus *Tanganyikacythere* DUCASSE & CARBONEL, 1993

Tanganyikacythere fulgens sp. nov.
(Pl. 1, Figs 1-11, Pl. 4, Figs 1-11)

DERIVATION OF NAME

Latin: *fulgens* = shiny, because of the shiny, smooth valve surface.

TYPE LOCALITY

Lake Tanganyika, Zambia, Chimba, W. of Sumbu, 8° 25' 29" S, 30° 27' 27" E, depth 18 m, muddy sand and algae, collected by SCUBA with handnet, leg.: K. MARTENS, 25 September 2006 (Station n° 16).

TYPE MATERIAL

Holotype: A male with valves stored dry (O.C. 2930a) and dissected limbs preserved in a sealed glycerine preparation (O.C. 2930b).

Allotype: A female with valves stored dry (O.C. 2931a) and dissected limbs preserved in a sealed glycerine preparation (O.C. 2931b).

Paratypes: seven dissected males and six dissected females (O.C. 2932-2944) and one male and one female empty carapace (O.C. 2945).

DIAGNOSIS

Large, very shiny, smooth and translucent valves; hinge completely negative in the left valve and positive in the right one; first right leg in the male developed as a clasping organ; hemipenis with a crescent-shaped distal shield, narrow and nearly straight distal lobe and suboval and slightly curved central lobe.

DESCRIPTION

Large, thick and heavily calcified carapaces; general appearance somewhat spherical; right valves markedly lower than left ones, especially in females. Valves completely smooth and shiny, translucent.

Female valves (Pl. 1, Fig. 2, Pl. 4, Figs 3-4, 6-7): dorsal margin weakly convex; anterior and posterior margins broadly rounded, with no marked transition between the dorsal and ventral margins; ventral margin convex, particularly in the postero-ventral area of the left valve: dorsal and ventral margins not parallel, but slightly tapering towards the anterior; maximum height

in the posterior third of the valves; carapace in dorsal view with blunt anterior and rounded posterior extremity; lateral margins nearly parallel in the middle; largest width situated in the posterior third of the carapace.

Male valves (Pl. 1, fig. 1, Pl. 4, Figs 1-2, 5) more elongate, i.e. less high than females; dorsal and ventral margins weakly convex, and nearly parallel; carapace in dorsal view with blunt anterior and posterior extremities and with convex, and in the middle parallel lateral margins.

Inner lamella wide in both sexes; numerous straight, sometimes bifurcated, marginal pore canals (Pl. 1, Figs 1, 2); very shallow anterior and posterior vestibula; muscle scar pattern consisting of a row of four oval adductor scars, a rounded V-shaped frontal scar and a small fulcral point. Hinge strongly developed in the female (Pl. 1, Fig. 2), much less so in the male (Pl. 1, Fig. 1). Hinge completely positive in the right valve and negative in the left one. Female hinge of the right valve tripartite and consisting of ca 15 anterior elongate and obliquely oriented toothlets, a median element with ca 13 small toothlets and a posterior element with 6 obliquely oriented toothlets. The median element is not divided. Hinge of the left valve complementary with a comparable number of sockets. Male hinge, as in the female, but less strongly developed.

Antennule (Pl. 1, Fig. 3) five-segmented; first segment stout, dorso-distally set with a row of fine setules; second segment elongate, with long ventro-distal seta, reaching beyond the middle of the terminal claws; third and fourth segment short, with three long curved claw-like setae and two shorter claws; fourth segment with very short medial seta; fifth segment long and slender with a long slender claw, and a short aesthetasc, fused at its base with a curved seta.

Antenna (Pl. 1, Fig. 4) four-segmented with two-segmented exopodite; terminal segment small with two stout claws.

First leg dimorphic in the male: left leg (Pl. 1, Fig. 7) as in the female, with slender segments; right leg (Pl. 1, Fig. 8) developed as a four-segmented clasping organ: second segment with a very narrow knee-like joint with the first segment; claw of terminal segment stout.

Second leg strongly dimorphic in the male: left leg (Pl. 1, Fig. 6) as in the female, with slender curved terminal claw; right leg (Pl. 1, Fig. 10) strongly reduced and weakly sclerotized.

Third leg (Pl. 1, Fig. 5) not dimorphic, long and very hirsute; anterior margin of second segment set with numerous setules; terminal segment with slender and long, slightly S-shaped, claw.

Hemipenis (Pl. 1, Fig. 11) with a crescent-shaped

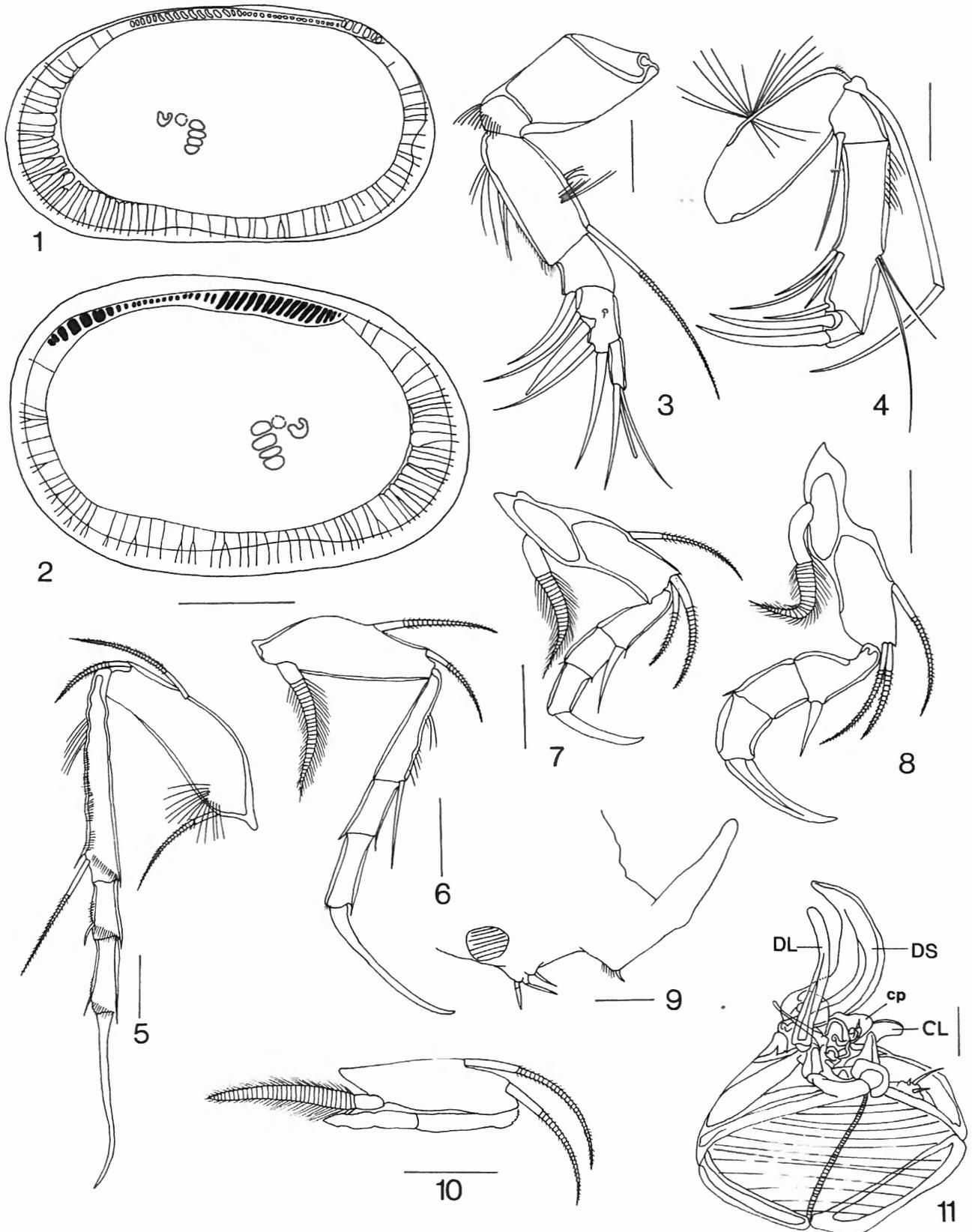


Plate 1. *Tanganyikacythere fulgens* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Right valve, male, holotype, internal view (O.C. 2930). Fig. 2. Left valve, female, allotype, internal view (O.C. 2931). Fig. 3. Antennule, male, holotype. Fig. 4. Antenna, male, holotype. Fig. 5. Third leg, male, holotype. Fig. 6. Left second leg, male, holotype. Fig. 7. Left first leg, male, holotype. Fig. 8. Right first leg, male, holotype. Fig. 9. Abdominal extremity, female, paratype (O.C. 2944). Fig. 10. Right second leg, male, paratype (O.C. 2932). Fig. 11. Hemipenis, holotype. Scales: Figs 1-2: 200 μ m; Figs 3-11: 50 μ m.

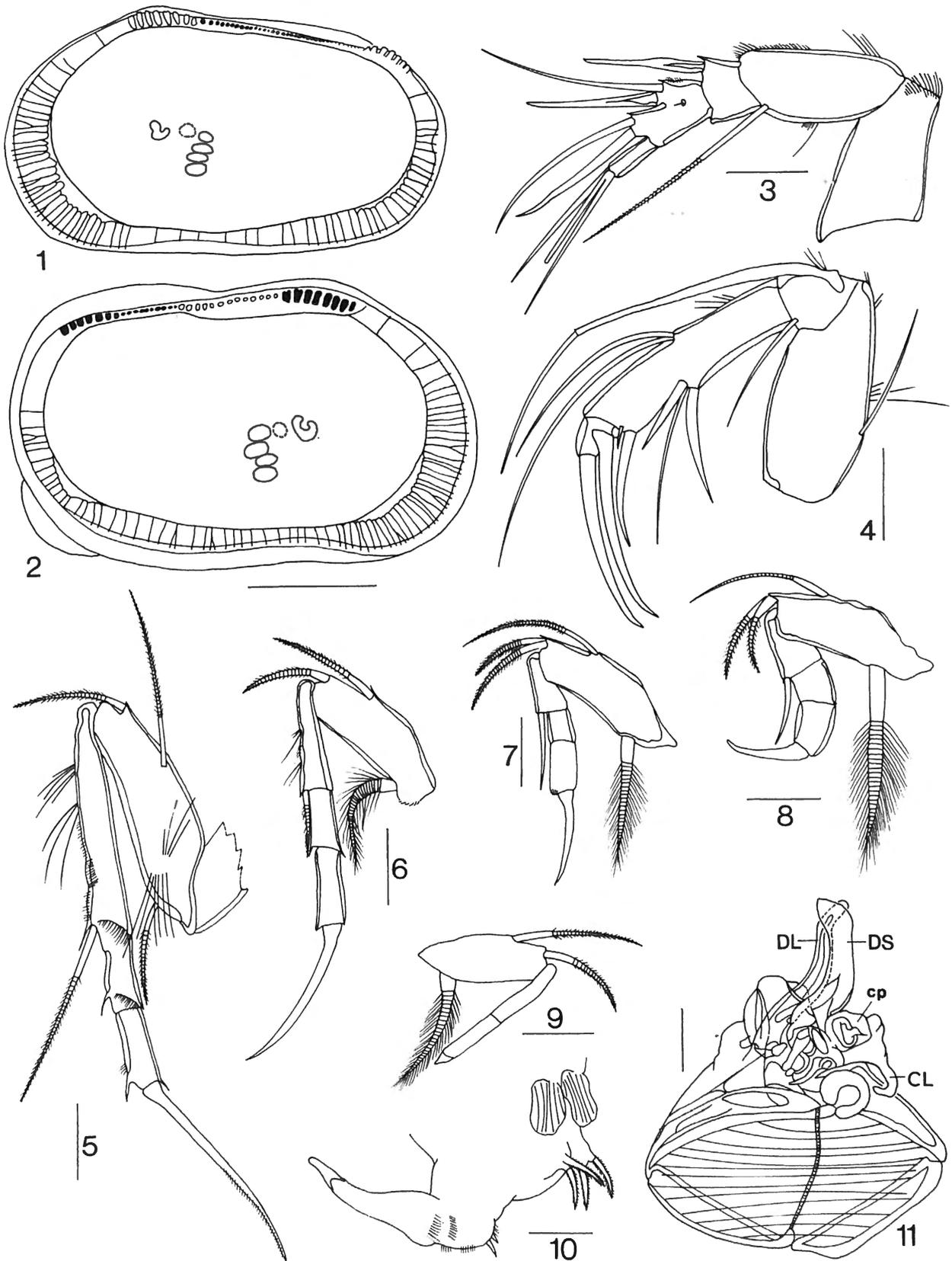


Plate 2. *Cyprideis aciculata* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Right valve, male, holotype, internal view (O.C. 2946). Fig. 2. Left valve, female, allotype, internal view (O.C. 2947). Fig. 3. Antennule, male, holotype. Fig. 4. Antenna, male, holotype. Fig. 5. Third leg, male, holotype. Fig. 6. Left second leg, male, holotype. Fig. 7. Left first leg, male, paratype (O.C. 2948). Fig. 8. Right first leg, male, paratype (O.C. 2948). Fig. 9. Right second leg, male, holotype. Fig. 10. Abdominal extremity, female, paratype (O.C. 2961). Fig. 11. Hemipenis, holotype. Scales: Figs 1-2: 200 μ m; Figs 3-11: 50 μ m.

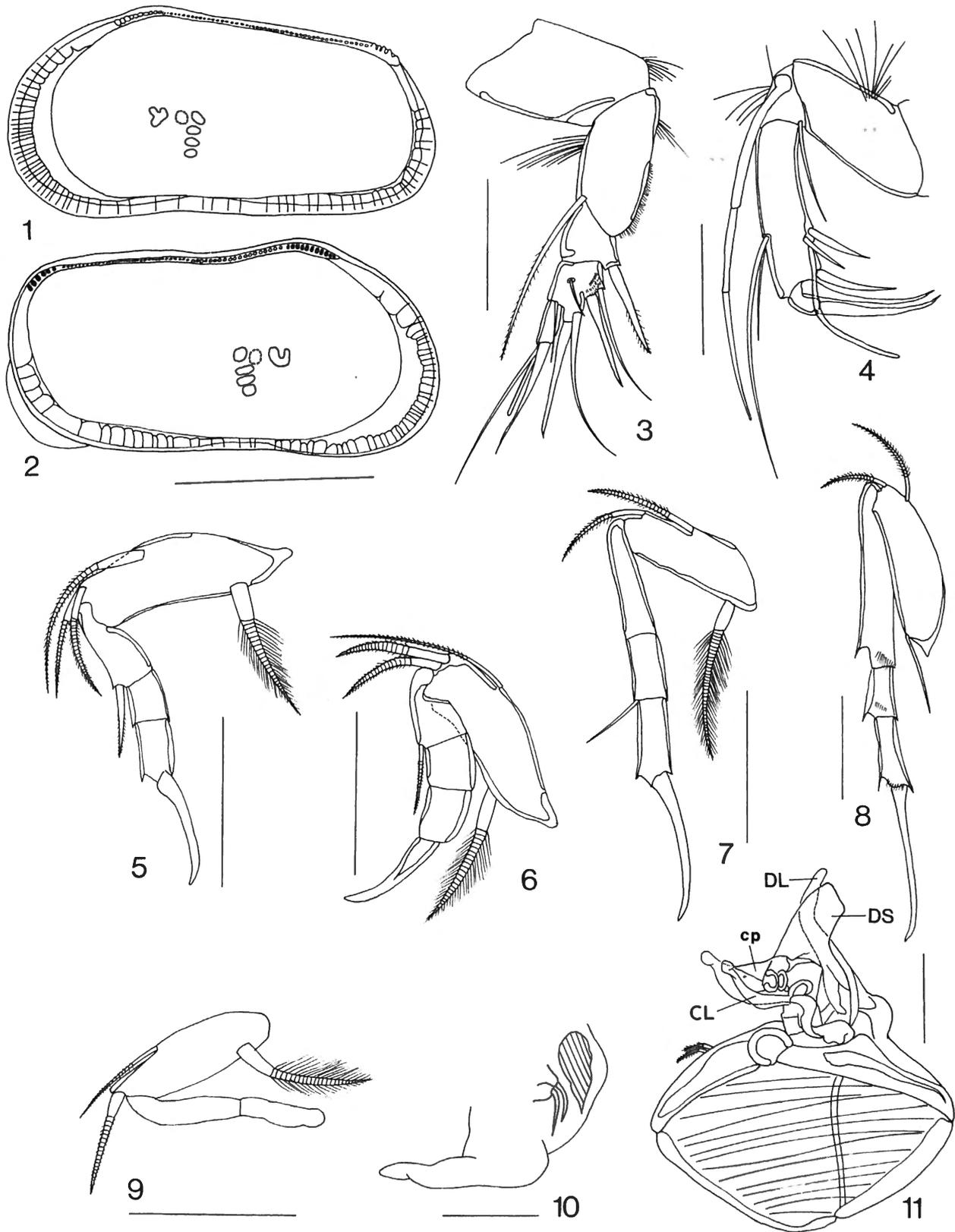


Plate 3. *Romecytheridea bacata* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Right valve, male, holotype, internal view (O.C. 2966). Fig. 2. Left valve, female, allotype, internal view (O.C. 2967). Fig. 3. Antennule, male, paratype (O.C. 2970). Fig. 4. Antenna, male, paratype (O.C. 2970). Fig. 5. Left first leg, male, holotype. Fig. 6. Right first leg, holotype. Fig. 7. Left second leg, paratype (O.C. 2971). Fig. 8. Third leg, female, paratype (O.C. 2975). Fig. 9. Right second leg, male, holotype. Fig. 10. Abdominal extremity, female, paratype (O.C. 2972). Fig. 11. Hemipenis, holotype. Scales: Figs 1-2: 200 μ m; Figs 3-11: 50 μ m.

distal shield (DS); distal lobe (DL) narrow, and nearly straight; copulatory process (cp) rounded and small; central lobe (CL) suboval and slightly curved.

Abdominal extremity in the female (Pl. 1, Fig. 9) a wedge-shaped process, proximally set with fine setules; furcae small.

MEASUREMENTS

Holotype (male)

Left valve: L 0.77 mm, H 0.45 mm

Right valve: L 0.77 mm, H 0.42 mm

Allotype (female)

Left valve: L 0.80 mm, H 0.52 mm

Right valve: L 0.76 mm, H 0.48 mm

Paratypes, males

L 0.75-0.80 mm, H 0.42-0.48 mm

Paratypes, females

L 0.75-0.81 mm, H 0.46-0.54 mm

REMARKS

The present species is a brooder. In seven of the dissected females the postero-dorsal pouch contained: 5 eggs and 1 nauplius (O.C. 2939), 18 eggs (O.C. 2931), 12 eggs (O.C. 2940), 17 eggs and 3 nauplii (O.C. 2941), 18 eggs (O.C. 2942), 21 eggs (O.C. 2943), 13 eggs and 5 nauplii (O.C. 2944).

OCCURRENCE

Tanganyikacythere fulgens sp. nov. is only known from the type locality namely Chimba, W. of Sumbu (Zambia), 8° 25' 29" S, 30° 27' 27" E, depth 18 m, muddy sand and algae.

DISCUSSION

Two other species of the genus *Tanganyikacythere* have thus far been described from Lake Tanganyika: *Tanganyikacythere burtonensis* DUCASSE & CARBONEL, 1993 and *Tanganyikacythere caljoni* WOUTERS & MARTENS, 1994. *T. fulgens* sp. nov. is the largest species of the three (*T. burtonensis*, length 0.68-0.80 mm, *T. caljoni*, length 0.62-0.69 mm, *T. fulgens* length 0.75-0.81 mm). In *T. caljoni* the short median element of the hinge is divided in an antero-median element and a postero-median element. The antero-median element consists of a few toothlets in the left valve and sockets in the right one. In *T. fulgens* sp. nov. the median element is undivided, and the hinge is completely positive in the right valve and negative in the left one (as in *T. burtonensis*). *T.*

burtonensis has much thicker valves and is more spherical in dorsal view. The appendages of *T. burtonensis* and *T. fulgens* sp. nov. show a number of similarities. The right first leg is developed as a clasping organ in both species, and the shape of their distal shields is quite similar. The distal lobe of *T. fulgens*, however, is much narrower, and the central lobe has a suboval shape and is slightly curved, whereas in *T. burtonensis* the central lobe is hook-like. The similarities between the two species may well constitute a valid argument in favour of their close relationship.

Genus *Cyprideis* JONES, 1857

Cyprideis aciculata sp. nov.

(Pl. 2, Figs 1-11, Pl. 5, Figs 1-11)

DERIVATION OF NAME

Latin: *aciculatus*, -a, -um = set with small needle-shaped spines.

TYPE LOCALITY

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Allotype: a female with valves stored dry (O.C. 2947a) and dissected limbs preserved in a sealed glycerine preparation (O.C. 2947b).

Paratypes: nine dissected males and eight dissected females (O.C. 2948-2964) and one male and one female empty carapace (O.C. 2965).

DIAGNOSIS

Medium-sized valves, with four lateral nodes; valve surface with a fine reticulation pattern with rounded to polygonal meshes; muri and anterior, posterior and ventral margins set with small needle-shaped spines; hemipenis with narrow, apically truncate distal shield, narrow and sigmoid distal lobe and large central lobe with distally oriented blunt process and proximally oriented hook-like process.

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Paratypes: nine dissected males and eight dissected females (O.C. 2948-2964) and one male and one female empty carapace (O.C. 2965).

DIAGNOSIS

Medium-sized valves, with four lateral nodes; valve surface with a fine reticulation pattern with rounded to polygonal meshes; muri and anterior, posterior and ventral margins set with small needle-shaped spines; hemipenis with narrow, apically truncate distal shield, narrow and sigmoid distal lobe and large central lobe with distally oriented blunt process and proximally oriented hook-like process.

DESCRIPTION

Medium-sized elongate suboval valves; male valves markedly lower than females.

Female valves (Pl. 2, Fig. 2, Pl. 5, Figs 4-5): the dorsal margin has an irregular appearance because of the large brood pouch which is protruding over the (straight) hinge line; anterior margin broadly rounded; posterior margin truncate; ventral margin nearly straight; maximum height in the posterior third of the valves; carapace (Pl. 5, Fig. 9) in dorsal view wedge-shaped, with blunt anterior and truncate posterior extremity; lateral margins irregular, because of the prominent nodes; largest width situated in the posterior fifth of the carapace.

Male valves (Pl. 2, Fig. 1, Pl. 4, Figs 1-2) more elongate, i.e. less high than females; dorsal margin irregular, by the presence of a lateral postero-dorsal pouch (less than in females); ventral margin weakly convex; anterior margin broadly rounded; posterior margin rounded, but somewhat triangular; dorsal and ventral margins tapering towards the posterior. Carapace (Pl. 5, Fig. 8) narrow, with irregular lateral margins because of the prominent nodes; anterior extremity truncate, posterior one narrowly rounded.

Valves in both sexes with four nodes, a small antero-dorsal one and a medio-dorsal one, with a sulcus between the two nodes; third node situated medio-centrally and fourth postero-ventrally; both nodes being much larger in females than in males; subcentral (muscular) tubercle weakly developed. Valve surface covered with a fine reticulation pattern, consisting of rounded to polygonal meshes; muri set with very fine micro-ornamentation, consisting of small needle-shaped spines; these small spines also present along the anterior, posterior and ventral margins.

Anterior inner lamella moderately wide, posterior one narrow; numerous straight, rarely bifurcated marginal pore canals (Pl. 2, Figs 1-2); very shallow antero-ventral and postero-ventral vestibula; muscle scar pattern consisting of a row of four oval adductor scars, a rounded V- to U-shaped frontal scar and a small fulcral point. Hinge (Pl. 2, Figs 1-2, Pl. 5, Figs 5-7) consisting of three elements: anterior element, median element (divided in antero-median and postero-median element) and posterior element; right valve hinge: anterior element positive, consisting of 7 bicuspid toothlets; antero-median element negative, with approximately 15 very small sockets; postero-median element, a crenulated bar, with indistinct toothlets; posterior element positive, consisting of ca 7 toothlets. Hinge of the left valve complementary with a comparable number of teeth, toothlets and sockets.

Antennule (Pl. 5, Fig. 3) five-segmented; first segment stout, dorso-distally set with a row of fine setules; second segment elongate, with long ventro-distal seta, reaching to the middle of the terminal claws; third and fourth segments short, with two stout, nearly straight, setae and three longer and curved claws; fourth segment with very short medial seta; fifth segment long and narrow, with long and slender curved seta, and a long aesthetasc, fused at its base with a long and slender, nearly straight seta.

Antenna (Pl. 1, Fig. 4) four-segmented with two-segmented exopodite; third segment with long antero-median setae, and two stout postero-median claws and a slender curved seta; terminal segment very small with two stout claws.

First leg dimorphic in the male: left leg (Pl. 2, Fig. 7) as in the female, with slender segments; right leg (Pl. 2, Fig. 8) not very different from left one, only with somewhat wider second, third and fourth segments; claw of terminal segment stronger in right leg.

Second leg strongly dimorphic in the male: left leg (Pl. 2, Fig. 6) as in the female, with slender curved terminal claw; right leg (Pl. 2, Fig. 10) strongly reduced, two-segmented and weakly sclerotized.

Third leg (Pl. 2, Fig. 5) not dimorphic, long and very hirsute; anterior margin of second segment set with numerous setules; terminal segment with slender and long and slender claw.

Hemipenis (Pl. 2, Fig. 11) with narrow, apically truncate distal shield (DS); distal lobe (DL) narrow and sigmoid; copulatory process (cp) rounded; central lobe (CL) large, with distally oriented blunt process and proximally oriented hook-like process.

Abdominal extremity in the female (Pl. 2, Fig. 10) a slightly curved wedge-shaped process, proximally set with fine setules; furcae small.

MEASUREMENTS

Holotype (male)

Left valve: L 0.72 mm, H 0.42 mm

Right valve: L 0.70 mm, H 0.39 mm

Allotype (female)

Left valve: L 0.74 mm, H 0.54 mm

Right valve: L 0.72 mm, H 0.42 mm

Paratypes, males

L 0.70-0.75 mm, H 0.39-0.44 mm

Paratypes, females

L 0.72-0.80 mm, H 0.42-0.49 mm

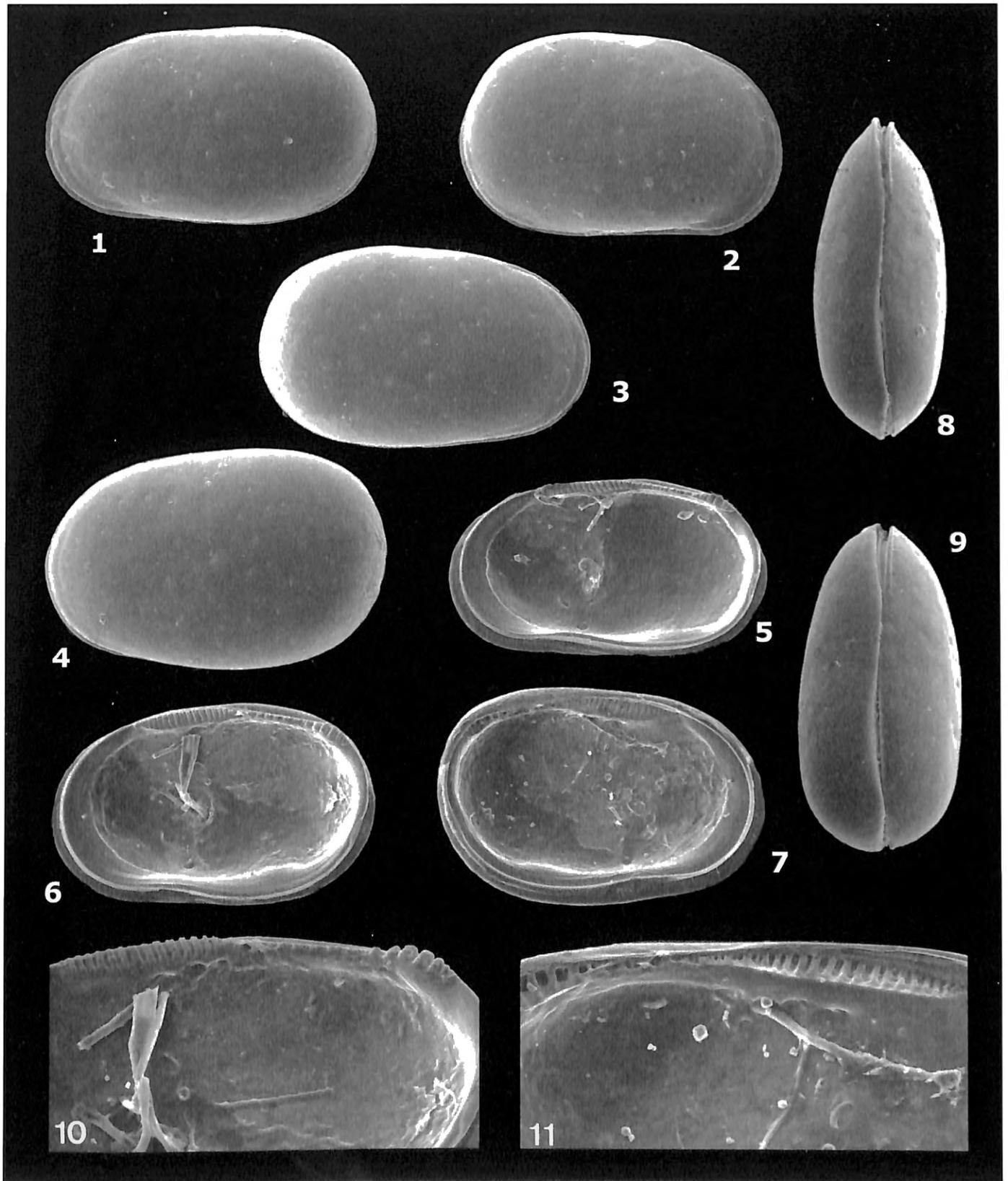


Plate 4. *Tanganyikacythere fulgens* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Left valve, male, lateral view, paratype (O.C. 2936). Right valve, male, lateral view, paratype (O.C. 2936). Fig. 3. Right valve, female, lateral view, paratype (O.C. 2942). Fig. 4. Left valve, female, lateral view, paratype (O.C. 2942). Fig. 5. Right valve, male, internal view, paratype (O.C. 2938). Fig. 6. Right valve, female, internal view, paratype (O.C. 2943). Fig. 7. Left valve, female, internal view, paratype (O.C. 2943). Fig. 8. Carapace, male, dorsal view, paratype (O.C. 2945). Fig. 9. Carapace, female, dorsal view, paratype (O.C. 2945). Fig. 10. Hinge, right valve, female, paratype (O.C. 2943). Fig. 11. Hinge, left valve, female, paratype (O.C. 2943). Magnifications: Figs 1-9: 80 x; Figs 10-11: 150 x.

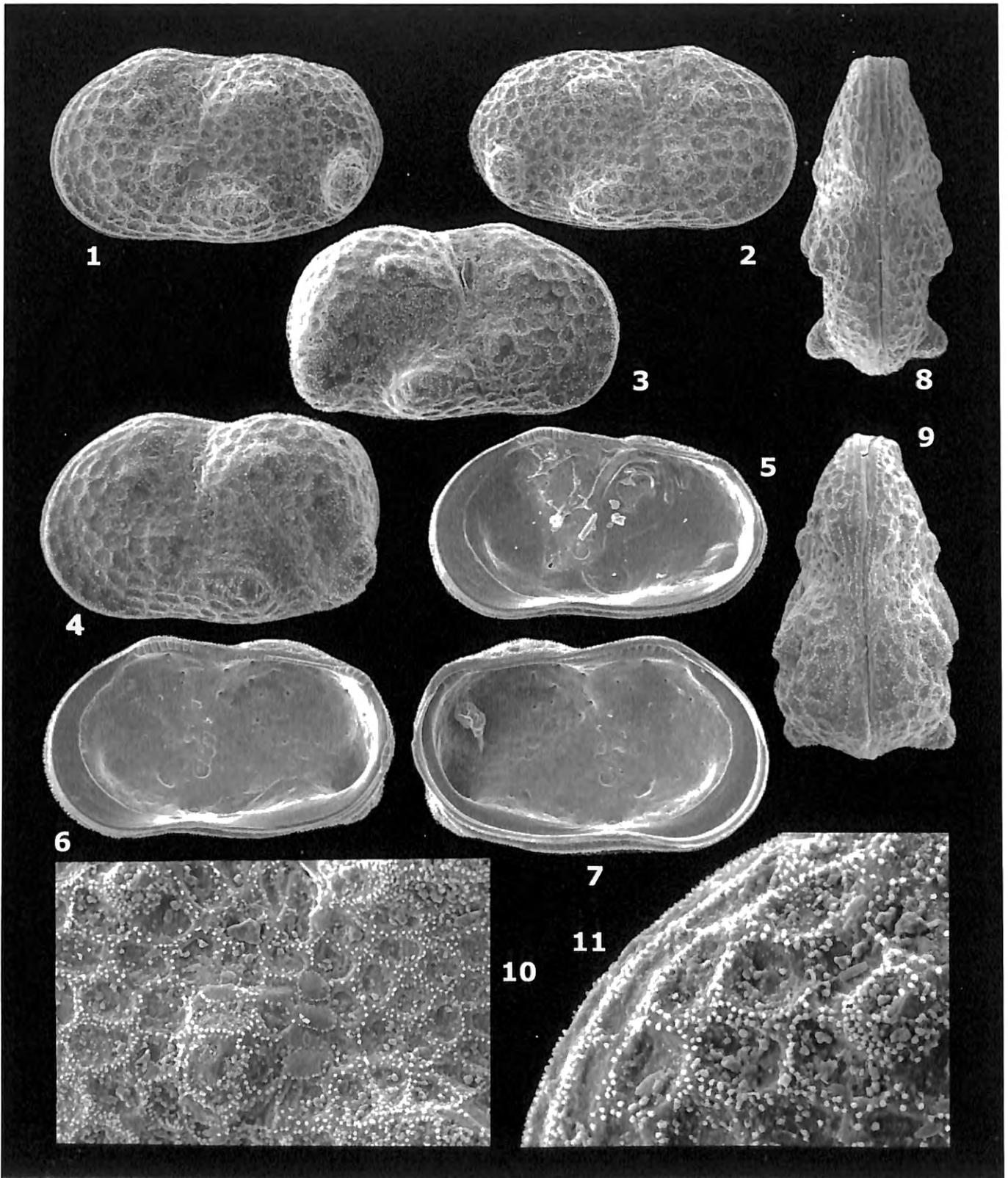


Plate 5. *Cyprideis aciculata* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Left valve, male, lateral view, paratype (O.C. 2955). Right valve, male, lateral view, paratype (O.C. 2955). Fig. 3. Right valve, female, lateral view, paratype (O.C. 2961). Fig. 4. Left valve, female, lateral view, paratype (O.C. 2961). Fig. 5. Right valve, male, internal view, paratype (O.C. 2954). Fig. 6. Right valve, female, internal view, paratype (O.C. 2962). Fig. 7. Left valve, female, internal view, paratype (O.C. 2962). Fig. 8. Carapace, male, dorsal view, paratype (O.C. 2965). Fig. 9. Carapace, female, dorsal view, paratype (O.C. 2965). Fig. 10. Left valve, male, paratype, subcentral tubercle and ornamentation (O.C. 2955). Fig. 11. Left valve, male, paratype, antero-dorsal margin and ornamentation (O.C. 2955). Magnifications: Figs 1-9: 90 x; Figs 10-11: 220 x.

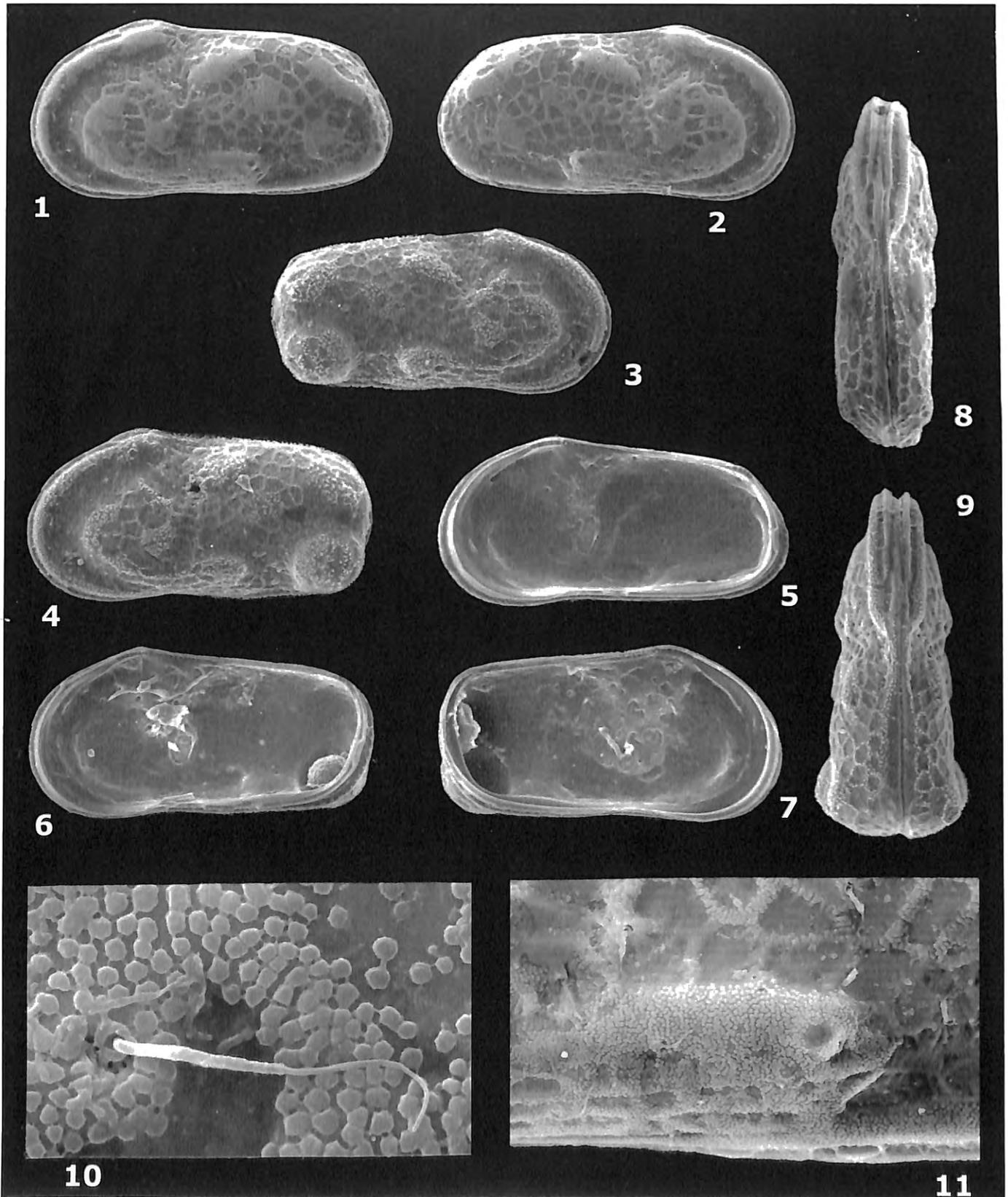


Plate 6. *Romecytheridea bacata* sp. nov., Lake Tanganyika, Zambia, Chimba. Fig. 1. Left valve, male, lateral view, paratype (O.C. 2974). Right valve, male, lateral view, paratype (O.C. 2974). Fig. 3. Right valve, female, lateral view, paratype (O.C. 2977). Fig. 4. Left valve, female, lateral view, paratype (O.C. 2977). Fig. 5. Right valve, male, internal view, paratype (O.C. 2979). Fig. 6. Right valve, female, internal view, paratype (O.C. 2980). Fig. 7. Left valve, female, internal view, paratype (O.C. 2980). Fig. 8. Carapace, male, dorsal view, paratype (O.C. 2981). Fig. 9. Carapace, female, dorsal view, paratype (O.C. 2981). Fig. 10. Left valve, male, holotype, ventro-lateral micro-ornamentation. Fig. 11. Left valve, male, holotype, ventro-lateral view. Magnifications: Figs 1-9: 145 x; Fig. 10: 2800 x; Fig. 11: 550 x.

REMARKS

The present species is a brooder. In nine of the dissected females the postero-dorsal pouch contained: 12 eggs (O.C. 2956), 11 eggs (O.C. 2947), 5 eggs (O.C. 2957), 11 eggs and 7 nauplii (O.C. 2958), 9 eggs and 5 nauplii (O.C. 2959), 11 eggs (O.C. 2960), 11 eggs and 5 nauplii (O.C. 2961), 17 eggs and 2 nauplii (O.C. 2962) and 12 eggs and 7 nauplii (O.C. 2963).

OCCURRENCE

Cyprideis aciculata sp. nov. is only known from the type locality namely Chimba, W. of Sumbu (Zambia), 8° 25' 29" S, 30° 27' 27" E, depth 18 m, muddy sand and algae.

DISCUSSION

Five other species of the genus *Cyprideis* have thus far been described from Lake Tanganyika, namely *C. loricata* WOUTERS & MARTENS, 2001, *C. mastai* WOUTERS & MARTENS, 1994, *C. profunda* WOUTERS & MARTENS, 1999, *C. rumongensis* WOUTERS & MARTENS, 1994 and *C. spatula* WOUTERS & MARTENS, 1999. Only one of these five species, *C. loricata*, has strongly ornamented valves, the others have smooth or more or less pitted valves. *C. loricata* is a larger species (L. 0.93-1.01 mm), with heavily calcified valves. *C. aciculata* sp. nov. is much smaller (L. 0.70-0.80 mm) and has thinner valves. In *C. loricata* the dorsal and ventral margins are tapering towards the posterior, whereas they are nearly parallel in *C. aciculata*. Furthermore, *C. loricata* lacks the fine reticulation pattern, and the micro-ornamentation of *C. aciculata* sp. nov.

Genus *Romecytheridea* WOUTERS, 1988

Romecytheridea bacata sp. nov.

(Plate 3, Figs 1-11, Plate 6, Figs 1-11)

DERIVATION OF NAME

Latin: *bacatus*, *-a*, *-um* = set with pearls, because of the fine micro-ornamentation on the valves.

TYPE LOCALITY

Lake Tanganyika, Zambia, Chimba, W. of Sumbu, 8° 25' 29" S, 30° 27' 27" E, depth 18 m, muddy sand and algae, collected by SCUBA with handnet, leg.: K. MARTENS, 25 September 2006 (Station n° 16).

TYPE MATERIAL

Holotype: a male with valves stored dry (O.C. 2966a) and dissected limbs preserved in a sealed glycerine preparation (O.C. 2966b).

Allotype: a female with valves stored dry (O.C. 2967a) and dissected limbs preserved in a sealed glycerine preparation (O.C. 2967b).

Paratypes: eight dissected males and six dissected females (O.C. 2968-2980) and one male and one female empty carapace (O.C. 2981).

DIAGNOSIS

Valves small, irregularly reticulated, with indistinctly delineated low nodes and a ventro-lateral rim; nodes, muri and ventro-lateral rim set with delicate micro-ornamentation consisting of very small rounded to polygonal pustules, interconnected by very fine thread-like structures; distal shield of hemipenis triangular with convex anterior margin and with truncate distal extremity; distal lobe longer than distal shield and curved; copulatory process with subtriangular base and spoon-shaped extremity; central lobe long, narrow, curved and ending in a spoon-shaped extremity.

DESCRIPTION

Small, elongate, thinshelled, posteriorly truncate valves with pronounced anterior marginal rim; marginal rim thicker in eye region; valve surface noded and irregularly reticulated. Male valves (Pl. 3, Fig. 1, Pl. 6, Fig. 1-2) with nearly straight dorsal margin; anterior margin almost evenly rounded; posterior margin narrowly rounded; ventral margin straight; dorsal and ventral margins tapering. Valve with indistinctly delineated low nodes and ventro-lateral ridge, extending mostly in anterior half of the valves; surface irregularly reticulated between nodes; reticulation absent in groove behind anterior marginal rim; nodes, muri and ventro-lateral rim set with delicate micro-ornamentation (Pl. 6, Figs 10-11) consisting of very small (diameter ca 1 µm) rounded to polygonal pustules, sometimes interconnected by very fine thread-like structures. Male carapace (Pl. 6, fig. 8) in dorsal view very narrow, with nearly parallel lateral margins, with truncate anterior extremity, marked by the presence of a marginal rim; posterior extremity rounded; largest width situated in the middle.

Female valves (Pl. 3, Fig. 2, Pl. 6, Figs 3-4) with dorsal and ventral margins tapering, but less so than in males; anterior margin obliquely rounded, posterior margin truncate; valves with irregularly delineated nodes;

postero-ventral node large, semi-spherical, and hollow (containing eggs, see Pl. 6, Fig. 6); micro-ornamentation as in males; female carapace (Pl. 6, Fig. 9) wedge-shaped; anterior extremity truncate by the presence of a marginal rim; posterior extremity truncate; lateral margins nearly straight, but with protruding subcentral tubercle and postero-ventral node.

Inner lamella in both sexes wide, with numerous mostly straight and unbranched marginal pore canals (Pl. 1, Figs 1-2); anterior vestibulum large, with a narrow fused zone; posterior vestibulum small and very shallow. Hinge tripartite and consisting of anterior, median and posterior elements; median element bipartite. Hinge of right valve (Pl. 3, Fig. 1): anterior element with 8-9 small toothlets; antero-median element with numerous (ca 20) very small sockets; postero-median element a bar-like structure with a large number of small toothlets; transition between postero-median element and posterior element situated near the middle of the valve; posterior element consisting of about six small toothlets. Left valve hinge complementary (Pl. 3, Fig. 2)

Antennule (Pl. 3, Fig. 3) five-segmented; first segment short and broad; second segment about twice as long as wide; third segment very short, fourth segment slightly more elongated; fifth segment twice as long as wide; antero-distal seta of second segment long, reaching beyond the tip of the fifth segment; third segment with a stout seta, and fourth segment with one stout and one long and slender curved seta; medial seta of fourth segment long, reaching to the end of the fifth segment. Fifth segment slender with a rather thin claw-like seta, and a long aesthetasc, fused at the base with a curved long seta.

Antenna (Pl. 3, Fig. 4) four-segmented, with three-segmented exopodite; third segment with three medially inserted posterior setae, of which two short, and one long seta, reaching to the tip of the terminal claw, rather short distal posterior seta and one very long and one short curved anterior seta; claws of terminal segment moderately long.

First leg only slightly dimorphic in the male: left leg (Pl. 3, Fig. 5) slender, as in the female; right leg (Pl. 3, Fig. 6) somewhat broader with stronger terminal claw.

Second leg dimorphic in the male; right leg (Pl. 3, Fig. 9) strongly reduced and weakly sclerotized; first segment of same size as in the female, the following two segments small; left leg (Pl. 3, Fig. 7) as in the female, slender, with long terminal claw.

Third leg (Pl. 3, Fig. 8) not dimorphic, but long and slender, with only few bundles of setulae, and with long and slender weakly curved terminal claw.

Hemipenis (Pl. 3, Fig. 11): distal shield (DS) triangular

with convex anterior margin and truncate distal extremity; distal lobe (DL) longer than distal shield and curved; copulatory process (cp) large lobe, with subtriangular base and spoon-shaped extremity; central lobe (CL) long, narrow, curved, club-shaped and ending in a spoon-shaped extremity, comparable to that of the copulatory process; female abdominal extremity (Pl. 3, Fig. 10), small, with a nearly straight process with irregular lateral margins; genital lobe with rounded anterior and triangular posterior margin (as in other *Romecytheridea*-species); furcae small.

MEASUREMENTS

Holotype (male): L 0.44 mm, H 0.22 mm

Allotype (female): L 0.42 mm, H 0.22 mm

Paratypes : L 0.40-0.46 mm, H 0.20-0.23 mm

REMARKS

The present species is a brooder. In seven of the dissected females the postero-dorsal pouch contained: 4 eggs (O.C. 2972), 2 eggs (O.C. 2967), 5 eggs and 2 nauplii (O.C. 2973), 4 eggs and 1 nauplius (O.C. 2975), 2 eggs (O.C. 2976), 6 eggs (O.C. 2977), 3 eggs and 3 nauplii (O.C. 2980).

OCCURRENCE

Romecytheridea bacata sp. nov. is only known from the type locality namely Chimba, W. of Sumbu (Zambia), 8° 25' 29" S, 30° 27' 27" E, depth 18 m, muddy sand and algae.

DISCUSSION

Five other species of the genus *Romecytheridea* have thus far been described from Lake Tanganyika, namely *R. ampla* WOUTERS, 1988, *R. belone*, WOUTERS & MARTENS, 2001, *R. longior* WOUTERS & MARTENS, 1999, *R. plegma* WOUTERS & MARTENS, 2001 and *R. tenuisculpta* (ROME, 1962). *R. bacata* sp. nov. (L 0.40-0.46 mm) is the smallest species of the six (*R. ampla* L 0.44-0.46, *R. belone* L 0.43-0.49, *R. longior* L 0.56-0.64, *R. plegma* L 0.62-0.66, *R. tenuisculpta* L 0.66-0.68). *R. longior* lacks the anterior marginal depression, present in *R. bacata*, and in the other known *Romecytheridea* species. *R. belone* differs by its strongly branched anterior marginal pore canals, and by the very different morphology of the hemipenis, with a distally pointed triangular distal shield and a large club-shaped central lobe. In general appearance, however, the valves of *R. belone* show some resemblance to those of *R.*

bacata n. sp., by the reticulation pattern and the presence and the structure of the lobes. *R. plegma* differs by its very regular reticulation pattern, by the absence of nodes, and by the pointed triangular distal shield and short and straight distal lobe.

R. tenuisculpta is a markedly larger species, with only weakly developed nodes, almost no anterior vestibulum, branched marginal pore canals and a pointed triangular distal shield. Among all *Romecytheridea* species, *R. bacata* sp. nov. shows most resemblance to *R. ampla*. There are similarities in the morphology of the valves, which, under the light microscope, could easily lead to confusion. However, the reticulation pattern is more regular in *R. ampla*, the anterior vestibulum smaller, and the dorso-median and ventro-median nodes in the males narrow and sharply delineated. In females, the dorso-median and ventro-median nodes are smaller in *R. ampla*. In dorsal view the carapaces of both species are very similar. The typical pearl-like micro-ornamentation of *R. bacata* is not present in *R. ampla*. The morphology of the hemipenis shows similarities as well as differences. The distal lobe is large and sigmoid in both species. The distal shield is truncate in *R. bacata*, and rounded in *R. ampla*. The copulatory lobe is spoon-shaped in both species. The main difference is in the morphology of the copulatory process, which is rounded in *R. ampla*, and wide, with a distal spoon-shaped process in *R. bacata* sp. nov. Based on these observations, it can be deduced that both species are probably closely related.

GENERAL DISCUSSION

The present material was collected in the framework of the ESF Eurocore-project MOLARCH, which searches for fingerprints of past climatic events (i.e. lake level fluctuations) in extant populations of several model groups of ancient lake organisms, including the *Cyprideis* species flock. While specimens putatively identified as *Romecytheridea ampla* were screened with molecular techniques, it became clear that specimens of this population did not cluster with previous sequences of *R. ampla* from Tanzania. Subsequent analyses of the soft parts (especially of the hemipenis) showed that we were indeed dealing with a new species of *Romecytheridea*, albeit one which strongly resembles *R. ampla* in habitus. Dissection of species of other genera, also putatively identified as known taxa, revealed a further two new species.

It is therefore clear that the Tanganyikan *Cyprideis* species flock is prone to be much more speciose than was previously thought, and re-examination of older

collections will be necessary to check for more cryptic species. This is not completely unexpected, as for other groups in ancient lakes, similar predictions have been made. For example, based on allozyme analyses, VÄINÖLA & KAMALTYNOV (1999) estimated that the number of amphipod species in Lake Baikal could be close to one thousand, rather than the c 350 species presently accepted.

At present, the Tanganyikan *Cyprideis* species flock comprises 20 species in 6 genera (see Table 1). It is difficult to offer reliable estimates of the number of taxa awaiting description, but it is not impossible that in this case, the true number of (cryptic) species in this flock is much higher than was previously assumed.

Table 1. List of the actually known species of the *Cyprideis* species flock of Lake Tanganyika (in alphabetical order).

Archeocyprideis tuberculata DUCASSE & CARBONEL, 1994

Cyprideis aciculata sp. nov. (this paper)

Cyprideis loricata WOUTERS & MARTENS, 2001

Cyprideis mastai WOUTERS & MARTENS, 1994

Cyprideis profunda WOUTERS & MARTENS, 1999

Cyprideis rumongensis WOUTERS & MARTENS, 1994

Cyprideis spatula WOUTERS & MARTENS, 1999

Kavalacythereis braconensis WOUTERS, 1979

Mesocyprideis irsacae (KISS, 1959) WOUTERS & MARTENS, 1992

Mesocyprideis nitida WOUTERS & MARTENS, 2001

Mesocyprideis pila WOUTERS & MARTENS, 1999

Romecytheridea ampla WOUTERS, 1988

Romecytheridea bacata sp. nov. (this paper)

Romecytheridea belone WOUTERS & MARTENS, 2001

Romecytheridea longior WOUTERS & MARTENS, 1999

Romecytheridea plegma WOUTERS & MARTENS, 2001

Romecytheridea tenuisculpta (ROME, 1962) WOUTERS, 1988

Tanganyikacythere burtonensis DUCASSE & CARBONEL, 1993

Syn.: *Tanganyikacythere banzaensis* DUCASSE & CARBONEL, 1993

Syn.: *Tanganyikacythere mondegueri* DUCASSE & CARBONEL, 1993

Tanganyikacythere caljoni WOUTERS & MARTENS, 1994

Tanganyikacythere fulgens sp. nov. (this paper)

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