BULLETIN
ZOÖLOGISCH MUSEUM

UNIVERSITEIT VAN AMSTERDAM

Vol. 17 No.1 1999

ON *PSEUDOCYPRIDOPSIS* N.GEN., WITH A REDESCRIPTION OF *PSEUDOCYPRIDOPSIS CLATHRATA* (KLIE, 1936) AND A FIRST DESCRIPTION OF THE MALE (OSTRACODA, CYPRIDOPSINAE)

Ivana Karanovic

Key words: Ostracoda, Cypridopsinae, Taxonomy, Montenegro.

ABSTRACT

Pseudocypridopsis n. gen. is described to comprise the species *Pseudocypridopsis clathrata* (Klie, 1936) found, until now, only in Skadar Valley (Montenegro, SE Europe). This genus is characterised by the absence of the furca in both female and male. In this paper the male is described for the first time. The taxonomic position of the new genus within the subfamily Cypridopsinae is discussed.

RÉSUMÉ

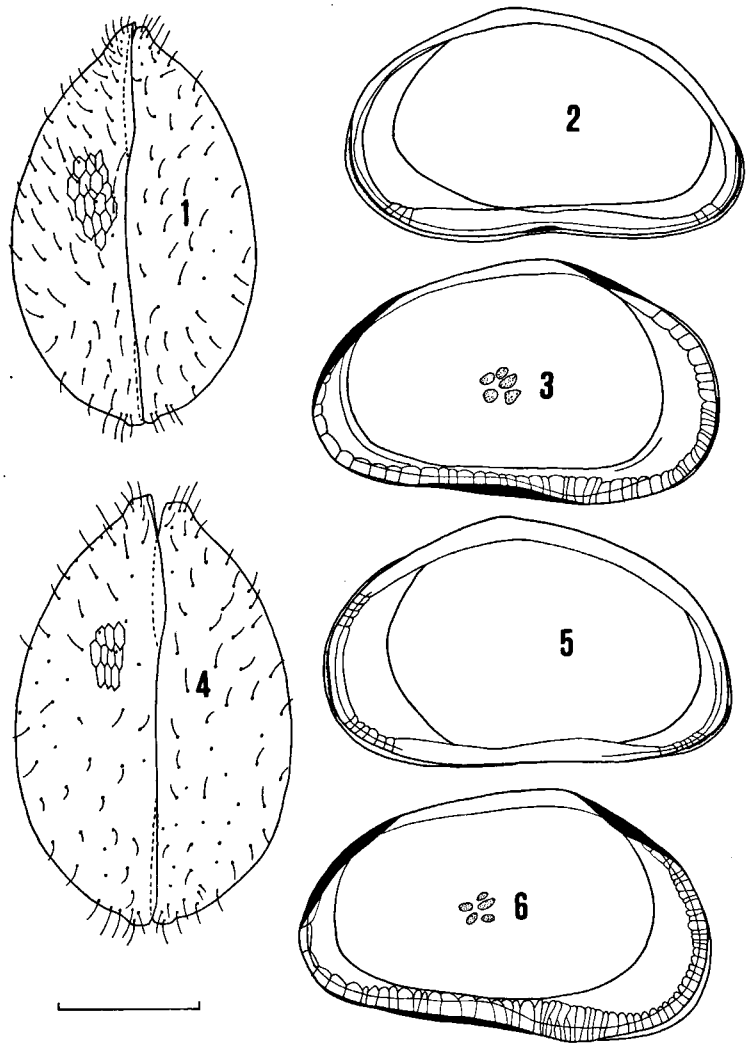
Pseudocypridopsis n. gen., crée afin d'y inclure l'espèce *Pseudocypridopsis clathrata* (Klie, 1936), est décrite de la Skadar Vallée (Monténégro, SE Europe). Ce genre est caractérisé par absence du furca en femelles et mâles. La première déscription du mâle est présentée. Remarques taxonomiques et la position du nouveau genre dans le sous-famille Cypridopsinae sont discutés.

INTRODUCTION

The subfamily Cypridopsinae counts, at present, 13 recent genera: *Cypridopsis* Brady, 1867; *Plesiocypridopsis* Rome, 1965; *Sarscypridopsis* McKenzie, 1977; *Kapcypridopsis* McKenzie, 1977; *Cavernocypris* Hartmann 1964; *Potamocypris* Brady, 1870; *Zonocypris* Muller, 1898; *Neocypridopsis* Klie, 1940; *Austrocypridopsis* McKenzie, 1982; *Tanganyikacypridopsis* Martens, 1985; *Tungucypridopsis* Victor, 1983; *Klieopsis* Martens, Meisch & Marmonier, 1991 and *Bryocypris* Roen, 1965 (see Marmonier et al., 1989; Martens, 1989; Martens & Behen, 1994; Martens et al., 1991). The main characteristic of this subfamily is the reduction of the furca, which is flagellum-like in the females, while in males it is absent (Martens, 1985). Additional features of the subfamily Cypridopsinae are: carapace generally small, the valves show an enlarged fused zone in the antero-ventral region and hemipenis is with part c and d built in a characteristic coil.

Pseudocypridopsis n. gen., described herein, is the first genus where both female and male lack the furca. But, by the shape and appearance of the carapace and valves, appearance of the cleaning leg and hemipenis, this genus still fits into the range of the subfamily Cypridopsinae.

For now, the new genus has only one species, *Pseudocypridopsis clathrata* described by Klie (1936) from spring Ribnica in Skadar Valley (Montenegro, SE Europe). The species is described only after females, but in the description Klie (1936) pointed out that the females had spermatophores. Material for this paper was collected in three localities, while males are found only in the type locality. In the description, Klie (1936) doubted the presence of the furca, and examination of all the females that we found, showed that this species does not possess a furca.



Figs. 1-6. *Pseudocypridopsis clathrata* (Klie, 1936), 1-3 (male, 0.57 mm); 4-6 (female, 0.6 mm): 1 -dorsal view; 2 - right valve (internal view); 3 - left valve (internal view); 4 - dorsal view; 5 - right valve (internal view); 6 - left valve (internal view). Scale = 0.2 mm.

The description of *Pseudocypridopsis clathrata* and *Candona bimucronata* were the first data on the ostracod fauna of Montenegro (Klie, 1936), which is until now poorly known. Samples for this paper are taken during a new survey of the ostracod fauna in Montenegro.

METHODS

Samples were taken with a handnet of 0.05 mm mesh size, and with a Bou-Rouch pump. The material was fixed with several drops of 36% formaldehyde. Ostracods were separated with a Wild-M5 stereomicroscope. Dissected material was mounted on slides in Faure's medium, while nondissected material was preserved in a glass test-tube in 70% ethyl alcohol. All drawings were prepared using a camera lucida on a Leica DMLS microscope with C-PLAN achromat objectives. Chaetotaxy of the limbs follows the model proposed by Broodbakker & Danielopol (1982), and revised for the antenna by Martens (1987). Terminology for the anatomy of the hemipenis is used according to Broodbakker (1982) and Martens (1985).

Abbreviations used in text and figures: a-d - parts of the labyrinth in the hemipenis; ce - lateral corner of part e in the hemipenis; ds - distal shield of peniferum; e - sclerotised part in hemipenis; gp - genital protuberance; LV - left valve; ps - proximal shield of peniferum RV - right valve; t - top of trabecule in part e of the hemipenis; tf - transverse fold of peniferum on medial side of ps.

DESCRIPTIVE PART

Family Cyprididae Baird, 1845
Subfamily Cypridopsinae Kaufmann, 1900
Genus *Pseudocypridopsis* n. gen.

Diagnosis

Small cypridopsinid ostracods with ovoid valve form. LV overlapping RV anteriorly, caudally and ventrally. Carapace ornamented. Valves without double folded inner list. Selvage peripheral. Five adductor muscle scars present. Antenna with short swimming setae. Terminal segment of maxillular palp cylindrical; third endite of this appendage with two smooth claws. Hemipenis with obtuse proximal shield and elongated distal shield. Furca absent in both sexes. Genital lobe with copulatory hooks.

Type species

Cypridopsis clathrata Klie, 1936.

Derivation of name

The new genus is named after the genus *Cypridopsis* Brady, 1865 with the Latin prefix *pseudo*.

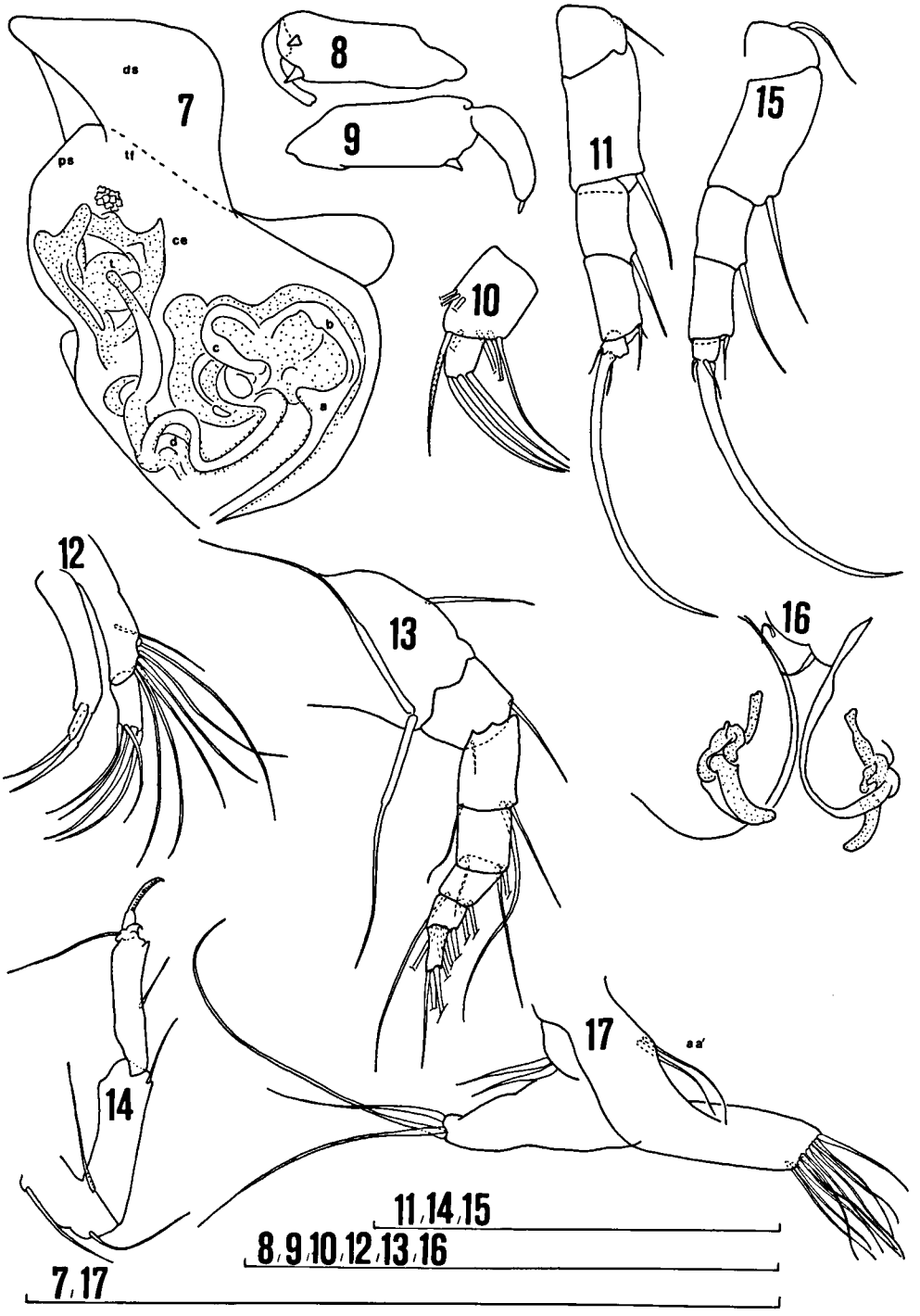
***Pseudocypridopsis clathrata* (Klie, 1936) n. comb.**

Synonymy

Cypridopsis clathrata Klie, 1936, p. 148-150, figs. 14-17; Klie, 1943, p. 61-62; Loffler & Danielopol, 1978, p. 205.

Material examined

1) Nameless spring near river Zeta, village Velje Brdo near the town Podgorica, Montenegro, 27 May 1994, coll. I. Karanovic: 1 female.
2) Pump on river Ribnica, the town Podgorica, Montenegro, 07 July 1995, coll. I. Karanovic: 18 females and 15 males.
3) Spring Mareza, near the town Podgorica, Montengro, 13 March 1998, coll. I Karanovic: 1 female.

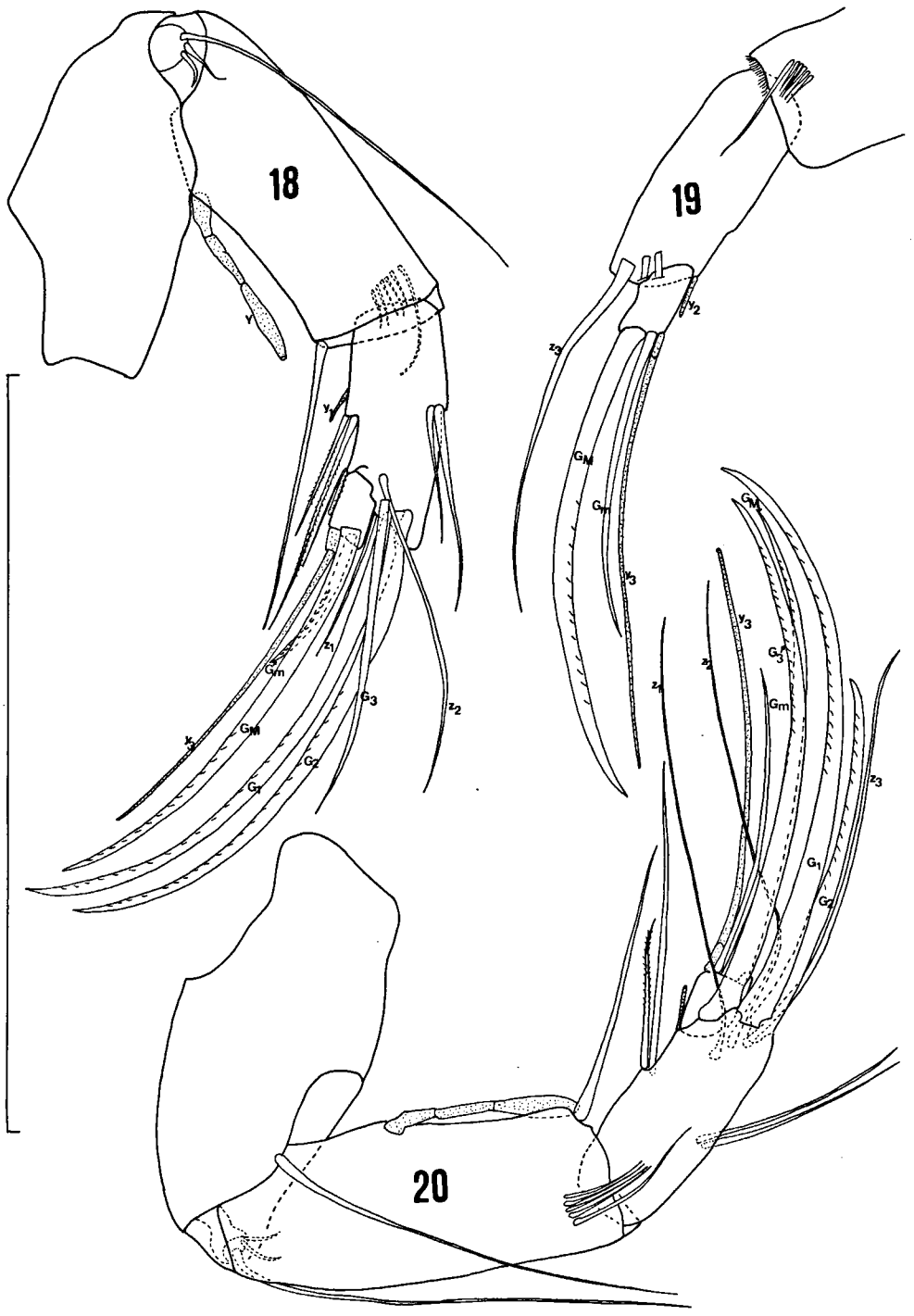


Figs. 7-17. *Pseudocypridopsis clathrata* (Klie, 1936), 7-14 (male, 0.57 mm); 15-17 (female, 0.6 mm): 7 - hemipenis; 8 - left prehensile palp; 9 - right prehensile palp; 10 - part of mandibular palp; 11 - walking leg; 12 - Maxillula (palp and 3rd endite); 13 - Antennula; 14 - cleaning leg; 15 - walking leg; 16 - genital lobe; 17 - Maxilla. Scales = 0.2mm.

Four females and three males are dissected and mounted on the slides, 14 females and 10 males are preserved in 70% ethyl alcohol. These specimens are deposited in the Institute of Marine Biology, Kotor (private collection of the author). Two females and two males are deposited in the Zoological Museum, Amsterdam (ZMA Ost. 203.908).

Description of male

Carapace (Figs. 1-3). Length of LV = 0.57 mm, length of RV = 0.56 mm. In dorsal view (Fig. 1) LV overlapping RV on anterior and posterior ends. Carapace oviform, anterior end slightly pointed, posterior broadly rounded. Greatest width around the middle, ca. 60% of the length. In ventral view, LV overlapping RV. In lateral view (Figs. 2-3) dorsal



Figs. 18-20. *Pseudocypridopsis clathrata* (Klie, 1936), 18 (male, 57 mm); 19 (female, 0.6 mm); 20 (female, 0.58 mm): 18 - Antenna; 19 Antenna (detail of the chaetotaxy of the last two segments); 20 - Antenna. Scale = 0.2 mm.

margin convex with a clear hump on the greatest height (first third of length). Greatest height on LV about 60.7%, on the RV 60% of the length. Anterior and posterior margins rounded; posterior clearly narrower than anterior. Ventral margin straight. Selvage peripheral on both valves, especially well developed on anterior and posterior ends of RV. RV with small, obtuse teeth both on anterior and posterior ends, LV with such teeth only on anterior end. Width of marginal zone: anteriorly 15%; posteriorly 10% of the length on both valves. Double folded inner list absent, weakly developed inner list present posteriorly on LV only. Line of concrescence wide, especially antero- and postero-ventrally. LV with flange present ventrally, antero-dorsally and postero-dorsally. Valve surface with shallow, but wide pits (form of honeycombs), with dense hairs. Colour white-yellow.

Antennula (Fig. 13). Seven-segmented. First segment with 3 setae: one anteriorly, two posteriorly. Second segment with 1 seta posteriorly and 1 seta anteriorly. Third segment with 2 setae antero-distally and 1 short seta postero-distally. Fourth and fifth segments distally with 3 setae each. Sixth segment with 4 setae distally. Seventh segment with 2 setae distally and aesthetasc twice as long as terminal segment. All setae, interrupted on the Fig. 13, reaching fairly beyond terminal segment. Length ratios of five distal segments: 2.5 : 2 : 1.6 : 1 : 1.5.

Antenna (Fig. 18). Aesthetasc (Y) 60% of first endopodal segment. Swimming setae (5+1) very short. The longest one reaching only till one third of penultimate segment. All other setae of the same length, reaching slightly beyond the margin of the first endopodal segment. Claws G_1 and G_2 6 times as long as terminal segment. Claw G_3 reduced to a seta. Seta z_2 stronger developed than z_1 seta (at proximal end claw-like, at distal end seta-like); z-setae reaching half length of the claws. Seta z_3 missing. Claw G_M 5.8 times as long as terminal segment, G_m very short, twice as long as terminal segment. Seta y_3 very long, only slightly shorter then claw G_M. Claws G_1, G_2 and G_M slightly serrated, claw G_m somewhat stronger serrated than these claws.

Mandibular palp (Fig. 10). First segment interiorly with 2 S-setae (plumose) and 1 seta slightly longer than S-setae. Second segment interiorly with 3+2 setae, only β-seta plumose, others smooth. Exteriorly 3 setae. γ-seta long and serrated, other setae on that segment smooth. Terminal segment with 3 claws of the same length.

Maxillula (Fig. 12). Penultimate segment of endopodite with 7 smooth setae; terminal segment 1.5 times as long as width and with 5 apical setae. Third endite with 2 smooth claws, and several setae.

Maxilla (Figs. 8-9). Left prehensile palp with terminal segment smaller than right palp. Setae thorn-like on both palps.

Walking leg (Fig. 11). Protopodite with 1 seta; first endopodal segment with 1 smooth seta exceeding distal end of second segment. Second segment with seta exceeding distal end of penultimate segment. Penultimate segment with 2 short setae. Terminal segment with 2 setae. Claw 1.6 times as long as 3 combined terminal segments, not serrated.

Cleaning leg (Fig. 14). Protopodite with 3 setae; first and second endopodal segment with 1 seta each, of about the same length. Pincer organ without M_1-M_4 rows of hairs.

Hemipenis. Proximal shield (ps) obtuse, distal shield (ds) elongated, and pointed at inner side. The inner anatomy is shown in Fig. 7.

Zenker organs with 12 whorls; Furca absent.

Description of the female

Carapace (Figs. 4-6). LV = 0.6 mm, RV = 0.57 mm. In dorsal view (Fig. 4), carapace oviform. Greatest width around the middle, ca. 65% of the length. LV overlapping RV both on anterior and posterior ends. Anterior end more pointed than posterior, the latter broadly rounded. In lateral view, dorsal margin convex with a hump at the greatest height (first third of length). LV (Fig. 6) with greatest height 62%, in RV (Fig. 5) 61% of the length. Anterior margin broader than posterior. Ventral margin straight. Selvage peripheral on both valves. Valves with obtuse teeth, both on anterior and posterior ends of the RV, and weakly developed on the anterior end of LV. Marginal zone as in male. In ventral view, LV overlapping RV.

Antenna (Fig. 20). Seta z_3 on penultimate segment stronger than the two other z setae. Claw G_1 8.5 times, G_2 5.5 times, and G_3 7.7 times as long as terminal segment. Claw G_M 7 times as long as terminal segment, with G_m more seta-like and 4.5 times as long as terminal segment. Swimming setae: anterior reaching half the length of penultimate segment, others reaching at the most to first third of penultimate segment.

Maxilla (Fig. 17). Exopodite with 2 setae. Setae a/a' developed, and of the same length. Length ratios of distal setae on protopodite are 2 : 1.5 : 1.

Walking leg (Fig. 15). Setae on the first and second endopodal segment longer than in male.

Furca absent. Genital lobe (Fig. 16) with copulatory hooks. Antennula, mandibular palp, maxillula and cleaning leg as in the male.

Variability

Length of females varies between 0.56 mm and 0.6 mm, while length of males varies slightly, between 0.56 mm and 0.57 mm. On the second antenna, in females, five natatory setae either reach only till the distal end of the first endopodal segment (Fig. 19), or they can reach till first third of the penultimate segment (Fig. 20). In males such variability is not noticed. In females the a/a' setae on the maxilla can be long, as it is figured (Fig. 17), or about half as long.

ECOLOGY

The absence of a pigmented eye clearly shows that *Pseudocypridopsis clathrata* (Klie, 1936) is stygobiont species. Other features, like short swimming setae, and long aesthetasc (Y) on the antenna are not characteristic of subterranean species only, as they can also be found in many superficial species (Marmonier et al., 1989). Only two females are found in a spring, probably ejected by subterranean waters, while the greatest part of the collected material (including males) are collected from interstitial waters. Species of the subfamily Cypridopsinae are often good swimmers and they live in surface water, but colonization of interstitial habitats is common in this subfamily. Laboratory experiments on *Cypridopsis vidua* (O. F. Muller, 1776) have shown that this species actively explores the interstitial of a fine gravel sediment (Roca & Danielopol, 1991). Pressures of predation or food requirements are not the main reasons for such behavior. *Cypridopsis vidua* and *Pseudocypridopsis clathrata* also show that, for life in the interstitial, ovoid valve form is not a limiting factor.

Ovigerous females were collected both in spring and in summer, while adult males (with spermatozoids) are found in summer only. In material that we collected, no juveniles were found, but Klie (1936) found juveniles in summer, together with adult females.

RELATIONSHIPS

The subfamily Cypridopsinae Kaufmann, 1900, at present counts 14 living genera. The new genus *Pseudocypridopsis* stands apart from all the other 13 genera by the absence of furca in both female and male. But the other characteristics, like enlarged fused zone in the antero-ventral region of both valves, chaetotaxy of the Antenna (see Martens et al., 1991), appearance of the cleaning leg, appearance of the hemipenis, completely fits into the subfamily Cypridopsinae. This subfamily could be separated into two groups according to ventral and anterior overlapping of the valves. *Pseudocypridopsis* gen. n., belongs to the group where LV overlaps RV, together with following genera: *Cypridopsis* Brady, 1865; *Austrocypridopsis* McKenzie, 1982; *Zonocypris* G.W. Muller, 1868; *Tungucypridopsis* Victor, 1983; *Cavernocypris* Hartmann, 1964 and *Neocypridopsis* Klie, 1940.

Among those genera only *Cypridopsis, Zonocypris,* and *Neocypridopsis* have an ovid valve form, like the new genus, *Cavernocypris* and *Tungucypridopsis* have elongated valve forms, while, *Austrocypridopsis* is subrectangular.

The genus *Neocypridopsis* differs from *Pseudocypridopsis* by the absence of the pincer organ on the cleaning leg. *Zonocypris* has an asymmetrical valve form (like *Potamocypris* Brady, 1807) and like *Neocypridopsis* it also has serrated claws on the 3rd masticatory process on the maxillula, while in the new genus those claws are smooth.

In the genus *Cypridopsis* there are species that have distinctly ovoid valve form (*Cypridopsis vidua* (O.F. Muller, 1776) and *Cypridopsis obesa* Brady & Robertson, 1869), and on the other hand species like *Cypridopsis elongata* (Kaufmann, 1900), *Cypridopsis hartwigi* (O.F. Muller, 1900) and *Cypridopsis brevisetosa* Klie, 1943 that have clearly more elongated valve shapes. Generally, *Pseudocypridopsis* gen.n. could be easily separated from the genus *Cypridopsis* by the absence of a double folded inner list, short natatory setae and presence of copulatory hooks on the genital field in the females.

According to Meisch (1991), there are five genera of the Cypridopsinae in Europe: *Cypridopsis* Brady, 1865; *Cavernocypris* Hartmann, 1964; *Potamocypris* Brady, 1807; *Plesiocypridopsis* Rome, 1965 and *Sarscypridopsis* McKenzie, 1977. The sixth European genus, *Pseudocypridopsis* gen. n., could be separated from all the others by the following combination of characteristics: ovoid valve form; LV overlaps RV both anteriorly and ventrally; no double folded inner list; terminal joint of the maxillular palp cylindrical; furca absent; presence of copulatory hooks in the females.

ACKNOWLEDGEMENTS

The author is very thankful to Dr Koen Martens for all useful corrections and suggestions he made, which improved this paper.

REFERENCES

Broodbakker, N. W., 1982. Amsterdam expeditions to the West Indies, Report 20. The genus *Heterocypris* (Crustacea, Ostracoda) in the West Indies Part I. Taxonomic characters. Bijdr. Dierk., 52 (2): 207-227.

Broodbakker, N. W. & D. L. Danielopol, 1982. The chaetotaxy of Cypridacea (Crustacea, Ostracoda) limbs: proposals for a descriptive model. Bijdr. Dierk., 52 (2): 103-120.

Klie, W., 1936. Neue Ostracoden aus Jugoslavien. Glasnik Skopskog Naucnog Drustva, 17: 143-150.

Klie, W., 1943. Ostracoden aus Marokko und Mauretanien. Zoologischer Anzeiger, 143 (3/4): 49-62.

Loffler, H. & D. L. Danielopol, 1978. Ostracoda In: Limnofauna Europea, ed: Illies J., Gustav Fischer Verlag, Stuttgart - New York - Sweets & Zeitlinger, Amsterdam: 196-208.

Marmonier, P., C. Meisch & D. L. Danielopol, 1989. A review of the genus *Cavernocypris* Hartmann (Ostracoda, Cypridopsinae): systematics, ecology and biogeography. Bull. Soc. Nat. Luxemb., 89: 221-278.

Martens, K., 1985. *Tanganyikacypridopsis* gen. n. (Crustacea, Ostracoda). Zoologica Scripta, 14 (3): 221-230.

Martens, K., 1987. Homology and functional morphology of the sexual dimorphism in the antenna of *Sclerocypris* Sars, 1924 (Crustacea, Ostracoda, Megalocypridinae). Bijdr. Dierk., 57 (2): 183- 190.

Martens, K., 1989. On *Bryocypris grandipes* Roen. Stereo-Atlas of Ostracod Shells, 16 (29): 140-147.

Martens, K. & F. Behen, 1994. A Cheklist of the Recent Non-Marine Ostracods (Crustacea, Ostracoda) from the Inland Waters of South America and Adjacent Islands. Trav. sci. Mus. nat. hist. nat. de Luxemb., 22: 1-84.

Martens, K., C. Meisch & P. Marmonier, 1991. On *Klieopsis* n. gen., with a redescription of *Cypridopsis horai* Klie, 1927 (Crustacea, Ostracoda). Bull. Inst. Royal des Sci. Nat. Belgique, 61: 55-64.

Meisch, C. 1991. Revision of the freshwater ostracod species *Cypridopsis hartwigi* and *Cypridopsis elongata.* With a generic key to the European Cypridopsinae (Crustacea, Ostracoda). Bull. Soc. Nat. luxemb., 92: 159-178.

Roca, J. R. & D. L. Danielopol, 1991. Exploration of interstital habitats by the phytophylous Ostracod *Cypridopsis vidua* (O. F. Muller): experimental evidence. Annls. Limnol., 27 (3): 243-152.

Ivana Karanovic
Institute of Marine Biology
P. O. Box 69, 85335 Kotor
Montenegro, Yugoslavia

Received: 15 January 1999.
Distributed: 21 May 1999.