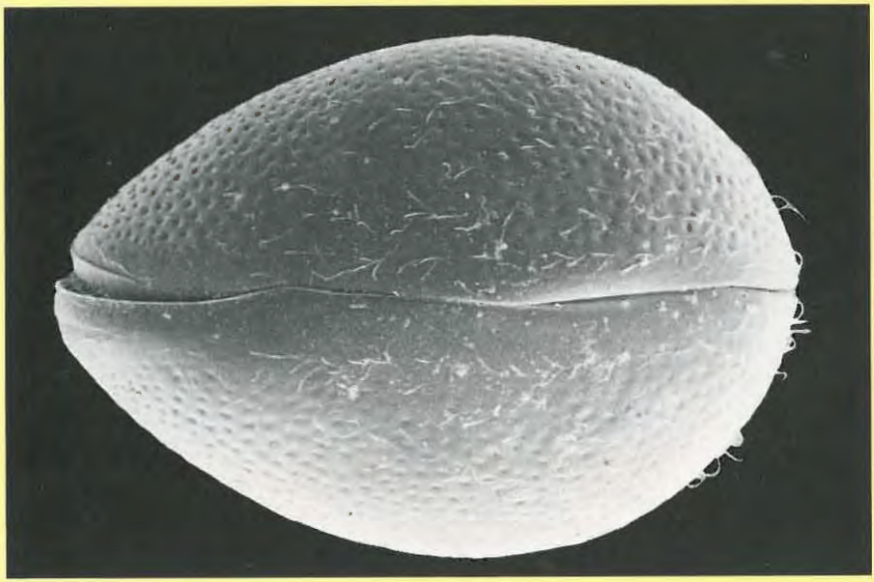
ISSN 0251 - 2424

MINISTÈRE DE LA CULTURE

TRAVAUX SCIENTIFIQUES
DU MUSÉE NATIONAL D'HISTOIRE NATURELLE
DE LUXEMBOURG



23

Ostracoda

Luxembourg
1996

Date de publication: 31 janvier 1996

Prix du volume 23: **FB 150.--**

Les commandes sont à adresser à:
Musée national d'histoire naturelle, Bibliothèque
rue Münster, L-2160 Luxembourg

ISBN 2-495-15064-0

Page de couverture:

Cypridopsis obesa (Brady & Robertson, 1869). Carapace in dorsal view.

ISSN 0251 - 2424

MINISTÈRE DE LA CULTURE

TRAVAUX SCIENTIFIQUES
DU MUSÉE NATIONAL D'HISTOIRE NATURELLE
DE LUXEMBOURG

23

Ostracoda

Luxembourg
1996

Trav. sci. Mus. nat. hist. nat. Lux. 23. 1996

Ilyocypris getica Masi, 1906 (Crustacea, Ostracoda): Taxonomy, Ecology, Life History, Distribution, Fossil Occurrence and First Record for Germany

Claude MEISCH [1] Roland FUHRMANN [2] & Karel WOUTERS [3]

Abstract:

The finding of living and fossil populations of the freshwater ostracod *Ilyocypris getica* Masi, 1906 is reported for the first time from two sites in Germany, and from one site on the isle of Crete, Greece. A list of ostracod species, coexisting with *I. getica*, is added. A redescription, a differential diagnosis, and a review of the ecology, distribution and fossil occurrence of the species are given. *I. getica* is most probably stenothermal for a temperature range of 10-15°C. The main distribution area of Recent populations extends from the circum-mediterranean regions to eastern Europe and eastern Asia. The rare occurrence of the species in western and central Europe is best explained by occasional passive transport, probably by migratory birds, into those regions.

1. Introduction

Ilyocypris is a very large cosmopolitan genus comprising about 165 nominal Recent and fossil species (Kempf 1980; also working copy of 1995).

Identification of Recent species of *Ilyocypris* relies mainly on characters of the appendages (see for instance Meisch 1988 for a key to the 11 European species of the genus). The shape and structure of the carapace show relatively little variation throughout the genus. In addition, at least part of the

[1] Musée national d'histoire naturelle de Luxembourg, Marché-aux-Poissons, L-2345 Luxembourg
[2] Eilenburger Straße 24, D-04317 Leipzig
[3] Koninklijk Belgisch Instituut voor Natuurwetenschappen, Vautierstraat 29, B-1040 Brussels

carapace characters, exhibit a marked infraspecific variability. Specific identification of fossil carapaces and valves therefore appears to be most difficult for the majority of species. Recently, it has been shown that the number and arrangement of the so-called marginal ripplets on the inner lamella of the LV (those ripplets are best seen in the SEM) allow distinction of at least part of the species (Van Harten 1979; Janz 1994).

I. getica Masi, 1906 so far is known from North Africa, where it is not uncommon, and from scattered localities in south-eastern and eastern Europe and Asia. In western and central Europe it appears to be very rare. The species is here reported for the first time from Germany.

The material of *Ilyocypris getica* described here comprises both Recent and fossil specimens. In 1983 and 1984 one of us (R.F.) repeatedly sampled living populations of *I. getica* in two ditches in Kleinliebenau near Leipzig. In 1995, the same of us collected living specimens on the Lassithi-highland on the isle of Crete (Greece). The fossil specimens were collected from Pleistocene and Holocene deposits in four localities in eastern Germany (see details below). It should be noticed that two of the four fossil samples had been recorded formerly as *'I. biplicata'* by Diebel & Pietrzeniuk (1969) and *'Ilyocypris* sp. 2' by Fuhrmann & Pietrzeniuk (1990a,b), respectively. Both the Recent and the fossil populations examined comprise females only.

As well Recent as fossil material is used to provide a detailed redescription of the carapace and appendages of the species. A differential diagnosis and a review of the ecology, life history, distribution, and the fossil occurrence of the species are added.

Abbreviations used in text and figures: RV = right valve; LV = left valve; L, H and W = length, height and width; *lla* = calcareous part of inner lamella.

2. Taxonomy

The classification adopted here is that of Maddocks (1982) as rearranged for the Podocopida by Martens (1992).

Phylum or subphylum **Crustacea** Pennant, 1777

Class **Ostracoda** Latreille, 1806

Order **Podocopida** Sars, 1866

Infraorder **Cypridocopina** Jones, 1901

Superfamily **Cypridoidea** Baird, 1845

Family **Ilyocyprididae** Kaufmann, 1900

Genus **Ilyocypris** Kaufmann, 1900

Ilyocypris getica Masi, 1906

(Figs 1-8)

1906a *Ilyocypris getica* n. sp. Masi: 649.

1906b *Ilyocypris getica* - Masi, vol. 7 (1906): 134; 145. Vol. 8 (1907): 58; plate 1: 1, 3, 9, 10; plate 2: 6. (Remark: the plates have been interchanged).

1928 *Ilyocypris getica* - Gauthier: 123, fig. 47.

1948 *Ilyocypris getica* - Stephanides: 72, plate 26: 311-312; plate 27: 313.

1958 *Ilyocypris getica* - Petkovski: 54, figs 2, 4 and 5.

1965 *Ilyocypris getica* - Fox: 624.

1974 *Ilyocypris getica* - Sywula: 251, fig. 140; plate 23: g,h.

I. getica Masi, 1906 was originally described by Masi (1906a,b) on the basis of female specimens collected in Roumania. This author failed to provide reliable details on the type-locality. In a footnote of his second paper, Masi (1906b) specified that he also examined specimens from Mongolia (in fact from China), sent to him by G.O. Sars. Sars had identified those specimens with *I. lacustris*. Masi (1906a) pointed out that Sars's specimens are identical with those from Roumania and hence he identified them as *I. getica*.

Gauthier (1928) reported on the finding of males and females in a number of localities in Algeria and Tunisia. He pointed out that the carapaces of the animals from the highlands (Hauts-Plateaux) were usually longer and broader in dorsal view than those of the animals from the coastal regions. Moreover, the anterior end of the carapace of the highland-animals was blunt in dorsal view, while that of the coastal specimens was pointed. The appendages, however, were identical in both forms.

Stepbanides (1948) and Petkovski (1958) illustrated and described the taxonomic characters of female specimens collected in Corfu (Greece) and Macedonia (former Yugoslavia). Finally, Sywula (1974) provided a redescription (in Polish) and illustrations of females collected in Bulgaria.

It should be noticed that males are so far only known from North Africa, Roumania and Slovakia (Gauthier 1928; Masi 1906a; Rybecky 1986).

Description

Material examined: Ca 20 females, > 300 empty carapaces and valves collected at Kleinliebenau, west of Leipzig (Germany). See details below.

Females

C a r a p a c e in lateral view: dorsal margin almost straight, slightly sloping posteriorly, and with an anterior and a posterior angle; greatest H situated at the anterior dorsal angle; H = 0.53-0.56 L; both valves with a weak concavity in the eye region, and, behind mid-length, with a well-developed dorsal expansion overlapping the valve margin.(fig. xxx). Distance between the posterior dorsal angle and the posterior end of carapace slightly exceeding 0.10 L.

Posterior margin markedly asymmetrical, weakly arched above mid-height, basally joining the ventral margin in a broadly rounded arch; postero-ventral end of carapace thus having a somewhat expansion-like appearance.

Anterior margin broadly rounded, evenly joining the ventral margin; ventral margin weakly and slightly asymmetrically concave.

Valves without lateral projections; dorso-lateral transverse sulci and central muscle scars as for the genus. Surface of valves covered with small, shallow,

rounded, scattered pits, which are best seen with the SEM. The pits are usually absent in the area of the ovaries. Valves surface almost smooth in the stereomicroscope (ca 40 x). Anterior margin of both valves with a tightly packed row of denticles that becomes less dense on the ventral margin; posterior margin with few denticles only; postero-ventral and posterior margin of RV smooth, without denticles. RV and LV with a small conical postero-ventral spine that pointing in posterior direction. Anterior and posterior areas of valves with sparse tiny warts.

Surface of juvenile valves almost smooth, usually with glossy appearance; the area of the central muscle scars is weakly and indistinctly pitted.

Calcareous part of the inner lamella (*IIa*) well developed in both valves. *IIa* anteriorly slightly exceeding in length 0.10 L, posteriorly equalling 0.5-0.7 L.

Structure of the calcareous part of the inner lamella:

(a) LV, anterior marginal zone: free *IIa* obtusely attached to the fused zone; free *IIa* weakly bent inwards in front of the inner margin; fused zone equalling 29-35 % of the L of the *IIa*; antero-ventral area with a row of 6-8 more or less well developed marginal ripplets; line of concrescence antero-ventrally with another row of weakly developed ripplets.

(b) LV, posterior marginal zone: free *IIa* obtusely attached to the fused zone; line of concrescence sometimes with a weakly developed groove; free *IIa* bent inwards in front of the inner margin; fused zone equalling 27-45 % of the L of the *IIa*; inner part of the fused zone with 5-6 rather indistinct marginal ripplets which in some cases overlap the line of concrescence; the ripplets extend from the postero-ventral area to the posterior end of the valve. The ripplets are spherical to elongate in shape; the line forming their external limit appears subdivided in archs and is situated at some distance; internally, the ripplets decrease into a plane surface.

(c) RV, anterior marginal zone: fused zone and free *IIa* gently and evenly (not angularly) bent inwards, with a weak inner list in the antero-ventral area; fused zone equalling 19-22 % of the L of the *IIa*.

(d) RV, posterior marginal zone: fused zone and free *IIa* steeply and evenly (not angularly) bent inwards; selvage peripheral; fused zone equalling 35-45 % of the L of the *IIa*.

Carapace in dorsal view: both lateral margins concave in the area of the transverse sulci; greatest W situated behind mid-length, at 0.55-0.58 L; anterior end pointed, posterior end broadly rounded; both lateral margins anteriorly and posteriorly weakly and indistinctly angular. The LV overlaps the RV anteriorly and posteriorly (more distinctly at the posterior end).

S i z e of the Recent specimens from Kleinliebenau (sample no 760: August 7, 1983):

Carapaces (n=25):	L = 1.15 mm (1.02-1.27 mm); W = 0.49 mm (0.43-0.54 mm); W/L = 0.43 (0.39-0.46).
Valves:	
LV (n=50):	L = 1.16 mm (1.00-1.30 mm); H = 0.63 mm (0.56-0.70 mm); H/L = 0.54 (0.53-0.56).
RV (n=50):	L = 1.14 mm (0.97-1.27 mm); H = 0.62 mm (0.53-0.67 mm); H/L = 0.54 (0.53-0.56).

Remark: The valves of the fossil samples are slightly smaller; mean L = 1.05-1.1 mm, with max. L = 1.22 mm.

A p p e n d a g e s (figs 6-8): Antennule (A1) 6-segmented; natatory setae relatively strong and short. Antenna (A2) stout; terminal claws: G2-claw slightly longer than the G3 and G1-claws; natatory setae reduced, with very thin tips, the longest extending to about 3/4 of the length of the terminal claws; 6th seta (sensitive seta) of 'normal' length, extending beyond mid-length of the penultimate segment. Y-aesthetasc short, weakly developed.

Second segment of the mandibular palp with a bunch of 3 setae.

Maxillular palp: terminal segment distally enlarged, with 3 strong and 3 thin spine-shaped setae.

Maxilliped (T1): palp 2-segmented; branchial plate with 6 filaments.

Walking leg (T2) 5-segmented (penultimate segment subdivided); terminal claw conspicuously long and smooth; anterior terminal seta conspicuously long; d-seta short.

Cleaning leg: basal segment (protopodite) and segment 2 each with one seta; segment 3 (=penultimate segment) undivided, with 2 simple and one aesthetasc-like setae; distal edge of the penultimate segment with a row of short setae; terminal segment with two long and one shorter setae.

Furcal rami well developed, weakly curved; both terminal claws long, thin and smooth; posterior seta well developed, extending about to the distal end of the ramus; posterior margin with an irregular row of very delicate setae; furcal attachment weakly developed.

Males

The material examined lacks males. Males so far have only been recorded from North Africa, Roumania and Slovakia. Masi (1906a) described the males but failed to provide any illustration. Gauthier (1928) contributed a figure of a male carapace in dorsal view. Masi (1906a) described the taxonomic characters of the male as follows:

Carapace similar to that of the female but slightly smaller (1.0 mm; 1.2 mm for the female). Left maxilliped two-segmented; proximal segment cylindrical, 5 x longer than broad; distal segment shorter and thinner, but terminally inflated and slightly curved. Right maxilliped not described. Furcal rami less developed than in the female. Hemipenis as in *I. lacustris*, with four distal lobes. Zenker's organ not described.

3. Differential diagnosis and taxonomic discussion

Ilyocypris getica: Carapace relatively large (L = 1.00-1.25 mm), without lateral projections, but with two transverse dorsal sulci. Valve surface covered with very shallow pits. Natatory setae of the antenna (A2) reaching from mid-length of the terminal claws to the tips of those claws. Walking leg 5-segmented (penultimate segment subdivided). Cleaning leg 4-segmented; penultimate segment undivided, with two simple and one aesthetasc-shaped

setae. Furcal rami hairy, terminal claws long and thin. Bisexual populations in North Africa and eastern Europe, parthenogenetic populations in central and northern Europe.

Discussion: *I. getica* comes close to *I. lacustris* Kaufmann, 1900. Both species share the presence of a third and very peculiar, aesthetasc-like seta on the penultimate segment of the cleaning leg. This character is unknown in any of the remaining species of the genus *Ilyocypris*.

I. lacustris was desbribed from lake Bielersee in Switzerland, where it was captured at a depth of 30 m. Other living populations of this species are so far only known from lake Constance, where the animals were collected at depths of 25-30 m (Löffler 1969).

I. lacustris and *I. getica* differ in the following characters:

(a) the length of the A2-natatory setae: in *I. lacustris* these setae are strongly developed, extending beyond the tips of the claws by about half of their length;

(b) the number of segments on the walking leg (T2): in *I. lacustris* the penultimate segment of the walking leg is undivided and hence the T2 is 4-segmented;

(c) the shape of the furcal rami: they are weakly curved in *I. getica* (strongly curved in *I. lacustris*).

The characters under (a) and (b) allow easy distinction of the two species.

4. Reduction of the natatory setae

The partly reduced A2-natatory setae most certainly prevent *I. getica* from being a good swimmer. The animals hence are most certainly linked to the surface of the bottom-mud. The relatively long and thin terminal claws of both the walking legs and the furcal rami are other characteristic features of a digging ostracod.

I. getica is probably engaged in an evolutionary process leading to progressive reduction of the A2-natatory setae, a process which parallels the transition from a swimming to a crawling and/or digging way of life. A similar evolutionary trend has been discussed in more detail for *Cypridopsis lusatica* Schäfer, 1943 by Petkovski et al. (1993).

5. Ecology

The two Recent populations at Kleinliebenau were found living in

(a) a ditch in a concrete tunnel crossing the underground of the motorway; shallow stagnant water in May and June, with a temperature of 10-13°;C

(b) a shallow temporary ditch with much vegetation and stagnant to slow flowing water; water temperature less than 13°C (see more details and also a list of coexisting ostracods below).

In central and northern Europe, *I. getica* has been recorded

(a) in a small pond situated in a meadow (Klie 1939; the locality is at present situated in Slovakia);

(b) in a slightly brackish ditch at Seasalter in Kent, England (Fox 1965);

(c) in freshwater on the edge of the Severn, England (Henderson 1990);

(d) in the muddy-bottomed, grassy, downstream area of a calcareous coastal stream in South Wales (Griffiths et al., in press).

The population sampled on the isle of Crete, Greece, (leg. R. F.) lives in a drainage ditch on the Lassithi-highland.

In Macedonia (former Yugoslavia), large numbers of specimens (females only) were captured in temporary pools (Petkovski 1958). In North Africa, where *I. getica* is common in the steppes and substeppes, the animals were reported to live in temporary water bodies filled with muddy rather than pure water (Gauthier 1928, 1934; Ramdani 1982). The eggs hatch immediately when water arrives in the pool and the animals are believed to disappear

when the habitat dries up (Ramdani 1982).

In Corfu (Stephanides 1948), the species was found as well in a ditch as in a pond, the latter with a 'bottom of mud and debris'; the ditch is said to be located 'near the sea coast' (?brackish water).

From these data it can be concluded that *I. getica* inhabits small, shallow water bodies and slow flowing streams. It seems to have a preference for temporary pools. It is not clear if it is obligatedly linked to temporary waters. So far it has not been reported from lakes. Apparently the animals can tolerate a slight increase in salinity. The species is probably stenothermal for a temperature range of 10-15°C. Future investigations should show if juveniles and/or adults survive the drying up of the habitat. The species is expected to occur in waters connected with springs at a temperature range of 10-15°C.

6. Life history

In the ditches at Kleinliebenau the larval development takes place in May when the water is about 10° C. Adults appear in June at 11-12 C. In early August, at a temperature of 14 °C, all adults have died.

The literature provides only very few data on the life history of the species. In England and Wales, the animals (only females) were collected in November (Fox 1965; one single adult female) and January (Griffiths et al., preprint). In Corfu, the animals (only females) were collected from December to March (Stephanides 1948). In Morocco, males and females were captured from January to March (Ramdani 1982).

The data from Germany and England appear contradictory. Those from Kleinliebenau, Germany, rather suggest *I. getica* to produce one generation in the year, with adults vanishing in late spring. In Britain, the adults appear to persist in the winter.

In North Africa and southern Europe, reproduction probably takes place in the winter and possibly in early spring, before the drying up of the habitats.

7. Bisexual versus parthenogenetic reproduction

I. getica presents an interesting case of geographical parthenogenesis: populations in North Africa (?all) reproduce bisexually. Bisexual populations have also been reported from Roumania and Slovakia (Masi 1906; Rybecky 1986). All other populations so far recorded from Europe comprise only females, which is a strong indication that they reproduce parthenogenetically. There are probably more bisexual populations to be found in the circum-mediterranean areas in southern Europe, but this needs much more field work.

8. Distribution

I. getica has been found in Roumania (Masi 1906a,b), Slovakia (Klie 1939; Rybecky 1986), Corfu (Stephanides 1948), Macedonia (former Yugoslavia; Petkovski 1958), Bulgaria (Cvetkov 1957, the record is marked as uncertain; Sywula 1968); Algeria and Tunisia (Gauthier 1928, 1934), Morocco (Ramdani 1982; for the distribution in North Africa see also the review in Martens 1984), England (Fox 1965, 1967; Henderson 1990), Wales (Griffiths & Evans 1995; Griffiths et al., preprint), and China (Masi (1906b).

I. getica appears to be widely distributed in North Africa, where (?all) the populations reproduce bisexually. The records from Macedonia and Corfu suggest that the species also occurs in other circum-mediterranean regions in Europe.

I. getica has repeatedly been found in eastern Europe. It appears to be very rare in western Europe and in particular in Germany, where the ostracod fauna has extensively been investigated since the 19th century, but where the species was unknown until now. The findings in England and Wales are most noteworthy. All three British records come from coastal regions. One of the localities is situated within the wetlands of the River Severn, an area which represents an important feeding ground for migratory water fowl and waders (Griffiths, pers. comm.).

In conclusion, the distribution area of *I. getica* extends from the circum-mediterranean regions to eastern Europe and eastern Asia. Occasionally the animals are transported, most probably by migratory bird, towards western

Europe. Future investigations will show if the species is able to maintain stable populations outside its principal distribution area.

9. Detailed list of localities and samples studied

Recent populations

The site on the isle of Crete, Greece, is a drainage ditch located at 850 m a.s.l. on the Lassithi-highland, 1 km north of the village Kato Metohi; leg. R. Fuhrmann, 3 June 1995.

Both German sites studied are located at Kleinlichenau, ca 13 km west of Leipzig (Germany, Land Sachsen). Gauß-Krüger system of coordinates: R 4513260 H 5692210 93 m NN. Leg. Dr R. Fuhrmann, March 1983 - Sept. 1984:

(a) Ditch in a concrete tunnel crossing the underground of the motorway west of Leipzig; water permanent, with a depth of 0.10-0.40 m; bottom covered with a thin layer of mud. The habitat exists since 1935. Samples no 638; 760; 844; 965; 1003; 1056 of the Ostracoda-collection of R. Fuhrmann.

(b) Ditch extending up to 300 m west of the motorway mentioned under (a); the ditch, which is ca 2 m deep, is located in the open field; the water is 5 cm deep; it is rich in aquatic vegetation and slows very slowly (ca 1 cm/sec); seeping springs are present; the ditch dries up periodically. Samples no 761; 1004; 1005; 1006; 1007; 1057 of the Ostracoda-collection of R. Fuhrmann.

Chemical data: $[Co_3^{2-}]$= 12-17 dH°; [chloride]= 100 mg/l.

Maximum annual water temperature under the motorway (site (a) above): scarcely more than 15 C.

The following ostracods were found at Kleinliebenau (leg. et det. Roland Fuhrmann):

	Ditch under the motorway	Ditch in the open field
Ilyocypris getica Masi	++++	+
Ilyocypris bradyi Sars	++++	+ (v)
Ilyocypris cf. *biplicata* (Koch)	+ (v)	-
Candona candida (O.F. Müller)	++++	++++
Candona neglecta Sars	+	+++
Candona spec.	+ (v)	+++
Pseudocandona albicans (Brady)	+ (v)	+++
Pseudocandona marchica (Hartwig)	++ (v)	+++
Pseudocandona rostrata (Brady & Norman)	-	++
Pseudocandona sarsi (Hartwig)	-	+ (v)
Cyclocypris laevis (O.F. Müller)	+ (v)	-
Cyclocypris pygmaea Croneberg	+	+ (v)
Cypria ophtalmica (Jurine)	++	+
Bradleystrandesia affinis (Fischer)	+ (v)	++
Bradleystrandesia fuscata (Jurine)	-	+ (v)
Tonnacypris lutaria (Koch)	+ (v)	+
Eucypris lilljeborgi (G.W. Müller)	-	+
Eucypris moravica Jancarik	-	+++
Eucypris pigra (Fischer)	++ (v)	+++
Eucypris virens (Jurine)	-	+

++++ > 100 specimens; +++ 50-100 specimens; ++ 10-49 specimens; + 1-9 specimens; (v) only valves.

Remarks: (1) *Ilyocypris* cf *biplicata* is similar to *I. gibba*, except for the absence of any lateral projections on the valves;

(2) Dr Trajan Petkovski (Skopje) kindly checked the specimens listed as belonging to *Candona* spec. above: they come very close to *Candona peterseni* Caraion, 1979. The latter species, however, is distinctly smaller.

(3) *Cyclocypris pygmaea*, which markedly differs in carapace shape from *Cyclocypris ovum*, is not rare in the environs of Leipzig; this species is also

Gauthier, H., 1928. - Recherches sur la faune des eaux continentales de l'Algérie et de la Tunisie. - Thèses présentées à la Faculté des sciences de l'université de Paris, série A, 1160: 1-423.

Gauthier, H., 1934. - Nouvelles recherches sur la faune des eaux continentales de l'Algérie et de la Tunisie. 1re note. - Bulletin de la Société d'Histoire naturelle de l'Afrique du Nord, 25: 121-126.

Griffiths, H.I. & J.G. Evans, 1995. - An annotated check-list of British Pleistocene, Holocene and modern freshwater ostracods. - Journal of Micropalaeontology, 14: 59-65.

Griffiths, H.I, K.E. Pillidge, C.J. Hill, J.G. Evans, & M.A. Learner (in press; preprint 1993). - Ostracod distribution in a calcareous coastal stream: implications for the interpretation of Holocene Tufas and Travertines. - Proceedings of the 2nd European Ostracodologists Meeting, University of Glasgow, Scotland (23-27 July 1993): 109-121.

Henderson, P. A., 1990. - Freshwater Ostracods. - Universal Book Services/Dr. W. Backhuys: Synopses of the British Fauna (New Series), 42: 1-228.

Janz, H., 1994. - Zur Bedeutung des Schalenmerkmals ‚Marginalrippen' der Gattung *Ilyocypris* (Ostracoda, Crustacea). - Stuttgarter Beiträge zur Naturkunde, Ser. B, 206: 1-19.

Kantorek, J., 1983. - Prehled Lasturnatek (Ostracoda, Crustacea) nekterych typu stojatych vod severomoravskeho kraje. - Campanula. Krakské stredisko památkové péce a ochrany prirody, Ostrava: 33-48.

Kempf, E.K., 1980. - Index and Bibliography of Nonmarine Ostracoda. 1: Index A; 2: Index B; 3: Index C; 4: Bibliography A. - Sonderveröffentlichungen des Geologischen Instituts der Universität zu Köln, 35: 1-188; 36: 1-180; 37: 1-204; 38: 1-186.

Klie, W., 1939.- Adatok Magyarország Kagylósrák-Faunájának Ismeretéhez. Beiträge zur Ostracodenfauna Ungarns. - Allattani Koezlemenyek, 36 (3/4): 168-174.

Löffler, H., 1969. - Recent and subfossil distribution of *Cytherissa lacustris* (Ostracoda) in Lake Constance. - Mitteilungen der Internationalen Vereinigung für theoretische und angewandte Limnologie, 17: 241-251.

Maddocks, R.F. 1982. - Ostracoda. - In: Bliss, D.E., editor: The Biology of Crustacea. Vol. 1.: Systematics, the Fossil Record, and Biogeography. - Academic Press. 319 p.

Martens, K., 1984. - Annotated check-list of non-marine ostracods (Crustacea, Ostracoda) from African inland waters. - Koninklijk Museum voor Midden-Afrika (Tervuren, Belg.), Zool. Dok., 20: 1-51.

Martens, K., 1992. - On *Namibcypris costata* n.gen., n.sp (Crustacea, Ostracoda, Candoninae) from a spring in northern Namibia, with the description of a new tribe and a discussion on the classification of the Podocopina. - Stygologia, 7 (1): 27-42.

Martens, K., 1994. - Towards a revision of the Cypricercinae (Crustacea, Ostracoda): on the validity of the genrea Neocypris SARS, 1901 and Bradleycypris McKENZIE, 1982. - Buleltin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie, 64: 231-233.

Masi, L., 1906a. - Faune de la Roumanie. Ostracodes récoltés par Mr. Jaquet et déterminés par Mr. le Dr. L. Masi. - Buletinul Societatii de Sciinte (Bulletin de la Société des Scieuces), Bucarest, 14 (6): 647-665.

Masi, L., 1906b. - Contributo alla sistematica delle "Ilyocyprinae". - Bollettino della Societá Zoologica Italiana, seria 2, 7: (4/6): 133-146; 249-268 (1906); 8 (1/3): 55-57 (1907).

Meisch, C., 1988. - Ostracodes récoltés à Paris. Avec une clé pour la détermination des espèces européennes du genre Ilyocypris. - Bulletin de la Société des Naturalistes Luxembourgeois, 88: 145-163.

Meisch, C., K. Wouters & K. Martens, 1990. - Liste annotée des Ostracodes actuels non-marins trouvés en France. - Travaux scientifiques du Musée national d'histoire naturelle du Luxembourg, 15: 1-48.

Petkovski, T.K., 1958. - Süsswasser-Ostracoden aus Jugoslavien. II. Subfam. Ilyocyprinae. - Fragmenta Balcanica Musei Macedonici Scientiarum

Naturalium, 2 (8): 53-58.

Petkovski, T., C. Meisch & K. Wouters , 1993. - Taxonomic revision of the freshwater Ostracoda species Cypridopsis lusatica Schäfer, 1943 (Crustacea). - Travaux Scientifiques du Musée National d'Histoire Naturelle de Luxembourg, 19: 49-66.

Ramdani, M., 1982. - Les Entomostracés de la Merja Sidi Bou Ghaba. - Bulletin de l'Institut Scientifique, Rabat, 6: 105-117.

Rybecky, M., 1986. - Lasturnicky (Ostracoda) vybranych lokalit Vychodoslovenskej Niziny. (Muschelkrebse (Ostracoda) mancher Lokalitäten des Tieflandes Vychodoslovenskas Nizina (Ostslowakei)). - Zbornik Slovenskeho Narodneho Muzea, Prirod Vedy, 32: 69-89.

Stephanides, T., 1948. - A survey of the freshwater biology of Corfu and of certain other regions of Greece. - Praktika of the Hellenic Hydrobiological Institute, 2 (part 2), III-VIII: 1-263. (Ostracoda: 70-94, 103-107, 244-250, tables 25-34.

Sywula, T., 1968. - Notes on Ostracoda. II. On some Bulgarian species. - Bulletin de la Société des amis des sciences et des lettres de Poznan, série D, 8 (1967): 11-42.

Van Harten, D., 1979. - Some new shell characters to diagnose the species of the Ilyocypris gibba-biplicata-bradyi group and their ecological significance. - In: Taxonomy, Biostratigraphy and Distribution of Ostracodes. Proceedings of the 7th International Symposium on Ostracodes: 71-76. (Editor: Serbian Geological Society).

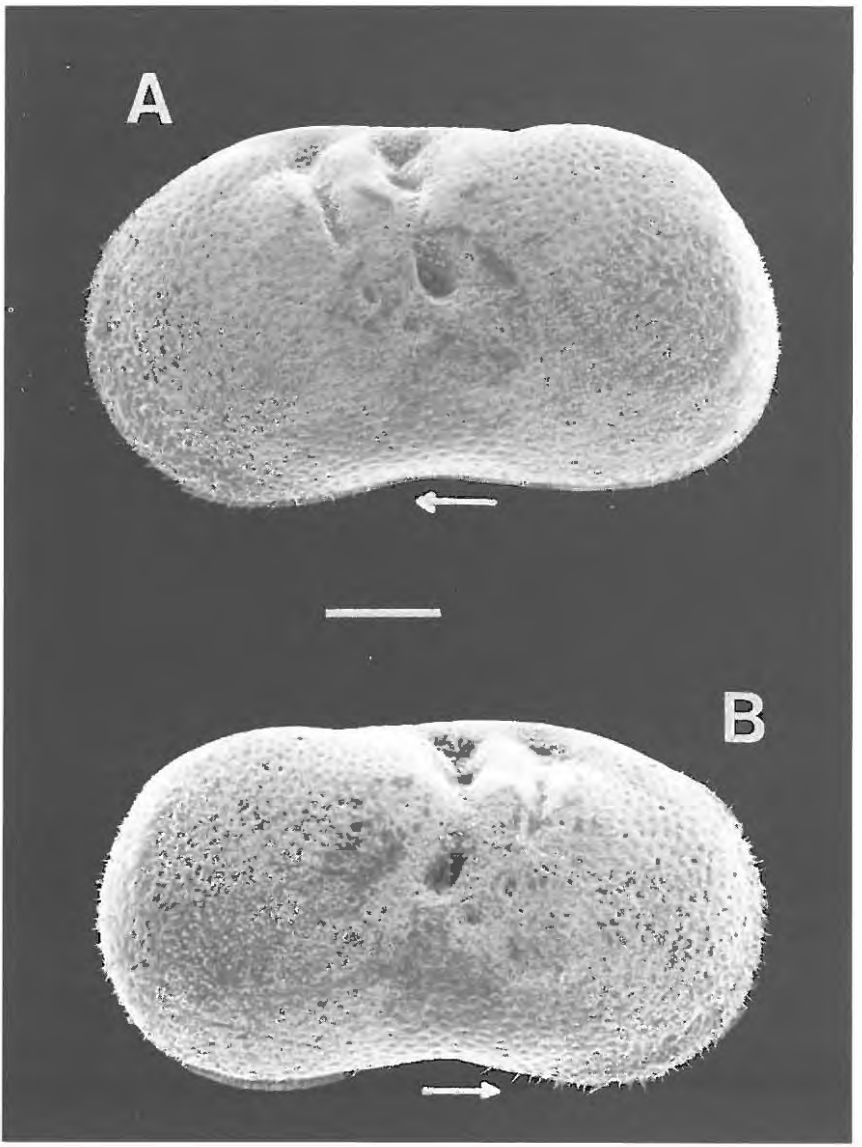


Fig. 1. - *Ilyocypris getica*, female. A: left valve. B: right valve. External views. Scale bar, 0.20 mm.

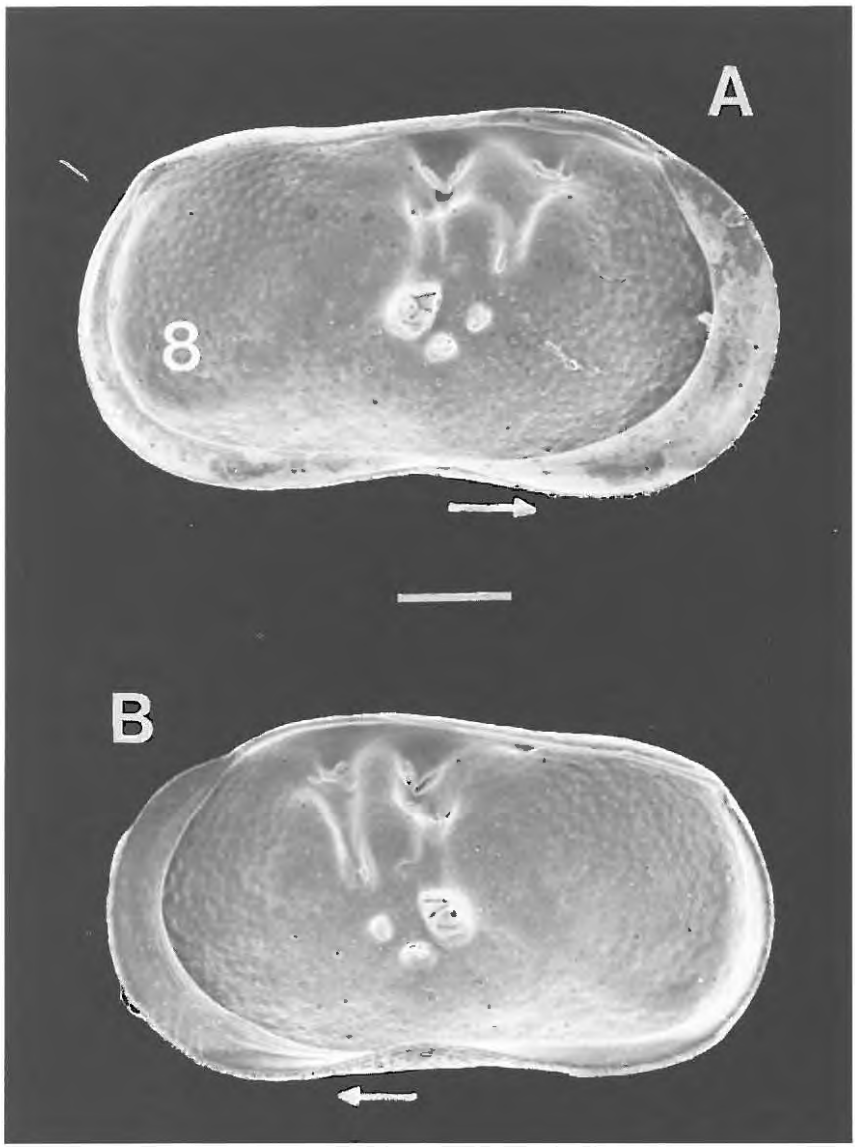


Fig. 2. - *Ilyocypris getica*, female. A: left valve. B: right valve. Internal views. Scale bar, 0.20 mm.

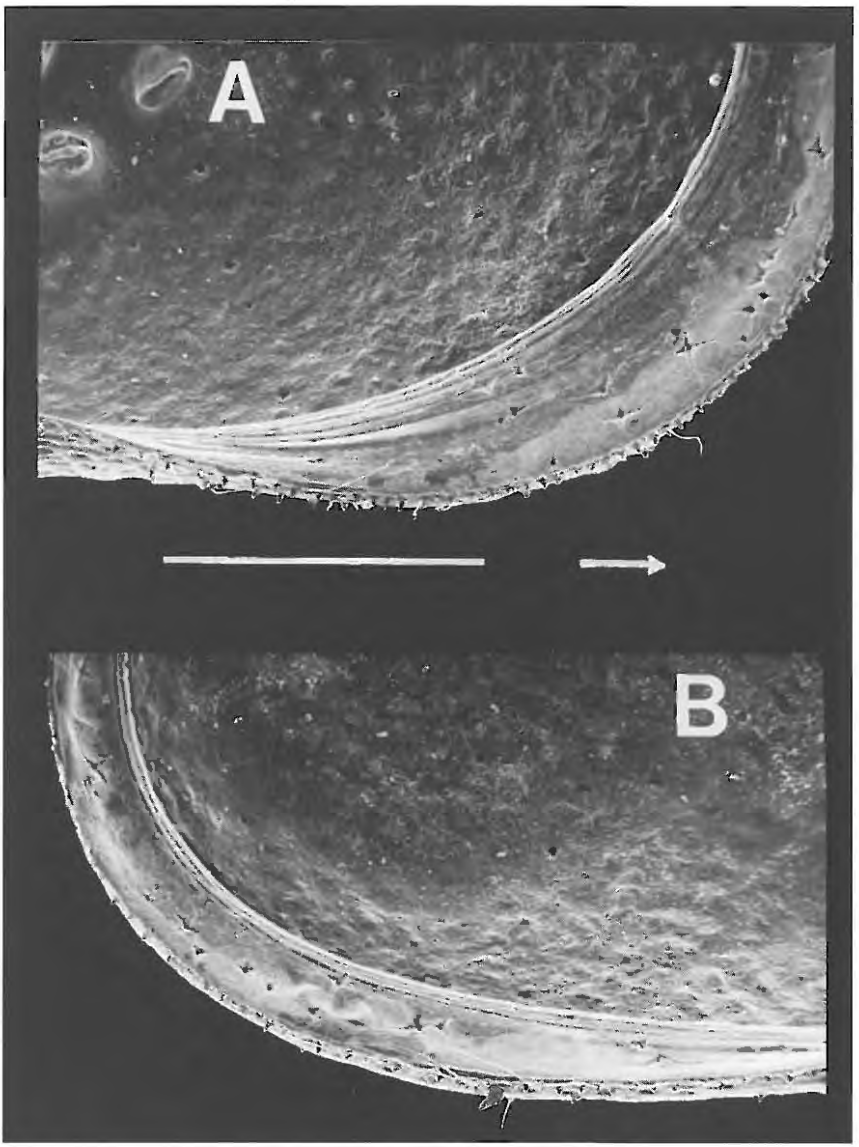


Fig. 3. - *Ilyocypris getica*, female. A: left valve, antero-ventral marginal zone. B: right valve, postero-ventral marginal zone. Internal views. Scale bar, 0.20 mm.

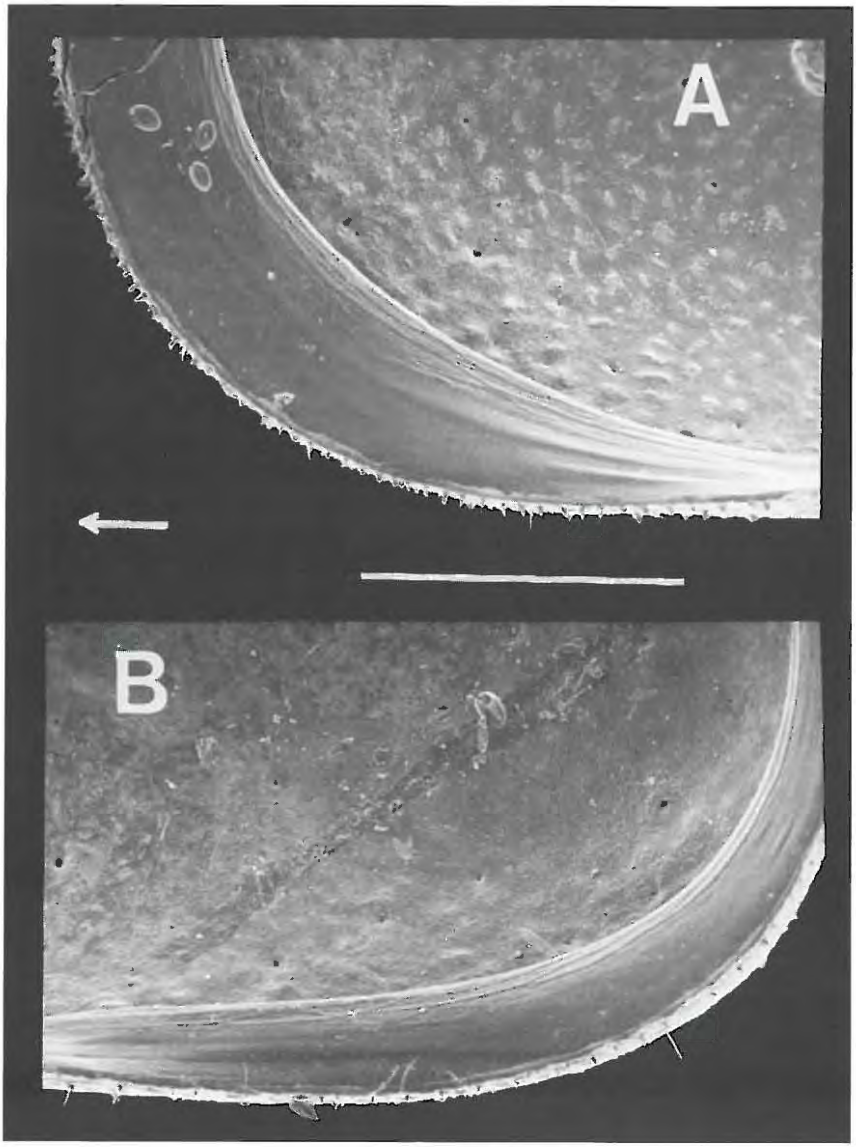


Fig. 4. - *Ilyocypris getica*, female. A: right valve, antero-ventral marginal zone. B: right valve, postero-ventral marginal zone. Internal views. Scale bar, 0.20 mm.

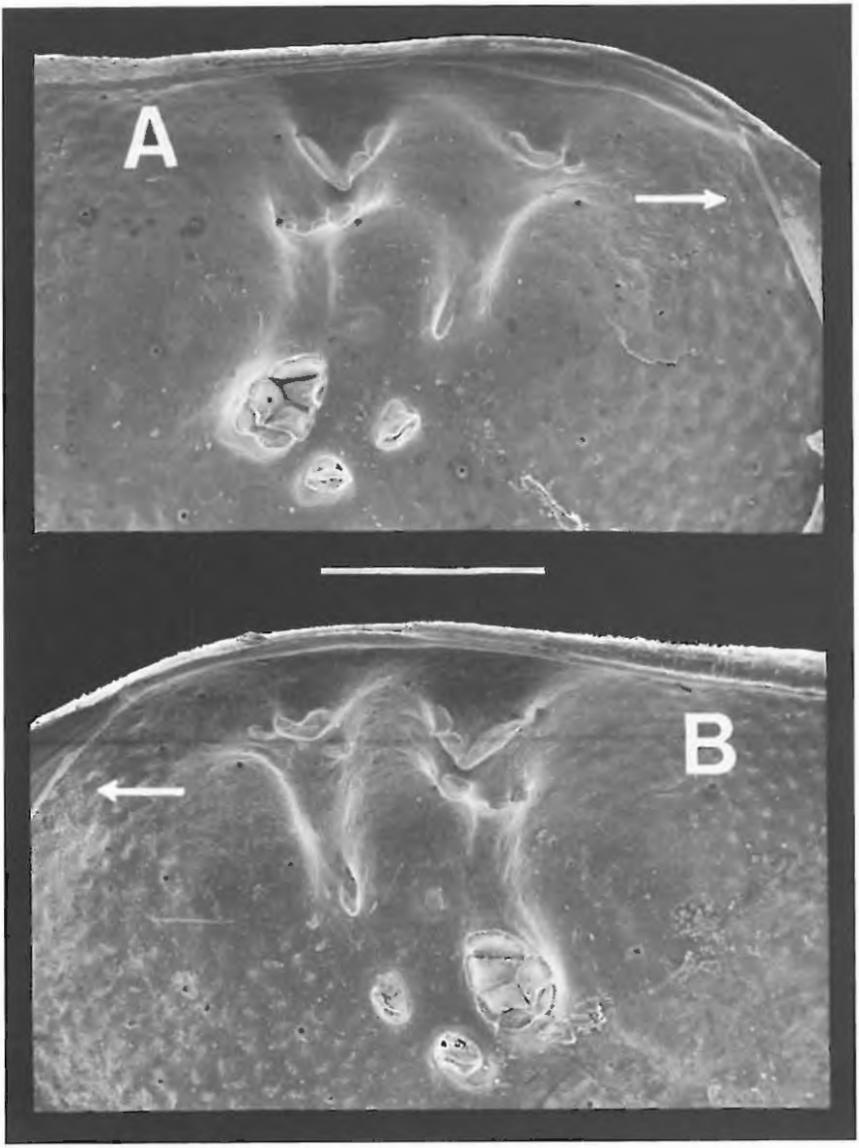


Fig. 5. - *Ilyocypris getica*, female. A: left valve, hinge and muscle scars. B: right valve, hinge and muscle scars. Internal views. Scale bar, 0.20 mm.

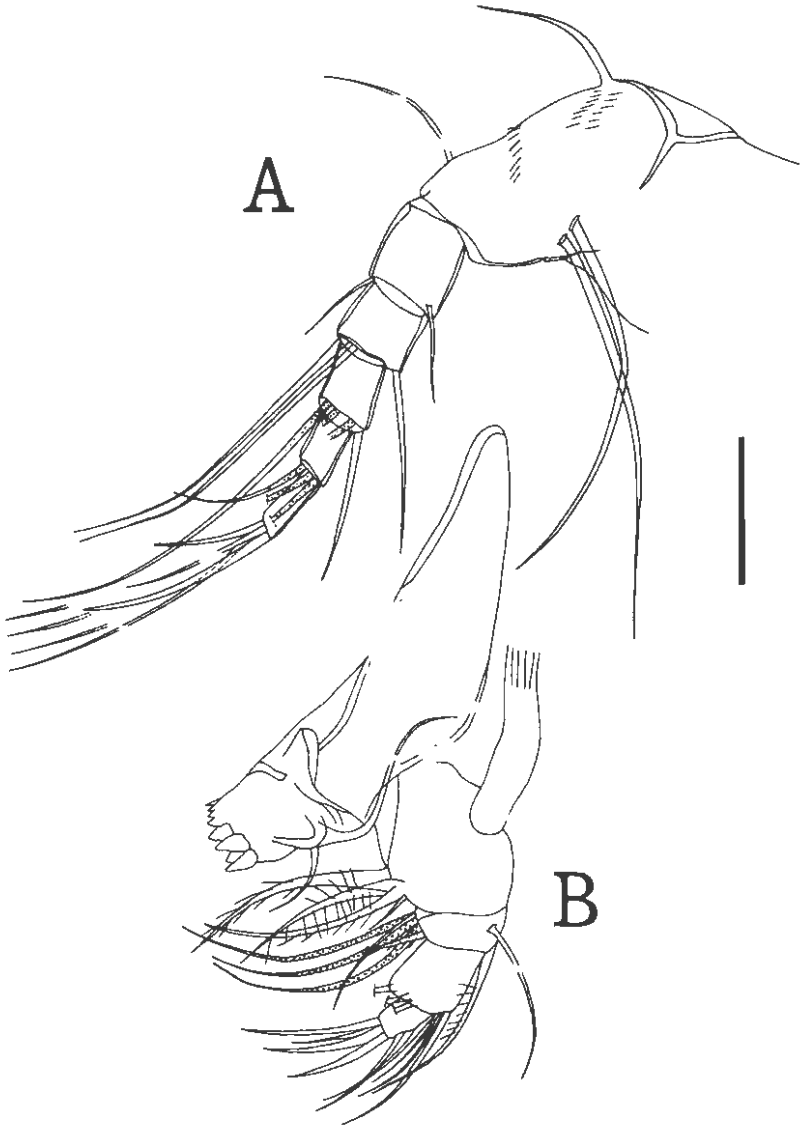


Fig. 6. - *Ilyocypris getica*, female. A: antennula, A1. B: mandibula and mandibular palp. Scale bar, 100 µm for both.

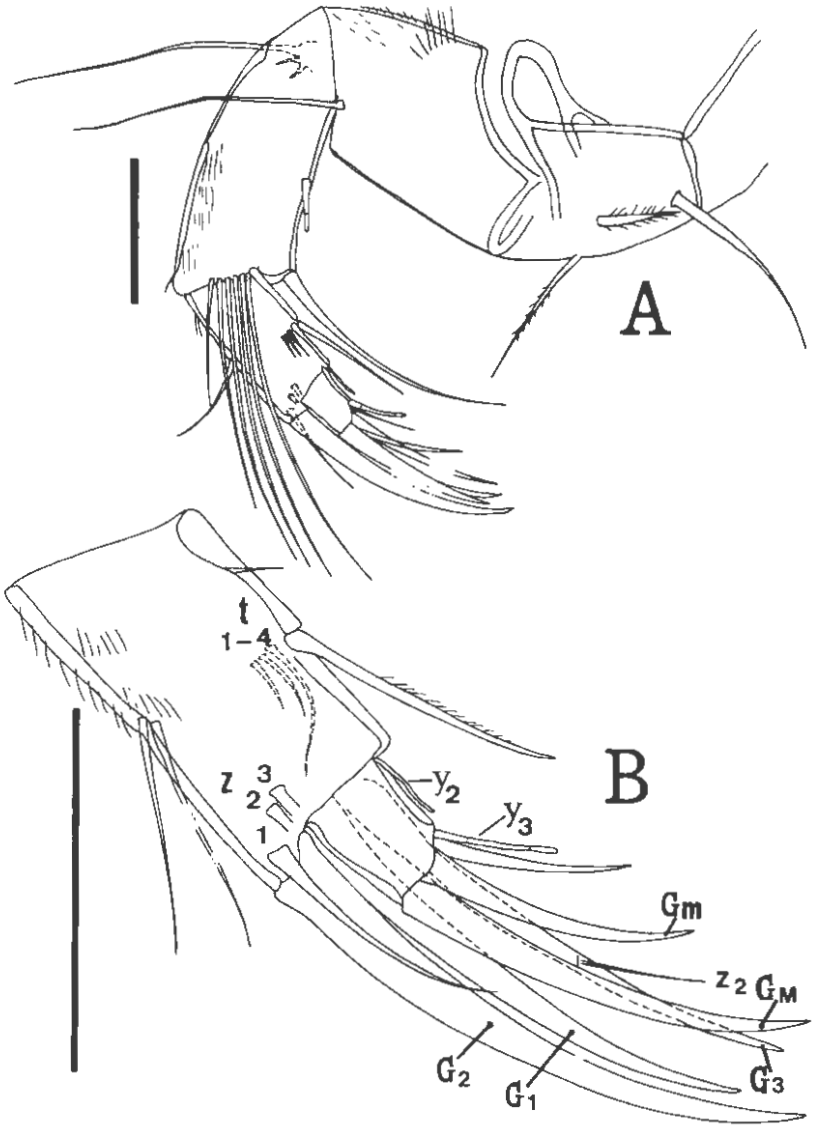


Fig. 7. - *Ilyocypris getica*, female. A: antenna, A2, internal view. B: antenna, terminal end, external view. Scale bars, 100 µm.

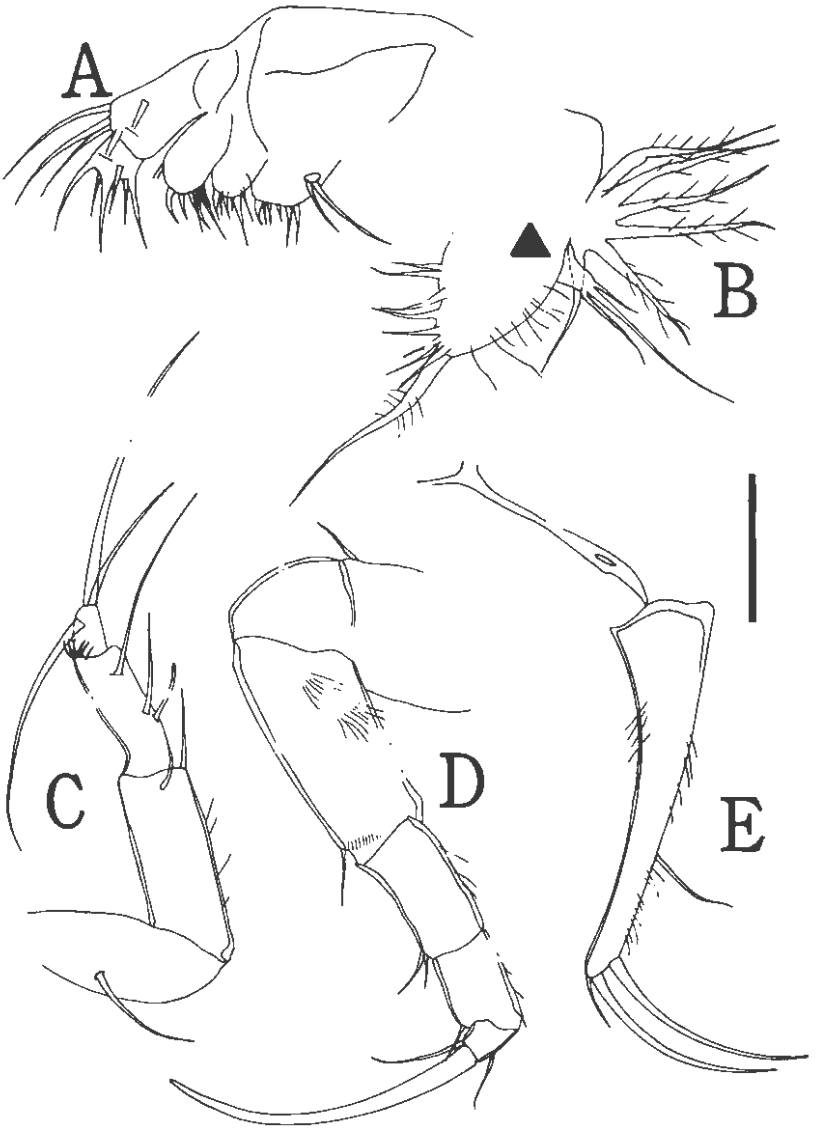


Fig. 8. - *Ilyocypris getica*, female. A: maxillula, Mx. B: maxilliped, the arrow points to the palp. C: cleaning leg. D: walking leg. E: furcal ramus and furcal attachment. Scale bar, 100 µm for all.

Trav. sci. Mus. nat. hist. nat. Lux. 23, 1996

Freshwater Ostracoda (Crustacea) collected on La Gomera (Canary Islands), with a redescription of *Cypridopsis obesa* (Brady & Robertson, 1869)

Gabriele BEYER [1] **and Claude MEISCH** [2]

Key words: Freshwater Ostracoda, Macaronesia, Canary Islands, La Gomera, biogeography, ecology.

Abstract:

During the course of detailed investigations of the freshwater fauna of the island La Gomera in 1991, 1992 and 1994 nine species of freshwater Ostracoda were found, only four of which were previously known from La Gomera. Two of the species, *Herpetocypris brevicaudata* Kaufmann, 1900 and *Cypridopsis obesa* Brady & Robertson, 1869, are new to the Macaronesian region. Two other species, *Cypridopsis lusatica* Schäfer, 1943 and *Potamocypris villosa* (Jurine, 1820), are reported from the Canary Islands for the first time, although they occur in other parts of Macaronesia. Scanning electron micrographs of the carapace and valves, and a differential diagnosis of *Cypridopsis obesa* are provided. Representative physico-chemical data of several of the sampling sites are given. Maps providing a preliminary overview of the distribution of the species on La Gomera are added. Furthermore, *Cypridopsis lusatica* Schäfer, 1943 is reported from one locality in Tenerife and *Sarscypridopsis lanzarotensis* from Fuerteventura.

[1] Institut für Angewandte Zoologie, Rheinische Friedrich-Wilhelms-Universität Bonn, An der Immenburg 1, D-53121 Bonn.
[2] Musée national d'histoire naturelle de Luxembourg, Marché-aux-Poissons, L-2345 Luxembourg.

1. Introduction

With a total area of 370 km^2, La Gomera is the second smallest of the seven major islands belonging to the Canary archipelago. The Canary Islands are situated in the Atlantic Ocean off the coast of Africa. Together with Madeira and the Cape Verde Islands, the Canary Islands belong to the biogeographical region known as Macaronesia (Kunkel, 1987). La Gomera is renowned for its well-preserved Tertiary laurel forest which still covers most of the central highland area and forms the major part of the Garajonay National Park. This area is drained by numerous streams, some temporary, others perennial. A detailed study of the freshwater habitats within and outside the boundaries of the National Park has been carried out by Beyer (1993) Subsequent studies followed in 1994. A representative cross-section of streams and other aquatic habitats was investigated. The ostracod fauna was not the main focus of attention in this study, but as a number of interesting species were recorded, it seemed justified to present the results separately here.

To date, only relatively few papers dealing with the freshwater ostracod fauna of the Canaries have been published: Mallwitz, 1984; Meisch & Broodbakker, 1990, 1993*; Baltanás & García Avilés, 1993*, Meisch et al., 1995. The papers marked with an asterisk include records from the island of La Gomera. Up till now the following freshwater ostracod species were known to occur on La Gomera: *Pseudocandona albicans* (Brady, 1864); *Heterocypris salina* (Brady, 1868), *Cypretta seurati* Gauthier, 1928; *Cypridopsis vidua* (O.F. Müller, 1776); *Sarscypridopsis lanzarotensis* (Mallwitz, 1984); *Herpetocypris chevreuxi* (Sars, 1896) (= *Herpetocypris helenae* G.W. Müller, 1908).

The aim of the present study is to update our knowledge of the ecology and distribution of the ostracod fauna in the Canary Islands, in particular La Gomera, and to complete the information about little known species.

List of the species collected in 1991, 1992 and 1994 in La Gomera

Phylum or subphylum Crustacea Pennant, 1777

Class Ostracoda Latreille, 1806

Subclass Podocopa Müller, 1894

Order Podocopida Sars, 1866

Superfamily Cypridoidea Baird, 1845

Family Candonidae Kaufmann 1900

Subfamily Candoninae

Pseudocandona albicans (Brady, 1864)

Family Cyprididae

Subfamily Cyprinotinae

Heterocypris incongruens (Ramdohr, 1808)

Subfamily Herpetocypridinae

Herpetocypris brevicaudata Kaufmann, 1900
Herpetocypris chevreuxi (Sars, 1896)

Subfamily Cypridopsinae

Cypridopsis vidua (O.F. Müller, 1776)
Cypridopsis obesa Brady & Robertson, 1869
Cypridopsis lusatica Schäfer, 1943
Sarscypridopsis lanzarotensis (Mallwitz, 1984)
Potamocypris villosa (Jurine, 1820).

2. Material and methods

In spring (March to May) 1991, autumn (September to October) 1991, spring and summer (April to July) 1992 and in summer (July to September) 1994, samples of aquatic invertebrates were collected in various parts of the island of La Gomera. 76 sampling sites representing a range of different freshwater habitats were selected for the study. Some of the main sampling sites were further divided into subsampling sites (a, b etc) in order to take various microhabitats into account. Only those sites (23) in which Ostracoda have so far been found are mentioned in this paper.

Animals were collected with the usual methods, i.e. capturing with a finely-meshed hand-net, sifting substrate with a sieve and microscopic analysis of the substrate. Specimens were preserved in 70 % ethanol.

At several sampling sites, physicochemical analyses were carried out. Water temperature was determined with a mercury thermometer (capable of readings accurate to 0.5 °C), pH with a pH meter (WTW pH 95). The following tests (MERCK) were used for further examination: chloride (Aquamerck 11 106); total hardness (Aquamerck 8039); calcium (Aquamerck 11 110); magnesium (Aquamerck 11 131).

The specimen collection is currently lodged with the first author (G.B.). Dissections and voucher specimens have been deposited with the second author (C.M.).

3. List of sampling sites with respective species

Numbering of the sampling sites follows that of the first author during her studies on La Gomera (see Beyer 1993). The following abbreviations are used in the text: m a.s.l. = metres above sea-level; spm = specimen; f. = ad. female; subad. = subadult; juv. = juvenile; e.cp. = empty carapace; diss. = dissection; (A) = specimens found during aquarium studies using substrate from the respective sampling site.

4b: El Cedro stream, permanent, in exposed location, stream-bed rocky, with luxuriant moss and filamentous algal growth. 400 m a.s.l.,

UTM: 28RBS 83/15.

Sarscypridopsis lanzarotensis. 05.07.1992: 1 f.

5a: El Cedro stream, permanent, in exposed location, dammed up immediately before entering a reservoir. Stream-bed muddy, vigorous growth of *Apium nodiflorum*. 410 m a.s.l., UTM: 28RBS 83/14.

Herpetocypris chevreuxi. 05.07.1992: ca 30 f., many subad. and juv.; 17.06.1992: 1 f.

Sarscypridopsis lanzarotensis. 05.07.1992: 30 f.; 26.05.1992 (*S.* cf. *lanzarotensis*). 1 f. (crashed spm).

5b: Same station, stream-bed rocky, with luxuriant moss and filamentous algal growth. Physicochemical data (05.06.1992): water temperature: 14.5 °C; pH 7.7, total hardness: 4.8°dH; Ca^{2+}: 10 mg/l; Mg^{2+}: 0-100 mg/l, Cl^{-}: 42 mg/l.

Herpetocypris chevreuxi. 17.06.1992: ca 30 f., many subad. and juv.; 07.06.1992 (A): 1 juv. (L=1.65 mm).

Sarscypridopsis lanzarotensis. 05.06.1992: 1 f. (L=0.71 mm); 07.07. 1992 (A): 1 f.; 17.06.1992: 30 f.

6: El Cedro stream, permanent, in exposed location, stream-bed muddy with some larger rocks. Rocks with luxuriant moss and filamentous algal growth. 790 m a.s.l., UTM: 28RBS 82/14. Physicochemical data (11.06.1992): water temperature: 13.5°C, pH 7.6; total hardness: 3.6°dH; Ca^{2+}: 18 mg/l; Mg^{2+}: 0-100 mg/l; Cl^{-}: 36 mg/l.

Sarscypridopsis lanzarotensis. 20.07.1992 (A): 1 f. L=0.68 mm; 11.06.1992: 7 f.; 1 e.cp.

7. El Cedro stream, permanent, in exposed location near human habitation, visibly polluted with domestic sewage, substrate muddy, anaerobic. 810 m a.s.l., UTM: 28RBS 82/14. Physicochemical data (03.06.1992): water temperature: 14.8°C, pH 7.6; total hardness: 4.2°dH; Ca^{2+}: 10 mg/l; Mg^{2+}: 0-100 mg/l; Cl^{-}: 42 mg/l.

Pseudocandona albicans. 19.07.1992 (A): 1 f. (L=0.84 mm).

Sarscypridopsis lanzarotensis. 11.06.1992: ca 60 f. (L=0.67-0.73 mm, 5 animals were measured); 19.07.1992 (A): 1 f. (L=0.72 mm); 20.07.1992: 3 f.

8b: El Cedro stream, permanent, within shady laurel forest, stream-bed sandy and stoney, in parts muddy. *Nasturtium officinale* and *Apium nodiflorum* present. 870 m a.s.l., UTM: 28RBS 82/13. Physicochemical data (02.06.1992): water temperature: 12.0°C, pH 7.7; total hardness: 4.2°dH; Ca^{2+}: 12 mg/l; Mg^{2+}: 0-100 mg/l; Cl^-: 36 mg/l.

Cypridopsis lusatica. 03.07.1992: 1 f. (L=0.63 mm).

9: El Cedro stream, near Ermita de Na. Sra. de Lourdes, permanent, witin shady laurel forest, stream-bed stony and rocky. 930 m a.s.l., UTM: 28RBS 81/12.

Herpetocypris brevicaudata. 16.10.1991: 1 f. (L=1.82 mm).

11b: Spring of El Cedro stream system, substrate sandy and muddy, vigorous plant growth. 980 m a.s.l., UTM: 28RBS 81/12. Physicochemical data were determined at sampling site 11a which is situated approx. 1 m away from 11b (15.06.1992): water temperature: 11.5 C; pH 7.5; total hardness: 4.0°dH; Ca^{2+}: 16 mg/l; Mg^{2+}: below detection limits; Cl^-: 34 mg/l.

Sarscypridopsis lanzarotensis. 11.07.1992 (A): 3 f.

Cypridopsis lusatica. 11.07.1992 (A): 2 f.

26a: Meriga, permanent stream, within shady laurel forest. 830 m a.s.l., UTM: 28RBS 80/16. Physicochemical data (08.06.1992): water temperature: 13.2°C, pH 7.3; total hardness: 3.8°dH; Ca^{2+}: 20 mg/l; Mg^{2+}: 0-100 mg/l; Cl^-: 50 mg/l.

Herpetocypris chevreuxi. 08.06.1992: 1 f. (L=2.18 mm).

Herpetocypris brevicaudata. 08.06.1992: 1 subad. 28.08.1994: 1 f.

Sarscypridopsis lanzarotensis. 28.08.1994: 1 f.

27a-f: Meriga, permanent stream in exposed location with series of interconnected pools, vigorous plant growth in watercourse between pools (*Nasturtium officinale* and *Apium nodiflorum*), pools with *Lemna gibba* and filamentous algae. 840 m a.s.l., UTM: 28RBS 80/16. Physicochemical data (14.06.1992): water temperature: 16.0°C, pH 7.6; total hardness: 5.0°dH; Ca^{2+}: 20 mg/l; Mg^{2+}: 0-100 mg/l; Cl^{-}: 62 mg/l.

Herpetocypris chevreuxi. 09.03.1991: 3 f.; 27.03.1991: 4 f. (L=2.28-2.37 mm); 04.04.1991: 4 f., 2 juv. (Lad.=2.14 mm, 1 diss.); 22.04.1991: 2 f.; 23.09.1991: 1 f. (L=2.04 mm), 1 juv., 1 e.cp.; 01.10.1991: 16 f., 20 juv.; 13.10.1991: many spms (L=2.16-2.38 mm); 13.10.1991: 6 f., 1 juv., 1 e.cp; 14.10.1991 (A): 3 f. (L=2.30-2.33 mm, 1 diss.); 20.07.1992 (A): 1 f. (L=2.23 mm); 10.08.1994: ca 50 f. and juv. (L=2.08 mm, one spm was measured).

Herpetocypris brevicaudata. 26.09.1991: 2 f. (L1=L2=1.73 mm); 14.10.1991: 5 f., 3 juv. (L=1.70-1.75 mm, 1 diss.); 31.05.1992: 3 f. (L=1.80-1.82 mm); 09.07.1992: 1 f. (L=1.77 mm, diss.)

Herpetocypris sp. 01.10.1991: 1 subad. (L=0.98 mm).

Sarscypridopsis lanzarotensis. 27.03.1991: 4 f.; 26.09.1991: 1 subad. f.; 31.05.1992: ca 50 f., many juv.; 01.06.1992: 1 f. (L=0.67 mm); 24.06.1992: 3 f.; 18.07.1992: 1 f., 2 juv.; 10.08.1994: ca 70 f. and juv.

Cypridopsis vidua. 09.07.1992 (A): 1 f. (L=0.73 mm).

Cypridopsis lusatica: 10.08.1994: 17 f. and subad.

Cypridopsis obesa: 10.08.1994: 8 f. and 1 subad. (L=0.70-0.74 mm).

34: Rockface, permanently wet (typical hygropetric habitat), in exposed location between Palmita and Meriga. Some algal growth. 750 m a.s.l., UTM: 28RBS 82/17.

Cypridopsis lusatica. 23.09.1991: 1 f. (L=0.61 mm).

Sarscypridopsis lanzarotensis. 11.08.1994: 1 f.

37: Rockface, permanently wet (typical hygropetric habitat), and run-off water at its base, in exposed location by road between Arure and Valle Gran Rey. Some algal growth. 800 m a.s.l., UTM: 28RBS 72/13.

Heterocypris incongruens. 20.07.1992 (A): 9 f.

Sarscypridopsis lanzarotensis. 11.07.1992: 1 f. (L=0.67 mm), 2 juv; 15.07.1992: 7 f; 20.07.1992 (A): 10 f., 7 juv.; 03.09.1994: 10 f. and juv.

Cypridopsis lusatica. 03.09.1994: 2 f. (L=0.50-0.53 mm).

38a-d: Agua Jerba Huerto, spring pool and spring brook with series of interconnected pools, permanent, in exposed location, vigorous plant growth (*Nasturtium officinale*, *Apium nodiflorum*, moss and filamentous algae). 1230 m a.s.l., UTM: 28RBS 78/12. Physicochemical data (09.06.1992): water temperature: 12.0°C, pH 6.1; total hardness: 2.2°dH; Ca^{2+}: 12 mg/l; Mg^{2+}: 0-100 mg/l; Cl^{-}: 22 mg/l.

Cypridopsis lusatica. 11.10.1991: 1 f.; 18.05.1992 (A): 1 f. (L=0.66 mm).

Sarscypridopsis lanzarotensis. 04.10.1991: 1 juv.

Potamocypris villosa. 04.10.1991: 1 f. (L=0.81 mm); 11.10.1991: 2 f. (L=0.79-0.81 mm, 1 diss.).

38d: Agua Jerba Huerto, open man-made sedimentation basin, bottom of basin muddy, exposed location. 1230 m a.s.l., UTM: 28RBS 78/12.

Potamocypris villosa. 22.06.1992 (A): 1 f. (L=0.81 mm, diss), 2 juv.

39a-d: Fuente Erque, permanent spring in *Salix* scrub followed by a small waterfall on exposed rock, most of water is fed into open irrigation channel, some water follows natural course forming a small muddy stream. *Nasturtium officinale* present. 980 m a.s.l., UTM: 28RBS 78/10. Physicochemical data (07.07.1992): water temperature: 16.0°C, pH 7.6; total hardness: 2.2°dH; Ca^{2+}: 8 mg/l; Mg^{2+}: 0-100 mg/l; Cl^{-}: 22 mg/l.

Cypridopsis lusatica. 07.07.1992: 1 f., 1 juv. (1 diss.) (L=0.57 mm

and 0.51 mm); 22.07.1992 (A): 1 f.

Sarscypridopsis lanzarotensis. 02.07.1992: 1 f. (L=0.71 mm, diss.); 07.07.1992: 4 f. (L1-L4=0.69 mm), 3 juv.

43b: La Fuente Cercado, shallow water channel with muddy bottom flowing from nearby spring, exposed location. Much *Apium nodiflorum* and *Lemna minor*. 1010 m a.s.l., UTM 28RBS 75/12.

Herpetocypris chevreuxi. 02.101991: 1 f. (L=1.99 mm), 5 subad., 1 juv.; 11.10.1991 (A): ca 60 f. and subad. (L=2.06 mm); 02.10.1991: 5 f., ca 20 juv.

Herpetocypris brevicaudata. 02.10.1991: 2 f. (1 diss.).

Sarscypridopsis lanzarotensis. 02.10.1991: 1 f., 1 juv.

44a: El Cercado, Fuente Los Tanquillo, small spring-pool in exposed location, substrate sandy and muddy. 1000 m a.s.l., UTM: 28RBS 75/12.

Herpetocypris chevreuxi. 13.05.1992: 12 f., ca 12 juv. (L=2.16-2.28 mm).

Cypridopsis vidua. 13.06.1992 (A): 1 f.

Sarscypridopsis lanzarotensis. 13.05.1992: ca 32 f. (1 diss.), many juv.; 04.06.1992 (A): 1 f.; 13.06.1992: 5 f., 12 juv.

50a-b: Rockface, permanently wet (typical hygropetric habitat) and run-off water at its base, exposed location, by road between Arure and Valle Gran Rey. 500 m a.s.l., UTM: 28RBS 73/12.

Sarscypridopsis lanzarotensis. 18.08.1994: ca 200 f. and juv. (L=0.58-0.71 mm, 5 animals were measured).

51b: Barranco de las Lagunetas (Agua Oscura), pools of a temporary stream with stagnant water. 1100 m a.s.l., UTM: 28RBS 76/13.

Herpetocypris chevreuxi. 04.08.1994: 3 f. and 3 juv.

Sarscypridopsis lanzarotensis. 04.08.1994: 3 f. (L=0.66-0.69 mm, 3

animals were measured).

Potamocypris villosa. 04.08.1994: 5 f. (L=0.56-0.61 mm, 3 animals were measured, 1 diss.).

66: Small pool at the base of a wet rockface, by the roadside near Ermita de Na. Sra. del Buen Paso. 1220 m a.s.l, UTM: 28RBS 79/09.

Herpetocypris brevicaudata. 27.08.1994: ca 500 f. and juv. (1 diss.).

Cypridopsis lusatica. 27.08.1994: few spms in large sample (L=0.54 mm, 1 animal was measured).

Sarscypridopsis lanzarotensis. 27.08.1994: few spms in large sample.

Potamocypris villosa. 27.08.1994: 3 f. (L=0.65-0.68 mm).

70: Small spring above La Dehesa (Chipude). 1030 m a.s.l., UTM: 28RBS 76/11.

Herpetocypris brevicaudata. 01.09.1994: ca 20 f. and subad. (L= 1.56-1.63 mm, 1 diss.).

Cypridopsis lusatica. 01.09.1994: 3 f. and 8 juv.

71: Open water tank above La Dehesa (Chipude). 1030 m a.s.l., UTM: 28RBS 76/11.

Herpetocypris chevreuxi. 01.09.1994: 5 f. (L=1.70-1.92 mm).

72: Barranco de los Manantiales, small open water tank near Chipude. 1040 m a.s.l., UTM: 28RBS 75/11.

Herpetocypris chevreuxi. 01.09.1994: 1 f. (L=2.09 mm), 3 subad.

74b: Barranco de la Cuesta (Degollada Fria), pool of a temporary stream in small laurel forest glade. 970 m a.s.l., UTM: 28RBS 76/14.

Pseudocandona albicans. 02.09.1994: 1 f. (L=0.88 mm, 1 diss.).

76: Spring-brook of El Cedro stream system, within laurel forest, near Ermita de Na. Sra. de Lourdes. 940 m a.s.l., UTM: 28RBS 81/12.

Herpetocypris brevicaudata. 06.09.1994: 13 f. (L=1.7-1.9 mm, 5 animals were measured, 1 diss.).

4. Notes on species

***Pseudocandona albicans* (Brady, 1864)**

Syn.: *Candona parallela* G.W. Müller, 1900.

Only two female specimens were found. One in a stream, at a place where the water is polluted with domestic sewage, and another in a pool with stagnant water.

Pseudocandona albicans inhabits both permanent and temporary ponds. It has also been found in the littoral zone of lakes, in springs, underground waters and slightly salty waters. Males are very rare, which accounts for the fact that the majority of populations reproduces parthenogenetically. The species is distributed throughout Europe, the western part of Asia and North America. Up to now it has not been recorded on the African continent (Martens 1984), where, however, its occurrence is to be expected.

In Macaronesia, the species has already been recorded from Tenerife and La Gomera (Meisch & Broodbakker 1993).

***Heterocypris incongruens* (Ramdohr, 1808)**

Nine female specimens were collected in a pool. *H. incongruens* is an ecologically highly tolerant species. It lives in both permanent and temporary ponds with a preference, however, for the latter. Males of this almost cosmopolitan species are only known from the circum-Mediterranean regions and from central and eastern Europe.

In the Canary Islands *H. incongruens* is also known to occur on the islands of Fuerteventura and Tenerife (Baltanás & García-Avilés 1993). It has also been reported from the Azores (Meisch & Broodbakker 1993).

Herpetocypris brevicaudata Kaufmann, 1900

About 550 female specimens were collected from seven stations. Three of the localities are streams, two are springs (one in shady laurel forest, the other in exposed location outside of the forest), one station is an open water channel, and one a small muddy pool under a wet rockface in exposed location.

H. brevicaudata is taxonomically a difficult species. It differs from the closely related *H. reptans* in the following features: (a) the carapace shows almost uniform greenish, without distinct dark green patches (with dark green patches in *H. reptans*; (b) of the reduced five A2 natatory setae, the fifth (= ventral) seta is the longest (in *H. reptans* the first natatory seta is the longest); (c) in frontal view the LV dorsally overlaps the RV (both valves approximately reach the same height in *H. reptans*).

H. brevicaudata prefers springs and waters flowing from springs. It has also been found in slow flowing ditches and, more rarely, in the littoral zone of lakes. The species is known from Europe and from North Africa. Bisexual populations have been reported from Portugal and North Africa only (Petkovski 1964).

The species is new to the Macaronesian region.

Herpetocypris chevreuxi (Sars, 1896)

Syn.: *Herpetocypris helenae* G.W. Müller, 1908;
Herpetocypris cf. *helenae* - Baltanás & García-Avilés, 1993.

More than 200 adult females and many subadult and juvenile specimens were collected in two streams, in a small water channel flowing from a nearby spring, in a small spring pool, in pools with stagnant water and in two open watertanks.

H. chevreuxi inhabits small permanent ponds, the littoral zone of lakes, slow flowing streams and swampy waters. It is known to occur in both freshwater and slightly salty coastal and inland waters. The species has a holarctic distribution. Males are unknown.

H. chevreuxi has been recorded repeatedly from La Gomera and Tenerife (Meisch & Broodbakker 1993; Baltanás & García-Avilés 1993; Meisch et al.

1995). It is also known from the Azores (see Meisch & Broodbakker 1993).

Cypridopsis vidua (O.F. Müller, 1776)

The species was found in a pool of a permanent stream and in a small spring pool. Both habitats are not typical of the species, and this most probably explains why only two adult females and two juveniles were collected.

C. vidua prefers permanent ponds with much vegetation and the littoral zone of lakes. The species has a worldwide distribution. Males have never been found.

In Macaronesia, *C. vidua* is known from the islands of Fuerteventura, La Gomera, El Hierro and La Palma (Canary Islands) and from the Azores.

Cypridopsis obesa (Brady & Robertson, 1869)

Syn.: *Cypridopsella tumida* Kaufmann, 1900.

One subadult (L=0.66 mm) and eight adult females (L=0.70-0.74 mm) were collected in a pool of a permanent stream.

When compared with *C. vidua*, *C. obesa* is readily recognized in the stereomicroscope by:

(a) the length of the carapace: 0.70-0.74 mm; (< 0.70 mm in *C. vidua*);

(b) the more or less uniform greenish colour of the carapace (usually with 3 or 4 conspicuous transverse bands in *C. vidua*).

We would like to point out that both the carapace shape and the sculpture (pits) of the valves of the *C. obesa* animals from La Gomera perfectly fit the variability range of *C. vidua*. It should be noticed that the carapaces of our *C. obesa* specimens appear barely more obese than those of a number of *C. vidua* animals of our collections from Europe.

The branchial plate of the maxilliped (this appendage is often but erroneously referred to as the 2nd maxilla) of our *C. obesa* specimens bears three filaments (*C. vidua* usually has 5, more rarely 4 or even only 3 filaments).

Close examination of the structure of the valves in the SEM reveals subtle hut striking differences:

(a) Right valve of *C. obesa*: antero-ventral outer marginal zone smooth; in *C. vidua* there is a row of tiny tubercles;

(b) Left valve of *C. obesa*, anterior inner marginal zone (fig. 4): selvage peripheral; distal inner list with a row of ca 17 tiny spines; proximal inner list antero-ventrally undulated (fig. 4B; the arrows in fig. 4 point to the two lists). The groove situated between those two lists is densely covered in tiny spherical tubercles (fig. 4C and D). *C. vidua* lacks the tubercle bearing groove.

Taxonomic remarks: There is a lot of confusion about *C. obesa* in the zoologic literature. The confusion is due to the fact that *C. obesa* comes close to *C. vidua*, a cosmopolitan species which shows markedly variable in carapace size, colour and shape (but not in the structure of the inner marginal zones of the valves). Kaufmann (1900) redescribed *C. obesa* as *Cypridopsella tumida* from Switzerland. Various authors of the beginning of the century (Müller 1900, 1912; Alm 1915) considered *C. obesa* an infraspecific form of *C. vidua*. Sars (1925), however, maintained the species and provided a detailed redescription based on specimens collected in Norway. Farkas (1974) unsuccessfully tried to separate *C. obesa* and *C. vidua* using morphometric data; it is, however, doubtful if this author really examined animals belonging to *C. obesa*. More recently Rybecky (1981) recorded *C. obesa* from Slovakia and provided some taxonomic data.

In our opinion the differential diagnosis of the two species should run as follows:

C. vidua (Müller, 1776): Size of carapace 0.45-0.65 mm. Carapace weakly to distinctly ovate in dorsal view. Valves usually densely covered in round distinct pits, more rarely with sparse shallow pits. Carapace greenish, usually with 3 to 4 conspicuous dark green transverse bands; the bands, however, show more or less undistinct in some specimens. Branchial plate of maxilliped usually with 5, more rarely with 4 or only 3 filaments. Males unknown. Distribution: cosmopolitan.

C. obesa Brady & Robertson. 1869: Size of carapace 0.70-0.77 mm. Carapace markedly obese in dorsal view. Valves (?always) covered in coarse, conspicuous round pits. Carapace uniformly green or with blurred dark patches. Right valve: anterior outer marginal zone smooth, without a row of tiny spinules. Left valve: inner anterior marginal zone with two weak lists: the distal one with a row of tiny spinules; the groove situated between the two marginal lists with tiny spherical tubercles. Branchial plate of maxilliped (?always) with 3 filaments. Males unknown. Distribution: northern, central and eastern Europe, ?North America, Canary Islands, Azores.

***Cypridopsis lusatica* Schäfer, 1943**

Syn.: *Cypridopsis brincki* Petkovski, 1963. (For a complete list of synonyms see Petkovski et al. 1993).

Several adult females and some juveniles were collected in two permanent streams, in three springs, in a pool, and on a permanently wet rockface (typical hygropetric habitat).

The species also occurred in a sample collected in Tenerife (Barranco Infierno, 26.04.1992) by one of us (G.B.). The species is new to the fauna of La Gomera and Tenerife and to the Canary Islands in general.

C. lusatica prefers springs and waters flowing from springs, especially those in open fields (pastures). The species appears to be widespread in the circum-Mediterranean area; it is very rare in central and northern Europe (Petkovski et al. 1993). It has not been recorded from Africa, where it is most likely also to occur.

In Macaronesia, *C. lusatica* is also known from the Azores and from Madeira (Meisch & Broodbakker 1993; Petkovski et al. 1993).

***Sarscypridopsis lanzarotensis* (Mallwitz, 1984)**

About 550 adult females and many juveniles were collected in springs, waters flowing from springs, in streams, and in isolated pools with stagnant water.

At present *S. lanzarotensis* is only known from the Canary Islands where it appears to be widespread. It was found in springs, waters connected with

springs, streams, wells and caves. Males are unknown.

To date, the species is known from the islands of La Gomera, El Hierro, Lanzarote, La Palma and Tenerife. In 1993 it was also collected by one of us (G.B.) on Fuerteventura (unpublished record).

***Potamocypris villosa* (Jurine, 1820)**

Only a few adult females and many juveniles were collected in the pools of a permanent stream, in isolated pools with stagnant water and in an open man-made sedimentation basin. This species is new to the Canary Islands.

P. villosa prefers both springs and flowing as well as stagnant waters connected with springs. It is more rarely found in the littoral zone of lakes.

The species has a nearly world-wide distribution but is absent from Australia. Males are only known from north-western Spain (Martens & Meisch 1985) and from Italy (Margalef 1954).

P. villosa has also been recorded from the Azores.

5. Discussion

With respect to its ostracod fauna, very little is known from La Gomera, and only few isolated records exist in the literature (Meisch & Broodbakker 1993; Baltanás & García-Avilés 1993). Including the results of this study, eleven freshwater ostracod species are now known to occur on the island, and they are listed below. Five of them have been recorded for the first time on the island (*), two are new for the Canary archipelago (**) and further two are new to the Macaronesian region in general (**).

Updated check-list of Ostracoda from La Gomera

Pseudocandona albicans (Brady, 1864)

Heterocypris incongruens (Ramdohr, 1808) (*)

Heterocypris salina (Brady, 1868)

Herpetocypris brevicaudata Kaufmann, 1900 (***)

Herpetocypris chevreuxi (Sars, 1896)

Cypretta seurati Gauthier, 1929

Cypridopsis vidua (O.F. Müller, 1776)

Cypridopsis lusatica Schäfer, 1943 (**)

Cypridopsis obesa (Brady & Robertson, 1869) (***)

Sarscypridopsis lanzarotensis (Mallwitz, 1984)

Potamocypris villosa (Jurine, 1820) (**)

The distribution maps presented in this paper must be regarded as being provisional, as they reflect the results of the first more detailed study carried out on the island. Some parts of La Gomera which possibly contain suitable habitats are still waiting to be examined. However, certain general statements can already be formulated.

It appears as if *Sarscypridopsis lanzarotensis*, the only freshwater ostracod which so far has only been recorded from the Canary Islands, is the most widespread on La Gomera (found at 17 of the 23 sampling sites in which ostracoda occurred), showing no distinct preference to any one habitat. In addition, it has been found over a wide range of altitudes (400 m to 1230 m a.s.l.). More records at lower altitudes are to be expected, because the species has been collected from the adjacent islands (El Hierro and Tenerife) at nearly sea-level (Meisch & Broodbakker, 1993; Baltanás & García-Avilés, 1993).

The results to date indicate that the other species have a more restricted range. For instance, only two stations contained *Pseudocandona albicans*, a widespread species, obviously tolerant of polluted water. It was collected from a stream heavily contaminated with domestic sewage. *Heterocypris incongruens* and *Cypridopsis obesa* have only been found each at one of the sites.

With the exception of one sampling site visibly affected by human waste, the data of the chemical analyses show that the water of the examined stations is poor in nutrients, and that very little between-site variation occurs. It is therefore not possible to comment on the requirements and tolerances of the different ostracod species. More detailed investigations are necessary into this field.

More research into the way the various species coexist is also necessary. In this study, it was interesting to find three *Cypridopsis* species (*C. lusatica, C. vidua* and *C. obesa*) at the same sampling site (27: Meriga stream), all inhabiting the same habitat (pools) at nearly the same time of year (July-August).

6. Acknowledgements

We would like to thank the Instituto Nacional para la Conservación de la Naturaleza (ICONA), La Gomera, for permission to carry out studies in the Parque Nacional de Garajonay and for logistic support during the periods of fieldwork of the first author. We also thank Gary Brown (D-Bonn), who improved the English manuscript. A grant for a part of the fieldwork provided by the Richard-Winter-Stiftung, Bergisch Gladbach (Germany) is appreciated.

7. References

Baltanás, A. & J. García-Avilés, 1993. - New records of freshwater Ostracoda (Crustacea) from the Canary Islands. - Bull. Soc. Nat. luxemb., 94: 219-232.

Beyer, G., 1993 (not published). - Limnologische und biogeographische Untersuchungen an Quellen und Bächen der Kanaren-Insel La Gomera. - Diplomarbeit Math.-Nat. Fakultät, Rheinische Friedrich-Wilhelms-Univ. Bonn: 1-182.

Farkas, H.K, 1974. - Morphological analysis of Ostracods (Crustacea). 1. The problem of Cypridopsis vidua and Cypridopsis obesa. - Acta Zoologica Academiae Scientiarum Hungaricae, 20 (1/2): 33-46.

Kunkel, G., 1987. - Die Kanarischen Inseln und ihre Pflanzenwelt. - G. Fischer Verlag, Stuttgart, 202 pp.

Mallwitz, J., 1984. - Cypridopsis lanzarotensis n. sp., ein neuer Ostracode von Lanzarote (Kanarische Inseln) (Crust.: Ostracoda: Podocopida). - Mitt. Hamb. Zool. Mus. Inst., 81: 171-176. Hamburg.

Margalef, R., 1954. - Algunos Crustaceos de agua dulce y salobre de la Romagna (Collección Zangheri). - Bollettino della Società Entomologica Italiana, 84 (9/10): 146-150.

Martens, K., 1984. - Annotated Checklist of Non-Marine Ostracods (Crustacea, Ostracoda) from African Inland Waters. - Musée Royal de l'Afrique Centrale, Tervure-Belgique, Documentation Zoologique, 20: 1-51.

Martens, K. & C. Meisch, 1985. - Description of the male of Potamocypris villosa (Jurine, 1820) (Crustacea, Ostracoda). - Hydrobiologia, 127: 9-15.

Meisch, C. & N.W. Broodbakker, 1990. - On freshwater Ostracoda (Crustacea) collected on the Canary Islands. - Beaufortia, 41 (21): 151-157.

Meisch, C. & N.W. Broodbakker, 1993. - Freshwater Ostracoda (Crustacea) collected by Prof. J.H. Stock on the Canary and Cape Verde Islands. With an annotated checklist of the freshwater Ostracoda of the Azores, Madeira, the Canary, the Selvagens and Cape Verde Islands. - Trav. sci. Mus. nat. hist. nat. Luxembourg, 19: 1-67. Luxembourg.

Meisch, C., B. Malmqvist & A. Nilsson, 1995. - Freshwater Ostracoda (Crustacea) collected in Tenerife, Canary Islands. - Mitteilungen aus dem hamburgischen zoologischen Museum und Institut, 92 (Ergbd.): 281-293.

Petkovski, T., 1964. - Bemerkenswerte Entomostraken aus Jugoslavien. - Acta Musei Macedonici scientiarum naturalium, 9 (7): 147-182.

Petkovski, T., C. Meisch & K. Wouters, 1993. - Taxonomic revision of the freshwater Ostracoda species Cypridopsis lusatica Schäfer, 1943 (Crustacea). - Travaux Scientifiques du Musée National d'Histoire Naturelle de Luxembourg, 19: 49-66.

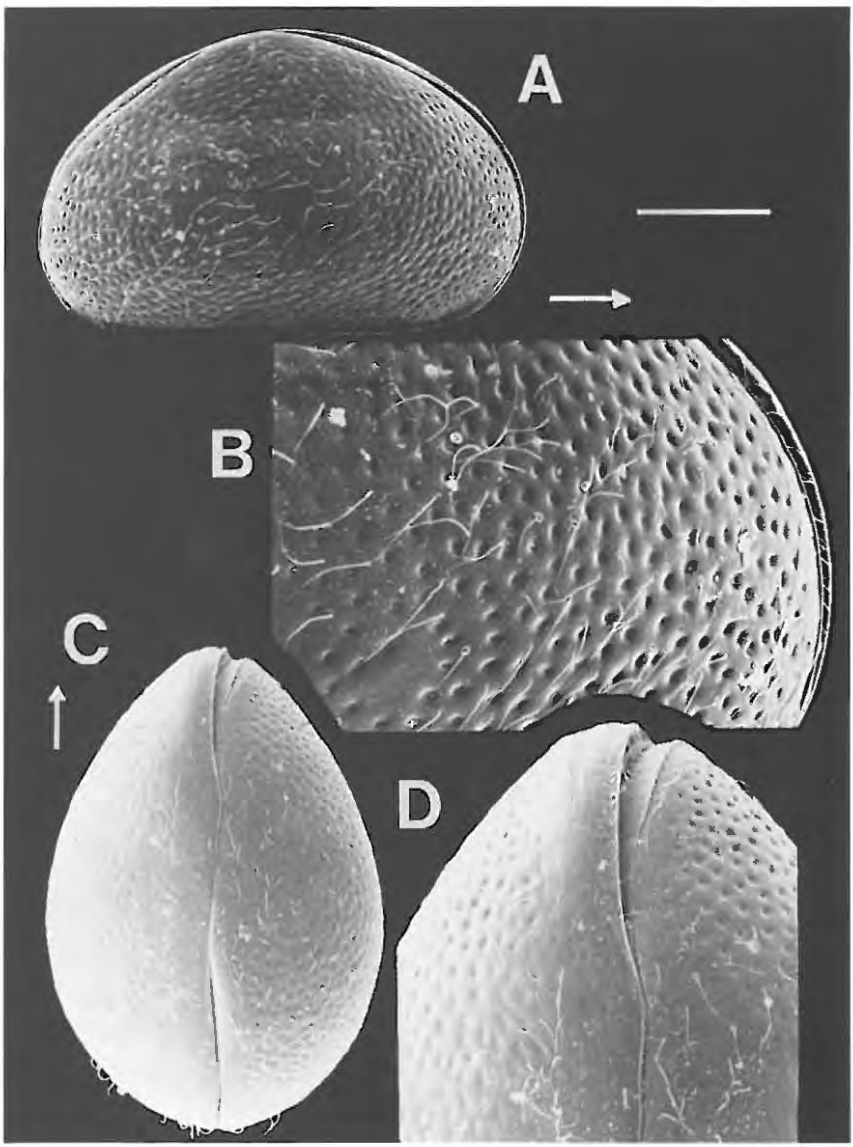


Fig. 1. - *Cypridopsis obesa*, female. La Gomera.
A: carapace in lateral view. B: anterior detail of A. C: carapace in dorsal view. D: anterior detail of C. Scale bar: 0.20 mm for A and C.

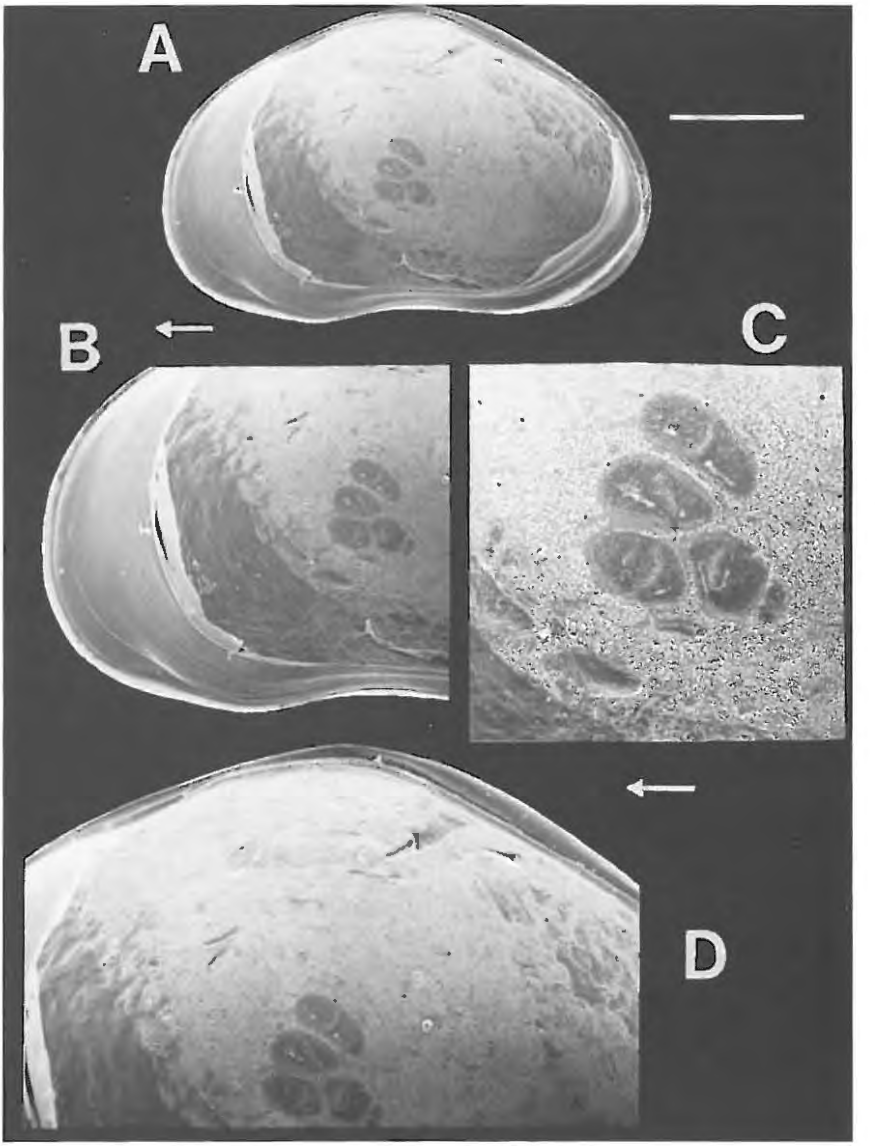


Fig. 2. - *Cypridopsis obesa*, female. La Gomera.
A: right valve, inner view. B: anterior detail of A. C: central muscle scars, detail of B. C: hinge of the right valve, detail of A. Scale bar: 0.20 mm for A.

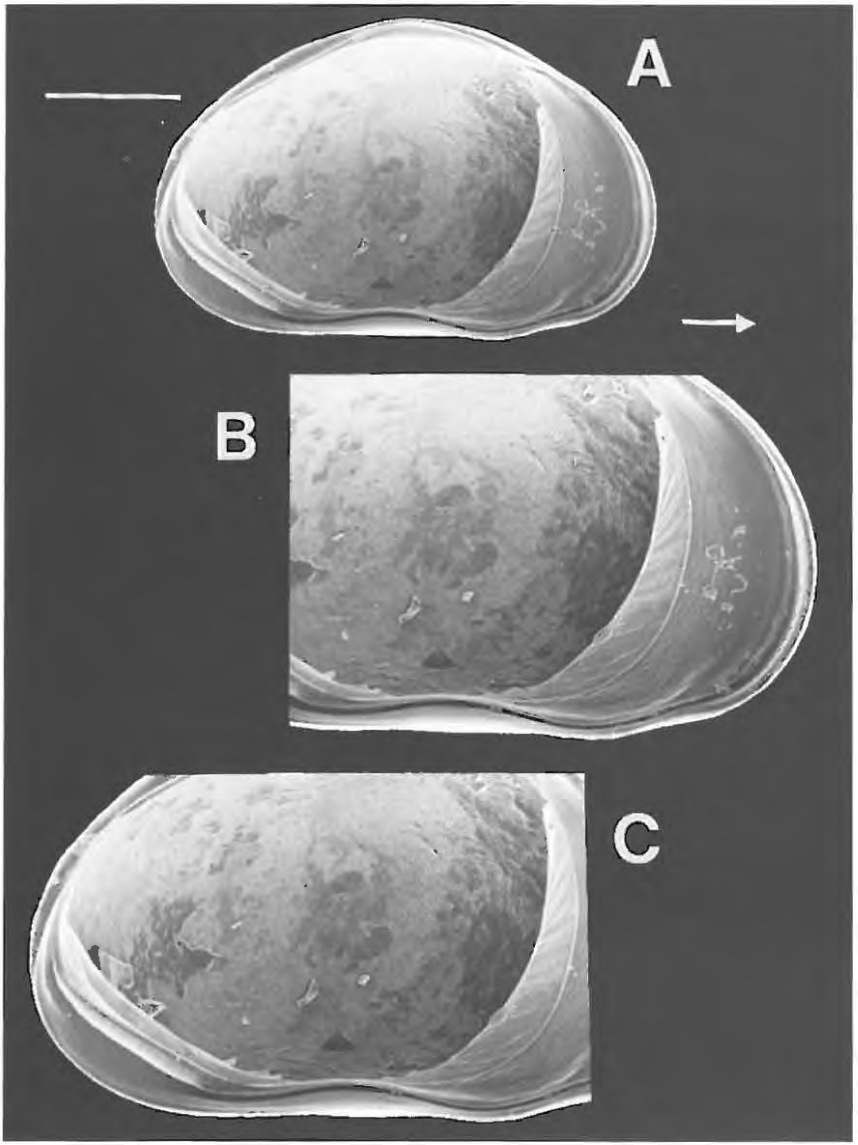


Fig. 3. - *Cypridopsis obesa*, female. La Gomera.
A: left valve, inner view. B: anterior detail of A. C: posterior detail of A. Scale bar: 0.20 mm for A.

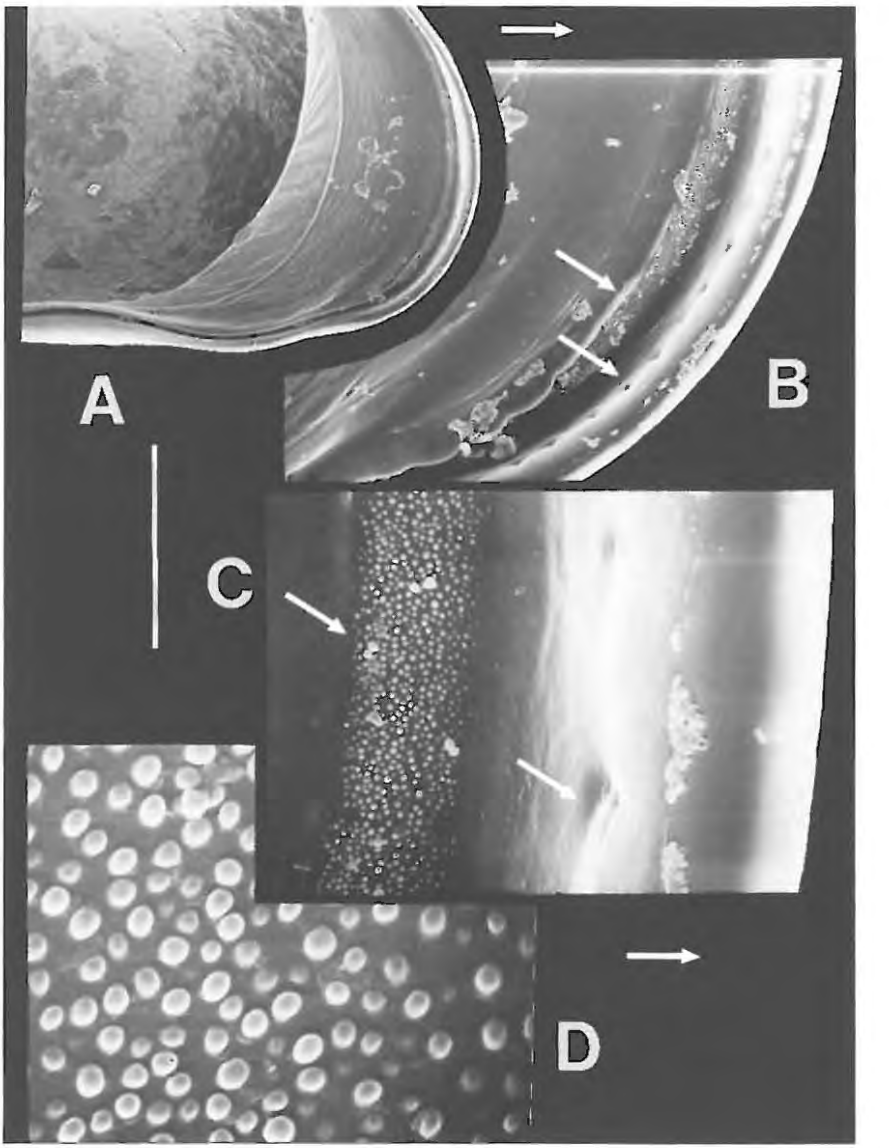
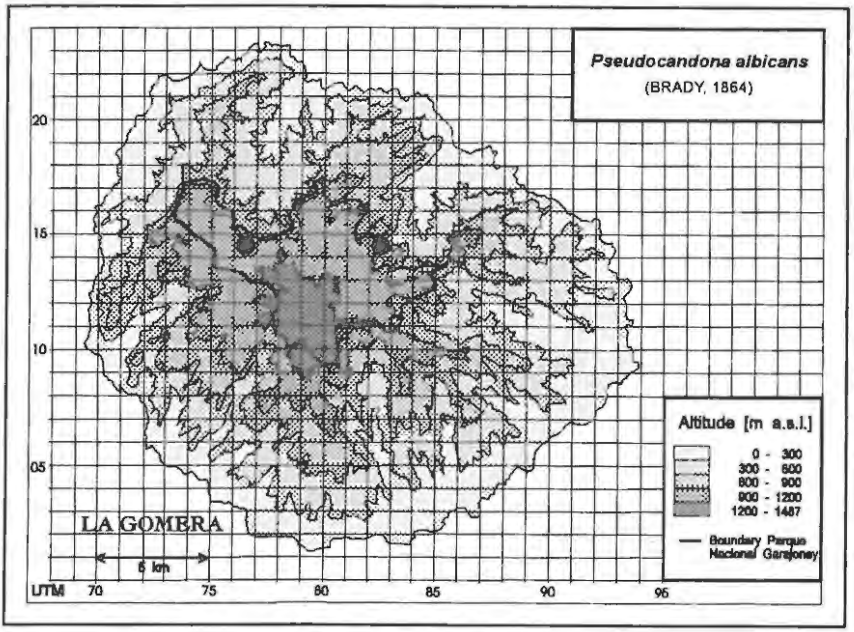
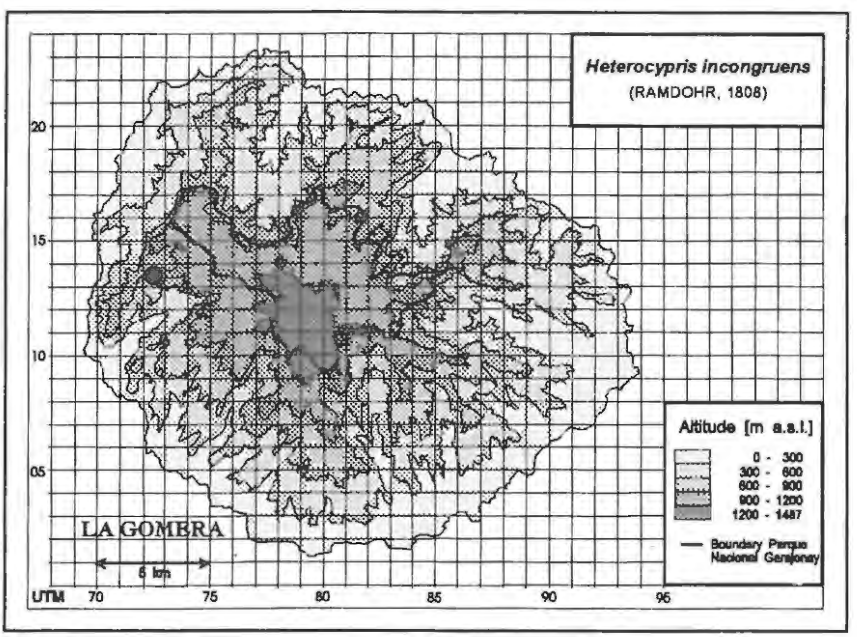
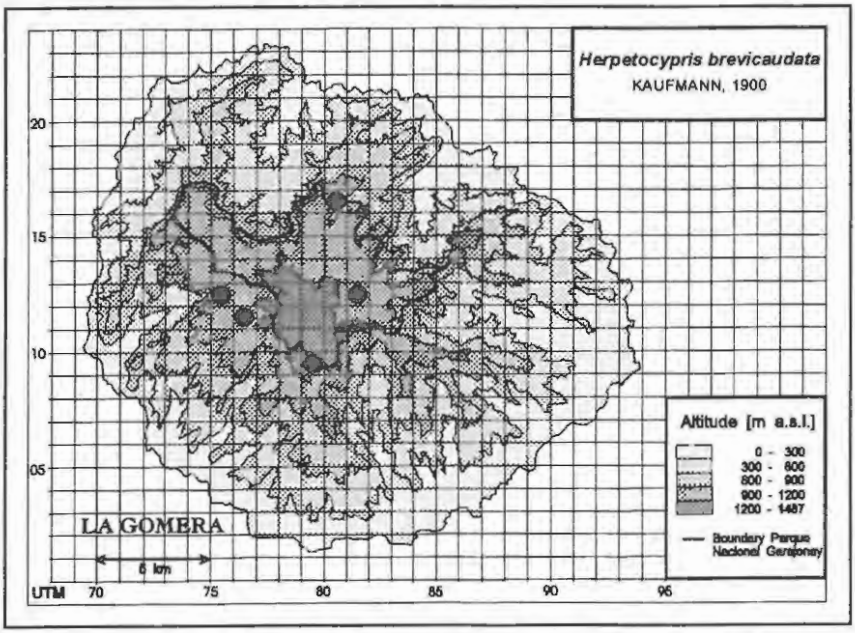
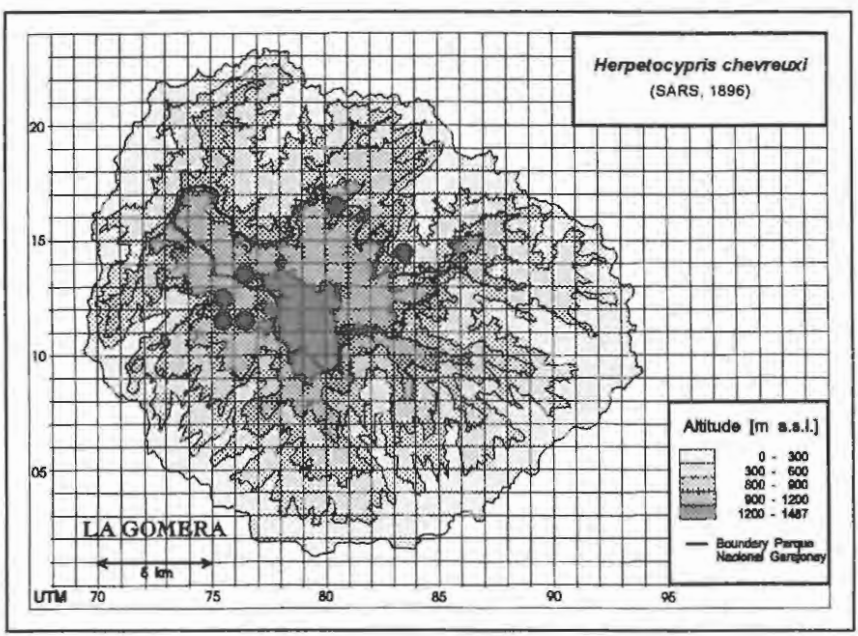


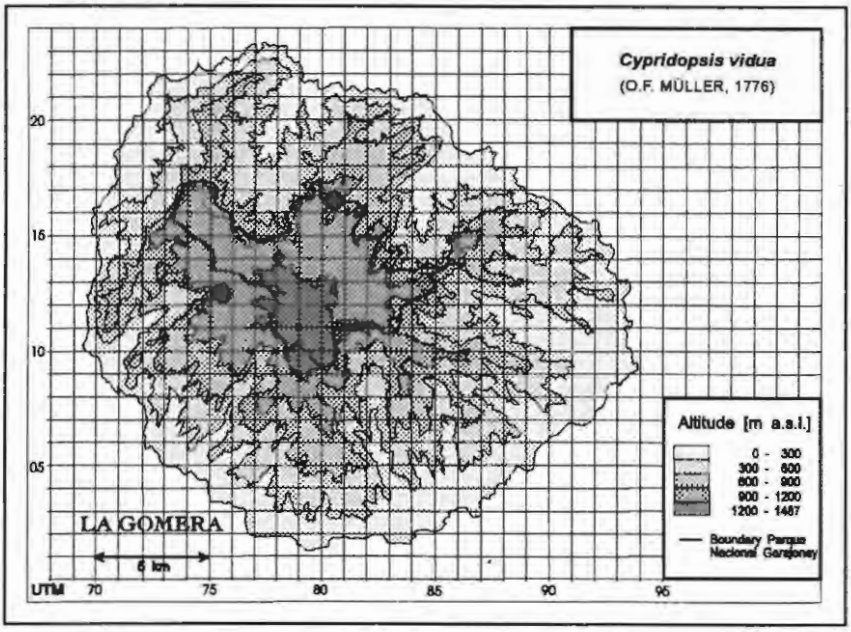
Fig. 4. - *Cypridopsis obesa*, female. La Gomera.
A: LV, anterior marginal zone, inner view. B: detail of A; see the two lists (arrows) and the area between those lists. C: detail of B; see the distal spiniferous list and the area between the two lists. D: detail of C; see the tiny spherical tubercles. Scale bar: 0.20 mm for A.

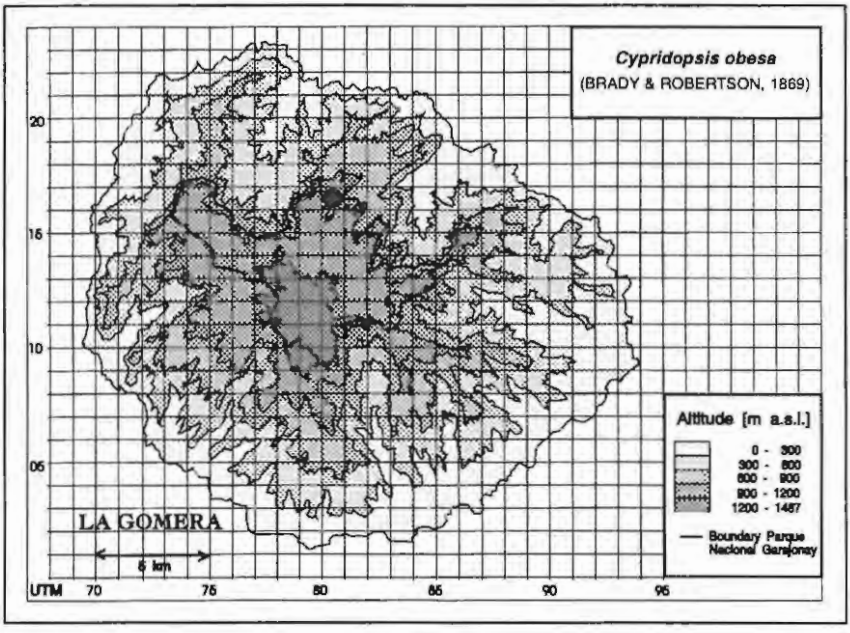

Pseudocandona albicans
(BRADY, 1864)
20
15
10
05
LA GOMERA
5 km
UTM 70 75 80 85 90 95
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay

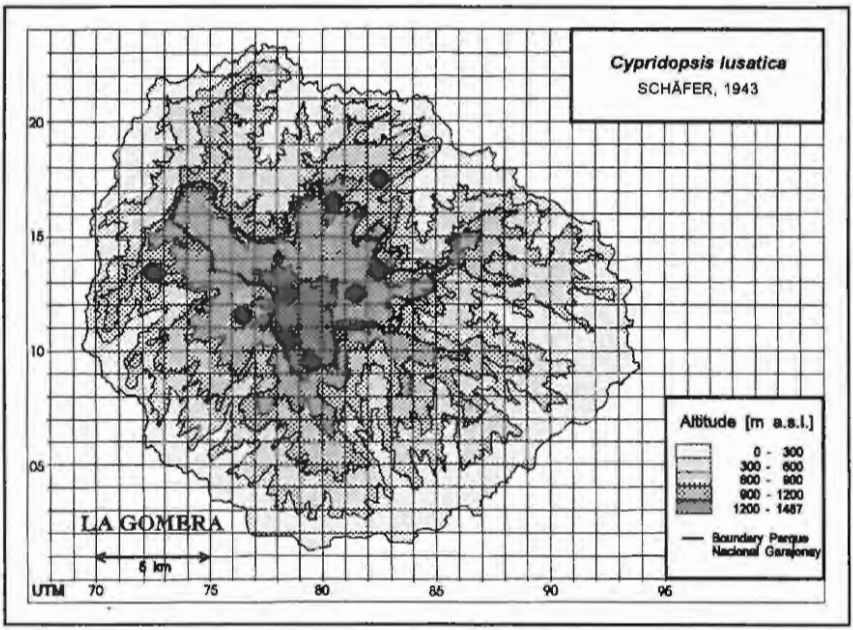

Heterocypris incongruens
(RAMDOHR, 1808)
20
15
10
05
LA GOMERA
5 km
UTM 70 75 80 85 90 95
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay

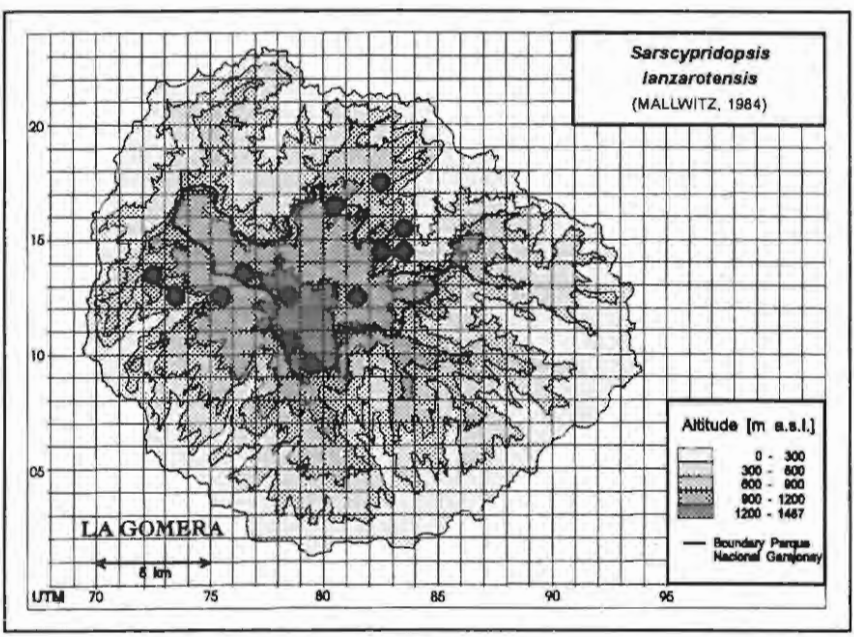

Herpetocypris brevicaudata
KAUFMANN, 1900
20
15
10
05
LA GOMERA
6 km
UTM 70 75 80 85 90 95
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay

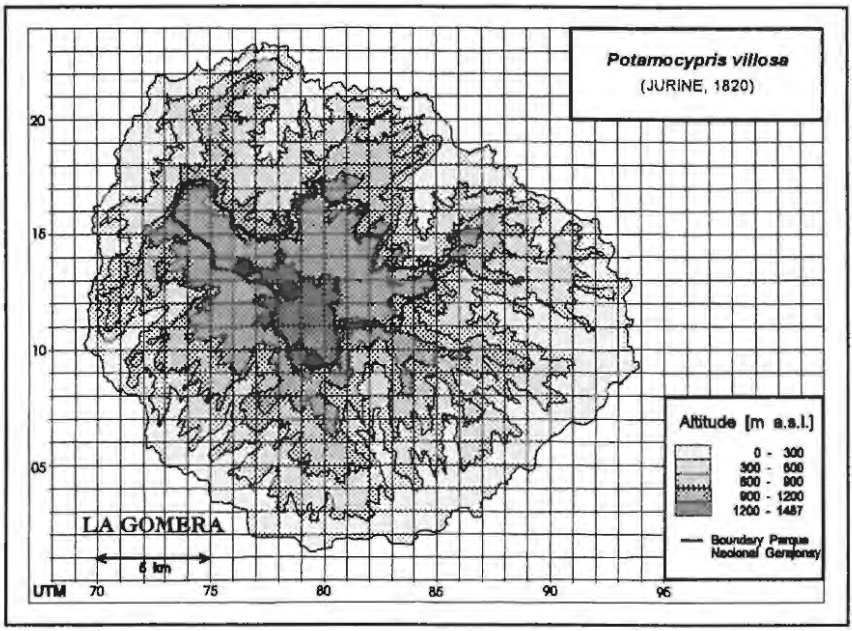

Herpetocypris chevreuxi
(SARS, 1896)
20
15
10
05
LA GOMERA
6 km
UTM 70 75 80 85 90 95
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay


Cypridopsis vidua
(O.F. MÜLLER, 1776)
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay
LA GOMERA
5 km
UTM
70
75
80
85
90
95
20
15
10
05


Cypridopsis obesa
(BRADY & ROBERTSON, 1869)
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay
LA GOMERA
5 km
UTM
70
75
80
85
90
95
20
15
10
05


Cypridopsis lusatica
SCHÄFER, 1943
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay
LA GOMERA
5 km
UTM
70
75
80
85
90
95
20
15
10
05


Sarscypridopsis ilanzarotensis
(MALLWITZ, 1984)
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay
LA GOMERA
5 km
UTM
70
75
80
85
90
95
20
15
10
05


Potamocypris villosa
(JURINE, 1820)
20
15
10
05
LA GOMERA
6 km
UTM
70
75
80
85
90
95
Altitude [m a.s.l.]
0 - 300
300 - 600
600 - 900
900 - 1200
1200 - 1487
Boundary Parque Nacional Garajonay

Trav. sci. Mus. nat. hist. nat. Lux. 23, 1996

Species of the genus *Stenocypris* Sars, 1889 from the rice-fields of Macedonia (Crustacea, Ostracoda)

Trajan PETKOVSKI[1] & Claude MEISCH[2]

Abstract:

The authors provide descriptions of two members of the genus *Stenocypris* (Ostracoda, Podocopida, Cypridoidea, Cyprididae, Herpetocypridinae) occurring in the rice-fields of Macedonia (former Yugoslavia): *Stenocypris bolieki* Ferguson, 1962, and *Stenocypris macedonica* nov. spec. The taxonomy of close relatives of *Stenocypris major* (Baird, 1859), the type species of the genus, is discussed. Three species groups are erected and characterized: (a) the *major*-group, with *Stenocypris major* (Baird, 1859), *Stenocypris major okuboi* n.ssp., and *Stenocypris major sketi* n.ssp.; (b) the *bolieki*-group, with *Stenocypris bolieki* Ferguson, 1952; (c) the *intermedia*-group with *Stenocypris intermedia* Klie, 1932 and *Stenocypris macedonica* nov. spec.

1. Introduction

The genus *Stenocypris* was established by Sars (1889) for animals collected in Australia, which the author identified with *Cypris malcolmsoni* Brady,

[1] Prirodonaucen Muzej na Makedonija, Bulevar Ilinden 86, 91000 Skopje, Macedonia

[2] Musée national d'histoire naturelle de Luxembourg, Marché-aux-Poissons, L-2345 Luxembourg

1886 recorded from Sri Lanka (Ceylon). Consequently Sars (1889) designated *Stenocypris malcolmsoni* as the type species of the genus.

At present, *Stenocypris* Sars, 1889 is a large genus with ca 80 recent nominal species mainly distributed throughout the tropical and subtropical regions (Kempf 1980, and subsequent working copies).

The taxonomy of the genus, however, remains very confused (see for instance McKenzie 1965 and Martens 1984a).

An important first step towards taxonomic clarification was made when Ferguson (1969), after examination of the type specimens, showed that *Cypris cylindrica major* Baird, 1859, described from Nagpur in India, and *Stenocypris malcolmsoni* (Brady, 1886) Sars, 1889 from Sri Lanka are specifically identical.

Cypris cylindrica major, now called *Stenocypris major* (Baird, 1859), is the older synonym and hence has priority. (See Triebel 1953 and Ferguson 1969 for discussion of the rather complicated taxonomy of *Cypris cylindrica cylindrica*, known only from fossil record, and *Cypris cylindrica major*).

In conclusion, we consider *S. major* (Baird, 1859) the valid name of the type species of the genus. However, Kempf (1980) and also Martens & Behen (1995) adopt the younger synonym, i.e. *S. malcolmsoni*, as the name of the type species.

At present the genus *Stenocypris* s.l. comprises several phylogenetical lineages best separated at generic level.

According to Martens (1984a), of all the African species which have been assigned to *Stenocypris*, probably only *Stenocypris major* (Baird, 1859) belongs to *Stenocypris* s.str. Most of the remaining species assigned to *Stenocypris* either belong to *Chrissia* Hartmann, 1958 or *Parastenocypris* Hartmann, 1964. We would like to point out, however, that discussion of the taxonomy of *Stenocypris* and its allied genera lies beyond the scope of the present work.

In this study, we take *S. major*, the type species of the genus, of which we describe two forms coming from Madagascar and Sri Lanka respectively, and the taxa occurring in the rice-fields of Macedonia, as a starting-point.

As a second step, we try to clarify the specific assignments of the animals recorded as *S. major* and *S. malcolmsoni* in the literature. Indeed, quite a lot of records assigned to the type species of the genus obviously do not belong there. We tentatively give a specific assignation to those 'forms', this with the help of both the information provided in the literature, and the material at our disposal. We will first assign each 'form' to a species-group, then a diagnosis of each species-group will be given, and, finally, the two species found in Macedonia will be described in detail.

A first group of species, here called the *major*-group, comprises *S. major*, the type species of the genus, and its closest relatives. The species of this group are characterized by (a) the relatively short radial septa in the anterodorsal marginal zone, i.e. the zone in front of the eye, of both valves; (b) the relatively large carapace size, which exceeds 2.00 mm in most species; and (c) the markedly sinuate (not roundly arched) inner margin at the posterior end of the carapace.

So far, *S. major* is known with certainty only from the records of Baird (1859) and Brady (1886) from India and Sri Lanka (Ceylon), respectively. Most probably the animals recorded under *S. major* by Daday (1898) from Sri Lanka do belong here. At least part of the animals recorded under *S. malcolmsoni* by Lowndes (1930) from the New Hebrides apparently also belong to *S. major*. The species recorded from India as *S. major* by Victor & Fernando (1979) has a posterior inner margin which differs from that described above, and therefore those animals probably do not belong to *S. major*.

S. distincta Victor & Fernando, 1978, described from southern India, does not belong to the *major*-group: the carapace is relatively large (L=2.84-3.20 mm); the zone of marginal septa is conspicuously broad, the inner posterior margin is 'normal' (roundly arched, not sinuate), and the teeth bristles (Zahnborsten) of the 3rd masticatory process of the maxillula are heavily barbed.

The specific assignment of the animals recorded as *S. major* by Okubo (1975) from Japan appears problematic. The Japanese specimens are smaller and the posterior inner margin of the valves is only slightly sinuate. Okubo (1975) ranks with *S. major* the animals recorded (a) by Lowndes (1930; part. p. 973, pl. 1) from the New Hebrides; (b) by Furtos (1936) from Yucatan in

Mexico; and (c) by Tressler (1959) from North America.

We agree with Okubo (1975) when he considers the specific assignment of all the remaining records of *S. major* as dubious: the records of (a) Sars (1889) from Queensland, Australia; (b) Vávra (1897) from eastern Africa (Deutsch-Ostafrika); (c) Lowndes (1930 part. p. 973, pl. 1, figs 1,5,6) from Austria; (d) Puscariu (1951) from Roumania; (d) Triebel (1953) from El Salvador; and (e) Fox (1965) from northern Italy.

In our opinion, Okubo's specimens recorded under *S. major* from both America and (with a question mark) from Japan, actually belong to the next species-group.

Our material from Madagascar and Sri Lanka comprises two forms which undoubtedly belong to the *major*-group. They are described as *S. major okuboi* n. ssp. and *S. major sketi* n. ssp. below.

The second group of species within the *major*-complex comprises a number of species which have (a) a wide zone of radial septa, which is characteristically broadened both in front of the eye and in the mouth area; (b) a 'normal' (not sinuate) posterior inner margin; and (c) a medially sized carapace (ca 1.48-2.00 mm). This group might be called the *bolieki*-group.

We rank the following forms within this group: (a) the animals recorded under *S. malcolmsoni* by Sars (1889) from Australia; (b) the form from Japan designated by Okubo (1975) as being an atypical *S. major*; (c) the form described by Klie (1933 and 1939a) from Northeast Brasil and the Isle of Bonaire; (d) the form described by Tressler (1959) from a number of Pacific Islands (from Hawai and the Phillipines to Celebes and Bali). Finally, *S. bolieki* Ferguson, 1962, described from Florida, undoubtedly belongs to this group of species.

According to Ferguson (1962), *S. bolieki* differs from *S. malcolmsoni* sensu Furtos (1936) and Tressler (1959) in the greater length of the furcal rami and the slightly smaller size (1.70-1.77 mm, versus ca 2.00 mm). However, we would like to point out that the apparent length of the furcal rami varies with the position of the furca under the microscope. Moreover, the anterior and posterior margins differ in length; Ferguson (1962) fails to mention which margin has been checked. Furthermore, the size of the animal depends

markedly on the ecological conditions of the habitat. We would like to conclude that the animals recorded under *S. malcolmsoni* from North-America by both Furtos (1936) and Tressler (1959) actually belong to *S. bolieki*.

In our opinion, most of the 'forms' belonging to the *bolieki*-group, belong to *S. bolieki*: (a) the form from Japan, designated by Okubo (1975) as being an atypical *S. major*; (b) the form described by Klie (1933 and 1939a) from the Northeast of Brasil and the Isle of Bonaire; (c) the form described by Tressler (1959) from a number of Pacific Islands (Hawai, the Phillipines, Celebes, Bali and others).

S. orientalis Victor & Fernando, 1981, described from the Philippines and western Malaysia, stands somewhat apart taxonomically. The valves of this species bear a net-like surface sculpture, a character which is not found in any of the related species. Therefore, we do not consider *S. orientalis* to be closely allied to *S. bolieki*.

In the rice-fields of Macedonia, one of us (T.P.) collected animals in which the taxonomic characters are in good agreement with *S. bolieki*. A description of these specimens is given below.

A third group of species, which might be called the *intermedia*-group, is characterized by (a) a relatively small size, ca 1.23-1.50 mm; (b) a very broad zone of radial septa on both valves (the zone is even broader than in the species of the *bolieki*-group). One form belonging to this group was described as *S. malcolmsoni* by Klie (1932) from the Sunda Islands; because of the reduced A2-natatory setae, the author established a separate subspecies, i.e. *S. malcolmsoni intermedia*, for those specimens. A similar form was recorded by Ghetti (1978) from rice-fields in Turkey; the author ranked his specimens within a new subspecies, i.e. *S. malcolmsoni* ssp *lata*. However, Ghetti (1978) erroneously interchanged the diagnostic features of *S. malcolmsoni malcolmsoni* and *S. malcolmsoni intermedia*: this explains why he established a new subspecies.

We consider Klie's (1932) specimens to belong to a separate species, and we therefore raise the subspecies *intermedia* to specific rank: *Stenocypris intermedia* Klie, 1932.

The Klie Collection deposited in the Zoological Institute and Museum of the University of Hamburg contains specimens from tbe isle of Bonaire, which, after examination by one of us (T.P.), clearly appeared to belong to *S. intermedia*. Both the date of collection and the locality are unknown. A description of these specimens is given below. It should be noticed that in his work on the Ostracoda of Bonaire, Klie (1933) only mentions finding a species similar to *S. bolieki*.

Recently, Victor & Fernando (1981) described a small *Stenocypris*-species from the environs of Kuala Lumpur in Malaysia: *Stenocypris malayica* Victor & Fernando, 1981. Despite its small size, this species obviously does not belong within the *intermedia*-group: its radial septa are conspicuously short. *S. malayica* also differs in the very long terminal claw of the cleaning limb. Both characters even prevent the species from being ranked within one of the two other species groups considered above.

The rice-fields of Macedonia harbour an hitherto unknown species of the *intermedia*-group, which we call *Stenocypris macedonica* n.sp. The new species differs from *S. intermedia* in well-developed A2-natatory setae and also its carapace shape in dorsal view. Our material also contains a sample of *S. macedonica* n.sp. collected in Sri Lanka. The latter animals differ slightly in carapace shape from those found in Macedonia. Both forms are described below.

Abbreviations used in text and figures: RV, right valve. LV, left valve; L, length; H, maximum height of carapace; B, width of carapace in dorsal view; spm(s), specimen(s).

Classification (after Maddocks 1982 as rearranged for the Podocopida by Martens 1992):

Phylum or subphylum CRUSTACEA Pennant, 1777

Class OSTRACODA Latreille, 1806

Order PODOCOPIDA Sars, 1866

Infraorder CYPRIDOCOPINA Jones, 1901

Superfamily CYPRIDOIDEA Baird, 1845

Family CYPRIDIDAE Baird, 1845

Subfamily HERPETOCYPRIDINAE Kaufmann, 1900

Genus STENOCYPRIS Sars, 1889

2. Descriptions

Stenocypris major (Baird, 1859) ssp. *okuboi* n.ssp.

(Fig. 1)

1930 *Stenocypris malcolmsoni* - Lowndes: 973; pl. 1: 2-4. (New Hebrides).

1975 *Stenocypris major* - Okubo: 1; pl. 1 A-N. (Japan).

Material examined

Several ovigerous females collected in Madagascar, and lodged in the Klie Collection of the Zoological Institute and Museum of the University of Hamburg, Germany. Date and locality unknown.

Description

The type material and other material of the typical form of the species (*S. major major)* came from Nagpur in India and Sri Lanka (Ferguson 1969: 73;

fig. 3 and Daday 1898: 70, fig. 34). The posterior inner margin of the valves of those animals is conspicuously sinuate.

Victor & Fernando (1979: 194, figs 196-204) report on a slightly different form collected in various regions in India. Specimens (see the illustrations) have a very weakly sinuate (almost evenly rounded) posterior inner margin. Okubo (1975) reports a rounded posterior inner margin on his specimens of *S. major* from rice-fields in Japan. The same is true for specimens from the New Hebrides examined by Lowndes (1930).

The specimens from Madagascar are similar to those recorded by Okubo (1975) from Japan. We rank these animals in a separate and new subspecies, which we dedicate to Ichiro Okubo, who first described this form. We expect the new subspecies to be widely distributed in freshwater habitats from Madagascar to Australia and Japan.

Size of the specimens examined (Madagascar): ca 2.00 mm; max. H of LV ca 0.77 mm. Zone of radial septa relatively broad, anterodorsally only slightly broadened; this feature best characterizes the species of the *major*-group (fig. 1A). Inner posterior margin almost evenly rounded (not distinctly sinuate). Teeth bristles of the 3rd masticatory process of the maxillula distinctly barbed.

The two furcal rami are conspicuously asymmetrical. Right ramus lamelliform, relatively strongly curved, the length of the anterior margin more than 12x exceeding the width of the ramus (fig. 1B); length ratios of the anterior margin of the ramus, the anterior distal seta, the anterior and the posterior terminal claws: 180:62:88:48; anterior terminal claw usually with 14 (6+8) strong and blunt denticles; posterior terminal claw with ca 12 (6+6) slightly more pointed denticles; posterior margin of the left ramus with up to 48 denticles and spinules, usually grouped into three rows, and increasing in size from the base towards the distal end of the ramus.

Left furcal ramus (fig. 1C) almost straight, proximally very weakly curved, more than 13x as long as broad at the distal end. Length ratios (see above): 178:72:87:48; anterior terminal claw with ca 16, posterior terminal claw with ca 15 denticles similar to those of the right ramus; distal quarter of the posterior margin of the ramus with tiny spinules.

Stenocypris major (Baird, 1859) ssp. *sketi* n. ssp.

(Fig. 2)

1977 *Stenocypris major* - Neale: 273; pl. 1,1; fig. 7. (Sri Lanka).

Material examined

Several adult females from Sri Lanka, collected together with *Hemicypris* cf. *bairdi* Martens & Wouters, 1985 and *Cypridopsis* spec. in October 1980; leg. Boris Sket. Type locality: a well on the peninsula Jaffna, Sri Lanka. The species is dedicated to Prof Dr Boris Sket of the University of Ljubljana.

Diagnosis

Valves as in *S. major major* with a relatively broad zone of radial septa; the septal zone is not broadened in the eye region (fig. 2 A,C). Inner margin posteriorly weakly sinuate. The anterodorsal expansion of both valves is the most characteristic feature of this form. This character is not found in any of the related forms.

Description

Carapace ellipsoid, conspicuously elongate in lateral view, with greatest H approximatively at mid-length. LV ca 1.88-1.95 mm long with greatest H = 0.75-0.78 mm (fig. 2A). RV up to 1.91 mm in length, with H = 0.75 mm (fig. 2C). Both valves bear a characteristic expansion situated at the transition of the dorsal to the posterior margin. The expansion is best seen in oblique dorsal view (fig. 2A). Antennula (A1) with long natatory setae, exceeding the tip of the A1 by 2.5 x the length of the 5 combined distal A1-segments. Natatory setae of the antenna (A2) slightly exceeding the tips of the terminal claws. Teeth bristles (Zahnborsten) of the 3rd masticatory process of the maxillula smooth at medium magnification, but appearing very weakly barbed at high magnification. Walking leg: terminal claw very long, length slightly exceeding the 3 distal segments combined. Cleaning limb: terminal claw smooth and relatively short, shorter than 1/3 of the length of the penultimate segment.

Anterior margin of the furcal rami 11-12 x as long as distally broad. Right ramus (fig. 2D) lamelliform, only slightly curved; length ratios of the anterior margin, the terminal seta, the anterior and the posterior terminal claws: 175:67:83:50; each terminal claw with 13 denticles; posterior margin with ca 46-53 denticles and spinules arranged in 3-4 rows.

Length ratios of the left furcal ramus (fig. 2E): 168:70:78:48; anterior claw with 12, posterior claw with 11 denticles; posterior margin with a few small and some other still smaller denticles in the distal quarter.

Taxonomic remarks

Our specimens from Sri Lanka differ from all other infraspecific forms of *S. major* in the presence of a posterodorsal expansion on both valves. The specimens recorded under *S. major* from Sri Lanka by Neale (1977; see pl. 1,1) also have this expansion. Unlike the animals of the nominal form (*S. major major)* from India and Sri Lanka, those of the ssp *sketi* have a posterior inner margin that is only very weakly sinuate. Remember that in the representatives of the ssp *okuboi* from Japan, the New Hebrides and Madagascar the posterior inner margin is almost 'normal', i.e. evenly rounded.

The presence of *S. major sketi* in our material and that of Neale (1977), tends to show that this form is widely distributed in Sri Lanka. We shall not be surprised if this form, due to passive transport, will be found later in other areas of the tropical and subtropical zones.

Stenocypris bolieki Ferguson, 1962

(Figs 3 and 4)

1889 *Stenocypris malcolmsoni* - Sars: 28; pl. 1: 7-8; pl. 5: 1-4. (Australia, Queensland).

1897 *? Stenocypris malcolmsoni* - Vávra: 14; fig. 4: 1-5. (Eastern Africa, Deutsch-Ostafrika).

1936 *Stenocypris malcolmsoni* - Furtos: 100; figs 76-80 (Mexico, Yucatan).

1953 *Stenocypris major* - Triebel: 9; pl. 9: 1-6; pl. 2: 7-14. (El Salvador).

1959 *Stenocypris malcolmsoni* - Tressler: 715; figs 28.147a-c. (Mexico, Yucatan, and Trinidad).

1962 *Stenocypris bolieki* Ferguson: 65; figs 1-4. (USA, Florida).

Material examined

(1) A great number of females collected in the rice-fields of the valleys of the rivers Bregalnica, Anska, Topolka, Babuna and Luda Mara in Macedonia. All those rivers are tributaries of the Vardar, the main river of Macedonia. The Vardar flows into the Aegean Sea in the environs of Thessaloniki in Greece.

(2) Several females of the Klie Collection at the Zoological Institute and Museum in Hamburg.

In the Macedonian rice-fields mature females can be found from early June to mid-September (irrigation is stopped in September). A number of other exotic ostracods, such as *Stenocypris macedonica* n.sp. (see below), *Dolerocypris sinensis, Tanycypris pellucida, Cypretta seurati, Cypretta murati* and *Potamocypris producta* are regularly found in those localities. *Strandesia spinulosa, Cypris subglobosa, Hemicypris monstriata, Hemicypris anomala, Herpetocypris virudulus* and *Cypridopsis dubia* are recorded less frequently.

Description

Carapace laterally strongly compressed (dorsal view), with greatest B equalling about 1/3 L, and situated at about mid-length; the LV slightly overlaps the LV at both ends. Carapace usually pale green. Valves semi-translucent, the inner organs showing through the valves. Valves surface smooth, with scattered pores and numerous tiny spots. Valves setae dense at the anterior end; the seta are very sparse but longer and thicker at the posterior end.

Left valve (fig. 3A) elongate, subreniform in lateral view, with greatest H markedly smaller than 1/2 L and situated in the posterior 1/3 of L. Dorsal margin almost straight and parallel to the ventral margin; the latter weakly concave in front of the eye region. Anterior end broadly, posterior end more narrowly rounded. Ventral margin with a well developed concavity in front of mid-length. Free margin of the valve with a broad zone of radial septa; the

zone is broadened both in the anterodorsal area and in front of the mouth area. Anterior duplicature very broad (inner margin markedly displaced inwards), inner margin ventrally and posteriorly running close to the valve margin; posterior inner margin evenly rounded (not sinuate).

Right valve (fig. 3B) similar in shape and structure to the left valve.

Natatory setae of the antennula (A1) well developed, exceeding the A1-tip by more than 2.5 x the length of the 5 combined distal A1-segments. Second segment 2x as long as broad; all 4 distal segments about equally long, their length equalling about the width of the basal segment. Natatory setae of the antenna (A2) well developed, extending to the tips of the terminal claws. The longest terminal claw of the penultimate segment is shorter than the corresponding segment. The long claw (GM) of the terminal segment reaches the tip of the longest claw of the penultimate segment. Mandibular palp: alpha-seta long and smooth; beta-seta slightly reduced, spindle-shaped and densely barbed; gamma-seta thick and brush-shaped. Maxillular palp: terminal segment cylindrical; teeth bristles of the 3rd masticatory process very delicately barbed. Maxilliped: branchial plate with 5 long and one reduced branchial filaments. Walking leg with a strong terminal claw, the length of which slightly exceeds that of the 3 combined distal segments. Cleaning limb with a bent terminal claw, which equals only 1/3 of the length of the penultimate segment.

Furcal rami conspicuously asymmetrical. Posterior margin of both rami bearing tiny spinules.

Right furcal ramus lamelliform, weakly curved; anterior margin 11-12x as long as broad at the base of the posterior terminal claw. Length ratios of the anterior marginal, the terminal seta, the anterior and posterior terminal claws: 152:50:62:32 (figs 3C, 4A). Anterior (= long) terminal claw weakly curved, bearing ca 16-18 strong and pointed denticles, of which the most proximal ones and also one in the middle are reduced. Posterior (= small) terminal claw strongly curved (this is a very characteristic feature of this species), with 12-14 denticles which are stronger and more pointed than those of the neighbouring, anterior claw. Distal half of the posterior margin of the ramus usually with 2-3 rows of 30-50 denticles and spinules, the size of which increases towards the distal end. Examples of the numbers of denticles, from the distal towards the proximal end, in 5 specimens: 13+10+15; 17+7+18;

19+11+13; 28+28; 28+11+19.

Left furcal ramus (figs 3D, 4B) rod-shaped, somewhat longer and more slender than the right ramus. Anterior margin slightly more than 13x as long as broad at the distal (but not yet narrowed) end. Length ratios (see above): 160:62:63:30. Anterior claw weakly curved, usually with 17-18, posterior claw with ca 11-14 denticles. Distal third of the posterior margin of the ramus with a row of tiny spinules, which only rarely appear to be arranged in rows.

The carapace size shows both an intra- and interpopulational variability. Examples:

(a) Cesinovo, rice-fields of River Bregalnica; 4 spms, leg. T. Petkovski, 09.09.1964.

LV: L = 1.68-1.69 mm; H = 0.66-0.67 mm.
RV: L = 1.63-1.65 mm; H = 0.63-0.65 mm.

(b) Martolci, rice-fields of River Babuna; 3 spms, leg. T. Petkovski, June 1991.

LV: L = 1.85-1.88 mm; H = 0.74-0.75 mm.
RV: L = 1.81-1.84 mm; H = 0.72-0.73 mm.

(c) Orizari, rice-fields of River Topolka; 6 spms, leg. T. Petkovski, 17.8.1950.

LV: L = 1.64-1.80 mm; H = 0.65-0.72 mm.

The Klie Collection at the Zoological Institute in Hamburg contains a number of *Stenocypris*-specimens from Brasil, the taxonomic characters of which are in good agreement with *S. bolieki* (fig. 4C). However, Klie's animals from Brasil are smaller: LV, L = 1.54 mm; H = 0.63 mm. We believe small size to be related to local or regional ecological conditions.

Right furcal ramus (fig. 4E) more than 11 x as long as broad; length ratios: 140:56:63:38. Anterior terminal claw with 7+7 denticles. Posterior margin of the ramus with 2 rows of spinules; proximal row with 9-14, distal row with 13-19 spinules. Left furcal ramus (fig. 4D) more than 12 x as long as broad;

length ratios: 136:70:65:35. Anterior terminal claw with 10+8, posterior claw with 6+6 denticles. Distal quarter of the posterior margin of the ramus with tiny spinules, which do not appear arranged in groups. Proximal part of the posterior margin also with a row of tiny spinules.

We would like to conclude that the occurrence of *S. bolieki* in North- and Central America, Brasil, Australia, and Macedonia is confirmed by the present study. Possibly the animals recorded under *S. major* from rice-fields in northern Italy (Fox 1965; Moroni 1967; Ghetti 1981), Roumania (Pescariu 1951; Danielopol 1965) and Uzbekistan (Muhamediev 1960) also belong to *S. bolieki*. However, the descriptions and illustrations provided by those authors do not allow us to confirm this hypothesis. The same is true for the animals recorded under *S. malcolmsoni* by Klie (1933) from the Isle of Bonaire (L = 1.95 mm; H = 0.75 mm; B = 0.54 mm), and later (Klie 1939) from northeast Brasil (L = 1.7 mm; H = 0.65 mm).

The specific assignment of *S. malcolmsoni* reported by Vávra (1897) from eastern Africa (Deutsch-Ostafrika) remains problematic. In this form, the greatest width is not situated at mid-length but distinctly behind the mid-length of the carapace. This feature is not found in S. *bolieki*.

Stenocypris macedonica n. sp.

(Figs 5 and 6)

Material examined

A great number of females collected in the rice-fields of the Rivers Bregalnica, Anska, Topolka, Babuna and Luda Mara, where the species coexists with *S. bolieki* (see above). Leg. T. Petkovski, June 1991.

Type locality: Rice-fields of River Babuna in the environs of the village Martolci.

Derivation of name: after Macedonia, the country from where the species is described.

Diagnosis

A relatively small species of the genus *Stenocypris*. Carapace elongate, laterally compressed in dorsal view; anterior end relatively sharply pointed, posterior end more roundly pointed; greatest width situated within the posterior 1/3 of L. Free margin of both valves with a wide zone of radial septa; this zone broader in front of the eye and in the mouth area. Natatory setae of the antenna well developed. Posterior terminal claw of the furcal rami only slightly curved. Terminal seta of the left furcal ramus markedly longer than the anterior (=long) terminal claw. Colour dark green.

Description

Left valve (fig. 5A) elongate, reniform in lateral view; dorsal margin straight and almost parallel to the ventral margin; anterior end broadly, posterior end more narrowly rounded; greatest H situated in the distal 1/3 of L, equalling ca 42% of L. Marginal zone of radial septa very broad, still broader both in front the eye and mouth areas. Ventral margin weakly concave. Anterior duplicature very broad, posterior duplicature narrow (inner margin posteriorly running close to the valve margin).

Right valve similar to the left, except for the anterior slope of the dorsal margin (see fig. 5B).

Natatory setae of the antennula (A1) well developed, exceeding the tip of A1 by 2x the length of the 5 combined distal A1-segments. Length ratios of the 5 distal A1-segments, from the proximal to the distal end: 38:16:14:15:15. The most proximal segment of those 5 segments is 2.5x as long as broad. Natatory setae of the antenna (A2) well developed, extending to the tips of the terminal claws. Penultimate A2-segment 1.5 x the length of the longest terminal claw. Sensory setae of the mandibular palp similar to those of *S. bolieki*. Maxillula: terminal segment of the palp at least 2x as long as broad; teeth bristles of the 3rd masticatory process only delicately barbed. Branchial plate of the maxilliped with 5 well developed and one reduced filament. Walking with a strong termminal claw, which slightly exceeds in length the 3 combined distal segments. Cleaning limb: terminal claw short, delicately striated, only ca 1/4 as long as the penultimate segment.

Furcal rami conspicuously asymmetrical. Right ramus (figs 5C, 6A) broad,

with 3-4 rows of spinules; each row with 10-12 spinules.

At present, we tend to consider the specimens from Sri Lanka to be a local form of *S. macedonica*. Further findings will certainly allow to clarify the relationship between the two forms.

Stenocypris intermedia Klie, 1932

(Fig. 7)

1932 *Stenocypris malcolmsoni intermedia* s.ssp. Klie: 477. (Sunda Islands).

1978 *Stenocypris malcolmsoni lata* s.ssp. Ghetti: 130; tahles 6-7. (Northern Turkey).

Material examined

Several sexually mature females from the Klie Collection in Hamburg, collected on the Isle of Bonaire in the Caribbean Sea. Date and locality unknown.

Description

Greatest width of the carapace situated at mid-length, equalling ca 37% of the length. LV, L = 1.35 mm, H= 0.59 mm. RV, L = 1.31 mm, H = 0.57 mm (fig. 7A). Zone of marginal septa very broad, similar to that of *S. macedonica*, most broad in front of the eye and in the mouth area. LV with about 85, RV with about 84 septa.

Both the shape of the valves and the structure of the appendages are almost identical with those of *S. macedonica*, with the exception of the natatory setae of the second antenna. In *S. intermedia* the longest of the 5 setae extends to the distal end of the penultimate segment; the 4 remaining natatory setae are distinctly shorter: the neighbouring sensory (= 6th) seta scarcely reaches to the middle of the penultimate segment.

Right furcal ramus (fig. 7B) ca 13x as long as broad, proximally slightly curved. Length ratios of the anterior margin and the terminal seta and claws:

130:57:56:35. Anterior claw with 8+6, posterior claw with 7+5 denticles. Posterior margin distally with 2-3 rows of denticles and spinules (10+11+3).

Left furcal ramus (fig. 7C) more slender, more than 13x as long as broad. Length ratios: 136:60:58:38. Anterior claw with 9+7, posterior claw with 7+6 denticles. Distal third of the posterior margin with 3 indistinct rows of small denticles.

In conclusion, *S. intermedia* differs from *S. macedonica* in (a) the relative position of the greatest width of the carapace in dorsal view, and (b) the length of both the 5 A2-natatory setae. The known distribution of *S. intermedia* extends from the West Indies (Isle of Bonaire) to Turkey and the Sunda Islands.

3. Acknowledgments

We thank Prof Dr Boris Sket of the University of Ljubljana who kindly forwarded the ostracods he collected in Sri Lanka.

4. References

Baird, W., 1959. - Description of some new Recent Entomostraca from Nagpur, collected by the Rev. S. Hislop. - Proceedings of the Zoological Society of London, 27: 231-234, table 63.

Brady, G.S., 1886. - Notes on Entomostraca collected by Mr. A. Haly in Ceylon. - Journal of the Linnean Society of London, Zoology, 19: 293-317, tables 38-40.

Daday, E.v., 1898. - Mikroskopische Süsswasserthiere aus Ceylon. - Termeszetrajzi Füzetek, 21 (Anhangsheft): 1-123. (Ostracoda: 69-85, figs 34-40).

Ferguson, E., 1962. - Stenocypris bolieki, a new Freshwater Ostracod from Florida and a new record of distribution of the genus. - American Midland Naturalist, 67 (1): 65-67.

Ferguson, E., 1969. - The type species of the genus Stenocypris Sars, 1889 with description of two new species. - In: J.W. Neale (editor), The Taxonomy, Morphology and Zoology of Recent Ostracoda, 67-75.

Fox, H.M., 1965. - Ostracod Crustacea from rice fields in Italy. - Memorie dell'Istituto Italiano di Idrobiologia, 18: 205-214.

Furtos, N.C., 1936. - On the Ostracoda from the Cenotes of Yukatan and vicinity. - Publications of the Carnegie Institution of Washington 457: 89-115.

Ghetti, P.F., 1972. - L'ostracodofauna di alcune risaie turche e persiane. - L'Ateneo Parmense, sezione 2: Acta Naturalia, nuova serie, 8 (suppl. 1): 117-147.

Ghetti, P.F. & K.G. McKenzie, 1981. - Ostracodi. - Guide per il riconoscimento delle specie animali delle acque interne italiane. (Coordinatore: S. Rufo), 11: 1-83.

Kempf, E.K., 1980. - Index and bibliography of nonmarine Ostracoda. 1: Index A; 2: Index B; 3: Index C; 4: Bibliography A. - Sonderveröffentlichungen des Geologischen Instituts der Universität zu Köln, 35: 1-188; 36: 1-180; 37: 1-204; 38: 1-186.

Kempf, E.K., 1991. - Index and bibliography of nonmarine Ostracoda. 5: Bibliography B. - Sonderveröffentlichungen des Geologischen Instituts der Universität zu Köln, 77: 1-232.

Klie, W., 1932. - Die Ostracoden der Deutschen Limnologischen Sunda-Expedition. - Archiv für Hydrobiologie, Supplementarband 11 (= Tropische Binnengewässer 3): 447-502, tables 64-69.

Klie, W., 1933. - Süß- und Brackwasser-Ostracoden von Bonaire, Curaçao und Aruba. - Zoologische Jahrbücher. Abteilung für Systematik, Ökologie. Geographie und Biologie der Tiere, 64 (3/5): 369-390.

Klie, W., 1939a. - Süßwasserostracoden aus Nordostbrasilien: 3. Die Gattungen Stenocypris und Dolerocypris. - Zoologischer Anzeiger, 128 (11/12): 316-320.

Klie, W., 1939b. - Ostracoden aus dem Kenia-Gebiet, vornehmlich von dessen Hochgebirgen. - Internationale Revue der gesamten Hydrobiologie und Hydrographie, 39 (1/2): 99-161.

Lowndes, A.G., 1930. - On Entomostraca from the New Hebrides collected by Dr. J.R. Baker. - Proceedings of the Zoological Society of London, 1930 (4): 973-977.

Maddocks, R.F. 1982. - Ostracoda. - In: Bliss, D.E., editor: The Biology of Crustacea. Vol. 1.: Systematics, the Fossil Record, and Biogeography. - Academic Press. 319 p.

Martens, K., 1984a. - Annotated check-list of non-marine ostracods (Crustacea, Ostracoda) from African inland waters. - Musée Royal de l'Afrique Centrale Tervuren, Documentation zoologique, 20: 1-51.

Martens, K., 1984b. - On the freshwater ostracods (Crustacea, Ostracoda) of the Sudan, with special reference to the Red Sea Hills, including a description of a new species. - Hydrobiologia, 110: 137-161.

Martens, K., 1992. - On Namibcypris costata n.gen., n.sp (Crustacea, Ostracoda, Candoninae) from a spring in northern Namibia, with the description of a new tribe and a discussion on the classification of the Podocopina. - Stygologia, 7 (1): 27-42.

Martens, K. & F. Behen, 1995. - A Checklist of the Recent Non-Marine Ostracods (Crustacea, Ostracoda) from the Inland Waters of South America and Adjacent Islands. - Travaux scientifiques du Musée national d'histoire naturelle de Luxembourg, 22: 1-82.

McKenzie, K.G., 1965. - The great Stenocypris muddle: a cautionary tale for taxonomists. - Australian Society of Limnology, 4 (2): 51-52.

Moroni, A., 1967. - Ostracodi delle risaie italiane. Sistematica, Ecologia, Distribuzione geografica. - Studium parmense, 1-79.

Muhamediev, A.M., 1960. - Materialy k gidrobiologii risovyh polej Ferganskoj doliny. - Fergan. gosud. pedag. Inst., Utschen. zap., Ser. Biol., 6: 1-82.

Neale, J.W., 1977. - Ostracoda from the Rice-Fields of Sri Lanka (Ceylon). - In H. Löffler & D.L. Danielopol (editors): Aspects of Ecology and Zoogeography of Recent and Fossil Ostracoda. Sixth International Ostracod Symposium, Salfelden, Austria: 271-283. Dr. W. Junk b.v. Publishers, The Hague.

Okubo, I., 1975. - Stenocypris major (Baird, 1859) from Japan. Freshwater Ostracoda from Japan, 9. - Bulletin of the Biogeographic Society of Japan, 31 (1): 1-6.

Puscariu, V., 1951. - Contributii la cunoasterea raspandirii geografice a Ostracodelor de apa dulce din R.P.R. - Buletin stiintific, sectiunea de stiinte biologice, agronomice, geologice si geografice, 3 (4): 661-673.

Sars, G.O., 1889. - On some freshwater Ostracoda and Copepoda raised from dried Australian mud. - Forhandlinger i Christiania Videnskabs-Selskabet, 8: 1-79, pl. 1-8.

Tressler, W.L., 1937. - Ostracoda. (Mitteilung 18 von der Wallacea-Expedition Woltereck 1931-32). - Internationale Revue der gesamten Hydrobiologie und Hydrographie, 34 (3-5): 188-207.

Tressler, W.L., 1959. - Ostracoda. - In: H.B. Ward & G.C. Whipple: Freshwater Biology (2nd edition) (editor: W.T Edmondson), chapter 28: 657-734. Wiley.

Triebel, E., 1953. - Genotypus und Schalen-Merkmale der Ostracoden-Gattung Stenocypris. - Senckenbergiana, 34 (1/3): 5-14.

Vávra, W., 1897. - Die Süßwasser-Ostracoden Deutsch-Ost-Afrikas. - Deutsch-Ostafrika: 4 (2/3): 1-28. (K. Möbius, editor: Die Tierwelt Ost-Afrikas und der Nachbargebiete).

Victor, R. & C.H. Fernando, 1978. - Two new species of freshwater ostracods from southern India. - Zoological Journal of the Linnean Society, 64: 79-85.

Victor, R. & C.H. Fernando, 1979. - The freshwater ostracods (Crustacea, Ostracoda) of India. - Records of the Zoological Survey of India, 74 (2): 147-242.

Victor, R. & C.H., Fernando, 1981. - Freshwater Ostracoda of the genera Chrissia Hartmann, 1957 and Stenocypris Sars, 1889 from Malaysia, Indonesia and the Philippines. - Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut, 78: 151-168.

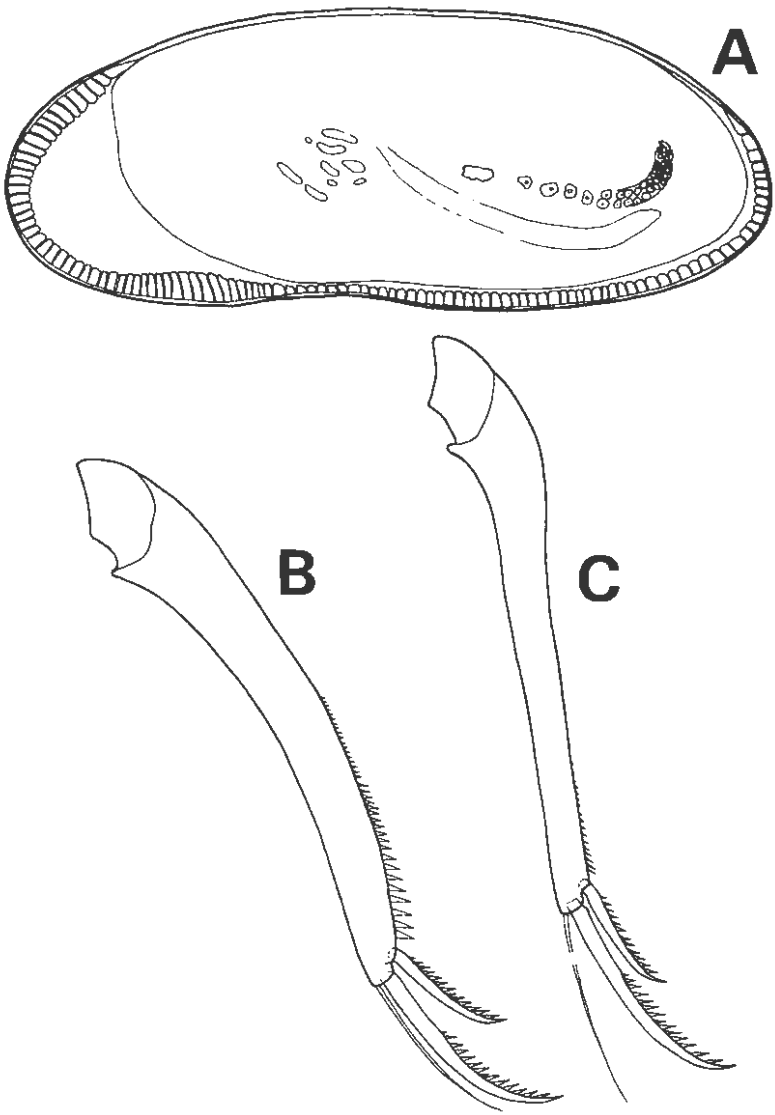


Fig. 1. - *Stenocypris major okuboi* n. ssp. Female, Madagascar.
A: RV, internal view. B: left furcal ramus. C: right furcal ramus.

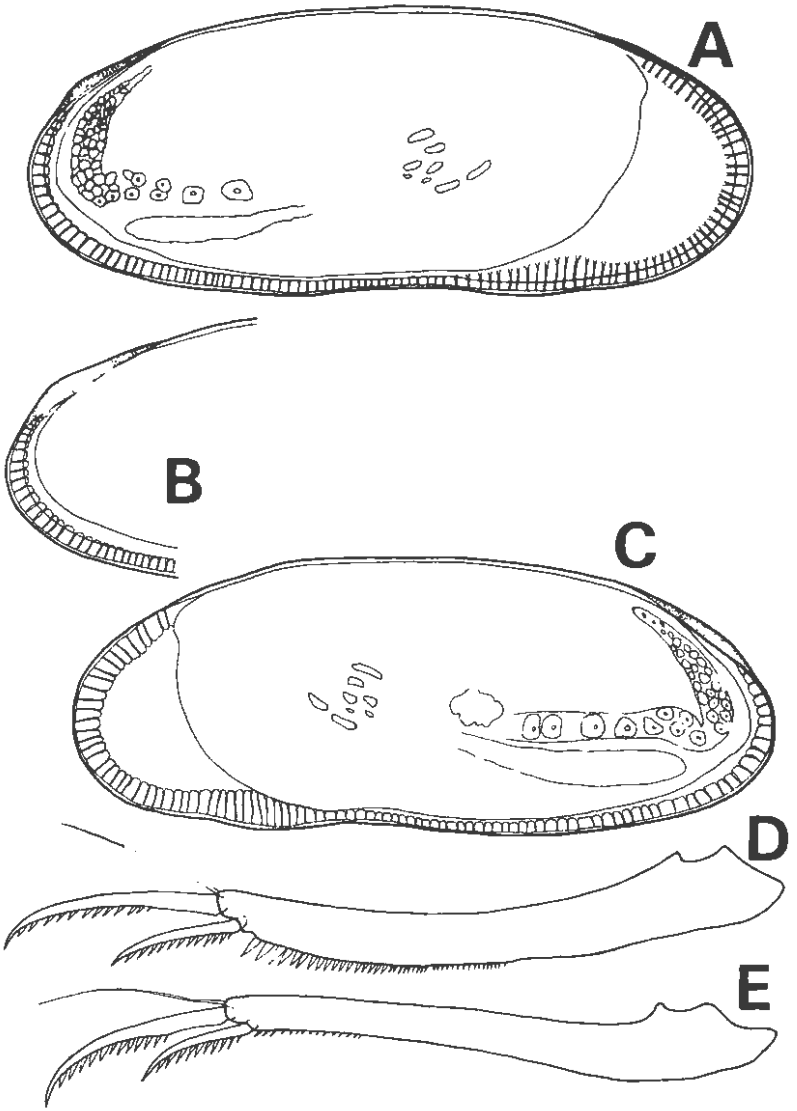


Fig. 2. - *Stenocypris major sketi* n. ssp. Female, Sri Lanka.
A: LV, internal view. B: LV, posterior end in an oblique dorsal view. C: RV, internal view. D and E: left and right furcal rami.

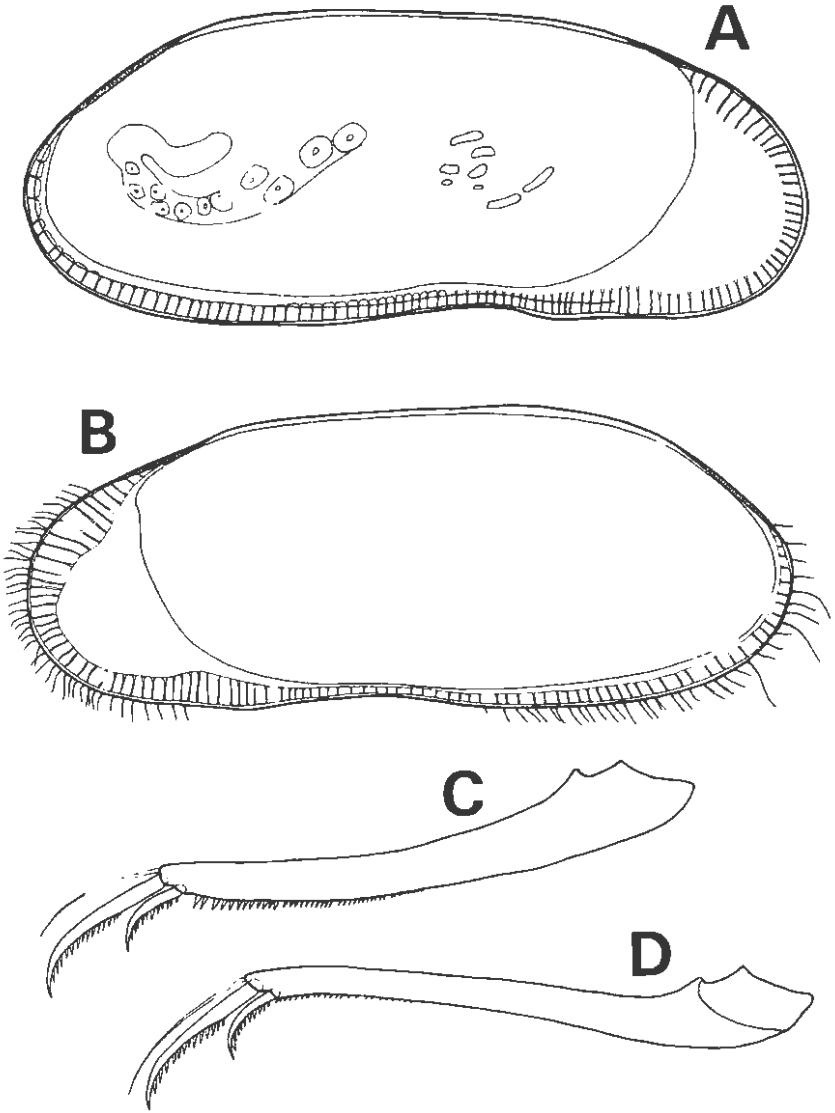


Fig. 3. - *Stenocypris bolieki* Ferguson. Female, Macedonia.
A: LV, internal view. B: RV, internal view. C and D: left and right furcal rami.

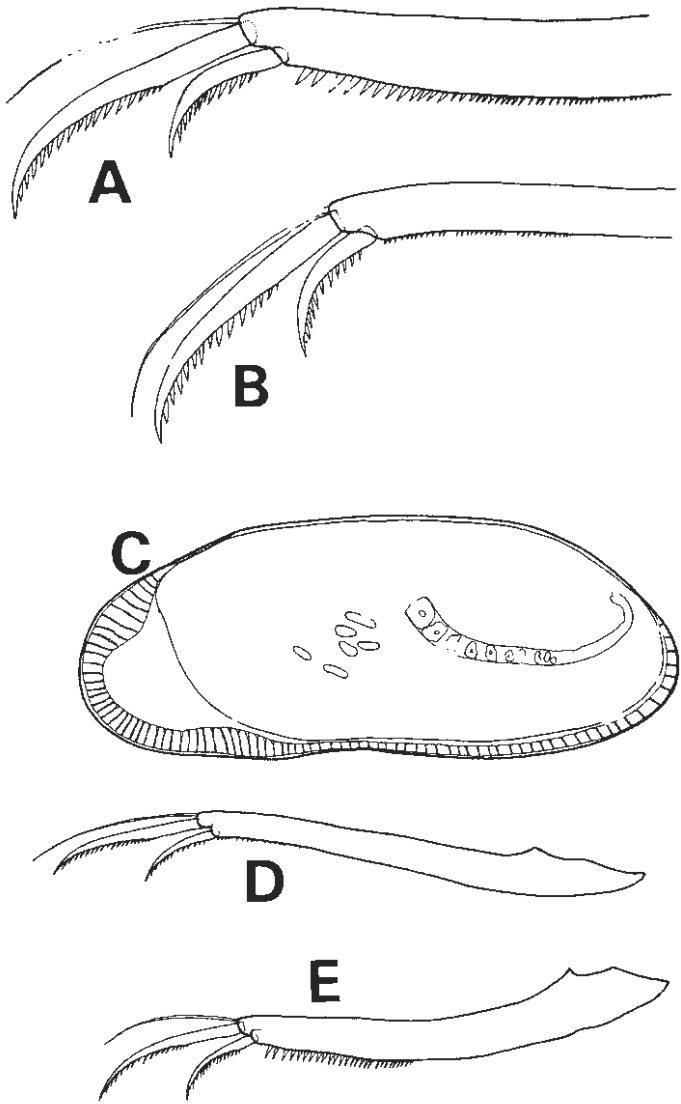


Fig. 4. - *Stenocypris bolieki* Ferguson. Female, Macedonia (A, B) and Brasil (C,D,E).
A and B: distal ends of the left and right furcal rami. C: RV, internal view. D and E: right and left furcal rami.

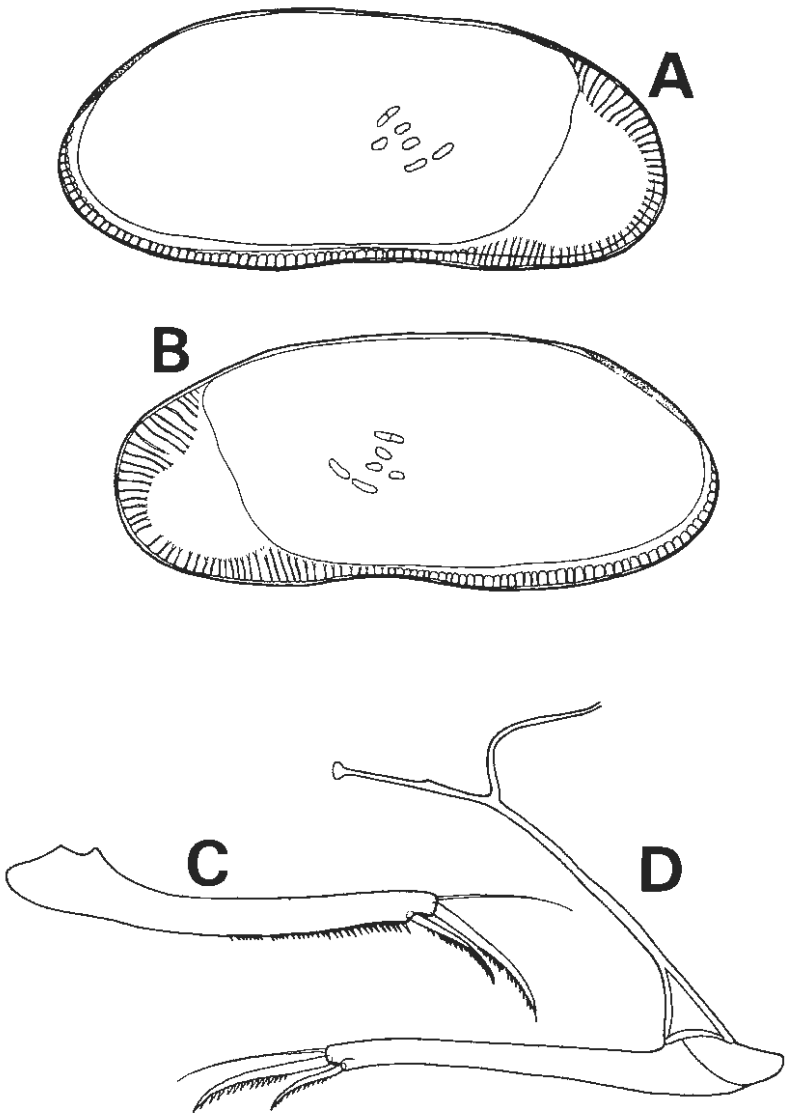


Fig. 5. - *Stenocypris macedonica* n. sp. Female, Macedonia.
A: LV, internal view. B: RV, internal view. C: left furcal ramus. D: right furcal ramus and attachment (the distal triangle on the furcal attachment is a diagnostic feature of the Herpetocypridinae).

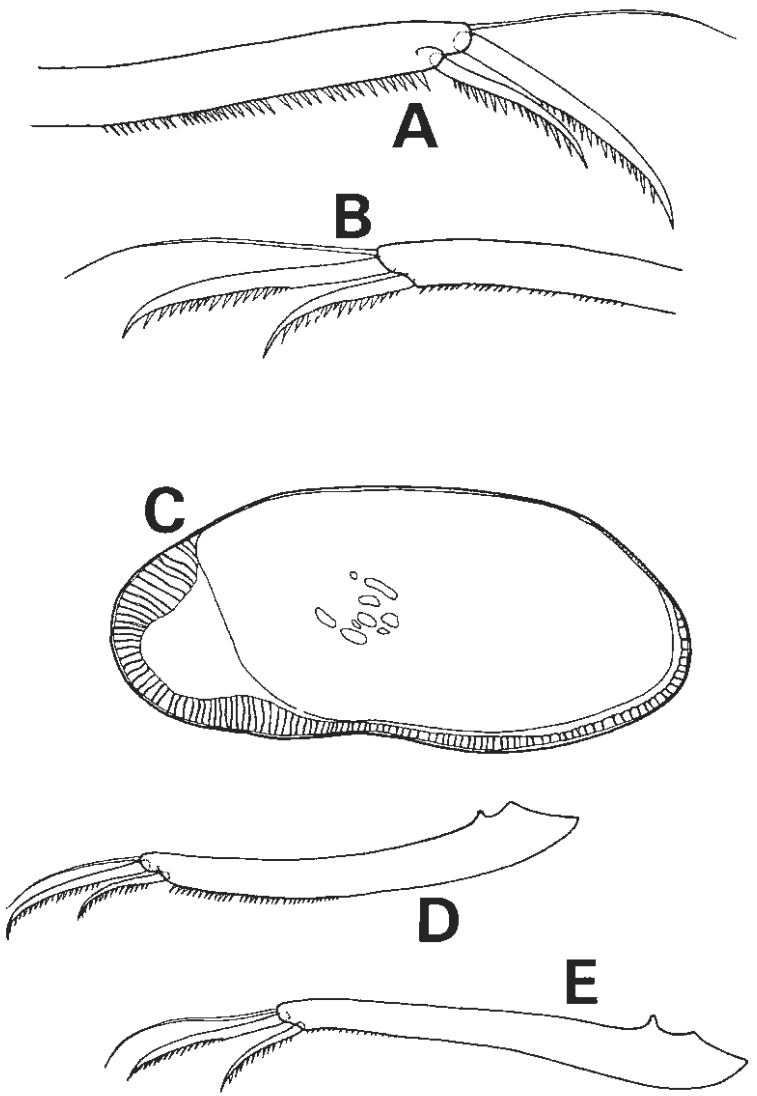


Fig. 6. - *Stenocypris macedonica* n. sp. Female, Macedonia (A,B) and Sri Lanka (C,D,E).
A and B: left and right furcal rami. C: RV, internal view. D and E: left and right furcal rami.

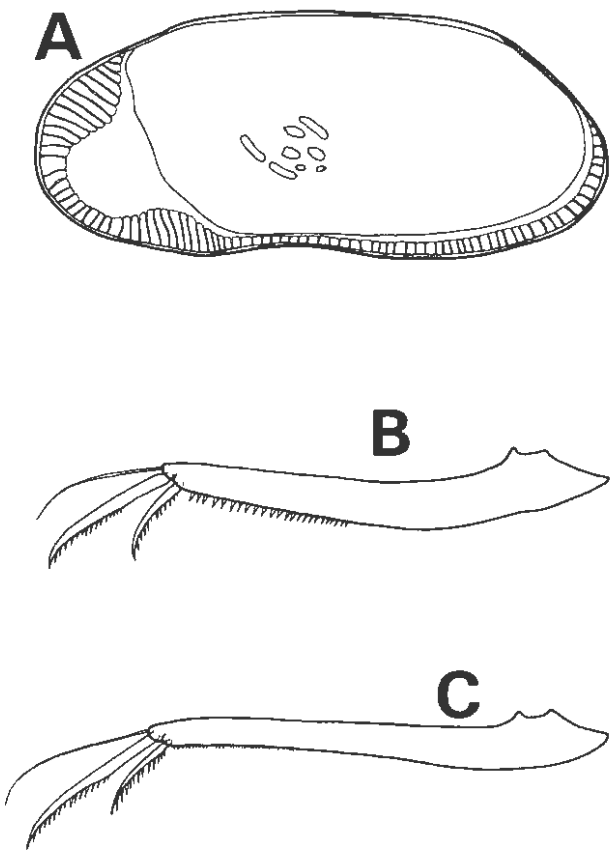


Fig. 7. - *Stenocypris intermedia*, Klie. Female, Isle of Bonaire.
A: RV, internal view. B and C: left and right furcal rami.

Les TRAVAUX SCIENTIFIQUES DU MUSÉE NATIONAL D'HISTOIRE NATURELLE DE LUXEMBOURG paraissent à intervalles non réguliers.

Liste des numéros parus à cette date:

I Atlas provisoire des Insectes du Grand-Duché de Luxembourg. Lepidoptera, 1re partie (Rhopalocera, Hesperiidae). Marc MEYER et Alphonse PELLES, 1981.

II Nouvelles études paléontologiques et biostratigraphiques sur les Ammonites du Grand-Duché de Luxembourg et de la région Lorraine attentante. Pierre L. MAUBEUGE, 1984.

III Revision of the recent western Europe species of genus Potamocypris (Crustacea, Ostracoda). Part 1: Species with short swimming setae on the second antennae. Claude MEISCH, 1984.

IV Hétéroptères du Grand-Duché de Luxembourg
1. Psallus (Hylopsallus) pseudoplatani n. sp. (Miridae, Phylinae) et espèces apparentées. Léopold REICHLING, 1984.
2. Quelques espèces peu connues, rares ou inattendues. Léopold REICHLING, 1985.

V La bryoflore du Grand-Duché de Luxembourg: taxons nouveaux, rares ou méconnus. Ph. DE ZUTTERE, J. WERNER et R. SCHUMACKER, 1985.

VI Revision of the recent western Europe species of genus Potamocypris (Crustacea, Ostracoda). Part 2: Species with long swimming setae on the second antennae. Claude MEISCH, 1985.

VII Les Bryozoaires du Grand-Duché de Luxembourg et des régions limitrophes. Gaby GEIMER et Jos. MASSARD, 1986.

VIII Répartition et écologie des macrolichens épiphytiques dans le Grand-Duché de Luxembourg. Elisabeth WAGNER-SCHABER, 1987.

IX La limite nord-orientale de l'aire de Conopodium majus (Gouan) Loret en Europe occidentale. Régine FABRI, 1987.

X Epifaune et endofaune de Liogryphaea arcuata (Lamarck). Armand HARY, 1987.

XI Liste rouge des Bryophytes du Grand-Duché de Luxembourg. Jean WERNER, 1987.

XII Relic stratified scress occurences in the Oesling (Grand-Duchy of Luxembourg), approximate age and some fabric properties. Peter A. RIEZEBOS, 1987.

XIII Die Gastropodenfauna der «angulata-Zone» des Steinbruchs «Reckingerwald» bei Brouch. Hellmut MEIER et Kurt MEIERS, 1988.

XIV Les lichens épiphytiques et leurs champignons lichénicoles (macrolichens exceptés) du Luxembourg. Paul DIEDERICH, 1989.

XV Liste annotée des ostracodes actuels non-marins trouvés en France (Crustacea, Ostracoda). Claude MEISCH, Karel WOUTERS et Koen MARTENS, 1989.

XVI Atlas des lichens épiphytiques et de leurs champignons lichénicoles (macrolichens exceptés) du Luxembourg. Paul DIEDERICH, 1990.

XVII Beitrag zur Faunistik und Ökologie der Schmetterlinge im ehemaligen Erzabbaugebiet "Haardt" bei Düdelingen. Jos. CUNGS, 1991.

XVIII Moosflora und -Vegetation der Mesobrometen über Steinmergelkeuper im Luxemburger und im Bitburger Gutland. Jean WERNER, 1992

19 Ostracoda. Authors: Nico W. BROODBAKKER, Koen MARTENS, Claude MEISCH, Trajan K. PETKOVSKI and Karel WOUTERS, 1993

20 Les haies au Grand-Duché de Luxembourg. Konjev DESENDER, Didier DRUGMAND, Marc MOES, Claudio WALZBERG, 1993

21 Ecology and Vegetation of Mt Trikora, New Guinea (Irian Jaya). Jean-Marie MANGEN, 1993.

22 A Checklist of the Recent Non-Marine Ostracods (Crustacea, Ostracoda) from the Inland Waters of South America and Adjacent Islands. Koen MARTENS & Francis BEHEN, 1993.

23 Ostracoda. Authors: Claude MEISCH, Roland FUHRMANN, Karel WOUTERS, Gabriele BEYER and Trajan PETKOVSKI, 1996

Ces numéros peuvent être obtenus à l'adresse suivante:
Musée national d'histoire naturelle, Bibliothèque
rue Münster, L-2160 LUXEMBOURG

Imprimerie Graphic Press S.à r.l., Mamer