

THE GENUS *MICROCHARON* KARAMAN IN ITALY: AN UPDATE
AND DESCRIPTION OF THREE NEW SPECIES (CRUSTACEA
ISOPODA: MICROPARASELLIDAE)*)

BY

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SUMMARY

Three new stygobiont fresh-water species of the genus *Microcharon* Karaman (Isopoda: Microparasellidae) are described from phreatic waters of Italy, viz.: *M. angelicae* n.sp., from wells of the Abruzzo région (central Italy) and *M. nuragicus* n.sp. and *M. silverii* n.sp. from wells in Sardinia. New localities for the species *M. marinus* Chappuis & Delamare are reported from Sardinia, and a map with the distribution of the genus *Microcharon* in Italy is provided.

RÉSUMÉ

Trois nouvelles espèces stygobiontes d'eau douce du genre *Microcharon* Karaman (Isopoda Microparasellidae) sont décrites des eaux phréatiques d'Italie; il s'agit de *M. angelicae* n.sp. de puits de la région des Abruzzes (Italie centrale) et de *M. nuragicus* n.sp. et *M. silverii* n.sp., de puits de la Sardaigne. De nouvelles localités de Sardaigne sont mentionnées pour *M. marinus* Chappuis & Delamare, et une carte de la distribution des espèces de *Microcharon* en Italie est présentée.

Intensive stygobiological research, carried out by the "Dipartimento di Scienze Ambientali" of the University of L'Aquila (Italy) in different ground-water habitats of Italy, has yielded an important collection of microparasellid isopods of the genus *Microcharon* Karaman, 1933, from karstic substrates of Latium (central Italy) and Sardinia.

Up to now only two species of *Microcharon* were known from Italy, viz.: *M. marinus* Chappuis & Delamare, 1954, widespread in oligo- and mesohaline interstitial habitats of Tuscany (island of Montecristo), Campania, Sardinia and Sicily, and *M. arganoi* Pesce & Tetè, 1978, limited to subterranean fresh waters (wells) of Apulia. It is therefore of interest to record three new species of the genus from inland groundwater of central Italy and Sardinia: these animals are described in the present paper as *M. angelicae* n.sp. (Latium, central Italy) and *M. nuragicus* n.sp. and *M. silverii* n.sp. (Sardinia). These records

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bring from 2 to 5 the number of known species of *Microcharon* in Italy and suggest that the genus is more widespread than previously thought.

A map of the distribution of the Italian species of the genus and new localities for the species *M. marinus* are provided.

Family Microparasellidae Karaman, 1933

Genus *Microcharon* Karaman, 1933

***Microcharon angelicae* n.sp. (figs. 1-16)**

Material.—1 ♂ (holotype), 2 ♀♀, 6 ♂♂ (paratypes), freshwater well along the Main Road S.S.82, Castello di Balsorano (Sora, Latium); depth 10.5 m; water level 8.5 m from the soil surface; water temperature 15.5°C; pH 7.1; bottom sediment composed of fine sand with some plant detritus; accompanying fauna: cyclopid and harpacticoid copepods; amphipods; gastropods; oligochaetes; water mites; 24.Sept.1986; coll. A. Canossi & M. C. Curia. Holotype and one ♀ paratype, completely dissected and mounted on slides in Faure's medium, kept in the collection of the Zoölogisch Museum, Amsterdam, Netherlands (ZMA Is. 105.344, 105.341). Remaining paratypes, dissected and mounted as above, in the senior author's collections at the Dipartimento di Scienze Ambientali, University of L'Aquila, Italy.

Description.—Body length, excluding antennae and uropods, ♀♀ 1.10-1.35 mm, ♂♂ 1.05-1.15 mm. Cephalosome longer than wide; rostrum narrowly rounded. Pleotelson slightly longer than wide (length/width ratio: 1.20-1.25), with subparallel lateral margins; armature as in fig. 14.

First antenna 6-segmented, not dimorphic; segment 2 with distally short aesthethe-like element; segment 5 distally with an aesthete; segment 6 distally with 1 short, plumose seta and 1 aesthete, subdistally with 1 characteristic lanceolate seta.

Second antenna without particularities, flagellum 9-segmented, segments of about equal length, distal segment armed with 2 subequal setae.

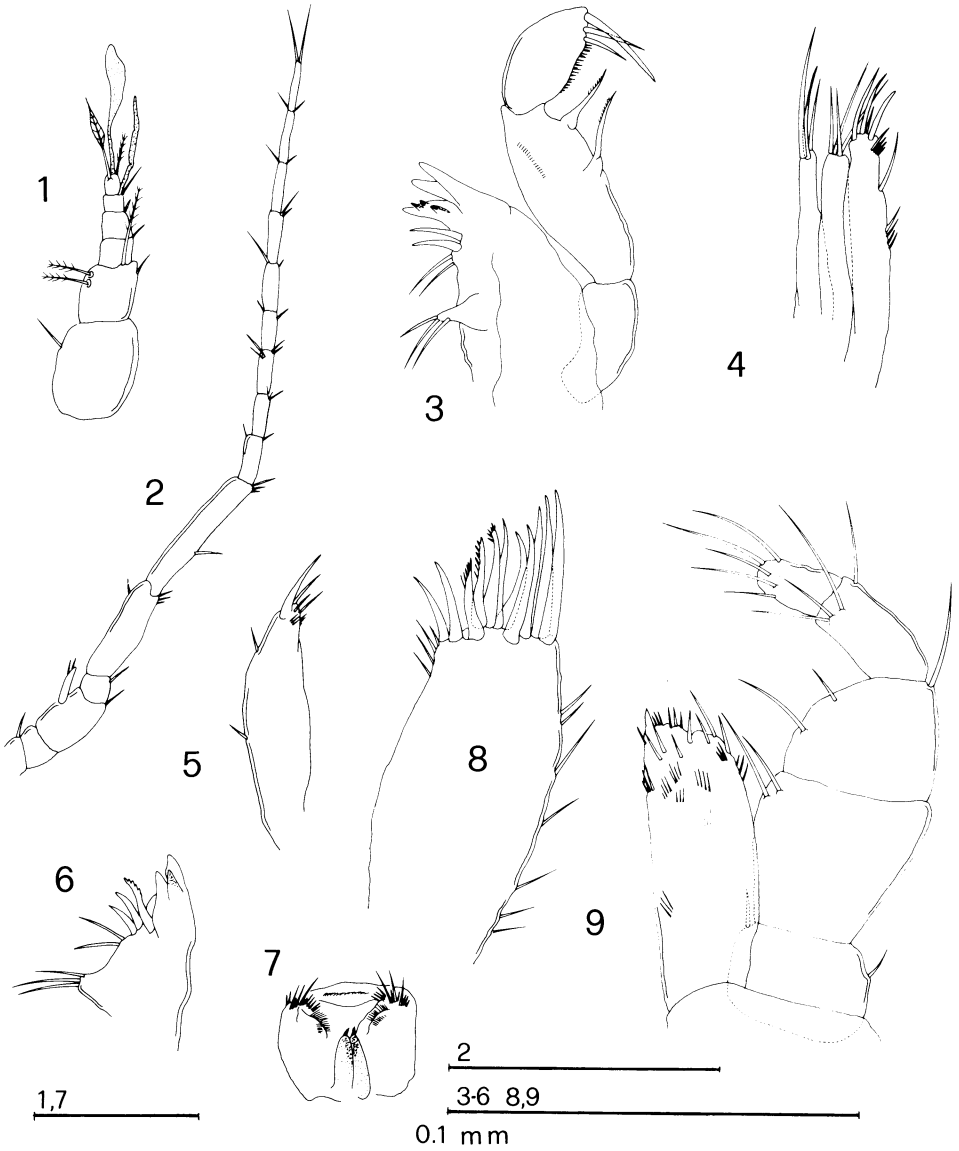
Labrum without particular characteristics; labium not deeply cleft, ciliated on inner and distal margins.

Left mandible: lacinia mobilis with 4 small teeth; pars incisiva reduced, consisting of 2 teeth; pars molaris subconical, armed with 2 distal and 1 subdistal setae; 2 spines and 2 slender setae between lacinia mobilis and pars molaris. Right mandible differs in lacking lacinia mobilis, in pars incisiva consisting of 3 teeth and in having 3 spines (1 denticulate) between pars incisiva and pars molaris. Palp 3-segmented, segment 2 longest, bearing 2 fringed spines on outer margin, segment 3 with 1 strong terminal spine and 2 shorter spines on outer margin.

First maxilla consisting of 2 endites: outer with distal row of 11 spines (3 pectinate); inner endite with some subdistal and lateral "cilia" and a subterminal long spinule. Second maxilla consisting of 3 endites, inner longest, with distal setae and spines (fig. 4).

Maxilliped without particularities (fig. 9).

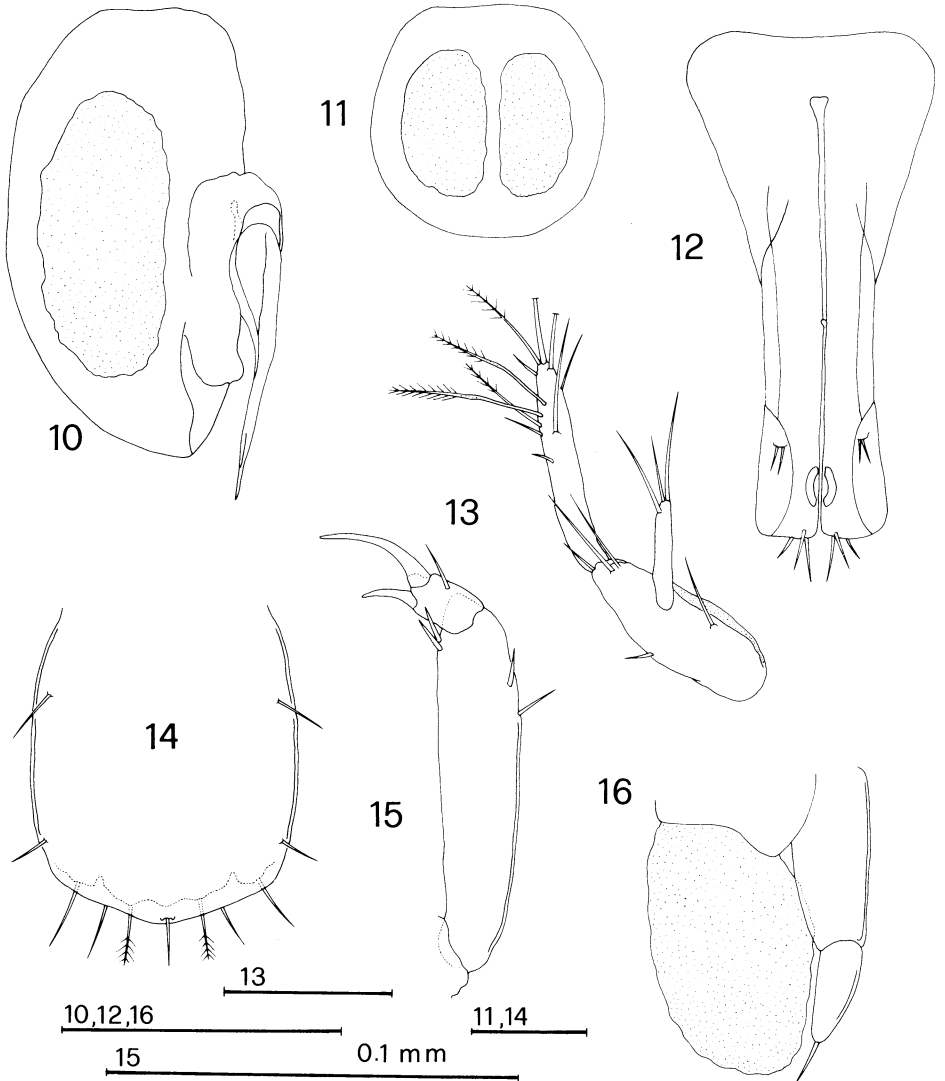
Pereopods similar to those of freshwater species of genus, and with same



Figs. 1-9. *Microcharon angelicae* n.sp.: 1, first antenna; 2, antenna; 3, left mandible; 4, second maxilla; 5, 8, first maxilla; 6, right mandible; 7, lower lip; 9, maxilliped.

morphology and armature from pereopod 2 (P2) to pereopod 7 (P7); dactylus of P2-P7 with 2 elongated unguili of different length and one posterior seta (fig. 15); dactylus of pereopod 1 (P1) with 1 posterior setule, 4 distal setae and 2 unguili.

First male pleopod bilobed, distally flattened; length/basal width ratio =



Figs. 10-16. *Microcharon angelicae* n.sp.: 10, pleopod II (♂); 11, pleopod II (♀); 12, pleopod I (♂), 13, uropod; 14, pleotelson; 15, pereopod VII; 16, pleopod III.

2.01-2.09, length/distal width ratio = 3.78-3.86; 3 distal and 2 subdistal setules in each half.

Male pleopod 2: sympodite with slightly pointed distal corner; endopod recurved, shorter than sympodite (endopod/sympodite length ratio = 0.70-0.75), with pointed distal tip; exopod reduced to oval lobe.

Female pleopod 2 as long as wide (length/width ratio = 1.00-1.05), without distal setae.

Pleopods 3 and 4 not sexually dimorph. Pleopod 3: endopod 2-segmented, curved inward, second segment with slender distal seta; endopod large, without distal setae. Pleopod 4, 1-segmented, rudimentary.

Uropods: sympodite elongated (length/width ratio = 2.78-2.80); endopod about as long as sympodite; exopod short, about half as long as endopod and sympodite; armature as in fig. 13.

Etymology.—Specific epithet after Miss Dr. Angelica Canossi, who collected the new species.

Remarks.—Following Coineau's (1968, 1986, 1987) review of the genus, *M. angelicae* n.sp. belongs to the group of the most derived freshwater species of *Microcharon*, which are characterized by an apomorphic round and naked female pleopod 2 and a suboval sympodite of male pleopod 2. Inside this group, it more strongly resembles the French species *M. juberthiei* Coineau, 1968; some similarity also exists with the Italian species *M. arganoi* Pesce & Tetè, 1981 and *M. nuragicus* n.sp. (described below).

From the above species, *M. angelicae* n.sp. differs as follows: from *M. juberthiei* in having pectinated spines on outer endite of the first maxilla (versus naked spines only), absence of outer distal setae on male pleopod I and different morphology and armature of pleotelson and uropods; from *M. arganoi* in having a subcircular female pleopod II (versus longer than wide) and in the different morphology and armature of the male pleopod I. *M. nuragicus* n.sp. seems to be morphologically close to *M. angelicae* n.sp., however these two species are easily distinguishable by the quite different armature of first maxilla and mandible and by the different number of setae on the first male pleopod.

Microcharon nuragicus n.sp. (figs. 17-31)

Material.—1 ♂ (holotype), 2 ♀♀, 1 ♂ (paratypes), brackish-water well along the main road Cagliari-Capo Spartivento, cross-road to Pula (Cagliari); depth 6.0 m; water level 2.3 m. from the soil surface; water temperature 17.9 °C; pH 6.6; bottom sediment composed of fine sand; accompanying fauna: cyclopoid and harpacticoid copepods; ostracods; amphipods; gastropods; stenasellid isopods; turbellarians; water mites; 3.Nov.1979, coll. G. L. Pesce, G. Silverii and D. Maggi. Holotype and one female paratype, completely dissected and mounted on slides in Faure's medium, kept in the collection of the Zoölogisch Museum, Amsterdam, Netherlands (ZMA Is. 105.342, 105.343). Remaining paratypes, mounted as above, in the senior author's collections at the Dipartimento di Scienze Ambientali, University of L'Aquila (Italy).

Description.—Body length, excluding antennae and uropods, ♀♀ 1.26-1.27 mm, ♂♂ 1.20-1.22 mm. Cephalosome slightly longer than wide; rostrum narrowly rounded. Pleotelson elongated (length/width ratio = 1.20-1.28), with rounded lateral margins; armature as in fig. 20.

First antenna 6-segmented, not sexually dimorphic; segment 2 with characteristic aesthete-like element and 3 short subdistal setae; segment 5 with

short aesthete; distal margin of segment 6 with 1 short plumose seta, 1 aesthete and 1 lanceolate characteristic seta. Second antenna: flagellum 9-segmented, segments of about equal length. Labrum and labium without particularities.

Left mandible: pars incisiva and lacinia mobilis consisting of 4 distal subconical teeth; pars molaris subconical, with 3 distal slender setae; between pars molaris and lacinia mobilis there are 2 stout naked spines and 4 setae of different length. Right mandible differs in lacking lacinia mobilis and in having 3 stout denticulate spines between pars molaris and pars incisiva. Mandibular palp 3-segmented, without special characteristics.

First maxilla consisting of 2 endites: inner endite slender and armed with simple distal setae, outer one armed with 10 simple and 1 denticulate (the 6th from the inner margin) apical spines; remaining armature as in fig. 28. Second maxilla consisting of 3 endites: inner longest, with several simple spines; outer endites, each bearing 3 distal elongate spiniform setae. Maxilliped without particular characteristics (fig. 27).

Pereopod 1, dactylus with 1 posterior seta, 3 subdistal setae, 2 inner setae and 2 long unguli of different length; morphology and armature of remaining segments without particularities. Pereopods 2 to 7, elongate and slender, with same armature as in other freshwater species of genus.

First male pleopod bilobed, distally flattened (length/basal width ratio: 1.95-1.97; length/distal width ratio: 3.72-3.75); armature reduced, consisting of 3 apical setulae and 1 long seta implanted on a protuberance at 1/5 from distal end on each half. Male pleopod 2: sympodite with rounded mediodistal corner and broadly rounded laterodistal one; endopod recurved, shorter than sympodite (endopod/sympodite length ratio: 0.75-0.76), with pointed distal part; exopod reduced to suboval lobe.

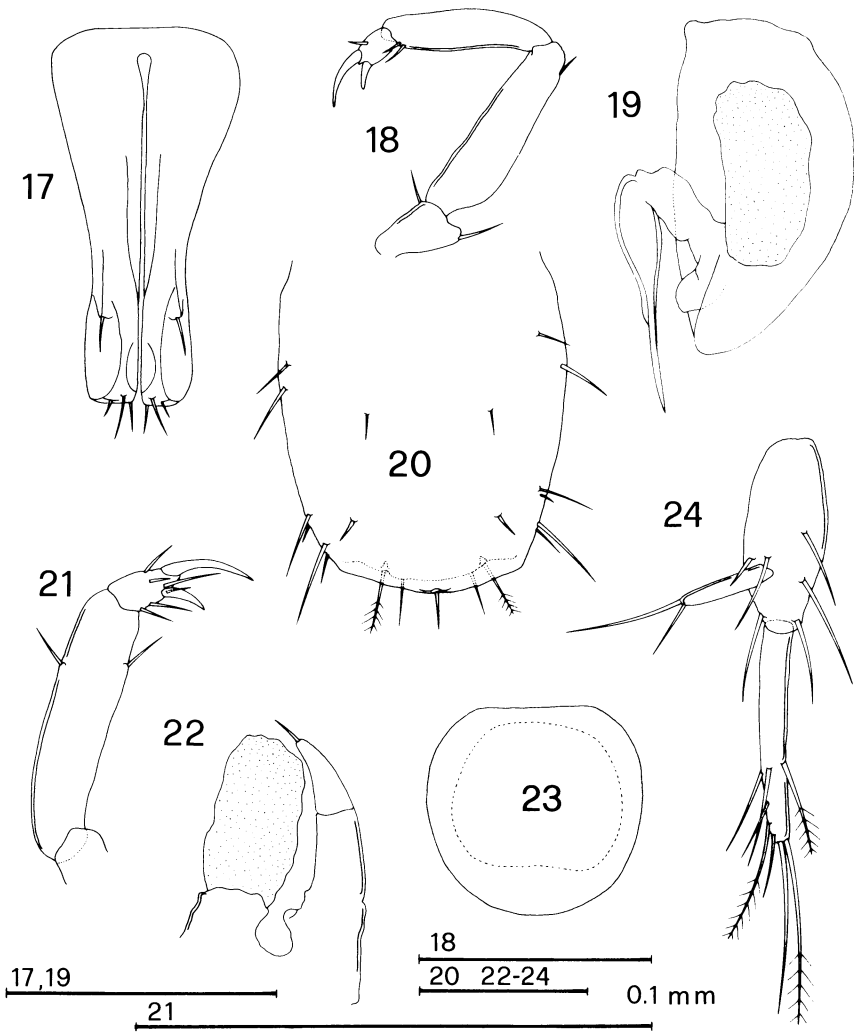
Female second pleopod about as long as wide (length/width ratio: 0.98-1.00) and without armature.

Pleopods 3 and 4 not sexually dimorphic. Pleopod 3 with 2-segmented endopod, curved inward, and with 1 slender distal seta; endopod large, unarmed. Pleopod 4 consisting of 1-segmented, naked rudiment.

Uropods: sympodite elongated (length/width ratio: 2.40-2.45); endopod 1.10-1.15 times longer than sympodite; exopod 0.42-0.43 times shorter than endopod and 0.46-0.48 times shorter than basipodite; armature as in fig. 24.

Etymology.—Specific epithet after the neolithic civilization of Sardinia: “Nuragica”.

Remarks.—*M. nuragicus* n.sp., as the above described *M. angelicae* n.sp., fits well into the group of the most derived freshwater species of the genus *Microcharon*. Within this group, the new species is close both to the nominate species and to *M. arganoi*, differing from these species in several characters, especially in the armature of the maxilla and mandible, the armature of the

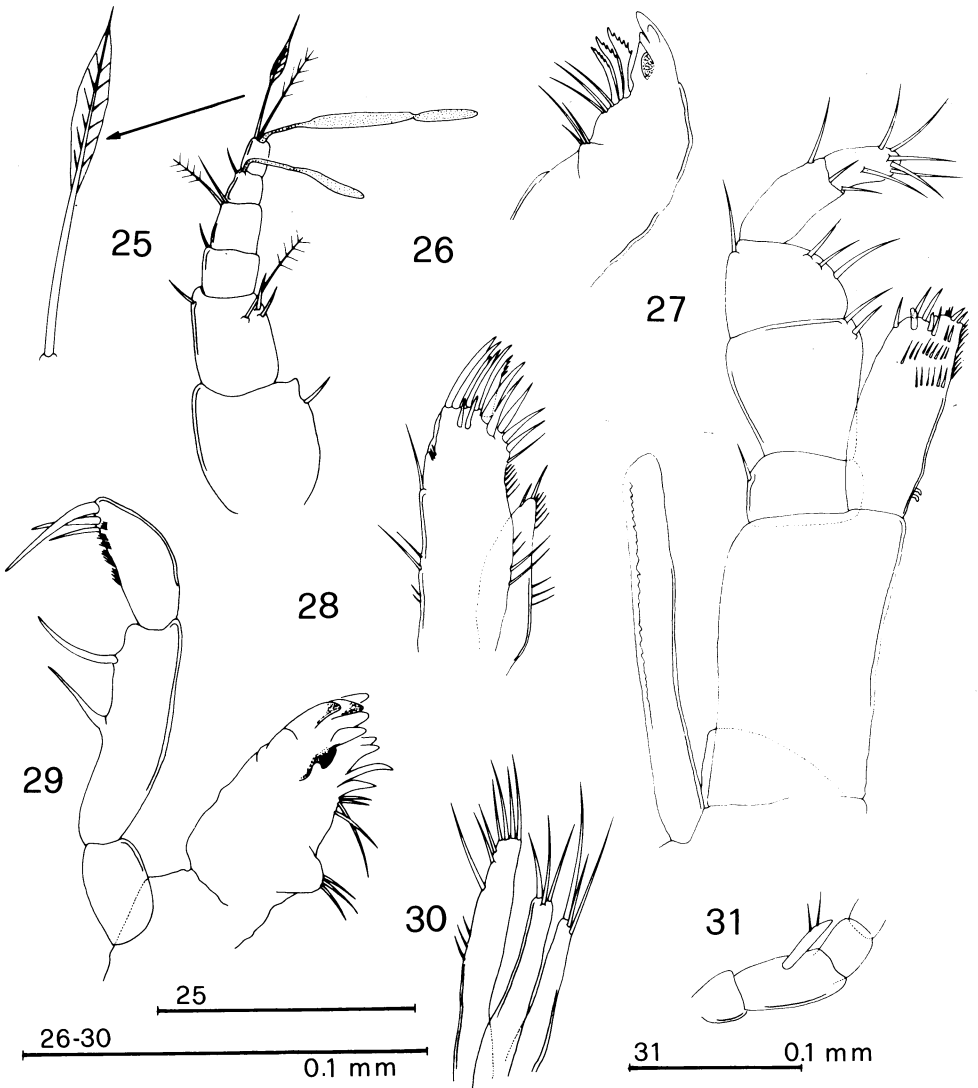


Figs. 17-24. *Microcharon nuragicus* n.sp.: 17, pleopod I (♂); 18, pereopod VII; 19, pleopod II (♂); 20, pleotelson; 21, pereopod I; 22, pleopod III; 23, pleopod II (♀); 24, uropod.

pleotelson and the different construction of the uropods. Another difference that clearly separates *M. nuragicus* n.sp. from the above species as well as from the other members of the freshwater group of *Microcharon* is the peculiar, reduced armature of the first male pleopods.

***Microcharon silverii* n.sp. (figs. 32-42; 45, 46)**

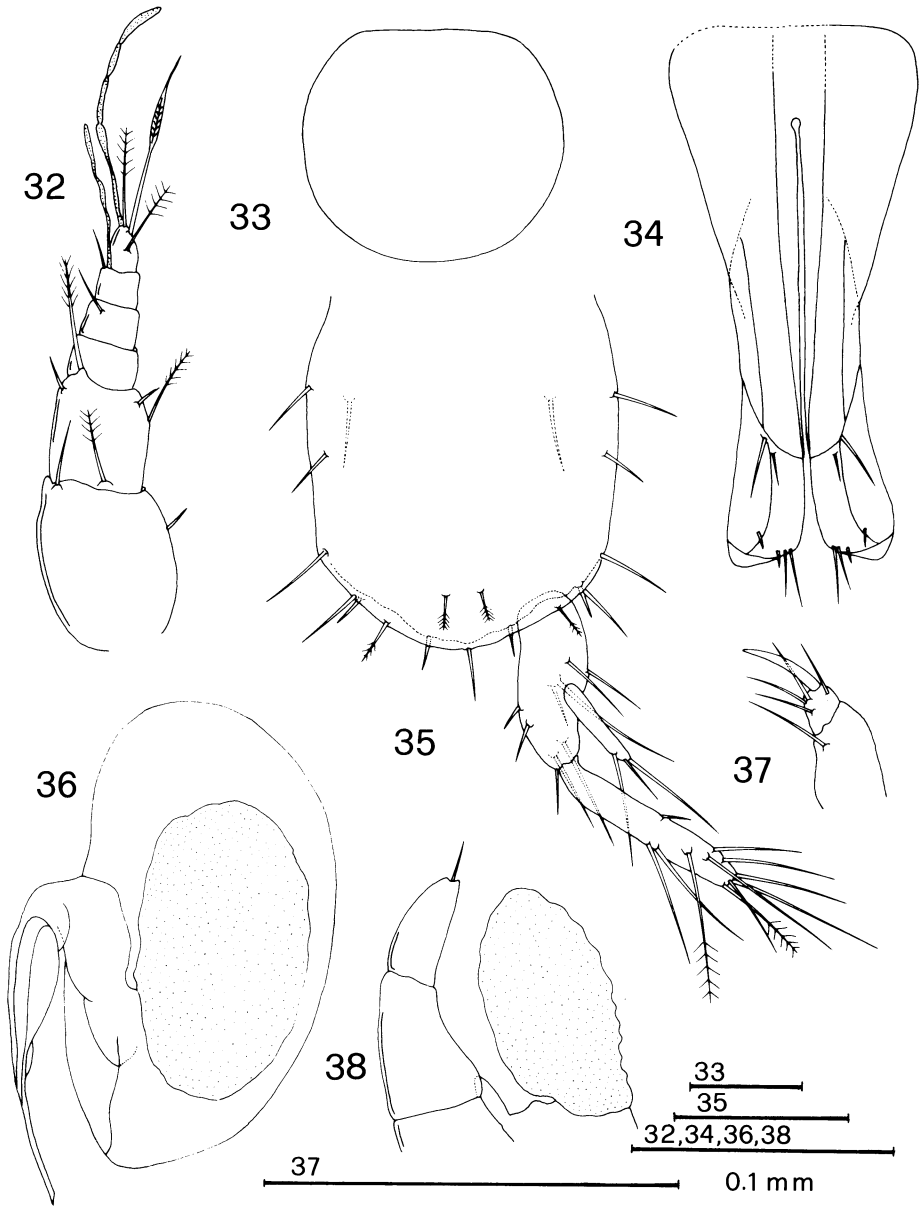
Material.—1 ♂ (holotype), 3 ♀♀, 5 ♂♂ (paratypes), brackish-water well at Sarroch, along the main road Cagliari-Capo Spartivento (Cagliari); depth 6.5 m; water level 1.5 m. from the soil surface; water temperature 18.0 °C; pH 6.5; bottom sediment composed of fine sand; accom-



Figs. 25-31. *Microcharon nuragicus* n.sp.: 25, first antenna; 26, right mandible; 27, maxilliped; 28, first maxilla; 29, left mandible; 30, second maxilla; 31, second antenna, exopod.

payning fauna: cyclopid copepods; ostracods; asellid isopods; amphipods; turbellarians; water mites; 3 Nov. 1979; coll. G. L. Pesce, G. Silverii and D. Maggi. Holotype and one female paratype, completely dissected and mounted on slides in Faure's medium, kept in the collections of the Zoölogisch Museum, Amsterdam, Netherlands (ZMA Is.105.345, 105.346). Remaining paratypes, mounted as above, in the senior author's collection at the Dipartimento di Scienze Ambientali, University of L'Aquila (Italy).

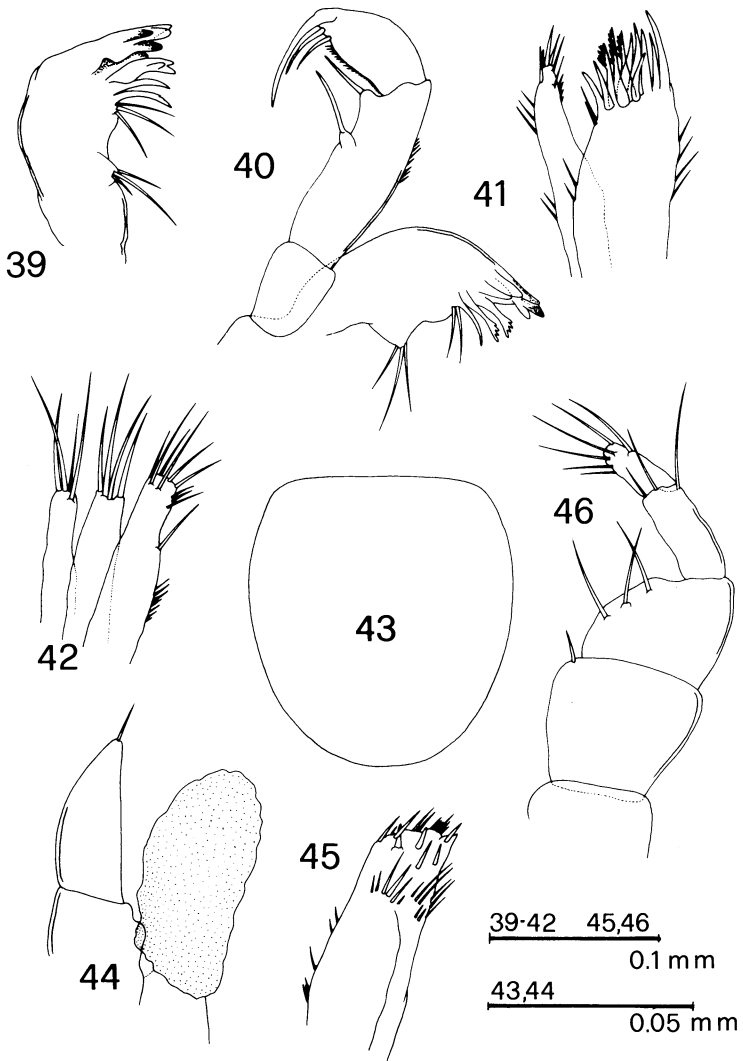
Description.—Body length (without antennae and uropods) 1.37-.38 mm (♀♀) and 1.26-1.30 mm (♂♂). Cephalosome slightly longer than wide;



Figs. 32-38. *Microcharon silverii* n.sp.: 32, first antenna; 33, pleopod II (♀); 34, pleopod I (♂); 35, pleotelson and uropod; 36, pleopod II (♂); 37, pereopod I; 38, pleopod III.

rostrum rounded. Pleotelson longer than wide (length/width ratio: 1.16-1.19, with subparallel margins; armature as in fig. 35).

First antenna 6-segmented, not sexually dimorphic; segment 2 distally with 1 short aesthete-like element; segment 5 with an aesthete; segment 6 with 1



Figs. 39-46. *Microcharon silverii* n.sp.: 39, left mandible; 40, right mandible; 41, first maxilla; 42, second maxilla; 45,46, maxilliped; *Microcharon* sp.: 43, pleopod II (♀); 44, pleopod III.

long distal aesthete, 2 plumose setae and 1 characteristic lanceolate seta. Second antenna, flagellum 9-segmented, segments subequal in length. Labrum and labium without particular characteristics.

Left mandible: pars incisiva with 4 teeth, lacinia mobilis with 3 distal triangular teeth, pars molaris consisting of conical swelling with 3 setae; between lacinia mobilis and pars molaris arise 2 stout naked spines and 3 slender setae. Right mandible differs in lacking lacinia mobilis and in having

2 fringed spines between pars incisiva and pars molaris. Mandibular palp as usual in genus (fig. 40).

First maxilla consisting of 2 endites: inner endite elongate, with "cilia" on both margins and 1-2 subterminal spines; outer endite stouter, bearing distal row of 8 simple and 3 (3th, 4th, 5th from inner margin) pectinated spines, and some "cilia" on both margins. Second maxilla consisting of 3 endites, inner longest (fig. 42). Maxilliped and pereopods without particular characteristics (fig. 37, 46).

First male pleopod bilobed and slightly diverging distally, distal margin of each half folded inward (length/basal width ratio: 2.18-2.20; length/distal width ratio: 3.20-3.21); armature consisting of 3 distal, 1 subdistal and 2 setae at 1/4 from distal end on each half.

Male pleopod 2: sympodite with rounded distal corner; endopod curved, shorter than sympodite (endopod/sympodite length ratio: 0.70-0.72), with pointed distal tip; exopod reduced to oval lobe.

Female pleopod 2 rounded, wider than long (length/width ratio: 0.89-0.91), without armature on distal margin.

Pleopods 3 and 4 not sexually dimorphic, without particular characteristics if compared to those of other species in the genus.

Uropods: sympodite slender, 2.60-2.70 times longer than wide; endopod 1.15-1.17 times longer than sympodite; exopod short, about 1/2 as long as endopod as well as sympodite; armature as in fig. 35.

Etymology.—Specific epithet after our friend dr. Giuseppe Silverii who participated in the fieldwork and collected the new species.

Remarks.—*Microcharon silverii* n.sp. belongs to the same phyletic group as the above described *M. angelicae* n.sp. and *M. nuragicus* n.sp. From these species it differs in many characters such as morphology and armature of the male pleopods 1 and 2, morphology of female pleopod 2 and armature of the pleotelson. However, within the nominate group, the new species mostly resembles *M. doueti* Coineau, 1968 and *M. juberthiei* Coineau, 1968 both from groundwaters of France, in general appearance and in many morphological details (armature of male first pleopod, rounded male sympodite of second pleopod, construction of uropods). From the above species, as well as from the others in the same group, *M. silverii* n.sp. is easily distinguishable by several characters, especially the armature of the first maxilla, the morphology of the male first and of the female second pleopods, and the morphology and armature of the pleotelson.

Microcharon sp. (figs. 43,44)

Material.—1♀, dissected and mounted on slide in Faure's medium, freshwater well at Gonsfanadiga (Cagliari, Sardinia); depth 5.5 m, water level 2.5 m. from the soil surface; water

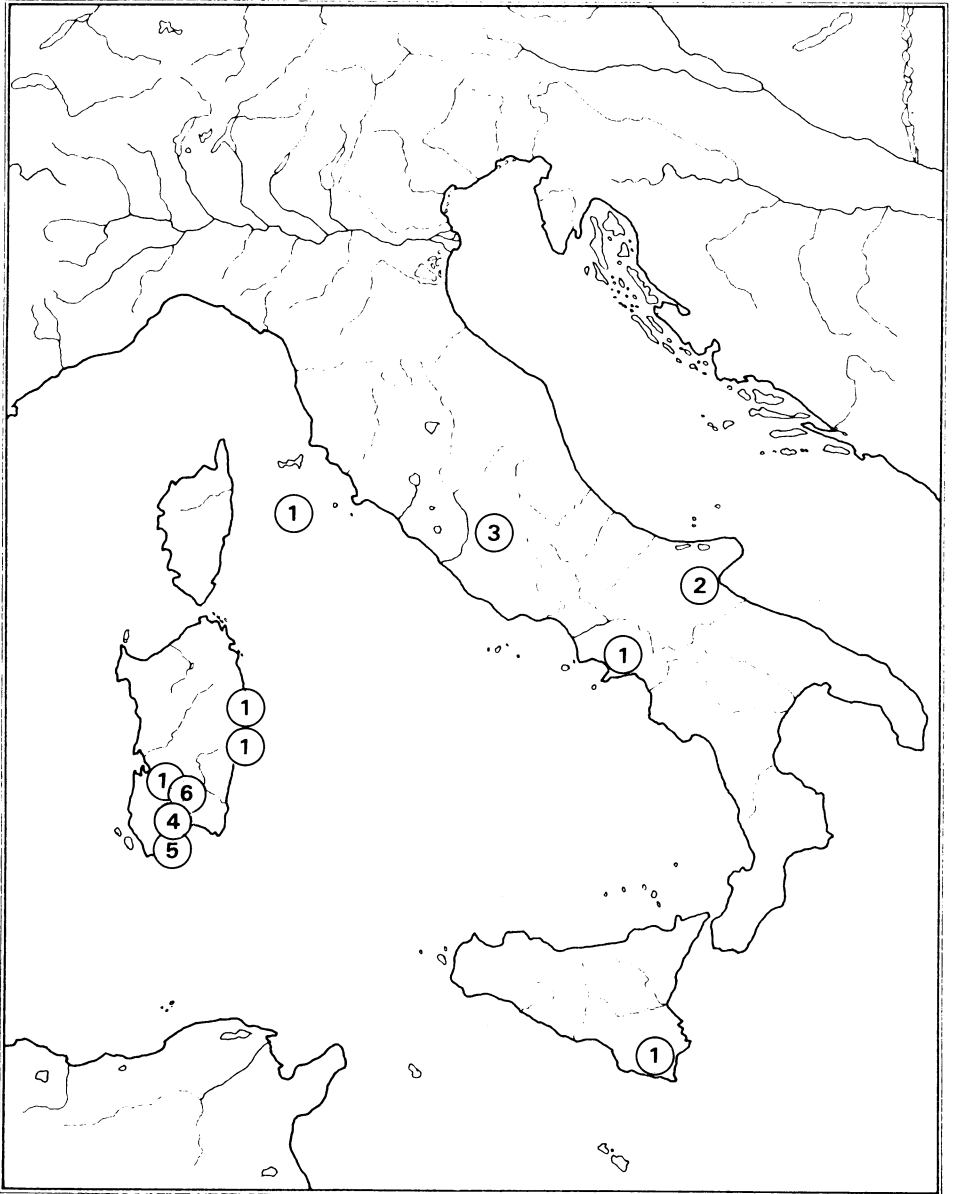


Fig. 47. Distribution of the genus *Microcharon* Karaman in Italy: 1, *M. marinus* Chappuis & Delamare; 2, *M. arganoi* Pesce & Tetè; 3, *M. angelicae* n.sp.; 4, *M. nuragicus* n.sp.; 5, *M. silverii* n.sp.; 6, *Microcharon* sp.

temperature 19.0 °C; pH 6.7; bottom sediment: clay and thin sand; accompanying fauna: cyclopid and harpacticoid copepods; ostracods; amphipods; water mites; 3 Nov. 1979; coll. G. L. Pesce, G. Silverii and D. Maggi.

Microcharon marinus Chappuis & Delamare, 1954

Material.—1♀, 1 juv., preserved in alcohol 70°, freshwater well at Decimomannu airport (Cagliari, Sardinia); dept 5.5 m; water level 1.5 m. from the soil surface; water temperature 19.0 °C; pH 6.8; bottom sediment: clay and sand; accompanying fauna: cyclopid copepods; ostracods; asellid isopods; oligochaetes; 3 Nov. 1979; coll. G. L. Pesce, G. Silverii and D. Maggi; 1 ♀, completely dissected and mounted on slide in Faure's medium, freshwater well at Villasor, Cagliari (Sardinia); depth 5.5 m; water level 2.3 m. from the soil surface; water temperature 18.5 °C; pH 7.0; bottom sediment: fine sand; accompanying fauna: cyclopid and harpacticoid copepods; ostracods; amphipods and oligochaetes; 3 Nov. 1979; coll. G. L. Pesce, G. Silverii and D. Maggi.

According to Coineau (1968), *M. marinus* shows morphological features of both freshwater and brackish or marine species of *Microcharon*. Its ecology and distribution is suggestive of a "thalassoid" (sensu Stock, 1977, 1980) origin for this species, at present widespread in coastal groundwaters of the Mediterranean [Portugal, Spain, France (including Corsica), Greece, Italy and Morocco].

As to its distribution in Italy. *M. marinus* is actually known, besides from phreatic waters of Sardinia, from coastal interstitial of Tuscany (island of Montecristo), Campania and Sicily.

REFERENCES

- COINEAU, N., 1968. Contribution à l'étude de la faune interstitielle. Isopodes et Amphipodes. Mém. Mus. natn. Hist. nat., (A) Zool. (n.S.), 55(3): 1-71.
- , 1986. Isopoda: Asellota: Janiroidea: 465-572. In: L. Botosaneanu, ed., Stygofauna Mundi (E.J. Brill/Dr. W. Backhuys, Leiden).
- , 1987. L'isopode *Microcharon* (Crustacea, Isopoda) abondant dans les eaux interstitielles de l'est Lyonnais. *M. reginae* n.sp., écologie et biogéographie. *Stygologia*, 3(3): 200-216.
- STOCK, J. H., 1977. *Microparasellidae* (Isopoda, Asellota) from Bonaire with notes on the origin of the family. *Stud. Fauna Curaçao*, 51(168): 69-91.
- , 1980. Regression model evolution as exemplified by the genus *Pseudoniphargus* (Amphipoda). *Bijdr. Dierk.*, 50(1): 105-144.