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FROM PHREATIC WATERS OF ITALY
(CRUSTACEA : COPEPODA)

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GIUSEPPE LUCIO PESCE

EUCYCLOPS SUBTERRANEUS (E. GRAETER) FROM PHREATIC WATERS OF ITALY (CRUSTACEA : COPEPODA) (*)

(*in redazione il 20 ottobre 1978*)

In the course of biological researches on the subterranean waters in central Italy, promoted by the Zoological Institute of the University of L'Aquila, a large number of hypogean cyclopids copepods were obtained from both interstitial and phreatic habitats.

Among these materials, which were committed to me for study, some specimens of the uncommon and little known subterranean species *Eucyclops subterraneus* (E. Graeter) were recognized.

The discovery of this noticeable species in the interstitial waters of central Italy is noteworthy and of some biogeographical value ; until now it had never been collected in Italy, and had been only recorded from cave and interstitial waters of Switzerland, France, Roumania, Jugoslavia and Japan. The distribution of this species is still little known and it is most probable that its geographical range could be enlarged by further investigations in the interstitial biotopes.

At present time, *E. subterraneus*, as well as its subspecies, is reported as inhabitant of subterranean waters only, and this fact suggested that it could be considered as a troglobitic (stygobiont, according to some AA.) species (PLESA, 1969, 1971 ; PETKOVSKI, 1971 ; LESCHER-MOUTOUÉ, 1974, 1975).

As regard its systematic status, PLESA (1969, 1971) resolved that it could include, as synonymous, the following other species and sub-

(*) Contribution to knowledge of the underground waters fauna in central and southern Italy : XII.

species : *Cyclops graeteri* (Chappuis 1927) ; *Cyclops macrurus* var. *subterranea* (E. Graeter 1907) ; *Eucyclops macrurus intermedius* (Damian 1955) and *Eucyclops miurai* (Ito 1952), the first ones from subterranean waters of Europe, the last one from subterranean waters of Japan.

PETKOVSKI (1971) subdivided *E. subterraneus* in Europe, as follows : *Eucyclops subterraneus subterraneus* (E. Graeter) ; *E. subterraneus napheus* Petkovski 1971 ; *E. subterraneus intermedius* (Damian 1955) ; *E. subterraneus damianae* Petkovski 1971 and *E. subterraneus inarmatus* (Kiefer 1932).

Later on, in describing materials from caves in France, LESHER-MOUTOUÉ (1974, 1975) considered *E. graeteri* (Chappuis 1927) as a separated species.

The materials from Italy, according to PETKOVSKI (1971), quite fit in the subspecies *intermedius* by Damian, which since now has been reported only from subterranean waters of Roumania (Cluj, Crisana, Bonat).

Because of the great biogeographical interest and the little variations we pointed out in our specimens as compared to the original description and illustrations by Damian, we think useful to give their morphological description, together with some remarks on their ecology and variability, which allows a better knowledge of this subspecies as well as of the species *E. subterraneus* in Europe.

EUCYCLOPS SUBTERRANEUS INTERMEDIUS (DAMIAN 1955)

1955 – *Eucyclops macrurus* var. *intermedius* Damian, Bul. Acad. R.P.R., p. 427

1963 – *Eucyclops* (*Eucyclops*) *macrurus intermedia*, Damian, Fauna Rep. Pop. Romine, Ed. Acad., R.P.R., 4, 6, p. 84

Material examined : 6 ♀♀ and 2 juv. (cop. III, IV), dissected and mounted in polivinil-lacthophenol on microscopic slides, labelled Ma.22.1-Ma.22.6 ; Valdaso, Ascoli Piceno (Marche), fresh-water well (water depth : 5 m ; temperature : 18.5°C ; pH : 6.5 ; bottom sediment composed of thin sandstone with many small fossil remains) ; coll. G. Baldoni, december 27, 1977.

In the same locality *E. subterraneus intermedius* lives in association with the other cyclopids copepods *Tropocyclops prasinus* (Fischer 1860) and *Diacyclops bicuspidatus odessanus* (Schmankevitch 1875), and with

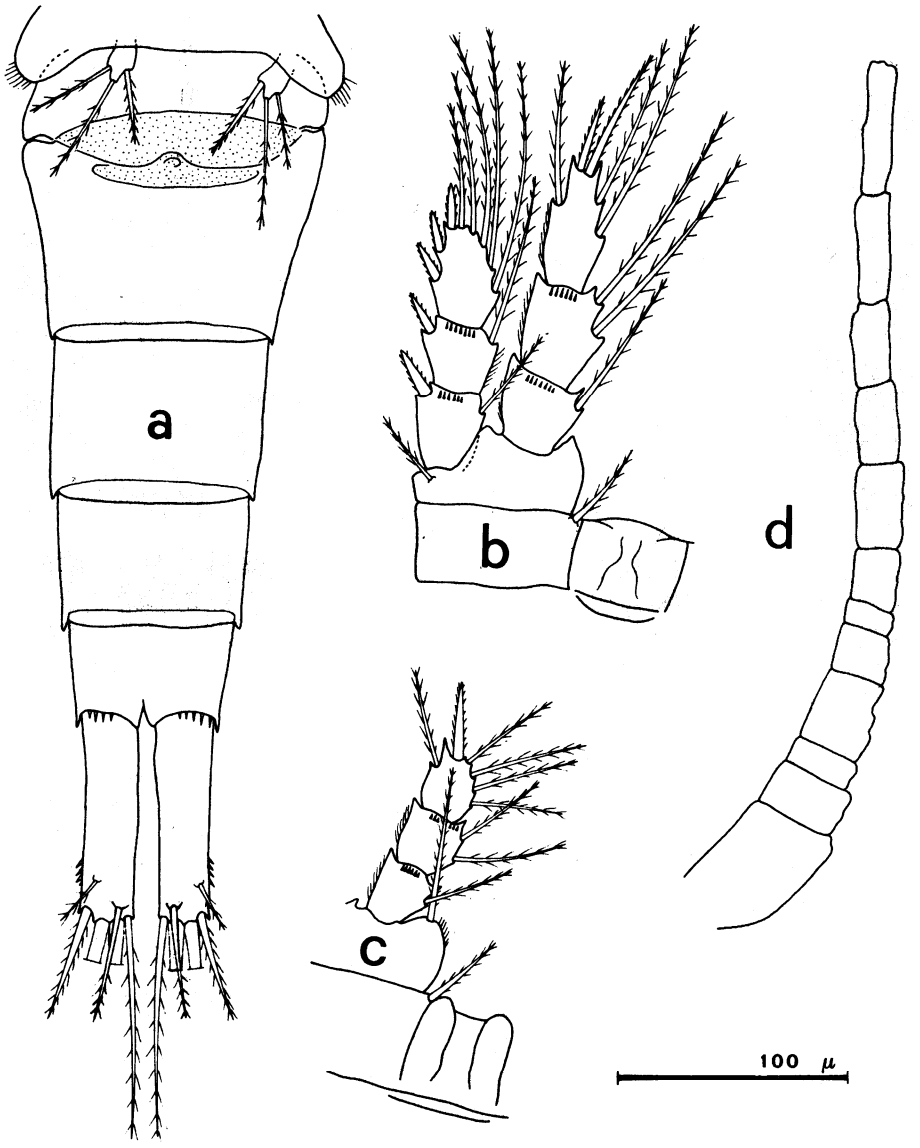

Fig. 1 — *Eucyclops subterraneus intermedius* (E. Graeter). a. abdomen and furcal rami, ventral view ; b. P_4 ; c. endopodite of P_1 ; d. antennula.

harpacticoids copepods, amphipods (*Salentinella angelieri* Ruffo et Delamare Deboutteville 1952), asellids isopods (*Proasellus adriaticus* Argano et Pesce, in press), ostracods, oligochaetes and water mites.

Materials deposited at the Zoological Institute of the University of L'Aquila, Italy (author's collections).

Description : Body elongated ; length, excluding furcal setae and antennae 870–990 microns ; cephalothorax short ; genital segment slightly longer than large ; thoracic segment 5, lateral corners with hair–like setae.

Furcal rami about 4.2 times longer than large ; external lateral seta implanted on 1/3 distal ; marginal inner seta long, about 2 (1.57–2.26) times the length of the outer one, and slightly longer than the furcal rami. Furcal rami, each with a row of 3–7 small spinules on the external margin, beneath the external lateral seta.

Antennulae 12–segmented, overreaching the second thoracic segment, and without visible hyaline lamella on the segment 12.

P_1–P_4 3–segmented ; exopodites spine formula : 3 4 4 3 ; exopodites setae formula : 5 5 5/6 5 ; endopodite 3 of P_4 more than twice longer than large (L/l = 2.13 — 2.61), apical spines of different length, the inner much longer than the outer one and about as long as the article.

P_5, spine about as long as the external seta.

P_6 with two short spines and one inner seta.

The biometrical data of the females are reported in the Table I.

Remarks : The specimens we examined quite agree with the description and the illustrations by DAMIAN (1955, 1963), as well as, according to PETKOVSKI (1971), they fall into the subspecies *E. subterraneus intermedius* (Damian 1955).

The little variations we pointed out in the above materials as compared to the description by DAMIAN (1955) are the following : greater size (870–990 microns, versus 600–700 microns) ; slightly shorter genital segment ; spine of P_5 about as long as the outer seta (versus the same spine is slightly shorter than the external seta) ; more elongated article 3 of the endopodite of P_4.

In our opinion these small differences are variations of little systematic importance, and could be due to the particular ecological conditions of the collecting locality (ecotypes).

From a biogeograph point of view the discovery of *E. subterraneus* in the underground waters of Italy is most interesting as it greatly

TABLE I

Measurements (Microns) of *Eucyclops subterraneus intermedius* (E. Graeter), from Central Italy (Marche)

		Furcal rami						Endopodite 3 of P_4					
Prep. n.	Size	L	l	L/l	L Ti	L Te	LTi/LTe	L	l	L/l	L inner ap. sp. (a)	L outer ap. sp. (b)	a/b
Ma 22.1	920	91	20	4.55	103	55	1.85	47	18	2.61	51	30	1.70
Ma 22.2	870	80	18	4.44	88	45	1.95	45	20	2.25	49	29	1.60
Ma 22.3	990	100	22	4.54	100	53	1.88	47	22	2.13	54	34	1.58
Ma 22.4	885	83	20	4.15	85	54	1.57	47	18	2.61	57	30	1.90
Ma 22.5	895	88	22	4.00	102	45	2.26	44	20	2.20	51	28	1.82
Ma 22.6	884	97	24	4.04	95	39	2.43	51	22	2.31	58	31	1.87
$m \pm S_m$	907 ± 2.70	89.8 ± 1.13	21 ± 0.58	4.28 ± 0.20	95.5 ± 1.12	48.5 ± 1.03	1.99 ± 0.22	46.8 ± 0.63	20 ± 0.54	2.35 ± 0.18	53.3 ± 0.77	30.3 ± 0.58	1.74 ± 0.15

L = length ; l = width ; Ti = inner furcal seta ; Te = outer furcal seta.

Up to now this noticeable species was known from underground waters of France, Switzerland, Jugoslavie, Roumania and Japan.

According to PETKOVSKI (1971), the materials from Italy quite fit into the subspecies *E. subterraneus intermedius* (Damian 1955), which was known only from the subterranean waters of Roumania.

A description of the examined specimens, as well as some remarks on the variability, the ecology and the systematic of *E. subterraneus* in Europe are given.