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The Occurrence of *Diacyclops antrincola* Kiefer (Crustacea, Copepoda) in Subterranean Waters of Turkey, and Remarks on Its Variability and Distribution.

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Abstract

The hypogean cyclopid copepod *Diacyclops antrincola* Kiefer is for the first time reported from subterranean waters of Turkey. The record let us to better know the variability of this species, as well as greatly enlarges to East its geographical range.

In the course of researches on the underground waters fauna in Eastern Mediterranean, promoted by the Zoological Institute of the University of L'Aquila (Italy), some specimens of the interesting cyclopid copepod (*Diacyclops antrincola*) Kiefer were collected from brackish wells along the coast of the Marmara Sea (Turkey).

The above record is noteworthy and of some biogeographical and ecological value, as it greatly enlarges to East the geographical range of this species, adding a new and interesting feature to the cyclopid fauna of Europe, as well as it suggests that *D. antrincola* could be a true stygobiont, which likely lives in slightly brackish waters only, in coasting phreatic systems.

D. antrincola was described by Kiefer (1967) on materials from the cave "Grotta del Fiume", Ancona (central Italy); secondly, Petkovski (1971) reported the species from subterranean waters of Montenegro (Yugoslavia); later on, Pesce and coll. (1978, 1979), Pesce and Fabrizi (1979) and Pesce and Maggi (in press) widely enlarged its geographical range, including the southern Italy (Apulia), the continental Greece and some ionian islands.

The new data, here reported, besides the biogeography, let us to better know the systematic and the ecology of this species, as well as to define its real variability.

In particular, in the present paper, we report the main morphological features of the examined specimens, compared to those from the previous descriptions and illustrations, together with some remarks on the variability, the ecology and the geonomy of the species.

Diacyclops antrincola Kiefer 1967

D.antrincola : Kiefer 1967, pp. 133-138, figs. 1-6, central Italy

D.antrincola : Petkovski 1971, pp. 93-95, figs. 35-37, Yugoslavia

D.antrincola ; Pesce and coll. 1978, pp. 39-43, fig. 7, southern Italy

D.antrincola : Maggi and Pesce (in press), Greece

MATERIALS

3 ♀♀ , 2 ♂♂ and some juveniles (cop. IV-V) from brackish wells (Tu. 8, Tu. 10) along the southern coast of the Marmara Sea, near the village of Lapseki (depth of water: 2.0-2.4 m; temperature: 15.7-15.8 °C; pH: 7; bottom sediment composed of thin organogenic sandstone detritus); April 15, 1979; coll. Pesce and Silverii.

In the same localities *D.antrincola* lives in association with other cyclopids copepods as *Paracyclops fimbriatus* (Fischer), *Diacyclops languidoides* (Lilljeborg) and *Cyclops* sp. and with the following other groups: harpacticoids copepods, asellids isopods, amphipods, oligochaetes and ostracods.

Materials, some dissected and mounted on coverlips in Faure solution, are in the author's collections, at the Zoological institute of the University of L'Aquila (Italy).

Description

Body length 0.85-0.98 mm, including furcal rami, not including furcal setae, Genital segment slightly longer than large. Antennula (A₁), 12-segmented, reaching the posterior margin of the first thoracal segment; segments 1, 8 and 9 much longer than others; aesthetasc on the article 9 reaching 1/2 the article 10; comparative lengths of the articles as follows: 37-10-5-13-10-5-14-29-24-11-15-18.

Antenna (A_2) without particular characteristics.

Swimmings legs with rami 3-segmented; uniting lamella of P_1 - P_3 with two sets of thin hairs, that of P_4 with two sets of hairs and a row of small sinules; spine formula of the exopodites: 2 3 3 3. Inner margin of the median segments of endopod p_2 - P_3 with one seta only. Setae formula of swimmings legs, as follows:

P_1	P_2	P_3	P_4
1 1	1 1	1 1	1 1
1 1	1 1	1 1	1 2
4 4	4 4	4 4	4 2

P_4 , article 3 of endopodite 1.56-1.70 times longer than large and armed with two long apical, divaricate spines, the inner 1.3 times longer than the outer one and slightly longer than the article. P_5 , distal article long ($L/1 = 2.2$ - 2.4); distal spine 1.2 times longer than the article itself.

P_6 armed with a very long seta and two shorter spiniform setae.

Furcal rami subparallel, 4.18-4.35 times longer than large (width measured at the insertion of the lateral seta); lateral setae inserting about at the distal quarter of each ramus; inner apical setae 1.70-1.75 times longer than the outers and about as long as each ramus; dorsal setae relatively long, and about as long as the rami and the inner apical setae.

Some body comparative measurements among the known populations of *D. antrincola* are presented in the Table 1.

Table 1

<i>D. antrincola</i>	Furca			P_4	
	L/1	Ti/Te	ds/Ti	L/1	ratio: inner/outer spines
1. Central Italy	4.87-5.38	1.57-1.67	about 0.80	1.66-1.77	1.05-1.1
2. South Italy	4.20-4.50	1.71-1.79	0.95-1.0	1.65-1.70	1.19-1.25
3. Yugoslavia	about 5	about 1.90	about 0.75	about 2	about 1.30
4. Greece	4.10-4.30	1.89-1.94	0.95-1.0	1.68-1.76	1.05-1.17
5. Turkey	4.18-4.35	1.70-1.75	about 1	1.65-1.70	1.29-1.31

1. after Kiefer, 1967
2. after Pesce and coll., 1978
3. after Petkovski, 1971
4. after Maggi and Pesce, in press
5. after present records.

REMARKS

D. antrincola is included in the group ("crassicaudis") of *Di-n cyclops* which are characterized by a 12-segmented antennula, i. e.: *D. alticola* (Kiefer, 1935), *D. crassicaudis* (Sars, 1863), *D. karmani* (Kiefer, 1932) and *D. skopljensis* (Kiefer, 1932).

Within this group it is easily distinguishable, as Kiefer (1967) suggested, and Petkovski (1971) and Pesce and coll. (1978) corroborated, by numerous features, as the coxal plates of P_1 - P_4 , the terminal spines of the segment 3 of endopod P_4 (slender, slightly differing in length and well divaricate) and mainly by the presence of one seta only on the inner margin of the median segment of the endopod P_2 - P_3 .

From an ecological point of view, the existing data strongly suggest that *D. antrincola* is to be considered a stygobiont species, which lives in underground waters only; moreover, as far as we know, it lives in slightly brackish waters, in subterranean systems, along the sea coasts.

As for the biogeography, on evidence of the present records, *D. antrincola* could be considered as a nord-mediterranean oriental element in the subterranean aquatic biocoenosis.

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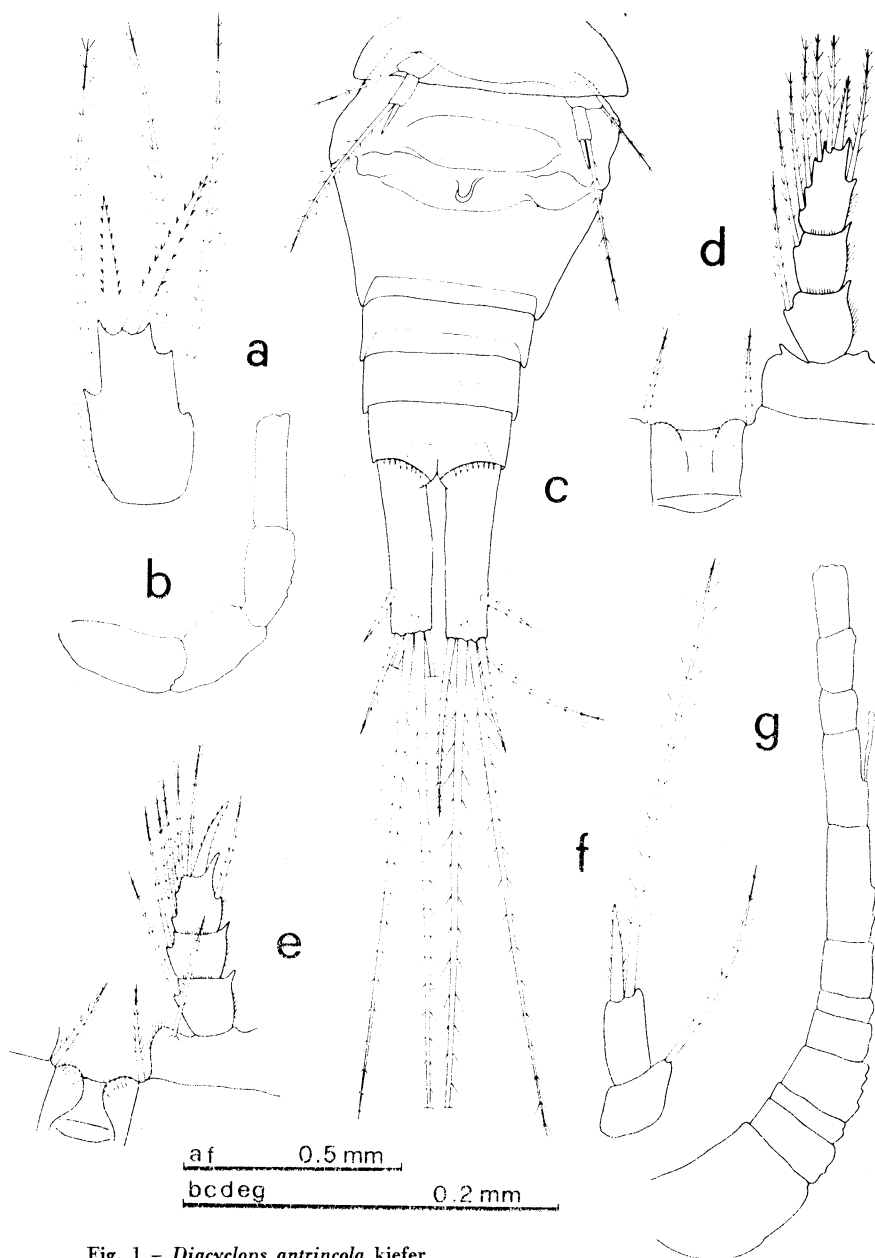


Fig. 1 - *Diacyclops antrincola* kiefer
 a. endopodite P_4 , article 3; b. antenna; c. abdomen and furcal rami, ventral view;
 d. endopodite P_3 ; e. endopodite P_1 ; f. P_5 ; g. antennula

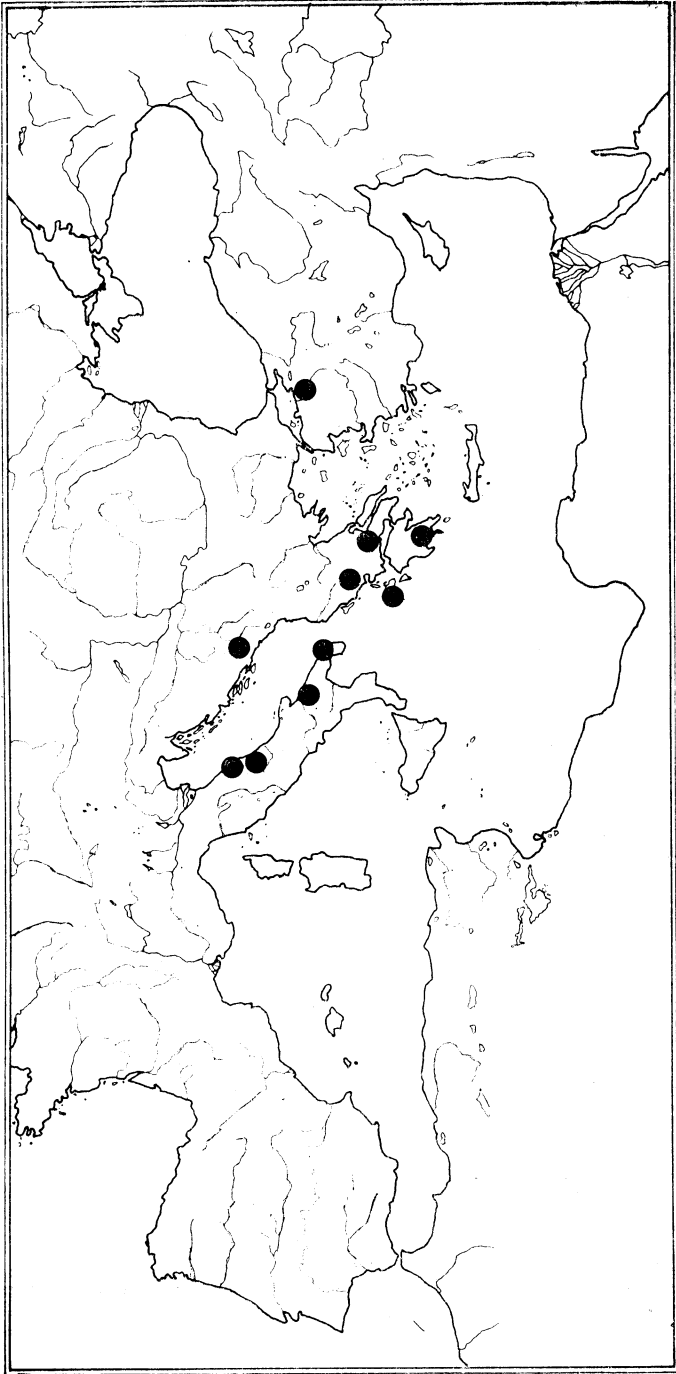


Fig.2 - Distribution of *Diacyclops antrincola* Kiefer