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

By

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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 geonemy 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 Pecce (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 (*A*), 12- segmented, reaching the posterior margin of the first thoracic 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 (A₂) without particular characteristics.

Swimmings legs with rami 3–segmented; uniting lamella of P₁–P₃ with two sets of thin hairs, that of P₄ 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 p₂–P₃ with one seta only. Setae formula of swimmings legs, as follows:

<table>
<thead>
<tr>
<th>P₁</th>
<th>P₂</th>
<th>P₃</th>
<th>P₄</th>
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<tbody>
<tr>
<td>1</td>
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<td>4</td>
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P₄, 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. P₅, distal article long (L/1 = 2.2–2.4); distal spine 1.2 times longer than the article itself.

P₆ 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

<table>
<thead>
<tr>
<th>D. antrincola</th>
<th>Furca</th>
<th>P₄</th>
<th>ratio: inner/outer spines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L/1</td>
<td>Ti/Te</td>
<td>ds/Ti</td>
</tr>
<tr>
<td>1. Central Italy</td>
<td>4.87–5.38</td>
<td>1.57–1.67</td>
<td>about 0.80</td>
</tr>
<tr>
<td>2. South Italy</td>
<td>4.20–4.50</td>
<td>1.71–1.79</td>
<td>0.95–1.0</td>
</tr>
<tr>
<td>3. Yugoslavia</td>
<td>about 5</td>
<td>about 1.90</td>
<td>about 0.75</td>
</tr>
<tr>
<td>4. Greece</td>
<td>4.10–4.30</td>
<td>1.89–1.94</td>
<td>0.95–1.0</td>
</tr>
<tr>
<td>5. Turkey</td>
<td>4.18–4.35</td>
<td>1.70–1.75</td>
<td>about 1</td>
</tr>
</tbody>
</table>

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-p cyclops_ which are characterized by a 12–segmented antennula, i.e.: _D. alticola_ (Kiefer, 1935), _D.crassicaudis_ (Sars, 1863), _D. karamani_ (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 P₁–P₄, the terminal spines of the segment 3 of endopod P₄ (slender, slightly differing in length and well divericate) and mainly by the presence of one seta only on the inner margin of the median segment of the endopod P₂–P₃.

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.

REFERENCES


Fig. 1 – *Diacyclops antrincola* kiefer
a. endopodite $P_3^1$; article 3; b. antenna; c. abdomen and furcal rami, ventral view;
d. endopodite $P_3^2$; e. endopodite $P_1^1$; f. $P_3^3$; g. antennula
Fig. 2 - Distribution of Diacylops antarcticus Kiefer