COPEPODS FROM GROUND WATERS OF WESTERN AUSTRALIA.
III. DIACYCLOPS HUMPHREYSI N. SP., AND COMMENTS ON THE
DIACYCLOPS CRASSICAUDIS-COMPLEX (COPEPODA, CYCLOPIDAE)

BY

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ABSTRACT

*Diacyclops humphreysi* n. sp. is described from the Cape Range karst area, North-west Cape Peninsula, Western Australia. The new species fits the *Diacyclops crassicaudis*-complex (Reid, 1992), being close to *D. longifurcus* Shen & Sung, 1963, from China and *D. alticola* Kiefer, 1935, from India.

The *Diacyclops crassicaudis*-complex is for the first time recorded in Australia.

RÉSUMÉ


Jusqu’à présent le groupe *crassicaudis* n’avait pas été signalée en Australie.

INTRODUCTION

In a continuing study of cyclopid copepods from different groundwater habitats (anchialine caves, sinkholes, production drillings, wells) of the Cape Range karst area, North-west Cape Peninsula (tropical northwestern Australia), entrusted to us for determination through the kindness of Dr. W. F. Humphreys of the Western Australian Museum (Perth), a new species of the *Diacyclops crassicaudis*-complex, herein described as *Diacyclops humphreysi* n. sp., has been identified.

The present finding represents the first record of representatives of the *Diacyclops crassicaudis*-complex from the Australian continent; it also brings the total number of species of *Diacyclops* recorded to date from Australia and nearby Tasmania up to three, the others being *D. bisetosus* (Rehberg, 1880) and *D. cryonastes* Morton, 1985.
Another species, *Diacyclops crassicaudoides* (Kiefer, 1928), has been reported from Tasmania (Brehm, 1953) but, according to Morton (1985), it is to be considered a junior synonym of *D. bisetosus*.

**MATERIAL AND METHODS**

Specimens, completely dissected, were mounted on cover slips in commercial polyvinyl-lactophenol. The figures were prepared using a camera lucida on a Leitz Laborlux D phase-contrast microscope.

The holotype and some paratypes were deposited in the Western Australian Museum, Perth, Australia; remaining paratypes are deposited in the collections of the “Museo Civico di Storia Naturale”, Verona, Italy.

Terminology applied to body and appendages is in accordance with Huys & Boxshall (1991).

Detailed information on the collecting area and localities is fully described in Humphreys (1993) and Pesce et al. (in press).

**Cyclopidae Burmeister, 1834**

**Cyclopinae Kiefer, 1927**

**Diacyclops** Kiefer, 1927

*Diacyclops humphreysi* n. sp. (figs. 1-12)


Description. — Adult female, body length excluding caudal setae and antennule, 600 µm (holotype), 595-605 µm (paratypes). Hyaline frills of all prosomites smooth. Genital double somite broader than long, expanded into two medio-lateral protuberances. Hyaline frills of genital double somite and two sub-
sequent somites weakly crenulate; fourth somite with small spines dorsally. Seminal receptacle with poorly developed anterior and posterior expansions. Anal operculum not sclerotized.

Caudal rami 3 times (holotype), 2.9-3.2 times (paratypes) longer than broad in dorsal view; innermost apical seta about 1.5 times longer than outermost; dorsal seta long, more than two times longer than caudal ramus; lateral seta inserted at posterior 3/5ths of ramus. Inner margin of ramus smooth.

Antennule 12-segmented, and armed as in fig. 1.

Antenna 5-segmented, comprising coxa, basis, and 3-segmented endopod. Endopodal vestigial seta absent; basis without ornamentation both on frontal and caudal side, but bearing two plumose setae on the inner distal angle [type 2a, according to Reid (1991)]; first endopodal segment with one outer seta; second endopodal segment with 4 setae arranged along the inner margin and 2 setae on the subdistal angle; third endopodal segment armed with 7 setae around distal margin.

Mandible consisting of a well-developed coxa with gnathobasis, and reduced palp, represented by three setae, two long and plumose, the other much shorter and naked.

Maxillula with precoxa bearing reduced, 2-segmented palp; precoxal endite with 4 spiniform setae and 4 stout spines fused to the segment; proximal segment of palp with 3 apical and one outer setae; distal segment armed with 3 setae.

Maxilla 4-segmented, including syncoxa, basis, and 2-segmented endopodite. Syncoxa bearing 3 endites; proximal endite armed with two plumose setae, middle endite consisting of a single plumose seta, distal endite with well-developed process bearing 2 apical plumose setae; beak-like extensions finely denticulated or ciliated.

Maxilliped 4-segmented, comprising syncoxa, basis, and 2-segmented endopodite; syncoxa armed with two inner setae representing vestigial endites; basis with one inner and one subdistal setae; first endopodal segment bearing a single plumose seta, second endopodal segment with 3 setae, outermost the shortest.

Swimming legs 1-4 with 3-segmented rami, terminal articles of exopodite with total of 2.3.3.3 spines and 4.4.4.4 setae, respectively; couplers without ornament. Basis of leg 1 with inner setiform spine, overreaching half of second article of endopodite. Endopodite 3 of leg 4 about 1.5 times longer than broad; terminal inner spine much shorter than outermost.

Terminal spine of leg 5 equal to or slightly longer than article 2 in length; lateral seta about 6 times longer than article.
Figs. 1-7. *Diacyclops humphreysi* n. sp. 1, antennula (♀); 2, antennula (♂); 3, maxilliped (♀); 4, antenna (♀); 5, mandible (♀); 6, maxillula (♀); 7, maxilla (♀).
Figs. 8-12. *Diacyclops humphreysi* n. sp. 8, abdomen and caudal rami, dorsal view (♀); 9, leg 1 (♀); 10, abdomen and caudal rami, ventral view (♂); 11, leg 4 (♀); 12, leg 5 (♀).
Male with habitus much slenderer than female. Length 580-590 μm. Antenna, mouthparts, swimming legs, leg 5, and caudal rami similar to those of female. Antennule geniculate, 16/17-segmented, armed as in fig. 2. Urosoma 6-segmented. Genital somite bearing paired genital pores ventrally. Leg 6 consisting of opercular plates closing off genital apertures and bearing one outer plumose seta and one inner, shorter spine.

Etymology. — Named after Dr. W. F. Humphreys, who collected the new species.

Affinities. — *Diacyclops humphreysi* n. sp. is a member of the *Diacyclops crassicaudis* species-complex (Reid, 1992), whose species and subspecies are characterized by a 12-segmented antennula and swimming legs 1-4 with both rami 3-segmented.


Some subspecies, such as *D. crassicaudis cretensis* and *D. crassicaudis brachycercus*, which are very similar to each other, have been much discussed (Dussart, 1969; Monchenko, 1974; Rylov, 1948; Pesce & Galassi, 1987), and recently Reid (1992) hypothesized that there is no good reason for distinguishing these nominal taxa, at least not in North America.

For the most part, species of the above complex are stygophilic or stygogene inhabitants of local (ground) freshwater systems of Asia, North America, and Africa. The others are known from subterranean (caves, wells) habitats of Europe (*D. antrincola, D. crassicaudis var. cosana, D. crassicaudis cretensis, D. fontinalis, D. karamani, D. ruffoi, D. skopljensis*) or in Iran (*D. iranicus*) but, with the exception of *D. antrincola* and *D. ruffoi*, they do not possess peculiar stygobiontic morphological characteristics.

Two species of the *Diacyclops crassicaudis*-complex, viz. *D. longifurcatus* and *D. alticola*, from China and India, respectively, are similar to *D. humphreysi* n. sp. in having the inner apical spine of the endopodite 3 of leg 4 shorter than the outermost one.
From these species *D. humphreysi* n. sp. can be readily distinguished by the differing length of the caudal rami (L/1 = 7.5 in *D. longifurcatus*; 6.5 in *D. alticola*; about 3 in *D. humphreysi*), the different length ratio between inner and outer apical caudal setae (subequal both in *D. longifurcatus* and *D. alticola*; inner seta longer than outermost in *D. humphreysi*), and the remarkable length of the dorsal caudal seta; moreover, the endopodal segment 3 of leg 4 is much more elongated in *D. longifurcatus* (L/1 about 2) than in *D. humphreysi* n. sp. (L/1 about 1.5).

From both the other species mentioned, *D. humphreysi* n. sp. also differs by some distinctive stygobiontic morphological characteristics, such as the small size, the enlarged genital double somite, the reduced ornamentation of the antennule and antenna, and the length of the caudal setae.

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