Zootaxa 617: 1–18 (2004)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

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A new species of *Eucyclops* Claus (Copepoda: Cyclopoida) from Southeast Mexico with a key for the identification of the species recorded in Mexico

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ABSTRACT

Eucyclops torresphilipi sp. nov. is described from samples collected in the state of Chiapas, on the southeastern Pacific coast of Mexico. It belongs to a group of species similar to the presumably cosmopolitan *E. agilis* (Koch, 1838). The new species is closest to the South American *E. delachauxi* (Kiefer, 1925); it can be distinguished from its congeners by a combination of characters that include a fifth leg with a particularly slender inner spiniform seta that is as long as the outer seta, the caudal rami has spinules covering up to ¾ of the outer margin, caudal rami over 4 times longer than wide, the relative length of the dorsal seta, and the proportion of the terminal spines of the third exopodal segment of the fourth legs. Only nine other nominal species of *Eucyclops* have been recorded in Mexico; nearly half of them are known also from South America. The new species seems to have a restricted distributional range; however, it could be present also in Guatemala. Its morphological affinity with South American forms confirms the influence of the South American cyclopoid fauna in Mexico. A key for the identification of the species of *Eucyclops* recorded in Mexico is included.

Key words: limnology, crustacean zooplankton, taxonomy

INTRODUCTION

The genus *Eucyclops* Claus, 1893 is the most speciose of the cyclopoid copepod subfamily Eucyclopinae. There are more than 135 nominal species and subspecies of this genus known to date (Dussart & Defaye 1985; Alekseev 1998). The knowledge of the genus in the Americas is meagre. Reid (1990) included 7 species and 1 subspecies in a faunistic account of Mexico, Central America, and the insular Caribbean. The number of species known in North (Williamson & Reid 2001) and South America (Rocha & Botelho 1998) is equally low.

Accepted by J. Olesen: 27 Jun. 2004; published: 27 Aug. 2004

The species of *Eucyclops* are currently divided into three subgenera, *Eucyclops* s.str., which contains most of the known species, *Stygocyclops* Pleşa, 1971, with only one species, and *Isocyclops* Kiefer, 1957 for endemic forms of Lake Baikal (see Dussart & Defaye 2001). Because of its diversification, the genus contains several problematic taxa; some species groups show a high intraspecific morphological variability. This, together with incomplete descriptions, has generated a taxonomic history that includes many species with an uncertain status (Collado et al. 1984; Reid 1985; Ishida 1997) and a complex taxonomy that relies on only a few relatively stable characters. One of the most relevant cases of taxonomical confusion includes *E. serrulatus* Fischer, 1851 and *E. agilis* (Koch, 1838), each one considered as a synonym of the other by two diverging streams of opinion (Yeatman 1959; Reid 1985; Ishida 1998); these two widely distributed nominal species, and also *E. speratus* (Lilljeborg, 1901) are undergoing taxonomical revision to evaluate cosmopolitanism. Species of *Eucyclops* occur as planktonic or littoral epibenthic forms in ponds and lakes worldwide (Williamson & Reid 2001). In this contribution a new species of *Eucyclops* is described based on specimens collected in Mexico. A key for the identification of the species recorded in this country is included.

MATERIAL AND METHODS

During the development of a project to determine the potential of copepods as biological controls of mosquitoes in Chiapas, Mexico, several zooplankton samples were obtained in different bodies of water in the southern part of the state between August and December 2003 (Fig. 1). Samples were collected using a standard plankton net hauled near the shoreline of the ponds. The biological material was then fixed and preserved in 70% ethanol. Copepods were sorted out from the entire original samples and maintained in 70% ethanol with a drop of glycerine. Male and female specimens of a species of *Eucyclops* were collected during this survey, tentatively identified as *E.* cf. *leptacanthus* Kiefer, 1956. The taxonomic re-examination of these individuals was motivated by the uncertainty of the taxonomic status of some of the neotropical records of this species (Collado et al. 1984) and differences observed in some of the structures with taxonomical relevance (Lindberg 1954, 1955; Reid 1985). These specimens were dissected and examined following the techniques described by Williamson and Reid (2001) and Reid (2003). Only female specimens were dissected, the male allotype was left undissected except for one of the antennules. All dissected specimens were mounted in semi-permanent slides with glycerine sealed with Entellan ®, a commercial, fast drying mounting medium and sealant. Drawings were done by the author with the aid of a camera lucida.

This new species was described and illustrated following the current standards for the taxonomic study of eucyclopine copepods (Reid & Janetzky 1996; Karaytug & Boxshall 1998; Alekseev 2000). Emphasis was given to describe the ornamentation of the coxal plates, the armature of the swimming legs and the caudal rami, including the length and

proportions of the caudal setae and the structure of the fifth legs (Karaytug 1999). The specimens of the new species were deposited in the collection of zooplankton at El Colegio de la Frontera Sur (ECO-CH-Z), in Chetumal, Mexico and in the Collection of Copepoda of the Muséum National d'Histoire Naturelle, Paris, France (MNH-COP).

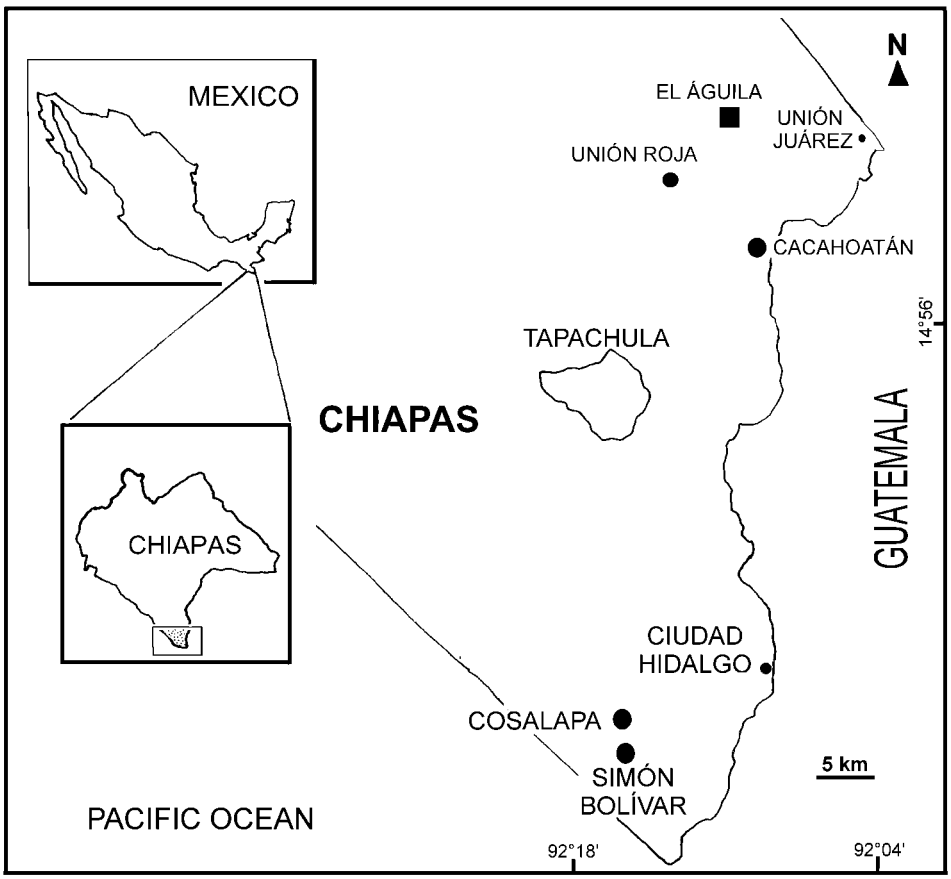


FIGURE 1. Location of the surveyed area in southern Chiapas, Mexico. The type locality of *Eucyclops torresphilipi* n. sp. is indicated by a solid square.

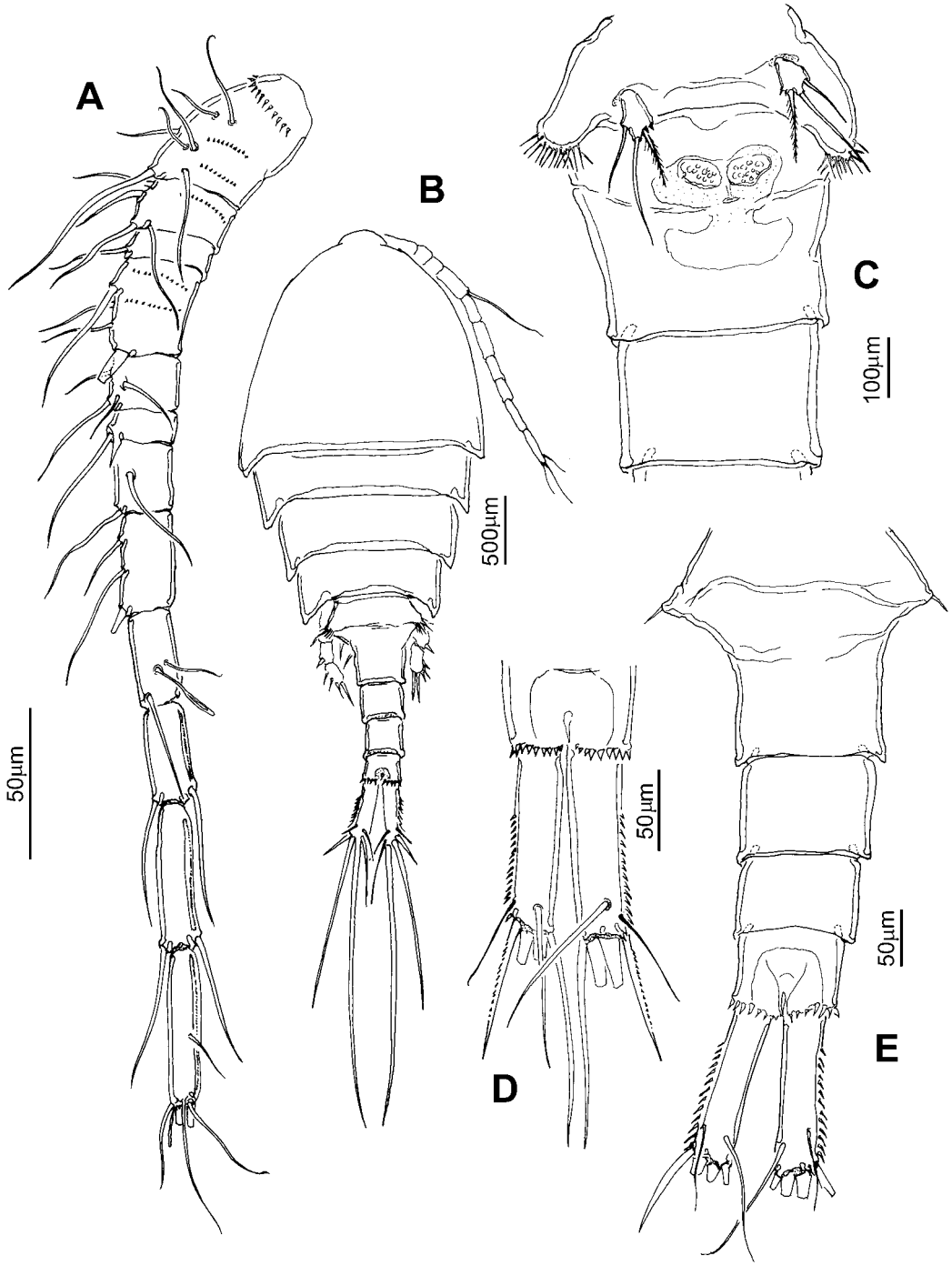
Order Cyclopoida Burmeister, 1835

Family Cyclopidae Dana, 1853
Subfamily Euyclopinae Kiefer, 1927
Genus *Eucyclops* Claus, 1893
***Eucyclops torresphilipi* Suárez-Morales, n. sp.**
(Figs. 2–5)

Material examined

Holotype. Adult ♀, dissected, mounted in glycerine sealed with Entellan (ECOCH-Z-

01809), pond in Ejido El Aguila, Cacahoatán, near Tapachula, Chiapas, Mexico (15° 05' 33" N; 92° 10' 46" W), January 1, 2004; coll. Felipe Hernández-Bravo.



FIGURES 2A–G. *Eucyclops torresphilipi* n. sp.. adult female from Chiapas, Mexico. A) antennule; B) habitus, dorsal view; C) fifth pedigerous and genital double-somites, ventral view; D) caudal rami, dorsal view; E) urosome, dorsal view, another specimen.

Paratypes. 1 dissected adult ♀, mounted in glycerine, slide sealed with Entellan (ECOCH-Z-01808), same locality and date as holotype, coll. Felipe Hernández. 12 undissected adult ♀♀, ethanol preserved (ECOCH-Z-01807), same locality and date as holotype, coll. Felipe Hernández-Bravo. Allotype. One partially dissected adult ♂, mounted in glycerine, slide sealed with Entellan (ECOCH-Z-01806), same locality and date as holotype; coll. Felipe Hernández-Bravo. Additional paratypes. Five undissected adult ♀♀, one undissected adult ♂, ethanol-preserved, vial deposited in the Muséum National d'Histoire Naturelle, Paris, France (MNH-Cp-2182). Additional, non-type specimens in collection of E. Suárez-Morales.

Type locality

Pond in Ejido "El Aguila", Cacahoatán, Chiapas, Mexico.

Etymology

The species name is a latinized composite formed by the surname and the first name of the two colleagues who collected this new species, José Luis Torres and Felipe Hernández-Bravo, respectively.

Descriptions

Female (Fig. 2B): Total body length = 0.680 ± 0.127 mm (n= 20) from anterior end of cephalothorax to posterior margin of furcal rami. Body elongated, cephalothorax relatively long, slightly expanded laterally at midlength of cephalosome in dorsal view; lateral margins of pedigers 3 and 4 straight, slightly produced posteriorly. Cephalothorax length = 0.45 ± 0.08 mm (n= 15), representing 66 % of total body length. Dorsal surface smooth, antennules reaching end of first pediger. Rostrum strong, wide, with two rows of spinules on lateral surfaces of rostral base converging near anteriormost end. Urosome slender, except for genital double-somite, lateral margins almost straight; urosome, excluding caudal rami, representing 34% of body length. *Antennule* (Fig. 2A): As usual in female *Eucyclops*, 12-segmented; armament per segment as follows (s= seta, ae= aesthetasc): 1(7s + ventral row of 10–12 unsocketed spines and two additional rows of spinules), 2(4s+ dorsal row of spinules), 3(1s), 4(4s+ two rows of spinules), 5(4s), 6(s+ 1 spine), 7(2s), 8(3s), 9(2s), 10(2s), 11(2s), 12(7s+1ae). Narrow hyaline membrane finely serrated on segments 10–12. Antennule reaching middle of second thoracic somite. *Antenna* (Fig. 3D): Four-segmented, basis with several groups of unsocketed spines on caudal surface. Largest spines on subdistal position, near insertion point of two anterodistal setae. Basis with long exopodal seta biserially pinnate. Second segment with 1 outer seta and inner row of 5–6 spinules. Third segment with 5 lateral and 3 outer distal setae; inner margin with row of spinules. Distal segment with 5 terminal and 2 subterminal setae. *Labrum* (Fig. 5F): Distal margin with 8 rounded teeth. Two rounded ventral plates in area where 2 groups of longer hair-like setae are medially conjoined. *Mandible* (Fig. 3A): Gnathobase with 5 strongly

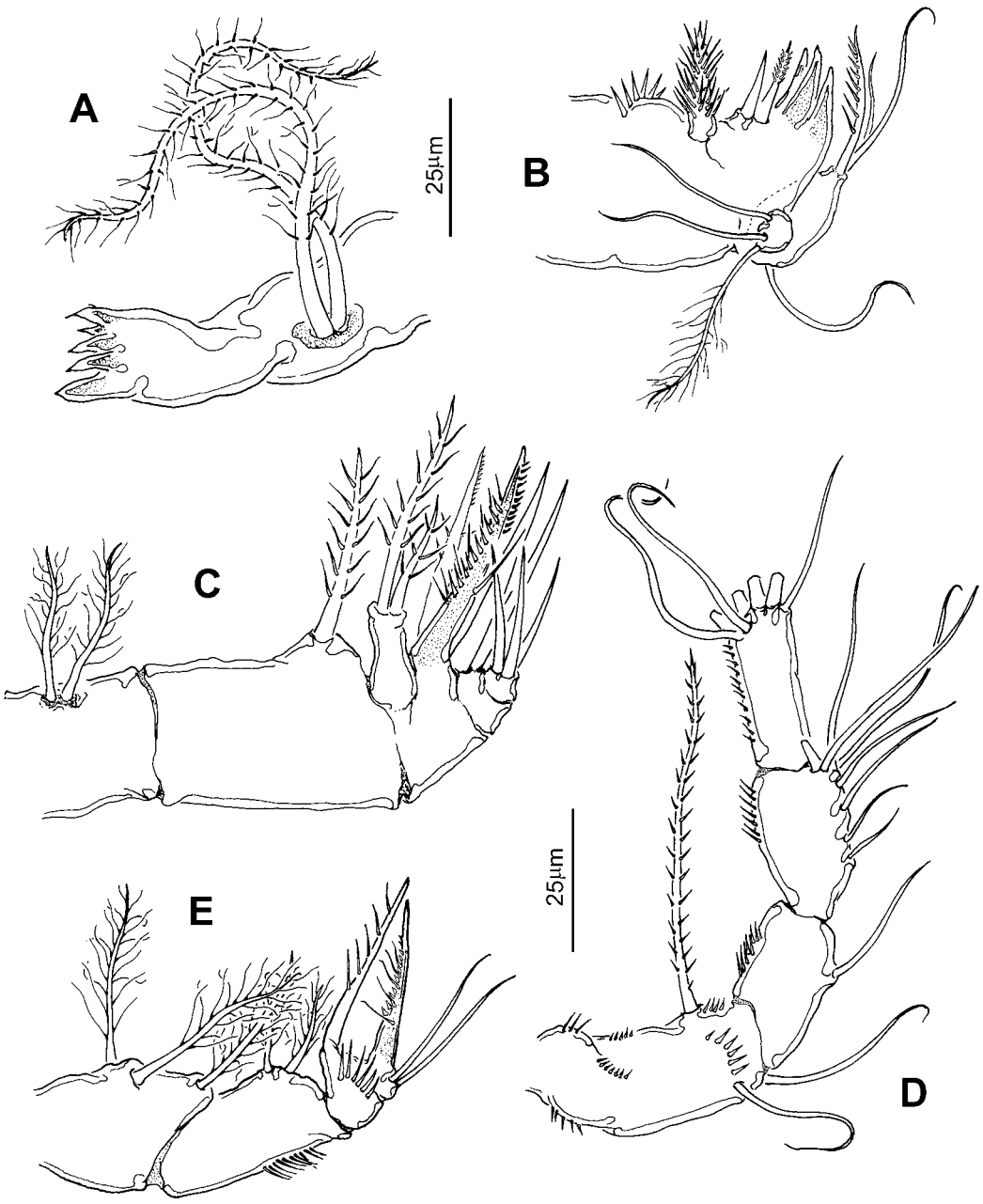
chitinized teeth. Palp reduced, with 2 long plumose setae. *Maxillule* (Fig. 3B): Praecoxal arthrite with 3 strong chitinized claws and 2 spiniform setae on frontal side. Proximal part of inner margin with thick, biserially plumose seta; row of 5 or 6 long spines near insertion point of thick seta. Maxillular palp with usual structure for family, with 3 setae on distal article and with 3 setae on proximal article, plus 1 long basal seta. *Maxilla* (Fig. 3C): Praecoxa and coxa separated; precoxal endite armed with 2 biserially setulated setae. Coxa with single long seta on distal inner margin; coxal caudal surface naked. Proximal basipodal endite well developed, with 2 apical seta furnished with spinules. Claw-like basal endite bearing 12–15 stout teeth along inner margin, row of fine denticles on distal 1/3 of outer margin, plus short, slender seta on frontal side. Endopod 2-segmented, proximal segment with 2 strong, long spiniform setae. Distal endopodal segment armed with 3 spiniform setae. *Maxilliped* (Fig. 3E): Four-segmented. Coxa with 3 setae bearing spiniform setules, 2 on midlength of coxa, 1 on distal position. Basis with 2 setae, both spinulate. One group of long spines on caudal surface. Endopod reduced, 2-segmented, first segment with wide-based, stout basal spine furnished with uniserial row of spinules on inner margin; row of 6–7 long spines on segment near insertion of stout seta. Second endopod armed with 1 proximal strong, spiniform seta armed with inner row of denticles and some setules along inner margin. Distal part of segment with 2 subequal, slender setae.

Leg 1 (Fig. 4A): Intercoxal sclerite (coupler) with 2 frontal rows of 4–6 and 7–10 unsocketed spines on each side plus proximal row of short spinules, distal margin with 2 rounded chitinized projections. Coxa with strong inner coxal seta. Basis with 1 slender seta on outer margin; inner margin with spines on insertion point of strong, biserially setulated spiniform basipodal seta; spiniform seta reaching beyond distal margin of second endopodal ramus. Endopod and exopod 3-segmented. Endopod slightly longer than exopod. Armature as in Table 1. *Leg 2* (Fig. 4B): Intercoxal sclerite (coupler) with 2 frontal, transverse rows of 7–10 spinules, plus 2 asymmetrical groups of spines, 1 on each side of coupler. Distal margin with 2 rounded chitinized projections (Fig. 5A). Coxa with strong inner coxal seta plus 2 rows of spinules along distal margin. Basis with 1 slender seta on outer margin; inner corner of basis forming sharp spiniform expansion. Distal margin with small spinules on disto-medial expansion between insertion point of exopod and endopod. Endopod and exopod 3-segmented. Endopod nearly as long as exopod. Armature as in Table 1. *Leg 3* (Fig. 4C): Intercoxal sclerite (coupler) with 2 frontal rows both of 4–6 unsocketed spines on each side, distal margin with 2 rounded chitinized projections each armed with 4 long unsocketed spines (Fig. 5D). Coxa with inner coxal seta. Basis with 1 relatively strong, biserially setulated seta on outer margin; inner corner of basis forming sharp spiniform expansion. Endopod and exopod 3-segmented. Endopod slightly longer than exopod. Armature as in Table 1. *Leg 4* (Figs. 5 B,C, H): Intercoxal sclerite (coupler) with light ornamentation on frontal surface, represented by row of 4–5 short unsocketed setiform elements on each side of plate; distal margin with 2 rounded chitinized projections (Fig. 5E). Coxa with strong inner coxal seta. Basis with 1 slender seta on outer mar-

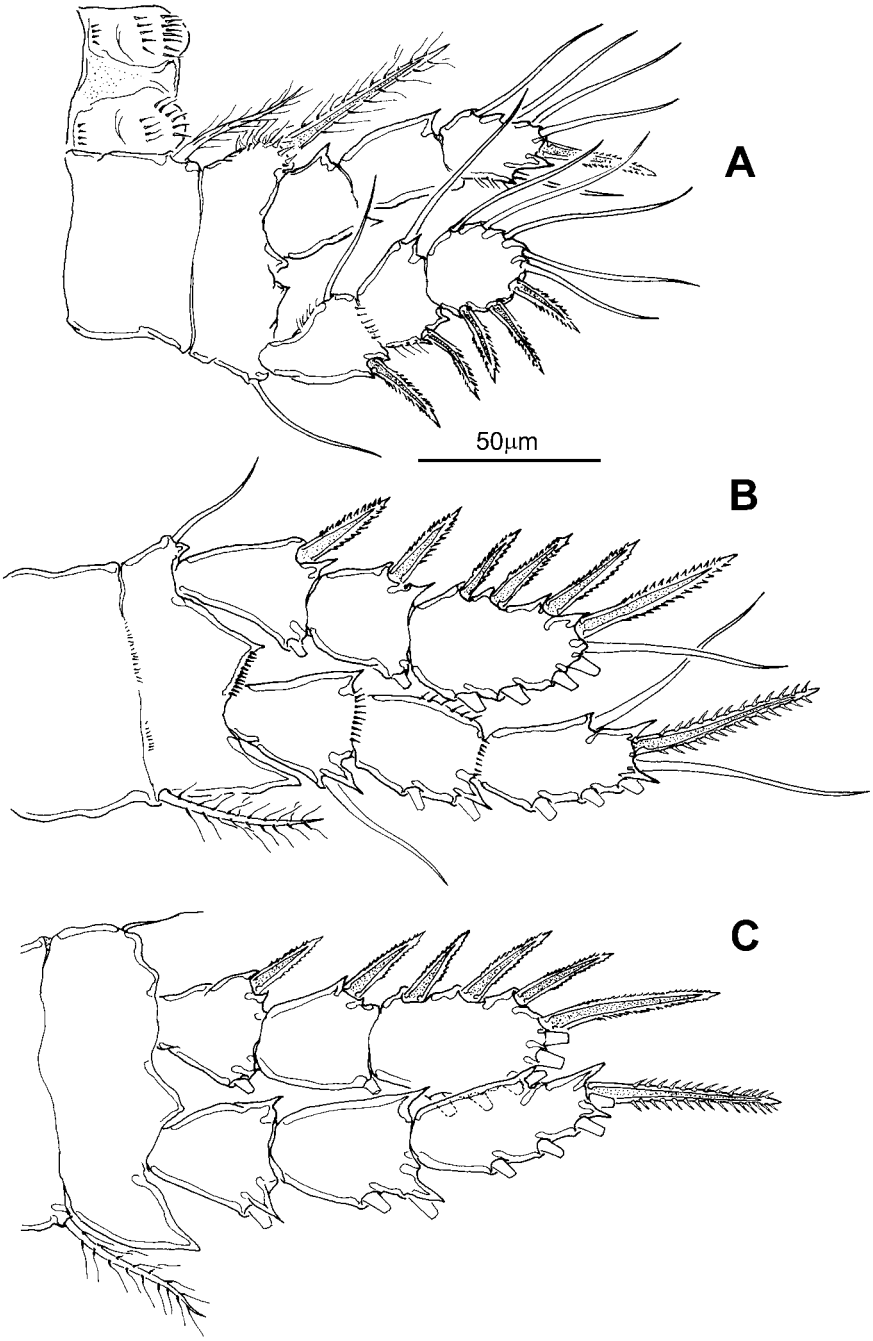
gin. Endopod and exopod 3-segmented. Endopod slightly longer than exopod. Armature as in Table 1. Outer and inner terminal endopodal spines finely spinulate along most of margins. Length ratio of outer and inner terminal spines of Enp 3= 1.22–1.25. Length/width ratio Enp 3= 2.1. Insertion point of seta on outer margin of Enp 3= 68%. Length of inner endopodal spine/endopod 3= 1.08–1.1. *Leg 5* (Figs. 2C, 5G): Leg consisting of broad article armed with 2 regular setae and 1 spiniform seta, middle seta longest, 2 remaining (inner and outer) setae subequal in length; inner spiniform seta biserially pinnate, particularly slender. Fifth leg article with cluster of 2–3 spinules along distal inner margin (arrowed in Fig. 5G). *Leg 6* (Fig. 2E): Small, low plate near lateral margin of genital double-somite with laterally directed dorsal seta and tiny lateral spinules. *Pediger 5* (Fig. 2C): Armed with tuft of hair-like setae on outer distal margin. *Urosome* (Figs. 2C, 2E): Formed by 4 somites, relative ratio of each urosomite as: 47.5: 22.5: 18.7: 11.2= 100. Genital double-somite representing 15–16.5 % of body length (excluding caudal rami). Genital double-somite smooth on ventral and dorsal surfaces. Anterior half of genital double-somite expanded laterally forming subtriangular processes with terminal short setae representing leg 6 (Fig. 2E). Paired eggsacs carried dorsolaterally. Each sac with 4–6 eggs. Seminal receptacle with 2 short, rounded lateral arms; lateral channels straight. Posterior margin rounded, sac-like. Ventral surface of anal somite smooth; distal ventral and dorsal margins with rows of 10–12 stout spines at insertion points of caudal rami (Figs. 2D,E, 5I). *Caudal ramus* (Figs. 2D,E): Ramus representing 11.7 % of total body length and 0.35 times as long as urosome. Length/width ratio= 4.1–4.5. Inner margin smooth. Outer margin armed with row of spinules from proximal 1/3 to distal margin; spines increasing in size distally. Cluster of spines at base of lateral terminal spiniform seta. Lateral terminal spiniform seta noticeably long, 0.75 times as long as caudal ramus. Dorsal seta relatively short, 0.72–0.85 times as long as caudal ramus. Lateral seta inserted subterminally, near the insertion point of the terminal setae. Dorsal seta inserted at about distal ¾ of caudal ramus length. Inner terminal seta longest, about 30% longer than outer terminal seta.

TABLE 1. Armature of swimming legs 1–4 (spines in Roman numerals, setae in Arabic) of *Eucyclops torresphilipi* n.sp. Sequence follows outer to inner positions.

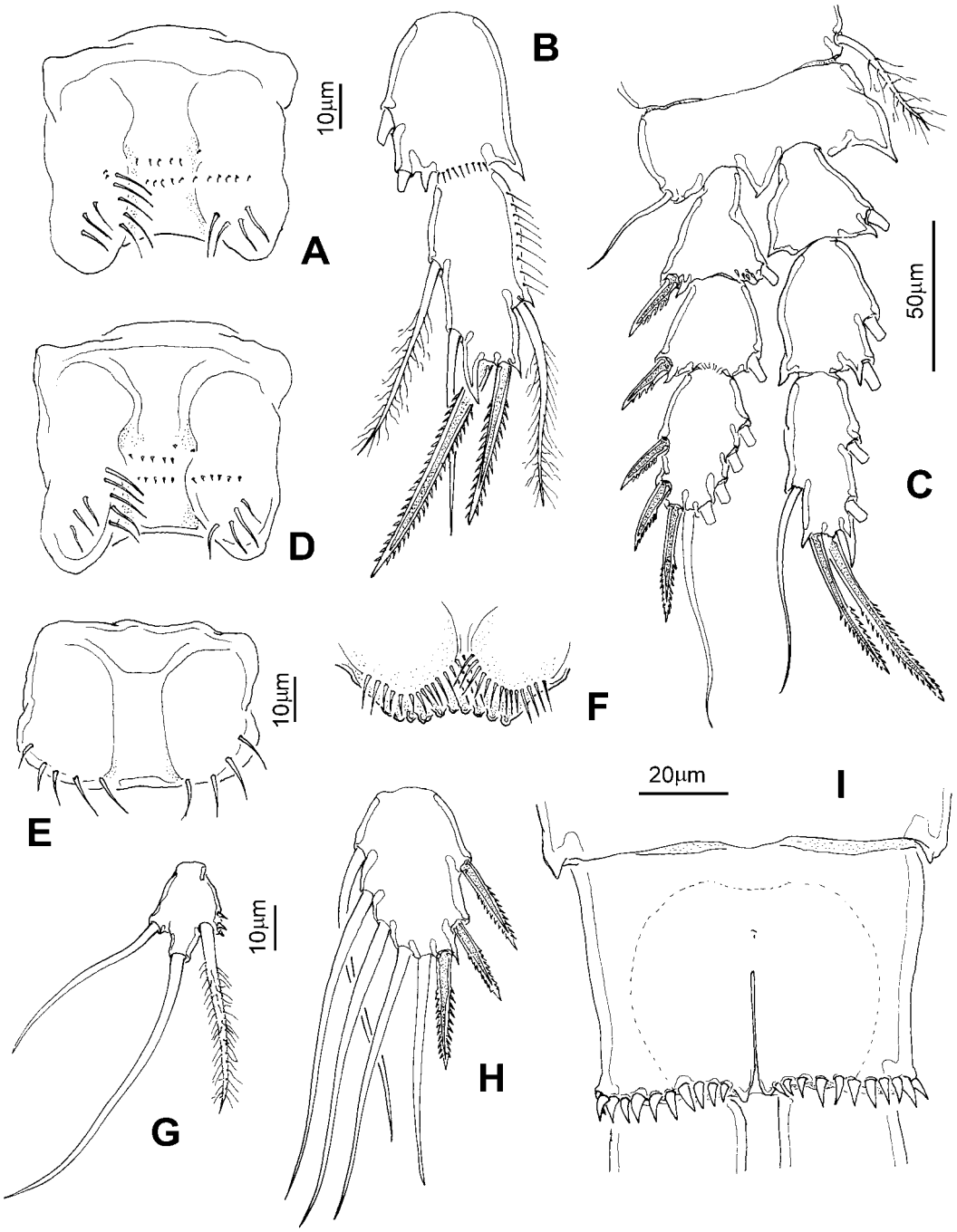
	coxa	basis	exopodite	endopodite
leg 1	0-1	1-1	I-1;I-1;III,2,3	0-0;0-0;1-I,2,2
leg 2	0-1	1-0	I-1;I-1;IV,1,4	0-1;0-2;1,I,1,3
leg 3	0-1	1-0	I-1;I-1;IV,1,4	0-1;0-2;1,I,1,3
leg 4	0-1	1-0	I-1;I-1;III,1,4	0-1;0-2;1,II,2



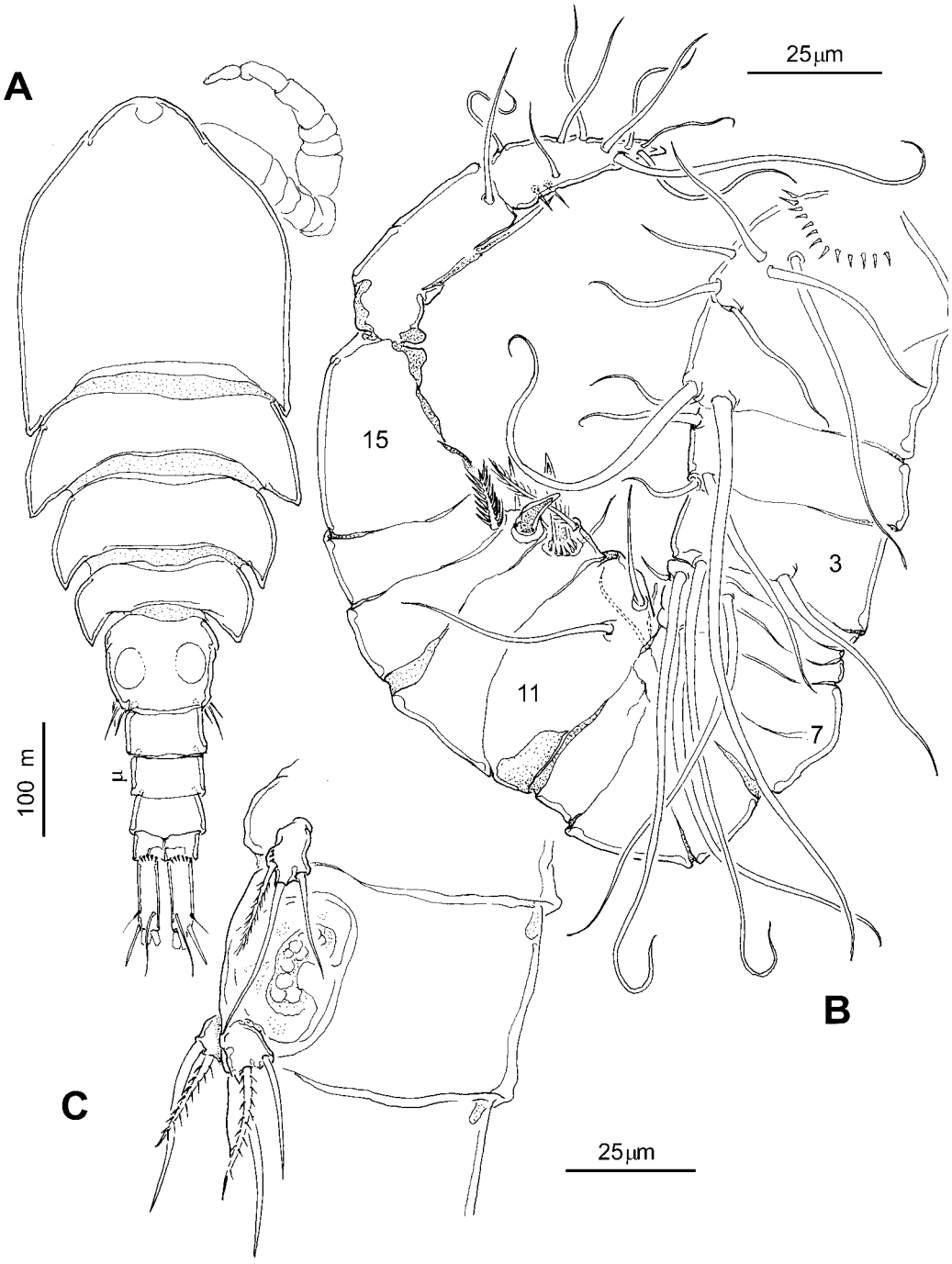
FIGURES 3A–E. *Eucyclops torresphilipi* n. sp. adult female from Chiapas, Mexico. A) mandible; B) maxillule and maxillular palp; C) maxilla; D) antenna; E) maxilliped.



FIGURES 4A–E. *Eucyclops torresphilipi* n. sp. adult female from Chiapas, Mexico. A) first swimming leg showing coxal plate; B) second swimming leg; C) third swimming leg.



FIGURES 5A–D. *Eucyclops torresphilipi* n. sp. adult female from Chiapas, Mexico. A) coxal plate of second swimming leg, caudal view; B) two terminal segments of endopod of fourth swimming legs; C) fourth swimming legs; D) coxal plate of third swimming leg, caudal view; E) coxal plate of fourth swimming leg, caudal view; F) labrum; G) fifth leg; H) fourth swimming leg, distal segment of exopod.



FIGURES 6A–C. *Eucyclops torresphilipi* n. sp. adult male (allotype) from Chiapas, Mexico. A) habitus, dorsal view; B) left antennule showing armature; C) fifth pedigerous and genital double-somites, lateral view, showing sixth legs (only setal armature represented).

Male (Fig. 6A): Body elongated, without hairs or pits on dorsal surface. Noticeably smaller than female. Total body length of allotype = 0.652 mm, cephalothorax length = 0.429 mm, representing almost 67% of total body length, abdomen length = 0.223 mm. Body and appendages as in females except for sexual dimorphism. *Antennule* (Fig. 6B): Geniculate, 17-segmented; article armament per segment as follows: 1(8s + proximal row of spinules), 2(3s), 3(1s), 4(1s), 5(3s), 6(1s), 7(1s), 8(0), 9(1s,1ae), 10(0), 11(2s), 12(2s + 1 sp), 13(1s+1 sp), 14(1s), 15(0), 16(1s, 1sp), 17(10s+1ae). First geniculation between segments 8 and 9, second one between segments 14 and 15 (Fig. 6B). *Leg 6* (Fig. 6C): consisting of broad subquadrate plate with long medial seta reaching beyond succeeding posterior urosomite. Article with 2 outer seta subequal in length and breath. Innermost seta 2.1 times longer than 2 lateral setae. *Urosome* (Fig. 6C): Five-segmented, genital double-somite largest of urosome; relative lengths of urosomites as: 40.4: 19.2: 17.3: 17.3: 5.8=100. Ventral and dorsal surface of anal somite smooth; distal margin with continuous dorsoventral row of spines. Anal plate smooth.

Remarks. The general body shape, the structure of the seminal receptacle, the armature of the swimming legs, and the setation of the fifth leg of the new species resembles other members of the genus *Eucyclops*. Some of the main characters used to include these specimens under *Eucyclops* were 1) the presence of a fifth leg represented by a single segment armed with 2 setae and an inner spiniform seta, 2) the segmentation of the female (12 articles) and male (16 articles) antennules, the 2 distal antennular segments with a hyaline membrane, 3) outer margin of the caudal rami with spinules, and 4) the presence of hair-like setules on each side of the fifth pedigerous somite (Reid 1985; Dussart & Defaye 2001).

Following the criteria proposed by Lindberg (1954, 1955) and Reid (1985), one of the most useful characters to separate some of the American species of *Eucyclops* is the spinulation pattern of the outer margin of the caudal rami. In some species the coverage of the spinules includes only the distal half of the rami and can be very sparse, represented by a few spinules only. Another group of species have a complete, tight spinulation pattern; this character has proved to be useful in many cases, but some species (i.e. *E. bondi* Kiefer, 1934) show intraspecific variations (see Suárez-Morales et al. 1996). The new species could be included in the second group, because nearly ¾ of the length of the outer margin is covered by spinules (see Figs. B,D,E; Table 2). With some exceptions (i.e. *Eucyclops neotropicus* Kiefer, 1936), most species of *Eucyclops*, including *E. torresphilipi* n.sp., have the inner margin of the caudal rami naked. A third discriminating feature is the insertion point of the outer seta of the fifth leg, which can be at the same level of the inner spiniform seta or at a different level (Reid 1985). The new species has both elements inserted at the same level (see Fig. 5G). An additional character used to separate the species of *Eucyclops* is the length/width proportions of the caudal rami, which can be very long (more than 6.5 times longer than it is wide) as in *E. solitarius* Herbst, 1959 or *E. festivus* Lindberg, 1955, or relatively short (between 3.6–4 in *E. leptacanthus* or 2–3 in *E. siolii*

Herbst, 1962, *E. breviramatus* Löffler, 1963, and the Asian *E. dumonti* Alekseev, 2000). The length ratio of the caudal rami in the new species shows values over 4 (4.3–4.5).

Among the American species that share with the new species at least three of these characters are: *E. delachauxi* (Kiefer, 1925), *E. agilis* (Koch, 1838), *E. conrowae* Reid, 1992, *E. leptacanthus* Kiefer, 1956, *E. ensifer* Kiefer, 1936, *E. pseudoensifer* Dussart, *E. prionophorus* Kiefer, 1931, and *E. bondi* Kiefer, 1934. The new species differs from this group of congeners by evaluating additional characters. The fifth leg in the new species has a particularly slender inner spiniform seta, a character that diverges from the general pattern in *Eucyclops*, in which this seta is normally stout, noticeably thicker than the other setae of the fifth leg, and heavily armed (spinulated). There are only two American species with a relatively long, slender inner spiniform seta are: *E. delachauxi* and *E. leptacanthus*, plus *E. permixtus* Kiefer, 1929 from India and Java (Lindberg 1955; Reid 1985; Collado et al. 1984). The new species can be distinguished from *E. delachauxi* by the spinule ornamentation pattern on the outer margin of the caudal rami. In *E. delachauxi* this pattern is somewhat variable (Reid 1985), only a few distal spinules can be present in some specimens and in others there is a sparse row of spinules that can stretch beyond half the length of the caudal rami (Lindberg 1955; Reid 1985); its coverage of the corresponding margin is between 16–52% (see Table 2). The spinulation pattern in the new species is consistently homogeneous, covering between 67–70% and arranged in a relatively tight pattern. The caudal rami proportions are similar in both species, around 4 times longer than it is wide; however, in *E. torresphilipi* n.sp. the dorsal seta is relatively longer with respect to the caudal ramus than it is in *E. delachauxi* (0.85 vs 0.64, respectively). The ratio of the inner/outer terminal spines of the third exopodal segment of the fourth leg is different in both species, 1.1 in *E. delachauxi* vs 1.3–1.5 in the new species. These spines are distally curved in *E. delachauxi* and straight in the new species (Figs. 5B,C). The ratio of the inner spiniform seta/ outer seta of the fifth leg is different in both species, (1.1 in *E. delachauxi*, 0.8 in the new species). Also, in *E. delachauxi* the insertion points of the inner and outer elements of the fifth leg are not at the same level (see Reid 1985, fig. 101), thus differing from the symmetrical insertion in the new species. *Eucyclops delachauxi* seems to be restricted to South America (Kiefer 1925, 1926; Dussart & Defaye 1985; Reid 1985).

The new species differs from *E. leptacanthus* in the structure of the fifth legs, the insertion point of the inner spiniform seta and the outer seta is not at the same level (Reid 1985). Also, the spiniform seta is about half the length of the outer seta in *E. leptacanthus* (Collado et al. 1984; Table 2) whereas both setal elements are equally long in *E. torresphilipi* n.sp. The inner/outer spines ratio of the third endopodal segment of the fourth leg is 1.8, whereas this ratio is 1.3–1.5 in the new species (see Table 2). The ornamentation of the fourth leg coxal plate is different in these species, with a single row of 4–5 setiform elements in the new species and a much denser pattern of 8–10 elements in *E. leptacanthus*. *Eucyclops leptacanthus* is closely related to *E. pseudoensifer* (see Collado et al. 1984) and some comparative comments are: the latter has a short dorsal caudal seta (0.37–

0.44 times as long as ramus), whereas this seta is longer in the new species (0.84 times as long as the ramus). Also, the hyaline membrane is characteristically well-developed and serrated in *E. pseudoensifer*; the same structure is weakly developed in the new species. The male sixth leg is different in both species, the innermost seta is longest and naked in the new species and the same seta is as long as the others and is thicker and spinulated in *E. pseudoensifer*. The relative length of the dorsal seta is different in these species, with *E. delachauxi* showing a wide range of variation (0.3–0.65), followed by *E. leptacanthus* (0.5–0.69), and *E. pseudoensifer* (0.37–0.44); the new species showed a low variability (0.85–0–87) (Table 2). Other morphometric differences to compare these and other American species of *Eucyclops*, including all the species recorded in Mexico, are shown in Table 2.

TABLE 2. Comparison of selected morphometric characters of adult females of some American species of *Eucyclops*, including *E. torresphilipi* n.sp. CR= caudal ramus; I=Inner terminal spine of third endopodal segment of fourth leg; IS= Inner spiniform seta of fifth legs; OS= Outer seta of fifth legs; O= Outer terminal spine of third endopodal segment of fourth leg; L4ED= Fourth leg endopod, third segment; L4EDS= Fourth leg endopodal terminal spine of third segment. LSD= Length of dorsal seta; SC= Coverage of serra on outer margin of caudal rami. (*) indicates South American forms. Data from Kiefer (1925), Reid (1985, 1992), Grimaldo-Ortega et al. (1998), Dussart & Defaye (1985, 2001).

Species	L/W CR	% SC	I/O L4EN3	I/ L4EN3	IS/OS L5	LSD/CR	L/W L4EN3
E. agilis	5–5.3	50–75	1.3	0.9	0.69–1.0	0.3	3.0–3.1
E. bondi	3.1–3.5	71	1.6–2	1.1–1.3	0.57–0.62	0.61–0.69	2.1–2.2
*E. delachauxi**	4.0	16–52	1.1	1.1	1.1	0.65	2.3
E. conrowae	3.5	77	1.5	1.2	0.54	1.0	2.2
E. festivus	6.0	68	1.1	1.1	1.4–1.7	0.41	2.5
*E. leptacanthus**	3.2–3.6	70–80	1.8	1.2–1.3	0.61–0.63	0.52–0.65	2.0
E. prionophorus	4–4.3	71	1.5	1.3–1.4	1.5–2.7	0.37–0.64	1.9–2.4
*E. pseudoensifer**	3–3.8	63–74	1.5	1.0	0.6	0.37–0.44	2.3
*E. solitarius**	6.5–8	73–90	1.2	0.85	1.5–1.6	0.39–0.61	2.9
E. torresphilipi	3.8–4.1	67	1.3–1.5	1.3	0.82	0.84–0.85	2.1

This is the tenth record of species of *Eucyclops* in Mexico, after *E. agilis* (as *E. serrulatus* and *E. cf. serrulatus*), *E. bondi*, *E. conrowae*, *E. festivus*, *E. prionophorus*, *E. leptacanthus*, *E. cf. bondi*, *E. pseudoensifer*, and *E. cf. solitarius* Herbst, 1959 (Grimaldo-Ortega et al. 1998; Suárez-Morales & Reid 1998; Suárez-Morales et al. 2000; Gutiérrez-Aguirre & Suárez-Morales 2001). The diversity of the Mexican fauna of *Eucyclops* could be underestimated. Some of the differences found in specimens identified as *E. bondi* and *E. prionophorus* from Central Mexico (Grimaldo-Ortega et al. 1998) suggest that they could be undescribed species.

The new species seems to have ties with presumedly cosmopolitan forms (i.e. *E. agilis*), but mainly with South American forms (*E. delachauxi*, *E. leptacanthus*, *E. pseudoensifer*) (Reid 1985). This affinity could be explained as a result of an early northwards dispersal of a common ancestor from South America after the Pliocene, when the connection of the two subcontinents was consolidated; it has been suggested that the ancestors of many other freshwater cyclopoid copepods closely related to South American forms have speciated in Southern Mexico and have restricted distributional ranges (Suárez-Morales et al. 2004).

Key for the identification of the species of *Eucyclops* recorded in Mexico
(see also Reid, 1985 for additional characters)

1A. Caudal rami clearly elongate, between 5–8 times longer than wide 2
1B. Caudal rami 5 times or usually less than 5 times longer than wide..... 3
2A. Caudal rami more than 6 times longer than wide. Antennular membrane not coarsely serrated *E. solitarius* (= *E. cf. solitarius* in Grimaldo-Ortega et al. 1998).
2B. Caudal rami between 5 and 6 times longer than wide. Antennular membrane coarsely serrate ..... *E. festivus*
3A. Caudal rami around 5 (usually 4.5) times longer than wide, third exopodal segment of fourth leg 3 times or more longer than it is wide..... *E. agilis*
3B. Caudal rami less than 5 times (normally 3–4) longer than wide, third exopodal segment of fourth leg less than 3 times longer than it is wide 4
4A. Distal segment of exopod of third leg with normal setae, anal somite not particularly short, more than 0.5 times the length of caudal ramus 5
4B. Distal segment of exopod of third leg with sclerotized, blunt subdistal setae, anal somite relatively short, 0.35 times the length of caudal ramus ..... *E. conrowae*
5A. Fifth leg with outer seta shorter than inner spiniform seta (except Mexican specimens of *E. pseudoensifer*) (Grimaldo-Ortega et al. 1998, fig. 32) 6
5B. Fifth leg with outer seta as long as or clearly longer (more than 1.4 times) than inner spiniform seta 7
6A. Fifth leg with ratio of length of inner spine/outer seta= 1.5, caudal rami 4 times longer than wide, 85 % of spinule coverage on outer margin of caudal rami (92% in Mexican specimens of *E.* cf. *prionophorus*, Grimaldo-Ortega et al. 1998) .... *E. prionophorus*
6B. Fifth leg with ratio of length of inner spine/outer seta= 0.6, caudal rami less than 4 times longer than wide, 78 % of spinule coverage on outer margin of caudal rami (58 % in Mexican specimens, Grimaldo-Ortega et al. 1998, fig. 33). The Mexican specimens could represent an undescribed taxon ..... *E. pseudoensifer*
7A. Caudal rami with spinules covering more than 70% of the outer margin; dorsal seta between 0.6 and 0.7 times as long as caudal rami. Inner/outer spines of

endopodal segment 3 of fourth legs between 1.6–2.0. Fifth leg inner spiniform seta not particularly slender ..... *E. bondi*

from the Yucatan Peninsula (Suárez-Morales et al. 1996) and Florida (Reid 1992), and *E. cf. bondi* from Costa Rica (Collado et al. 1984). In the specimens from central Mexico (Grimaldo-Ortega et al. 1998), the caudal rami is as in other forms of *E. bondi*, but its dorsal seta is very short (0.45–0.5 times as long as caudal rami); the outer seta of the fifth leg is shorter than in other forms of *E. bondi*. The material from central Mexico could represent an undescribed taxon.

7B. Caudal rami with other characters, a variable coverage of spinules, fifth leg with slender inner spiniform seta 8

8A. Inner spiniform seta of fifth legs about half the length of outer seta, caudal rami 3.2–3.6 times longer than wide; ratio of inner/outer terminal spines of third endopod of fourth leg=1.6 (in Reid 1985), 1.7 (in Collado et al. 1984) . *E. leptacanthus*

8B. Inner spiniform seta of fifth legs about as long as outer seta, caudal rami around 4 (3.8–4.1) times longer than wide; ratio of inner/outer terminal spines of third endopod of fourth leg between 1.1–1.5 9

9A. Fifth leg inner spiniform seta and outer seta inserted at same level of segment. Dorsal seta/ caudal ramus length ratio= 0.85, inner spiniform seta/outer seta of the fifth legs=0.8..... *E. torresphilipi*

9B. Fifth leg inner spiniform seta and outer seta inserted at different level of the segment. Dorsal seta/ caudal ramus length ratio= 0.6, inner spiniform seta/outer seta of the fifth legs=1.1..... *E. delachauxi*

ACKNOWLEDGEMENTS

This work was generated as part of the results of a project of the Instituto de Investigación del Paludismo in Tapachula, Chiapas, Mexico. The samples were collected by Felipe Hernández-Bravo and José Luis Torres. Rosa Ma. Hernández-Flores deposited the type specimens in the Collection of Zooplankton at ECOSUR and Danielle Defaye provided catalogue numbers for the specimens deposited in the Muséum National d'Histoire Naturelle in Paris. The comments of Janet W. Reid and two anonymous reviewers greatly improved the quality and contents of this contribution.

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