



A new species of Clausidiidae (Copepoda, Poecilostomatoida) associated with the bivalve *Ruditapes philippinarum* in Korea

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Abstract : A small-sized clausidiid copepod was found associated with the commercially important bivalve, *Ruditapes philippinarum*, from a Korean coastal lagoon. Since it resembles morphologically a European form known as *Hersiliodes latericius*, it is attributed to a new species, *H. exiguus* n. sp., of the same genus. The uneasy distinction between the genera *Hersiliodes* and the very similar *Hemicyclops* is discussed.

Résumé : Un Copépode de petite taille a été découvert associé à un bivalve commercialement important, *Ruditapes philippinarum*, provenant d'un lagon côtier coréen. Parce qu'il ressemble morphologiquement à une forme européenne connue comme *Hersiliodes latericius*, il a été attribué au même genre, avec le nom d'espèce *H. exiguus* n. sp. La distinction délicate entre les genres *Hersiliodes* et *Hemicyclops*, très similaires l'un de l'autre, est discutée.

Keywords : Copepoda Clausidiidae, *Hersiliodes exiguus* n. sp., *Hemicyclops*, *Ruditapes*, Korea

Introduction

The short-necked clam, *Ruditapes philippinarum* (Adams & Reeve, 1850) is an edible and commercially important bivalve, originally inhabiting southeast Asian and Indo-Pacific waters, but in the second half of the 20th century introduced for mariculture in the Mediterranean, and the Atlantic coasts of France and Great Britain. A new species of associated copepod, discovered in this clam from Korean waters, is described below.

Taxonomy

Copepoda : Poecilostomatoida : Clausidiidae

Genus *Hersiliodes* Canu, 1888

Hersiliodes exiguus n. sp.

Material.- 1 ♀ (holotype), 1 ♂ (allotype, dissected), 6 ♀

and 1 ♂ (paratypes, partially dissected). Holotype, allotype and 4 paratypes preserved in Zoölogisch Museum Amsterdam (cat. no. ZMA Co. 201.813), 2 ♀ and 1 ♂ kept by I.-H. Kim. From *Ruditapes philippinarum*; Sokcho (Korea: 32°12'N 128°30'E), lagoon opening to the Sea of Japan; 10 December 1995.

Female.- Body shape (Fig. 1A) more harpactiform than cyclopiform; total length 963 µm; prosomal length 458 µm; prosomal width 312 µm. Genital segment widest behind middle, 177 x 158 µm, with 2 small spinules behind genital swelling marking leg 6; three postgenital segments, 82 x 90 µm, 78 x 81 µm, and 83 x 75 µm, respectively (Fig. 1B). Anal segment with fine fringe of spinules along posterior margin. Caudal ramus (Fig. 1C) 85 x 31 µm, slightly longer than anal segment.

Antenna 1 (Fig. 1D) 172 µm long; 6-segmented; armature of segments 4, 14, 10, 4 (no aesthetasc), 2 + 1 aesthetasc, 7 + 1 aesthetasc.

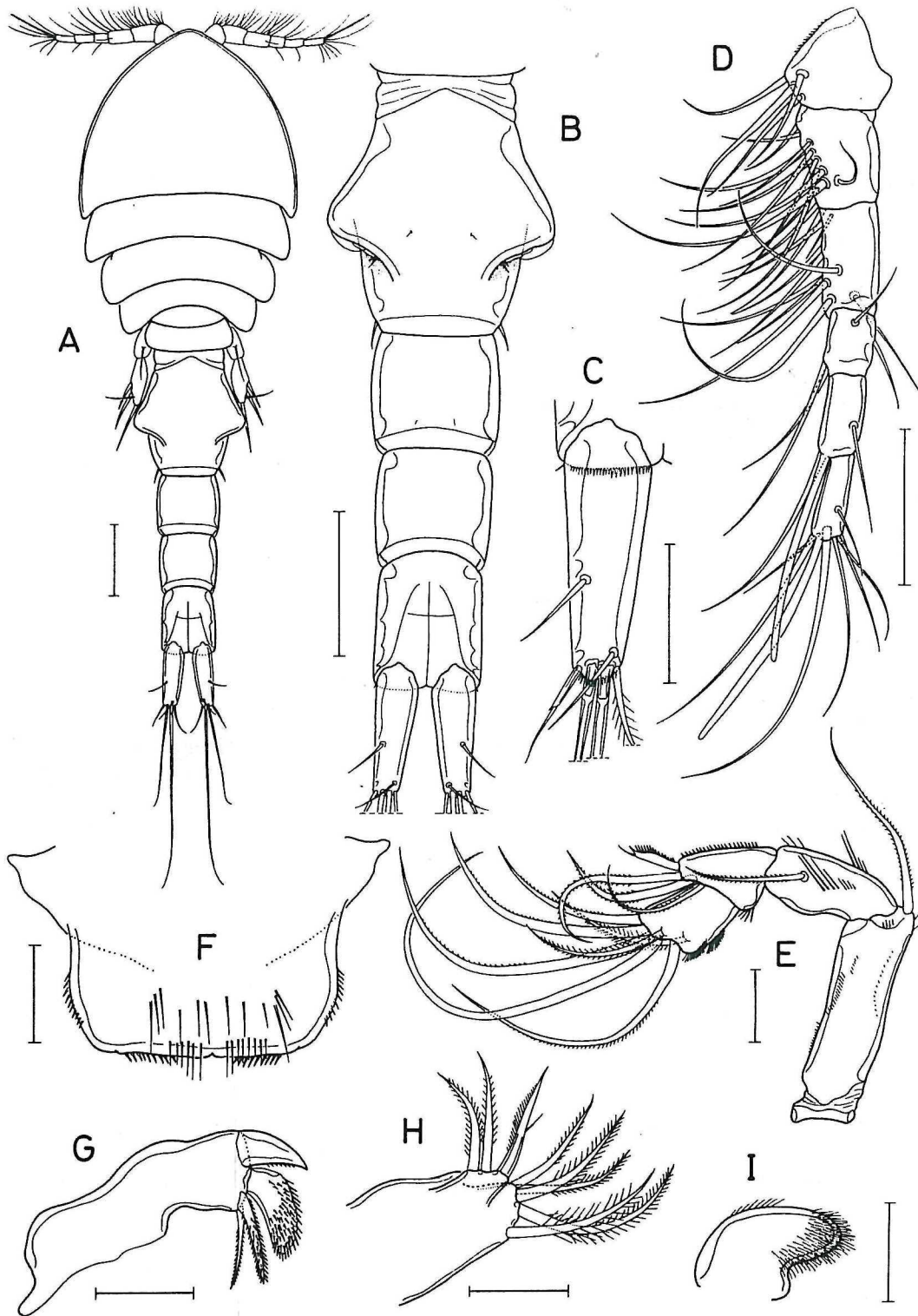


Figure 1. *Hersiliodes exiguus* n. sp., ♀. A, body, dorsal; B, urosome ventral; C, left caudal ramus, dorsal; D, antenna 1; E, antenna 2; F, labrum, ventral; G, mandible; H, maxilla 1; I, paragnath. Scales A, B = 0.1 mm; C, D = 0.05 mm; E-I = 0.02 mm.

Figure 1. A, corps, vue dorsale ; B, urosome, vue ventrale ; C, rame caudale gauche, vue dorsale ; D, antenne antérieure ; E, antenne postérieure ; F, labre, ventral ; G, mandibule ; H, maxille antérieure ; I, paragnathe. Echelles A, B = 0,1 mm ; C, D = 0,05 mm ; E-I = 0,02 mm.

Antenna 2 (Fig. 1E) with comb-like element + 3 curved setae on segment 3, and 7 curved setae on segment 4.

Labrum (Fig. 1F) with almost straight free margin.

Mandible (fig. 1G) with 1 short claw-like distal element, 1 pilose leaf-like element, and 2 plumose setae. First maxilla (Fig. 1H) bilobed, with 5 + 3 setae. Maxilla 2 (Fig. 2A) with 2 strong plumose and 1 small endites ("setae") on basal part ("syncoxa") and 2 plumose setae + 2 strangely shaped, lanceolate elements with spinules on lateral margin and smooth medial margin. Maxilliped (Fig. 2B) 4-segmented, setal armature 2, 2, 0, 5. Paragnath (Fig. 1I) a simple, finely pilose lobe. Between implantations of maxilliped and leg 1, a medial, midventral spiniform projection (Fig. 2C).

Legs 1 to 4 (Fig. 2D-G) as illustrated. Lateral coxopodal seta plumose in legs 1 and 2, glabrous in legs 3 and 4. Chaetotaxis formula as in *H. latericius*, i.e.

P1 basip. 0-1; coxp. 1-I; exp. I-0, I-1; III-I-4; enp. 0-1, 0-1, II-4.

P2 basip. 0-1; coxp. 1-0; exp. I-0, I-1, III-I-5; enp. 0-1, 0-2, III-3.

P3 basip. 0-1; coxp. 1-0; exp. I-0, I-1, III-I-5; enp. 0-1, 0-2, IV-2.

P4 basip. 0-1; coxp. 1-0; exp. I-0, I-1, II-I-5; enp. 0-1, 0-2, IV-1.

Especially noteworthy is armature of endopodite segment 3 of leg 1 (II-4), since this type is never recorded in *Hemicyclops*.

Leg 5 (Fig. 3A) 2-segmented; first segment with 1 seta; second segment 67 x 23 µm, with 4 elements.

Male (Fig. 3B).- Total length 788 µm; genital segment 117 x 118 µm; four post-genital segments, 57 x 87 µm, 56 x 76 µm, 47 x 68 µm, and 65 x 65 µm, respectively. Genital segment with 1 spine at each posterolateral corner (Fig. 3C).

Antennae 1 and 2, all mouthparts, and legs 2 to 4 as in female. Different are:

— maxilliped (Fig. 3D), with basal segment produced into strong, dagger-like medial projection; second segment with rows of spinules and 1 subdistal seta; terminal claw prehensile, curved, long, its basal-interior part with 2 setae and a small pointed projection;

— leg 1 (Fig. 3E), inner basipodal spine longer and more slender than in female; endopodite segment 3 without spiniform process at base of latero-proximal spine; between the two lateral spines of this segment, the small spiniform process seen in female is replaced by a robust knob in male;

— leg 5 (Fig. 3C), basal segment fused with first urosomite, not free as in female.

Etymology.- The proposed specific name, *exiguus* (Latin = very small) alludes to the great difference in size between *H. latericius* and *H. exiguus*.

Remarks.- The body shape, the 6- (not 7-) segmented antenna 1, the absence of sexual dimorphism in maxilla 2, the chaetotaxis of legs 1 to 4, and the strong medial projection on segment 1 of the male maxilliped are strongly reminiscent of *Hersiliodes latericius* (Grube, 1869), an associate living in the tube of the maldanid polychaete *Leiochone* (or *Clymenura*) *clypeata* De Saint-Joseph on the Atlantic coasts of France and in the Gulf of Naples (see Bocquet *et al.*, 1963, for earlier literature and synonymy). Holmes (1987) and Holmes & Gotto (1992) recorded it from the same host in Ireland, and Hamond (1973) discussed a possible record from Norfolk (England). Copepodids from the Atlantic coast of Spain, likewise found on the same host (Capaccioni *et al.*, 1993), belong possibly also to *H. latericius*, although they were recorded as *Rhodinicola* spec.

There are two records of *H. latericius* from the coasts of India (Saraswathy, 1964, and Ummerkuty, 1968). Saraswathy's animals, one male and several copepodids, cannot be allocated with certainty to this species, since none of the appendages are figured, but the male is definitely too large to be the Korean *H. exiguus* (body length 3.0 mm, against 0.79 mm). Ummerkuty's material of *H. latericius* is not accompanied by figures, but is said to correspond "in all details with the descriptions rendered by Bocquet *et al.*"

Because of the great similarity between *Hersiliodes latericius* and the new species, *exiguus*, we have placed the latter in *Hersiliodes*. *H. latericius* (abbreviated *l*) differs from *H. exiguus* (abbreviated *e*) in (1) body length (2.67-3.68 mm in *l* ♀, 0.96 mm in *e* ♀; 2.35-2.99 mm in *l* ♂, 0.79 mm in *e* ♂); (2) shape of projection on basal segment of maxilliped ♂ (club-shaped in *l*, dagger-shaped in *e*); (3) first segment of leg 5 ♀ being free in *e*, fused to first urosomite in *l* (in males of both species it is fused to urosomite 1); (4) spines on endopodite segment 3 of legs 1 to 3 shorter in *l* than in *e*; (5) genital segment ♀ widest in proximal half in *l*, in distal half in *e*.

Remarks on the genus *Hersiliodes*

There is a good deal of plasticity in the chaetotaxy of legs 1 to 4 of the closely related genus *Hemicyclops* (see review of Vervoort & Ramirez, 1966, table 2), but in none of these species the third endopodite segment of leg 1 has the formula II-4, which *Hersiliodes latericius* and *H. exiguus* have in common. The *Hemicyclops* species described after the review of Vervoort & Ramirez (see enumeration in Humes, 1995) do not show the II-4 chaetotaxy either.

Another character that *H. latericius* and *H. exiguus* have in common is the 6-segmented first antenna. This appendage is 7-segmented in all *Hemicyclops* species but *Hemicyclops stenidis* Ho & Kim, 1990 which is a typical *Hemicyclops*, however, in its remaining morphology.

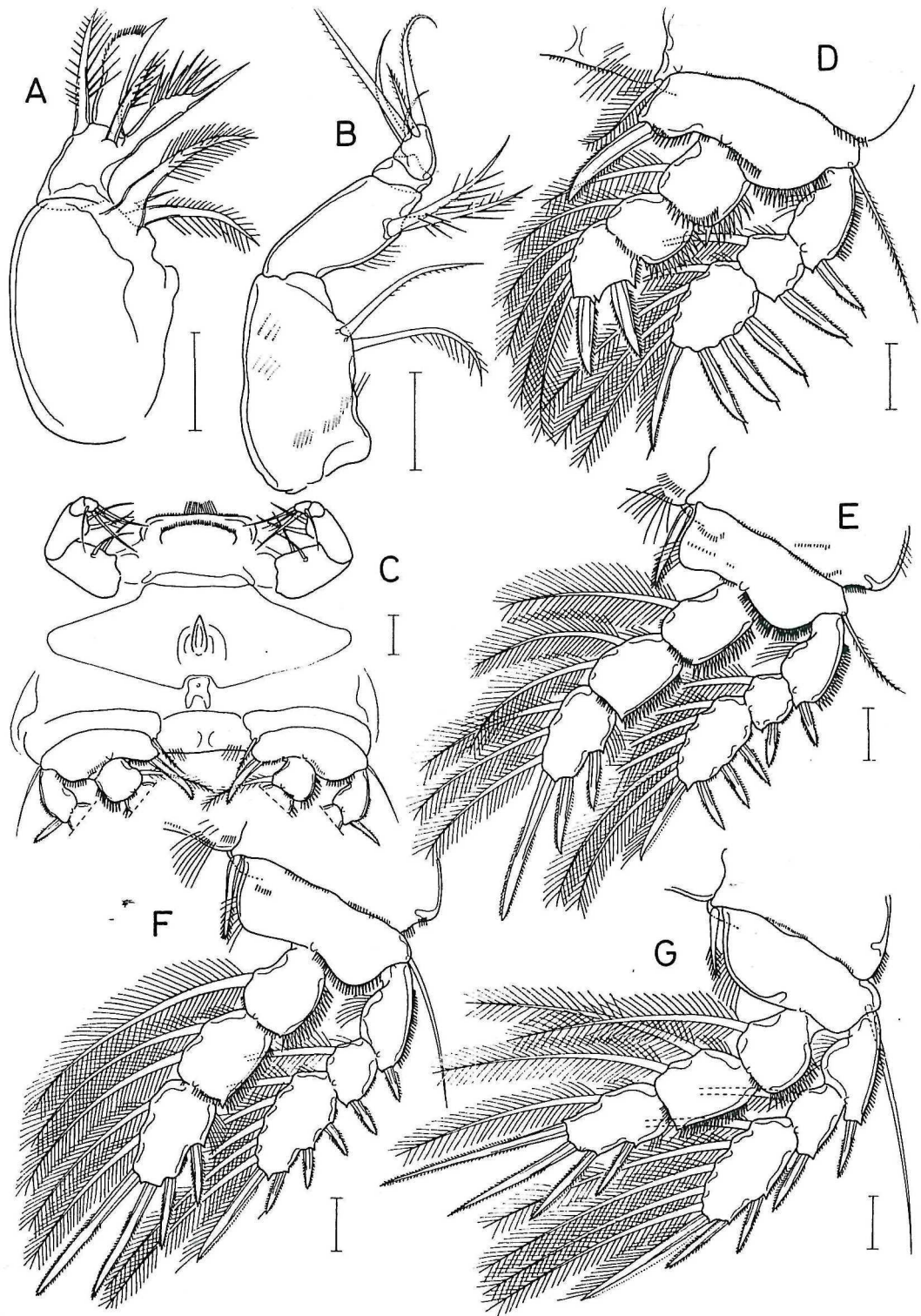


Figure 2. *Hersiliodes exiguus* n. sp., ♀. A, maxilla 2; B, maxilliped; C, area between maxillipeds and legs 1, ventral; D, leg 1; E, leg 2; F, leg 3; G, leg 4. Scales for all figures = 0.02 mm.

Figure 2. A, maxille postérieure ; B, maxillipède ; C, région entre les maxillipèdes et les pattes 1, vue ventrale ; D, patte 1 ; E, patte 2 ; F, patte 3 ; G, patte 4. Echelle pour toutes les figures = 0,02 mm.

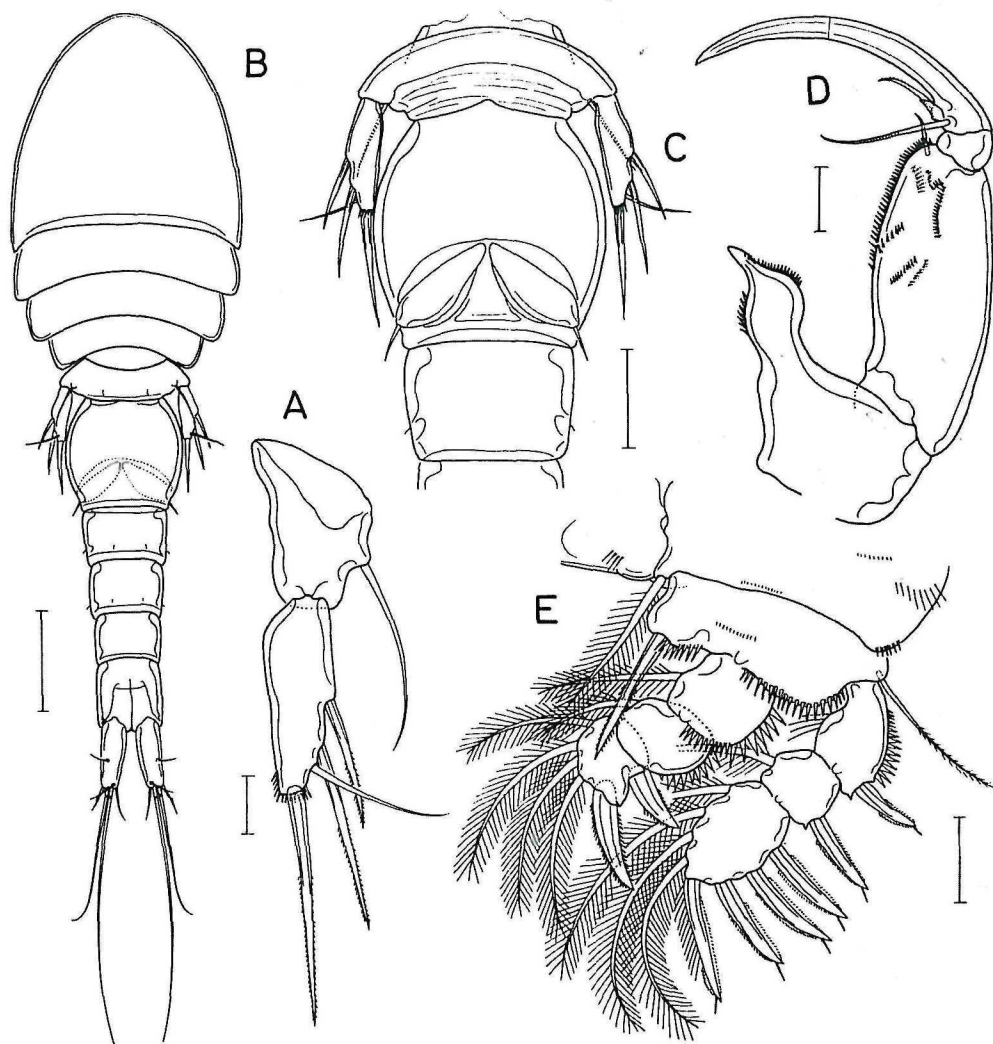


Figure 3. *Hersiliodes exiguus* n. sp., A = ♀; B-E = ♂. A, leg 5; B, body, dorsal; C, first three urosomites and leg 5; D, maxilliped; E, leg 1. Scales: A, D, E = 0.02 mm; B = 0.1 mm; C = 0.05 mm.

Figure 3. A, cinquième patte ; B, corps, vue dorsale ; C, les trois segments antérieurs de l'urosome et la cinquième patte ; D, maxillipède ; E, patte 1. Echelles: A, D, E = 0,02 mm ; B = 0,1 mm ; C, = 0,05 mm.

The strong projection on the male maxilliped, the chaetotaxis of legs 2 to 4, and the rather non-cyclopid form body shape are other features shared by *Hersiliodes latericius* and *H. exiguus*, but although most *Hemicyclops* have a cyclopid form appearance, some approach *Hersiliodes*, e. g. *Hemicyclops cylindraceus* (Pelseneer, 1929) and *H. livingstoni* (T. Scott, 1894).

Chaetotaxis formulae of the legs similar to those of *Hersiliodes* are also shown, in different combinations, by certain *Hemicyclops* species. For instance, the armature of IV-4 of the third exopodite segment of leg 1 in *Hersiliodes*

is shared by *Hemicyclops aberdonensis* (T. & A. Scott, 1892), *adhaerens* (Williams, 1907), *arenicolae* Gooding, 1960, *bacescui* (Serban, 1956), *elongatus* Wilson, 1937, *intermedius* Ummerkutty, 1962, *leggii* (Thompson & Scott, 1903), *subadhaerens* Gooding, 1960, and *thalassius* Vervoort & Ramirez, 1966.

The armature with IV-2 of the third endopodite segment of leg 3, as found in *Hersiliodes*, occurs likewise in *Hemicyclops adhaerens*, *arenicolae*, *australis* Nicholls, 1944, *carnifer* Humes, 1965, *elongatus*, *intermedius*, *saxatilis* Ho & Kim, 1991, and *subadhaerens*.

The armature with IV-1 of the third endopodite segment of leg 4 in *Hersiliodes* is found again in *Hemicyclops adhaerens*, *arenicolae*, *australis*, *bacescui*, *elongatus*, *intermedius*, *leggii*, *mortoni* Boxshall & Humes, 1987, *saxatilis*, *subadhaerens*, *thysanotus* Wilson, 1935, and *visendus* Humes, Cressey & Gooding, 1958.

The remark (Bocquet *et al.*, 1963 ; Vervoort & Ramirez, 1966) that it is almost impossible to delimit sharply the two genera, *Hemicyclops* and *Hersiliodes*, seems still to hold true some 30 years later. We also support the remark that *Hemicyclops* in its present composition is heterogeneous and that discovery of additional material hopefully will make possible a thorough revision. For the moment, the resemblance between *Hersiliodes latericius* and *H. exiguus* is so strong, that we have retained the genus *Hersiliodes* for them, instead of lumping them all together in *Hemicyclops*, as Gooding (1963) and Humes & Huys (1992) advocated.

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