

A new species of *Hyphalion*
(Copepoda, Poecilostomatoidea, Clausidiidae)
from off North Peru, in the Eastern Pacific

by Danielle DEFAYE and Tatsuki TODA

Abstract. — A new poecilostomatoid copepod of the genus *Hyphalion* is described from a single female collected off North Peru. *Hyphalion tertium* n. sp. is the third species of the genus *Hyphalion* Humes, 1987 and is morphologically close to *H. sagamiense* described by TODA, MIURA & NEMOTO (1992) from Sagami Bay, Japan, by the presence of 7-segmented antenna and the general structure of buccal appendages. This new copepod is distinguished from the two other species of the genus, by P6 composed of three setae instead of two.

Résumé. — Une espèce nouvelle d'*Hyphalion* (Copepoda, Poecilostomatoidea, Clausidiidae) du Pacifique oriental, au large du Pérou. Un copépode poecilostomatoïde nouveau du genre *Hyphalion* est décrit à partir d'une femelle récoltée au large du Pérou. Troisième espèce du genre, *Hyphalion tertium* n. sp. est proche de *H. sagamiense* décrite par TODA, MIURA & NEMOTO (1992) de Sagami Bay, Japon, par son antennule à sept segments et la structure des appendices buccaux. Elle se distingue principalement des deux autres espèces du genre par la P6 constituée par trois soies au lieu de deux.

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INTRODUCTION

Among the numerous new taxa of copepods described during the last two decades from different deep-sea sites (review by HUMES, 1991), the genus *Hyphalion* Humes, 1987 was only known from two species. *H. captans* Humes, 1987, was discovered first, from the eastern Pacific, Guaymas Basin, Gulf of California, then the second species *H. sagamiense* Toda, Miura & Nemoto, 1992, from the Western Pacific, in the Hatsushima cold-seep site, Sagami Bay, Japan. Recently, a new *Hyphalion* copepod was found in samples collected by the Nautiperc Campaign (March-April 1991) during a geological study of the Paita zone, Mendana and Nazca plates, off Peru zone.

The characteristics of this specimen, which distinguish it from the two other species, support the erection of a new taxon.

MATERIAL AND METHODS

The new copepod was obtained in washings of samples containing bivalves (*Calyptogena*, B. METIVIER, pers. comm.), nematodes and polychaetes during the Nautilé dive NP1-6-3 (depth 2340 to 3100 m), from off North Peru, on 11 March 1991. The specimen was fixed in 10 % formalin and preserved in 70 % ethanol, dissected in lactic acid and examined in glycerol. All drawings were made with the aid of a drawing tube mounted on a Wild M20. Permanent preparations were made using glycerol and sealed with Eukit. Body length was measured from the anterior border of the prosome to the posterior edge of the caudal rami. Segment lengths were measured along the dorsal midline; widths were given as maxima unless otherwise stated. The segments of antennule were measured along their posterior, non-setose margins.

ABBREVIATIONS : P1-P6 = leg 1-leg 6; Exp = exopodite; Enp = endopodite; Cxp = coxopodite; Bsp = basipodite; l = length; w = width. In the formula of leg armature, roman and arabic numerals are used for spines and setae, respectively.

Family CLAUDIIDAE Embleton, 1901

Genre HYPHALION Humes, 1987

Hyphalion tertium n. sp.

MATERIAL EXAMINED : A non-ovigerous female, described as the holotype, dissected (4 slides), deposited in Muséum national d'Histoire naturelle, Paris, MNHN Cp963.

LOCALITY : Off North Peru, Paita Zone, 5°32'S-81°33'W.

DESCRIPTION OF THE HOLOTYPE

Body (fig. 1a) elongated and flattened. Length without furcal setae 2.05 mm and largest width 0.65 mm. Segment bearing P1 fused with cephalosome and those bearing P2 to P5 very distinct and with rounded epimeral areas. Ratio of the length of prosome to urosome 1.30 : 1.

Segment bearing P5 298 μ m wide, with the P5 extended laterally (fig. 1a). Genital segment wider than the preceding somite ($w \times l : 326 \times 182 \mu$ m), expanded dorsally into two prominences corresponding to genital areas (fig. 1b). On each prominence, laterally, three spines representing P6 (fig. 1b, c). In dorsal view, the genital area appears as triangular plate with proximally two symmetrical scales (fig. 1a). Three following postgenital somites gradually decreasing in size, with regularly distributed spines (or sensillae) (fig. 1b). Anal segment without these structures but with two ventral symmetrical pairs of striate scales of approximately $17 \times 11 \mu$ m situated at proximal half of segment (fig. 1b, g).

Furcal rami ($l : w = 185 : 68 \mu$ m) 2.68 times longer than wide bearing seven elements (fig. 1d). The two outer lateral are composed of a small spine, inserted at 27 % of distance from base of ramus and another spine, here not visible, but with insertion more dorsal, situated at 61 % of furcal length. Dorsal seta 82 μ m. Terminal setae : innermost slender, smooth 111 μ m,

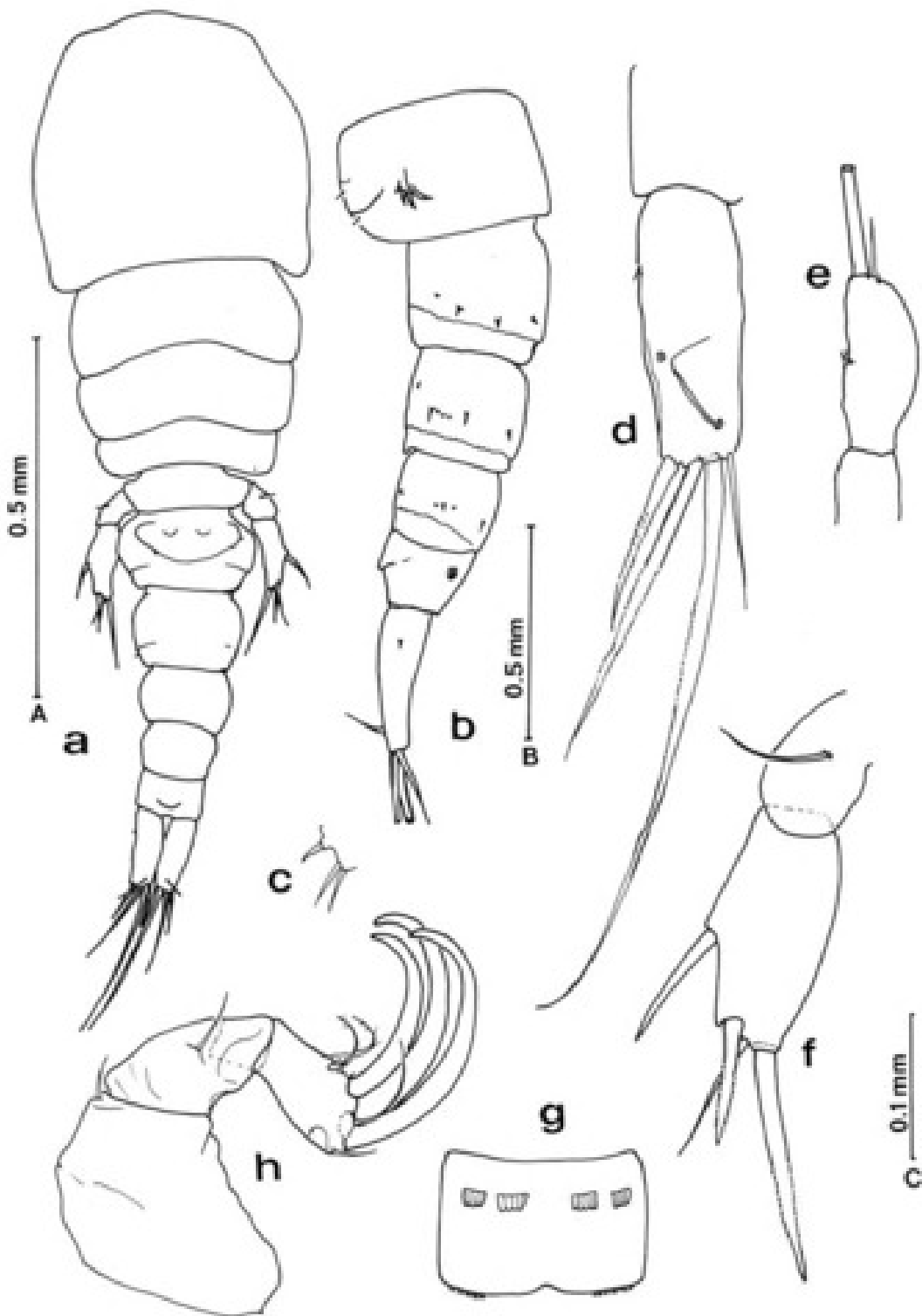


FIG. 1. — *Hyphalium tertium* n. sp., holotype female : a, dorsal (scale A) ; b, urosome, lateral (B) ; c, P6 (C) ; d, furca, dorsal (C) ; e, maxilliped ; f, P5 (C) ; g, anal somite, ventral (C) ; h, antenna (C).

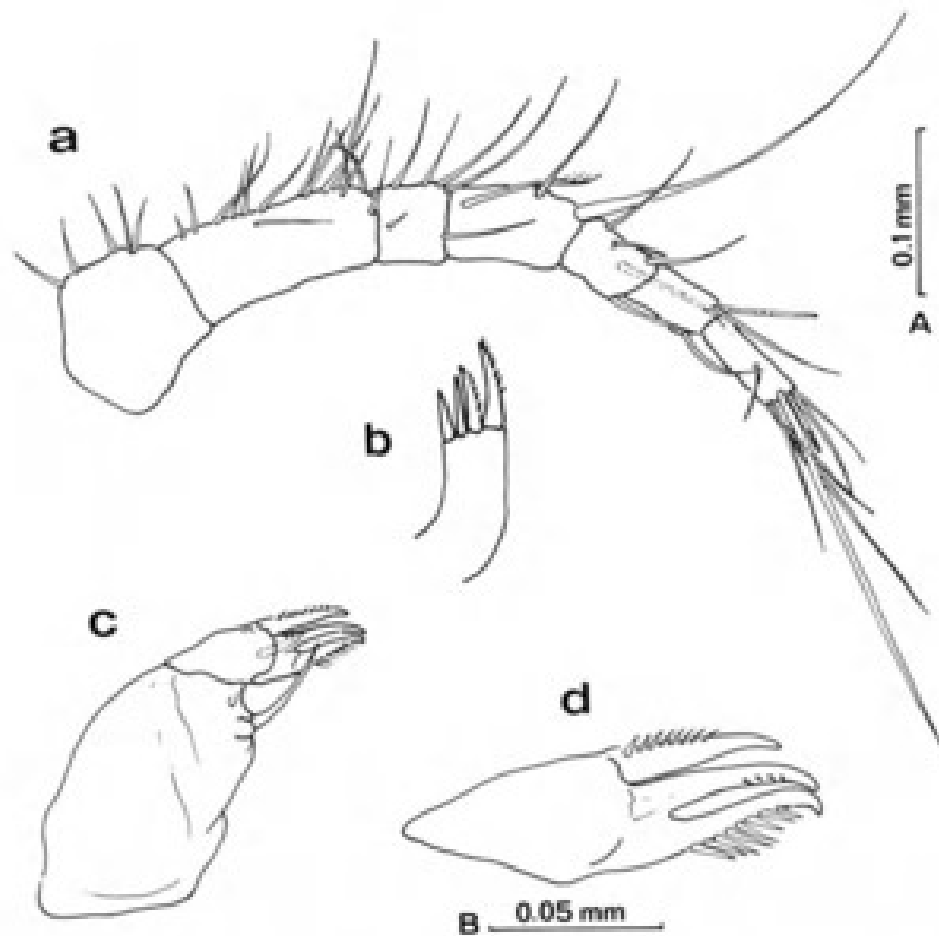


FIG. 2. — *Hyphalion tertium* n. sp., holotype female : a, antennule (scale A) ; b, mandible (A) ; c, maxilla (A) ; d, maxilla, second segment (B).

almost as long as outermost ($131\ \mu\text{m}$), latter relatively strong and barbed on terminal two-thirds. Medial terminal setae, 228 and $405\ \mu\text{m}$ long, each with a small constriction at beginning of last third of seta, both finely barbed.

No eggsac.

Antennule (fig. 2a) 7-segmented, $458\ \mu\text{m}$ long. Length of segments 71, 113, 42, 71, 46, 55, $60\ \mu\text{m}$, respectively. Armature : 5, 15, 6, 3, 5, 2 + 1 aesthete, 7 + 1 aesthete. Antenna (fig. 1h) 3-segmented. First and second segments with single thin and short seta. Third segment curved, ending in three long, prehensile, sickle-shaped claws, about $200\ \mu\text{m}$ long. On internal edge, three short setae, one smaller than others, one seta inserted at base of median claw and another one externally.

Mandible (fig. 2b) flexed, ending in four barbed spines of decreasing size. Paragnath (no figured) curved at its distal denticulate part. Maxillule (no figured) digitiform with five setae of which the median shorter, all smooth.

Maxilla (fig. 2c) 2-segmented. First segment massive, bearing a single seta. Second segment (fig. 2d) small, bearing three terminal spinulose spines and a ciliate seta. Maxilliped (fig. 1e)

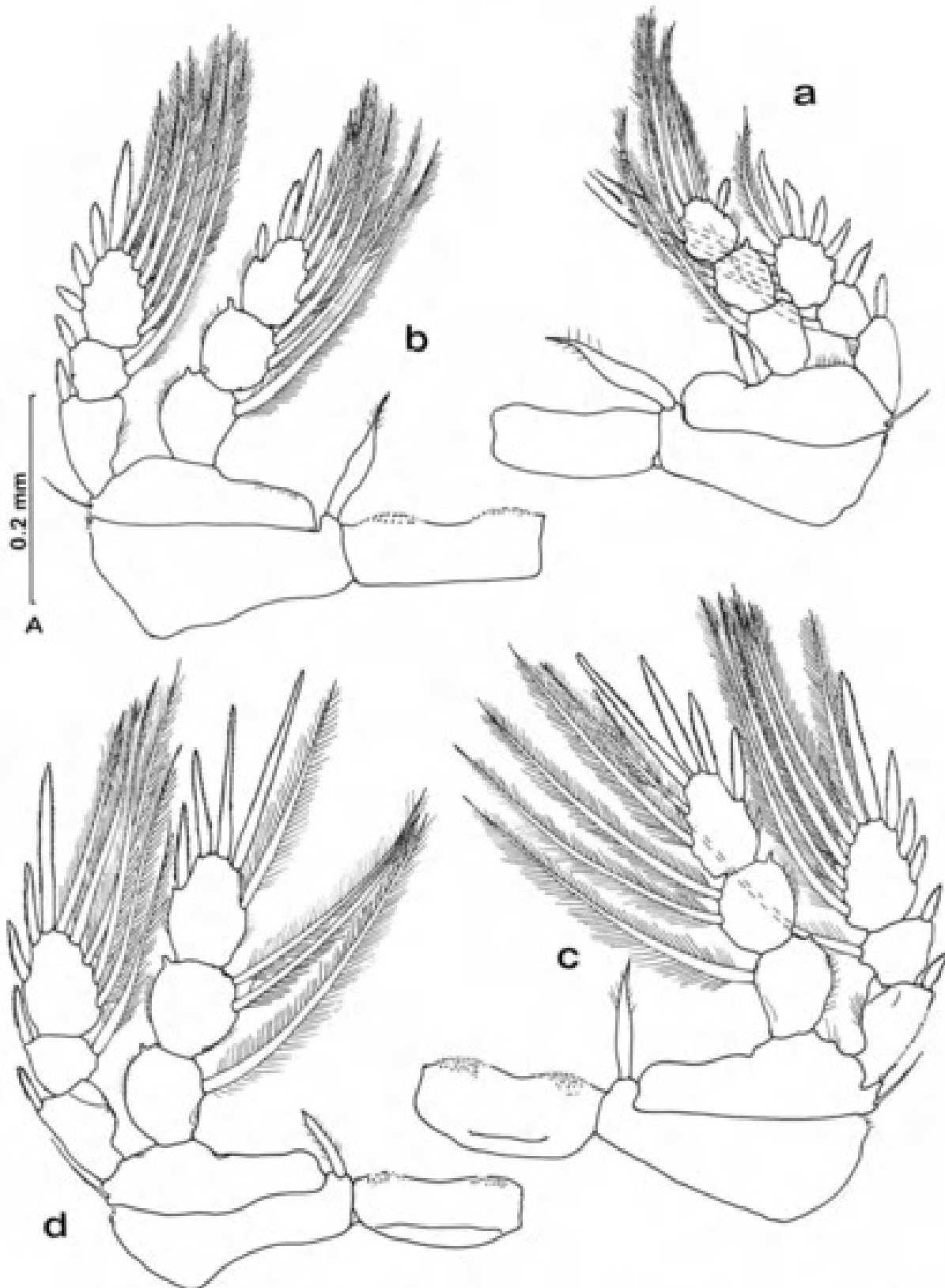


FIG. — 3. *Hyphalion tertium* n. sp., holotype female, natatory legs (scale A); a, P1; b, P2; c, P3; d, P4.

2-segmented; first segment unarmed, shorter than second; second segment with two very small setae, inserted centrally on inner edge, and a strong terminal seta (broken in figure), a short and thin seta and a very small spine.

P1 to P4 (fig. 3a, b, c, d) biramous, each ramus 3-segmented. Armature as follows (nomenclature of HUMES, 1987) :

P1	Cxp 0-1	Bsp 1-1	Exp 1-0; 1-1; III, 1, 4 Enp 0-1; 0-1; I, 5
P2	Cxp 0-1	Bsp 1-0	Exp 1-0; 1-1; III, 1, 5 Enp 0-1; 0-2; II, 1, 3
P3	Cxp 0-1	Bsp 1-0	Exp 1-0; 1-1; III, 1, 5 Enp 0-1; 0-2; II, II, 2
P4	Cxp 0-1	Bsp 1-0	Exp 1-0; 1-1; II, 1, 5 Enp 0-1; 0-2; II, II, 1

Intercoxal plates more than twice as wide as high, smooth on P1, with slightly rounded prominences in P2 to P4 and ornamented with minutes spines. Spine of the inner angle of Bsp and of inner part of Cxp sword-shaped.

P5 (fig. 1f) 2-segmented. Second segment larger than first, $171 \times 82 \mu\text{m}$, twice longer than wide, with three spines, one on the external side ($91 \mu\text{m}$), two terminal, of unequal size (88 and $165 \mu\text{m}$), inserted between both, a thin seta ($100 \mu\text{m}$).

P6 represented by three setae inserted on small plate, on genital area (fig. 1c).

ETYMOLOGY : The specific name *tertium* refers to the fact that it is the third described species of the genus and also alludes to P6 with three setae.

DISCUSSION

The main features of this species correspond to the genus *Hyphalion* described by HUMES (1987) : general shape, urosome of six somites, antenna 3-segmented ending in three prehensile claws, general structure of most buccal appendages, structure and armature of P1 to P5; the antennule structure (6 or 7-segmented) conforms to the minor emendation by TODA *et al.* (1992).

In spite of the fact that the description is based on a single female, its distinctive features distinguish it clearly from the two species until now described in this genus, *Hyphalion captans* Humes, 1987 and *Hyphalion sagamiense* Toda, Miura & Nemoto, 1992. Some characteristics are different from *H. captans* and common with *H. sagamiense*. The antennule in *Hyphalion tertium* is on the same type as in *H. sagamiense* : 7-segmented and with the same setae-formula while it is 6-segmented in *H. captans*. Moreover, the antennule is significantly longer in *H. tertium* than in the two other species; the ratio : length of antennule / total body length is 0.22 in *H. tertium*, 0.19 in *H. captans* and 0.15 in *H. sagamiense*. The shape of paragnaths is the same as in *H. sagamiense*.

The specific characters particular for *H. tertium* are : (1) the setation of the maxilliped ended by two setae and a small spine; in *H. sagamiense* as well as in *H. captans*, there are a long seta and two small spines; (2) P5 : although of the same structure, it differs by its size : the ratio l : w is 2 while it is 2.23 in *H. captans* and 1.38 in *H. sagamiense*; (3) P6 : composed

of three spines in the new species, only two in the other species ; (4) furcal ramus presenting a small spine at the proximal external side, the ratio $l : w = 2.68$ (2.83 in *H. sagamiense* and 3.17 in *H. captans*).

The presence of spines (sensillae) on the three postgenital segments, not mentioned for the other species, cannot be considered as a discriminant character. As a matter of fact, a reexamination of specimens of *H. sagamiense* from Sagami Bay, Japan, has revealed the presence of such sensillae.

The new species is morphologically closer to *H. sagamiense* than to *H. captans* and can be considered presenting the more primitive features in the genus, mainly because of the antennule, the maxilliped and P6. Concerning the antennule, the presence of a break in the sclerotized wall on the third segment (visible on HUMES' drawing and pers. comm.) tends to prove that there has been fusion of the third and fourth segments in the scheme of the antennule of *H. sagamiense* and *H. tertium*. The presence of a new species with features such as a 7-segmented antennule, a mandible with four terminal elements, a basipodite of P1 with an inner spine, confirms the affinities existing between the genera *Hyphalion* and *Hemicyclops*. Future discoveries of new species of *Hyphalion* would allow to precise the diagnosis of this genus and its phylogenetic relationships with *Hemicyclops* Boek, 1873, and the other genera of the family Clausidiidae.

CONCLUSION

The discovery of this new species changes considerably the first considerations on the distribution of the genus *Hyphalion* (see HUMES, 1991). It is present in eastern (Guaymas Basin, Paita zone) and western Pacific (Sagami Bay, Japan) in the Northern hemisphere and off Peru in the Southern hemisphere. In addition, the second author recently found an unidentified *Hyphalion* associated with a different type of *Calyptogena*, collected from the vicinity of the deep-sea hydrothermal vents in the Okinawa trough (in preparation). These collections imply that the distribution of the genus *Hyphalion* is larger than initially thought.

With the addition of this new species, a simple key of the genus *Hyphalion* is proposed (female only) :

- 1 (2). Antennule 6-segmented..... *Hyphalion captans*
2. Antennule 7-segmented 3
- 3 (4). Maxilliped with a long terminal setae and two spines ; P6 composed of 2 setae
..... *Hyphalion sagamiense*
4. Maxilliped with two terminal setae, a very long and a thin short, with a small spine ; P6 composed of 3 setae *Hyphalion tertium* n. sp.

Acknowledgements

We are indebted to Dr M. SEGONZAC, from Centob, Ifremer, Brest (France), who permitted this study, Drs G.A. BOXSHALL (The Natural History Museum, London) and A.G. HUMES (Boston University Marine Program, Woods Hole) for helpful advice.

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Defaye, Danielle and Toda, Tatsuki. 1994. "A new species of Hyphalion (Copepoda, Poecilostomatoidea, Clausidiidae) from off North Peru, in the Eastern Pacific." *Bulletin du Muséum national d'histoire naturelle* 16(1), 87–94.

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