

**NEW PHYLOGENETIC ASPECTS OF THE
CRISTACOXIDAE HUYS (COPEPODA,
HARPACTICOIDA), INCLUDING THE
DESCRIPTION OF A NEW GENUS FROM THE
MAGELLAN REGION**

K George

► **To cite this version:**

K George. NEW PHYLOGENETIC ASPECTS OF THE CRISTACOXIDAE HUYS (COPEPODA, HARPACTICOIDA), INCLUDING THE DESCRIPTION OF A NEW GENUS FROM THE MAGELLAN REGION. *Vie et Milieu / Life & Environment*, Observatoire Océanologique - Laboratoire Arago, 2002, pp.31-41. hal-03198726

HAL Id: hal-03198726

<https://hal.sorbonne-universite.fr/hal-03198726>

Submitted on 15 Apr 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

NEW PHYLOGENETIC ASPECTS OF THE CRISTACOXIDAE HUYS (COPEPODA, HARPACTICOIDA), INCLUDING THE DESCRIPTION OF A NEW GENUS FROM THE MAGELLAN REGION

K.H. GEORGE

AG Zoosystematik & Morphologie, Fachbereich Biologie, Geo- und Umweltwissenschaften, Carl von Ossietzky-Universität 26111 Oldenburg, Germany
Present Address: An dem Eschen 14E, 26129 Oldenburg, Germany
e-mail: kai.george@gmx.de

COPEPODES
HARPACTICOIDA
CRISTACOXIDAE
LAOPHONTISOCHRA MARYAMAE
DETROIT DE MAGELLAN

RÉSUMÉ. – Une nouvelle espèce d'Harpacticoïde du versant continental de Patagonie (Chili) est décrite. La présence des cristae sur la coxa du P1 de *Laophontisochra maryamae* gen. et sp.n. signale qu'elle appartient à la famille des Cristacoxidae Huys, 1990. D'autre part la nouvelle espèce diffère par plusieurs caractéristiques de la famille: elle ne possède pas d'apophyse épineuse sur le premier segment de l'antennule; en outre ni l'exp A2 ni les soies de la base mandibulaire ne sont complètement réduits. Il manque aussi la soie modifiée sur l'endite proximal du Mx. Les Cristacoxidae sont interprétées comme un ensemble de deux groupes, *Laophontisochra* gen.n. et un groupe plus dérivé comprenant *Cristacoxa* Huys, 1990, *Cubanocleta* Petkovski, 1977 et *Noodtorthopsyllus* Lang, 1965, qui montrent plusieurs synapomorphies. Un deuxième spécimen du Détroit de Magellan ressemblant à *Laophontisochra maryamae* gen. et sp.n. est décrit partiellement comme *Laophontisochra* sp.

COPEPODA
HARPACTICOIDA
CRISTACOXIDAE
LAOPHONTISOCHRA MARYAMAE
MAGELLAN REGION

ABSTRACT. – A new harpacticoid copepod from the Patagonian continental slope (Chile) is described. The presence of cristae on P1 coxa of *Laophontisochra maryamae* gen. et sp.n. indicates that it belongs to the family Cristacoxidae Huys, 1990. On the other hand, the new species differs in several "cristacoid" characters like the absence of an outer spinous process on the first antennular segment, the presence of an antennary exopodal seta, the incomplete reduction of setae of the mandibular basis, and the absence of a modified seta on the maxillar endite. The Cristacoxidae are interpreted as being composed of two groups, *Laophontisochra* gen.n. and a more derived group, comprising *Cristacoxa* Huys, 1990, *Cubanocleta* Petkovski, 1977, and *Noodtorthopsyllus* Lang, 1965 which show a number of synapomorphic characters. A second species from the Magellan Straits which resembles *Laophontisochra maryamae* gen. et sp.n. from the Magellan Straits is partly described. It resembles *Laophontisochra maryamae* gen. et sp.n. and is therefore named as *Laophontisochra* sp.

INTRODUCTION

Two German expeditions into the Magellan Region, the "Magellan Campaign" of RV "Victor Hensen" in 1994 and the expedition ANT XIII/4 of RV "Polarstern" in 1996 provided a wealth of new harpacticoid species (George 1999, George & Schminke 1999). Several of these new taxa have already been described (George 1998, George 2001, George & Schminke 1998). In the present paper, two new species from the Magellan Straits and the Patagonian Continental slope are described. Their general body shape reminds of Paramesochridae,

but no specific character has been found to support this impression. On the other hand, the P1 shows a rather laophontoidean shape, and it will be discussed what the phylogenetic position of the new species could be.

MATERIAL AND METHODS

Three specimens (2 females of *Laophontisochra maryamae* gen. et sp.n., 1 egg-sac carrying female of *L.* sp.) were found in samples from the Patagonian Continental slope and the Magellan Straits, respectively. The

material was collected with a Minicorer (MIC) during the German-Chilean-Italian "Magellan Campaign" of RV "Victor Hensen" in 1994 (Magellan Straits) (Arntz & Gorny 1996), and with a Multicorer (MUC) during ANT XIII/4 with RV "Polarstern" in 1996 (PCS) (Fahrbach & Gerdes 1997). The material has been treated as described by George (1999). The specimens were cleared up with glycerol. Drawings were made with the aid of a camera lucida on a Leitz-Dialux 20 EB compound microscope equipped with a phase contrast 100-times objective. The type material of *Laophontisochra maryamae* gen. et sp.n. and of *L. sp.* is kept in the collection of the AG Zoosystematik und Morphologie of the Carl von Ossietzky-Universität in Oldenburg, Germany.

The morphological terminology has been adopted from Huys & Boxshall (1991). The terminology related to phylogenetic systematics is used according to Ax (1984). Abbreviations used in the text: cphth: cephalothorax, A1: antennula, A2: antenna, md: mandible, mxl: maxillula, mx: maxilla, mxp: maxilliped, enp: endopod, exp: exopod, expl: first segment of exp, GDS: genital double somite, CR: caudal ramus, P1 – P6: swimming legs 1 – 6, benp: baseopodopod.

DESCRIPTION

Laophontisochra gen. n.

Generic diagnosis corresponds to the description of the type species *L. maryamae* gen. et sp.n.

Males: unknown.

Laophontisochra maryamae gen. et sp.n.

Holotype: female, mounted on 10 slides (labels UNIOL-1999.018/1-10). Paratype: female, mounted on 1 slide (label UNIOL-1999.017/1). Locus typicus: Patagonian Continental Slope, locality 55°26,4'S/66°14,0'W, 101m depth (station 40/110 of ANT XIII/4 of RV "Polarstern").

Etymology: The generic name *Laophontisochra* is a fusion of the names *Laophontidae* and *Paramesochra*. It is given because of the superficial mixture of laophontid and paramesochrid features of the new genus. The specific name *maryamae* is given in dedication to my daughter Maryam Josephina George.

Body (Fig. 1A, B) long, dorsoventrally slightly flattened, length 510 μ m. Rostrum (Fig. 2A) articulated, with 2 sensilla at its distal part.

CR (Fig. 1, 2B) approximately 3 times longer than broad, with row of small spinules proximally on outer side, and several spinules on the inner proximal half, terminally on dorsal side with tube pore. Setation: Setae I and II almost equal in length, set closely together laterally midlength on outer side. Seta III small, subterminally on outer side. Seta IV little longer than III, terminally on outer side of CR, fused with V. Seta V longest, at-

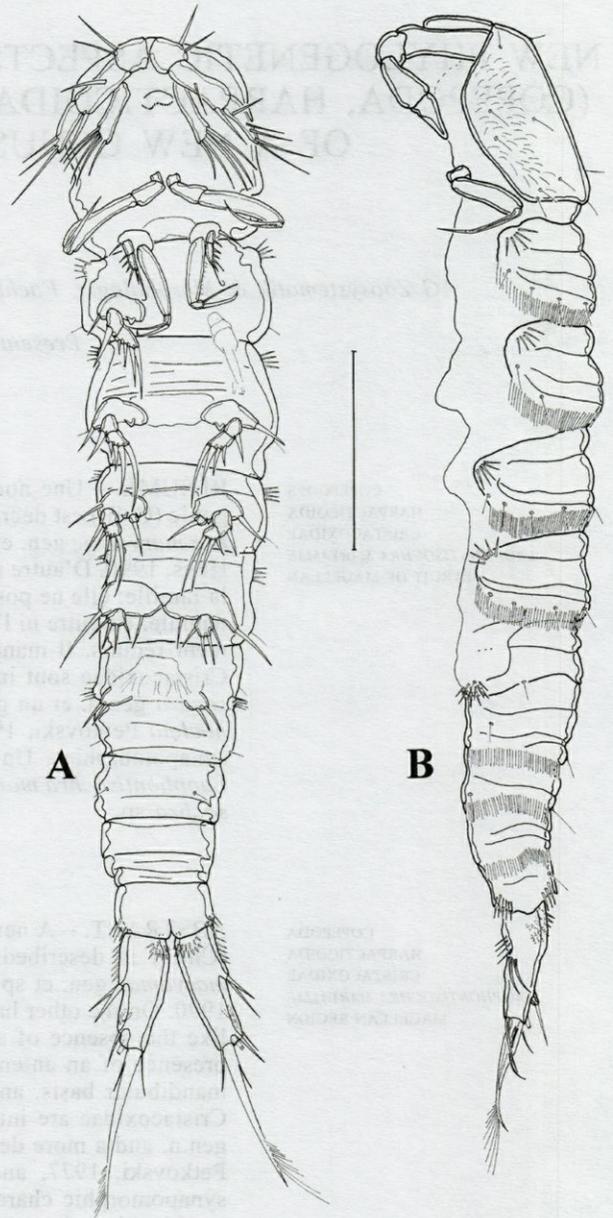


Fig. 1. – *Laophontisochra maryamae* gen. et sp.n., female. A, Habitus dorsolateral; B, Habitus lateral. Scale: 100 μ m.

taining length of CR, unipinnate in distal third. VI as small as III, subterminally on inner side. VII dorsally on distal half.

A1 (Figs. 2A, A') 4-segmented. First segment longest, with 1 small bare seta and rows of long spinules on both the inner and the outer side. Segment ornamented with fine grooves. Second segment smallest, bearing 7 bare and 2 bipinnate setae. Third and fourth segment of nearly equal length. Third segment with 5 bare and 4 bipinnate setae. Subterminally with 2 projections (Fig. 2A'), the first with a bare and slender seta, and the second with an aesthetasc and a slender seta. Fourth seg-

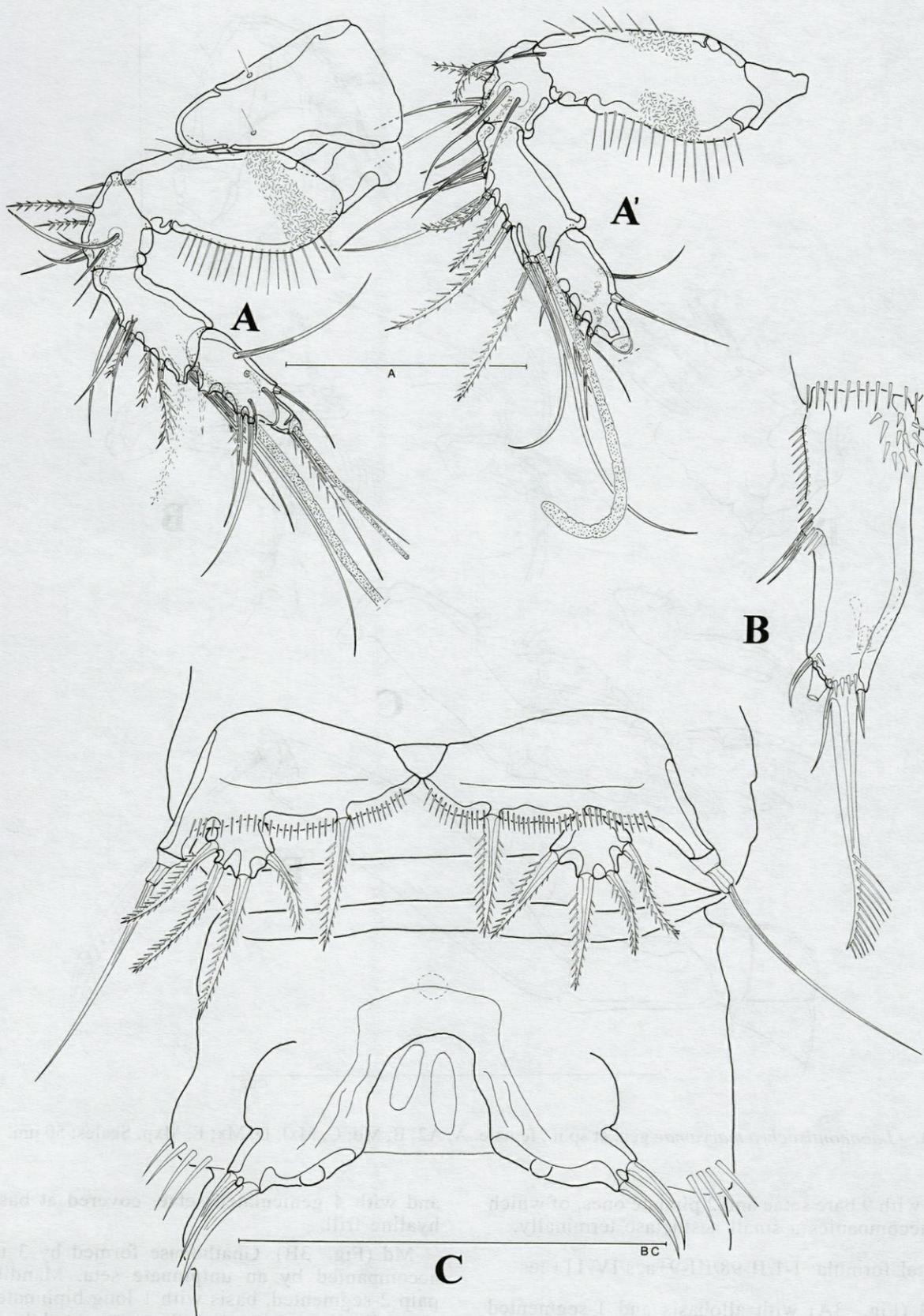


Fig. 2. — *Laophontisochra maryamae* gen. et sp.n., female. A, A', A1, dorsal and ventral view; B, right CR, ventral view; C, P5, P6 and GDS. Scales: 50 μ m.

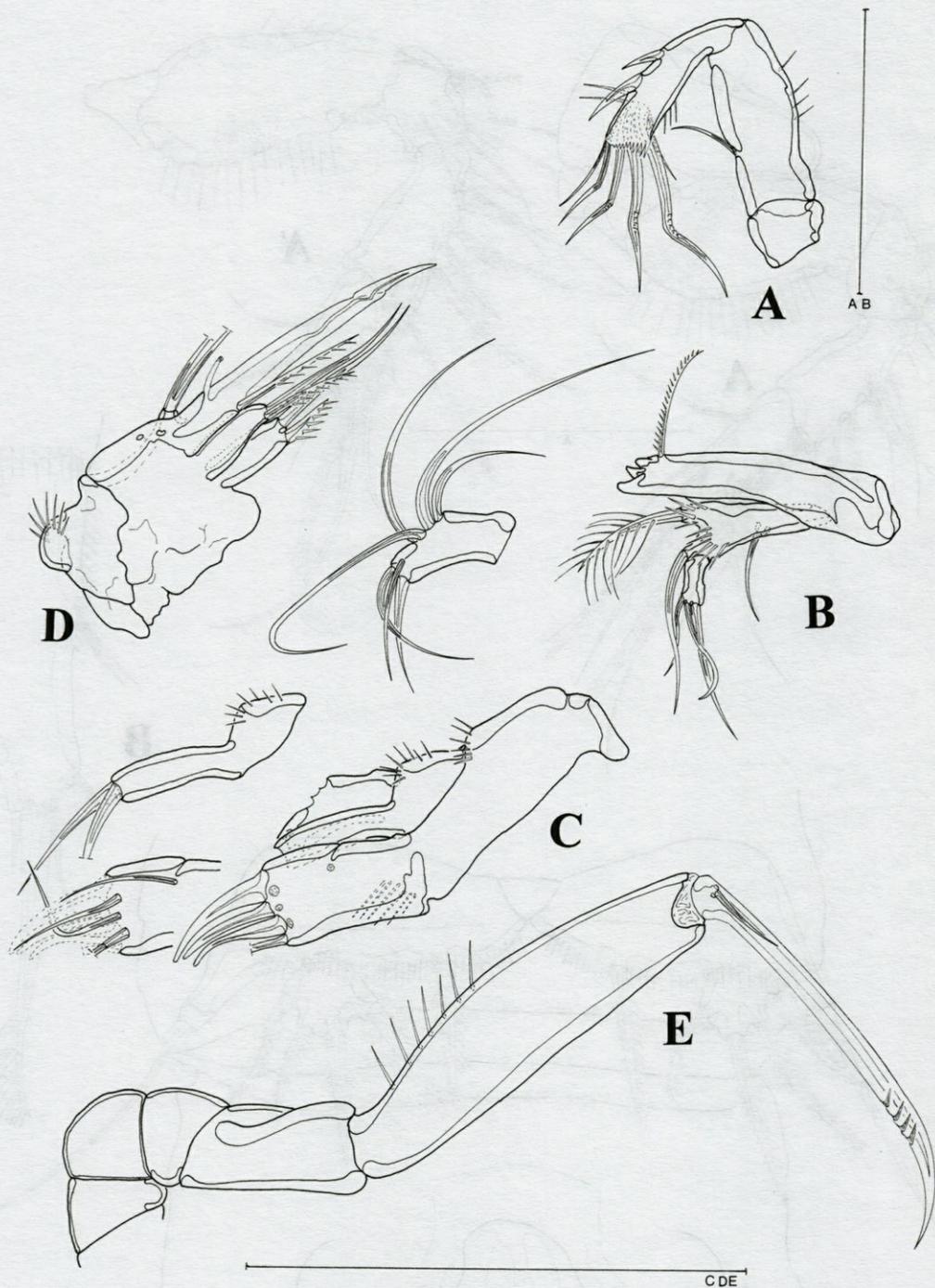


Fig. 3. — *Laophontisochra maryamae* gen. et sp.n., female. A, A2; B, Md; C, Mxl; D, Mx; E, Mxp. Scales: 50 μ m.

ment with 9 bare setae and 2 pinnate ones, of which one accompanies a small aesthetasc terminally.

Setal formula: I-1/II-98/III-9+aes/IV-11+aes

A2 (Fig. 3A) with allobasis and 1-segmented enp. Exp represented by small seta. Allobasis with row of small spinules along abexopodal margin, without abexopodal seta. Enp with 2 spines on inner margin. Subterminally with 21 small bare setae

and with 4 geniculated setae, covered at base by hyaline frill.

Md (Fig. 3B). Gnathobase formed by 3 teeth, accompanied by an unipinnate seta. Mandibular palp 2-segmented, basis with 1 long bipinnate and 1 smaller bare seta. Exp(?) represented by long bare seta. Enp with 3 setae terminally.

Mxl (Fig. 3C). Arthrite armed with 4 terminal setae/spines and 3 additional subterminal setae.

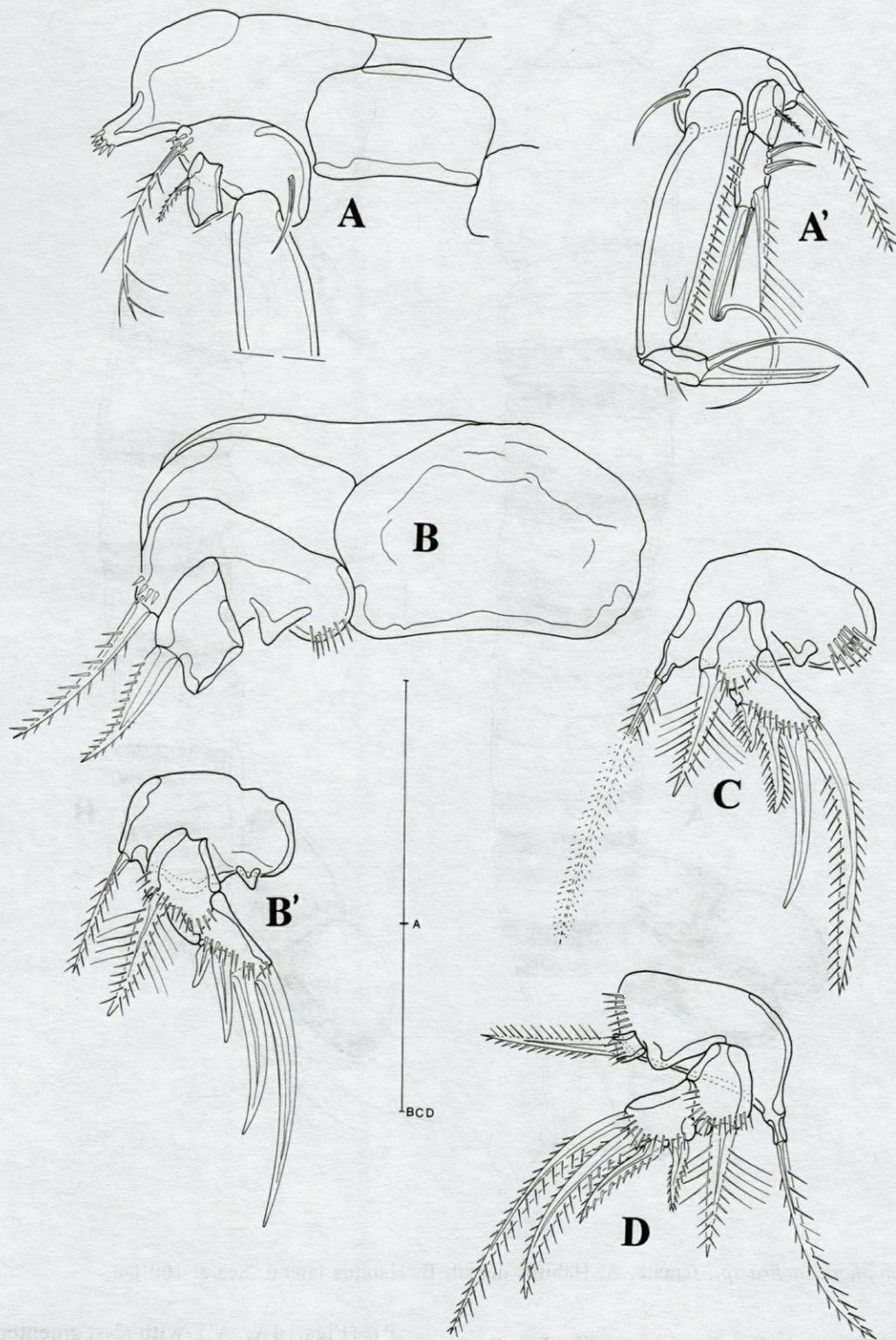


Fig. 4. — *Laophontisochra maryamae* gen. et sp.n., female. A, A', P1; B, B', P2 with intercoxal sclerite; C, P3; D, P4. Scales: 50 μ m.

Subapically with only 1 small seta. Coxal endite long, with 2 bare setae. Basis with 1 endite, armed with 2 terminal setae and 1 subterminal bare setae. Exp and enp represented each by 2 long, bare setae.

Mx (Fig. 3D) with 2 syncoxal endites, the proximal one with 1 unipinnate spine and 1 long bare seta, the second one with 1 unipinnate seta and a longer bare one. Basis transformed into long claw,

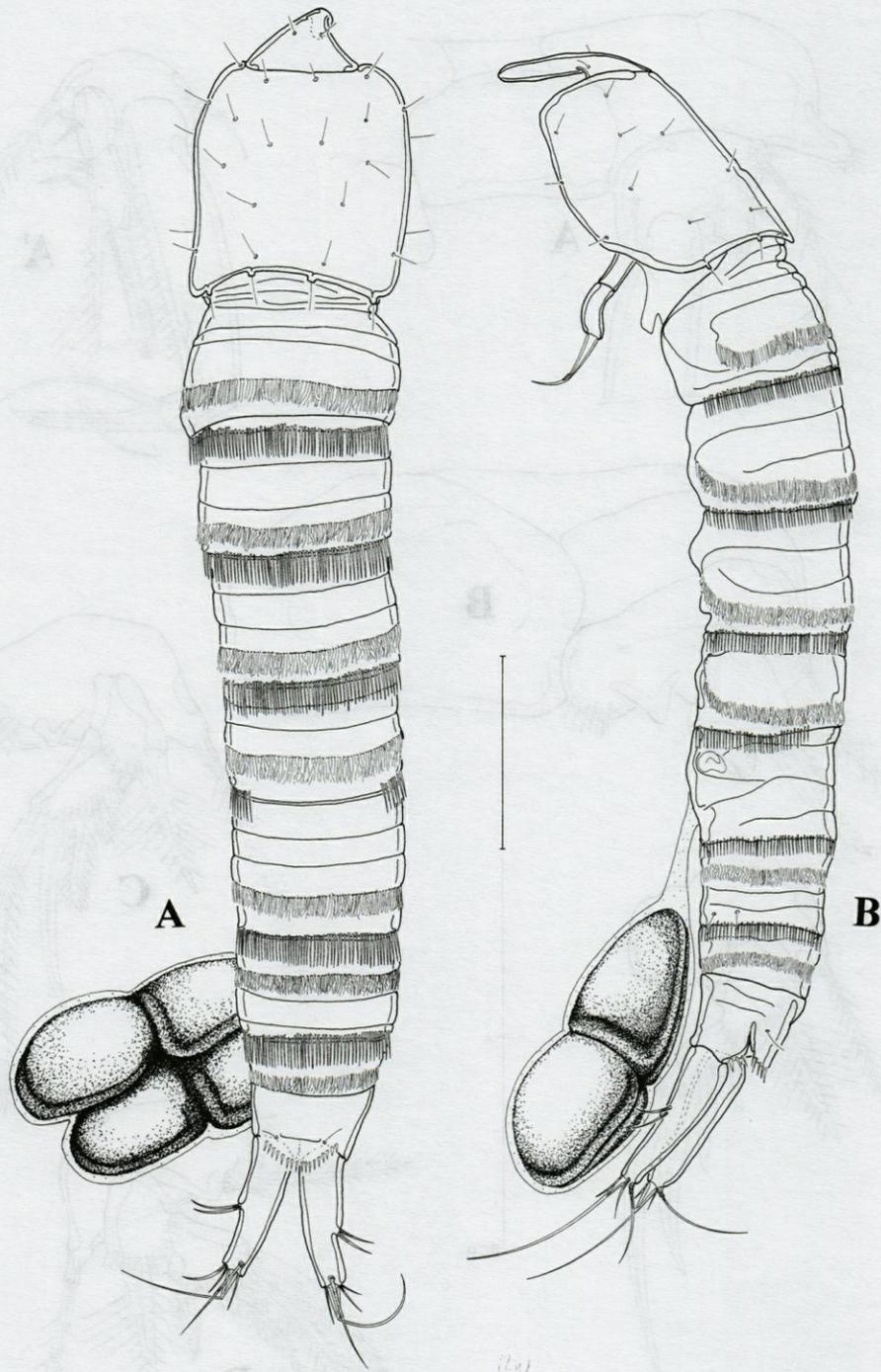


Fig. 5. - *Laophontisochra* sp., female. A, Habitus dorsal; B, Habitus lateral. Scale: 100 μ m.

accompanied by 1 smaller unipinnate seta. Basally with small tube pore (?). Enp small, with 2 bare setae.

Mxp (Fig. 3E) very long, prehensile. First segment small, interpreted here as praecoxa. Coxa separated from praecoxa by a strong fold, unarmed. Basis with row of long spinules on outer margin. Enp represented by long geniculated claw, which is accompanied by a small seta.

P1 (Figs. 4A, A') with 2-segmented exp and enp. Coxa projected on outer margin, with 1 crista. Basis with bipinnate outer seta and short bare inner seta. Exp1 with 1 small bipinnate outer seta. Exp2 laterally with 2 small bare setae, subterminally with 1 strong unipinnate seta, and terminally with 1 outer small bare and 1 very long sickle-shaped inner seta. Enp1 about twice as long as exp, without setation, but with row of small spinules along outer

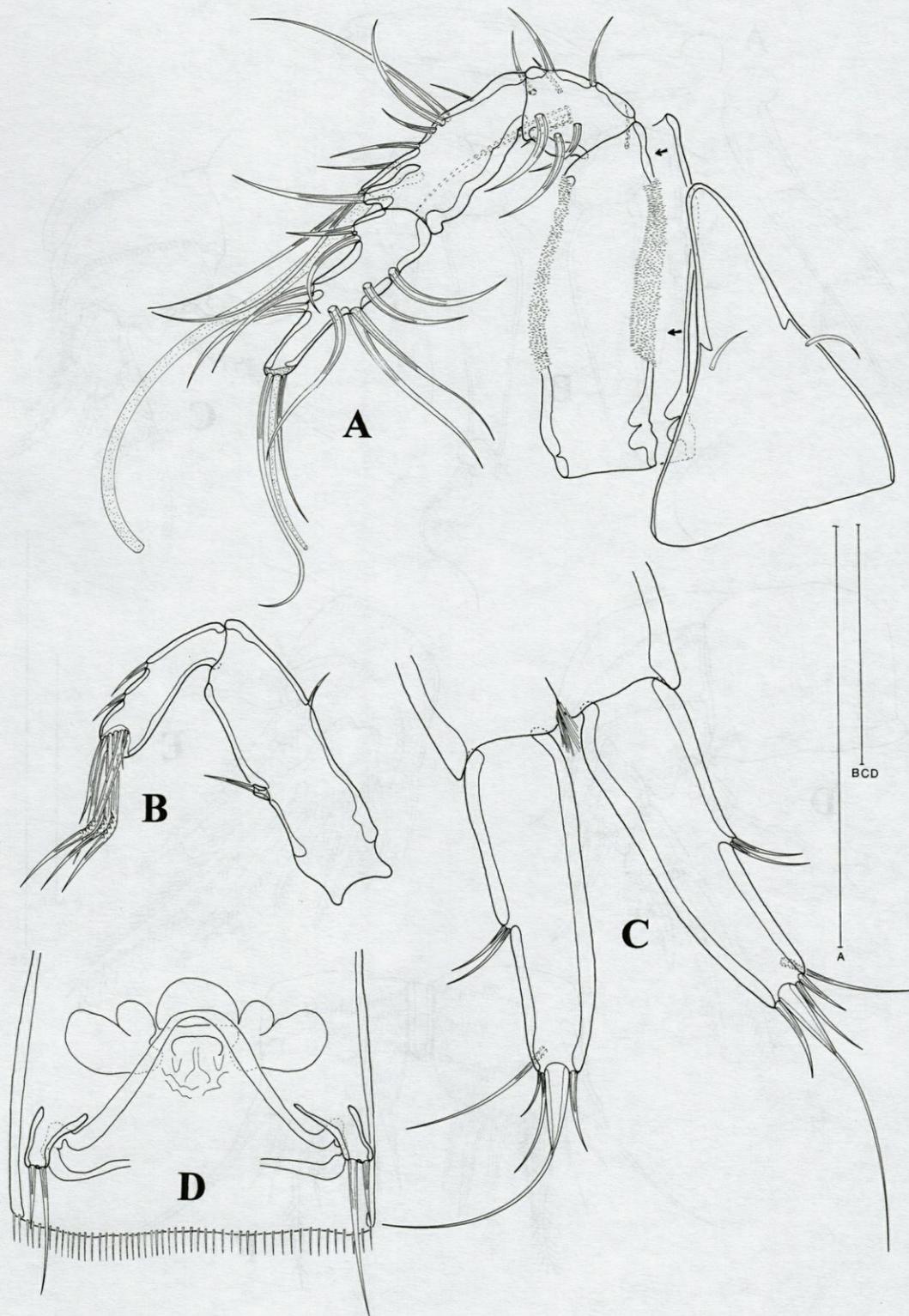


Fig. 6. — *Laophontisochra* sp., female. A, A1, dorsal view; B, A2; C, CR, ventral view; D, P6 and GDS. Scales: 50 μ m.

margin. Enp2 small, with 2 spinules on inner margin and with 1 claw and 1 long bare seta terminally.

P2 (Figs. 4B, B') small, lacking enp. Intercoxal sclerite forming broad plate. Praecoxa and coxa unarmed. Basis with bipinnate outer seta, several spi-

nules and triangular projection on inner side. Exp 2-segmented. Exp1 with 1 bipinnate outer spine, covered with row of spinules. Exp2 as long as exp1, with 4 strong bare spines on outer and terminal margin.

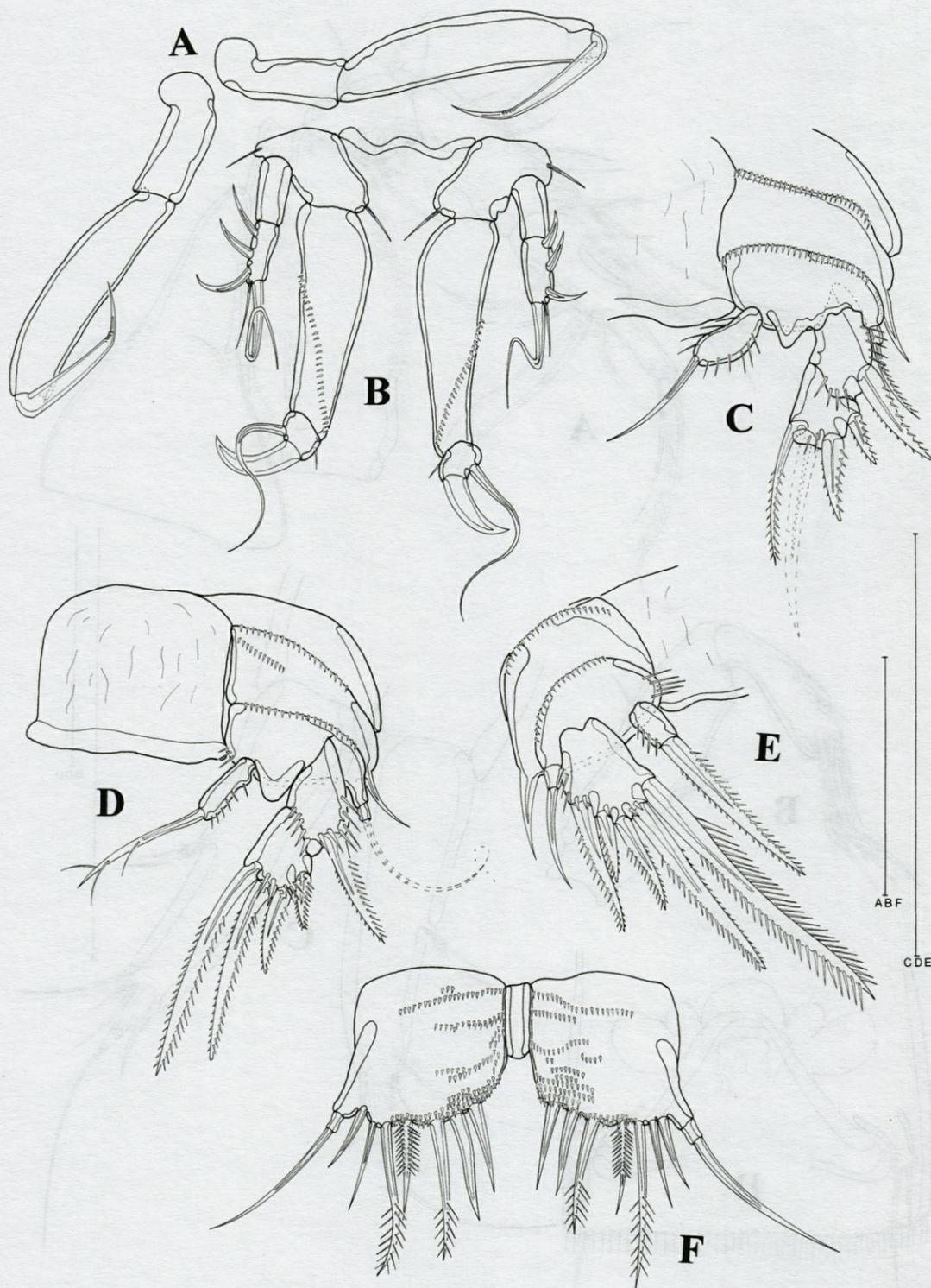


Fig. 7. — *Laophontisochra* sp., female. A, Habitus dorsal; B, Habitus lateral. Scale: 100 μ m.

P3 (Fig 4C) as P2, with the following differences: basal outer seta as long as exp, both lateral spines and inner terminal spines of exp2 bipinnate.

P4 (Fig. 4D) with 2-segmented exp and 1-segmented enp. Exp as in P3, with all setae and spines bipinnate. Enp with 1 long bipinnate seta.

P5 (Fig 2C) baseoenp and exp not fused, small intercoxal sclerite distinguishable. Benp with 1 inner seta and a row of spinules along caudal margin. Exp small, armed with 4 bipinnate setae.

GDS and P6 (Fig. 2C). Copulatory pore not distinguishable. P6 represented by 2 strong protuberances bearing 2 bare setae.

Laophontisochra sp.

Material: female, mounted on 8 slides (labels UNIO-1999.016/1-8).

Locality: 53°59,7'S/70°33,0'W, 79 m depth (Northern Magellan Straits, station V.H. 954 of "Magellan Campaign" of RV "Victor Hensen").

During dissection the mouthparts and P1 became lost. The description of P1 and Mxp is based on examinations before dissection.

Habitus (Fig. 5A, B) similar to *L. maryamae* gen. et sp.n., length 620 µm. Caudal margins of body somites except last thoracic somite with row of spinules, subterminally with row of cuticular, hair-like spinules. Rostrum (Fig. 5, 6A) articulated, with 2 sensilla. Cphth covered with several sensilla. Telson with convex anal operculum carrying a row of spinules along its caudal margin.

CR (Fig. 6C) approximately 3 times longer than broad, without spinules. Setation: Setae I and II of almost equal length, set very closely together laterally at midlength. Seta III small, terminally on outer side. Seta IV longer than III, terminally on outer side of CR standing very close to III. Seta V the longest, biarticulated, proximal part broad and tapering posteriorly, distal part long and slender. Seta VI slightly smaller than IV, subterminally on inner side. Seta VII dorsally on distal half, arising from small knob.

A1 (Fig. 6A) 4-segmented. First segment longest, with 1 small bare seta. Segment covered with a pelt of fine cuticular "hairs". Second segment the smallest, bearing 9 bare setae. Third and fourth segment of nearly equal length. Third segment with 7 bare setae on inner margin. Subterminally with 2 projections, the first one bearing a single bare seta, the second one an aesthetasc and a slender seta. Fourth segment with 11 bare setae, of which two accompany a small aesthetasc terminally.

Setal formula: I-1/II-9/III-9+aes/IV-11+aes.

A2 (Fig. 6B) with allobasis and 1-segmented enp. Allobasis with small abexopodal seta. Exp unisegmented with small bare seta. Enp with 2 inner spines, terminally with 3 geniculated setae, and 3 bare ones.

Mouthparts not described.

Mxp (Fig. 7A) very long, with syncoxa and basis unarmed, prehensile. Enp represented by long geniculated claw, accompanying seta not distinguished.

P1 (Fig. 7B) with 2-segmented exp and enp. Presence of cristae not confirmed. Basis with very small outer and inner setae. Exp1 without setae. Exp2 laterally and subterminally with 3 small bare

setae, terminally with 1 outer small bare and 1 very long curved inner seta. Enp1 about twice as long as exp, without setae, but with transverse row of small spinules from proximal outer margin to inner distal on inner margin. Enp2 small, with 1 spinule on inner margin, terminally with 1 claw and 1 long and curved bare seta.

P2-P4 (Figs. 7C-E) small. P2 and P3 with 2-segmented exps and 1-segmented enps, P4 with 1-segmented rami. Intercostal sclerite forming broad plate (Fig. 7D). Praecoxae and coxae with row of small spinules along their caudal margins. Praecoxae unarmed, coxae with thornlike apophysis (crista?). Basis with unipinnate outer seta on P2 and bare outer seta on both P3 and P4. P2 and P3 with triangular projection between exp and enp. P2 and P3 exp1 with 1 bipinnate outer spine, and covered with row of spinules. Exp2 as long as exp1, on P2 with 3 strong bipinnate spines on outer and terminal margin and 1 bipinnate seta subterminally on inner margin, on P3 with 4 strong bipinnate spines. P4 exp armed with 5 spines. Enp P2 with row of spinules along inner and outer margin and 1 bare seta terminally. P3 and P4 enps each with row of spinules along outer margin, and with 1 bipinnate seta terminally.

P5 (Fig. 7F) baseoenp and exp fused, forming single plate, with 1 outer basal seta and 7 setae on caudal margin. Intercostal sclerite distinguishable.

P6 and GDS (Fig. 6D). Copulatory pore not clearly distinguishable, receptacula seminis well-developed. P6 represented by 2 setae arising from a projection.

DISCUSSION

All three specimens resemble each other strongly in general body shape and appendage structure – the remarkably large mxp, the characteristic shape of the P1, the small peraeopods P2 to P4, and the shape of CR. On the other hand, several clear differences can be observed between the female from the Magellan Straits (*Laophontisochra* sp.) and the 2 specimens from the Patagonian continental slope (*L. maryamae* gen. et sp.n.) which suggests that there are two different species:

1. *L. sp.* has on its free thoracic somites, rows of hair-like spinules which are lacking in *L. maryamae* gen. et sp.n.;
2. Seta V on the CR is biarticulated in *L. sp.*, but unarticulated and pinnate in *L. maryamae* gen. et sp.n.;
3. The setation of A1 and A2 differs in both species;

4. In *L. sp.* there is a small 1-segmented exp on A2, which in *L. maryamae* gen. et sp.n. is represented only by a small seta;
5. The basis of the mxp of *L. maryamae* gen. et sp.n. bears a row of spinules, lacking in *L. sp.*;
6. The maxillipedal claw is accompanied by a small seta in *L. maryamae* gen. et sp.n., which is absent in *L. sp.*;
7. P1 differs in shape and ornamentation;
8. Peraeopods 2-4 differ considerably: P2 and P3 of *L. maryamae* gen. et sp.n. lack an enp, which is 1-segmented in *L. sp.*; P4 exp is 1-segmented in *L. sp.*, but 2-segmented in *L. maryamae* gen. et sp.n.;
9. Shape and setation of P5 differs markedly.

An attempt to assess the phylogenetic position of *Laophontisochra* gen.n. leads to the Laophontoidea which according to Huys (1990) is characterised among other things by the following features:

1. A2 with allobasis and 1 abexopodal seta;
2. Exp P1 without inner setae, exp3 with 4 setae;
3. Enp P1 2-segmented; enp1 very long, enp2 short, with 2 armature elements which overlap each other basally;
4. Male P6 armed with 2 setae.

Except for the last of these characters which cannot be ascertained because no males are as yet known in *Laophontisochra* gen.n. it shares all of the remaining features so that it can be regarded as a member of Laophontoidea. Within this group it shares two characters with Cristacoxidae Huys, 1990: 1. Presence of cristae on the P1 coxa of (known at least in *L. maryamae* gen. et sp.n.); 2. Mxp of all Cristacoxidae and of *Laophontisochra* gen.n. considerably remarkably long and of nearly the same shape;

Only the first of these is mentioned by Huys (1990), the second one is added here. However, Huys (1990) lists more characters as being autapomorphies of Cristacoxidae:

3. Cristacoxid males with extremely long and slender spermatophores;
4. A1 with outer spinous process on first segment;
5. A2 without exp;
6. Loss of abexopodal seta in A2;
7. Presence of modified seta on syncoxal endite of mx;
8. Setae of P1 exp3 geniculated;
9. "The fifth legs in both sexes have a neotenous origin" (Huys 1990, p.118).

As males are as yet unknown in *Laophontisochra* gen. n. character 3 cannot be compared. The same applies to character 8 because of the highly derived swimming legs of the new taxon. In

the remaining characters there is no agreement between *Laophontisochra* gen. n. and Cristacoxidae which could mean that a) *Laophontisochra* gen.n. does not belong to Cristacoxidae, or b) there are two groups in Cristacoxidae, viz. *Laophontisochra* gen. n. and a group comprising *Cristacoxa* Huys, 1990, *Cubanocleta* Petkovski, 1977, and *Noodtorthopsyllus* Lang, 1965. The latter group is characterised by the following autapomorphic characters: spinous process on first antennular segment (character 4 above), lack of A2 exp (character 5 above), modified seta on syncoxal endite of mx (character 7 above). *Laophontisochra* gen.n. on the other hand shows autapomorphic characters in its A1, swimming legs 1 to 4, etc.

Both these groups together form the Cristacoxidae on the basis of the following synapomorphies:

1. Cristae on the coxae of P1;
2. large mxps;
3. atrophy of A2 exp and abexopodal seta.

Thus, Cristacoxidae turn out to be composed not only of derived taxa but also of a more plesiomorphic one in the form of *Laophontisochra* gen.n. The md of *L. maryamae* gen. et sp. n. has 2 setae on its basis. This is a very primitive feature within Laophontoidea where it is so far known only from the laophontid *Esola bulligera* Farran, 1913. The 4-segmented A1 is also indicative of a basal position within Laophontoidea (cf. Huys 1990). The alternative of a broader taxon Cristacoxidae is favoured here instead of excluding *Laophontisochra* gen. n. from it and making cristae on the coxae of P1 the character of an even more inclusive taxon.

ACKNOWLEDGMENTS. – Grateful thanks are due to Prof Dr HK Schminke (Oldenburg) for comments on the manuscript. Mrs A Sievers (Oldenburg) helped with the English and French text of the manuscript.

REFERENCES

- Arntz WE, Gorny M eds 1996. Cruise report of the Joint Chilean-German-Italian Magellan "Victor Hensen" Campaign in 1994. *Ber Polarforsch* 190, 113p.
- Ax P 1984. Das Phylogenetische System. Gustav Fischer Verlag Stuttgart, 349 p.
- Fahrbach E, Gerdes D eds 1997. Die Expedition ANTARKTIS XIII/4-5 des Forschungsschiffes "Polarstern" 1996. *Ber Polarforsch* 239, 126p.
- George KH 1998. A new Ancorabolidae (Crustacea, Copepoda) from the Beagle Channel (Chile). *Hydrobiologia* 379 (1/3): 23-32
- George KH 1999. Gemeinschaftsanalytische Untersuchungen ausgewählter Harpacticoida der Magellanregion, sowie erste similaritätsanalytische Vergleiche mit Assoziationen der Antarktis. *Ber Polarforsch* 327: 1-187.

- George KH 2001. First record of the genus *Ancorabolus* Norman, 1903 (Copepoda, Harpacticoida, Ancorabolidae) from the Southern Hemisphere, including analyses of copepodid development. *Senckenberg Biol* 81 (½): 23-36.
- George KH, Schminke HK 1998. First records of the genus *Ceratonotus* G.O. Sars, 1909 (Copepoda, Ancorabolidae) from the southern hemisphere, with the description of two new species. *Crustaceana* 71(7): 801-817.
- George KH, HK Schminke 1999. Sublittoral Harpacticoida (Crustacea, Copepoda) from the Magellan Straits and the Beagle Channel (Chile) – preliminary results of abundances and generic diversity. *Scient Mar* 63(1): 133-137.
- Huys R 1990. A new family of harpacticoid copepods and an analysis of the phylogenetic relationships within the Laophontoidea T. Scott. *Bijdr Dierk* 60(2): 79-120.
- Huys R, Boxshall GA 1991. Copepod Evolution. Ray Soc. Publs 159, London, 468p.

Reçu le 20 décembre 2000 ; received December 20, 2000
Accepté le 21 juin 2001 ; accepted June 21, 2001