

A New Species of *Namakosiramia* Ho & Perkins Parasitic on Holothurians from Korea (Copepoda: Harpacticoida)

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Abstract

Namakosiramia koreensis sp. nov., a copepod of the family Laophontidae, ectoparasitic on holothurians, is described from Korean seas. This is the second species in the genus.

While describing a new species *Namakosiramia californiensis*, an ectoparasite of a Californian holothurian, Ho and Perkins (1977) founded a new family Namakosiramiidae and placed it in Cyclopoida. Later, Ho (1986) stated that this family should have been placed in the Harpacticoida because of some harpacticoid features of the species. Huys (1988) re-examined the type specimens and concluded that *Namakosiramia* is a member of the Laophontidae. The genus was tentatively allocated in the Laophontinae, because of certain characters such as the tetrasetose, unisegmented exopodite of the antenna, and the prehensile first leg in which the endopodite has no inner seta on the proximal segment, but a strong claw and one minute accompanying seta on the distal segment. He further mentioned that only the discovery of the male could provide clues as to the relationships of the genus within the Laophontinae. Both the original description and Huys' redescription were based on the female type specimens, and information on the male has not been published since.

In the present paper, a new species of *Namakosiramia* is described and figured based on specimens of both sexes found on the body surface of holothurians from Korean waters.

Family Laophontidae T. Scott, 1905

Namakosiramia koreensis sp. nov. (Figs. 1-3)

Type material. 60 females (9 ovigerous) and 29 males, washed from 10 specimens of the holothurian, *Stichopus japonicus* Selenka kept in aquarium of a fish market in Kangreung (on the coast of the Sea of Japan, 37°44'N, 128°56'E), collected on 21 August 1990 by I.-H. Kim. Holotype female, allotype, and 20 paratypes (10 females including 3 ovigerous females and 10 males) will be deposited in the U. S. National

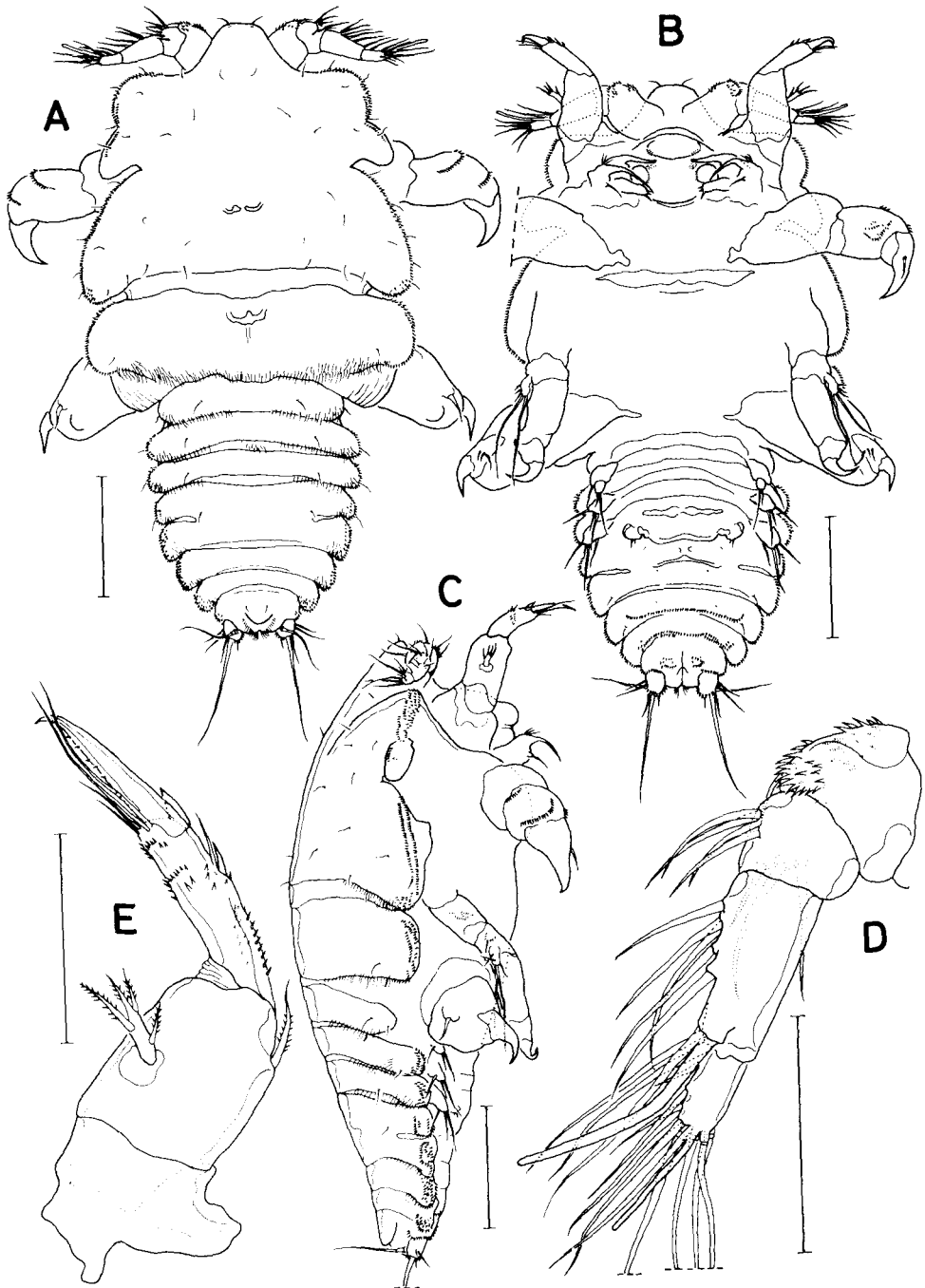


Fig. 1. *Namakosiramia korensis*, sp. nov., female. A. habitus, dorsal; B. habitus, ventral; C. habitus, lateral; D. antennule; E. antenna. Scales: A-C. 0.1 mm; D, E. 0.05 mm.

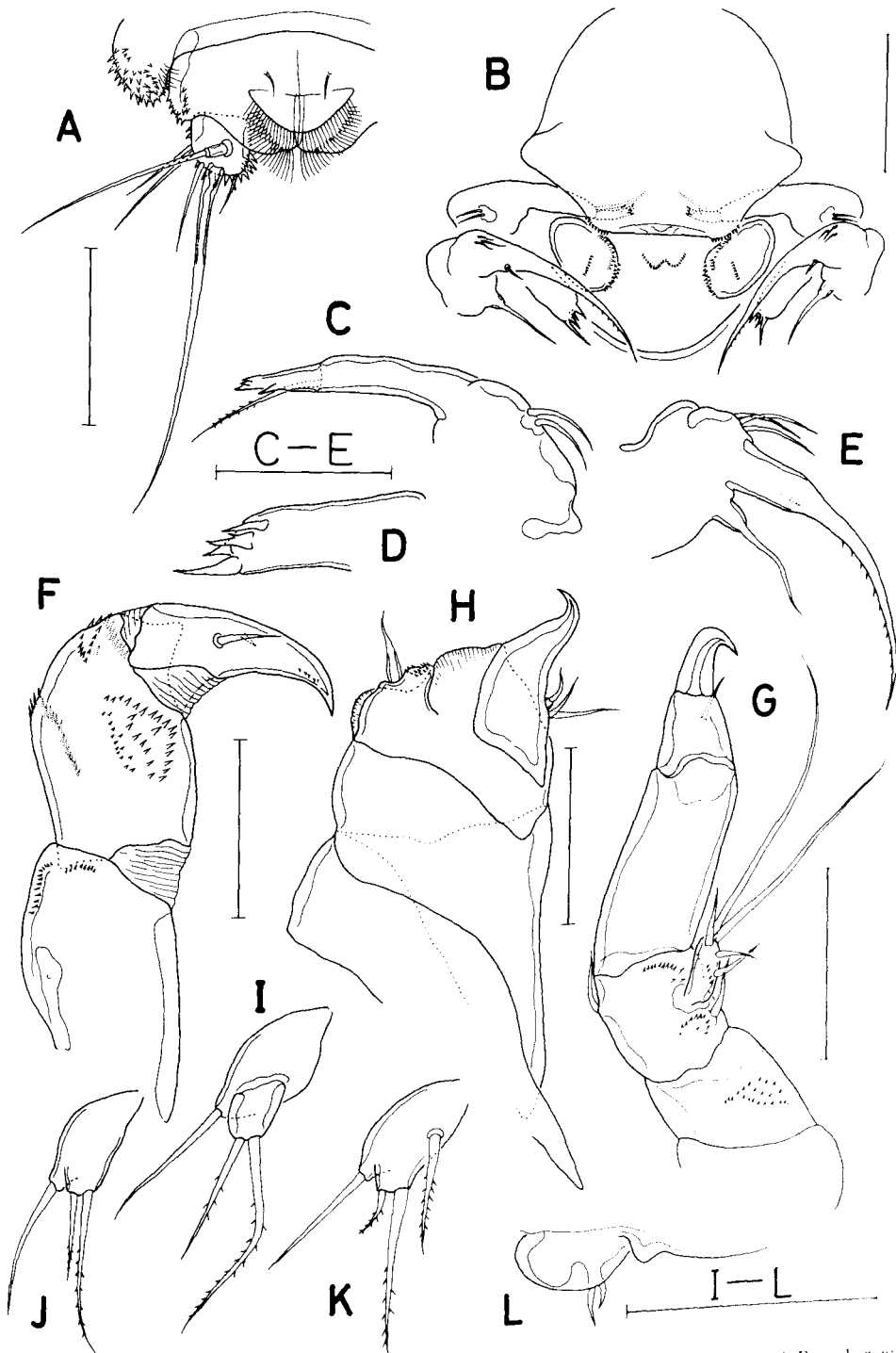


Fig. 2. *Namakosiramia koreensis*, sp. nov., female. A. left posterior part of abdomen, dorsal; B. oral area; C. mandible; D. maxillule; E. maxilla; F. maxilliped; G. leg 1; H. leg 2; I. leg 3; J. leg 4; K. leg 5; L. leg 6. Scales: A, B, F-L. 0.05 mm; C-E. 0.025 mm.

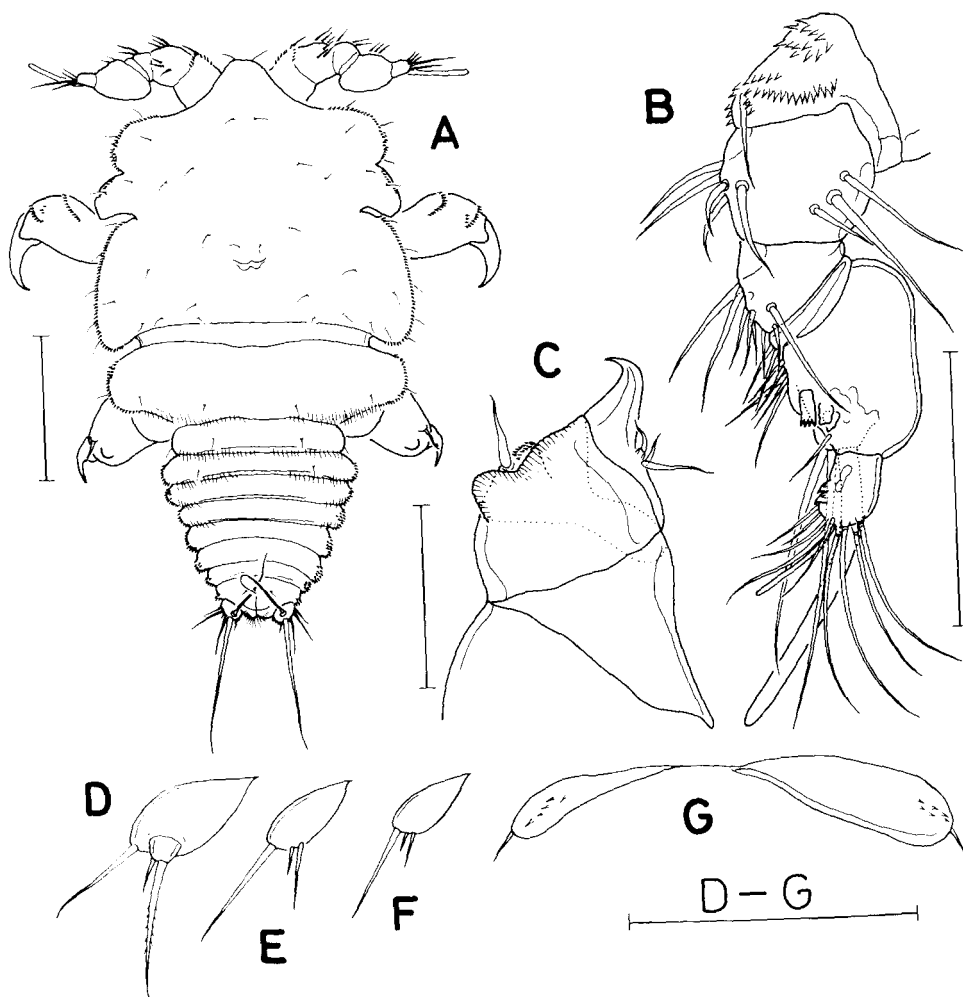


Fig. 3. *Namakosiramia korensis*, sp. nov., male. A. habitus, dorsal; B. antennule; C. leg. 2; D. leg 3; E. leg 4; F. leg 5; G. leg 6. Scales: A. 0.1 mm; B-G. 0.05 mm.

Museum, Smithsonian Institution, Washington, D. C. Other paratypes (49 females and 18 males including dissections of 4 females and 4 males) are retained in the collection of the author.

Other material examined. 5 females and 4 males, washed from 2 specimens of *Stichopus japonicus* kept in aquarium of a fish market in Mokpo (On the coast of the Yellow Sea in southwest Korea, 34°48' N, 126°22' E), collected on 24 november 1989 by I. H. Kim; 5 females and 2 males, washed from 1 specimen of *Holothuria monacaria* (Lesson) kept in aquarium of a fish market in Pusan (Korea Strait, 35°10' N, 129°02' E), collected on 26 June 1987 by I. -H. Kim.

Female

Body (Figs. 1A-C) dorsoventrally depressed, 502 μ m measured from tip of rostrum to

posterior margin of caudal rami. Greatest width $271\ \mu\text{m}$ measured across posterior margin of cephalothorax. Ratio length to width 1.80:1. Ratio length of prosome to urosome approximately 1.4:1. Entire lateral margin of body, except for rostral area, lateral lobe and second thoracic segment, fringed with spinules. Rostrum prominent, truncate at apex, fused with cephalothorax, with a pair of setules. Cephalothorax with a deep lateral incision just posterior to midway (0.57) cephalothorax; anterolateral margin bilobate with anterior lobe spinulose and semicircular, and posterior lobe laterally produced and as long as its basal width; postero-lateral corner rounded and extended posteriorly. First free thoracic somite as wide as, and clearly isolated from cephalothorax, and ornamented with hairs at posterior border. Second pedigerous somite distinctly narrower than following ones, without spinules at lateral margin, but fringed with hairs along posterior border. Third pedigerous somite as long as fourth one. Genital and first abdominal somites fused, fusion indicated by a faint chitinous suture laterally. Abdominal somites gradually narrowing posteriorly; first two somites ornamented with a row of spinules at posteroventral margin. Anal somite with spinules on mid-ventral surface and at posteroventral border. Anal operculum rounded, with hairs on margin. Caudal rami (Fig. 2A) originating from posteroventral side of anal somite, as long as wide, with 6 smooth setae, of which inner terminal one distinctly developed.

Antennule (Fig. 1D) short, 4-segmented, tapering distally, without any process on second segment; first segment wider than long, armed anteriorly with numerous spinules and 1 seta; second segment also wider than long, with 7 setae; third segment longest, with 7 setae and 1 large aesthetasc; fourth segment with 10 setae and 1 small aesthetasc.

Antenna (Fig. 1E) with allobasis; coxa wider than long; allobasis with exopodal bipinnate spine at $1/3$ distance from distal margin. Exopodite 1 segmented, with 4 bipinnate spines. Endopodite as long as allobasis, with a number of spinules at inner margin of proximal half; distal half armed with 1 spine, 2 setae and several spinules along inner margin and 2 transverse rows of spinules along outer margin; anterior margin armed with 1 spine, 1 claw and 4 slender setae two of which longer than claw; the spine at outer distal corner short and thick; claw strong.

Labrum (Fig. 2B) with a patch of denticles at each slightly protruding posterolateral corner.

Mandible (Fig. 2C) with elongated coxa which is provided with 1 pinnate seta and 4 minute teeth, one of which is subterminal. Mandibular palp represented by 2 setae.

Paragnaths (Fig. 2B) well developed, armed with spinules along inner side, and a row of spinules on posterior surface.

Maxillule (Fig. 2D) simple, 1-segmented, with 4 spines, the posterior one longest.

Maxilla (Fig. 2E). Syncoxa with 1 endite which is produced into a bare seta. Allobasis fused with syncoxa and forming a long claw, with a minute accompanying setule near the base. Endopodite represented as 3 setae.

Maxilliped (Fig. 2F) strong, prehensile. Syncoxa with minute spinule near outer distal corner. Basis with 3 groups of spinules. Endopodal claw strong, with a seta on anterior surface, a minute setule on posterior surface, and armed with several den-

ticles subterminally.

Leg 1 (Fig. 2G) biramous. Coxa with a patch of spinules on anterior surface. Basis with 2 setae, each on outer and inner margin, and 2 groups of spinules; outer seta surrounded by spinules. Exopodite 1-segmented, with 3 short and 2 subequally long, terminal setae. Endopodite 2-segmented, prehensile; proximal segment bare; distal segment with a subdistal small seta and a strong claw.

Leg 2 (Fig. 2H) biramous, largely transformed, stout and prehensile. Precoxa, coxa and basis strongly enlarged. Basis with outer seta. Exopodite represented as a strong claw and 3 short accompanying setae.

Legs 3-5 extremely reduced. Leg 3 (Fig. 2I) with 1 basal outer seta; exopodite weakly defined at base, with 2 bipinnate setae distally.

Leg 4 (Fig. 2J) with 1 basal outer seta; exopodite fused with protopodite, with 2 bipinnate setae.

Leg 5 (Fig. 2K): Baseoendopodite with 1 outer and 1 inner setae; exopodite fused with baseoendopodite, with 2 bipinnate setae.

Leg 6 (Fig. 2L) represented by 2 small setae.

Male

Habitus (Fig. 3A) as the female. Length 379 μm . Maximum width 212 μm . Genital somite free. Urosome tapering and relatively smaller compared to the female. Ratio of length of prosome to urosome approximately 1.7:1.

Antennule (Fig. 3B) 6-segmented, chirocerate. First segment as in the female. Second and third segments each with 8 setae. Fourth segment short, indistinctly demarcated, with 2 setae. Penultimate segment expanded, with 5 proximal setae, 3 medial elements of which 1 is combed distally, and 3 setae+1 thick aesthetasc distally. Terminal segment with 2 spiniform armatures, 9 setae and 1 thin aesthetasc.

Antenna, oral appendages, and legs 1-3 not differing from those of the female.

Leg 4 (Fig. 3E) and leg 5 (Fig. 3F) vestigial, each with 3 setae.

Leg 6 (Fig. 3G) represented by 1 or 2 short setae.

Variation

Eight females and 7 males were dissected. Variations occur in the form of leg setae in both sexes and in the spinulation of the genital somite of the female. The exopodal setae of leg 3 and the inner setae of legs 4 and 5 are variable in size and armature. These setae may be naked, bipinnate or pinnate on only one side, and this variation is not related to the body size. The number of setae of the male leg 6 is not constant; it is 1 or 2, and may differ between the left and right side of a pair in the same individual. The posteroventral margin of the genital somite of the female is usually smooth, but is sometimes ornamented with a row of spinules.

Etymology

The specific name, *koreensis*, is derived from Korea where the type locality is located.

Remarks

This new species resembles closely to *N. californiensis* in basic body plan and size. However, it is easily distinguished from the latter by the shape of the cephalothorax, notably, with its anterolateral edge clearly protruded (almost linear in *N. californiensis*), the better developed lateral lobe (as long as wide) being posterolaterally directed (shorter and directed laterally in *N. californiensis*), and having the lateral incision located posterior to half the length of the cephalothorax (anterior in *N. californiensis*). The cephalothorax and the first thoracic somite are distinctly separated from each other rather than in close contact as in *N. californiensis*. In the latter species the length:width ratio of the body is 1.55:1 from the Ho and Perkins' description or 1.57:1 when measuring Huys' figure, whereas it is 1.8:1 (1.74-1.85:1 based on 10 specimens) in the new species. Unlike *N. californiensis*, the new species has the long subterminal seta on the mandibular gnathobase (possibly it was omitted in the descriptions of *N. californiensis*), and spinules on the outer margin of paragnath are lacking. In the maxilla of the new species the allobasis is produced into a long spine rather than a claw-like structure as in *N. californiensis*. The demarcation of the exopod in leg 3 of the species is also an important differentiating character.

The *Namakosiramia* undoubtedly belongs to the Laophontidae judging from the structure of leg 1 and antenna. However, the genus has strongly reduced legs, an aberrant body shape and oral appendages, and the sexual dimorphism. These features make it difficult to establish relationships with the other genera. Most laophontid genera are defined by the leg morphology and transformation and by their sexual dimorphism. Leg reduction can also be observed in several other genera, such as *Laophontina*, *Afrolaophonte*, *Klieonychocamptoides*, *Mexicolaophonte* and *Pseudolaophonte*, but these genera exhibit distinct sexual dimorphism in the legs. In the genus *Namakosiramia* the sexual dimorphism can only be observed in the antennule, the genital segmentation and the legs 5 and 6. Weak sexual dimorphism can also be observed in *Laophonte* to which *Namakosiramia* is not related in other respects. The transformation of the oral appendages of *Namakosiramia* is quite remarkable and shows some resemblance to those of poecilostomatoids. The degenerated mandibular palp, the extremely simplified maxillule and the well-developed paragnaths are of poecilostomatoid type. This convergence certainly is a result of an adaptation to the parasitic mode of life. In addition to this, the enlargement of basal segments in leg 2 and its transformation to an anchoring device are unique and hardly comparable to the other harpacticoids.

Literature Cited

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