

A new species of *Onychocamptus* Daday, 1903 (Copepoda: Harpacticoida: Laophontidae) from northwestern Mexico

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Abstract.—A new species of harpacticoid copepod, *Onychocamptus fratri-saustralis* (Harpacticoida: Laophontidae), is described from a coastal lagoon in northwestern Mexico (Sinaloa state). *Onychocamptus fratri-saustralis* appears to be related to *O. krusensterni* Schizas & Shirley, 1994, by the unusual formula of the P4 exopod. *Onychocamptus anomalus* (Ranga Reddy, 1984) shares the same formula of the P4 exopod, but differs from *O. fratri-saustralis* and *O. krusensterni* in the A2 exopod (with 4 setae in *O. krusensterni* and *O. fratri-saustralis*; with 1 seta in *O. anomalus*) and female P5 exopod (with four setae in *O. anomalus*; with three setae in *O. krusensterni* and *O. fratri-saustralis*). *Onychocamptus besnardi* Jakobi, 1954, also possesses a P4 exopod with two outer spines, but lacks the inner seta of the same segment. After thorough analysis of the type material of *O. krusensterni* (USNM259322), a number of subtle differences was found between this species and *O. fratri-saustralis*: armature of the antennal exopod, length/width ratio of caudal rami, dorsal ornamentation of the genital double-somite and fourth urosomite, relative length of the inner setae of second and third exopodal segments and the two innermost setae of second endopodal segments of P2–P3, relative length of the second endopodal segment of P4, general morphology of baseoendopod and relative length of the proximal setae of the endopodal lobe of P5, and relative length of the lateral outer seta of the last antennular segment.

As for many other harpacticoid taxa, the genus *Onychocamptus* Daday, 1903 has been subject to several changes which have led to a better understanding of relationships of the species within the genus. In the most recent redefinition of the genus, Lee & Huys (1999:319) recognized *O. krusensterni* Schizas & Shirley, 1994, *O. taifensis* Kikuchi, Dai & Itô, 1993, *O. bengalensis* (Sewell, 1934), *O. mohammed* (Blanchard & Richard, 1891), *O. vitiospinulosa* (Shen & Tai, 1963), *O. besnardi* Jakobi, 1954, formerly considered by Lang (1965) as a form of *O. mohammed*, as a distinct species, and *O. anomalus* (Ranga Reddy, 1984).

A new species closely related to *O. krusensterni* from Cape Krusenstern, Alaska, is described here. It was found in 1991 during a survey of the distribution and abundance of meiofauna in a coastal lagoon in the mouth of the Gulf of California.

Methods

Quantitative triplicate sediment samples were taken in Ensenada del Pabellón lagoon (Sinaloa, northwestern Mexico), using a plastic corer of 7.06 cm² (see Gómez-Noguera & Hendrickx 1997). Meiofauna was separated from macrofauna using 500 and 63 µm sieves. Harpacticoids were sorted under a dis-



Fig. 1. *Onychocamptus* dorsal; B, habitus, lateral.

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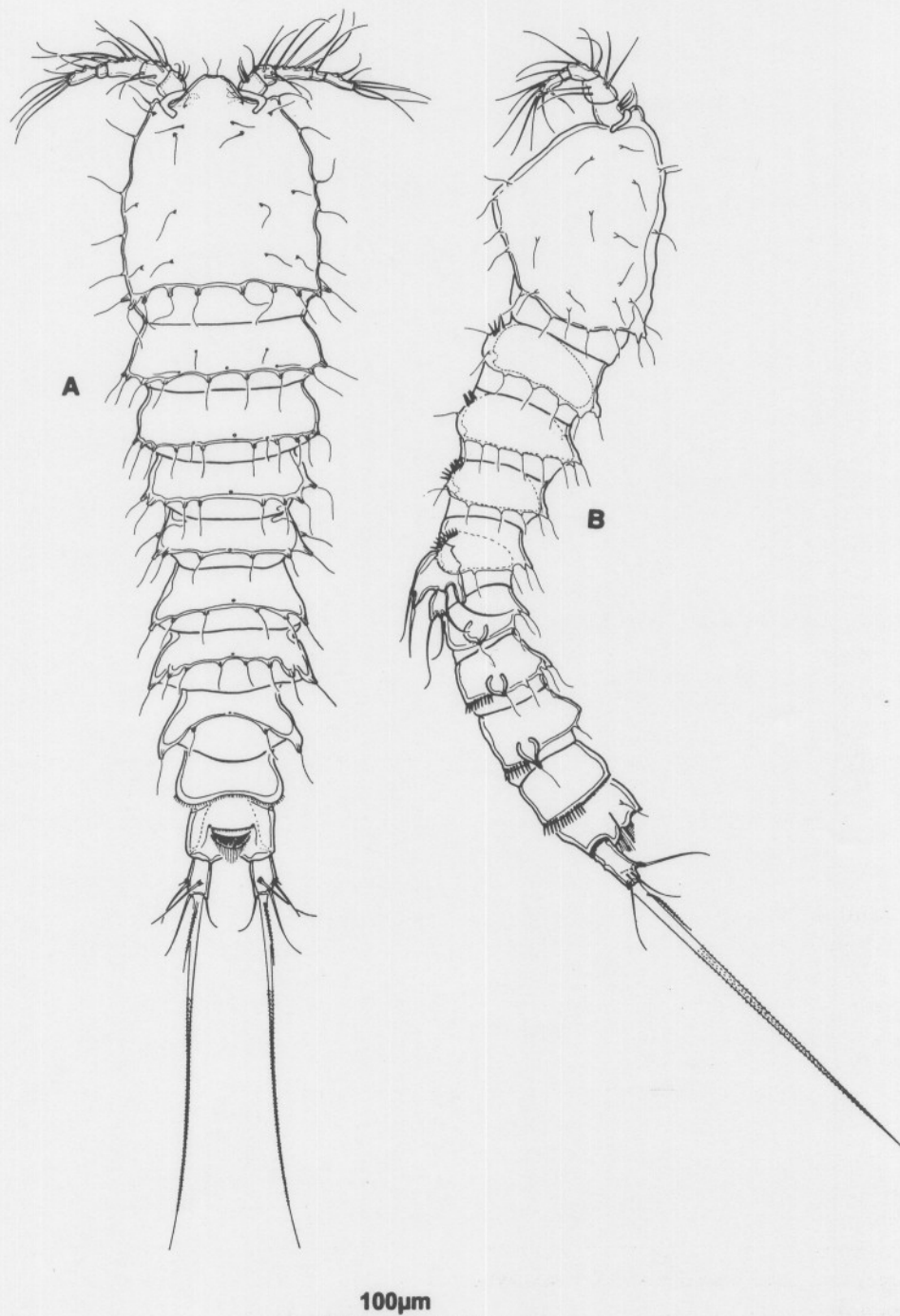


Fig. 1. *Onychocamptus frisaustralis*, new species. Holotype, female, EMUCOP-300392-25. A, habitus, dorsal; B, habitus, lateral.

secting microscope, counted, and preserved in 70% ethanol. Observations and drawings were made from whole and dissected specimens mounted in glycerin, at 1000 \times using a phase-contrast light microscope equipped with a drawing tube. In order to assure the identity of this new taxon, the type material of *O. krusensterni* (USNM259322) was thoroughly reanalysed. Terminology proposed by Huys & Boxshall (1991) was adopted. Abbreviations used in the text and tables: P1–P6, first to sixth leg; EXP, exopod; ENP, endopod.

The type material has been deposited in the collection of the Instituto de Ciencias del Mar y Limnología, Unidad Académica Mazatlán.

Family Laophontidae T. Scott, 1905

Genus *Onychocamptus* Daday, 1903

Onychocamptus fratrissaustralis, new species

Figs. 1–5

Holotype.—Dissected female, EMUCOP-300392-25, collected in May 1991 by Samuel Gómez in Ensenada del Pabellón lagoon (24°19'–24°35'N, 107°28'–107°45'W), Sinaloa, (southeastern Gulf of California), Mexico.

Paratype.—One female preserved in 70% ethanol (EMUCOP-020591-18).

Type locality.—Ensenada del Pabellón lagoon (24°19'–24°35'N, 107°28'–107°45'W), Sinaloa, Mexico.

Etymology.—The specific name is derived from the Latin *frater* (brother) (*fratris* is the genitive form) and *australis* (southern) and alludes to the close relationship of the new species with *O. krusensterni* Schizas & Shirley, 1994, of which the new Mexican laophontid is a southern relative.

Diagnosis.—Laophontidae. Antennule 5-segmented; outer lateral seta of last segment as long as segment. Armature formula of P1–P4 (EXP/ENP): P1-[I-0;III,2,0/0-0;0,I,1], P2-[I-0;I-1;III,I,1/0-0;0,2,2], P3-[I-0;I-1;III,I,1/0-0;I,2,3], P4-[I-0;I-1;II,I,1/0-0;1,1,1]. Antennal exopod with 4 setae, lateral

seta shorter, sub-apical seta slightly longer than exopod. Caudal rami as long as anal somite; about 2 times longer than wide. Middle seta of female P5 baseopod about 1.3 times longer than exopod.

Description.—Total body length of holotype 527 μ m, measured from anterior margin of rostrum to posterior margin of caudal rami. Greatest width measured at posterior margin of cephalothorax. Urosome gradually tapering posteriorly (Figs. 1A, 2A). Cephalothorax nearly $\frac{1}{4}$ total body length, with surface sensilla, and with sensillar tubercles along posterior margin. Pedigerous somites ornamented like cephalothorax, dorsally with anterolateral sets of spinules (Fig. 1B). Genital double-somite wider than long (Figs. 1A, B, 2A, B), with sensillar tubercles middorsally and laterally and along posterior margin dorsally; P6 represented by one smooth element and genital field in anterior half, ornamented with small spinules along posterior margin. Fourth urosomite with 4 sensillar tubercles along posterior margin dorsally, ventrally as preceding somite. Penultimate somite with fragile spinules along posterior margin dorsally, without sensilla, ventrally as preceding somite. Anal somite as long as preceding somite, with rounded dentate operculum, and with minute spinules along posterior margin ventrally. Caudal rami as long as anal somite, about 2 times longer than wide, with 7 setae (Fig. 2A, B).

Antennule (Fig. 3A): 5-segmented. Surface of segments smooth except for 2 spinular rows on first segment. Armature formula 1-[1], 2-[8], 3-[7+ae], 4-[1], 5-[11].

Antenna (Fig. 3B): 3-segmented, comprising coxa, allobasis, and 1-segmented endopod. Allobasis ornamented with longitudinal row of spinules along inner margin, with inner seta on distal half. Exopod 1-segmented; ornamented with transverse row of small spinules; with 4 setae, lateral seta as long, subapical seta slightly longer than exopod, apical setae clearly longer than exopod (one of them longer and thicker than the other). Endopod ornamented

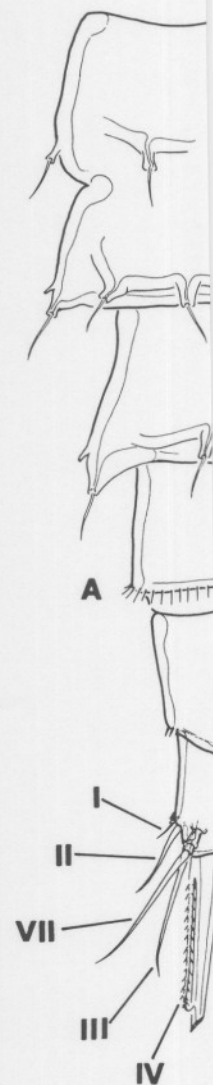


Fig. 2. *Onychocamptus fratrissaustralis*. A, dorsal; B, urosome, v

with strong spinules with 1 strong spinule latter arrowed in elements (outermost)

Mandible (Fig. 4): gnathopodidate teeth around pinnate spine and with 5 slender setae

Maxillule (Fig. 5): 2-segmented with 2 spinules at base of c

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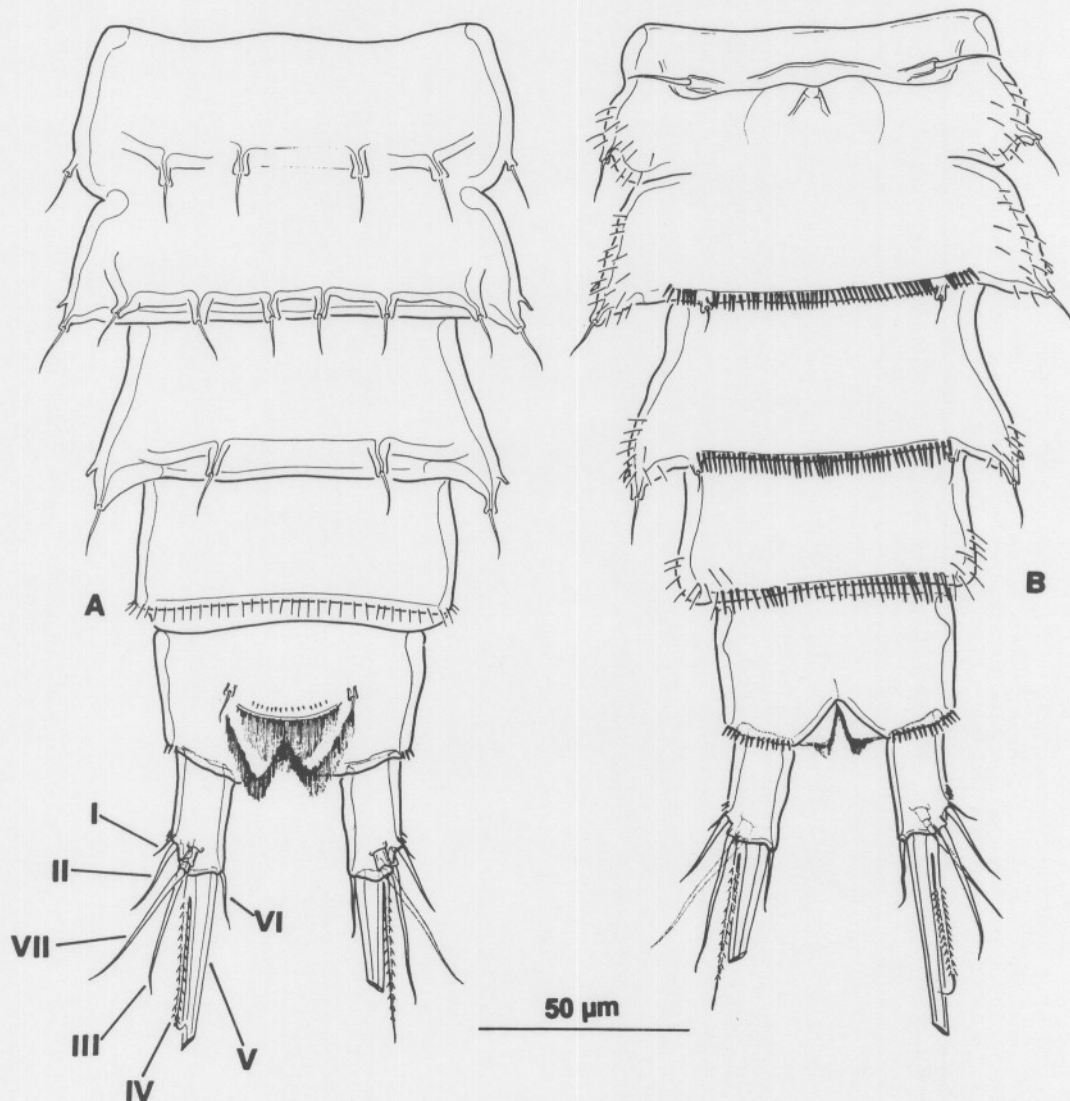


Fig. 2. *Onychocampus fratrissaustralis*, new species. Holotype, female, EMUCOP-300392-25. A, urosome, dorsal; B, urosome, ventral.

with strong spinules along lateral margin;
with 1 strong spine and 1 slender seta (the
latter arrowed in Fig. 3B); with 6 distal el-
ements (outermost 2 fused).

Mandible (Fig. 3C, D): With well devel-
oped gnathobase bearing several multicus-
pidate teeth around distal margin; with 1
pinnate spine and 1 naked seta. Palp small,
with 5 slender setae.

Maxillule (Fig. 3E): Praecoxa with spi-
nules at base of coxa and along outer mar-

gin. Arthrite well developed, with 6 distal
elements, and 1 spine on inner margin of
arthrite. Coxa with cylindrical endite bear-
ing 1 naked and 1 curved seta. Basis with
cylindrical endite bearing 3 setae, with spi-
nular row around inner distal margin and at
base of endopod. Endopod and exopod in-
corporated in basis, the former with 3, the
latter with 2 setae.

Maxilla (Fig. 3F): Syncoxa with 2 endites;
with 1 proximal inner row of small spinules

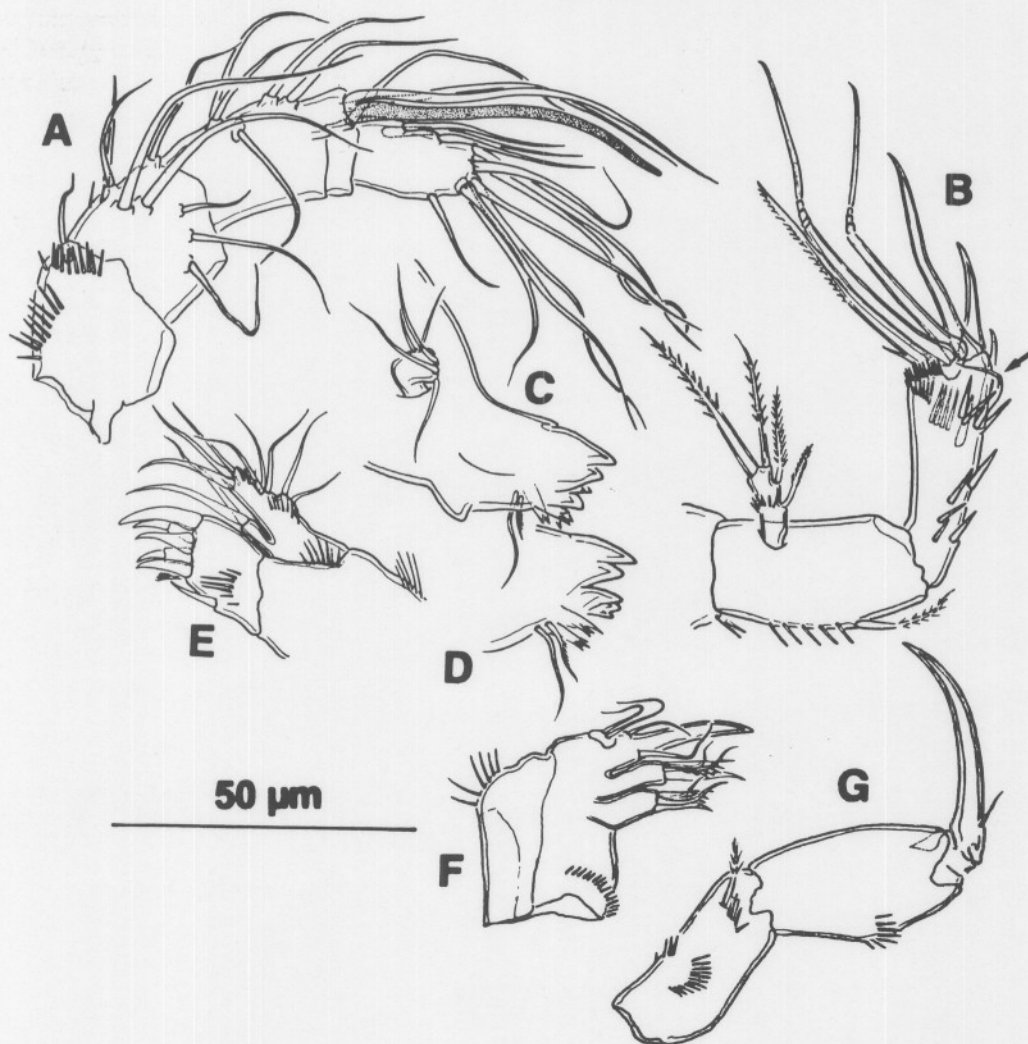


Fig. 3. *Onychocamptus fratrissaustralis*, new species. Holotype, female, EMUCOP-300392-25. A, antennule; B, antenna; C, mandible; D, gnathobase of mandible, another view; E, maxillule; F, maxilla; G, maxilliped.

and some long spinules along outer margin; both endites with 3 naked setae (2 of them slender) and 1 pinnate seta. Allobasis drawn out into strong, naked claw; accessory armature consisting of 2 slender, naked setae. Endopod represented by 2 setae.

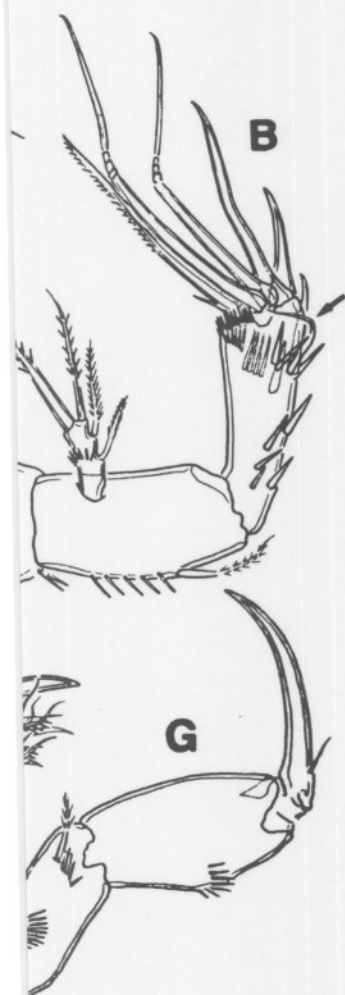
Maxilliped (Fig. 3G): With 1 plumose seta and several patches of spinules on syncoxa. Basis with transverse row of spinules on outer margin. Endopod drawn out into long, naked claw, with 1 accessory seta anteriorly.

P1 (Fig. 4A): Praecoxa with some me-

dian spinules. Coxa large, with spinules along outer margin. Basis with 1 plumose seta on distal pedestal, long setules on proximal inner margin, and strong bipinnate outer spine with patch of short spinules at its base. Exopod 2-segmented, reaching proximal third of first endopodal segment. Endopod 2-segmented; first segment about 5.2 times longer than wide, with setular row along inner margin; second segment small, slightly longer than wide, with 1 slender naked inner seta and 1 long, naked claw. Armature formula as in Table 1.

Fig. 4. *Onychocamptus*

P2-P4 (Fig. 4B, 5A and basis ornamented figured. Basis of P2 spine; basis of P3 and naked outer seta. Exopod seta of second exopod



EMUCOP-300392-25. A, antennule; B, maxillule; F, maxilla; G, maxilliped.

s. Coxa large, with spinules margin. Basis with 1 plumose pedestal, long setules on prox-argin, and strong bipinnate out- patch of short spinules at its 1 2-segmented, reaching prox- first endopodal segment. En- nented; first segment about 5.2 than wide, with setular row margin; second segment small, er than wide, with 1 slender na- ta and 1 long, naked claw. Ar- ula as in Table 1.

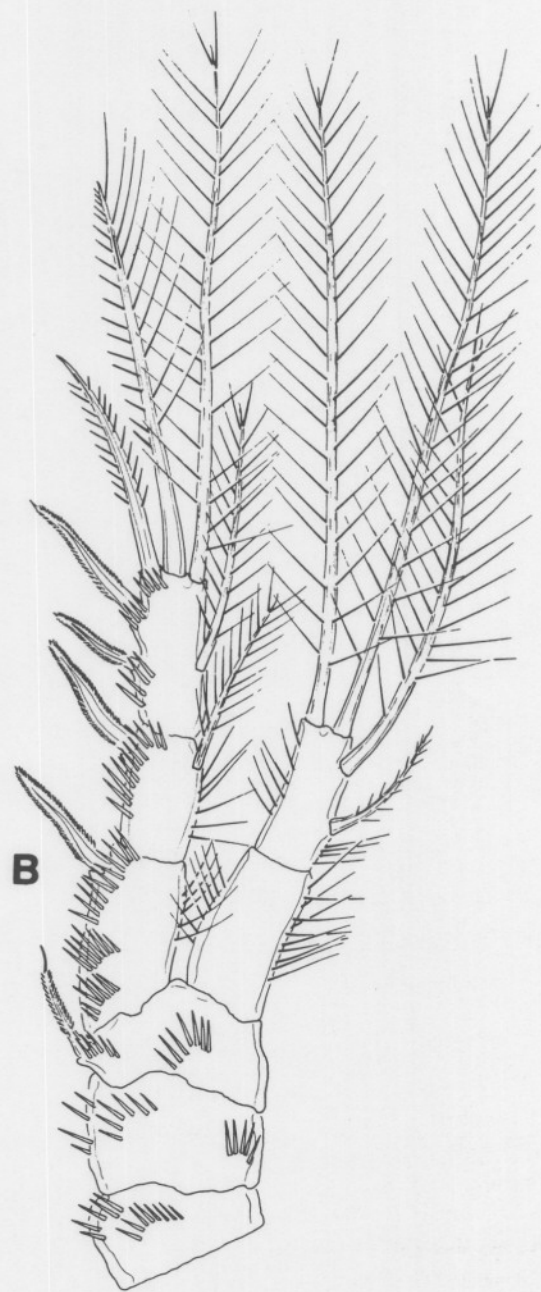
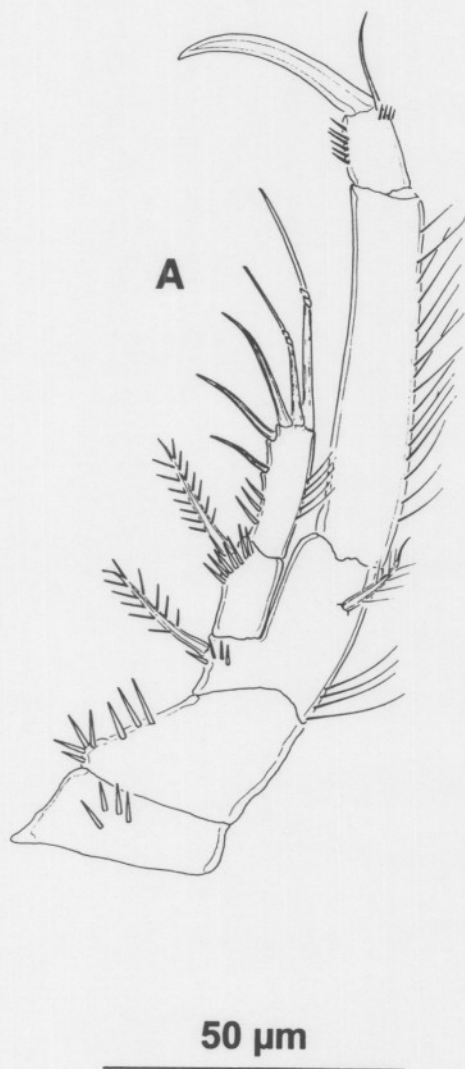


Fig. 4. *Onychocamptus fratrissaustralis*, new species. Holotype, female, EMUCOP-300392-25. A, P1; B, P2.

P2-P4 (Fig. 4B, 5A, B): Praecoxa, coxa and basis ornamented with spinular rows as figured. Basis of P2 with outer bipinnate spine; basis of P3 and P4 with slender naked outer seta. Exopod 3-segmented. Inner seta of second exopodal segment of P2

hardly reaching tip of third exopodal segment; inner seta of third exopodal segment of P2 clearly longer than supporting segment; outer spines of third exopodal segment of P4 shorter than supporting segment. Endopod 2-segmented. Endopod of

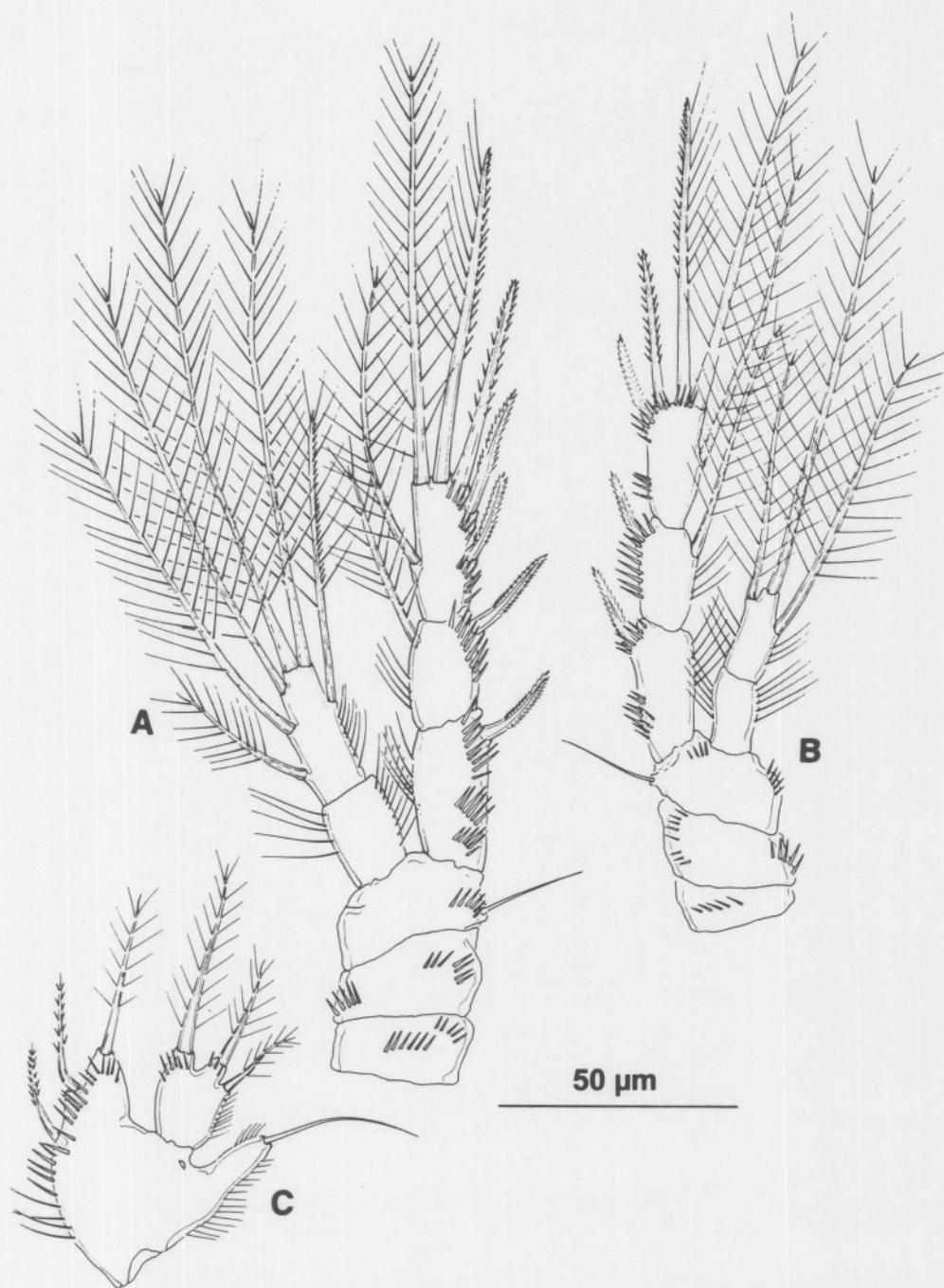


Fig. 5. *Onychocampus fratrissaustralis*, new species. Holotype, female, EMUCOP-300392-25. A, P3; B, P4; C, P5.



Fig. 6. *Onychocampus fratrissaustralis*. A, dorsal; B, urosome.

P2 slightly beyond mentum, of P3 hardly reaching distal end of second exopoda. Armature of P2 reaching distal end of second exopoda. Armature of P3 reaching distal end of second exopoda.

P5 (Fig. 5C) long outer setopl setular rows. End of P5 most to tip of exopoda and 2 spiniform setae as long as exopoda proximal inner setae.

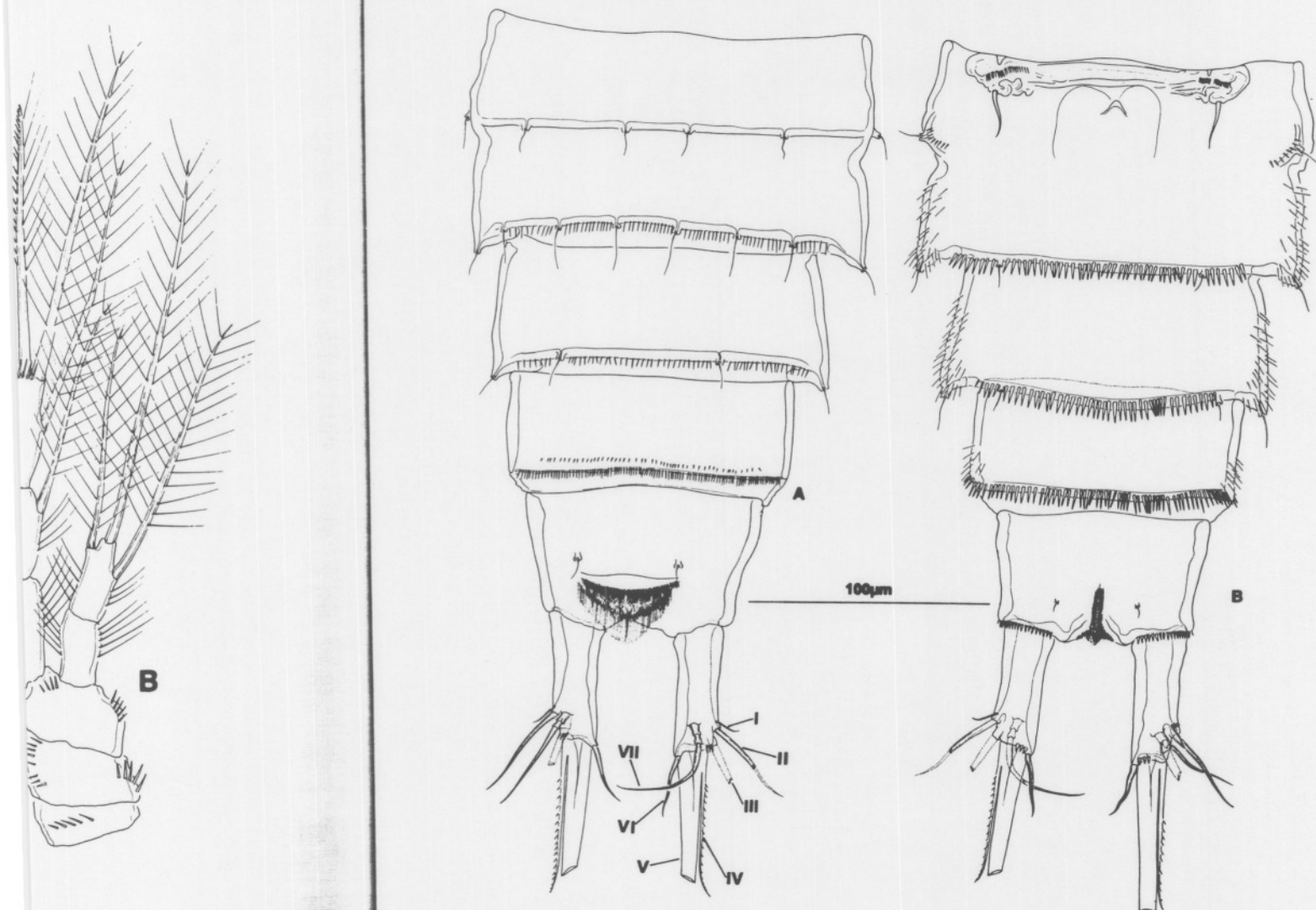


Fig. 6. *Onychocamptus krusensterni* Schizas & Shirley, 1994. Paratype, female, USNM 259322. A, urosome, dorsal; B, urosome, ventral.

P2 slightly beyond second exopodal segment, of P3 hardly reaching distal third of second exopodal segment, of P4 hardly reaching distal half of second exopodal segment. Armature formula as in Table 1.

P5 (Fig. 5C): Baseoendopod forming long outer setophore bearing basal seta and setular rows. Endopodal lobe extending almost to tip of exopod, with 1 apical seta and 2 spiniform inner elements (proximal as long as exopod), and ornamented with proximal inner set of long setules and spi-

nular row. Exopod nearly as long as wide, with 3 setae, ornamented with setules along outer margin and with small spinules at bases of 2 innermost setae.

Male unknown.

Remarks.—The new Mexican laophontid, *Onychocamptus fratrissaustralis*, proved closely related to *O. krusensterni* found in Krusenstern Lagoon (Alaska) in 1994 (Schizas & Shirley 1994). After thorough analysis of the species and after further dissection and analysis of the type material of

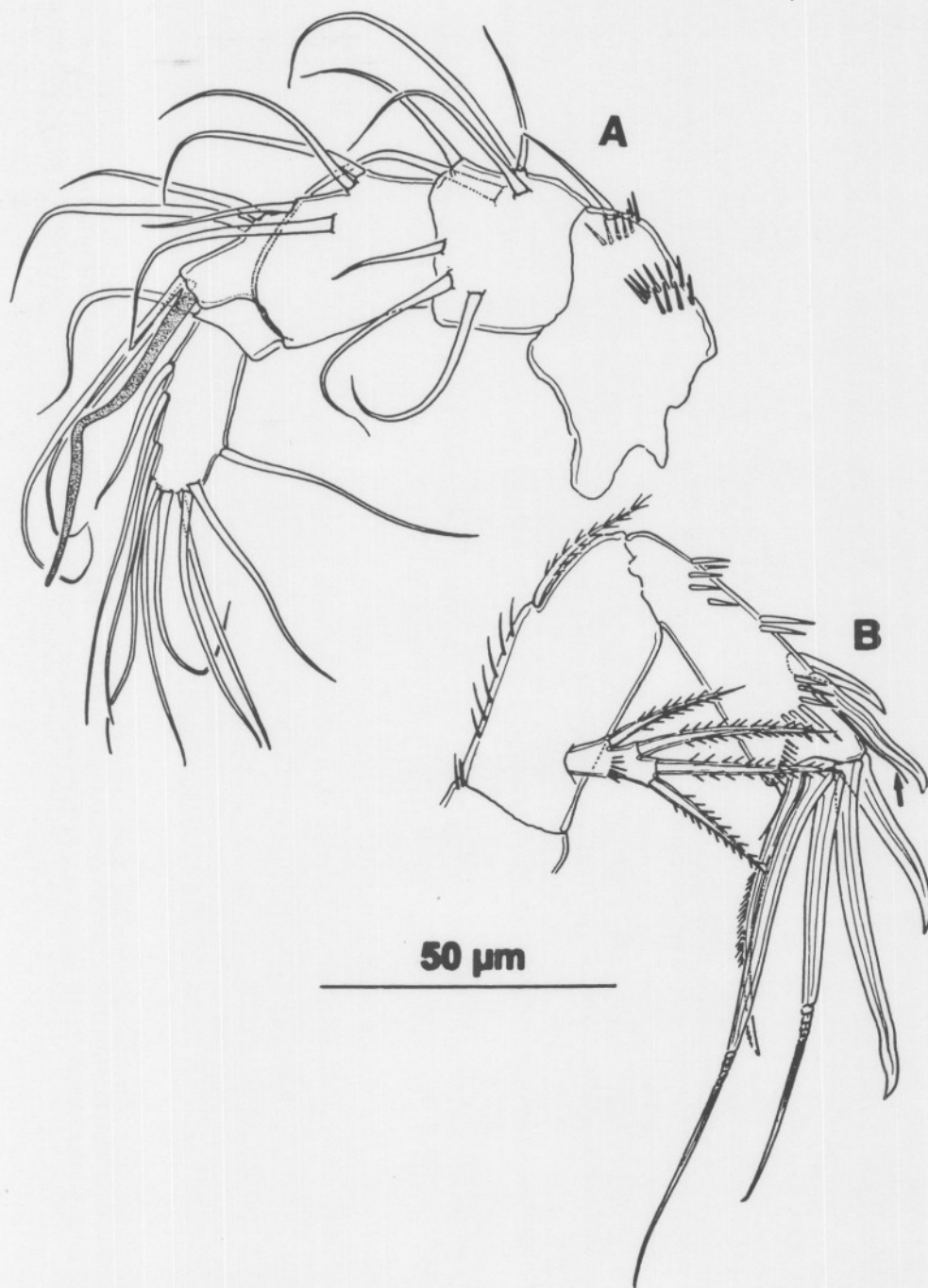
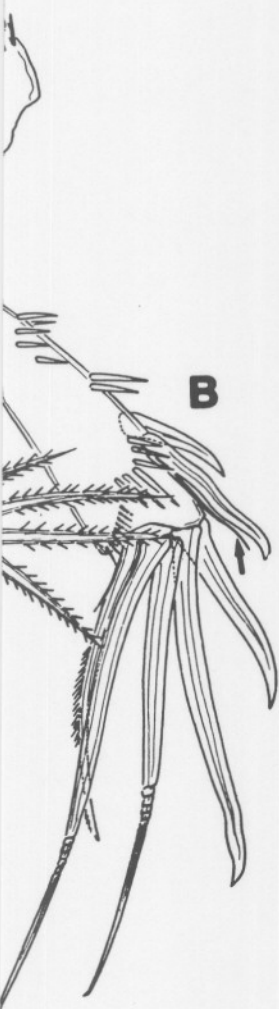


Fig. 7. *Onychocampus krusensterni* Schizas & Shirley, 1994. Paratype, female, USNM 259322. A, antennule; B, antenna.



Fig. 8. *Onychocampus* P2.



female, USNM 259322. A, anten-

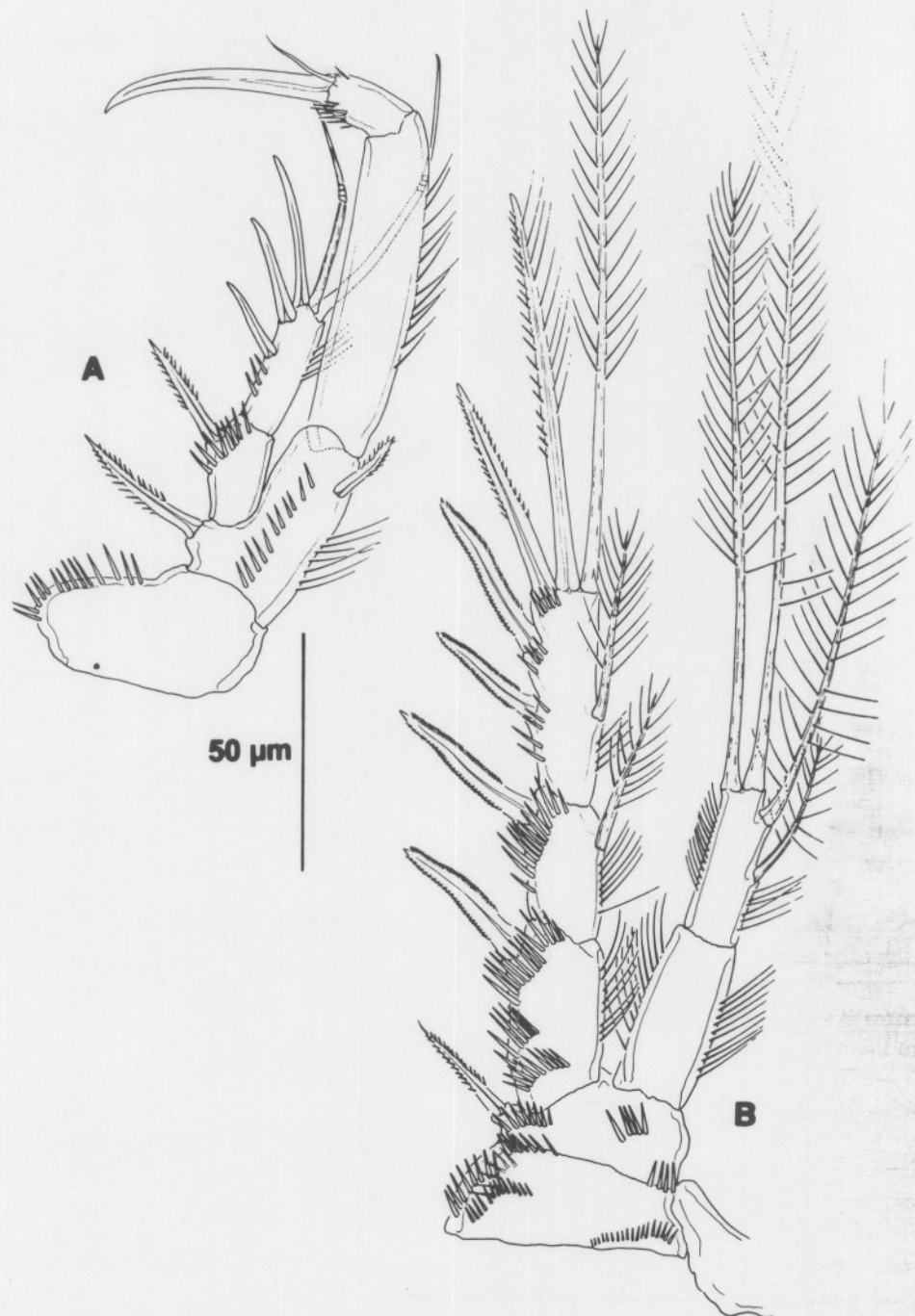


Fig. 8. *Onychocamptus krusensterni* Schizas & Shirley, 1994. Paratype, female, USNM 259322. A, P1; B, P2.



Fig. 9. *Onychocamptus krusensterni* Schizas & Shirley, 1994. Paratype, female, USNM 259322. A, P3; B, P4; C, P5.

Table 1.—Armature of *Onychocamptus trisaustralis*.

	EXP
P1	I-0; III, 2, C
P2	I-0; I-1; III, 1
P3	I-0; I-1, III, 1
P4	I-0; I-1; II, 1

O. krusensterni (Fig. 9A) differs from *O. trisaustralis* in several subtle differences.

Although *O. krusensterni* is closely related to *O. trisaustralis*, the usual formula of setal arrangement for the species can be separated. The caudal rami of *O. krusensterni* are 2.8 times longer than the caudal rami of *O. trisaustralis*, about 2 times longer than the genital double-somite of *O. trisaustralis*. The setules along the posterior margin of the sixth sternite of *O. krusensterni* (Fig. 6A) are more numerous than those of *O. trisaustralis* (Fig. 2B). The sixth sternite of *O. krusensterni* possesses a small setal field, close to the posterior margin. *O. trisaustralis* lacks this setal field. The sixth sternite of *O. krusensterni* has a naked seta appearing anteriorly in *O. krusensterni*. The most lateral seta of the antennule is self in *O. krusensterni*, clearly longer in *O. trisaustralis*. The two lateral setae of the antenna are longer in *O. krusensterni* than in *O. trisaustralis*. The swimming leg of *O. krusensterni* has a longitudinal spinous seta (Fig. 4A), which is absent in *O. trisaustralis* (Fig. 4A). The setae of basis and first swimming leg of *O. krusensterni* (Fig. 4A) are longer than those of *O. trisaustralis* (Fig. 4A). The margin of the first swimming leg of *O. krusensterni* are longer in *O. krusensterni* than in *O. trisaustralis*.

Table 1.—Armature formula of *Onychocampus fratrissaustralis*.

	EXP	ENP
P1	I-0; III, 2, 0	0-0; 0, I, 1
P2	I-0; I-1; III, II, 1	0-0; 2, 2, 2
P3	I-0; I-1, III, II, 1	0-0; I, 2, 3
P4	I-0; I-1; II, II, 1	0-0; 1, 1, 1

O. krusensterni (Paratype USNM 259322) several subtle differences became evident.

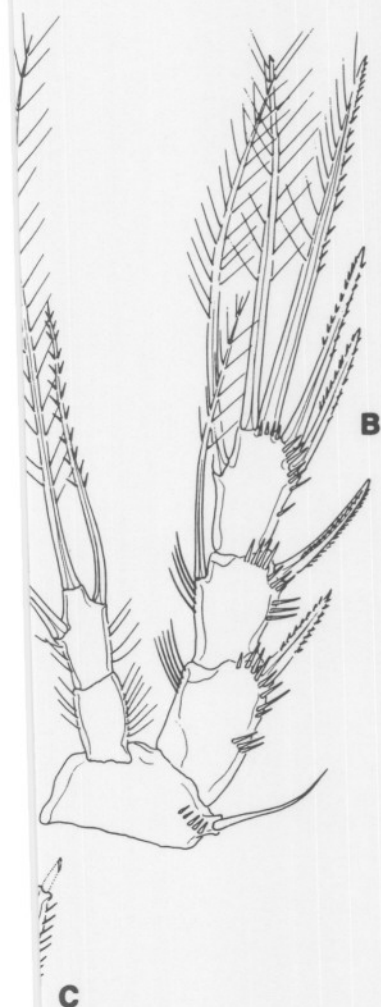
Although *O. fratrissaustralis* proved closely related to *O. krusensterni* by the unusual formula of the P4 exopod, these species can be separated by the follow states. The caudal rami of *O. krusensterni* is about 2.8 times longer than wide (Fig. 6), while the caudal rami of *O. fratrissaustralis* is about 2 times longer than wide (Fig. 2). The genital double-somite and fourth urosomite of *O. fratrissaustralis* lacks the minute spinules along the posterior margin (Fig. 2A); such ornamentation is present in *O. krusensterni* (Fig. 6A). *Onychocampus krusensterni* possesses a spinular row on the genital field, close to P6 (Fig. 6B); *O. fratrissaustralis* lacks such a spinular row (Fig. 2B). The sixth leg represented by a single, naked seta appears to be directed laterally in *O. fratrissaustralis* (Fig. 2B), but posteriorly in *O. krusensterni* (Fig. 6B). The outermost lateral seta on the last segment of the antennule is as long as the segment itself in *O. fratrissaustralis* (Fig. 3A), but clearly longer in *O. krusensterni* (Fig. 7A). The two lateral setae of the exopod of the antenna are comparatively stronger and longer in *O. krusensterni* (Fig. 7B) than in *O. fratrissaustralis* (Fig. 3B). The first swimming leg of *O. krusensterni* possesses a longitudinal spinular row on the basis (Fig. 8A), which is absent in *O. fratrissaustralis* (Fig. 4A). The spinules near the outer spine of basis and first exopodal segment of the first swimming leg are much smaller in *O. krusensterni* (Fig. 8A) than in *O. fratrissaustralis* (Fig. 4A). The spinules along the margin of the inner spine of the basis of P1 are longer in *O. fratrissaustralis*. The second

swimming leg of both species differ in relative length of the inner setae of the second and third exopodal segments (comparatively longer in *O. fratrissaustralis*), in most apical seta of the second endopodal segment (almost two times longer than innermost seta in *O. krusensterni*, and barely longer in *O. fratrissaustralis*), and armature of the most apical outer spine and outermost apical element of the third exopodal segment (larger and thicker in *O. fratrissaustralis*) (Figs. 4B, 8B). The relative length of the second endopodal segment of the third swimming leg is about 1.3 times longer than the first endopodal segment in *O. fratrissaustralis* (Fig. 5A), but 1.7 times longer in *O. krusensterni* (Fig. 9A). The outermost setae on the second endopodal segment of the fourth swimming leg of *O. fratrissaustralis* is ornamented with spinules but the same seta is ornamented with spinules in *O. krusensterni*. The relative size of the two inner setae of the endopodal lobe of P5 is nearly or slightly longer than exopod in *O. fratrissaustralis* (Fig. 5C), but clearly longer in *O. krusensterni* (Fig. 9C). The site of insertion of the apical seta of the endopodal lobe reaches the tip of the exopod in *O. fratrissaustralis*, but hardly reaches the middle of exopod in *O. krusensterni*.

Onychocampus anomalus (Ranga Reddy, 1984) shares the same formula of the P4 exopod, but differs from *O. fratrissaustralis* and *O. krusensterni* in the A2 exopod (with 4 setae in *O. krusensterni* and *O. fratrissaustralis*; with 1 seta in *O. anomalus*) and the female P5 exopod (with 4 setae in *O. anomalus*; with 3 setae in *O. krusensterni* and *O. fratrissaustralis*). *Onychocampus besnardi* Jakobi, 1954, also possesses a P4 exopod with 2 outer spines, but lacks the inner seta of the same segment.

Acknowledgements

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pe, female, USNM 259322. A, P3; B,

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Fridericia nann (Oli)

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Abstract.—*Fridericia nann* sp. nov. from Nanning hu Park, Nanning southwest China, a poorly-developed spermathecae with the ampulla and species, *F. alata* and *F. tubulosa* Dózs developed clitella and fewer chaetae constriction in the and it differs from origin of the dors cae ampulla, short orifice.

Since *Henlea vent* 1854) was first reported phenson (cited in Cern 40 terrestrial enchytra na have been recorded 1979; Xu 1989; Lian 1999; Xie 1999a, 1999 2000c, 2000d; Xie despite of these works, traoids in the country ied, and the investigation covered in the Chang and some localities gions. Concerning th of China, however, reported. In 1992, a survey of terrestrial Zhuang Autonomous carried out. Among ed, one species of nized as a new species given herein.