*Crustaceana 66 (2) 1994*, © E. J. Brill, Leiden

# *ONYCHOCAMPTUS KRUSENSTERNI* (COPEPODA, HARPACTICOIDA, LAOPHONTIDAE) — A NEW SPECIES FROM KRUSENSTERN LAGOON, ALASKA

BY

NIKOLAOS V. SCHIZAS and THOMAS C. SHIRLEY

Juneau Center, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, 11120 Glacier Highway, Juneau, AK 99801-8677, U.S.A.

ABSTRACT

A new harpacticoid copepod of the genus *Onychocamptus* was discovered during an investigation of a lagoon in Kotzebue Sound in northwestern Alaska. *Onychocamptus krusensterni* n. sp. was the predominant copepod in Lower Krusenstern Lagoon. It is distinguished from the other members of the genus *Onychocamptus* by having only five spines and setae on the terminal exopod segment of swimming leg 4 of females and the complex ornamentation of antennules of males.

ZUSAMMENFASSUNG

Eine neue Art der Harpacticoiden-Gattung *Onychocamptus* ist bei Untersuchungen in einer Bucht des Kotzebue Sound im Nordwesten Alaskas entdeckt worden. *O. krusensterni* n. sp. dominiert in der Lower Krusenstern Lagoon. Morphologisch unterscheidet sich die neue Art von anderen Arten der Gattung durch die komplexe Bewehrung der 1. Antenne ♂ und dadurch, daß das terminale Glied des Exopoditen des P4 ♀ nur 5 Dornen und Borsten trägt.

## INTRODUCTION

During a survey of benthic and epibenthic invertebrates in lagoons of Cape Krusenstern, Alaska, a new species of harpacticoid copepod was discovered. *Onychocamptus krusensterni* n. sp. was collected from the muddy bottom of Krusenstern Lagoon (fig. 1).

The harpacticoid fauna of Alaska is not well known. A small number of taxonomic papers have been published (e.g., Frost, 1967; Montagna, 1979; Gee, 1988a; Gee & Fleeger, 1990; Schizas & Shirley, in review). The role of harpacticoid copepods in marine and aquatic benthic communities and food webs can be investigated only if the species comprising the communities are known (McCall, 1992).

All specimens examined were collected from a single location in lower Krusenstern Lagoon (67°05′48″N, 163°26′06″W; fig. 1) on July 19, 1992. Benthic and epibenthic samples were collected with a Ponar grab. The only hydrographic variables available for the site (salinity, 6.46 ppt; temperature, 9.8°C; conductivity, 0.804 s/m and density 4.8 $\sigma_t$) were recorded August 10,

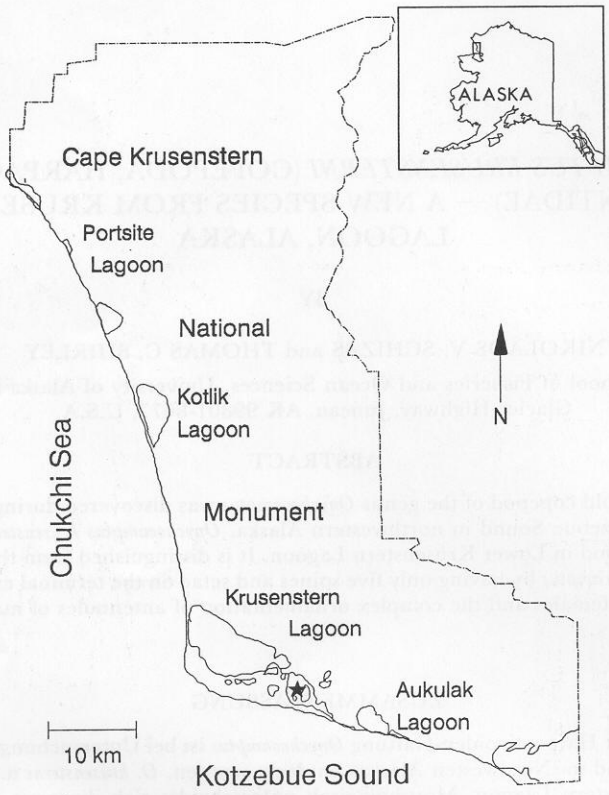


Fig. 1. Map of Cape Krusenstern National Monument. Asterisk indicates the collection site.

1991. Copepods were sampled from 1 m depth, preserved in 10% buffered formalin and stained with rose bengal.

The phylogeny and descriptive terminology used in this paper are mainly from Lang (1965) and Gee & Fleeger (1990). All figures were drawn with the aid of a camera lucida. Body length measurements do not include antennules, rostrum and caudal rami.

## **Onychocamptus krusensterni** new species (figs. 2-7)

Material examined. — Holotype female dissected on two slides, USNM No. 259321. Paratypes: three dissected males, a whole mounted male; three dissected females, a whole mounted female and a female urosome. Other paratypes 15 females (one ovigerous), 15 males and 10 copepodites preserved in 70% alcohol, USNM No. 259322. Other specimens of both sexes, as well as copepodites were deposited in the University of Alaska Fairbanks Museum (Fairbanks, Alaska). Antennule, leg 1, legs 3-5, urosome were drawn from the holotype female.

Type locality. — Krusenstern Lagoon, Cape Krusenstern National Monument, Alaska (67°05′48″N 163°26′06″W, fig. 1), depth 1 m.

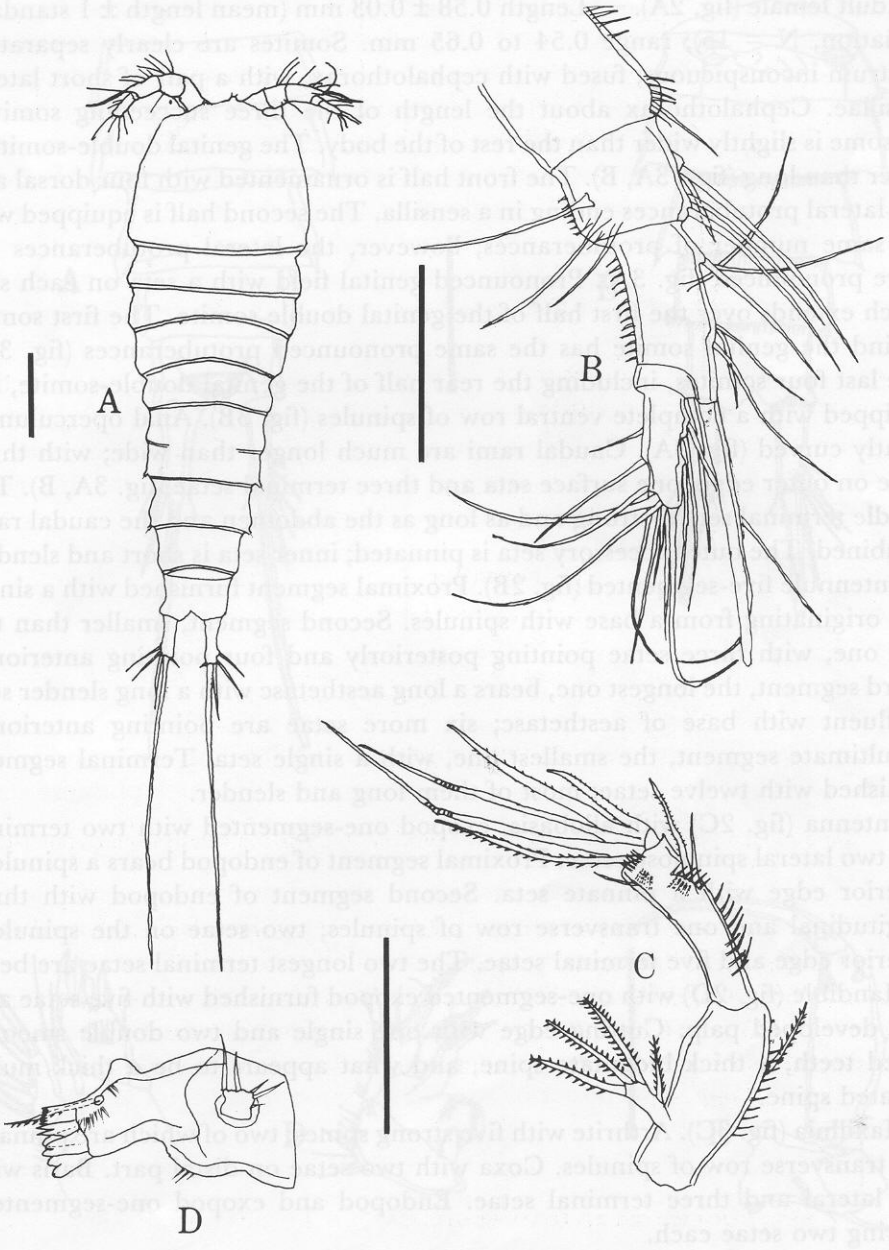


Fig. 2. *Onychocamptus krusensterni* n. sp., female. A, dorsal view of a mature female, scale (vertical bar) = 0.1 mm; B, antennule; C, antenna; D, mandible; scale for B, C, D = 0.05 mm.

Adult female (fig. 2A). — Length 0.58 ± 0.03 mm (mean length ± 1 standard deviation, N = 15), range 0.54 to 0.65 mm. Somites are clearly separated. Rostrum inconspicuous; fused with cephalothorax, with a pair of short lateral sensillae. Cephalothorax about the length of the three succeeding somites. Prosome is slightly wider than the rest of the body. The genital double-somite is wider than long (figs. 3A, B). The front half is ornamented with four dorsal and two lateral protuberances ending in a sensilla. The second half is equipped with the same number of protuberances; however, the lateral protuberances are more pronounced (fig. 3A). Pronounced genital field with a seta on each side which extends over the first half of the genital double somite. The first somite behind the genital somite has the same pronounced protuberances (fig. 3A). The last four somites, including the rear half of the genital double-somite, are equipped with a complete ventral row of spinules (fig. 3B). Anal operculum is greatly curved (fig. 3A). Caudal rami are much longer than wide; with three setae on outer edge, one surface seta and three terminal setae (fig. 3A, B). The middle terminal seta is strong and as long as the abdomen and the caudal rami combined. The outer accessory seta is pinnated; inner seta is short and slender.

Antennule five-segmented (fig. 2B). Proximal segment furnished with a single seta originating from a base with spinules. Second segment, smaller than the first one, with three setae pointing posteriorly and four pointing anteriorly. Third segment, the longest one, bears a long aesthetasc with a long slender seta confluent with base of aesthetasc; six more setae are pointing anteriorly. Penultimate segment, the smallest one, with a single seta. Terminal segment furnished with twelve setae; most of them long and slender.

Antenna (fig. 2C) with allobasis, exopod one-segmented with two terminal and two lateral spinulose setae. Proximal segment of endopod bears a spinulose anterior edge with a pinnate seta. Second segment of endopod with three longitudinal and one transverse row of spinules; two setae on the spinulose anterior edge and five terminal setae. The two longest terminal setae are bent.

Mandible (fig. 2D) with one-segmented exopod furnished with five setae and well developed palp. Cutting edge with one single and two double smooth-edged teeth, a thick bidentate spine, and what appears to be a thick multi-serrated spine.

Maxillula (fig. 3C). Arthrite with five strong spines; two of which are pinnate; one transverse row of spinules. Coxa with two setae on distal part. Basis with one lateral and three terminal setae. Endopod and exopod one-segmented, bearing two setae each.

Maxilla (fig. 3D). Syncoxa with two endites; spinules at outer proximal part; outer distal part with circular and ovoid rows of minute spinules. Proximal and distal endites have one spine and two setae each. Basis with one claw and one seta on each site. Endopod one-segmented with two terminal setae.

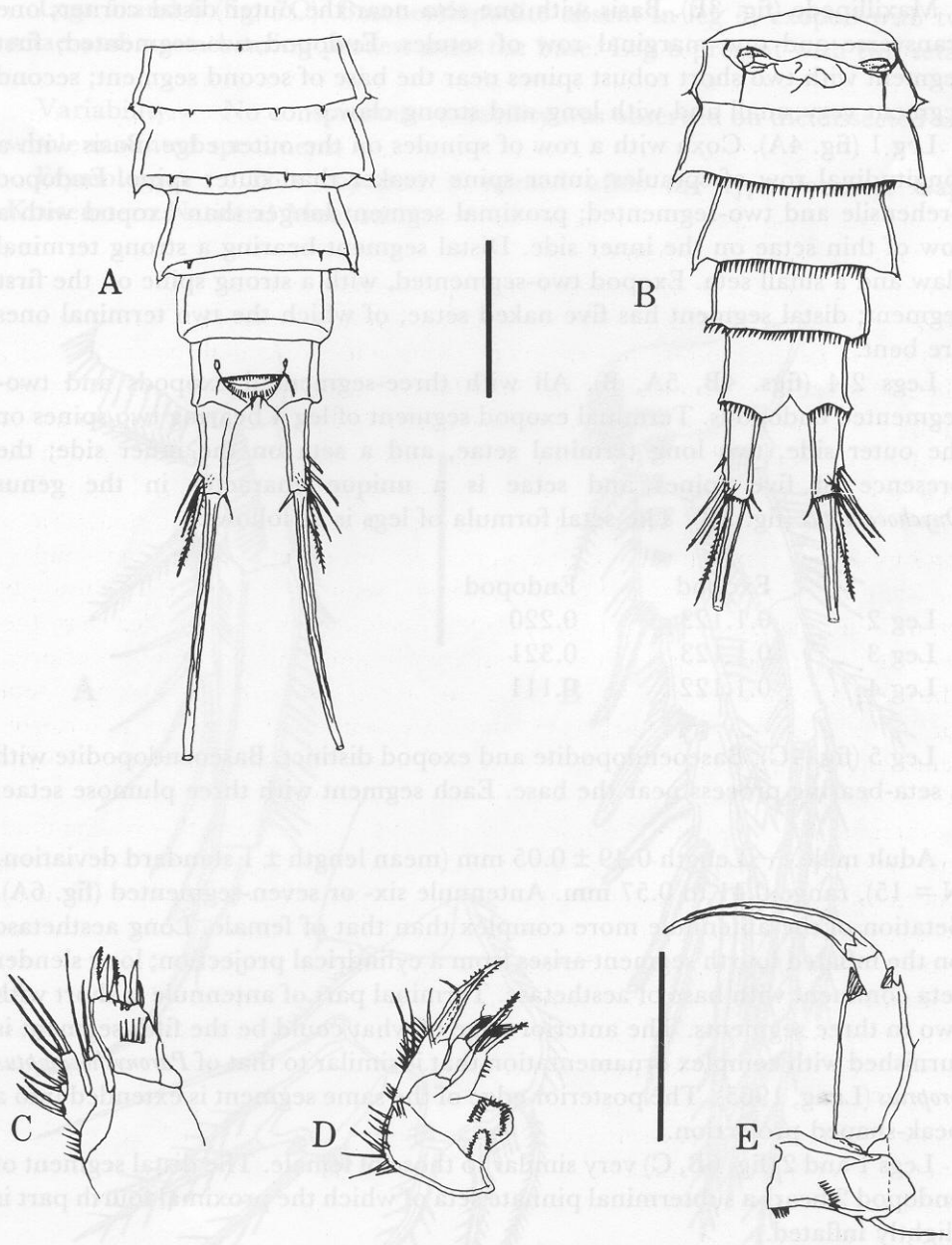


Fig. 3. *Onychocamptus krusensterni* n. sp., female. A, dorsal view of urosome; B, ventral view of urosome; C, maxillula; D, maxilla; E, maxilliped; scale (vertical bar) for A, B = 0.1 mm; scale for C, D, E = 0.05 mm.

Maxillipede (fig. 3E). Basis with one seta near the outer distal corner; one transverse and one marginal row of setules. Endopod two-segmented; first segment with two short robust spines near the base of second segment; second segment very small and with long and strong claw.

Leg 1 (fig. 4A). Coxa with a row of spinules on the outer edge. Basis with a longitudinal row of spinules; inner spine weaker than outer spine. Endopod prehensile and two-segmented; proximal segment longer than exopod with a row of thin setae on the inner side. Distal segment bearing a strong terminal claw and a small seta. Exopod two-segmented, with a strong spine on the first segment; distal segment has five naked setae, of which the two terminal ones are bent.

Legs 2-4 (figs. 4B, 5A, B). All with three-segmented exopods and two-segmented endopods. Terminal exopod segment of leg 4 bearing two spines on the outer side, two long terminal setae, and a seta on the inner side; the presence of five spines and setae is a unique character in the genus *Onychocamptus* (fig. 5B). The setal formula of legs is as follows:

| | Exopod | Endopod |
|---|---|---|
| Leg 2 | 0.1.123 | 0.220 |
| Leg 3 | 0.1.123 | 0.321 |
| Leg 4 | 0.1.122 | 0.111 |

Leg 5 (fig. 4C). Baseoendopodite and exopod distinct. Baseoendopodite with a seta-bearing process near the base. Each segment with three plumose setae.

Adult male. — Length 0.49 ± 0.05 mm (mean length ± 1 standard deviation, N = 15), range 0.41 to 0.57 mm. Antennule six- or seven-segmented (fig. 6A). Setation of the antennule more complex than that of female. Long aesthetasc on the inflated fourth segment arises from a cylindrical projection; long slender seta confluent with base of aesthetasc. Terminal part of antennule is short with two to three segments. The anterior edge of what could be the fifth segment is furnished with complex ornamentation that is similar to that of *Paronychocamptus proprius* (Lang, 1965). The posterior edge of the same segment is extended into a beak-shaped projection.

Legs 1 and 2 (fig. 6B, C) very similar to those of female. The distal segment of endopod 2 bears a subterminal pinnate seta of which the proximal fourth part is slightly inflated.

Leg 3 and 4 (figs. 7A, B). Exopods strongly built with heavy spinulation and robust segments. Endopod of leg 3 three-segmented; setal formula of this segment is 0:1:220. The second segment of same endopod with "a tapering adaxial thorn" as described by Hamond (1973); the thorn exceeds the total length of terminal segment. Setal formula of leg 4 exopod is 0:1:222.

Legs 5 and 6 (fig. 7C). Baseoendopodite absent in leg 5; exopod with two setae and a seta-bearing process near the base. Leg 6 present with two setae.

Variability. — No conspicuous variability was observed on the dissected and whole mounted specimens.

Etymology. — This copepod is named after the type locality, Cape Krusenstern National Monument.

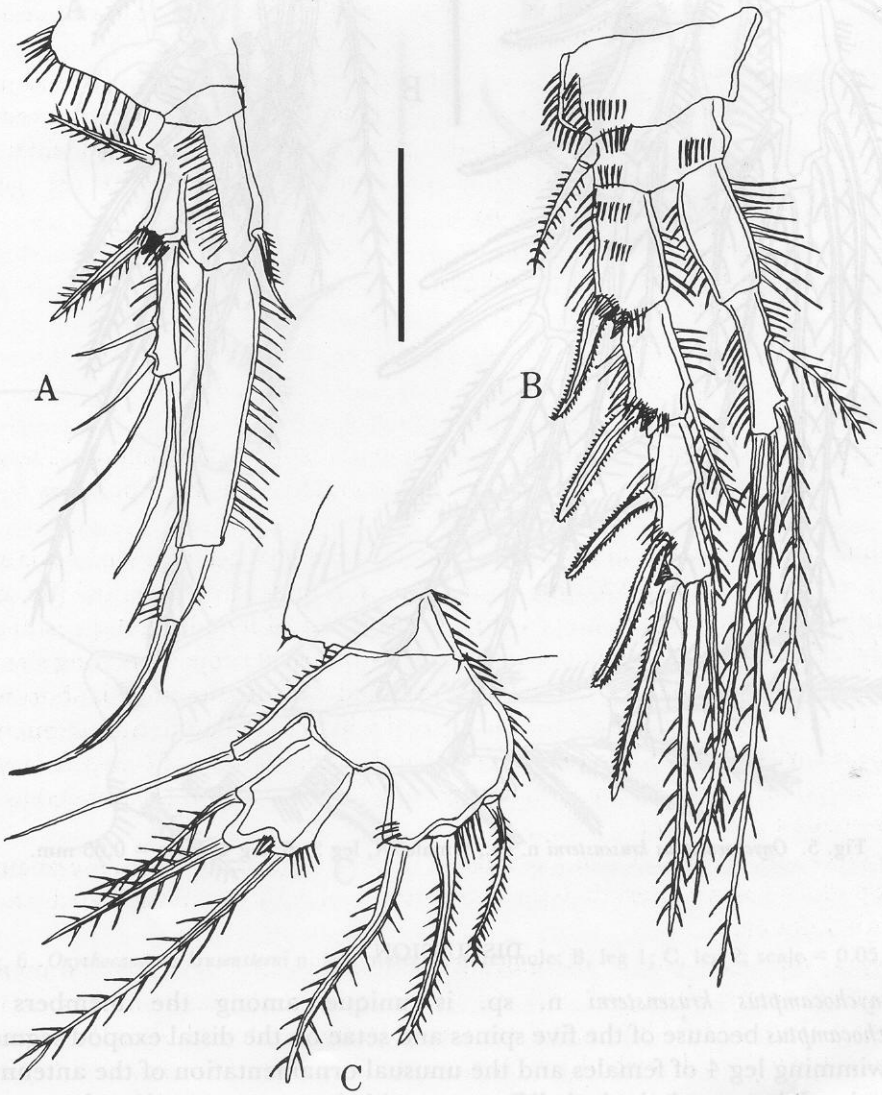


Fig. 4. *Onychocamptus krusensterni* n. sp., female. A, leg 1; B, leg 2; C, leg 5; scale = 0.05 mm.

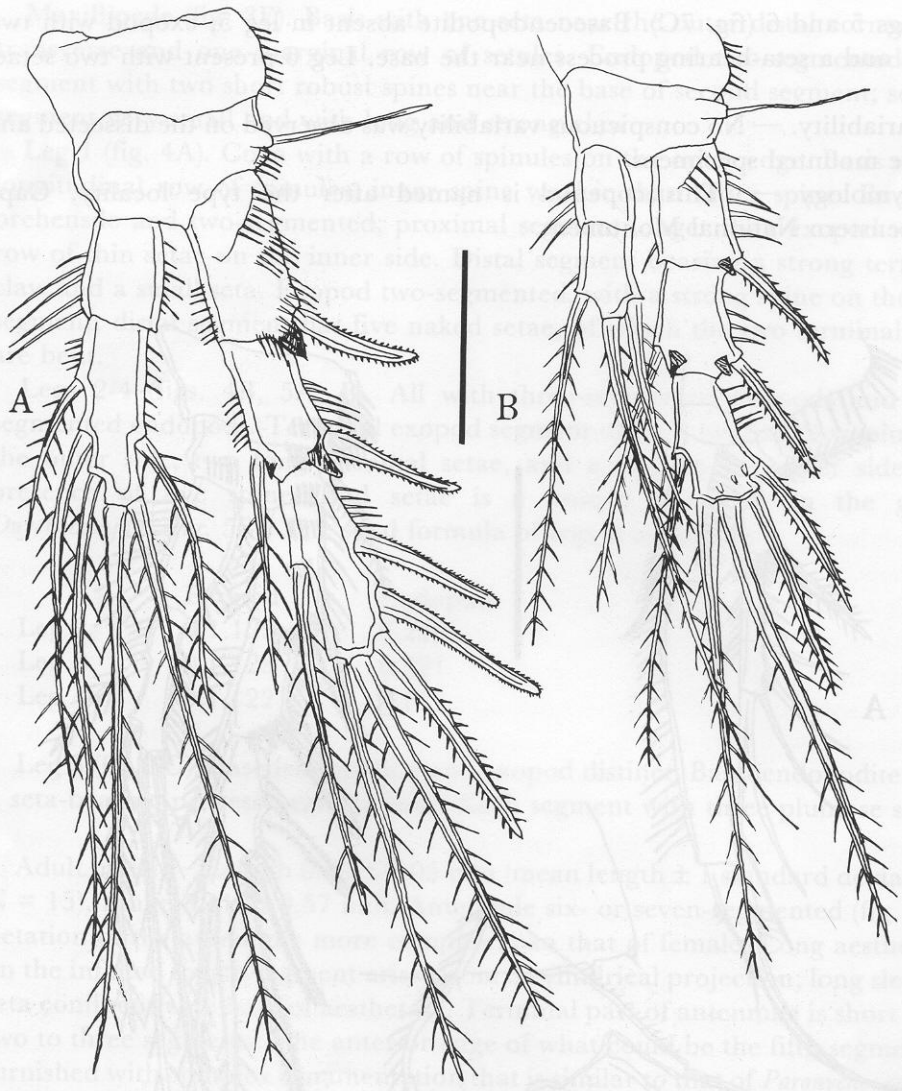


Fig. 5. *Onychocamptus krusensterni* n. sp., female. A, leg 3; B, leg 4; scale = 0.05 mm.

## DISCUSSION

*Onychocamptus krusensterni* n. sp. is unique among the members of *Onychocamptus* because of the five spines and setae on the distal exopod segment of swimming leg 4 of females and the unusual ornamentation of the antennule of males. The morphological differences with its congeners, though conspicuous, do not seem distinctive enough to propose alternative taxonomic place-

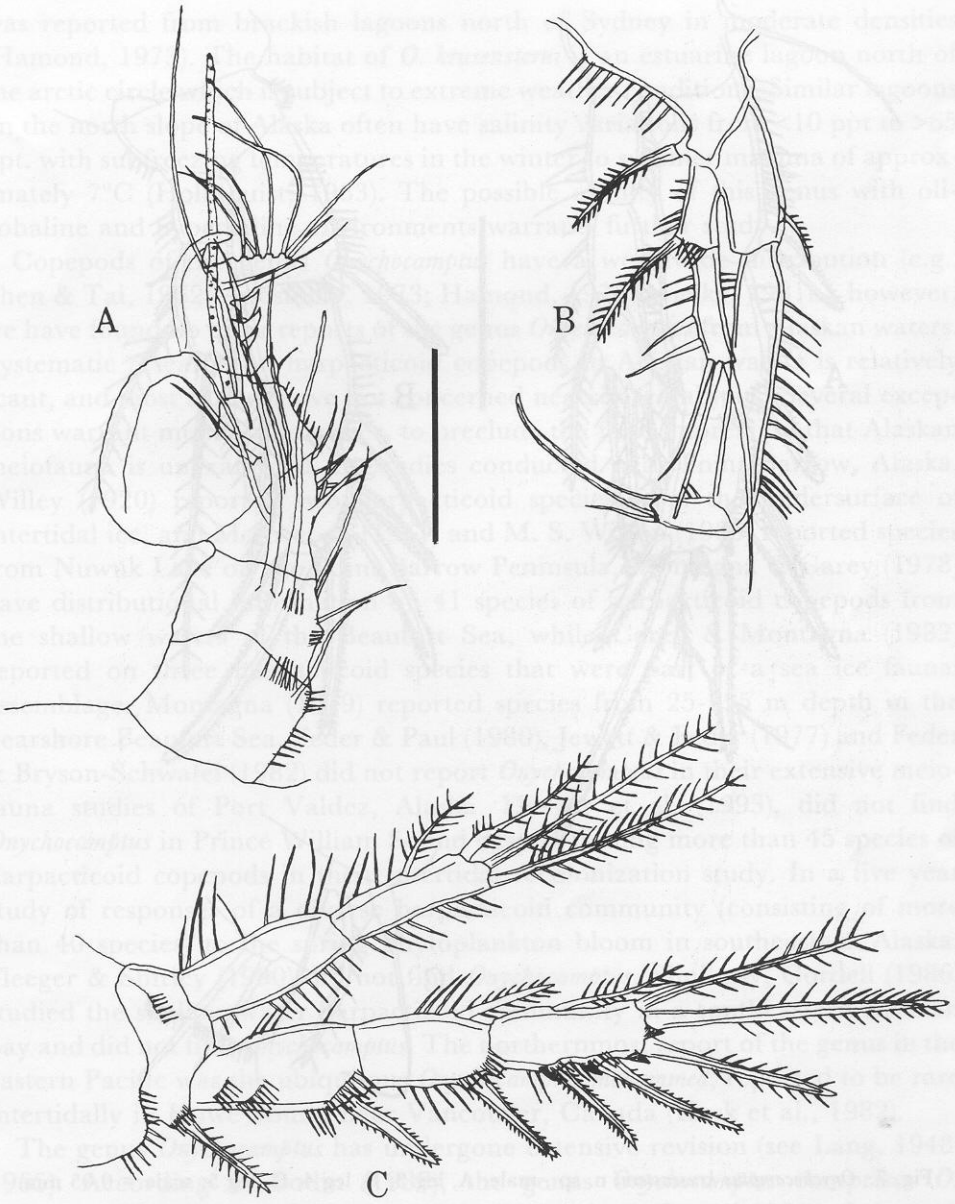


Fig. 6. *Onychocamptus krusensterni* n. sp., male. A, antennule; B, leg 1; C, leg 2; scale = 0.05 mm.

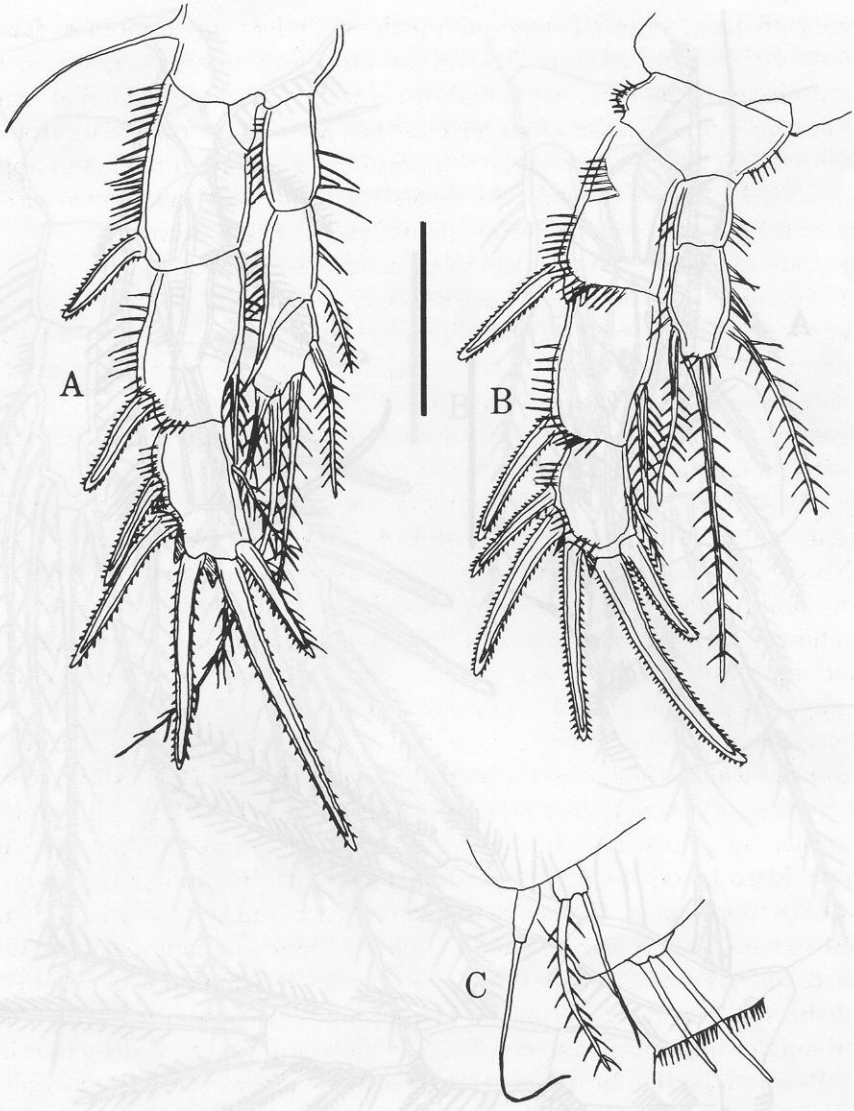


Fig. 7. *Onychocamptus krusensterni* n. sp., male. A, leg 3; B, leg 4; C, leg 5; scale = 0.05 mm.

ment for this species (e.g., a new genus). A high degree of sexual dimorphism is expressed in *O. krusensterni*, a characteristic of most laophontids.

Most species of *Onychocamptus* tolerate and even thrive in marginal habitats such as oligohaline lakes and lagoons. For example, *O. mohammed*, which is cosmopolitan, was the predominant copepod species from the oligohaline Wu-Li Lake, Kiangsu Province, China (Shen & Tai, 1962). *Onychocamptus bengalensis*

was reported from brackish lagoons north of Sydney in moderate densities (Hamond, 1973). The habitat of *O. krusensterni* is an estuarine lagoon north of the arctic circle which is subject to extreme weather conditions. Similar lagoons on the north slope of Alaska often have salinity variations from <10 ppt to >65 ppt. with subfreezing temperatures in the winter to summer maxima of approximately 7°C (Holmquist, 1963). The possible affinity of this genus with oligohaline and hypersaline environments warrants further study.

Copepods of the genus *Onychocamptus* have a worldwide distribution (e.g., Shen & Tai, 1962; Apostolov, 1973; Hamond, 1973; Mielke, 1981b); however, we have found no prior reports of the genus *Onychocamptus* from Alaskan waters. Systematic research on harpacticoid copepods in Alaskan waters is relatively scant, and most studies have not concerned nearshore habitats. Several exceptions warrant mention, however, to preclude the false impression that Alaskan meiofauna is unexamined. In studies conducted near Point Barrow, Alaska, Willey (1920) reported two harpacticoid species from the undersurface of intertidal ice, and Mohr et al. (1961) and M. S. Wilson (1965) reported species from Nuwuk Lake on the Point Barrow Peninsula. Montagna & Carey (1978) gave distributional information on 41 species of harpacticoid copepods from the shallow waters of the Beaufort Sea, while Carey & Montagna (1982) reported on three harpacticoid species that were part of a sea ice faunal assemblage. Montagna (1979) reported species from 25-355 m depth in the nearshore Beaufort Sea. Feder & Paul (1980), Jewett & Feder (1977) and Feder & Bryson-Schwafel (1982) did not report *Onychocamptus* in their extensive meiofauna studies of Port Valdez, Alaska. Fleeger et al. (1993), did not find *Onychocamptus* in Prince William Sound despite finding more than 45 species of harpacticoid copepods in their intertidal recolonization study. In a five year study of responses of a diverse harpacticoid community (consisting of more than 40 species) to the spring phytoplankton bloom in southeastern Alaska, Fleeger & Shirley (1990) did not find *Onychocamptus*. Similarly, Cordell (1986) studied the shallow-water harpacticoid community in a southeastern Alaskan bay and did not find *Onychocamptus*. The northernmost report of the genus in the eastern Pacific was the ubiquitous *Onychocamptus mohammed*, reported to be rare intertidally in Howe Sound near Vancouver, Canada (Kask et al., 1982).

The genus *Onychocamptus* has undergone extensive revision (see Lang, 1948, 1965). According to Bodin (1988), the genus *Onychocamptus* comprises *O. mohammed* (Blanchard & Richard 1891), *O. bengalensis* (Sewell 1934), *O. besnardi* Jacobi 1954, and a partially illustrated species, *Onychocamptus* sp., referred to by Mielke (1981) as a possible subspecies of *O. chathamensis*. *Onychocamptus chathamensis* (Sars, 1905) is another member of this genus (Lang, 1948; Wells, 1976). The status of *O. besnardi* has been questioned by Lang (1965) as being a form of *O. mohammed*.

The baseoendopodites of swimming leg 5 of *O. chathamensis* and *Onychocamptus* sp. look similar. It is tempting to propose that within the genus *Onychocamptus*

there are two species groups based on the shape of the baseoendopodite of swimming leg 5: the *mohammed* group assigned by Lang, comprising *O. mohammed, O. bengalensis* and *O. krusensterni* n. sp., and the *chathamensis* group with *O. chathamensis* and Mielke's *Onychocamptus* sp.

## ACKNOWLEDGEMENTS

We are grateful to Dr. C. O'Clair for collecting the specimens and for hydrographic data from Krusenstern Lagoon. Ms. Nora Foster provided the microscope and camera lucida. Drs. J. Fleeger, A. Todaro, and W. Mielke provided literature. This publication is the result of research supported in part by Alaska Sea Grant with funds from the National Oceanic and Atmospheric Administration, Office of Sea Grant, Department of Commerce, under grant no. NA90AA-D-SG066, project E/70-10, and from the University of Alaska with funds appropriated by the State.

## LITERATURE CITED

Apostolov, A., 1973. Harpacticoïdes des eaux saumâtres et des étangs côtiers. Zool. Anz., **191** (3-4): 281-294.

Bodin, P., 1988. Catalogue des nouveaux Copépodes Harpacticoïdes marins: 1-288. (Univ. Bretagne Occidentale, Lab. d'Océanogr. Biol., Brest).

Carey, A. G., Jr. & P. A. Montagna, 1982. Arctic sea ice faunal assemblage: first approach to description and source of the underice meiofauna. Mar. Ecol. Prog. Ser., **8**: 1-8.

Cordell, J., unpubl. Structure and dynamics of an epibenthic harpacticoid assemblage and the role of predation by juvenile salmon: 1-134. (Unpublished M.S. thesis, Univ. of Washington, Seattle, WA, 1986).

Feder, H. M. & B. Bryson-Schwafel, 1988. Chapter 6: The intertidal zone. In: D. G. Shaw & M. J. Hameedi (eds.), Environmental Studies in Port Valdez, Alaska. Lecture Notes on Coastal and Estuarine Studies: 117-164. (Springer-Verlag, Berlin).

Feder, H. M. & A. J. Paul, 1980. Seasonal trends in meiofaunal abundance on two beaches in Port Valdez, Alaska. Syesis, **13**: 27-36.

Fleeger, J. W. & T. C. Shirley, 1990. Meiofaunal responses to sedimentation from an Alaskan spring bloom. II. Harpacticoid population dynamics. Mar. Ecol. Prog. Series, **59**: 239-247.

Fleeger, J. W., M. A. Todaro, T. C. Shirley & M. Carls, 1993. Meiofaunal recolonization experiment with oiled sediments: the harpacticoid copepod assemblage. Proceedings of the EXXON VALDEZ Oil Spill Symposium.

Frost, B. W., 1967. A new species of the genus *Harpacticus* (Copepoda Harpacticoida) from Kodiak Island, Alaska. Crustaceana, **12** (2): 133-140.

Gee, J. M., 1988. Taxonomic studies on *Danielssenia* (Crustacea, Copepoda, Harpacticoida) with descriptions of two new species from Norway and Alaska. Zool. Scr., **17**: 39-53.

Gee, J. M. & J. W. Fleeger, 1990. *Haloschizopera apprisea*, a new species of harpacticoid copepod from Alaska, and some observations on sexual dimorphism in the family Diosaccidae. Trans. American Microsc. Soc., **109** (3): 282-299.

Hamond, R., 1973. The harpacticoid copepods (Crustacea) of the saline lakes in southeast Australia, with special reference to the Laophontidae. Rec. Australian Mus., **28** (17): 393-420.

Holmquist, C., 1963. Some notes on *Mysis relicta* and its relatives in northern Alaska. Arctic, **16**: 109-128.

Jewett, S. C. & H. M. Feder, 1977. Biology of the harpacticoid copepod, *Harpacticus uniremis* Krøyer on Dayville Flats, Port Valdez, Alaska. Ophelia, **16**: 111-129.

KASK, B. A., J. R. SIBERT & B. WINDECKER, 1982. A checklist of marine and brackish water harpacticoid copepods from the Nanaimo estuary, southwestern British Columbia. Syesis, **15**: 25-38.

LANG, K., 1948. Monographie der Harpacticiden: 1-1682. (Håkan Ohlsson, Lund).

——, 1965. Copepoda Harpacticoidea from the California Pacific coast. Kungl. Svenska Vetensk. Akad. Handl., **10**: 1-560.

MCCALL, J. N., 1992. Source of harpacticoid copepods in the diet of juvenile starry flounder. Mar. Ecol. Prog. Ser., **86** (1): 41-50.

MIELKE, W., 1981. Interstitielle Fauna von Galapagos. XXVIII. Laophontinae (Laophontidae), Ancorabolidae (Harpacticoida). Mikrofauna Meeresbodens, **84**: 1-106.

MOHR, J. W., D. J. REISH, J. L. BARNARD, R. W. LEWIS & S. R. GEIGER, 1961. The marine nature of Nuwuk Lake and small ponds of the peninsula of Point Barrow, Alaska. Arctic, **14**: 211-223.

MONTAGNA, P. A., 1979. *Cervinia langi* n. sp. and *Pseudocervinia magna* (Copepoda: Harpacticoida) from the Beaufort Sea (Alaska, USA). Trans. Amer. Micros. Soc., **98** (1): 77-88.

MONTAGNA, P. A. & A. G. CAREY, Jr., 1978. Distributional notes on Harpacticoida (Crustacea: Copepoda) collected from the Beaufort Sea (Arctic Ocean). Astarte, **11**: 117-122.

SHEN, C. J. & A. Y. TAI, 1962. The Copepoda of the Wu Li Lake, Wu-Sih, Kiangsu Province. III. Harpacticoida. Acta Zool. Sinica, **14** (3): 393-410.

SCHIZAS, N. V. & T. C. SHIRLEY, (in press). *Acrenhydrosoma mccalli* (Copepoda, Harpacticoida), a new species from Auke Bay, Alaska. Crustaceana.

WELLS, J. B., 1976. Keys to aid in the identification of marine harpacticoid copepods: 1-215. (University of Aberdeen, U.K.).

WILLEY, A., 1920. Report on the marine Copepoda collected during the Canadian Arctic Expedition. Rep. Canadian Arctic Exped. 1913-18, **7**: 1-46.

WILSON, M. S., 1965. North American harpacticoid copepods. 7. A new species of *Stenhelia* from Nuwuk Lake on the Arctic coast of Alaska. Proc. Biol. Soc. Washington, **78**: 179-188.

Received for publication 5 January 1993.