

North American harpacticoid copepods 7. A new species of *Stenhelia* from Nuwuk Lake on the Arctic coast of Alaska

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Proceedings of The Biological Society of Washington 78:179-187 (1965)

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BIOLOGICAL SOCIETY OF WASHINGTONNORTH AMERICAN HARPACTICOID COPEPODS
7. A NEW SPECIES OF *STENHELIA* FROM NUWUK
LAKE ON THE ARCTIC COAST OF ALASKA

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The only records of identified marine-brackish harpacticoids of the arctic coast of Alaska are those of Willey (1920) and Mohr *et al.* (1961). Alaskan records of brackish species given in Wilson and Yeatman (1959) are from other regions of Alaska with the exception of *Tachidius spitzbergensis* Oloffson, a record based on specimens from Lake Teshekpuk, a large freshwater lake on the arctic coast east of Barrow, and collections from coastal ponds listed by Reed (1962). The specimens from these records and those of Mohr *et al.* from Nuwuk Lake were all identified by M. S. Wilson. The description of one of the species found in Nuwuk Lake is presented here. Taxonomic accounts of some of the other species will be presented in other numbers of this series of papers.

FAMILY DIOSACCIDAE

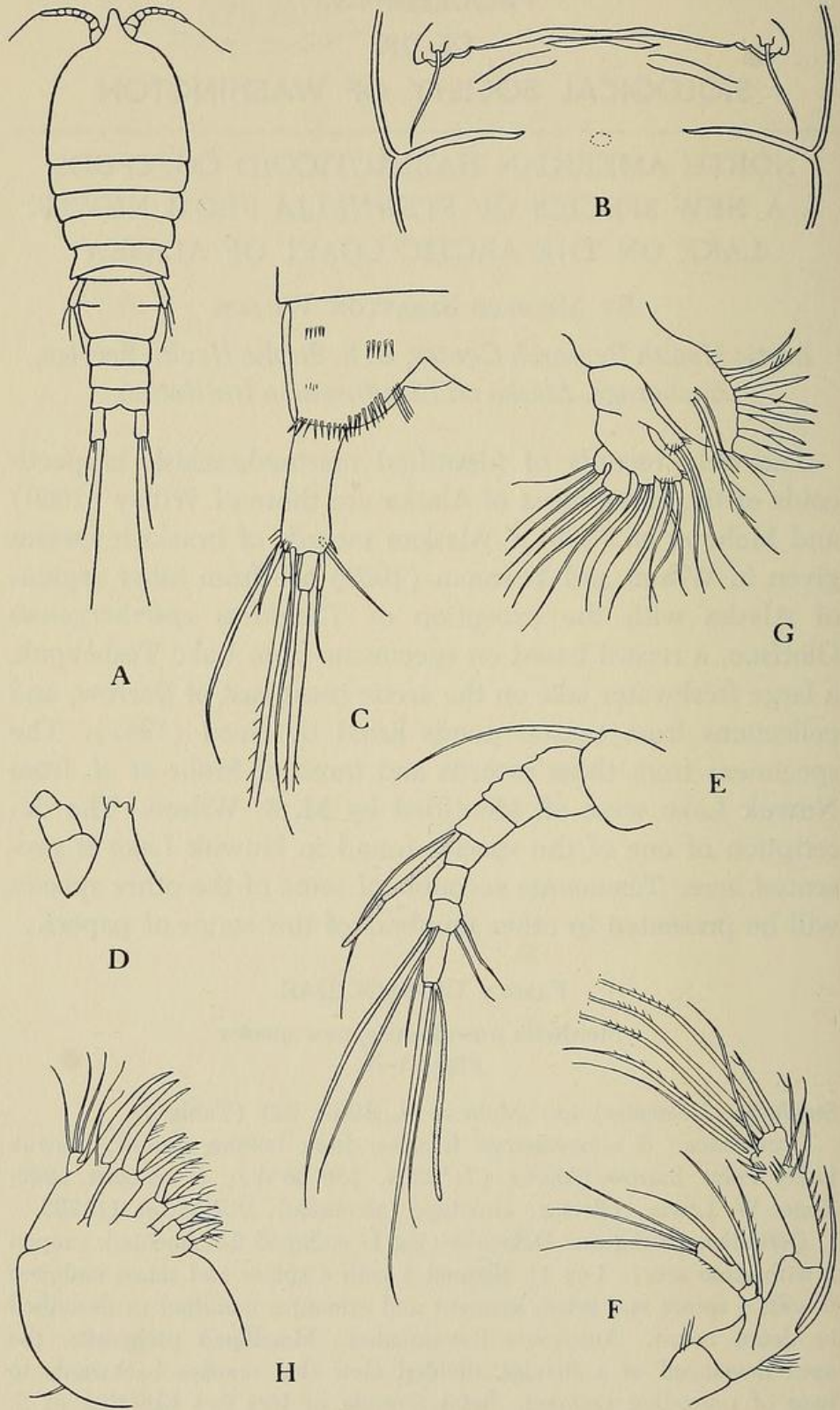
Stenhelia nuwukensis, new species

Figs. A-N

Stenhelia (Delavalia) sp.: Mohr *et al.*, 1961: 221 (Table 3).

Occurrence: 3 nonovigerous females, from bottom sample, Nuwuk Lake, Point Barrow, Alaska (71°23'N, 156°28'W); 11 August 1960; Roger W. Lewis, collector. Holotype (alcoholic), USNM no. 111293.

Definition: Subgenus *Delavalia* (leg 1: endopod 2-segmented; exopod 2 with inner seta). Leg 1: Exopod 3 with 4 spines and setae; endopod 2 with 4 spines and setae, segment and armature modified as described in detail below. Antennule 8-segmented. Maxilliped prehensile, the apex developed as a slender, divided claw that reaches backwards to base of preceding segment. Setal formula of legs 2-4 like that of *S.*



aemula (as given by Lang, 1948: 593). Leg 5: Exopod directed posteriorly, with 5 setae; basal expansion with 4 setae. (δ unknown.)

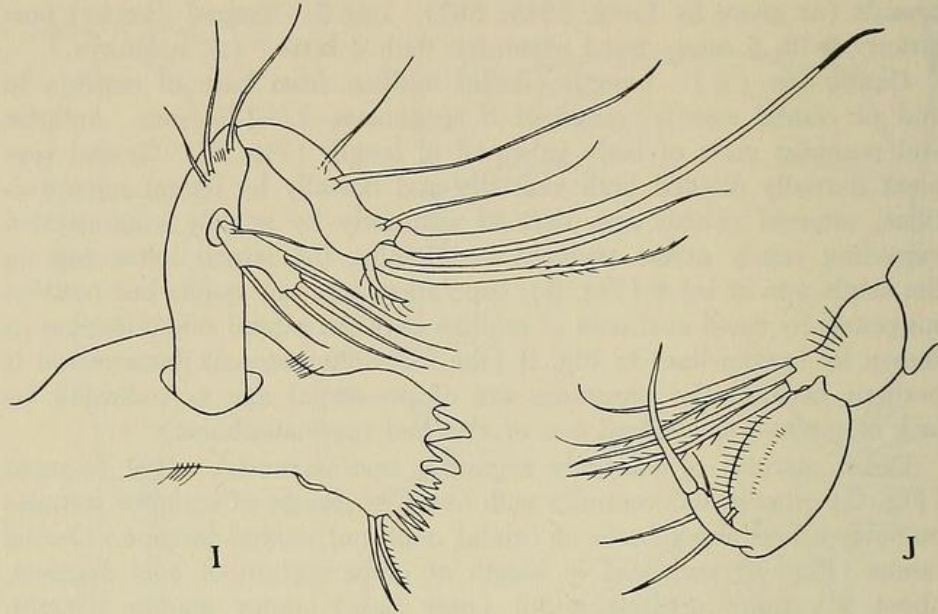
Description (φ): Length (dorsal midline from base of rostrum to end of caudal rami): range of 3 specimens, 1.0–1.24 mm. Anterior and posterior parts of body subequal in length (Fig. A). Genital segment partially divided both ventrally and dorsally by lateral sclerotizations; external genital area defined anteriorly by narrow sclerotization extending nearly across segment and joining the lateral lobes bearing the single seta of leg 6 (Fig. B); copulation pore not visible but position suggested by small oval area at midline between lateral sclerotizations as shown by broken lines in Fig. B (the indefinite external demarcation is perhaps because the specimens are of pre-sexual age as indicated by lack of internal or external ova or attached spermatophores).

Distal margins of all body segments unornamented. Anal segment (Fig. C) ornamented ventrally with irregular groups of scalelike spinules on surface and along bases of caudal rami and medial incision. Caudal ramus (Fig. C) subequal to length of outer margin of anal segment, about $2\frac{1}{2}$ times greatest width (near base); outer margin straight, inner margin incurved. All caudal setae (Figs. A, C) placed apically or subapically, representing what is probably the normal number (7) for the genus, though these are not illustrated in literature for all species. The two setae of outer margin placed subapically, the outermost setiform and about twice length of ramus; the other a shorter, stout spine. Of the three usual apical setae, the two outermost long, stout, jointed at their bases and bearing a few denticles near their middles; second seta the longest, subequal to length of urosome; outer seta reaching beyond middle of second; innermost apical seta also jointed at base, its length less than that of caudal ramus. The usual dorsal seta arising subapically near inner margin of ramus; ventrally, a slender seta placed above base of outer apical seta (Fig. C).

Rostrum (Fig. D) apex slightly indented medially. Antennule (Fig. E) 8-segmented; armed with exceedingly fine, nonplumose setae similar to the few shown in the illustration (because of the extreme fineness, similarity and crowding of the setae, it was found impossible to count precisely the numbers per segment, so a summary of this is omitted); segment 1 with 1 seta; largest number of setae (about 11) on segment

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FIGS. A–H. *Stenhelia nuwukensis*, n. sp., female. A, Habitus, dorsal view; B, Genital segment, ventral view showing external armature and Leg 6 (greatly enlarged); C, Part of anal segment, caudal ramus and setae, ventral view; D, Rostrum and base of antennule, dorsal view; E, Antennule, with aesthetes and some of setae; F, Antenna (apices of some setae incomplete); G, Maxillule; H, Maxilla. (Figs. C, E, F drawn to same scale; Figs. G, H drawn to same scale as one another but greater than Figs. E–F.)



FIGS. I-J. *Stenhelia nuwukensis*, n. sp., female. I, Mandible; J, Maxilliped (from appendage with anomalous fourth seta on basis). (Figs. drawn to same scale as G-H.)

2; all other segments with at least 3 setae; aesthetes on segments 4 and 8, that of 4 divided at distal third and reaching to end of antennule.

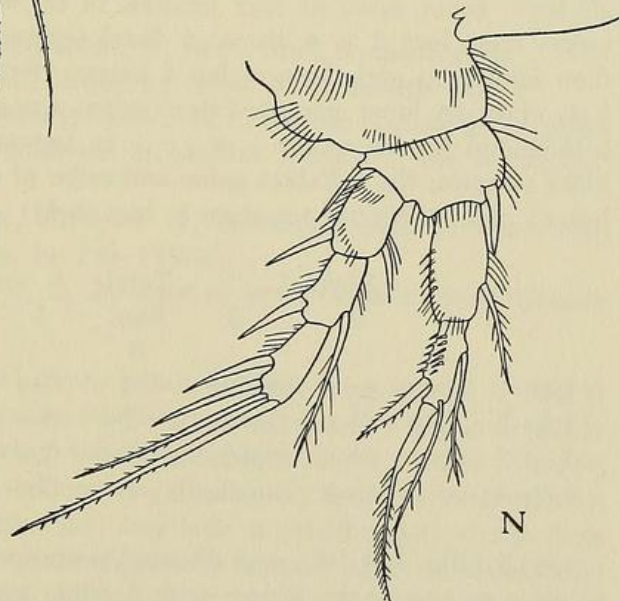
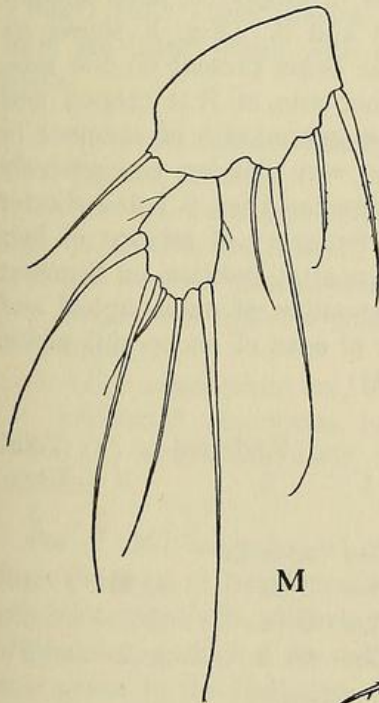
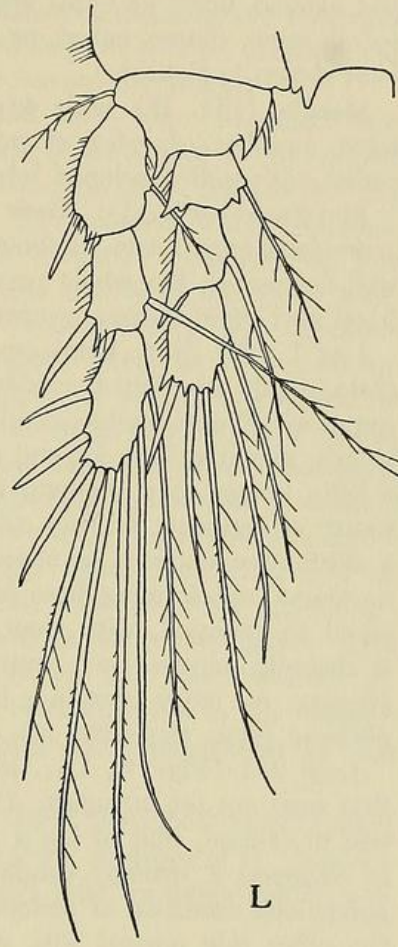
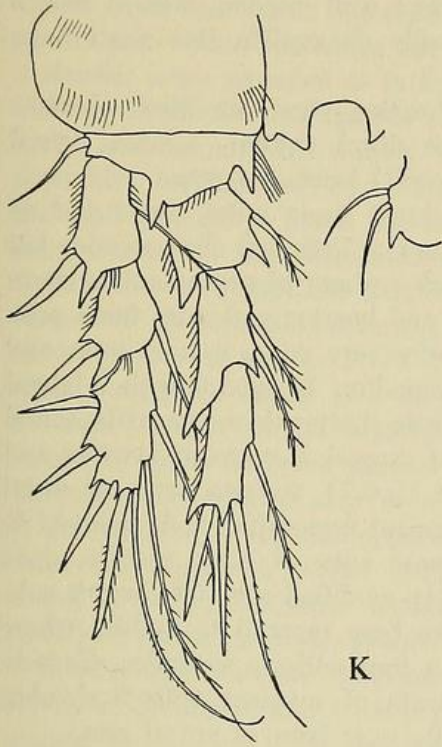
Antenna (Fig. F): The three segments of exopod bearing 1,1,1 lateral and 3 apical setae.

Mandible (Fig. I) largest of cephalic appendages, palp conspicuous even in lateral view of whole specimens. Width of denticles of gnathal lobe of considerable range, edge with 1 or 2 stout, modified setae. Basis of palp elongate, with 3 setae near apex. Exopod unsegmented, shorter than endopod, with 1 outer, 2 inner and 3 apical setae. Endopod elongate, only a little shorter than basis, unsegmented; with 3 inner marginal setae; outer subapical edge with a short stout, plumose seta and 2 setae arising from a common base and exceeding length of endopod; the inner apical edge produced, bearing a heavy unarmed seta exceeding in length the total of the basal and endopod segments.

Maxillule (Fig. G): Gnathal lobe with 10 apical spines and setae and 2 surface setae. Coxa and basis partly separated; lacinia of coxa with 3 setae; basis with 2 laciniae bearing 4 and 3 apical setae. Endopod

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FIGS. K-N. *Stenhelia nuwukensis*, n. sp., female. K, Leg 2, with outline of inner margin of an endopod segment 1 bearing a second anomalous seta; L, Leg 4; M, Leg 5; N, Leg 1. (Figs. drawn to same scale as one another and like that of Figs. C, E, F.)



and exopod fused at bases but the apices well divided, with 4 and 3 apical setae. Setae naked or with hardly discernible fine short hairs (not shown in figure).

Maxilla (Fig. H) with 4 endites bearing stout, modified clawlike setae; number of setae of proximal to distal endite: 4,3,3,3. Distal endite with well-developed lobe (endopod?) bearing 4 setae.

Maxilliped (Fig. J): Basis with 3 long, inner apical setae (or an anomalous fourth seta as shown in figure). Terminal claw slender but well-developed, the whole reaching back to base of preceding segment; basal part divided near proximal third and bearing a slender inner seta.

Leg 1 (Fig. N): Rami separated by a very wide, narrow intercoxal plate, nearly equaling the width of coxopodite. Exopod 3 with 2 lateral spines and 2 apical setae. Endopod a little shorter than exopod in actual length, reaching little beyond middle of exopod 3; segment 1 wider and a little longer than segment 2 (about 1 : 0.7), its seta set near distal fourth of segment; the four setae of segment 2 modified and arranged in a distinctive pattern: a stout spine near apex of outer margin, apex narrowed and forming base for a highly modified seta (its length subequal to endopod, with stout, spinelike base tapered to middle where it abruptly narrows and continues as a fine setiform extension, densely plumose on outer margin), inner margin of segment with 2 slender, plumose setae, the distal set subapically near base of apical seta.

Legs 2-4 (Figs. K, L): Intercoxal plates narrower than in leg 1 so that rami not set far apart. Endopods of legs 2 and 3 reaching to near end of exopod, that of leg 4 to near middle of exopod 3; outer margin of endopod 2 strongly produced in legs 2 and 3. (Fig. K shows an anomalous condition of endopod 1, two setae being present on one side, the other side normal with one seta.) Inner seta of first exopod and endopod segments placed near or little beyond middle of segment in all legs. Inner setae of legs tending to be very slender, progressively longer from legs 2 to 4, those of distal segments of leg 2 being shorter than total rami and those of leg 4 longer. Summary of setation of legs 1-4, outer to inner margin (sp = spine; s = seta; position on segment 3 indicated by the marks - or , : - = separation of outer, apical and inner margins; the , divides spine and setae of apex of endopod 3 which has no outer marginal armature in legs 2-4):

	Exopod			Total	Endopod			Total
	1	2	3	Exo. 3	1	2	3	Endo. 3
Leg 1	sp-0	sp-s	2sp-2s	4	0-s	sp-s-2s		
Leg 2	sp-s	sp-s	3sp-2s-2s	7	0-s	0-2s	sp,2s- s	4
Leg 3	sp-s	sp-s	3sp-2s-3s	8	0-s	0- s	sp,2s-3s	6
Leg 4	sp-s	sp-s	3sp-2s-3s	8	0-s	0- s	sp,2s-2s	5

Leg 5 (Fig. M): Exopod directed posteriorly rather than laterally as in some species of the genus; with 5 setae; setae 3 and 4 very fine; the

others stout near bases but tapered to setiform extension; the innermost the longest. Basal expansion not produced beyond base of exopod; with 4 slender setae arranged as in figure, the second the longest.

Taxonomy: Several species of *Stenhelia* have been described from arctic and far northern waters. It is a few of these that *S. nuwukensis* resembles in some of its most distinctive structural characters. The endopod of leg 1 is much like that of *S. (D.) cornuta* Lang, described from waters off King-Karl-Land, Swedish Vorland. However, leg 5 of *S. nuwukensis* is built like that of most other species of the genus while that of *S. cornuta* is structurally unique. *S. nuwukensis* also resembles the arctic-boreal species *S. (D.) longicaudata* Boeck in having an enlarged, modified apical seta on the endopod of leg 1, but differs in the much longer second segment; leg 5 of both species has a similar structure but a different number of exopod setae (6 in *longicaudata*). The elongate terminal claw of the maxilliped of *nuwukensis* is unusual in the genus in which this appendage is variously formed and the apical claw, when present, is not usually strongly developed. It should be noted, however, that many authors have not illustrated this appendage, merely referring to it as prehensile or not, or as in the genus. This is a very unsatisfactory description in a genus with the structural diversity of *Stenhelia*, and I draw attention of taxonomists in the Harpacticoida to the need for detailed description and illustration of this appendage.

Six species are known to me to have been described since Lang's (1948) list. These species, mostly tropical or subtropical in distribution, are listed below with their generalized type localities and known sexes:

- S. (S.) divergens* Nicholls, 1939, ♀, sand of St. Lawrence River, Quebec, Canada
- S. (D.) truncatipes* Sewell, 1940, ♀, Addu Atoll, Indian Ocean
- S. (D.) latisetosa* Sewell, 1940, ♀, Addu Atoll, Indian Ocean
- S. (D.) indica* Krishnaswamy, 1957, ♀, "from the compound ascidian, *Polyclinum indicum* collected at Madras Harbour," Bay of Bengal, India
- S. (D.) elisabethae* Por, 1960, ♀ ♂, Romanian coast of Black Sea; additional description in Por (1964)
- S. (D.) incerta* Por, 1964, ♀ ♂, coast of Israel, eastern Mediterranean Sea

Por (1964) has proposed a new genus *Melima*, for a species *caulerpae* from the coast of Israel, eastern Mediterranean Sea. This genus is closely related to *Stenhelia*, differing only in reduction of the number of setae of legs 1-4 (which I do not consider necessarily justifies erection of a new genus in the Harpacticoida), and lack of modification of legs 2 or 3 of the male. Por calls the endopod of leg 1 "highly aberrant and specialized," but considering the structural modifications found in *Sten-*

helia, this emphasis may be exaggerated. Unfortunately, for critical evaluation by other authors, the oral appendages are not illustrated (see above comment on maxilliped).

Ecology: Descriptions of Nuwuk Lake (or Pond) have been given by Mohr *et al.* (1961) and Holmquist (1963). In 1960, it was located at the extreme tip of Barrow Peninsula, known as Point Barrow, the farthest northern extension of land in Alaska. During a severe storm in early October, 1963, the peninsula was separated by channels cut by the ocean and temporarily, at least (summer, 1964), it is an island. It is not known how long Nuwuk Lake has been isolated from the ocean but at the time of the 1960 collections, it was separated on the north edge by a land barrier of about 45.7 m (Mohr *et al.*, 1961). There was no inlet or outlet; the surface area was about 2.5 ha and maximum depth varied from 5.2–5.64 m. The lake was usually ice-free for two months or less (July–August). Mohr *et al.* (1961) described it as a halocline lake with a persistent marine biota. Surface waters were slightly brackish (about 5–8‰) in 1960 and 1961, and the bottom layer had a salinity much above that of the adjacent sea water (about 60‰). Copepods from 1960 collections are species of marine and brackish waters most of which have varying degrees of euryhalinity within either the genus or species.

The three specimens of *S. nuwukensis*, picked out from a bottom sample of unknown locality and depth, were caked with mud, particularly on the dorsal sides of the body segments. This mud was easily removed after a few weeks in preservative and softening with fluid glycerin. The appendages were for the most part relatively clean. This suggests that although closely associated with bottom mud at some time, there must be considerable movement of the copepod in water, particularly during feeding. The large size of *S. nuwukensis* and its well-developed appendages, especially the stout mandibular palp, would seem to be a hindrance to existence in sand or mud. The species would appear more likely to be similar to bottom-living copepods that, in part, hover close to the sand or mud but do not burrow into it, as suggested for the peculiar calanoid genus *Platycopia* (Wilson, 1946: 2–3).

ACKNOWLEDGMENTS

Financial support for field and laboratory work by Mohr and associates has been acknowledged in their paper (Mohr *et al.*, 1961) as originating from the Office of Naval Research, Department of the Navy and the Arctic Institute of North America. My work has been otherwise supported financially by National Science Foundation grant G21643 to the Smithsonian Institution. I am indebted to Dr. Gerald W. Prescott for the collection from Teshekpuk Lake referred to in the introduction (collected August, 1952). I also thank Dr. Charlotte Holmquist for the information on the 1964 status of Barrow Peninsula and acknowledge help of my assistant, Miss Sandra Parker, in preparation of the man-

uscript for publication. Dr. Thomas Bowman kindly sent me a copy of the pages pertaining to the new species of Krishnaswamy (1957).

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