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Two New Species of Sand Burrowing Amphipod Crustaceans from Long Island Sound and the New York Bight (Amphipoda: Haustoriidae)

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ABSTRACT: ***Acanthohaustorius bousfieldi* n. sp. and *A. similis* n. sp. (Amphipoda: Haustoriidae) are described from the offshore bottom sands of the New York Bight and Long Island Sound regions.**

Introduction

The Sandy Hook Laboratory of the National Marine Fisheries Service has been studying the benthic faunal assemblages of the New York Bight area since 1968 (Pearce, et al. 1976, 1977a, 1977b; Radosh, Frame and Wilhelm 1976; Radosh, et al. 1978; Steimle and Radosh in press) and of Long Island Sound since 1972 (Reid, Frame and Draxler 1979). Four species of sand burrowing amphipod crustaceans of the genus *Acanthohaustorius* have previously been described from American middle Atlantic coastal waters by Bousfield (1962, 1965, 1973). Two additional species of *Acanthohaustorius* found in survey samples from the offshore bottom sands of the New York Bight and Long Island Sound are herewith newly described. Both of these new species were previously collected by the Woods Hole Laboratory, NMFS, in their 1962–1965 cruises from Cape Hatteras to Nova Scotia; *Acanthohaustorius bousfieldi* at stations ranging from Virginia to the New York Bight and *A. similis* from North Carolina to Nantucket Shoals (Dr. R. Wigley, pers. commun.). The Virginia Institute of Marine Science found *A. similis* in their study of the middle Atlantic continental shelf (Boesch 1978; Boesch, Kraeuter and Serafy 1977) and Equitable Environmental Health Inc. found this species in eastern Long Island Sound (Mr. R. Cassino, pers. commun.).

Acanthohaustorius Bousfield, 1965

The genus *Acanthohaustorius* is characterized by the following features: body broad, head broadest medially, rostrum broadly acute. Pleon side plate 3 with posterior spinous process. Urosome somewhat reduced, longer than pleon 3 which overhangs it. Urosome 2 as long as 3, narrower than urosome 1. Antenna 1, accessory flagellum 2—segmented. Antenna 2, segment 4 deeply lobate, segment 5 expanded but not lobate behind. Maxilla 2, outer plate large, broad. Maxilliped palp, segment 3 stout, geniculate. Gnathopod 1 simple, segment 5 moderately expanded especially in ♂. Gnathopod 2 minutely chelate in both sexes. Uropod 1, inner ramus shorter than outer. Telson broad, sharply and deeply notched medially.

KEY TO *ACANTHOHAUSTORIUS*

1. Telson cleft nearly to the base; peraeopod 6, distal margin of segment 5 subtruncate; uropod 1, inner ramus slender, setae singly inserted 2
   Telson U-cleft one half to base; peraeopod 6 distal margin of segment 5 oblique; uropod 1, peduncle stout,

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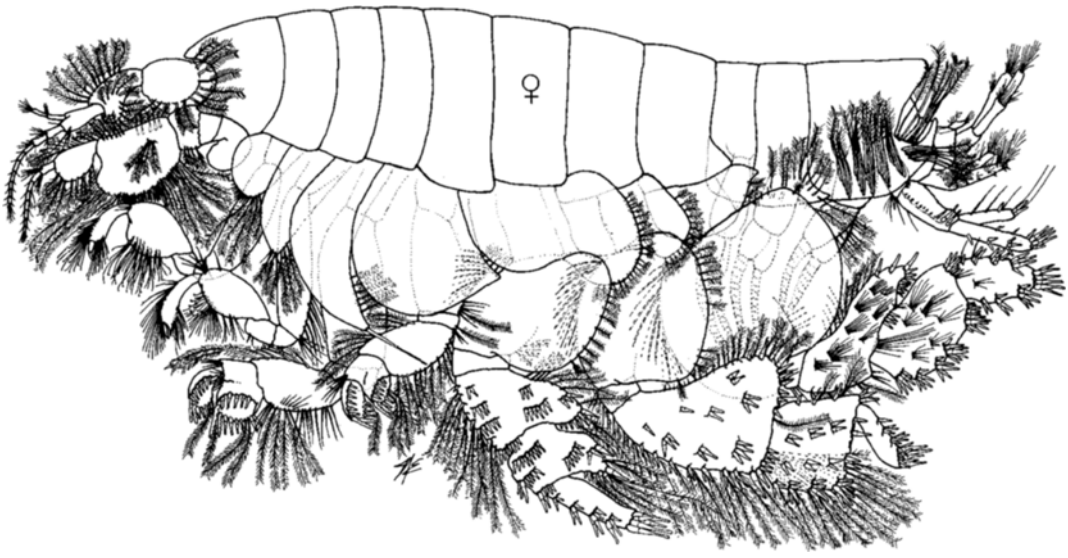

Fig. 1. *Acanthohaustorius bousfieldi*, n. sp., ♀, 9.3 mm.

inner ramus strong, setae inserted in clusters ..... *A. spinosus* (Bousf.)

2. Side plate 3 with short, weak spinous process; peraeopod 7, coxal plate posteriorly quadrate ... *A. intermedius* Bousf.

   Side plate 3 with large spinous process; peraeopod 7, coxal plate posteriorly subacute or acute 3

3. Uropod 1, inner ramus slender, approximately one half length of outer; telson lobes broad, rounded ... *A. shoemakeri* Bousf.

   Uropod 1, inner ramus slightly shorter than outer; telson outer margin concave 4

4. Uropod 1, peduncle stout, outer margin with 8–9 short stubby spines; peraeopod 6, segment 5 distal marginal spines in 3 clusters .. *A. bousfieldi* n. sp.

   Uropod 1, peduncle slender, outer margin with long spines; peraeopod 6, segment 5 spines continuous along distal edge 5

5. Uropod 1, peduncle with 4 long spines along outer margin, spines lacking on lower margin .. *A. millsi* Bousf.

   Uropod 1, peduncle with 6–9 long spines along outer margin, lower margin with 0–3 spines distally .*A. similis* n. sp.

Acanthohaustorius ***bousfieldi,***
new species
Figures 1–3

Material Examined. One km off Goshen Point, Conn., NL sta. E-1, 41°18′N, 72°06′W, 8 m, Apr. 30, 1975: ♀ holotype (USNM 172427), ♂ allotype (USNM 172428); same location, June 26, 1975: 3 ♀♀ paratypes (USNM 172429), 2 ♀♀ paratypes (NMNS Ottawa 14136). Off Greenport, N.Y., LIS sta. 119, 41°06′N, 76°25′W, 17 m, Aug. 22, 1972: 1 ♂. Three km east of Sandy Hook, N.J., *Albatross* SYMAP sta. 39, 40°25′N, 73°57′W, 10 m, Jan. 25, 1974: 1 ♂. Specimens were obtained by the NMFS Woods Hole Laboratory at the following stations: 37 km east of Harvey Cedars, N.J., *Gosnold* sta. 1313, 39°41′N, 73°45′W, 23 m, Oct. 13, 1963: 1 ♀; 36 km east of False Cape, Va., *Gosnold* sta. 2054, 36°39′N, 75°31′W, 20 m, Aug. 5, 1965: 2 ♀♀ (1 ov.), 1 ♂; 42 km east of Virginia Beach, Va., *Gosnold* sta. 2055, 36°50′N, 75°30′W, 30 m, Aug. 5, 1964: ♂ paratype (NMFS Ottawa 14136), 2 ♀♀, 2 ♂♂. All specimens collected with a Smith-McIntyre grab sampler.

Description. Female 7.5–11.2 mm. Head much broader than wide, broadest posteriorly; inferior angles blunt, rostrum short. Eyes unpigmented, not discernible. Body broad, strongly arched, barrel shaped.

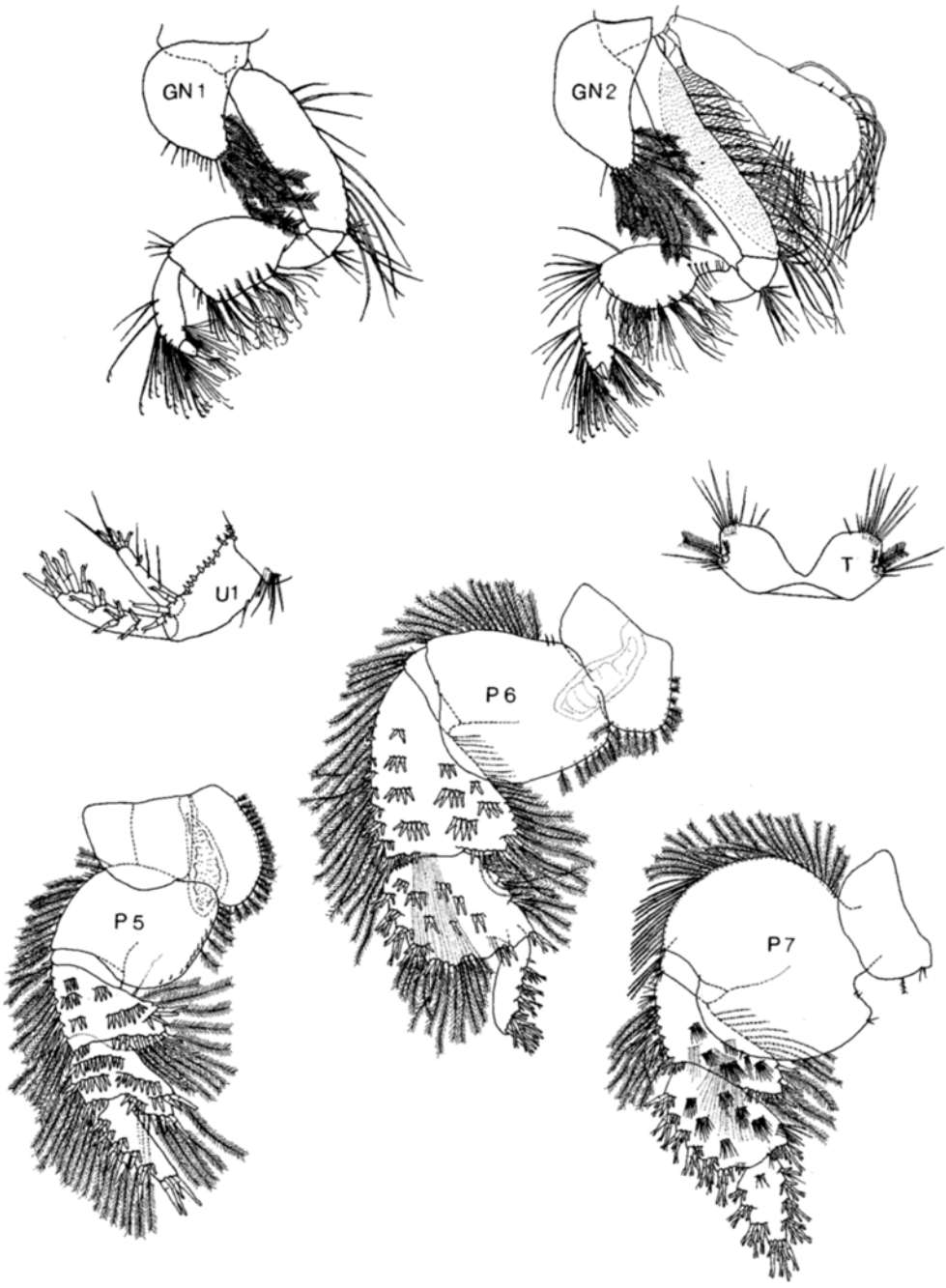

Fig. 2. *Acanthohaustorius bousfieldi,* n. sp., ♂, 9.5 mm.

Antenna 1: peduncular segment 1 as deep as long; 9-segmented flagellum with first segment longest; accessory flagellum with 2 long subequal segments. Antenna 2: peduncular segment 4 with short posterior lobe, margin richly plumose; segment 5 small; flagellum 8-segmented, first segment longest. Upper lip broad, apex smooth. Lower lip: inner lobes broadest distally. Mandible: incisor bifid, lacinia mobilis with 8 accessory blades; palp segment 3 with 22 comb-like marginal spines. Maxilla 1: inner plate small

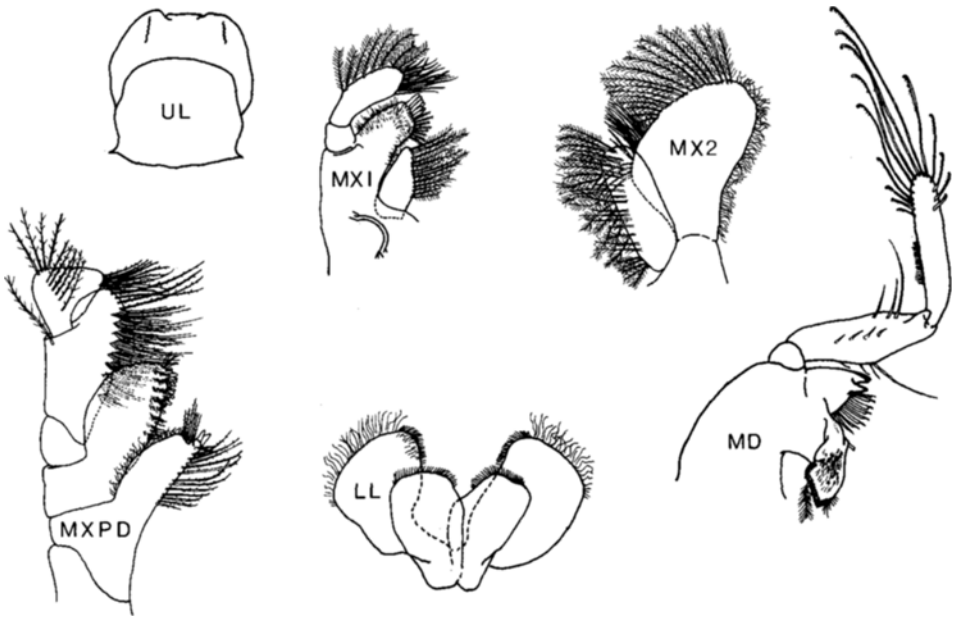

Fig. 3. *Acanthohaustorius bousfieldi*, n. sp., ♀, 9 mm.

with about 12 plumose setae; palp slender. Maxilla 2: outer plate greatly expanded, length approximately 1½ times inner plate. Maxilliped: inner plate with 12 inner marginal barbed setae, 2 subequal spines distally; outer plate much broader than inner, outer margin smoothly convex; palp segment 2 with minutely pectinate setae on the inner margin; palp segment 3 geniculate, with long terminal pectinate setae.

Gnathopod 1: postero-distal coxal angle with about 8 long plumose setae; segment 2 linear, posterior margin with 5 simple setae; segment 5 posteriorly inflated, lined with numerous groups of setae; segment 6 convex, anterior margin with club-tipped setae; dactyl strong, nail prominent. Gnathopod 2: postero-distal coxal angle gently rounded, with about 8 plumose setae; segment 5 slightly inflated; dactyl short, stout.

Peraeopod 3: coxal plate semilunate, coxal angle acute with a very long spine, posterior margin with 6 distal plumose setae; segment 4 distally expanded, margins plumose; segment 5 with 13 marginal spines and 2 plumose setae; segment 6 with 11 marginal spines and 2 plumose setae. Peraeopod 4: coxal plate deep, postero-distal angle acute, posterior margin with 5 short distal plumose setae; segment 5 with 10 marginal spines and 2 plumose setae; segment 6 with 11 marginal spines and 1 plumose seta. Peraeopod 5: bilobed coxal plate with posterior lobe largest, hind margin with 21 short plumose setae; segment 2 anterior margin with numerous long setae, posterior margin nearly straight with 10 short plumose setae; segment 4 broader than long with 6 clusters of spines on the outer face and spinal clusters on anterior and posterior lower margin; segment 5 narrower than 4, outer face with 4 clusters of spines plus clusters on lower margin; anterior margin segment 6 with 4 groups of spines without setae, long terminal spines.

Peraeopod 6: coxal plate shallow; segment 4 outer face with 2 single spines and 6 groups of spines; segment 5 subquadrate, lower margin with 3 groups of spines sitting in separate membranous folds or depressions anterior to junction with segment 6; segment 6 short and linear with numerous posterior and terminal spines. Peraeopod 7: posterior coxal lobe subacute or acute, the degree of sharpness determined by the seta(e) or spine(s) indentation on its lower margin; segment 2 with quadrate postero-proximal angle, plate generally large and orbicular; segment 4 posterior lobe narrowing, hind margin oblique with two groups

of a single seta and spine, outer face with 7 clusters of setae; segment 5 longer than 6, broadest distally, with virtually no posterior margin, anterior margin with 4 clusters of spines, outer face with 6 clusters of setae; segment 6 broad proximally, marginal and terminal spines long.

Pleosome side plate 3: posterior process long and stout with 7 lateral rows of long plumose setae. Pleosome side plates 1 and 2 posterodistally produced. Pleopods with slender rami, inner ramus 14-segmented, outer ramus 17-segmented.

Uropod 1: peduncle fairly stout, outer margin with 8–9 short, stubby spines and 3 long inter-ramal spines, species occasionally has a long, slender antero-proximal spine; inner ramus shorter and more slender than outer with three long singly inserted terminal spines; outer ramus with three clusters of spines and terminal cluster. Uropod 2: peduncle and rami subequal. Uropod 3: outer ramus longer than inner, segments of outer subequal. Telson broad, cleft nearly to base; outer margin with concavity with slender spines and 2 plumose setae, one of which is long and stout, the other short and slender.

Male 6.3–10.4 mm: very similar to female, but slightly smaller. The male of this species tends to have more plumose setae and, most noticeably, has more facial clusters of spines with a greater number of spines in each cluster on segments 4 and 5 of peraeopod 5, 6, and 7. Peraeopod 5: segment 5 spinal clusters are almost joined across outer face; segment 4 has more spines in clusters on outer face; segment 6 anterior margin with plumose setae as well as additional cluster of spines (female spines only). Peraeopod 6: outer face of segment 4 has 9 spinal clusters (6 clusters female); anterior margin of segment 5 and posterior margin of segment 6 with additional spinal clusters. Peraeopod 7: segment 4 inner and outer facial setae present (female outer facial setae only); anterior margin of segment 5 and posterior margin of segment 6 with additional spinal cluster. Slender penes arise ventrally on peraeon 7 near coxal base and are directed ventrally.

Remarks. This medium-large size acanthohaustoriid is generally similar to *Acanthohaustorius millsi* though larger in size. The peduncle of uropod 1 in *A. bousfieldi* is broader than that of *A. millsi* but not as broad as that of *A. spinosus*. The outer marginal spines are relatively short and stubby and are approximately one-third the length of other acanthohaustoriids. The shape of peraeopod 6, segment 5 resembles that of *A. millsi*, but whereas the spines of *A. millsi* are continuous along the edge of the distal margin, those of *A. bousfieldi* are in three clusters situated in slight depressions. The coxal angle of the posterior lobe of peraeopod 7 and segment 2 quadrate postero-proximal notch resembles that found in *A. shoemakeri*. The telson is similar in appearance to the telson of *A. millsi*, however, the telson of *A. millsi* has all marginal spines whereas that of *A. bousfieldi* has 2 plumose setae in addition to the marginal spines.

Etymology. This species is named for Dr. E. L. Bousfield of the National Museum, Natural Science, Ottawa, Canada, in recognition for his outstanding taxonomic and systemic work in establishing the new genera and species of haustoriids found in New England and other western Atlantic waters.

Distribution. Known only from eastern Long Island Sound and New York Bight south to Virginia.

Ecology. Rare, found in coarse, clean sand, depths of 8–30 m. In Long Island Sound, *A. bousfieldi* was found once with *A. similis*, *A. shoemakeri*, and *Protohaustorius* sp. cf. *deichmannae*, the intermediate form between *P. deichmannae* and *P. wigleyi* (described Bynum and Fox 1977). *Rhepoxynius epistomus* was present in all grab samples containing *A. bousfieldi*. At the NMFS Woods Hole Laboratory's *Gosnold* station 2054, the haustoriids *P. wigleyi*, *Parahaustorius attenuatus*, and *Acanthohaustorius* sp., a middle Atlantic offshore form of *A. shoemakeri* were found with *A. bousfieldi*. At *Gosnold* station 2055, *R. epistomus* was present.

Acanthohaustorius similis, new species
Figures 4–5

Materials Examined. Middle eastern Long Island Sound, LIS sta. 117, 41°11′N, 72°25′W, 39 m, Sept. 30, 1976: ♀ holotype (USNM 172425), 1 ♀ paratype (USNM

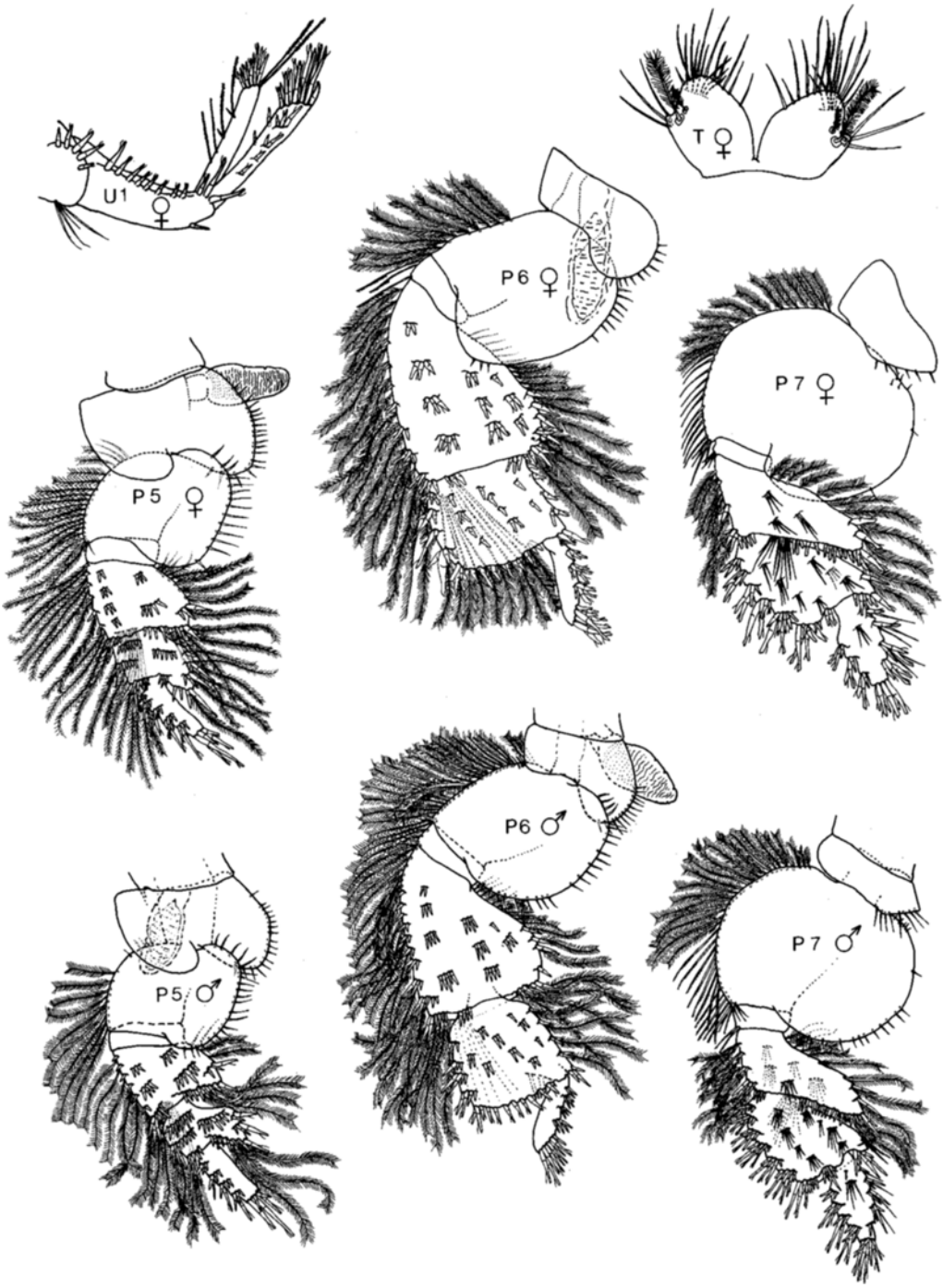

Fig. 4. *Acanthohaustorius similis*, n. sp., ♀, 6.5 mm; ♂, 6.0 mm.

172430), 9 ♂♂ paratypes (USNM 172426), 2 ♀♀ paratypes (NMNS Ottawa 14138), 3 ♂♂ paratypes (NMNS Ottawa 14137). LIS sta. 107, 41°00′N, 72°35′W, 5 m, Aug. 9, 1972: 2 ♀♀ (1 ov.), 1 ♂. LIS sta. 111, 41°08′N, 72°30′W, 30 m, Aug. 17, 1972: 6 ♀♀, 13 ♂♂. LIS sta. 122, 41°14′N, 72°20′W, 8 m, Aug. 16, 1972: 2 ♀♀, 1 ♂. Ambrose Channel, New York Bight, AMB sta. 5-B, 40°30′N, 73°59′W, 14 m, Mar. 13, 1971: 3

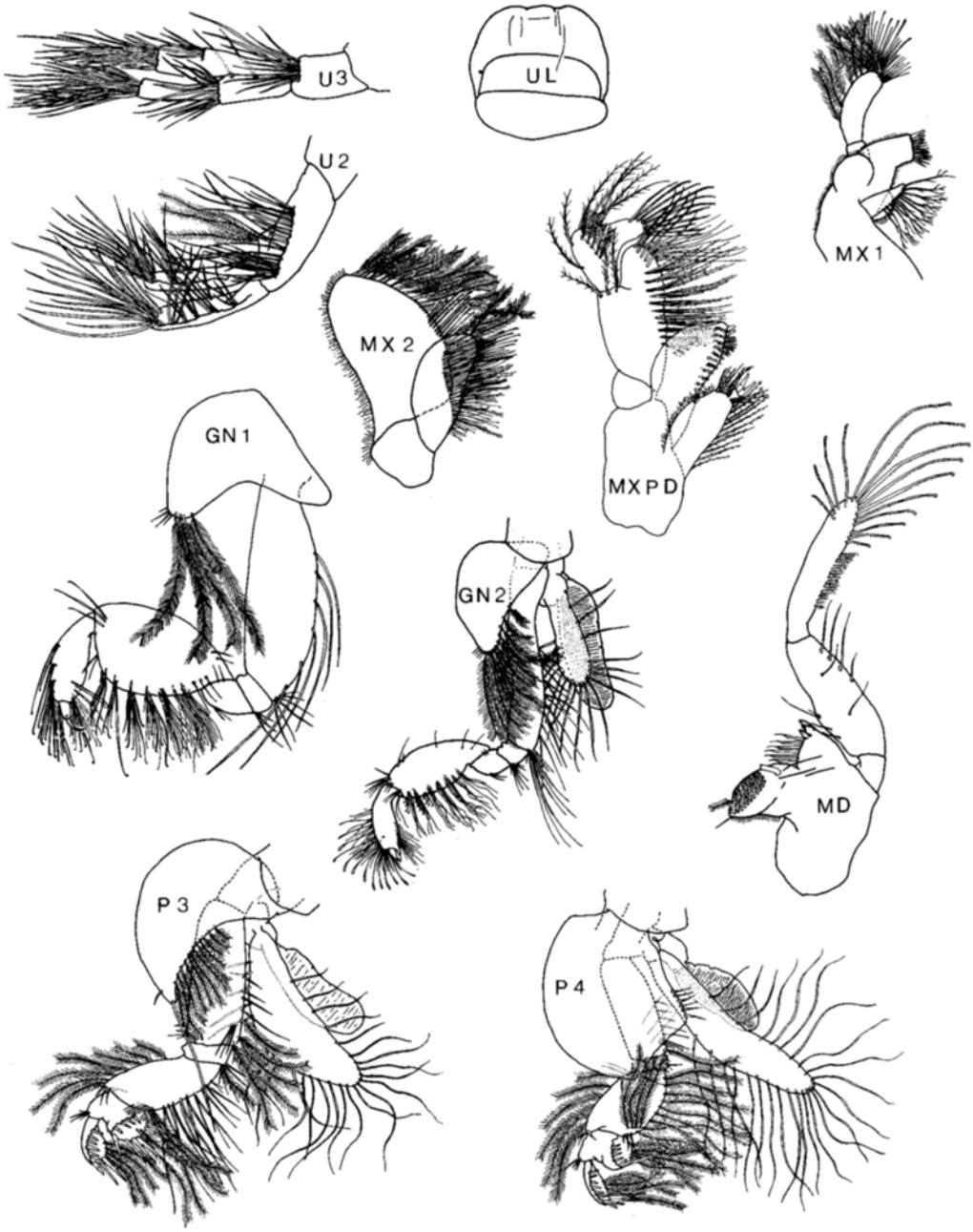

Fig. 5. *Acanthohaustorius similis*, n. sp., ♀, 6.5 mm.

♀♀, 1 ♂. Nine km south of light house at Fire Island, N.Y., SSS sta. 6, 40°35′N, 70°13′W, 22 m, Oct. 7, 1976: 1 ♀, 3 ♂♂. Nine km southeast of Atlantic City, N.J., JC sta. 91, 39°19′N, 74°23′W, 14 m, June 15, 1972: 12 ♀♀, 12 ♂♂. Eighty-five km east of Wildwood, N.J., OCS sta. 6, 38°58′N, 74°03′W, 36 m, Oct. 15, 1976: 2 ♂♂. Thirty-five km east of Townsend Inlet, N.J., Anoxia sta. S, 39°05′N, 74°18.8′W, 24 m, July 15, 1978: 1 ♂. Mattituck Sill, mid Long Island Sound, LIS sta. 103, 41°04′N, 72°25′W, 21 m, Aug. 9, 1972: 23 individuals. LIS sta. 104, 41°07′N, 72°35′W, 21 m, Aug. 21, 1972: 46 individuals. Two km north of Peconic, N.Y., LIS sta. 113, 41°03′N,

72°35′W, 4 m, Aug. 21, 1972: 15 adults, 6 imm. Specimens were obtained by the NMFS Woods Hole Laboratory at the following locations: 43 km south of Nantucket, 9 km south of Davis South Shoal, *Delaware II* sta. 16-1, 40°46′N, 70°00′W, 38 m, June 15, 1962: 4 ♂♂; 41 km south of Slocums Neck, Mass., 14 km south of Buzzards Bay entrance Texas Tower, Rhode Island Sound, *Delaware II* sta. 46-1, 41°10′N, 71°00′W, 40 m, June 17, 1962: 2 ♀♀, 3 ♂♂; 9 km south of Saltaire, N.Y., 40°36′N, 73°10′W, 22 m, Oct. 26, 1963: 16 ♀♀, 10 ♂♂; 17 km east of Ludlam Beach, N.J., *Gosnold* sta. 1345, 39°00′N, 74°15′W, 21 m, Oct. 16, 1963: 3 ♀♀, 5 ♂♂; 14 km east of Wildwood, N.J., *Gosnold* sta. 1348, 39°00′N, 74°15′W, 28 m, Oct. 18, 1963: 12 ♀♀ (2 ov.), 22 ♂♂; 17 km northeast of False Cape Va., *Gosnold* sta. 2058, 36°40′N, 75°45′W, 21 m, Aug. 5, 1964: 5 ♀♀, 5 ♂♂; 28 km east of Currituck Beach, N.C., *Gosnold* sta. 2062, 36°20′N, 75°30′W, 30 m, Aug. 6, 1965: 1 ♂. Specimens also examined from Virginia Institute of Marine Science, location 83 km east of Lavellette, N.J., sta. D-L, 39°04.7′N, 73°51.2′W, 31 m: 1 ♂ and Equitable Environmental Health Inc., location 1 km north of Wading River, N.Y., sta. B-4, 40°58.2′N, 72°54.5′W, 3 m, Sept. 1977: 1 ♀, 2 ♂♂.

Description. Female, 5.0–6.6 mm. Head shape similar to *A. millsi*. Eyes small, weakly pigmented in juveniles, not discernible in adults. Body broad, strongly arched, barrel shape.

Antenna 1: peduncle segment 1 as deep as wide, flagellum with 6–7 segments; accessory flagellum with 2 subequal segments. Antenna 2: lobe of peduncle segment 4 deep; flagellum with 7 segments, first segment longest, widest distally. Upper lip broad, apex smooth. Lower lip: inner lobes short and broadest distally. Mandible: incisor bifid, short lacinia mobilis with 6 accessory blades; 1 supramolar blade; palp segment 3 with 18 marginal comb-like spines and 14 apical spines. Maxilla 1: inner plate small, 11 marginal setae; outer plate with 15 apical spines; palp segment 2 with 9 plumose setae, 8 club-shape setae and about 10 simple setae. Maxilla 2: outer plate broad, 1½ times length of inner plate, outer margin pilose, inner margin with 15 plumose setae and 10 club-shape setae. Maxilliped: inner plate with 12 barbed outer marginal setae, apex the width of the two apical spines; outer plate slightly broader than inner; palp segment 3 geniculate with 5 short, facial plumose setae; long, minutely pectinate apical setae.

The shape, size and proportion of the segments of peraeopods 1–7 are all similar to those of *A. millsi* as described by Bousfield in 1965. However, while most of the spines and setae arrangements are similar, there are several differences that should be commented on. The posterior margin of segment 5, peraeopod 7 in *A. millsi* is without spines except for the cluster at the posterior distal angle, whereas *A. similis* has 1–2 singly inserted or 1–2 small clusters of spines on posterior margin in addition to large distal cluster. Peraeopod 7, segment 4 in *A. similis* has 3–4 groups of outer facial setae instead of 6 for *A. millsi*. Gnathopod 1 coxa posterodistal angle of *A. similis* has 4 plumose setae instead of the 8 found in *A. millsi*.

Pleosome side plates 1 and 2 hind margins acutely produced. Pleosome side plate 3 with a strong, stout posterior process and 6 rows of laterally inserted plumose setae. Pleopods with rather slender rami; outer ramus with 13 segments and inner ramus with 10 segments.

Uropod 1: long, slender peduncle slightly longer than rami, outer margin with up to 9 spines plus 3 inter-ramal spines, lower margin usually with 1 spine distally; inner ramus with 4 long singly inserted barbed setae along margin, terminal cluster of spines with 2 additional long barbed setae. While there is usually 1 lower peduncular spine, the number may vary from 0–2 and in rare instances right peduncle may have a different total number of spines from left. Uropod 2: peduncle and rami subequal, peduncle with 3 plumose setae in addition to other numerous setae. Uropod 3: short, slender peduncle; outer ramus slightly longer than inner. Telson similar in shape to those of *A. millsi* and *A. bousfieldi* with a deep cleft, outer margin of lobe with concave angle; in addition to marginal setae, each lobe has a long and short plumose seta.

Male, 5.5–6.0 mm: similar to female in shape but with more spines, spinal clusters and plumose setae, especially in peraeopod 5, segment 5 and peraeopod 6, segments 5

and 6. The coxal plate posterior margin of peraeopods 6 and 7 has a greater number of marginal spines compared to the female. Peraeopod 7, segment 4 has inner and outer facial setae (female outer facial seta only). The lower margin of peduncle of uropod 1 usually has 1 distal spine, but may have 0–3 spines. One large male had 2 lower marginal spines on left peduncle and 3 on right of uropod 1.

Remarks. A. similis differs from *A. millsi* in having a greater number of spines on the upper peduncle margin of uropod 1 (8–9 compared to 4) and in the presence of bottom distal spine(s) on the peduncle of *A. similis*. However, these distinguishing characteristics are not discernible until the animals reach 3.0–3.5 mm in length. In addition to the previously mentioned differences of the peraeopods, *A. similis* has 2 plumose setae on each telson lobe, 3 plumose setae on peduncle of uropod 2 and third palp segment of the maxilliped has 5 short, facial plumose setae, whereas *A. millsi* lacks plumose setae.

Etymology. This species is called *A. similis* because the shape of the body and appendages is similar to that of *A. millsi.*

Distribution. At present, range extends from Nantucket offshore waters south to Cape Hatteras; also found in eastern Long Island Sound.

Ecology. Found in clean, fine sand at depths of 3–40 m. In the middle Atlantic region, *Protohaustorius wigleyi* is the deeper offshore counterpart of *P. deichmannae,* and *Acanthohaustorius similis* replaces *A. millsi* in deeper offshore waters. At most stations, where *A. similis* is found, *P. wigleyi* is also present. *A. similis* was also found off of Townsend Inlet, N.J. (Anoxia sta. S) with *Protohaustorius* sp. cf. *deichmannae.*

Acknowledgments

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