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A NEW SPECIES OF *COROPHIUM* LATREILLE, 1806
(CRUSTACEA: AMPHIPODA) FROM GEORGIA
BRACKISH WATERS WITH SOME ECOLOGICAL
NOTES¹

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While surveying the invertebrate fauna of Georgia estuaries during 1968, a new species of tube-dwelling amphipod was discovered in low salinity marsh areas near the upper reaches of the North Newport River (Liberty County). This species is here designated as *Corophium aquafuscum*.

***Corophium aquafuscum* new species**

Diagnosis: A moderately large, very setose species with urosome completely segmented. Distinct rostrum lacking in male, but present in female. Antenna 2 alike in male and female with two strong teeth present on distoventral margin of segment 4. Inner margin of uropod 1 peduncle bare except for a blunt distal spine. A single blunt distoventral spine on segment 1 antenna 1 of female, lacking in male. Compound spines present on rami of uropods 1 and 2 in both sexes. Bifid compound spinules on distal margin of palm of gnathopod 1 of both sexes.

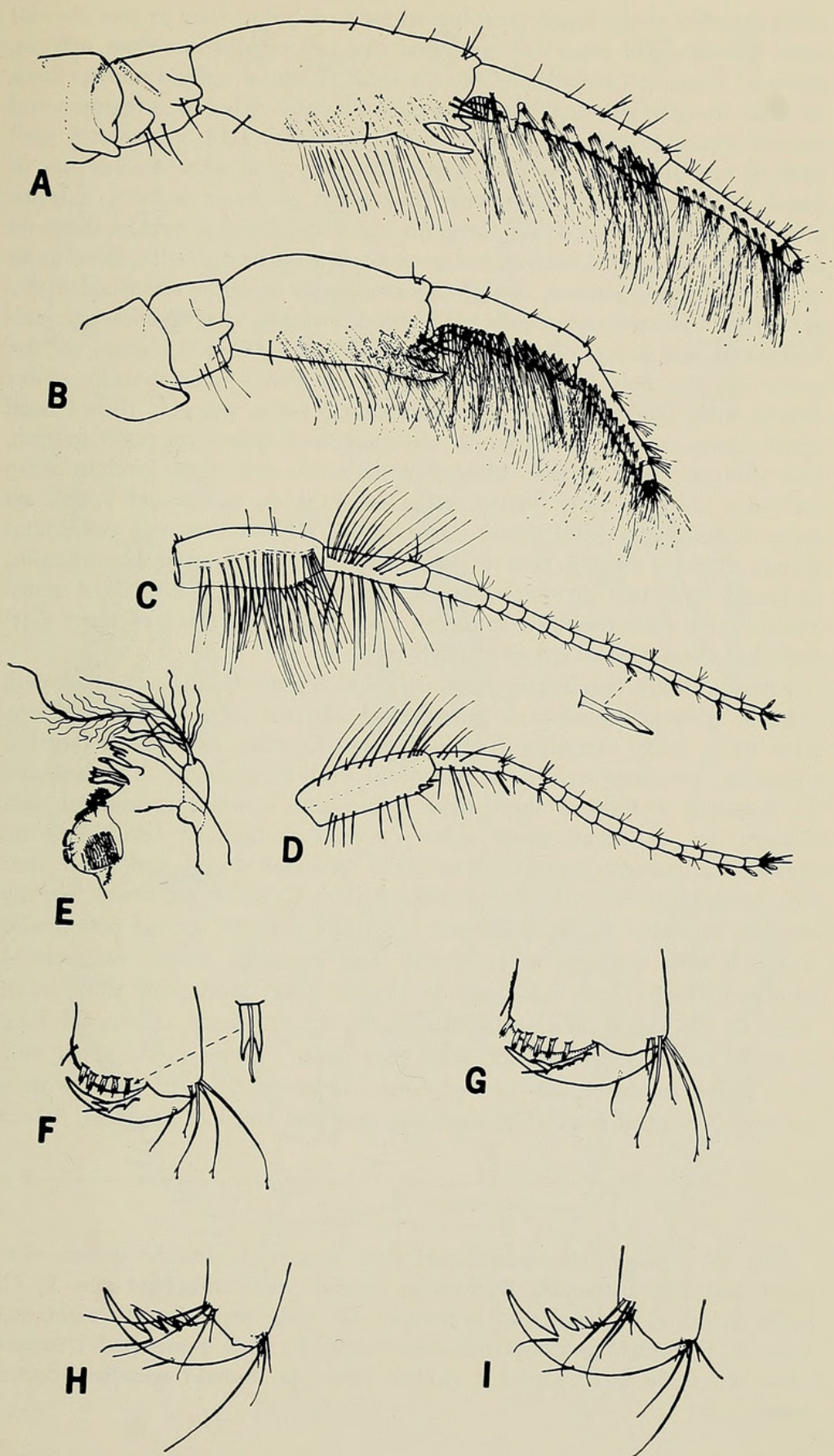
Description: (Based on adult specimens.) Male. Length (excluding antennae) 4 to 7 mm. Head frontal margin nearly straight, rostrum absent or reduced to small nub in large specimens. Eyes well developed on anterior head margin, oval and often notched posteriorly. Antenna 1 with three peduncular and 13-16 flagellar segments, reaching to about middle of segment 5 of antenna 2; peduncular segment 1 in shape of inverted triangle in cross section; row of 18 to 20 long setae on inner dorsal margin, 13 to 16 moderately long setae on ventral margin; single, stout, "brushlike" compound setae on distoventral margin; stout ventral spines absent; outer dorsal margin with two or three small stout setae

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(sometimes compound) proximally and three to five small slender setae on distal half of segment; segment 2 with row of 11–13 long setae on ventral and 12–16 on inner margins, dorsal margin with three or four small proximal setae and a small cluster of three distal setae; segment 3 with three or four mid-ventral setae and a ventral and dorsal cluster of three or four setae distally; most flagellar segments bearing setae distally, some segments without setae, spatulate (sensory?) setae on more distal segments (Fig. 1C). Antenna 2 from $\frac{1}{2}$ to $\frac{3}{4}$ length of body; five peduncular segments present, second segment with strong forward-projecting gland cone; third segment with distomesal and proximoventral protuberances on strongly developed ridge (Fig. 2D); segment 4 with two well-developed teeth on distoventral margin, ventral-most tooth larger, projecting past shorter second tooth (Fig. 1A), three prominent stout setae on upper mesial base of second tooth, 9–12 clusters of three to six long setae on ventrolateral margin, one small proximal and one small distal seta on inner ventral margin, five to seven small setae on dorsodistal half of segment; segment 5 with prominent ventral-projecting tooth on proximal fourth of segment, 16–19 clusters of long setae on ventral margin, 11–16 small setae on dorsal margin, inner ventrodorsal margin produced to form a stout tooth; flagellum with four articles, first article over $\frac{3}{4}$ length of peduncular segment 5 with 22–26 ventral clusters of long setae and 18–20 small dorsal setae; article 2 short (less than $\frac{1}{5}$ length of first article) with cluster of distal setae, articles 3 and 4 greatly reduced, with pair of very small blunt uncinat ventral spines at distal end of article 3. Mandible incisor strongly developed, tridentate; lacinia mobilis bidentate, well developed (but not quite so large as incisor in some specimens), three to four strong compound spine-teeth occupying position of spine-row; cluster of small soft plumose setae immediately before molar on distal margin; molar very strong and prominent, with 16–20 rows of microdenticles on triturative surface, three pedestalate accessory pads present on proximal margin; one plumose seta on proximal margin; mandibular palp appearing to be three segmented, “second” segment slightly produced distally, bearing one long plumose seta; “third” segment bearing long plumose setae distally. Gnathopod 1 (Fig. 1F) subchelate; segment 6 (palm) with six to seven transverse rows of long comblike setae on the inner surface; row of three to four transverse submarginate compound setae on lateroproximal third of segment, several compound and simple setae along posterior margin, 9–11 (four to five lateral and five to six mesal) submarginate compound,

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FIG. 1. *Corophium aquafusum* new species A, male antenna 2; B, female antenna 2; C, male antenna 1; D, female antenna 1; E, female right mandible; F, male gnathopod 1; G, female gnathopod 1; H, male gnathopod 2; I, female gnathopod 2.

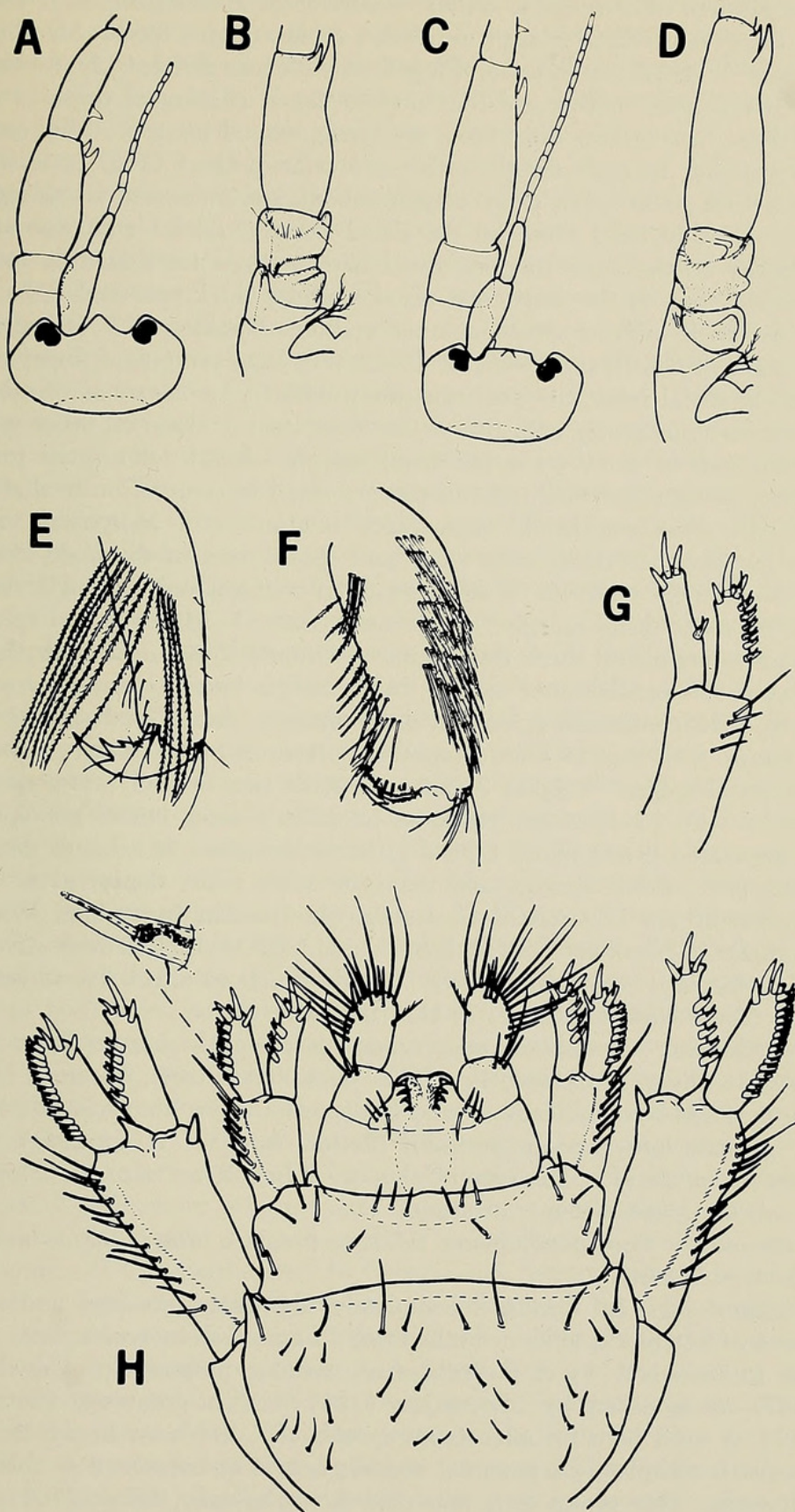


bifid spinules along distal grasping surface on palm; four to five slender setae weakly bifid near their rounded tips, all on disto-anterior margin. Dactyl (segment 7) with one seta on outer proximal margin; single tooth on inner margin; one distal, straight thick seta and two more proximomesal curved setae present. Gnathopod 2 simple, (Fig. 1H); segment 6 with straight row of 10–12 very long transverse compound setae, two groups of distal setae, posterior group with four setae on inner surface, anterior group with five or six setae, three on inner surface and two or three on outer surface. Dactyl with six setae as illustrated, armed with three teeth on inner margin. Pereon, coxae, and pereopods as other described males of genus. Urosome completely segmented, setation varies somewhat with individual specimens. Uropod 1 peduncle with 10 or 11 setae on the outer margin, only a single stout spine on distal-inner margin; outer ramus with 12–15 compound spines along outer margin, three distal spines; inner ramus with four to six compound spines on outer margin, two or three distal spines. Uropod 2 peduncle with three or four setae on outer margin; outer ramus with six or seven compound spines on outer margin, two distal spines; inner ramus with zero to two compound spines on outer margin, two or three distal spines. Uropod 3 uniramous, peduncle with two distolateral setae, ramus rounded with 12–14 setae. Telson with four proximal setae on each side, two rows of four short recurved thorn-shaped spines medially.

Female. Body (excluding antennae) 4 to 6 mm. Head well developed, rostrum present, sinuses of antennae 1 distinct and widely concave. Eyes as in male. Antenna 1 with three peduncular and 11–13 flagellar segments, reaching nearly to the distal end of segment 5 of antenna 2. Segment 1 with a short thick spine and a small compound seta distally, six or seven stout setae (several compound brushlike) on dorsolateral margin, rows of long setae on inner dorsal and inner ventral margins as in male but much sparser, flagellar segments bearing setae as in male. Antenna 2 about $\frac{1}{2}$ length of body, second peduncular segment with a distal protuberance and proximal ridge. Segment 4 similar to male, with two well-developed distal teeth and three stout setae at the origin of the inferior tooth, 13–15 dense clusters of long setae on outer ventral margin with very dense cluster on the outer surface at the origin of the inferior tooth. Segment 5, as in male, with a prominent ventral-projecting tooth on proximal third of segment, 19–23

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FIG. 2. *Corophium aquafuscum* new species A, female dorsal view head and left antennae; B, female ventral view right antenna 2; C, male dorsal view head and antennae; D, male ventral view right antenna 2; E, female gnathopod 2 mesial view; F, male gnathopod 1 mesial view; G, male left uropod 2 dorsal view; H, female urosome dorsal view.



dense clusters of long setae on the ventromesal and ventrolateral margins, inner ventrodistal margin produced to form stout tooth. Mandible and palp (Fig. 1E) as in male. Flagellum with four articles: first article with 18–22 long ventral and four or five dorsal clusters of three to six short setae, one or two short setae on dorsoproximal margin. Gnathopod 1 very similar to male except with more setae present (Fig. 1G); segment 6 with six or seven stout, compound bifid spinules and six to eight slender, weakly bifid setae on the distal margin; dactyl with one seta proximally on the outer margin armed with a single tooth slightly more developed than in the male, one distal straight, thick seta and three or four definitely curved setae on inner margin. Gnathopod 2 (Figs. 1I; 2E) segment 6 with single row of 10–12 very long compound setae; two groups of distal setae, the posterior group with five or six setae on inner surface, anterior group with five or six setae, two or three on inner margin and two or three on outer distal margin; dactyl with three teeth on inner margin, proximal-most tooth very small in comparison to that of male. Urosome completely segmented, setation with individual variation but generally with more setae and spines than in the male. Uropod 1 peduncle with 12–15 setae on outer margin, only a single stout spine on inner distal margin; outer ramus with 15–18 compound spines on outer margin and three distal spines. Uropod 2 peduncle with three to seven setae on the outer margin, inner margin bare; outer ramus with five to eight compound spines on outer margin, three distal spines; inner ramus with two to four compound spines on outer margin, two or three distal spines. Uropod 3 peduncle with two to four setae, ramus subovate with 13–18 setae; telson as in male, pereon, coxae, pereopods and associated brood plates typical of other described females of genus.

Holotype: Adult female, and paratype adult male, deposited in the collection of the Division of Crustacea, Smithsonian Institution, Washington, D.C., Numbers USNM 128291 and USNM 128292 respectively.

Type-locality: Georgia, Liberty County, Riceboro Creek (headwaters of the North Newport River) at U.S. Highway 17.

Distribution: *Corophium aquafuscum* is presently known from the Nanticoke River, Maryland, Pamunkey and York Rivers, Virginia (Boesch, personal communication), and the type-locality. This species probably extends into extreme northern Florida, however it appears to be absent from suitable habitats in the St. Johns River estuary, Florida (Bousfield, personal communication).

Etymology: The specific name refers to the dark brown, humic waters of the type-locality.

Comparisons: By having a completely segmented urosome and segment 4 of antenna 2 alike in both sexes, *C. aquafuscum* new species belongs to Section A(1) of the subgeneric scheme proposed by Crawford (1937) as modified by Shoemaker (1947). This grouping, (Section A(1)) as used here includes those species of *Corophium* in which the urosome is completely segmented and segment 4 of antenna 2 is alike in both sexes. This group thus includes: *C. volutator* (Pallas, 1766); *C.*

chelicorne Sars, 1895; *C. curvispinum* Sars, 1895; *C. homoceratum* Yu, 1938; *C. maeoticum* Sowinsky, 1898; *C. monodon* Sars, 1895; *C. mucronatum* Sars, 1895; *C. multisetosum* Stock, 1952; *C. nobile* Sars, 1895; *C. robustum* Sars, 1895; *C. spinicorne* Stimpson, 1857; and *C. spinulosum* Sars, 1896. Two forms, *C. arenarium* Crawford, 1937 and *C. salmonis* Stimpson, 1857, in which segment 4 of antenna 2 is not alike in both sexes were erroneously included in this subsection by Nayar (1950). The presence of two well-developed distoventral teeth on segment 4 of antenna 2 distinguish *C. aquafusum* new species from all but four species (*C. homoceratum*, *C. maeoticum*, *C. mucronatum* and *C. nobile*) in Section A (1). The lack of setae or spines on the inner margin of uropod 1 peduncular segment and the absence of a distinct rostrum in the male separate *C. aquafusum* new species from *C. homoceratum*, *C. mucronatum* and *C. nobile* which have three or more setae on the inner margin of uropod 1 peduncular segment and a distinct rostrum in both sexes. The presence of a row of setae (three to seven) on the outer margin of uropod 2 peduncular segment and rows of compound spines on the outer margins of the outer rami of uropod 1 (12–15) and uropod 2 (six to eight) will differentiate *C. aquafusum* new species from *C. maeoticum*. *Corophium chelicorne* and *C. spinicorne* are the only previously described species in Section A(1) having males without a distinct rostrum. *Corophium chelicorne* along with *C. spinulosum* have a greatly enlarged ventrodiscal tooth on segment 4 antenna 2 which with the stout flagellum superficially presents a chelate appearance. *Corophium spinicorne* (with *C. monodon*, *C. multisetosum* and *C. volutator*) is distinct from *C. aquafusum* new species by having only a single distoventral tooth on segment 4 antenna 2. Two species, *C. curvispinum* and *C. robustum*, are unique in possessing three distoventral teeth on segment 4 of antenna 2. There are two forms *C. rotundirostre* Stephensen, 1915, and *C. kitamorii* Nagata, 1965, whose descriptions were based on specimens which had antenna 2 missing on one or both sexes, however they are readily distinguished from *C. aquafusum* new species by both having a narrow elongate ramus on uropod 3.

In summary, the combination of the following three characteristics separate *C. aquafusum* new species from all other described species in Section A(1): (1) two strong distoventral teeth on segment 4 antenna 2, (2) distinct rostrum lacking in male, and (3) inner margin of uropod 1 peduncular segment bare except for a single distal spine.

Ecological Notes: At present little information is available on the bionomics of *C. aquafusum*. In Georgia this species appears to be confined to freshwater-oligohaline creeks influenced by tidal action. It was most abundant in the mid intertidal zone where the muddy substrate is shaded by marsh vegetation and debris. At the type-locality large concentrations of specimens occurred under fill rocks adjacent to the bridge abutment (Fig. 3). Our observations indicate that *C. aquafusum* normally constructs U-shaped burrows in mud-fine-sand substrates which are usually permeated with roots of *Spartina alterniflora*



FIG. 3. View of the type locality of *Corophium aquafuscum* new species from across Riceboro creek.

L., *Lileopsis chinensis* (L.), and other marsh vegetation. However, on several occasions at "Crossroads," near the headwaters of Riceboro Creek (about 2 miles west of the type-locality), specimens were found in sand-covered tubes attached to submerged logs and vegetation.

Ovigerous females were collected during the warmer months (June–September). During late August and September populations appeared to be at their peak. Specimens were comparatively rare in winter collections (February).

Corophium aquafuscum was found in the stomachs of white catfish *Ictalurus catus* (L.) and the mummichog *Fundulus heteroclitus* (L.) collected in Riceboro Creek near the type-locality during the winter and early spring of 1970. In addition, this species is probably preyed upon by clapper rails, spotted sandpipers, seaside sparrows and other birds which were observed in the collecting area.

Other oligohaline or euryhaline invertebrates occurring in the type-locality were the crabs, *Callinectes sapidus* Rathbun, *Rhithropanopeus harrisi* (Gould) and *Uca minax* (LeConte); the shrimps, *Penaeus setiferus* (L.), (juveniles during late summer and fall) and *Palaemonetes pugio* Holthuis; the isopods, *Cyathura polita* (Stimpson) and *Cassidinidea lunifrons* (Richardson); the amphipods, *Orchestia grillus* Bosc, *Orchestia uhleri* Shoemaker, *Gammarus tigrinus* Sexton, and *Corophium lacustre* Vanhoffen; the barnacle, *Balanus improvisus* Darwin; the polychaete, *Namalycastis abiuma* (Muller); and molluscs, *Litterodinops te-*

nuipes (Couper), *Hydrobia* sp., *Melampus bidentatus* Say, *Detracia floridana* (Pfeiffer), *Polymesoda carolina* Bosc, and *Cyrenoidea floridana* Dall.

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