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GERALD A. COLE

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A NEW AMPHIPOD CRUSTACEAN, GAMMARUS HYALELLOIDES N. SP., FROM TEXAS¹

GERALD A. COLE

Department of Zoology, Arizona State University, Tempe 85281

COLE, G. A. 1976. A new amphipod crustacean, *Gammarus hyalelloides* n. sp., from Texas. *Trans. Amer. Micros. Soc.*, 95: 80–85. *Gammarus hyalelloides* is described from specimens living in *Chara* beds at the mouth of Phantom Lake Spring, Jeff Davis County, Texas. The new species is the smallest of the North American fresh-water *Gammarus* species. It is closely related to *G. pecos* Cole & Bousfield, known only from Leon Creek and Diamond Y Spring, about 85 km east of Phantom Lake Spring.

The purpose of this paper is to describe a new species of *Gammarus*, first collected by W. L. Minckley and the author, 5 August 1967, in beds of *Chara* at the mouth of a Texas spring. The tiny size of the specimens, including amplexing adults and ovigerous females, and their habitat were reminiscent of *Hyaella azteca* (Saussure) in the American Southwest, and we first suspected that we were collecting *Hyaella*. The new amphipod is, therefore, named *Gammarus hyalelloides* n. sp.

THE HABITAT

Several authors have mentioned or described in some detail the type locality, Phantom Lake Spring, Jeff Davis County, Texas, where *G. hyalelloides* n. sp. occurs. It is an artesian spring arising from Cretaceous limestone at about 975 m above mean sea level and roughly 11 km SW of Balmorhea, Reeves County, Texas. It is one of seven major springs in the Toyah Basin of western Texas (White et al., 1941). The spring, issuing from a cave, derives its name from a lake which used to occupy a sink near its mouth. Cheatum (1935) presented a photograph of part of the lake and the stream issuing from it. Deevey (1957) described Phantom Lake as a large limnocrone, "... roughly rectangular, 100 m wide, and held up by a dam to a depth of several meters" (23 June 1940). According to Dundee & Dundee (1969) the lake disappeared sometime between 1946 and 1957, when water flowing from the cave was channeled into a concrete-lined irrigation canal.

The water is warm and mineralized, varying in concentration and temperature with changes in discharge. White et al. (1941) reported total dissolved solids from 0.14–2.31 g/liter; Deevey (1957) calculated 2.29 g/liter, and I found 1.94 g/liter by evaporating filtered water collected 5 August 1967. In terms of Clarke's (1924) classification the water is the sulfato-chloride type, with sodium being the principal cation. There are about 16 ppm of silica (Deevey, 1957). Temperatures reported by White et al. (1941) ranged from 21.7–25.6C. The water was 26 C on 5 August 1967.

Phantom Lake was the type locality for two snails, *Cochliopa texana* Pilsbry and *Lyrodes cheatumi* (Pilsbry). They persist today in the irrigation ditch at the cave mouth to a point about 30 m downstream (Dundee & Dundee, 1969). Deevey (1957) listed the biota of Phantom Lake, but included no amphipods. Dundee & Dundee (1969) tallied organisms collected from the irrigation ditch

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at the mouth of Phantom Lake Cave in 1968 and listed *Gammarus*. Specimens they kindly sent to me proved to be the tiny amphipod here described as new.

Gammarus hyalelloides n. sp.

(Figs. 1–2)

Diagnosis. The smallest of the known North American fresh-water *Gammarus* species, related to *G. pecos* Cole & Bousfield (1970) but differing in the following features: generally more elongate and far less setaceous than the large *G. pecos*; lacking setae on the posterior margin of the first peduncular segment of antenna 1; coxal plates 1–4 with fewer anteroventral setae, rarely more than a sum of 10 on one side; pereopods 6 and 7, basis armed with spines at the posterodistal margin of the segment proper, penultimate or antepenultimate seta of the posterior margin tiny; epimera 2 and 3 armed with spines, usually lacking anterior, ventral, and facial setae; uropod 3, terminal segment of exopod lacking lateral setae; and female without teeth in palmar concavities of gnathopods 1 and 2.

Description. Male: 5.8–7.8 mm. Interantennal lobe broad, lower margin gently rounded, upper lobe rounded somewhat more sharply. Eye, reniform, less elongate than in *G. pecos*.

Antenna 1, nearly two times length of antenna 2 and about 0.77 times body length; peduncular segment 1, posterior margin lacking proximal and medial setae but with one or two apical spines; peduncular segments 2 and 3 with two or three and one posterior clump of setae, respectively; flagellum with 21–30 segments; accessory flagellum short, with three or four segments.

Antenna 2, peduncle subequal to or slightly longer than flagellum; ultimate peduncular segment usually slightly longer than penultimate, its posterior margin with three or four clusters of setae; penultimate segment with two or three clusters of posterior setae; flagellum with 11–13 segments, lacking calceoli.

Mandible, palp terminal segment broadest in proximal half; outer face with two groups of setae, inner face with one group of one to three setae; inner margin with 13–17 weakly pectinate, nearly smooth setae and four long terminal setae; no dorsal setae; penultimate segment longer than ultimate, with submarginal distal row of four long setae and marginal row of two setae, two to four setae inserted more proximally.

Maxilla 1, inner plate with 10–11 plumose marginal setae; outer plate with 11 apical spine-teeth, bluntly or finely pectinate; right palp with three terminal conical teeth and one outer subterminal tooth and seta; left palp with four to six terminal spines accompanied by a subapical row of three longer setae and an inner subterminal spine.

Maxilla 2, inner plate with facial row of eight plumose setae inserted diagonally and seven marginal setae, about 14 terminal setae.

Maxilliped, inner plate with three apical conical teeth and one inner subterminal tooth, inner margin with four to seven long heavy plumose setae; outer plate broad, inner margin with eight to ten spine-teeth continuing around apex as five or six stout pectinate setae; palp segment 3 slender, 2.5 times longer than dactyl.

Pereopod (gnathopod) 1, propodus narrowing distally, palmar margin extremely oblique with one spine-tooth in middle concavity and six smaller spines near posterior angle; posterior margin with two or three groups of marginal setae; inner face with two superior lateral rows of setae and three or four inferior lateral rows close to margin. Coxal plate with one to three anteroventral setae, one posteroventral seta, and usually a facial seta.

Pereopod (gnathopod) 2, propodus slender, oblique palmar margin concave with one blunt spine-tooth and three smaller teeth at posterior angle; posterior

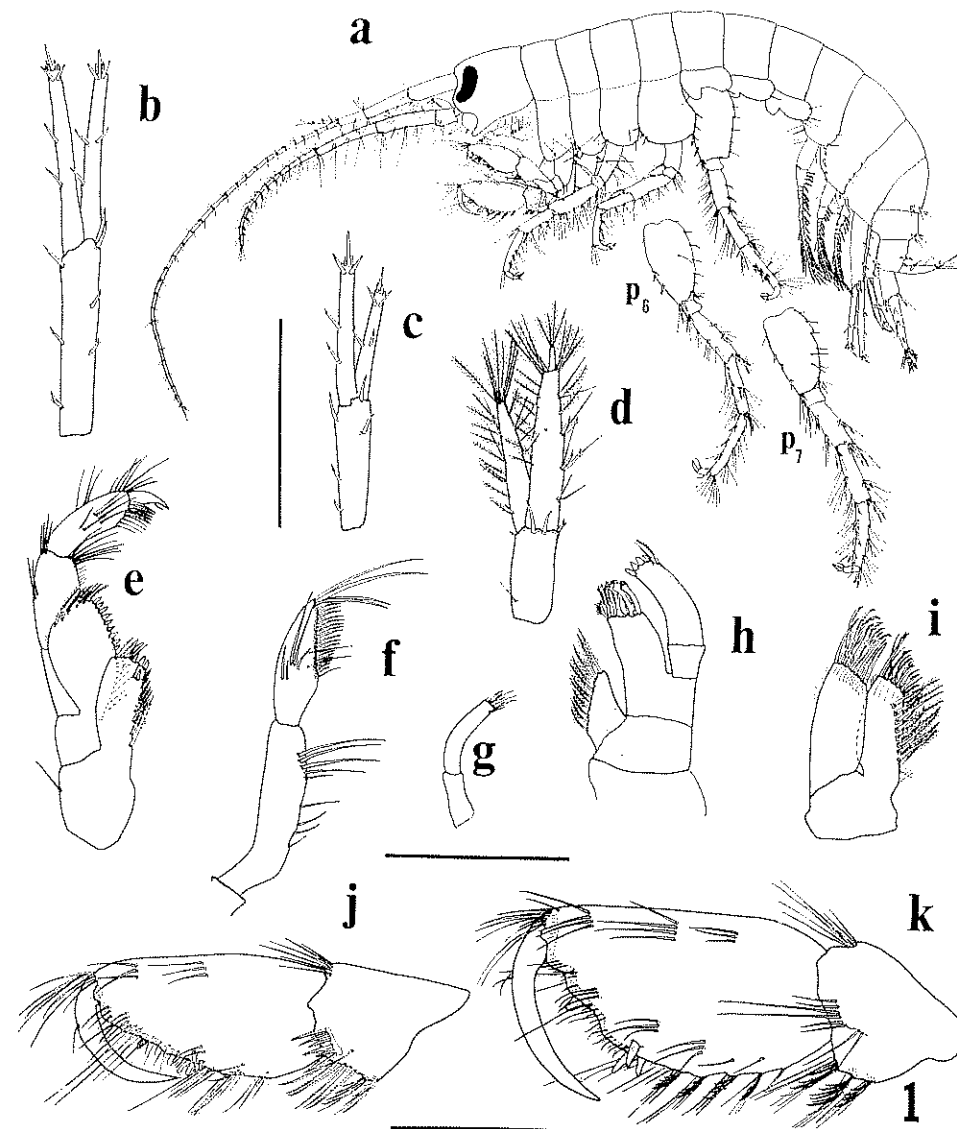


FIG. 1. *Gammarus hyalelloides* n. sp. (a) Habitus, male, 7.7 mm; p6, pereopod 6; p7, pereopod 7. (b-k) from male, 7.8 mm. (b) Uropod 1. (c) Uropod 2. (d) Uropod 3. (e) Maxilliped. (f) Mandibular palp, lateral aspect. (g) palp, left maxilla 1. (h) Right maxilla 1. (i) Maxilla 2. (j) Pereopod (gnathopod) 1, inner aspect, carpus, propodus, dactylus. (k) Pereopod (gnathopod) 2, inner aspect, carpus, propodus, dactylus. Scale lines = 0.5 mm.

margin with five or six groups of setae; inner face with three or four superior lateral groups and four or five inferior lateral rows of setae. Coxal plate with two to four anteroventral setae, one posteroventral seta, and usually one facial seta.

Pereopod 3, posterior margins of merus, carpus, and propodus with about four, three, and three clusters of spines and setae, respectively. Coxal plate with

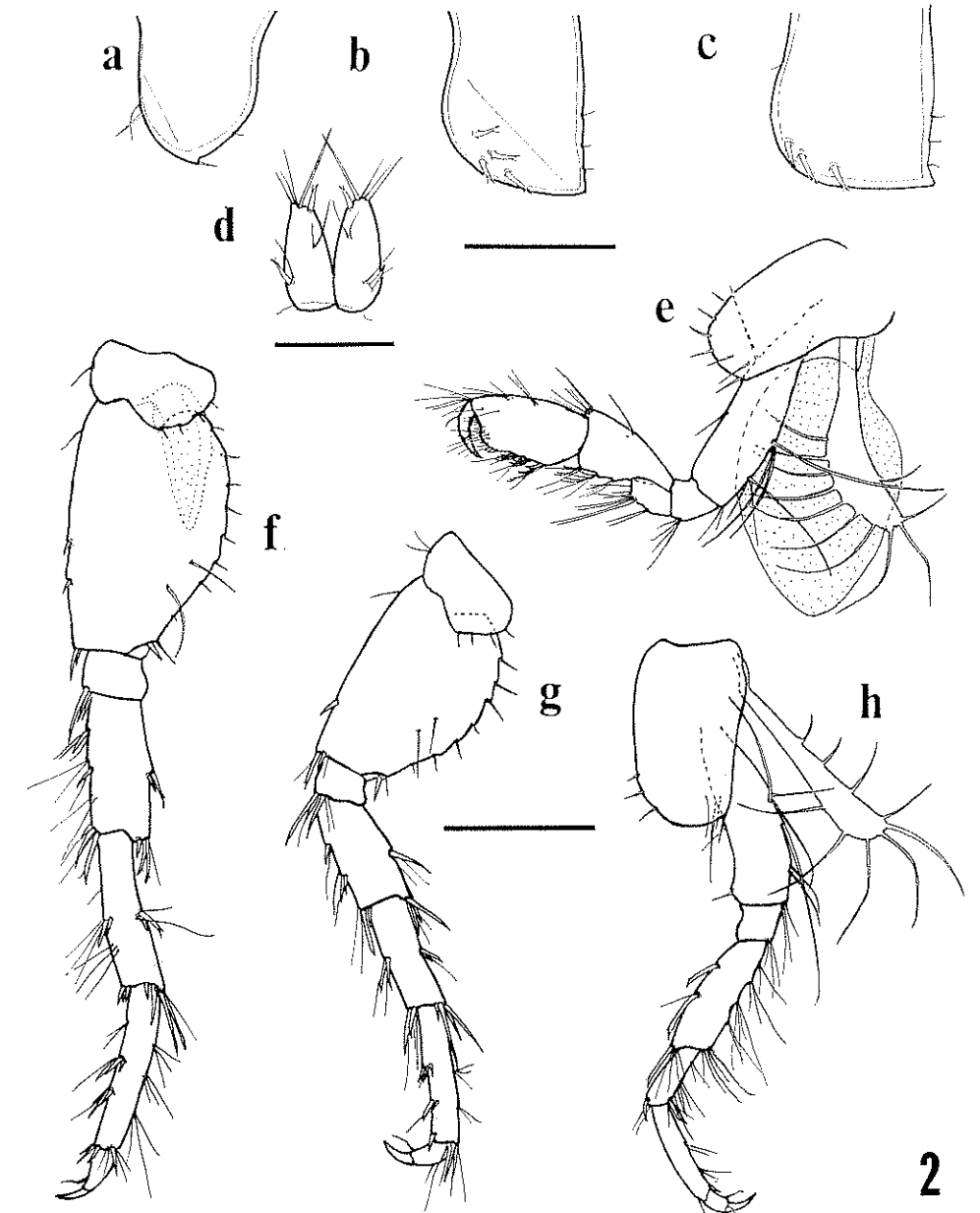


FIG. 2. *Gammarus hyalelloides* n. sp. (a-d,f) male 7.8 mm; (e,g,h) female 5 mm. (a) Epimeron 1. (b) Epimeron 2. (c) Epimeron 3. (d) Telson, dorsal aspect. (e) Pereopod (gnathopod) 2, broodplate 1 and gill 1. (f) Pereopod 7. (g) Pereopod 7. (h) Pereopod 3, broodplate 2. Scale lines = 0.5 mm.

two or three anteroventral setae, one posteroventral seta, and usually one facial seta.

Pereopod 4, markedly shorter than pereopod 3; merus, carpus, and propodus with four, three, and two sparse clusters of setae and spines, respectively. Coxal

plate with two or three anteroventral setae and three or four posterior setae, facial setae usually absent.

Pereopod 5, anterior surface of basis with three sparse groups of proximal setae and two or three more distal spines, anterodistal corner with two or three spines and setae; posterior surface nearly straight, with six to nine setae, the antepenultimate usually tiny; conspicuous free posterodistal lobe unarmed; usually no facial setae. Anterior margins of merus, carpus, and propodus with two or three clumps of spines and setae.

Pereopod 6, anterior surface of basis with a tuft of two proximal setae and two or three more distal spines; posterior surface slightly convex, tapering distally to segment proper, with no free lobe, lined with seven or eight setae, the ultimate longest or sometimes replaced by a spine, penultimate tiny; posterodistal angle at base of segment proper armed with one or two spines and one seta; one or two facial setae. Anterior margins of merus and propodus with three to five, three or four, and two or three clumps of spines and setae, respectively.

Pereopod 7, similar to number 6 although slightly longer; basis with one anterior proximal seta and three or four facial setae.

Coxal gills on pereopods 2–7, simple, laminate, decreasing in size posteriorly, the last gill inserted near upper inner margin of basis of pereopod 7.

Epimeron 1, with one stout seta at anteroventral angle and usually a slender seta inserted more proximally; posteroventral angle notched, with one stout seta; posterior margin with one or two short setae.

Epimeron 2, lacking armature in anterior proximal concavity and anteroventral convexity; usually two facial spines diagonally inserted and leading toward the more posterior of two submarginal ventral spines; posteroventral angle quadrate; posterior margin with three short setae.

Epimeron 3, shallow anterior concavity sometimes bearing a single small seta; anterior convexity unarmed; three marginal ventral spines; posteroventral angle slightly produced; posterior margin with three short setae.

Pleopods, long, natatory, third slightly shorter than first two; exopods of 1, 2, and 3 averaging 16, 14, and 13 complete segments, and fused basal segments with five or six, four, and three plumose setae, respectively; endopods averaging 14, 11, and 10 segments, respectively, and fused basal segments with two or three split-tipped setae; protopods, coupling hooks composed of two curved nodose spines and distal seta, protopod 3 most setaceous.

Uropod 1, slender, elongate, extending past tip of uropod 2; protopod 0.5–0.6 times total length, endopod only slightly longer than exopod; protopod and rami sparsely spined.

Uropod 2, slender, protopod about 0.5 times total length; endopod at least 1.2 times exopod length; protopod and rami sparsely spined.

Uropod 3, endopod about 0.67 times exopod length, inner margin with seven to nine sparse groups of plumose setae, mostly single, some with accompanying spine; outer margin with three or four groups of smooth and plumose setae, most singly inserted, apex with two spines and four to six plumose setae; exopod, inner margin with six or seven single spaced plumose setae; outer margin with five groups including smooth and plumose setae and spines in proximal groups, distal corners with two to four spines and seven to ten setae; terminal segment with four apical setae, no laterally inserted setae.

Telson, cleft to base, each apex with one to four slender smooth setae, and two spines or one spine plus an unusual long stout seta; outer margin with one dorsolateral spine and accompanying setae.

Uronites with slight dorsal humps; segments 1 and 2 with two middorsal spines and two setae; segment 3 often lacking middorsal spines or with only one;

dorsolateral armature, one or two spines, and zero to two short setae on each uronite.

Female, 5–7.3 mm. Smaller and more compact than male, as typical of the genus, carry three to five eggs, ovigerous individuals as small as 5 mm. Gnathopods lacking teeth in concave palmar margin, although teeth present at defining angles. Pereopods 5–7, basis relatively broader, with more convex posterior margins than in male; anterior borders with fewer spines, these sometimes replaced by setae. Slender brood plates on pereonites 2–5, decreasing in size posteriorly, few marginal setae. Uropod 3, sparsely armed.

Material Examined and Disposition of Types. Specimens collected 5 August 1967, 25 June 1968, and 21 April 1970 were studied for purposes of this report. The holotype, a male (U.S.N.M. No. 151957), and a representative ovigerous female paratype (U.S.N.M. No. 151958) are deposited in the U.S. National Museum. Additional series of paratypes have been deposited with the U.S. National Museum (U.S.N.M. No. 123826) and the National Museum of Canada.

DISCUSSION

Gammarus hyalelloides n. sp. is one of at least four gammarids in the Toyah Basin. The relationships have not been studied, but three are distinctly larger and different from the new organism. *Gammarus pecos* is one of these, occurring in Leon Creek and "Willbank Spring," the latter properly called Diamond Y Spring (Echelle & Miller, 1974), about 85 km east of Phantom Lake Spring. A similar form occurs in the rheocrene flowing from San Solomon Spring at Balmorhea State Park about 6 km northeast of Phantom Lake. Most remarkable, however, is the presence of another *Gammarus* in the modern canal system fed by Phantom Lake Spring. It is found especially in lateral canals and probably does not occur in the *Chara* beds near the spring orifice; it is much like *G. pecos*.

If speciation occurred in the Phantom Lake system, the absence of *Hyalella azteca* provided an unoccupied microhabitat for a small *Gammarus* to appropriate. This situation recalls the two species of *Gammarus* occurring in Doe Run, Kentucky (Minckley & Cole, 1963). A small aberrant *G. minus* Say is found in beds of moss (*Fissidens*) near the spring source, and the large *G. bousfieldi* Cole & Minckley lives in the nearby open water, ranging into lower reaches of the rheocrene.

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