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A DIAGNOSIS OF THE HOBBSI GROUP, WITH DESCRIPTIONS OF *CAECIDOTEA TERESAE,* N. SP., AND *C. MACROPROPODA* CHASE AND BLAIR (CRUSTACEA: ISOPODA: ASELLIDAE)

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Abstract.—The Hobbsi Group has emerged as a major assemblage of both epigean and hypogean species found over much of the eastern United States. With the new diagnosis of the group, 17 species are now tentatively assigned. *Caecidotea teresae,* a phreatobite from southern Indiana, is described herein as an addition to the group, and *C. ozarkana* is synonymized with *C. macropropoda.*

During his work on subterranean isopods, Steeves made the first attempt to divide some of the troglobitic species of the family Asellidae into assemblages which reflected their evolutionary histories: the Stygia (Steeves 1963), Hobbsi (Steeves 1964) and Cannulus groups (Steeves 1966). Of these, the Cannulus Group has received the most attention (Lewis 1981). However, with the addition of new species and the transfer of others, the Hobbsi Group is emerging as a dominant element among the North American asellids.

The Hobbsi Group is especially interesting from an evolutionary standpoint, since unlike the Stygia and Cannulus groups, it contains both epigean and hypogean species. Within the group, morphological intergradations exist between eyeless, unpigmented troglobites, vestigially eyed and pigmented phreatobites, to epigean species with functional eyes and pigmentation. The following diagnosis expands that of Steeves (1964).

The Hobbsi Group

Diagnosis of male.—Eyes and pigmentation present or absent. Palmar margin of pereopod 1 propus with strong processes. Pleopod 1 longer than pleopod 2; lateral margin of exopod concave, with weak nonplumose setae, distal margin with elongate, plumose setae. Pleopod 2, exopod with numerous elongate, plumose setae along margin of distal segment; endopod, basal apophysis well defined; tip with low conical cannula, extending along the axis of the endopod, often obscured by other terminal processes.

The following species are tentatively assigned to the Hobbsi group: Troglobites—*Caecidotea acuticarpa, C. adenta, C. fustis, C. hobbsi, C. macropropoda, C. nickajackensis, C. packardi, C. reddelli, C. salemensis*; Phreatobites—*C. kendeighi, C. spatulata, C. teresae, C. tridentata*; and Epigean—*C. brevicauda, C. dentadactyla, C. kenki, C. scrupulosa.*

Discussion.—The most unusual additions to the Hobbsi Group are undoubtedly the epigean species. Although Williams (1970) did not assign species to groups, in his cladogram of epigean asellids *C. dentadactyla, C. kenki, C. scrupulosa,* and *C. brevicauda* formed a lineage related to *C. montanus* and *C. nodula.* Of these latter two species, *C. nodula* appears to have some affinities with the Hobb-

si Group, especially in the morphology of the first pleopod, but the torsion of the endopod tip is not apparent in other members of the group. *Caecidotea montana*'s relationships with the Cannulus Group have been discussed elsewhere (Lewis 1981).

Unlike other epigean *Caecidotea,* which occur frequently in warm, lotic habitats, the epigean members of the Hobbsi Group occur mostly in cold water habitats. This is especially true of *C. brevicauda, C. kenki,* and *C. scrupulosa,* which are spring stream inhabitants and facultative cavernicoles.

Three other species deserve mention, *C. parva* (included by Steeves 1964 in the original Hobbsi Group), *C. bisetus,* and *C. pilus.* Although the endopod tips of these species are of the type found in members of the Hobbsi Group, the similarity ends there. The exopod of the first pleopod is ovate, not laterally concave, and weakly setose; the distal segment of the second pleopod bears only 1–5 setae; and the palmar margin of the gnathopod propus lacks processes. It is likely that in the future one or more of these species will be assigned to the genus *Lirceolus.*

Caecidotea teresae, new species
Figs. 1–2

Caecidotea sp. #2.—Lewis, 1981:582–583, 585.

Material examined.—INDIANA: Floyd Co., Indiana University Southeast campus, New Albany, drain tile near parking lot below Natural Sciences Building, 19 Nov 1977, J. Lewis, T. Everitt (Lewis), 28 ♂, 19 ♀. Same, 12 Dec 1978, J. Lewis, 5 ♂, 6 ♀. Drain tile flowing into small campus pond, near service area, 22 Mar 1980, T. Lewis, 1 ♂, 2 ♀.

A 12 mm male, 19 Nov 1977, is the holotype (USNM 189468), the other specimens are paratypes (USNM 189469, USNM 189470, USNM 189471). All of the material examined has been deposited in the collections of the National Museum of Natural History, Smithsonian Institution.

Description.—Eyeless, dorsum with light scattered pigmentation, darkest anteriorly. Largest male to about 15.5 mm, female to about 9.5 mm. Body slender, linear, about 6.8× as long as wide in males, 5.1× in females. Margins of head, pereonites and telson moderately setose. Head about 1.5× as wide as long, anterior margin concave, postmandibular lobes moderately produced. Telson about 1.3× as long as wide, sides subparallel, caudomedial lobe moderately produced.

Antenna 1 of male reaching midlength of last segment of antenna 2 peduncle, flagellum with up to about 13 segments, esthete formula 3-0-1-0-1; females with up to about 9 segments, 3-0-1. Antenna 2 about 0.6 length of body, last segment of peduncle about 1.3× as long as preceding segment, flagellum of about 95–100 segments.

Mandibles with 4-cuspate incisors and lacinia; distal segments of palp with plumose spine rows. Maxilla 1, outer lobe with 13 robust apical spines; inner lobe with 5 plumose setae apically. Maxilliped with 7 retinacula.

Pereopod 1 of male, propus 1.5× as long as wide, palm with proximal triangular process (spine in less mature specimens), larger trapezoidal median process separated by U-shaped cleft from shorter, rectangular, bicuspid distal process; dactyl flexor margin with weak spines. Female pereopod 1 propus about 1.5× as long

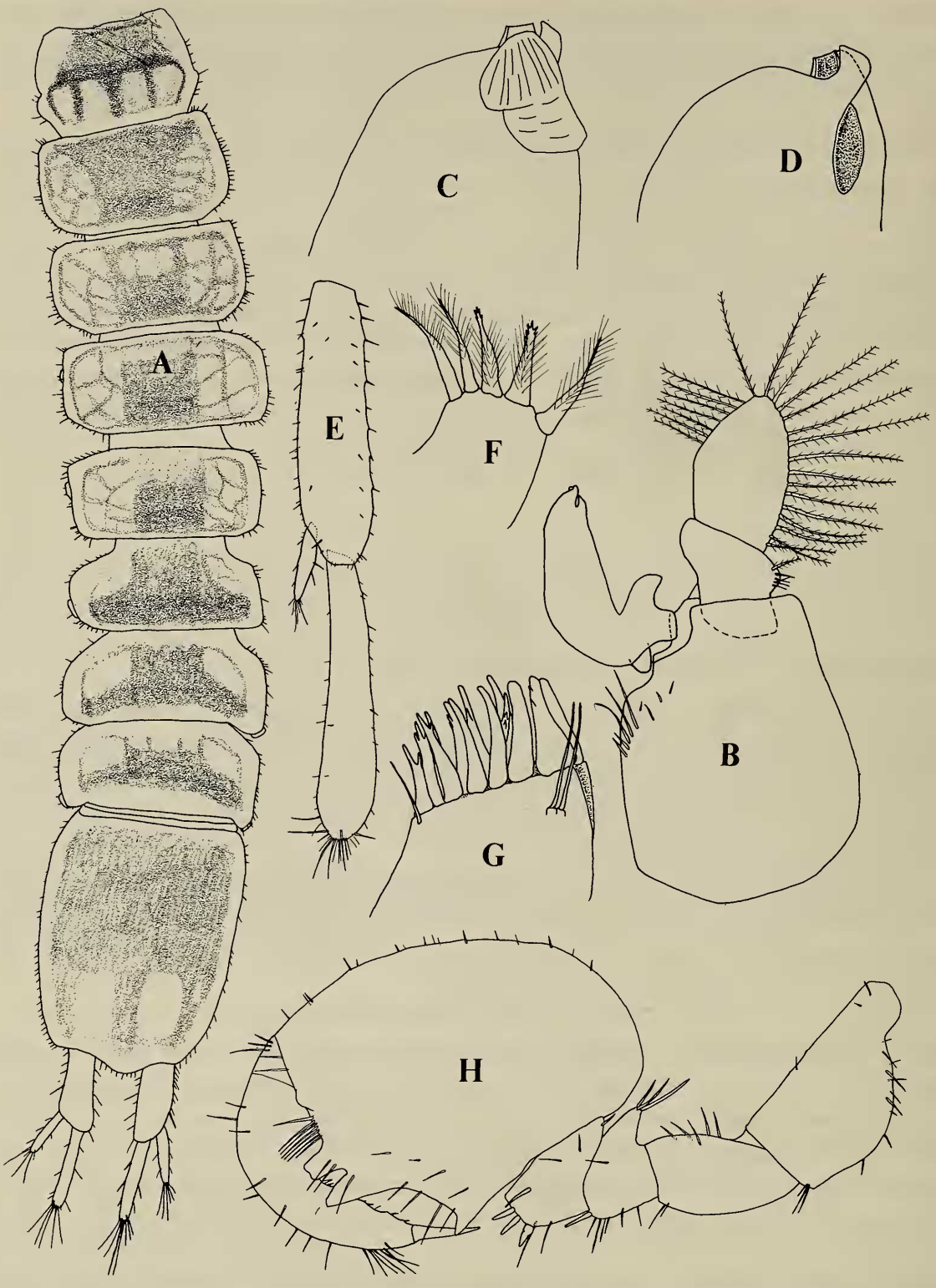

Fig. 1. *Caecidotea teresae,* A from female paratype, B–H from male paratype: A, Habitus, dorsal; B, Pleopod 2; C, Same, endopod tip, posterior; D, Same, endopod tip, anterior; E, Uropod, dorsal; F, Maxilla 1, inner lobe; G, Same, outer lobe; H, Pereopod 1.

as wide, processes absent, large proximal spine present; dactyl flexor margin with about 6 strong spines. Pereopod 4 more robust and spinose in males than females.

Male pleopod 1 larger than pleopod 2; protopod about 0.7 length of exopod, with 8 retinacula. Exopod about 0.6× as wide as long, lateral margin concave, with about 11 elongate plumose setae along distal margin. Pleopod 2, protopod

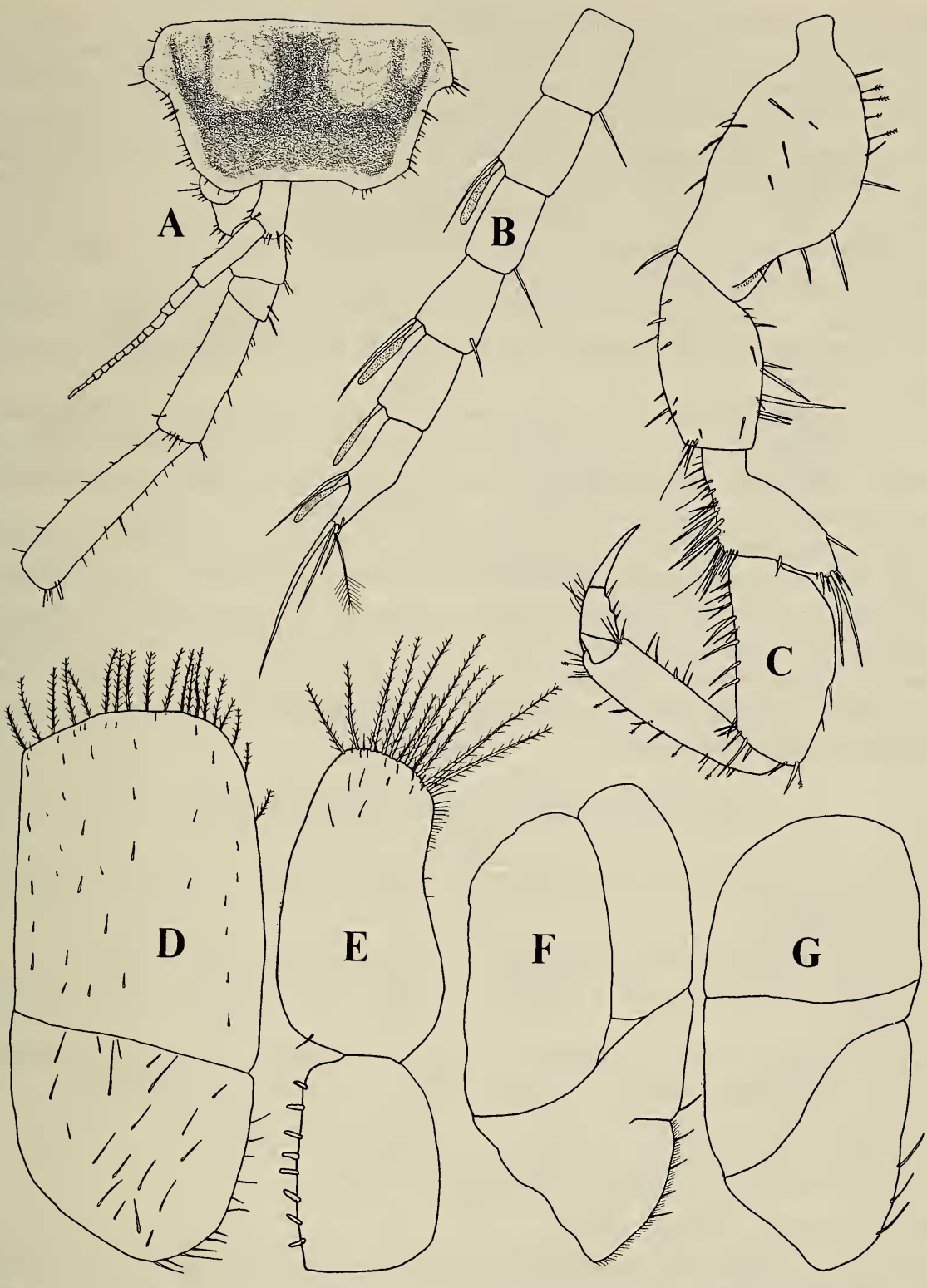

Fig. 2. *Caecidotea teresae*, male paratype: A, Head and antennae, dorsal; B, Antenna 1, distal segments; C, Pereopod 4; D, Pleopod 3; E, Pleopod 1; F, Pleopod 4; G, Pleopod 5.

with about 10 setae along medial margin. Exopod, proximal segment with up to 8 lateral setae, distal segment with about 23 elongate, plumose setae. Endopod with distinct basal apophysis; tip of endopod terminating in 3 processes: (1) cannula trapezoidal, low, wide, apically blunt, partly obscured by other processes; (2) mesial process slightly longer than cannula, slightly recurved, forming lateral

wall of endopodial groove; and (3) caudal process low, broadly rounded, heavily sclerotized. Female pleopod 2 pyriform, with about 13 elongate plumose setae along lateral margin, 2–3 setae on proximal-mesial margin. Pleopod 3 exopod, proximal segment about 0.7 length of distal segment, with about 12–13 setae on lateral margin; distal segment with about 19–20 elongate plumose setae on distal margin. Pleopod 4, about 5 setae on proximal lateral margin, 2 false sutures present. Pleopod 5, 3 setae on proximal lateral margin.

Uropods showing pronounced sexual dimorphism; male uropod about 1.5× length of pleotelson; female uropod about 0.7× length of pleotelson.

Etymology.—This species is named for Teresa M. Lewis, in recognition of her collection of not only this species, but many other subterranean asellids from the eastern U.S.

Relationships.—*Caecidotea teresae* has its closest morphological affinities with *C. tridentata, C. salemensis,* and an undescribed species from Illinois (Lewis and Bowman 1981). The relationship of *Caecidotea teresae* to these species was discussed in detail previously (Lewis 1981) and will not be repeated here.

Habitat and distribution.—*Caecidotea teresae* is known only from drain tiles on the New Albany campus of Indiana University Southeast. A small stream flows from a drain tile near the Natural Sciences Building, which at times is inhabited by a dense population of *C. teresae.* In addition to the phreatobitic isopods, an undescribed amphipod of the genus *Stygobromus* has also been taken from a drain tile near the campus service center. Both of these drain tile streams disappear during dry weather.

Caecidotea macropropoda Chase and Blair
Fig. 3

Caecidotea macropropoda Chase and Blair, 1937:220–224.—Nicholas, 1960:131. Kenk, 1973:13.
Caecidotea ozarkana Chase and Blair, 1937:220–224. Nicholas, 1960:131.
Caecidotea macropropodus.—Mackin, 1940:17–18.—Mackin and Hubricht, 1940:395.
Asellus macropropodus.—Hubricht, 1950:17.—Dearolf, 1953:227.—Bresson, 1955:51.—Mackin, 1959:875.—Black, 1971:6.—Fleming, 1973:294, 298.
Asellus ozarkanus.—Bresson, 1955:51.—Fleming, 1973:294, 298.
Conasellus macropropodus.—Henry and Magniez, 1970:356.
Conasellus ozarkanus.—Henry and Magniez, 1970:356.
Asellus ozarkana.—Black, 1971:7.

Material examined.—OKLAHOMA: Adair Co., stream in cave, 5 mi S. Kansas, A. P. Blair, 27 Dec 1935, 8 ♂ (USNM 8625); cave (same as previous collection?), A. P. Blair, 27 Dec 1935, 3 ♂; Spring, 5 mi S. Kansas, A. P. Blair, 12 Jul 1936, 1 ♂, 3 ♀ (USNM 108660); Cave, 5 mi. S. Kansas, coll. unknown, 15 Sep 1960, 3 ♂, 3 ♀; Bat Cave, 5 mi. S. Kansas, J. Lewis, T. Lewis, 1 June 1981, 17 ♂, 9 ♀; Cave behind old greenhouse, J. Lewis, T. Lewis, 1 June 1981, 2 ♂, 5 ♀; Cave behind Hardwicks house, 1 June 1981, 1 ♂.

Description of male.—Eyeless, unpigmented, length to about 15.0 mm. Body slender, linear, about 6× as long as wide; coxae visible in dorsal view. Head about 1.8× as long as wide, anterior margin concave, rostrum absent. Telson about 1.4× as long as wide, sides subparallel.

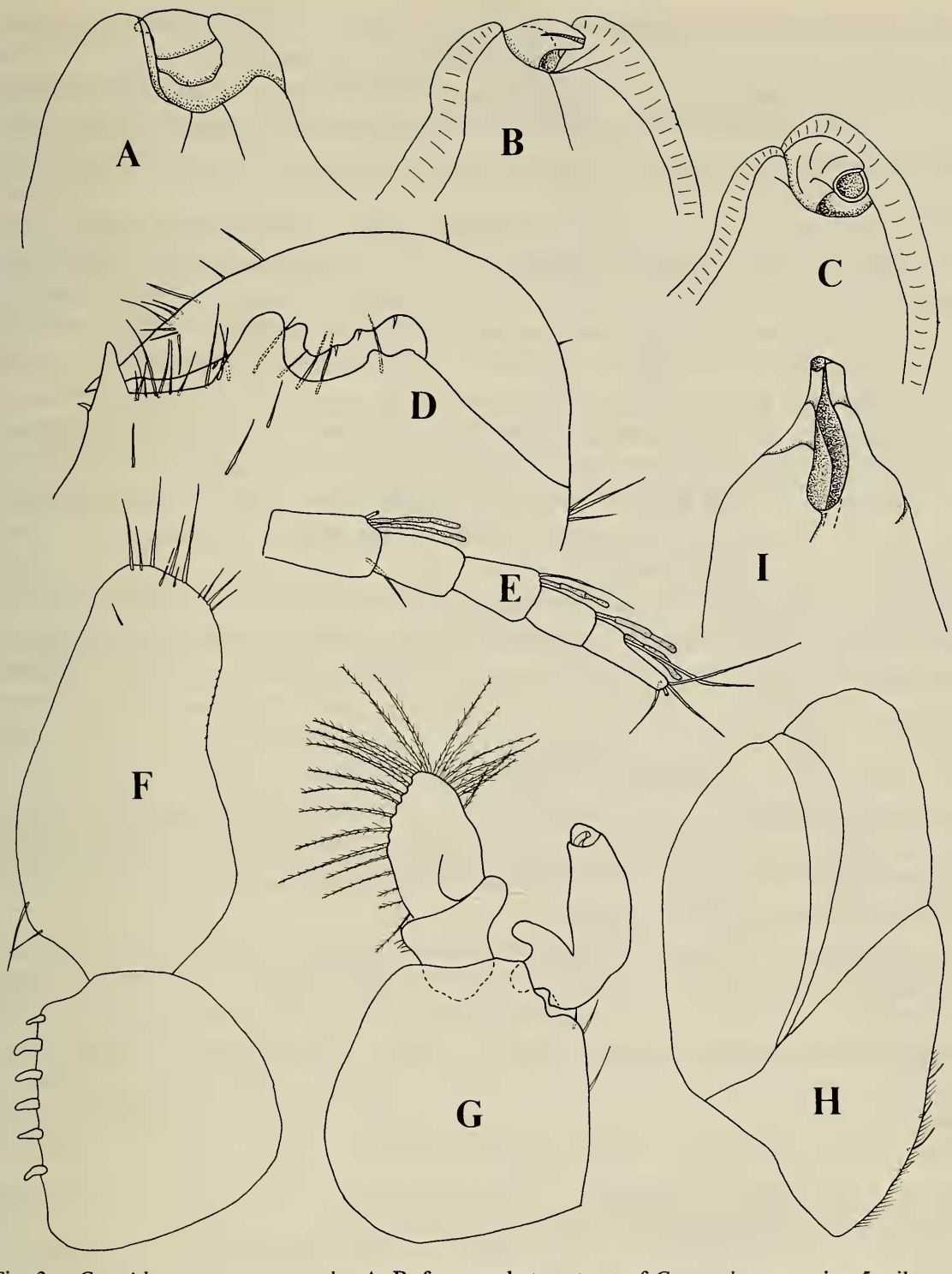

Fig. 3. *Caecidotea macropropoda,* A–B, from male topotype of *C. ozarkana,* spring 5 miles south Kansas; C–H from male topotypes of *C. macropropoda,* Bat Cave, 5 miles south Kansas: A, Pleopod 2 endopod tip, anterior; B, Same, posterior; C, Same, posterior; D, Pereopod 1, palmar margin of propodus; E, Antenna 1, distal segments, with abnormal esthete placement on 5th segment; F, Pleopod 1; G, Pleopod 2; H, Pleopod 4. *Caecidotea stiladactyla,* male, from small seep 9 miles southwest of Harrison, Boone Co., Arkansas (USNM 108666): I, Pleopod 2, endopod tip, anterior, recumbent position.

Antenna 1 of about 13 segments, esthete formula 3-0-1. Antenna 2, last segment of peduncle about 1.5× length preceding segment, flagellum to about 105 segments.

Mandibles with 4-cuspate incisors and lacinia mobilis; distal segments of palp

with plumose spine rows. Maxilla 1, outer lobe with 13 robust spines, inner lobe with 5 robust, plumose setae. Maxilliped with 4–5 retinacula.

Pereopod 1 propus about 1.5× as long as wide, with 3 processes: stout proximal spine, or spine-like process; median process large, blade shaped; distal process shorter, bicuspid, becoming lower and broader in larger individuals. Dactyl flexor margin with massive, lobed process.

Pleopod 1 longer than pleopod 2, protopod with 6–7 retinacula; exopod about 1.8× as long as wide, widened proximally with 1–2 proximomedial setae, lateral margin concave, bearing tiny spines, distal margin with about 10 non-plumose setae. Pleopod 2, exopod proximal segment with 4–5 small, lateral setae; distal segment with about 22 elongate, plumose marginal setae. Endopod with large, slightly decurved basal apophysis, tip with 3 processes: cannula decurved, tubular, flanked by broadly rounded, heavily sclerotized caudal process, and similar, but more slender, subterminal lateral process. Pleopod 3 with about 8 plumose setae along distal margin. Pleopod 4 with 2 false sutures, proximal lateral setae present. Pleopod 5 with poorly defined transverse suture. Uropods spatulate, over 2× length of pleotelson.

Remarks.—The report of 2 troglobitic asellids, *Caecidotea ozarkana* and *C. macropropoda,* from adjacent localities 5 miles south of Kansas, Oklahoma by Chase and Blair (1937) presented an unusual zoogeographic situation. Although not unprecedented, the syntopy (or near syntopy, as is the case here) of 2 troglobitic *Caecidotea* has been reported in only a few instances (Culver 1976; Lewis and Lewis 1981). Examination of specimens collected by A. P. Blair from the type localities of the 2 species confirmed the suspicion that *C. ozarkana* and *C. macropropoda* are conspecific. As *C. ozarkana* was apparently described from immature specimens taken from an unspecified spring, *C. macropropoda* is proposed here as the senior synonym.

Relationships.—The general morphological affinities of *Caecidotea macropropoda* appear to lie with the members of the Hobbsi Group. The strongly armed gnathopod and the shape and setation of the first pleopod are typical of other members of the group, but the structure of the second pleopod endopod tip is somewhat unusual. The cannula is recurved and appears to twist somewhat on its axis, in contrast to the usual low, conical cannula found in the Hobbsi Group. However, the basic shape of the cannula is conical and is obscured by other tip processes, as would be expected. The placement of *Caecidotea macropropoda* in the Hobbsi Group should be considered tentative.

Caecidotea macropropoda is most similar morphologically to *C. stiladactyla,* which occurs in caves and springs in the part of Arkansas adjacent to the localities of *C. macropropoda.* In both species the cannula appears movable, but in *Caecidotea stiladactyla* the cannula apparently extends and retracts from the body of the endopod. For comparison with *C. macropropoda,* the endopod tip of *C. stiladactyla* is illustrated in the retracted position (Fig. 3). *Caecidotea macropropoda* and *C. stiladactyla* may be easily separated by the morphology of the fourth pleopod. In *C. macropropoda,* 2 false sutures are present, while in *C. stiladactyla* only a single, sigmoid suture is present.

Distribution and habitat.—Dearolf (1953) reported *Asellus macropropodus* from 3 additional Oklahoma caves, besides the type-localities of *C. ozarkana* and *C. macropropoda,* plus a cave and an adjacent pool in Arkansas. These localities

remain unconfirmed. Besides the cave region of northeastern Oklahoma, which consists of an extension of the Springfield Plain section of the Ozark Plateau into the corner of the state, collections from the adjacent parts of Arkansas, Missouri, and Kansas have also been examined in search of new localities for *C. macropropoda*. However, *Caecidotea macropropoda* still remains known only from the type-locality and the immediate vicinity.

The type-locality of *Caecidotea macropropoda,* Bat Cave, is now also known as Christian School Study Cave. This cave was visited in June 1981 and found to be inhabited by a large population of isopods in a guano bog a short distance inside the lower entrance. The cave is also inhabited by a colony of Gray Bats, *Myotis griscesens,* which contribute the guano enrichment to the stream. The type-locality of *C. ozarkana* was not specified by Chase and Blair (1937), but several small springs and spring caves exist in the same valley as Bat Cave. *Caecidotea macropropoda* was also found at 2 of these small caves, along with numerous planarians, *Dendrocoelopsis americana* (Kenk 1973). Presumably, one of these small springs was the type-locality of *C. ozarkana.*

Black (1971) presented some water quality data for Bat Cave. In comparison with other Oklahoma caves surveyed, Bat (Christian School Study) Cave had particularly high total dissolved solid (209 ppm), nitrate (17.0 ppm) and orthophosphate (4.2 ppm) levels, probably reflecting the guano enrichment of the stream.

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