

Caecidotea simulator, a new subterranean isopod from the Ozark
Springfield Plain (Crustacea: Isopoda: Asellidae)

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Abstract.—With the description of *Caecidotea simulator*, a phreatobitic isopod reported herein from Arkansas and Kansas, a total of six species of subterranean asellids is now known from the Springfield Plain section of the Ozark Plateau. The presence of *C. macropropoda* in Arkansas, a subterranean species previously known with certainty only from Oklahoma, is confirmed by two collections examined from northeastern Arkansas.

The Springfield Plain is a region of gently rolling karst landscape formed on flat-bedded limestones in the southwestern part of the Ozark Plateau. This area of the central United States includes parts of southwestern Missouri, northwestern Arkansas, northeastern Oklahoma, and a tiny piece of southeastern Kansas. Previously reported from the Springfield Plain were the subterranean asellids *Caecidotea ancyla* (Fleming, 1972), *C. antricola* Creaser (1931), *C. macropropoda* Chase & Blair (1937), *C. stiladactyla* Mackin & Hubricht (1940), and *C. steevesi* (Fleming 1972). The type specimens of *C. steevesi* were examined and three species were found to be present: (1) *C. steevesi* from Carrico Cave, Dade County, Missouri (type-locality), and Gitten Down Mountain Cave, Adair County, Oklahoma; (2) *C. antricola*, also in the Carrico Cave collection; and (3) the new species described below from Baxter Springs, Cherokee County, Kansas.

Caecidotea simulator, new species

Figs. 1, 2a, c-f, 3a, b

Asellus steevesi Fleming 1972: 491-494
[Baxter Springs, Kansas record]; 1973:
295, 300 [in part].

Material examined.—Kansas: Cherokee County, Baxter Springs, seeps off 7th Avenue, 12 Jun 1964, J. R. Holsinger, 10♂♂,

13♀♀.—Arkansas: Washington County, O. A. Lasterling's well, 0.25 mile west Highway 71, Fayetteville, 22 Jul 1965, E. H. Schmitz, 15♂♂, 11♀♀.

An 11.0mm ♂ from Baxter Springs, Kansas is designated as the holotype (USNM 216971), with paratypes from Baxter Springs (USNM 222477) and Lasterling's well (USNM 216972). All of the material has been deposited in the collection of the National Museum of Natural History, Smithsonian Institution.

Description.—Eyeless, unpigmented, longest male to 19mm, female to 13mm. Body slender, linear, about 6.5× as long as wide. Margins of head, pereonites, and pleotelson moderately setose. Head about 1.5× as wide as long, anterior margin concave, postmandibular lobes moderately produced. Pleotelson about 2× as long as wide, sides subparallel, caudomedial lobe slightly produced.

Mandibles with 4-cusped incisors and lacinia mobilis, palp with rows of plumose setae on distal segments. Maxilla 1 with 5 robust plumose setae on inner lobe, 13 spines on outer lobe. Antenna 1 flagellum to 18 segments, esthete formula 3-0-1-0-1. Antenna 2, last segment of peduncle about 1.2× length of preceding segment, flagellum of 19mm ♂ with 168 segments.

Male pereopod 1, propus 1.5× as long as

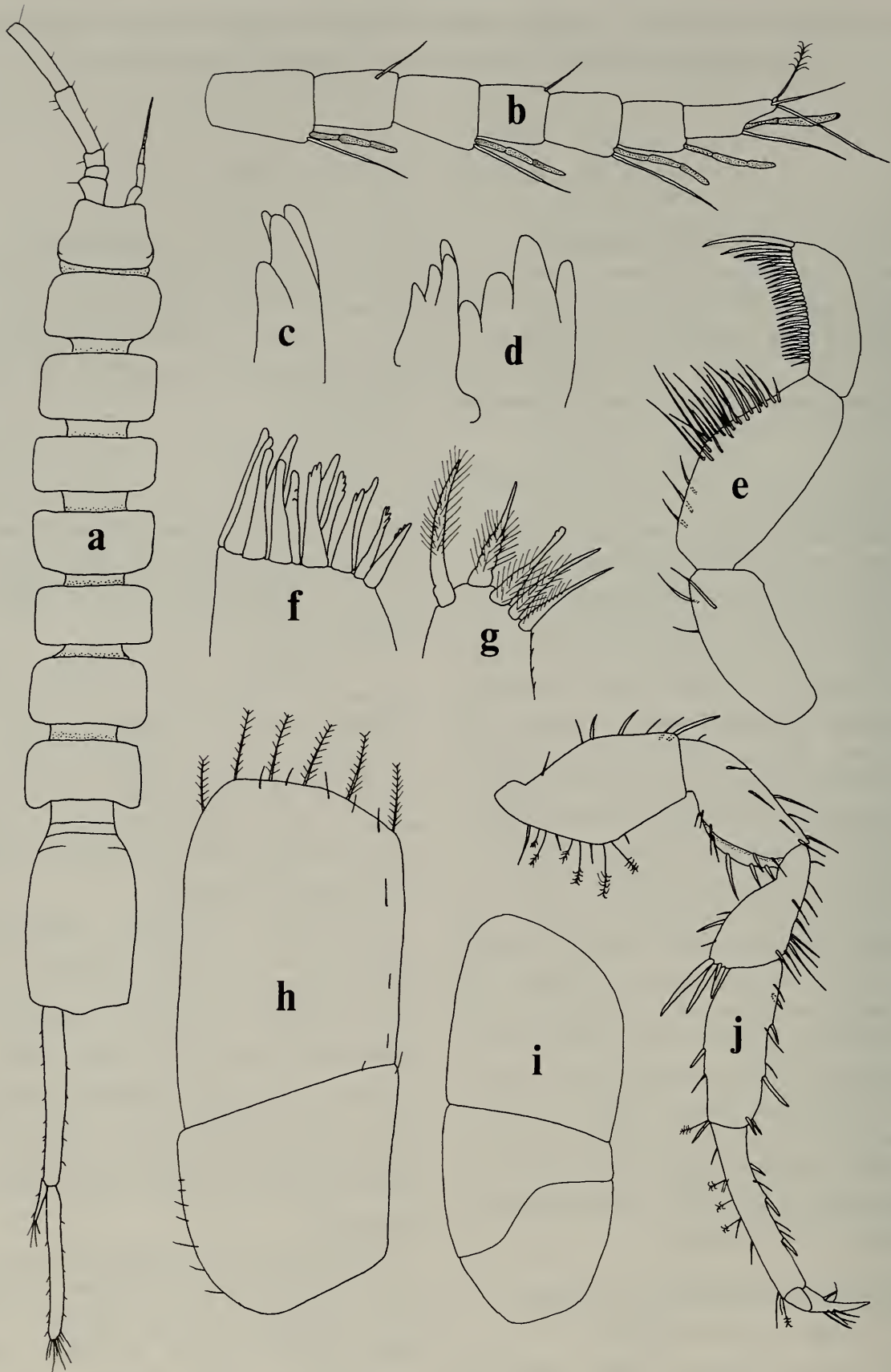


Fig. 1. *Caecidotea simulator*, male from Baxter Springs, Cherokee Co., Kansas: (a) habitus, (b) distal segments of antenna 1 flagellum, (c) right mandible, incisor, (d) left mandible, incisor and lacinia mobilis, (e) mandibular palp, (f) maxilla 1, outer lobe, (g) same, inner lobe, (h) pleopod 3, (i) pleopod 5, (j) pereopod 4.

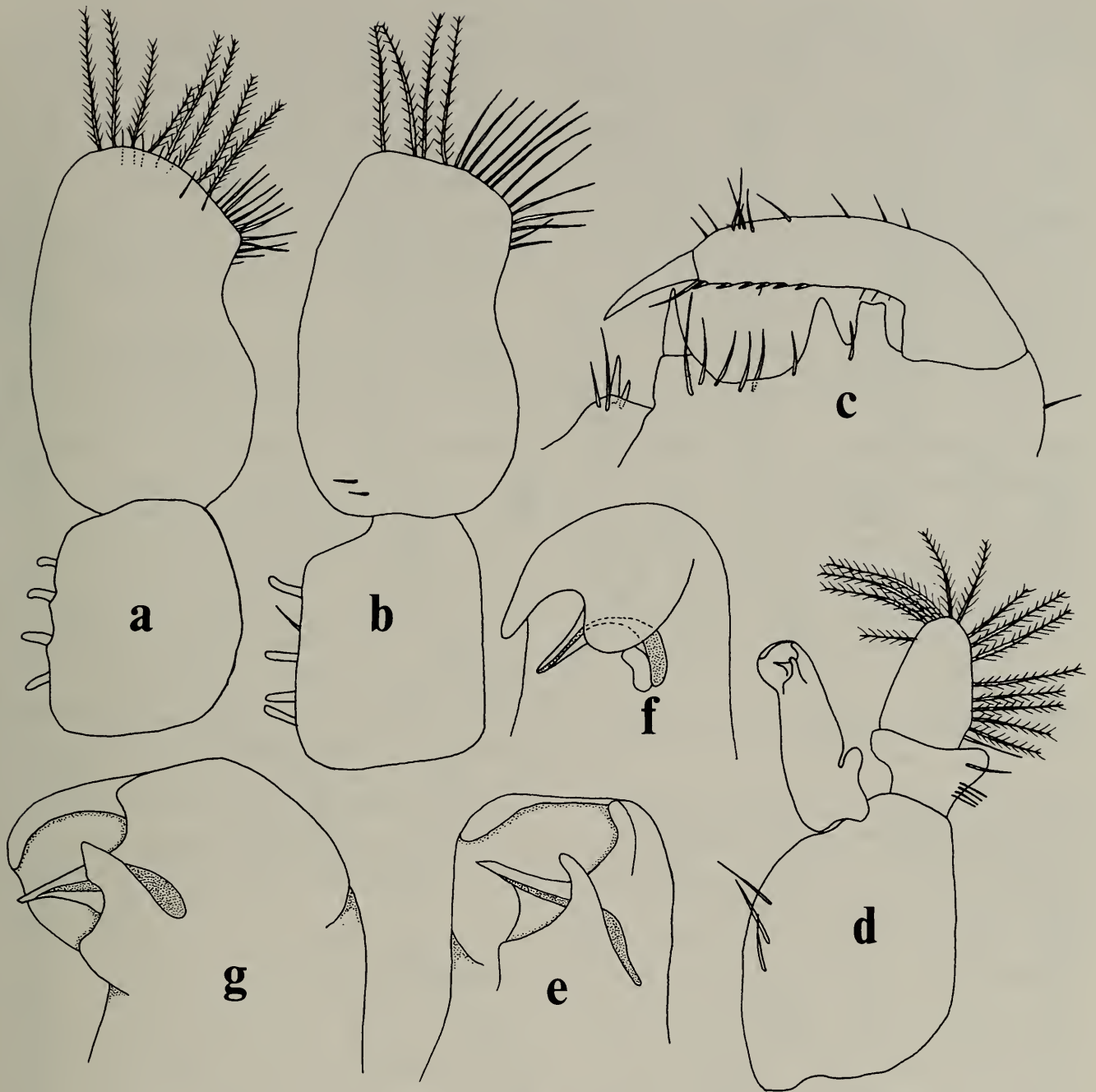


Fig. 2. *Caecidotea simulator*, (a, c–f) male from Baxter Springs, Cherokee Co., Kansas, and *Caecidotea steevesi*, (b, g) male from Carrico Cave, Dade Co., Missouri: (a) pleopod 1, (b) same, (c) gnathopod propus, palmar margin, (d) pleopod 2, (e) same, endopod tip, (f) same, caudal processes folded over anterior processes under coverslip, (g) pleopod 2, endopod tip.

wide, palm with raised proximal spine, median triangular process and slightly bicuspid distal process close together, sexual dimorphism absent. Pereopods 2–7 with moderate setation as figured, sexual dimorphism for clasping slight with male pereopod 4 carpus $2.6\times$ as long as wide female $2.9\times$.

Male pleopod 1, protopod about $0.6\times$ length of exopod, with 4 retinacula. Exopod about $1.6\times$ as long as wide; lateral margin

concave, distal margin with 6–8 long plumose setae. Pleopod 2, protopod with 3 mesial setae. Exopod, proximal segment with about 5 lateral setae, distal segment with about 15 long plumose setae along margin. Endopod with distinct basal apophysis, endopod tip twisted in appearance, processes directed away from axis of endopod, canula tapering to a stylet, mesial process tapering and becoming digitiform, decurved

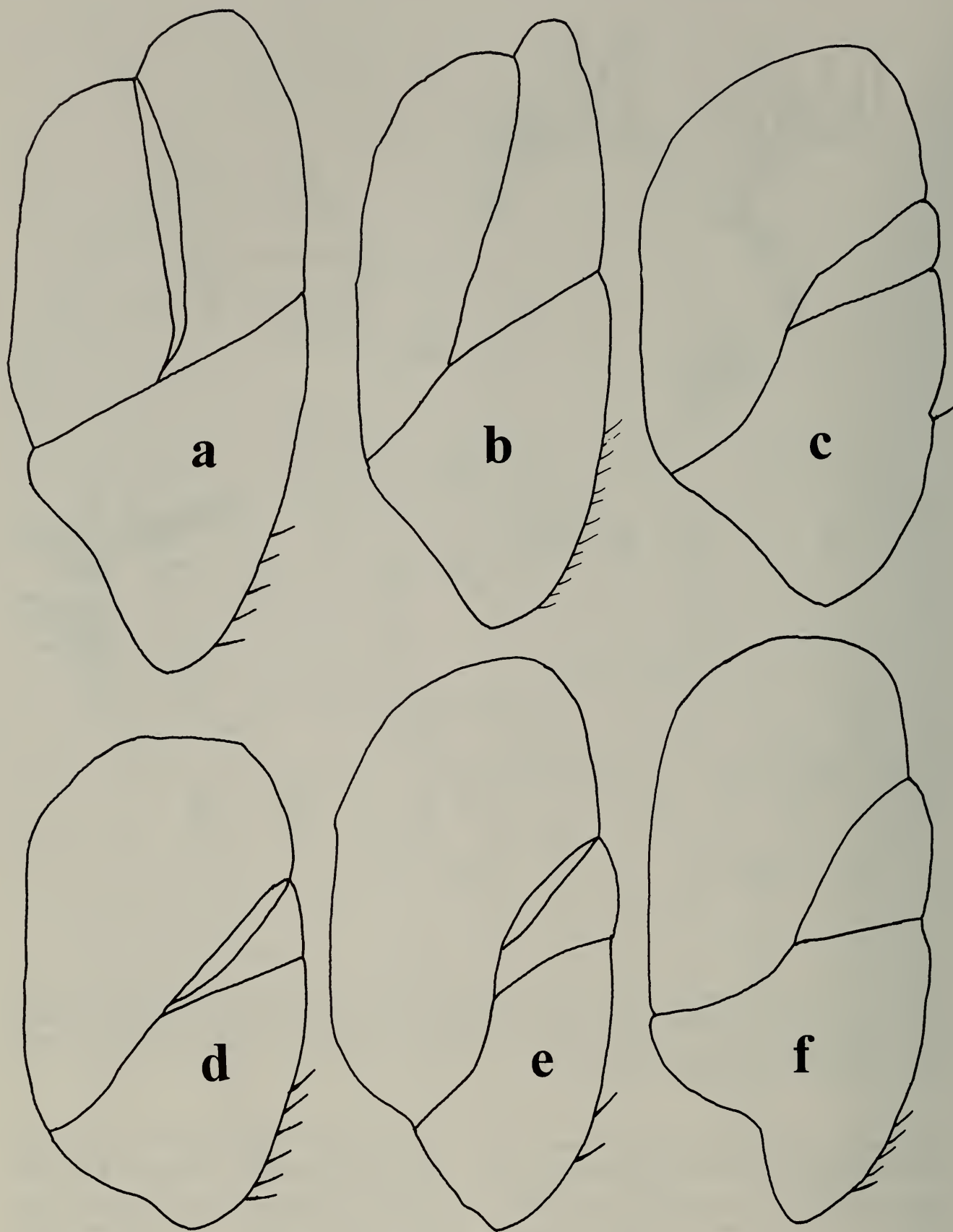


Fig. 3. Fourth pleopod exopods of related subterranean *Caecidotea* from the Springfield Plain: (a) *C. simulator*, Baxter Springs, Cherokee Co., Kansas, (b) *C. simulator*, Lasterling's well, Washington Co., Arkansas, (c) *Caecidotea stiladactyla*, small seeps 4.0 m. S. Boxley, Newton Co., Arkansas, (d) *C. steevesi*, Gittin Down Mountain Cave, Adair Co., Oklahoma, (e) *C. steevesi*, Carrico Cave, Dade Co., Missouri, (f) *C. steevesi*, War Eagle Cave, Madison Co., Arkansas.

mesiad, caudal process heavily sclerotized, thickened laterally and mesially. Pleopod 3 exopod, proximal segment about $9.7\times$ length of distal segment, with about 6 plumose setae on distal margin. Pleopod 4 with up to 18 proximolateral setae, two false sutures present. Pleopod 5 with 2 sutures. Uropods of male about $2\times$ length of pleotelson, equal to length of pleotelson in female.

Etymology.—The noun “simulator”, from the Latin meaning imitator or pretender, indicates the close resemblance of *C. simulator* to *C. steevesi*. The vernacular name suggested for this species is the Springfield Plain groundwater isopod.

Habitat and range.—*Caecidotea simulator* is known from the type-locality in southeastern Kansas and one locality in the adjacent corner of northwestern Arkansas. From its vermiform, eyeless, unpigmented appearance *C. simulator* is clearly an inhabitant of subterranean waters. *Caecidotea simulator* has not been found in caves and presumably lives in the saturated soil interstices that supply groundwater to the two sites from which it has been taken, a well and a seep spring.

Relationships.—*Caecidotea simulator* and *C. steevesi* are very similar morphologically. The gnathopods of both species are nearly identical. The apex of the first pleopod exopod has elongate plumose setae in both species, a characteristic also shared with all species of the Hobbsi Group (Lewis, 1982). In *C. simulator* these setae occur all the way across the distal margin of the pleopod and are about 7–8 in number. In *C. steevesi* the setae are located only on the mesial half of the distal margin and number 4–5 (Fig. 2b).

Due to torsion of the second pleopod endopod the taxonomically important tip processes are difficult to interpret and compare in *C. simulator* and *C. steevesi*, a characteristic shared with *C. macropropoda* and *C. stiladactyla*. The critical features are not easily seen without applying a coverslip, and the positions of the tip processes are

quite distorted under the pressure of the glass (as the endopod twists). The endopod tips illustrated in Fig. 2 are the result of numerous attempts to gain the same perspective for both *C. simulator* and *C. steevesi*. The endopods appear to be fundamentally similar, although side by side comparison (Fig. 2e–g) illustrates minor differences of questionable importance. For example, the mesial process in *C. simulator* tapers to a narrow, cylindrical digitiform process, while in *C. steevesi* it is wider and obliquely truncate.

The best way to separate *C. simulator* from *C. steevesi* is by the structure of the fourth pleopod exopod (Fig. 3a–b, d–f), which has two false sutures in *C. simulator* (and *C. macropropoda*, Lewis, 1982, Fig. 3h), but only a single sigmoid suture in *C. steevesi* (and *C. stiladactyla*, Fig. 3c).

Caecidotea macropropoda Chase & Blair,
1937

Material examined.—Arkansas: Carroll County, White River at Beaver Down, G. C. Kephart, Jul 1978, 4♂♂, 5♀♀.—Washington County, spring 2.2 miles north Dutch Mills, L. Hubricht, 21 May 1942, 6♂♂, 5♀♀; seep, 1.5 miles north Winslow, L. Hubricht, 22 May 1940, 31♂♂, 7♀♀.

Remarks.—Lewis (1982) synonymized *C. ozarkana* with *C. macropropoda* and re-described the species. Dearolf (1953) reported this species from two sites in Arkansas, but the validity of the records was unknown (Lewis, 1982). The records provided here substantiate those of Dearolf for the occurrence of *C. macropropoda* in Arkansas. The species is endemic to the Springfield Plain, where it is found in cave streams, springs, and seeps.

Acknowledgments

The late Dr. Thomas E. Bowman provided the loan of type-specimens of *Caecidotea steevesi* from the collections of the Smithsonian Institution, read the manu-

script, and offered suggestions for its improvement.

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