

THE SUBTERRANEAN ASELLIDS OF MARYLAND: DESCRIPTION OF *CAECIDOTEA NORDENI*, NEW SPECIES, AND NEW RECORDS OF *C. HOLSINGERI* AND *C. FRANZI* (CRUSTACEA: MALACOSTRACA: ISOPODA)

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Abstract: Five species of subterranean asellid are known from Maryland: *Caecidotea pricei*, *C. franzi*, *C. holsingeri*, *C. mausi* and *C. vandeli*. *Caecidotea nordeni*, n. sp. is a subterranean species described from Washington Co., Maryland and assigned to the *hobbsi* Group. A new locality for *C. franzi* in Kentucky is presented. This species was previously known from two caves in Maryland and Pennsylvania. The newly discovered population represents a range extension of over 400 km. The male pleopod 2 morphology of specimens from a Maryland population of the subterranean asellid *C. holsingeri* is compared with populations from three caves in West Virginia. The range of *C. holsingeri* extends from eastern West Virginia and adjacent Virginia to Garrett Co., Maryland.

INTRODUCTION

This paper is part of a long term project to better understand the systematics of subterranean isopods of the family Asellidae that occur in Maryland. This work started as a collaboration between Dan Feller of the Maryland Department of Natural Resources and Thomas E. Bowman of the Smithsonian Institution. Sadly, Dr. Bowman died before any of their work could come to fruition. I took possession of his materials, and after a long hiatus, the project has started to become productive finally.

My first contribution to the Maryland asellid project was the description of *Caecidotea mausi* Lewis (2009). Four other obligate subterranean species have been recorded from Maryland: *C. pricei* (Levy 1949), *C. franzi* (Holsinger and Steeves, 1971), *C. holsingeri* (Steeves, 1963) and *C. vandeli* (Bresson 1955). Much of what is currently known of the habitat and range of these species was summarized by Lewis (2009). The taxon described below adds a sixth species to Maryland's subterranean asellid fauna.

Another facet of the project was clarification of the ranges of other species already known to occur in Maryland. Few subterranean asellid distribution patterns are well understood due to their cryptic nature and ability to disperse through a variety of groundwater habitats. An example of this is *Caecidotea franzi*, previously known from Pennsylvania and Maryland, but now discovered in Kentucky and extending their range more than 400 km. Considerably less isolated were the isopods from John Friends Cave, Garrett Co., Maryland, identified by Fleming (1972) as *C. holsingeri*. There was some suspicion that the Garrett County population represented an undescribed species. To test that theory, Dr. Bowman compared the male pleopod 2 morphology of the Maryland specimens with other *C. holsingeri* populations in West Virginia. That analysis, as well as mapping the collection

sites of *C. holsingeri*, led to elucidation of the range of the species.

FAMILY ASELLIDAE

GENUS *CAECIDOTEA* PACKARD, 1871

CAECIDOTEA NORDENI, NEW SPECIES

FIGS. 1–2, 4

Material Examined: MARYLAND: Washington Co., under rocks in stream, 15.2 km SSE Hancock, 5 Apr 1980, A. Norden, 1♂. The holotype (USNM 337163) is in the collection of the National Museum of Natural History, Smithsonian Institution.

Description of Holotype: Eyeless, unpigmented, 7.8 mm long, body slender, 5× as long as wide. Head 1.5× as wide as long, anterior margin concave, postmandibular lobes slightly produced. Pleotelson slightly longer than wide, sides slightly convex, caudomedial lobe broadly rounded. Mouthparts conforming to diagnosis of genus (Lewis, 2009). Antenna 1 flagellum with 7 articles, distal 3 each bearing a single esthete. Antenna 2 flagellum with 50 articles. Male pereopod 1, propodus about 1.9× as long as wide, palmar margin with large proximal spine, low medial process; dactyl flexor margin with 5 stout spines.

Male pleopod 1 slightly longer than pleopod 2, protopod 1.2× as long as wide, with 2 retinaculae; exopod 1.6× length of protopod, distal margin with 5 elongate plumose setae, lateral margin slightly concave. Pleopod 2, protopod 1.3× as long as wide, elongate plumose seta and short non-plumose seta on mesodistally, 2 short setae distolaterally; exopod, proximal article with 3 short lateral setae (1 plumose), distal article with 8 elongate, plumose

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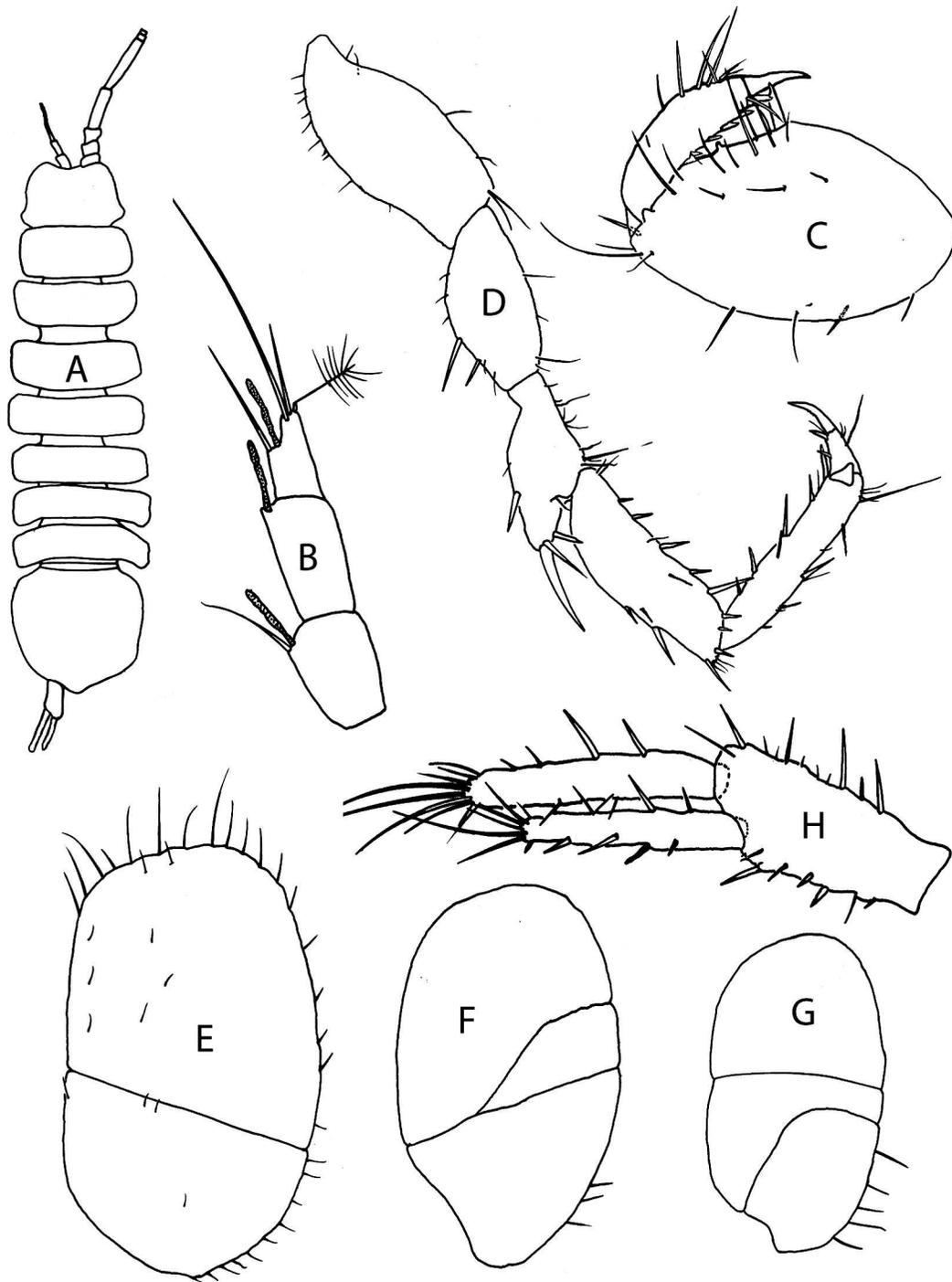


Figure 1. *Caecidotea nordeni*, new species: (A) habitus, (B) tip articles, antenna 1, (C) gnathopod, distal articles (D) pereopod 4, (E) pleopod 3 exopod, (F) pleopod 4 exopod, (G) pleopod 5 exopod, (H) uropod.

setae along margin. Endopod with well developed basal apophysis; tip with short, slightly conical cannula, small scallops laterally, half obscured by broad mesial process in anterior view, caudal process broadly rounded. Pleopod 3 exopod with 18 plumose setae along apical and lateral margin. Pleopod 4 exopod with sigmoid false suture bifurcating mid-length, 3 setae on proximolateral margin. Pleopod 5 with proximal sigmoid false suture, second false

sigmoid suture mid-length, 5 setae on proximolateral margin. Uropods 0.67 length of pleotelson, protopod approximately equal in length to endopod, exopod slightly shorter than endopod.

Relationships

Other than lacking large processes on the palmar margin of the pereopod 1 propodus, *C. nordeni* fits the

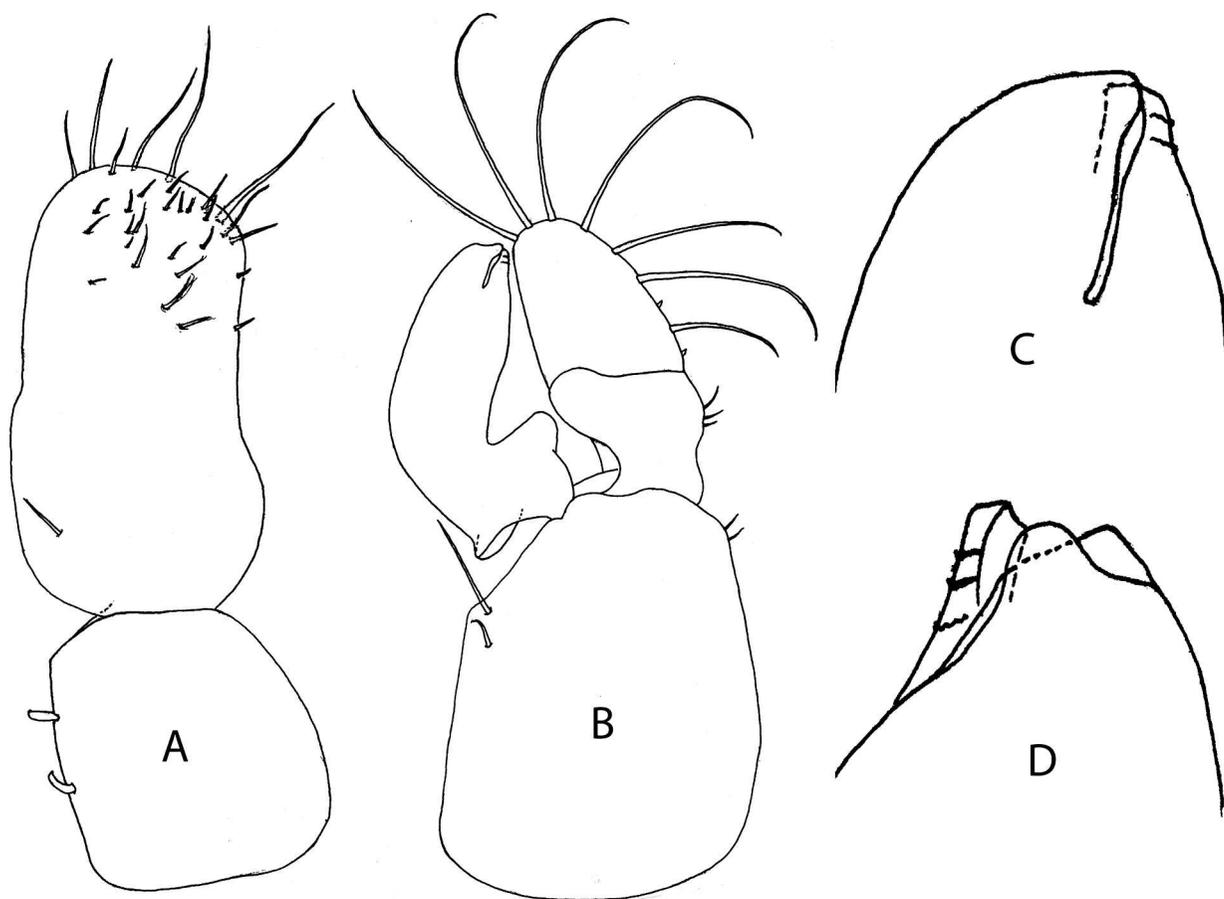


Figure 2. *Caecidotea nordeni*, new species: (A) pleopod 1, (B) pleopod 2, (C) pleopod 2 endopodite tip, anterior, (D) same, posterior.

diagnosis of the *hobbsi* Group (Lewis, 1982). In particular, the male first pleopod exopod with concave lateral margin and elongate plumose setae on the apical margin is quite characteristic of the members of this species group. Likewise, the second pleopod endopodite tip, with a short, blunt cannula partially obstructed from view in the anterior aspect is typical of the *hobbsi* Group. The absence of armature of the pereopod 1 may well be due to the holotype's size, as the processes of the palmar margin usually increase in size with maturity (Bowman and Beckett, 1978). Beyond the placement of *C. nordeni* in the *hobbsi* Group, the species does not bear strong resemblance to any of the other described species.

Etymology

This species is named in honor of the collector, Mr. Arnold Norden. The suggested vernacular name is Norden's groundwater isopod.

Habitat and Range

This subterranean isopod was found in a surface stream, where it presumably had emerged from a groundwater habitat. *Caecidotea nordeni* is known only from the type-locality in Washington Co., Maryland.

Franz and Slifer (1971) reported that over half of the 148 caves known in Maryland were located in that county.

CAECIDOTEA FRANZI (HOLSINGER AND STEEVES, 1971)

Material Examined: KENTUCKY: Harlan Co., Sawmill Hollow Cave, 1 km ENE Pine Mountain, James E. Bickford State Nature Preserve, Ellis Laudermilk, 4 Sep 2001, 1♂, 1♀; 24 Sep 2001, 1♂, 1♀; 1 Oct 2001, 2♂, 1♀.

This species was previously described from Millers Cave, Centre Co., Pennsylvania and Crabtree Cave, Garrett Co., Maryland. These caves are approximately 185 km from one another. The appearance of the male gnathopod, pleopod 2 and uropod of the Sawmill Hollow Cave specimens is essentially identical to that illustrated by Holsinger and Steeves (1971). The only significant difference is that the male first pleopod of the Kentucky specimens is not distolaterally produced to the extent shown in the type material. The distal lobes are present in the Sawmill Hollow Cave males and the difference may be a function of curvature of the exopod rather than anatomical.

That the range of *C. franzi* spans 600 km stretches credence. Certainly other subterranean species (e.g., *C. stygia*, *C. kendeighi* and *C. bicrenata*) are found in areas extending as much as 500 km. However, these species are

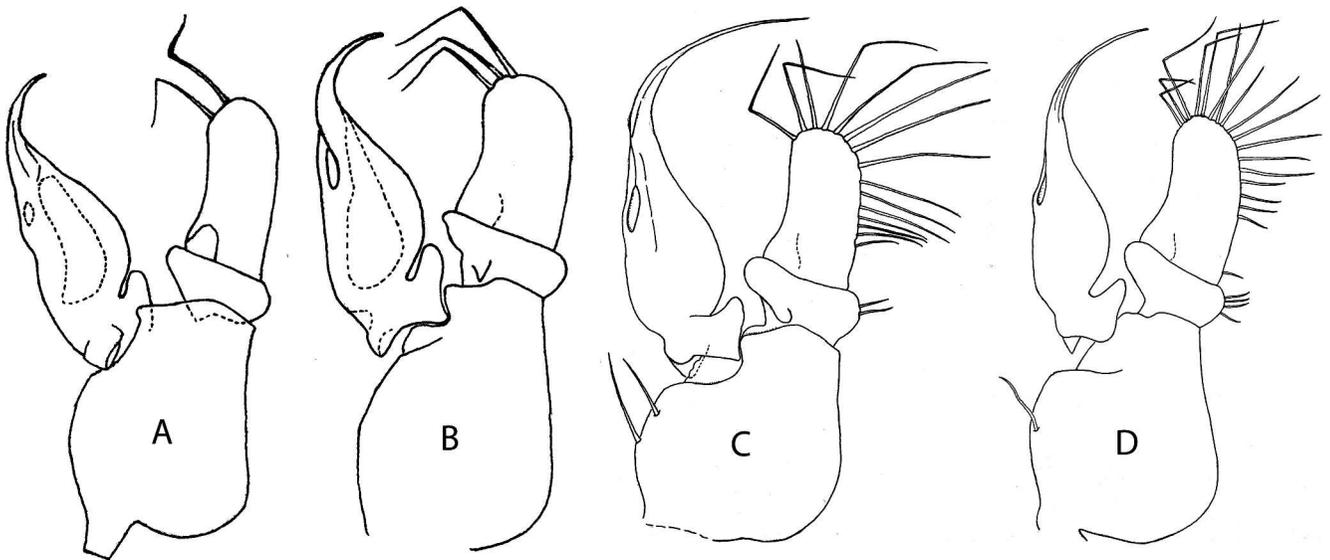


Figure 3. *Caecidotea holsingeri* (Steeves), variation in male pleopod 2: (A) John Friends Cave, Garrett Co., Maryland, (B) Swecker Stream Cave, Pocahontas Co., WV, (C) Piddling Pit Cave, Pocahontas Co., WV, (D) Organ Cave, Greenbrier Co., WV.

recorded from dozens or even hundreds of collection sites across their respective ranges, while *C. franzi* is known from few. The anatomy of specimens examined from the Kentucky population is so similar to the description by Holsinger and Steeves (1971) that despite the distance involved, it is considered intraspecific variation until evidence to the contrary is found.

CAECIDOTEA HOLSINGERI (STEEVES, 1963)

FIGS. 3–4

Material examined: MARYLAND: Garrett Co., John Friends Cave, 29 Aug 1966, John R. Holsinger, 1♂, 3♀ (USNM 230649); WEST VIRGINIA, Greenbrier Co., Organ Cave, 13 Jul 1987, David Culver, Janine Gibert 8♂♀ (USNM 235213); Pocahontas Co., Piddling Pit Cave, David Culver, Dan Fong, 23 Nov 1990, 3♂♀; Swecker Stream Cave, David Culver, 24 Nov 1990, 3♂♀.

The description by Steeves (1963) was adequate for identification of specimens. Steeves (1969) characterized the range as encompassing eastern West Virginia and the western tip of Maryland. Holsinger and Steeves (1971) added the first Virginia locality. Fleming (1972) and Holsinger et. al (1976) listed 27 caves within that range. Lewis (1980) redescribed *C. holsingeri*, adding details of the morphology and discussing variation. Lewis (2009) added records for Giles and Highland counties, Virginia.

In considering the John Friends Cave population, Thomas Bowman prepared comparative drawings of the male pleopod 2 from three other localities. Other than varying numbers of setae, no significant differences are appreciable. The thread-like cannula terminating the endopodite is fragile and breaks readily, explaining the apparent differences in the length of this structure. A characteristic feature of *C. holsingeri* is the prominent basal

apophysis of the male pleopod 2 endopod, which allows the convex lateral edge of the endopod to interlock with the concave exopod (Lewis, 1980, figure 4g).

A plot of the counties in which *C. holsingeri* has been recorded further supports the hypothesis of a single species. This distribution pattern is mirrored by the stygobiont amphipod *Stygobromus emarginatus*. The range map of the

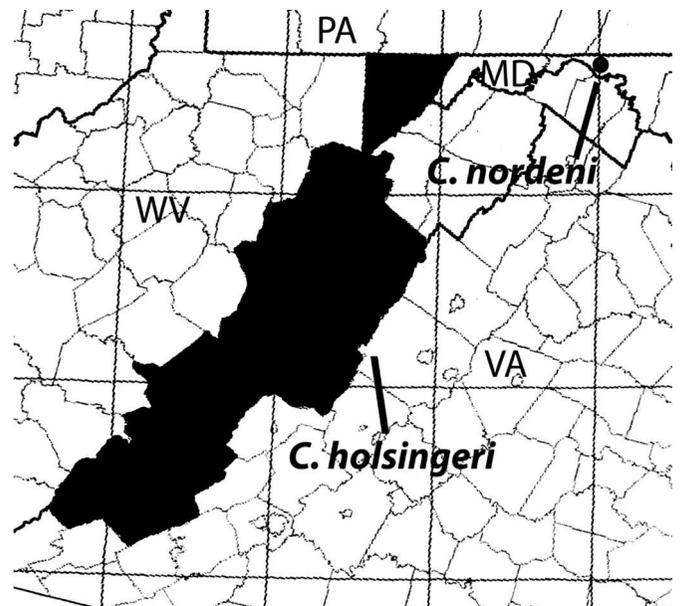


Figure 4. Map of counties of occurrence recorded for *Caecidotea holsingeri* in Virginia, West Virginia and Maryland. The only known locality of *C. nordeni*, n. sp. in Maryland is indicated by a dot.

collection sites for *S. emarginatus* presented by Holsinger (1978) is nearly identical to the one presented here for *C. holsingeri*. Both species are found primarily in caves developed in the Greenbrier Limestone of Mississippian age suggesting that continuous Paleozoic limestones provide a common dispersal corridor for these species.

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