ol. 80, pp. 131–140 28 July 1967

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

ASELLUS KENKI, A NEW ISOPOD CRUSTACEAN FROM SPRINGS IN THE EASTERN UNITED STATES

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The new asellid described herein was brought to my attention by Dr. Roman Kenk, who found it in certain springs in Rock Creek Park, Washington, D. C., where he was collecting planarians. Specimens from other springs in the vicinity of Washington were given to me subsequently by Dr. Kenk and by Dr. John R. Holsinger of East Tennessee State University. Examination of unidentified material in the Division of Crustacea, Smithsonian Institution, yielded additional specimens that had been collected by W. Howard Ball, Andrew Pizzini, the late Clarence R. Shoemaker, and others. I am grateful to all these individuals for their collecting efforts. I take considerable pleasure in naming the new species in honor of my distinguished colleague, Roman Kenk, Research Associate, Division of Worms.

Asellus kenki new species

Figs. 1–44

Description: A moderately small species, largest male 14 mm in length, but most mature males considerably shorter; ovigerous females reaching 7–8 mm. Body slender, length (excluding uropods) about 4 times width; pereonites 3–7 about equal in width, pereonites 1–2 slightly narrower; lateral excavations of pereonites not pronounced. Telson slightly longer than wide, median posterior process well developed. Setae on margins of head, pereonites, and telson well developed. Dorsum sculptured into low broad tubercles bearing scattered small surface setae; parts of cuticle of body and appendages bearing minute pectinate scales. Coxal plates inconspicuous, but usually visible dorsally on most pereonites.

Eye small, slightly longer than broad, composed of few facets.

First antenna reaching little beyond distal end of 4th segment of

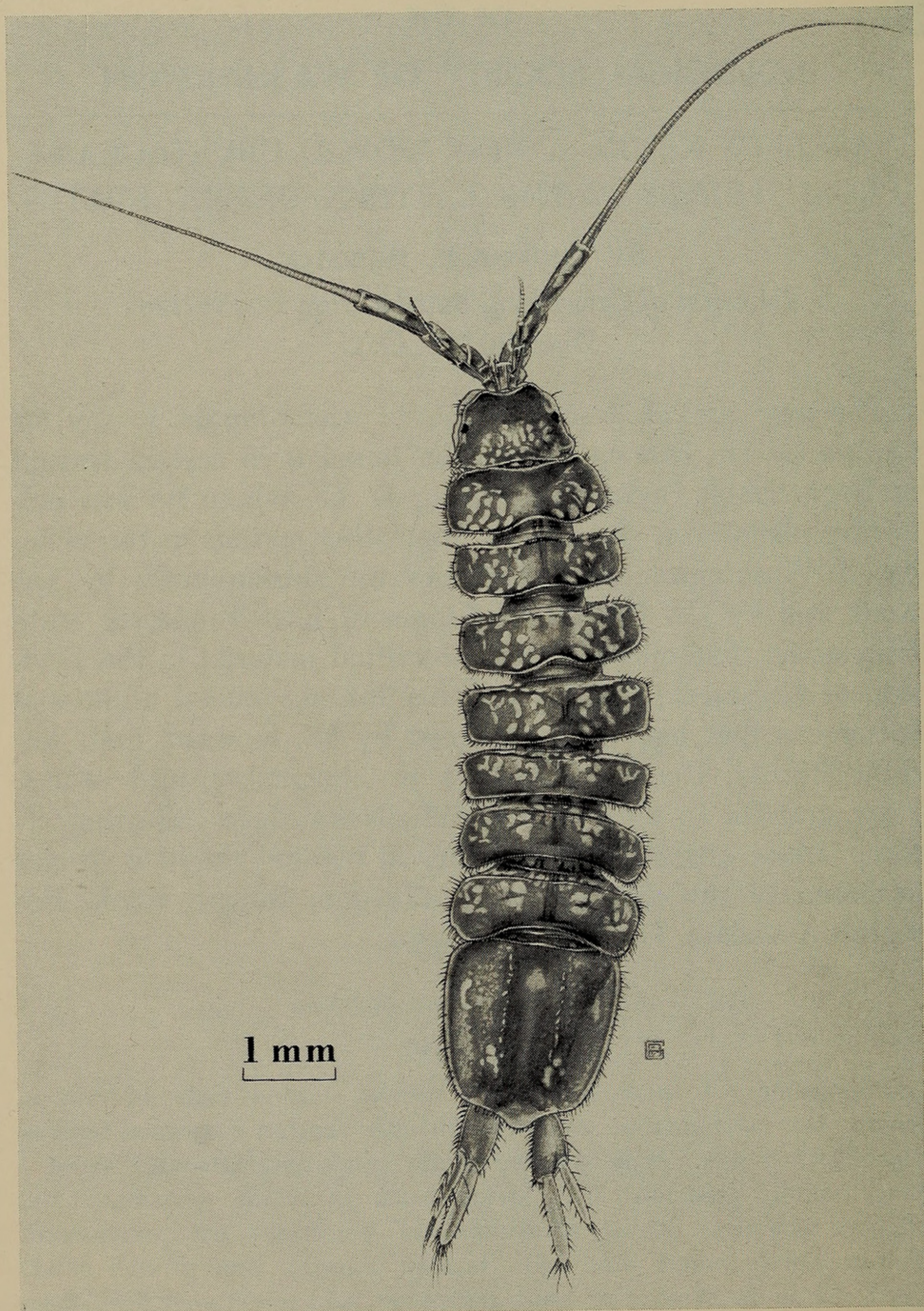
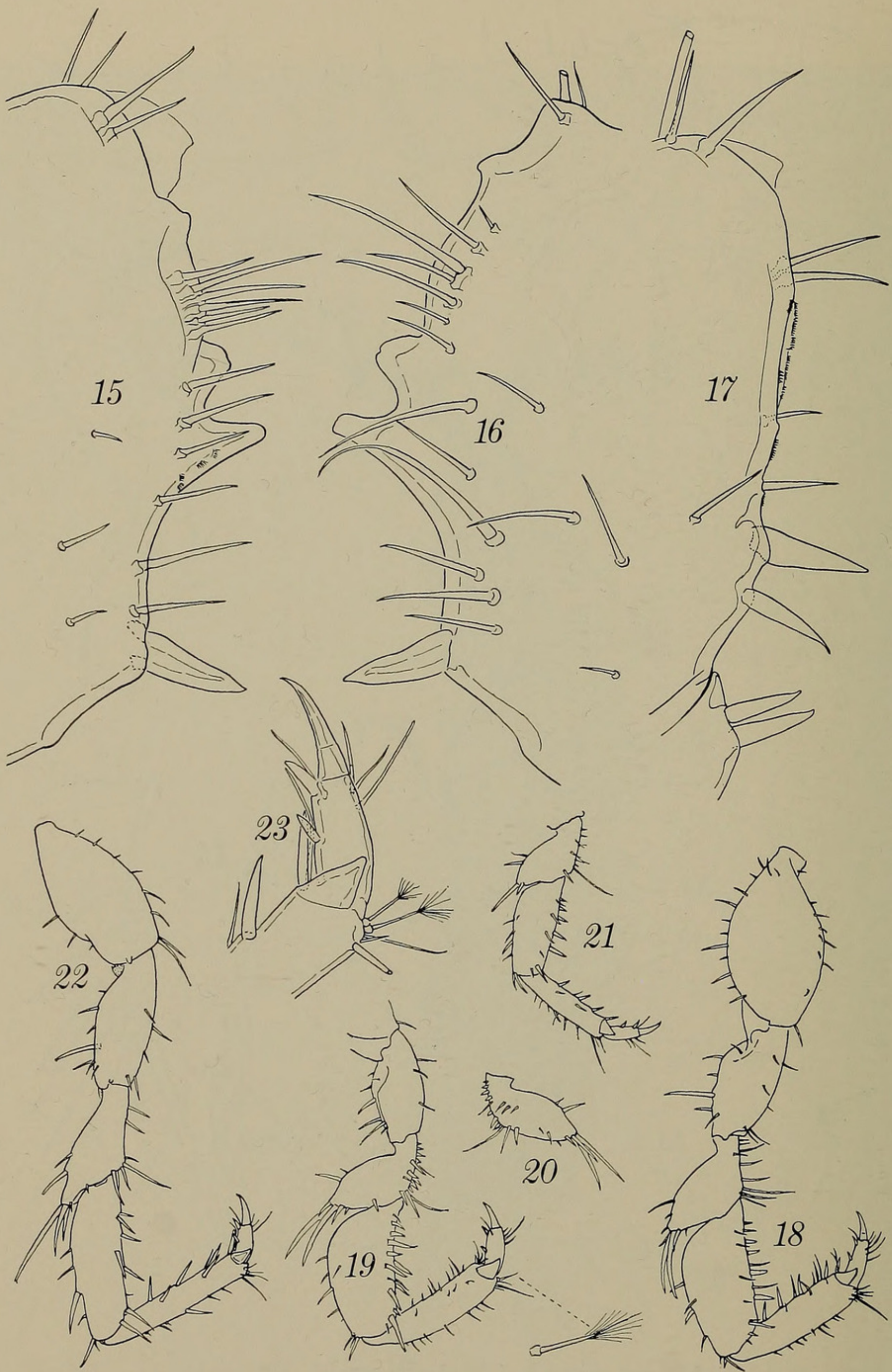
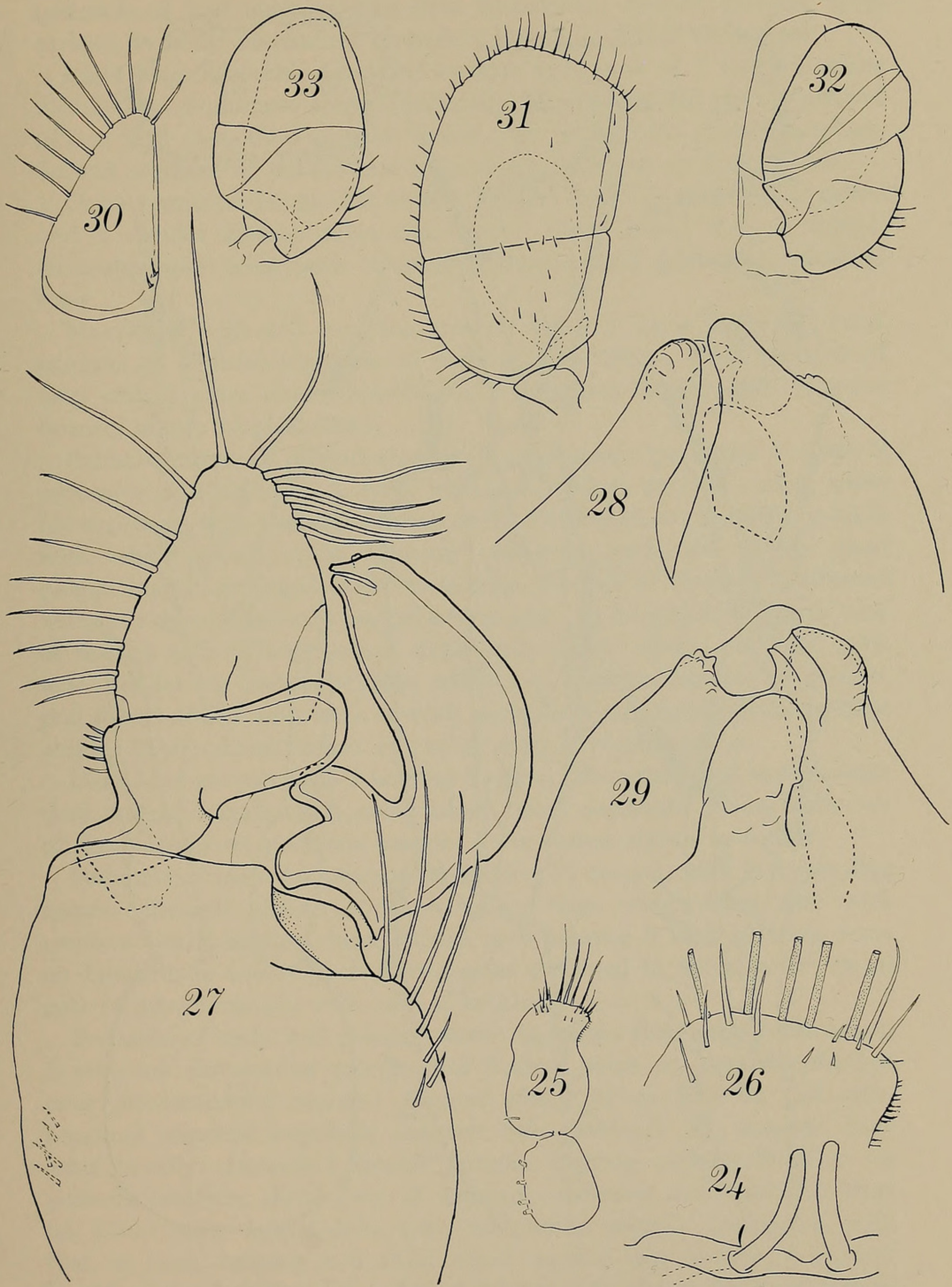


FIG. 1. *Asellus kenki*, holotype (drawn by Carolyn Gast).

FIGS. 2–14. *Asellus kenki.* 2, Left male 1st antenna, dorsal. 3, Peduncle of right male 2nd antenna, dorsal. 4, Incisor of female right mandible. 5, Incisor of female left mandible. 6, Plumose and dentate spines from spine row of female right mandible. 7, Mandibular palp. 8, Labium, female. 9, Male 1st maxilla, apex of outer ramus. 10, Same, apex of inner ramus. 11, Left maxilliped, ovigerous female. 12, Female gnathopod, medial. 13, Male gnathopod, medial. 14, Dactyl of male gnathopod, medial.



Figs. 15–23. *Asellus kenki.* 15, Palm of left gnathopod, 6.7 mm male, medial. 16, Same, lateral. 17, Same, 5.6 mm female, medial. 18, Pereopod 2, male, medial. 19, Pereopod 4, male, lateral. 20, Merus of same, medial. 21, Distal segments of female pereopod 4, lateral. 22, Left pereopod 7, female, medial. 23, Distal end of same.



Figs. 24–33. *Asellus kenki.* 24, Penes. 25, 1st pleopod, male. 26, Apex of same. 27, 2nd pleopod, male, anterior aspect. 28, Apex of endopod of male 2nd pleopod, anterior. 29, Same, posterior. 30, 2nd pleopod, female. 31, 3rd pleopod, male. 32, 4th pleopod, male. 33, 5th pleopod, male.

FIGS. 34–44. *Asellus kenki.* 34–38: Lateral parts of pereonites of ovigerous female, dorsal. 34, Pereonite 1. 35, Pereonite 2. 36, Pereonite 5. 37, Pereonite 6. 38, Pereonite 7. 39–43: Dorsal views of right uropods. 39, 3.5 mm male. 40, 5.0 mm male. 41, 6.5 mm male. 42, 8.2 mm male. 43, 6.5 mm ovigerous female. 44, Telson and uropods of 13 mm male, dorsal.

peduncle of 2nd antenna; flagellum 11-merous. Second antenna ¾–⅘ as long as body (excluding uropods); flagellum about 70-merous.

Right mandible with 4-toothed incisor; spine row of 7 dentate spines distally and 6 plumose spines proximally. Left mandible with 4-toothed incisor and 4-toothed lacinia; spine row of 10–12 plumose spines. Second segment of mandibular palp about 1.5 times as long as 3rd.

Outer ramus of 1st maxilla with 8 dentate and 3 smooth apical spines and 2 slender surface setae near apex. Inner ramus with 3 robust, circumplumose setae with denticulate apices, and 2 slender, plumose setae.

Maxilliped with 4–5 coupling spines. Apex of inner plate and inner margins of 4 distal segments of palp densely setose. First segment of palp with 2 outer setae. Maxilliped of ovigerous female with oostegite bearing about 8 apical setae.

Palmar margin of propodus of male gnathopod (pereopod 1) with 2 processes near middle: a large proximal conical process and a lower blunt process with slightly concave apex. Proximal end of palmar margin with single robust spine, directly obliquely posteriad. Setae along palmar margin arranged as shown in Figs. 15 and 16. Female gnathopod without central processes on palmar margin of propodus; proximal end of margin with 2 large spines, distal spine more robust, proximal spine with slender tip curved slightly proximad. Posterior margin of gnathopod dactyl armed with teeth in both sexes; teeth less conspicuous in large males. Posterodistal corner of carpus with 2 strong spines.

Dactyls of pereopods 2–7 bearing 2 spines. Pereopod 4 of male shorter than that of female, with more robust distal segments; merus with row of short spines on posterior margin, these spines absent in female.

Peduncle of male 1st pleopod ¾ as long as exopod, with 3–4 coupling spines. Exopod about 1.6 times longer than wide, distal part with concave lateral margin, bent laterad, and bearing 5 long plumose setae on broad apex and several shorter setae proximal to apical setae; distal part of lateral margin with row of setules.

Peduncle of male 2nd pleopod about ⅓ longer than wide, with about 5 setae on distomedial margin and 5 short setae on posterior surface near proximolateral margin. Exopod about ¾ as long as peduncle; proximal segment cupulate, inserted into peduncle by truncate base with heavily sclerotized lateral margin, bearing rectangular flap on posterior surface, distal part of segment widening into rounded lobes on either side; lateral lobe with sclerotized margin continuous with that of base, bearing 4–5 short setae; medial lobe produced beyond insertion of distal segment, margin sclerotized. Distal segment of exopod narrowing apically, armed with plumose setae on lateral margin and distal ⅓ of medial margin; proximal ⅓ of medial margin with broad sclerotization. Endopod shorter than exopod, with well-developed medial apophysis in proximal part; distal to apophysis endopod curves strongly laterad and ends in 5 processes: a straight rounded lateral process, a medial process consisting of a lobe overriding medial process and a rugose lobe posterior and proximal to it, a medially curving cannula posterior to lateral process, and a broadly rounded posterior process with a few rugosities.

Female 2nd pleopod subtriangular with about 10 plumose setae on lateral margin and apex. Medial margin straight, with 2 short setae near base. Pleopods 3–5 as in Figs. 31–33; "lines" on exopods of pleopods 4–5 similar to those of *A. communis* (cf. Racovitza 1920, Figs. 71–72).

Uropod of female and immature male with exopod about 1.1 times longer than peduncle; endopod 1.1 times longer than exopod; both rami linear, armed with spines on margins and at apex. Uropod of mature male modified: exopod shorter than peduncle; endopod spatulate, much longer and broader than exopod.

Material examined: Holotype, USNM 119808, adult male, 8.1 mm long, illustrated in Fig. 1, collected by the author in August 1966 from among leaf litter in pool into which water from a pipe above flows from spring. The spring is located about 0.9 km SSW of the Nature Center, Rock Creek Park, Washington, D. C. Numerous other specimens from the type-locality have been designated as paratypes.

In addition to the type-locality, I have identified specimens of *Asellus kenki* from the following localities:

VIRGINIA. FAUQUIER CO.: Under stones in spring on Appalachian Trail S of Paris, 22 June 1952, L. B. Holthuis. FAIRFAX CO.: Stream near Bull Neck Run, 26 February 1935, A. Pizzini. Stream near Scotts Run, 15 March 1936, A. Pizzini. Springs (3) along E side of Scotts Run, 25 May 1965, J. R. Holsinger and A. Pizzini. ARLINGTON CO.: Gencarlyn, from a spring, 7 July 1918, C. R. Shoemaker. DISTRICT OF COLUMBIA. Rock Creek Park, spring about 175 m S of North National Capital Parks Headquarters, August 1966, T. E. Bowman. Small springs, Montrose Park, Georgetown, 9 March 1938, Leslie Hubricht. Wetzel's Spring, Georgetown, 5 March 1933, A. Pizzini. Spring ½ mile E and N of Wetzel's Spring, 17 October 1937, A. Pizzini. Pools adjoining Foundry Branch, Burleith Woods, W of Georgetown, 26 March 1936, W. H. Ball. MARYLAND. MONTGOMERY CO.: Spring at Glen Echo, 28 June 1966, Roman Kenk. Spring, Cabin John, 15 April 1934, A. Pizzini. Spring flowing into Rock Creek near Kensington, 1 October 1933, C. R. Shoemaker. Running stream, "Miss Dean's place," Kensington, 4 May 1934, W. H. Ball. PRINCE GEORGES CO.: Stream flowing into Sligo Branch, Takoma Park, 5 April 1936, W. H. Ball. PENNSYLVANIA. INDIANA CO.: In stream passage, Strangford Cave (between Strangford and Conemaugh River), 1950, R. E. Hoffmaster. FAYETTE CO.: Dulaney's Cave, 700 ft from entrance, 20 January 1951, R. E. Hoffmaster.

Ecology: *Asellus kenki* is an inhabitant of springs and spring-fed streams. Large streams and ponds within its range are not occupied by *A. kenki,* but by more typically epigean species, such as *A. communis*

Say. Hence local populations of *A. kenki* must communicate with one another by subterranean channels. As indicated below, *A. kenki* is in some respects intermediate between the epigean and troglobitic species of *Asellus*, but its pigmentation and well developed, if small, eye, suggest that its preferred habitat is springs. The ability to tolerate the groundwater environment has survival value to the species, enabling it to repopulate springs that become dry seasonally. The rather large populations in springs suggest that the species is indigenous to springs, and that spring populations are not merely stray individuals that have been carried to the surface from the groundwater by the flow of the water.

At the type-locality *A. kenki* was associated with the following: the harpacticoid copepod *Bryocamptus zschokkei alleganensis* Coker; the cyclopoid copepods *Cyclops exilis* Coker and *Paracyclops fimbriatus* (Fischer) (identifications confirmed by Dr. Harry C. Yeatman); the ostracod *Potamocypris* sp. nov. (description being prepared by Dr. Edward Ferguson); the larval trichopteran *Lepidostoma* sp. (identified by Dr. Oliver S. Flint); the planarian *Phagocata morgani* (Stevens and Boring) (identified by Dr. Roman Kenk); and a new genus and species of the gastropod family Hydrobiidae (description being prepared by Dr. J. P. E. Morrison).

Specimens of *A. kenki* from the cold and unpolluted spring water of the type-locality lived for weeks in the laboratory at room temperature in jars of rather stagnant tap water. Dead leaves (oak and ash), which appear to be their natural food, were placed in the jars and were readily eaten.

Relationships: In some of its characters *Asellus kenki* is intermediate between typical epigean species and the subterranean species of *Asellus* that were formerly assigned to the genus *Caecidotea* Packard. Miller (1933) has tabulated measurements of body proportions for the species of *Asellus* (including *Caecidotea*) then known. The length : width ratio of the body for 16 species having eyes ranged from 2.3 to 4.1, with a mean of 3.11; for 13 species without eyes the proportion ranged from 4.0 to 7.0, with a mean of 4.92. In *A. kenki* the ratio, about 4.0, is intermediate. The length : width ratio of the telson for 18 species with eyes ranged from 0.7 to 1.0, with a mean of 0.92; for 13 blind species this ratio ranged from 1.0 to 1.7, with a mean of 1.32. The ratio in *A. kenki*, about 1.2, is within the lower range of the blind species.

A third character which is intermediate in *A. kenki* is the shape of the uropods. In most American epigean species of *Asellus* the uropodal rami tend to taper distally. The linear or spatulate shape in *A. kenki*, especially the very long and broad endopod found in large males, is more like that of the troglobitic species, and, as in *A. californicus* (Miller, 1939), results from heterogonic growth.

This intermediate condition is what is to be expected in a species inhabiting springs and spring-fed streams. As pointed out, communication between springs is by underground passageways, and the intermediate condition may be considered an adaptation for temporary subterranean existence.

A detailed comparison of *A. kenki* with other epigean eastern North American species of *Asellus* would require redescription of most of the other species, since their characteristics are inadequately known. However, enough is known to distinguish easily from *A. kenki* the 7 currently recognized species: *attenuatus* Richardson, *brevicauda* Forbes, *communis* Say, *dentadactylus* Mackin and Hubricht, *intermedius* Forbes, *militaris* Hay, and *montanus* Mackin and Hubricht. None of these has a long telson, the length : width being usually less than 1.0, but about equal to 1.0 in *intermedius, dentadactylus*, and *montanus*. None has linear or spatulate uropodal rami; the rami taper distally in all 7 species. A concave lateral margin of the male 1st pleopod is found in *A. brevicauda* and *A. dentadactylus*; in the other 5 species this margin is nearly straight or convex. Finally, the structure of the male 2nd pleopod clearly sets *A. kenki* apart from the other species.

No subgeneric allocation is given for *A. kenki*. Several subgenera have been proposed within the genus *Asellus* by various authors, but I agree with Chappuis (1953, 1955) that division into subgenera should only accompany a revision of the genus based on adequate collections. Studies such as that of Steeves (1966), which proposes evolutionary paths for several species groups of troglobitic North American asellids, based on modifications of the male second pleopod, are more likely to lead to rational subgeneric groupings than the present patchwork of subgenera.

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