

## COPEPODA (CRUSTACEA) FROM A SEASONALLY FLOODED MARSH IN ROCK CREEK STREAM VALLEY PARK, MARYLAND

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*Abstract.*—Species of Copepoda (Crustacea) collected from a seasonally flooded marsh in Rock Creek Stream Valley Park, Maryland, included the cyclopoids *Acanthocyclops vernalis* (Fischer), *Diacyclops bicuspidatus thomasi* (S. A. Forbes), and *Diacyclops palustris*, new species, and the harpacticoid *Attheyella* (*Mrazekiella*) *americana* (Herrick). The female of *D. palustris* is described; the species seems most closely related to *D. haueri* (Kiefer). *Diacyclops clandestinus* Yeatman is renamed *D. yeatmani*. A key to North American species of *Diacyclops* is presented. Some specimens of *A. americana* differ slightly from extant descriptions in details of the anal operculum and setation of the third swimming leg.

Mr. William B. Yeaman of the National Park Service brought a sample of water and detritus from a marsh in Rock Creek Stream Valley Park, Maryland, to Dr. Thomas E. Bowman of the Department of Invertebrate Zoology for identification of the aquatic fauna. The sample contained four species of Copepoda: *Acanthocyclops vernalis* (Fischer, 1853), 23 ♀♀, 3 ♂♂, 2 copepodites; *Diacyclops bicuspidatus thomasi* (S. A. Forbes, 1882), 1 ♂; *Attheyella* (*Mrazekiella*) *americana* (Herrick, 1884), 7 ♀♀, 1 ♂; and 2 ♀♀ of a previously undescribed species of *Diacyclops*. This species is described below as *D. palustris*. Variations of the population of *A. americana* from extant descriptions are also noted below.

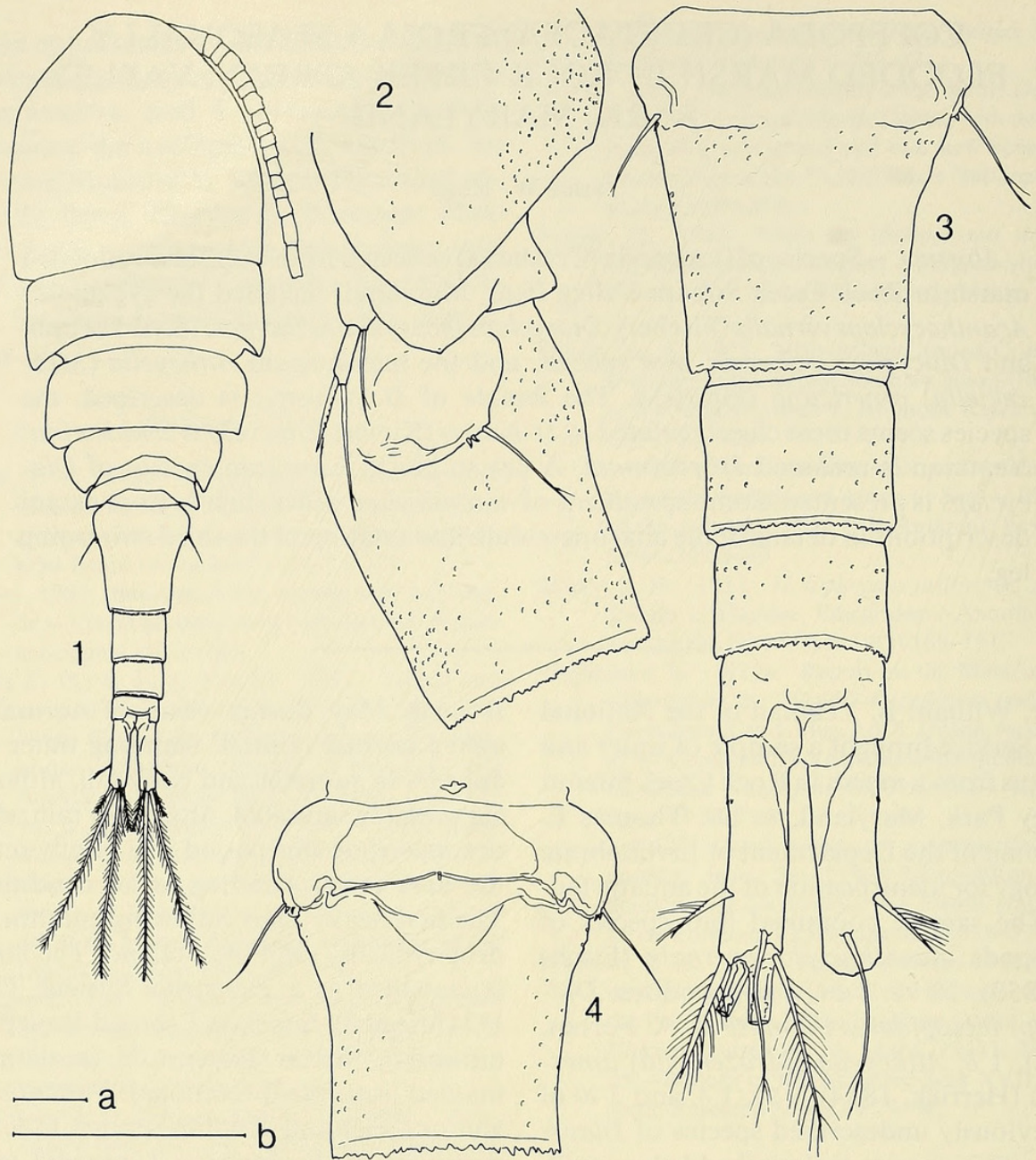
The collection was made on 23 Aug 1986 in a small marsh located in Rock Creek Stream Valley Park, Unit 3, Montgomery County, Maryland, on the west side of the park opposite Puller Drive, Kensington; about 39°01'41"N, 77°05'27"W. The marsh is shaded by broad-leaved deciduous hardwood trees such as red maple (*Acer rubrum*) and black willow (*Salix nigra*). The area is in the floodplain of Rock Creek; surface water usually persists from November

through May during years of normal or above normal rainfall. Standing water disappears in summer and early fall, although soils remain saturated. Any heavy rain which occurs during this period will briefly return the area to its standing water conditions. The first heavy rains following autumn leaf drop typically refill the wetland. The marsh is classified as a Palustrine System, Class FO (forested), Subclass 1 (broad-leaved deciduous), Water Regime E (seasonally flooded, saturated) (National Wetlands Inventory, Fish and Wildlife Service, U.S. Department of the Interior; Cowardin et al. 1979). During the unusually dry summer of 1986, standing water was absent for long periods, though soils remained saturated; the collection was made after a rain.

Family Cyclopidae Sars, 1913  
*Diacyclops palustris*, new species  
Figs. 1-19

*Material examined.*—1 ♀, holotype, dissected on 1 slide, National Museum of Natural History—USNM 232186. 1 ♀, paratype, dissected on 1 slide, USNM 232187.

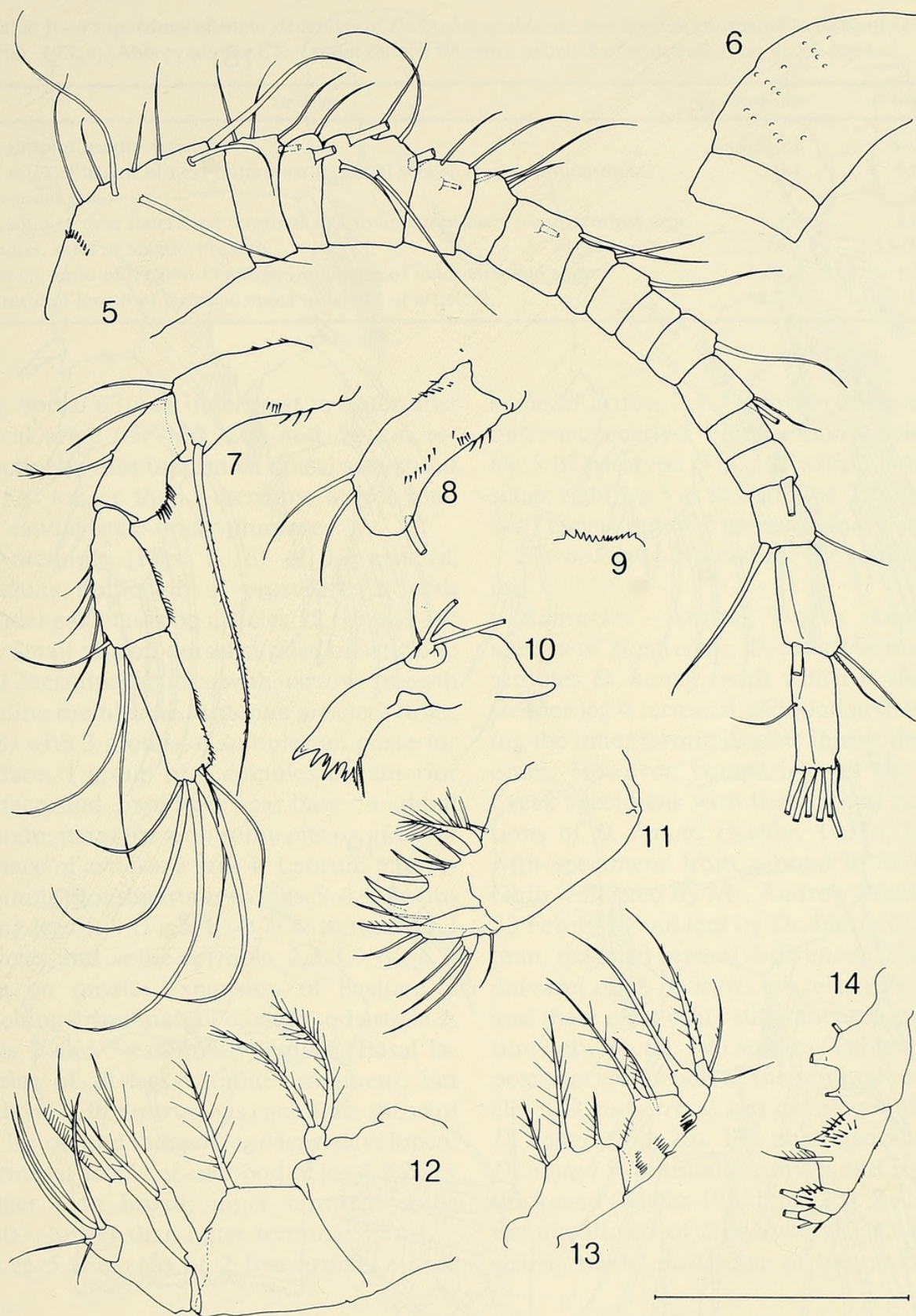
*Female.*—Length of holotype (excluding



Figs. 1-4. *Diacyclops palustris*, new species, female holotype: 1, Habitus, dorsal, omitting pores on somites (both next innermost terminal setae on caudal rami broken); 2, Posterior 2 pedigers and genital segment, left lateral; 3, Urosome, dorsal; 4, Genital segment, ventral. Scale a, Fig. 1; Scale b, Figs. 2-4; scales = 100  $\mu$ m.

caudal setae) 1140  $\mu$ m; length of paratype 1130  $\mu$ m. Posterior 2 pedigers (Figs. 1, 2) not markedly expanded laterally, each with small tubercle on posterolateral margin; posterior margins of urosomites with serrate hyaline membranes, except anal somite which has fine spinules along posteroventral margin. All somites (Figs. 2-4) with tiny pits; pattern of these pits different in holotype and paratype. Genital segment (Figs.

2-4) expanded anteriorly, slightly longer than broad; seminal receptacle with posterior part little expanded. Caudal ramus (Fig. 3) 4.5-6  $\times$  longer than broad, with lateral row of 5 spinules about  $\frac{1}{4}$  distance from base of ramus. Lateral seta of ramus inserted at distance from base of ramus equal to about 65% of length of ramus. Both longest apical setae of holotype broken; lengths of setae of paratype as follows: lateral 40



Figs. 5-14. *Diacyclops palustris*, new species, female holotype: 5, Antennule, ventral; 6, Antennule, articles 1 and 2, dorsal; 7, Antenna, anterior; 8, Antenna, article 1, posterior; 9, Labrum; 10, Mandible; 11, Maxillula; 12, Maxilla; 13, Maxilliped, posterior; 14, Maxilliped, anterior. Scale = 100  $\mu$ m.

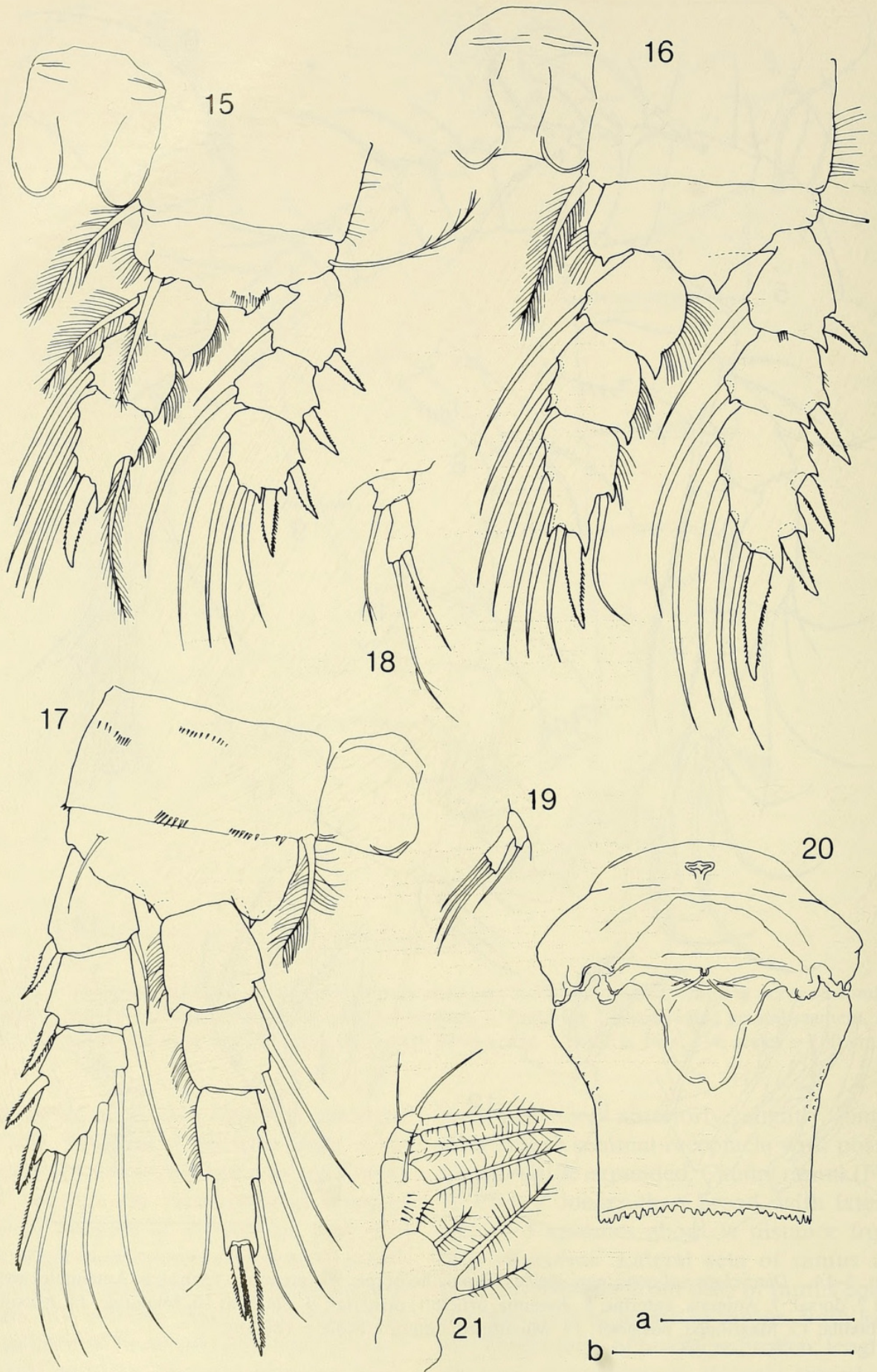


Table 1.—Proportions of some structures of *Diacyclops palustris*, new species, compared to those of *D. haueri* (Kiefer, 1931a). Abbreviations: CR, caudal ramus; P4 enp3, article 3 of endopod of leg 4; P5, leg 5.

Structure	<i>D. palustris</i>	<i>D. haueri</i>
CR, ratio of length : breadth	4.5–6:1	8–10:1
CR, ratio of length of next outermost terminal seta to length of outermost terminal seta	5.0:1	5.81:1
CR, ratio of next innermost terminal seta to length of outermost terminal seta	8.1:1	9.66:1
P4 enp3, ratio of length : breadth	2.26:1	2.53–3.0:1
P4 enp3, ratio of length of endopod to length of inner terminal spine	1.34:1	1.86:1
P5, ratio of length of terminal spine to length of article 2	1.7:1	1.2:1

$\mu\text{m}$ ; dorsal  $63 \mu\text{m}$ ; innermost to outermost apical setae  $65$ ,  $420$ ,  $260$  and  $52 \mu\text{m}$  respectively; thus innermost apical seta about  $1.25\times$  longer than outermost apical seta. All caudal setae finely plumose.

Antennule (Figs. 5, 6) of 17 articles, reaching midlength of prosomite 2; with slender esthetascs on articles 12, 16 and 17; few small pits on dorsal surface of article 1; and 2 terminal articles with narrow, smooth hyaline membrane. Antenna article 1 (Figs. 7, 8) with 3 groups of spinules on posterior surface, 1 group of 4 spinules on anterior surface, and 3 spinules near base on lateral margin; paratype with some pits on anterior surface of articles 3 and 4. Labrum and remaining mouthparts as in Figs. 9–14. Swimming legs 1–4 (Figs. 15–17) with rami of 3 articles and spine formula 2,3,3,3. Leg 1, seta on medial expansion of basipod 2 reaching distal margin of endopod article 2. Legs 2 and 3 essentially similar. Basal lamellae of all legs without armament, but with smooth protrusions each side, those of leg 1 most and those of leg 4 least developed. Terminal article of endopod of leg 4  $2.26\times$  longer than broad; inner terminal spine  $1.40\times$  longer than outer terminal spine.

Leg 5 (Fig. 18) of 2 free articles, inner

spine of article 2  $1.7\times$  longer than article, outer seta nearly  $3\times$  longer than article. Left leg 5 of paratype (Fig. 19) with 3 subequal setae; right leg 5 as in holotype. Leg 6 (Figs. 2–4) consisting of 2 spinules and 1 seta.

*Etymology*.—Named for the marsh habitat.

*Remarks*.—Among North American species of *Diacyclops*, *D. palustris* most resembles *D. haueri*, with which it shares a slender leg 4 terminal endopod article having the inner terminal spine longer than the outer. However, comparison of the Rock Creek specimens with the original descriptions of *D. haueri* (Kiefer, 1931a, b) and with specimens from a pond in Wooster, Ohio, collected by Mr. Andrew Weaver on 23 Feb 1948 and lent by Dr. Harry C. Yeatman, revealed several differences. The caudal rami of *D. palustris* are relatively short, and there exist other differences in proportion between the two species (Table 1). The posterior expansion of the seminal receptacle of *D. palustris* is less developed than in *D. haueri* (Fig. 20). The anal operculum of *D. haueri* is unusually convex and strongly thickened (Kiefer 1931b:fig. 23). Setules of the maxilliped of *D. palustris* (Fig. 13) are sparse, while most setae of the maxilliped

Figs. 15–21. 15–18, *Diacyclops palustris*, new species, female holotype: 15, Leg 1; 16, Leg 2; 17, Leg 4 (setules of most setae of swimming legs omitted for clarity); 18, Leg 5. Fig. 19, *D. palustris*, female paratype, left leg 5. Figs. 20–21, *Diacyclops haueri* (Kiefer, 1931a), females from Wooster, Ohio: 20, genital segment, ventral; 21, maxilliped. Scale a, Figs. 19, 20; Scale b, Figs. 15–18, 21; scales =  $100 \mu\text{m}$ .

of *D. haueri* bear many, closely set setules (Fig. 21). The seta on the medial expansion of the basipod 2 of leg 1 of *D. haueri* reaches the apex of endopod article 3. The inner terminal spine of endopod article 3 of leg 4 of *D. palustris* is straight, while that of *D. haueri* is bent outwards at midlength.

*Diacyclops palustris* is the fifteenth species and subspecies of the genus recorded from North America (Dussart & Defaye 1985). Since the widely used keys of Yeatman (1958) and of Pennak (1978) include only 11 and 10 species respectively, it seems useful to include an updated key. The formulation of this key owes much to the extensive discussions of variations within North American populations of several members of the genus *Diacyclops* by Yeatman (1944).

Dussart and Defaye (1985) suggested that in order to avoid confusion with *D. languidoides clandestinus* (Kiefer, 1926), *D. clandestinus* Yeatman, 1964 be renamed. I concur and propose the new name *D. yeatmani*, used below. The name of course honors Dr. Harry C. Yeatman for his many contributions to copepod systematics.

Key to Females of Species of *Diacyclops*  
Recorded from North America

- 1. Antennule with 11 articles ..... 2
- Antennule with 12 articles ..... 4
- Antennule with 16 or 17 articles ..... 5
- 2. Lateral seta of caudal ramus inserted at about midlength of ramus ..... *D. nanus* (G. O. Sars, 1863)
- Lateral seta of caudal ramus inserted at distal 2/3 to 3/4 of ramus ..... 3
- 3. Leg 4 endopod 3 with outer terminal spine and inner terminal seta ... *D. jeanneli putei* (Yeatman, 1943)
- Leg 4 endopod 3 with 2 terminal spines ..... *D. languidoides* (Lilljeborg, 1901)
- 4. Caudal rami 4-5x longer than broad ..... *D. crassicaudis* (G. O. Sars, 1863)
- Caudal rami 3.1-3.6x longer than broad .....

- ..... *D. crassicaudis brachycercus* (Kiefer, 1927)
- 5. Antennule of 17 articles ..... 6
- Antennule of 16 articles ..... *D. languidus* (G. O. Sars, 1863)
- 6. Leg 4 endopod 3, outer terminal spine longer than inner terminal spine or seta ..... 7
- Leg 4 endopod 3, inner terminal spine or seta longer than outer terminal spine ..... 9
- 7. Seta of article 2 of leg 5 about 2x length of spine ..... 8
- Seta and spine of article 2 of leg 5 subequal .. *D. navus* (Herrick, 1882)
- 8. Outer terminal spine of endopod 3 of leg 4 about 1.5x length of inner terminal spine; endopod 3 of leg 4 2-3x longer than broad ... *D. bicuspidatus* (Claus, 1857)
- Outer terminal spine of endopod 3 of leg 4 about 2x length of inner terminal spine; endopod 3 of leg 4 3-4.2x longer than broad ..... *D. bicuspidatus thomasi* (S. A. Forbes, 1882)
- 9. Leg 4 endopod 3, outer margin with seta ..... 10
- Leg 4 endopod 3, outer margin with spine .... *D. nearcticus* (Kiefer, 1934)
- 10. Leg 4 endopod 3 with 2 terminal spines ..... 11
- Leg 4 endopod 3 with outer spine and inner seta ..... *D. jeanneli* (Chappuis, 1929)
- 11. Leg 4 endopod 3 stout, about 1.5-1.7x longer than broad ..... 12
- Leg 4 endopod 3 slender, about 2.2-2.5x longer than broad .... 13
- 12. Innermost terminal caudal seta shorter than outermost; caudal rami 5-7x longer than broad ... *D. bisetosus* (Rehberg, 1880)
- Innermost terminal caudal seta longer than outermost; caudal rami 3-4.5x longer than broad ..... *D. yeatmani*, new name
- 13. Caudal rami 8-10x longer than

- broad; leg 4 endopod 3, length of endopod about  $1.9 \times$  length of inner terminal spine . . . . .  
 . . . . . *D. haueri* (Kiefer, 1931a)
- Caudal rami  $4.5\text{--}6 \times$  longer than broad; leg 4 endopod 3, length of endopod about  $1.3 \times$  length of inner terminal spine . . . . .  
 . . . . . *D. palustris*, new species

Family Canthocamptidae Sars, 1906  
*Attheyella* (*Mrazekiella*) *americana*  
 (Herrick, 1884)

*Material examined.* — 1 ♀, dissected on 2 slides; 5 ♀♀, 2 ♂♂, alcohol-preserved; USNM 232188.

*Remarks.* — The Rock Creek Park population varies little from those from North Carolina and Wisconsin, exhaustively described by Coker (1934). Two Rock Creek females bear two setae rather than one on the inner margin of leg 3 exopod article 2; Coker noted similar variability in the setation of endopod article 2 of this leg in females. The anal opercula of Rock Creek females bear 10–15 teeth, while those of the two males bear 12 and 14 teeth; Coker mentioned variations in this character also, his specimens from North Carolina having 12–18 “spinules”, and those from Wisconsin having 20–24 “spinules”.

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