

***Diacyclops albus* n.sp. and *Parastenocaris palmerae* n.sp. (Crustacea: Copepoda)
from the meiofauna of a stream bed in Virginia, U.S.A.**

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Two previously undescribed species of Copepoda are members of the interstitial community of the sandy bed of a stream in northern Virginia. *Diacyclops albus* n.sp. shares with *D. languidus*, *D. languidoides*, and *D. nanus* the combination of biarticulate rami of leg 1 and endopodite of leg 2, the remaining rami of the swimming legs being triarticulate. *Diacyclops albus* differs from these congeners in having one rather than two terminal spines on the leg 4 endopodite article 3, as well as in other characters. *Parastenocaris palmerae* n.sp. differs from North American congeners in having the medial margin of leg 5 strongly convex proximally and concave distally in both sexes; in addition, the male of no other known North American species has leg 4 with a multiply incised endopodite similar to that of the male of *P. palmerae*.

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Deux espèces nouvelles de copépodes font partie de la meiofaune interstitielle du substrat sablonneux d'un ruisseau du nord de la Virginie. *Diacyclops albus* n.sp. possède un caractère commun avec *D. languidus*, *D. languidoides* et *D. nanus*, la présence de rames biarticulées sur la patte 1 et sur l'endopodite de la patte 2; les autres rames des pattes natatoires sont triarticulées. *Diacyclops albus* diffère de ces espèces par d'autres caractères, notamment par la présence d'une épine terminale plutôt que deux sur l'article 3 de l'endopodite de la patte 4. *Parastenocaris palmerae* n.sp. diffère des espèces congénères nord-américaines en ce que la bordure médiale de sa patte 5 est fortement convexe dans sa partie proximale et concave dans sa partie distale, à la fois chez les mâles et femelles; de plus, chez le mâle *P. palmerae*, l'endopodite de la patte 4 comporte plusieurs échancrures, caractéristique exclusive à cette espèce en Amérique du Nord.

[Traduit par la rédaction]

Introduction

Specimens of copepods (Crustacea) in samples of interstitial meiofauna from Goose Creek, entrusted to me for determination by Dr. Margaret A. Palmer, included two previously undescribed species belonging to the genera *Diacyclops* (Cyclopoida) and *Parastenocaris* (Harpacticoida). These are described herein and compared with North American congeners.

Goose Creek, a perennial fourth-order low-gradient stream, is located in Loudoun County, northern Virginia, U.S.A. (38°57'N, 77°45'W). The stream bed is mostly sandy and about 40–60 cm deep. The habitat has been more fully described by Palmer (1990a, 1990b). Specimens were collected either directly from the stream bed or from drift in an experimental flume containing sand from the creek.

Materials and methods

Samples were fixed in formalin and transferred to 70% ethanol for long-term storage. For taxonomic description, specimens were mounted temporarily in glycerin or lactic acid, or permanently in commercial polyvinyl lactophenol medium with a little chlorazol black E added. Drawings were made at magnifications of 400×, 600×, or (with an oil immersion lens) 1000×, using a Wild M50 microscope fitted with a camera lucida. Specimens are deposited in the collections of the Division of Crustacea, Department of Invertebrate Zoology, U.S. National Museum of Natural History (USNM).

Taxonomic account

FAMILY Cyclopidae Burmeister, 1834

GENUS *Diacyclops* Kiefer, 1927

Diacyclops albus n. sp.

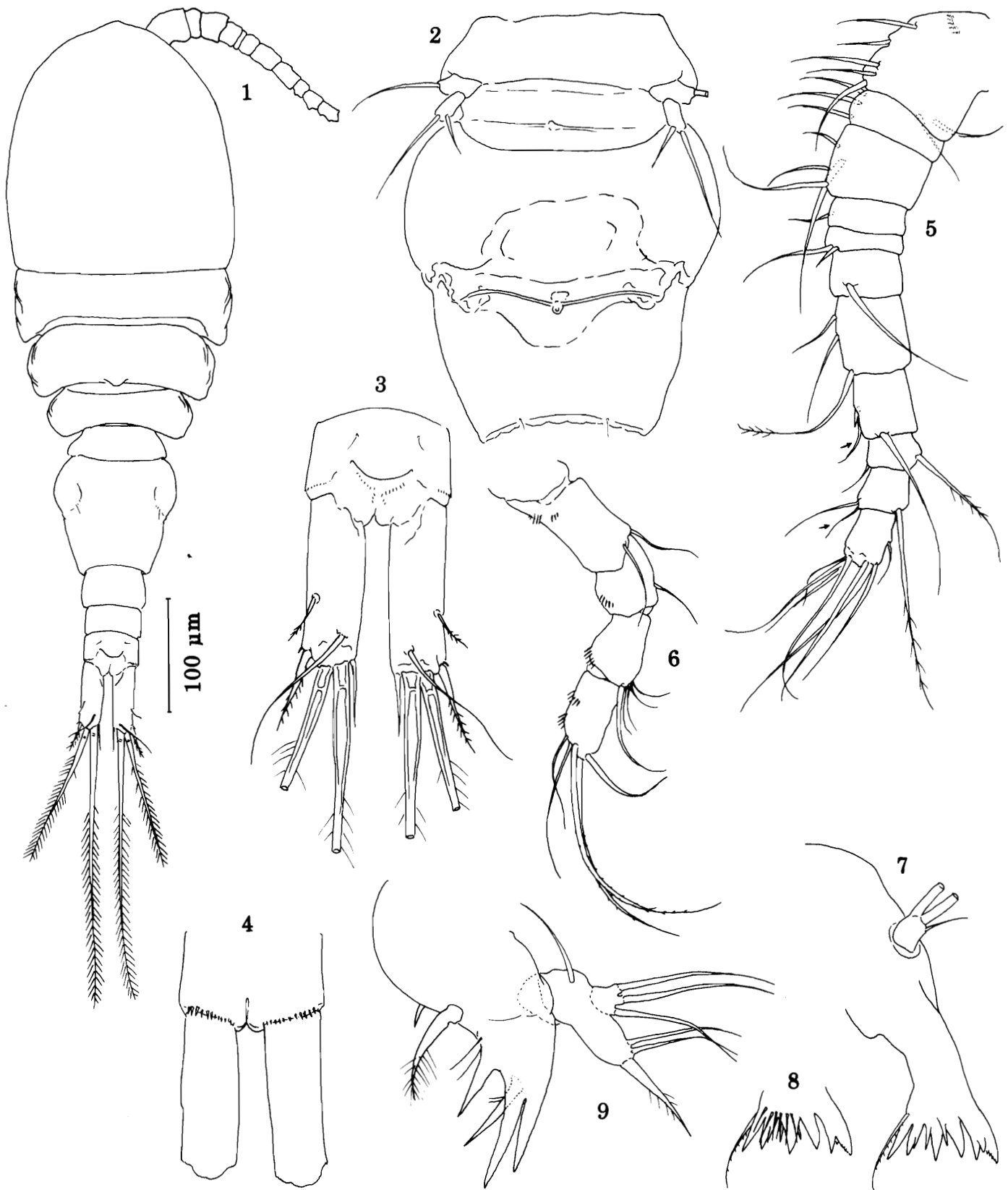
Figs. 1–20

MATERIAL: Holotype ♀, dissected on slide, flume sample 13.2, 16 Apr. 1990, USNM 250856; allotype ♂, dissected on slide,

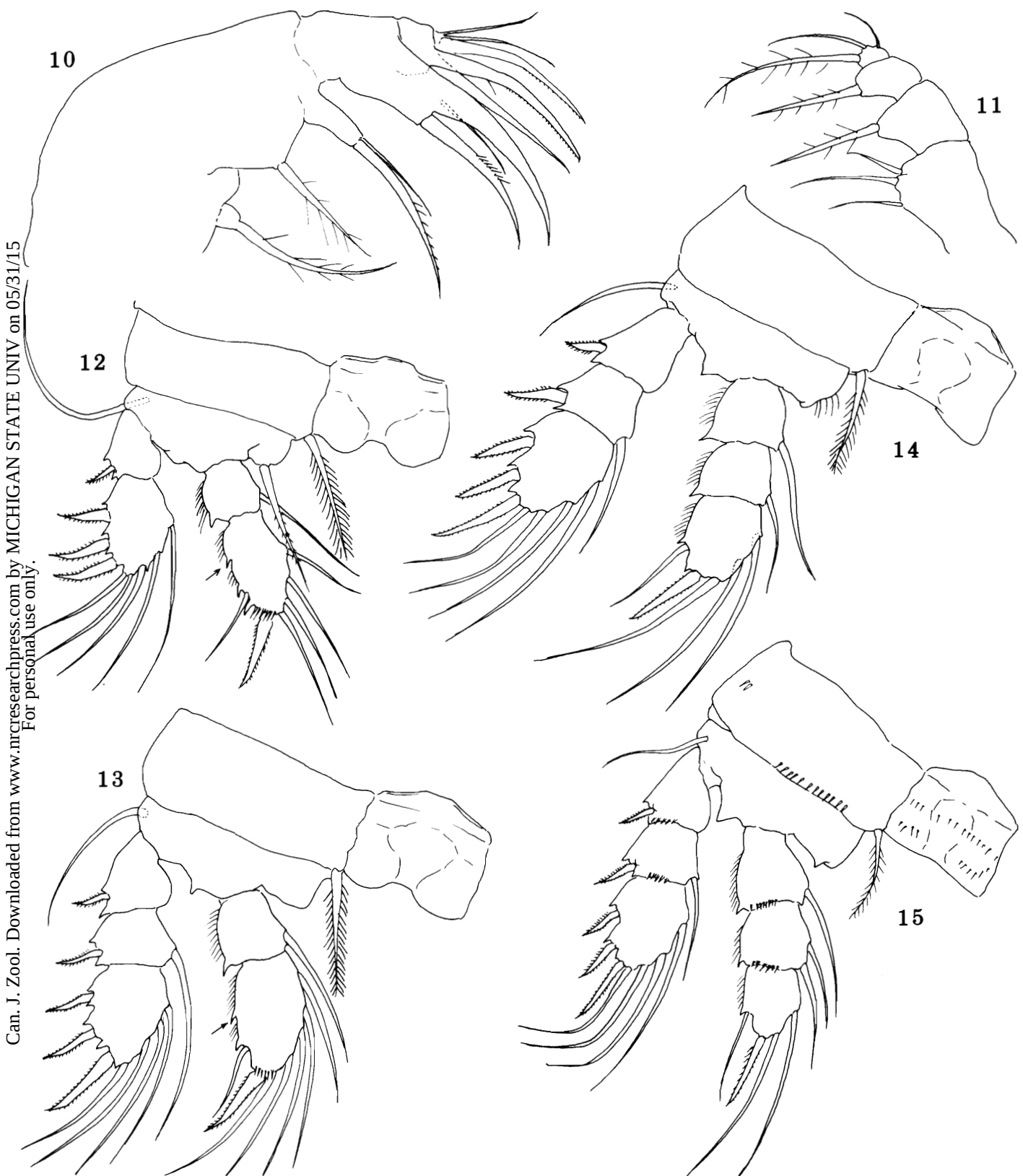
flume sample 13.6, 16 Apr. 1990, USNM 250857. Paratypes: 1 ♂, flume sample 13.5, low flow I, 16 Apr. 1990, USNM 250858; 2 ♀, 1 ♂, flume sample 13.6, 16 Apr. 1990, USNM 250859; 3 ♀ flume sample 13.7, 16 Apr. 1990, USNM 250860; 2 ♀ flume sample 13.8, 16 Apr. 1990, USNM 250861; 2 ♀, 1 ♂, 14 copepodids, flume sample 13.9, 16 Apr. 1990, USNM 250862; 2 ♂ flume sample 15, 20 Apr. 1990, USNM 250863; 4 ♀, 2 ♂, 6 copepodids, vertical distribution sample time 1, 3 cm, control, USNM 250864; 1 ♂ field sample, 3 Mar. 1990, USNM 250865; 3 ♀, 5 ♂, 9 copepodids, weir sample 32C, USNM 250866. All undissected specimens alcohol preserved.

Female

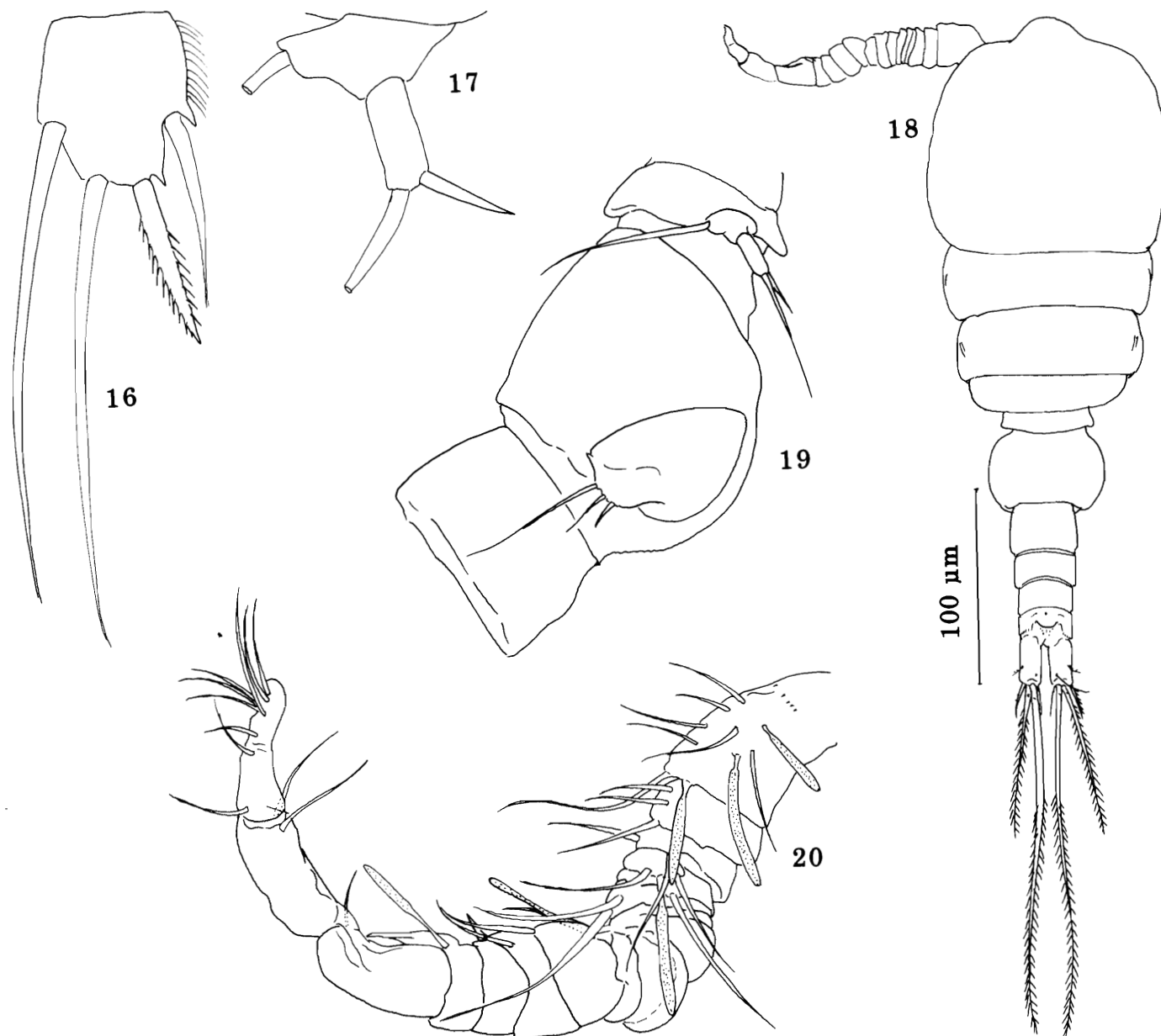
Length, excluding caudal setae, of holotype 616 µm; ranges of length and other body dimensions of holotype and 9 paratypes given in Table 1. Formalin-preserved specimens colorless, transparent. Prosomites (Fig. 1) with anteroposterior ridges near lateral margins, these ridges especially evident in dorsal view; pediger 3 additionally with dorsomedian rounded lobe near posterior margin. Lateral margins of prosomites rounded, smooth. Genital segment (Figs. 1, 2) about as long as broad, anterior half broadened. Seminal receptacle with anterior expansion subquadrate, posterior expansion subtriangular, and lateral arms nearly horizontal; pore canal very short, nearly spherical. Hyaline fringes of urosomites weakly crenulate. Anal somite (Figs. 1, 3, 4) with small spines dorsally and coarser spines ventrally near posterior margin; anal operculum crescentic, not sclerotized. Caudal ramus (Figs. 1, 3, 4) 3 times longer than broad, medial surface hairless, lateral surface lacking "comb" or dorsoventral row of small spines present in most congeners. Lateral seta inserted at posterior 3/5 of ramus. Next medialmost terminal caudal seta swollen near base. Dorsal seta tapering to thin tip. Most caudal setae with fine homonomous



FIGS. 1–9. *Diacyclops albus* n.sp., female holotype, USNM 250856. Fig. 1. Habitus, dorsal. Fig. 2. Legs 5 and genital segment, ventral. Fig. 3. Anal somite and caudal rami, dorsal. Fig. 4. Anal somite and caudal rami, ventral. Fig. 5. Antennule. Fig. 6. Antenna. Fig. 7. Mandible. Fig. 8. Pars incisiva of mandible, other side. Fig. 9. Maxillule. Scale bar applies to Fig. 1 only. Figs. 2–6 drawn at 600 $\times$; Figs. 7–9 drawn at 1000 $\times$.



FIGS. 10–15. *Diacyclops albus* n.sp., female holotype, USNM 250856. Fig. 10. Maxilla. Fig. 11. Maxilliped. Fig. 12. Leg 1, anterior. Fig. 13. Leg 2, anterior. Fig. 14. Leg 3, anterior. Fig. 15. Leg 4, posterior. Figs. 10 and 11 drawn at 1000 $\times$; Figs. 12–15 drawn at 600 $\times$.



FIGS. 16–20. *Diacyclops albus* n.sp. (Figs. 16 and 17 show female holotype, USNM 250856; figs. 18–20 show male allotype, USNM 250857.) Fig. 16. Leg 4 endopodite article 3. Fig. 17. Leg 5. Fig. 18. Habitus, dorsal. Fig. 19. Legs 5 and 6, right lateral. Fig. 20. Antennule. Scale applies to Fig. 18 only; Figs. 16 and 17 drawn at 1000 $\times$; Fig. 18 drawn at 400 $\times$; Figs. 19 and 20 drawn at 600 $\times$.

plumage, except dorsal and medialmost terminal setae naked. Lengths of caudal setae of holotype (μm): lateral 10, dorsal 33, lateralmost to medialmost terminal 29, 125, 228, 27.

Antennule (Figs. 1, 5) of 11 articles, not reaching posterior margin of cephalothorax; articles 5 and 8 each with spine, articles 8 and 10 each with slender sensillum (sensilla indicated by arrows in Fig. 5); no hyaline membrane visible on distalmost articles. Antenna (Fig. 6) lacking exopodite seta; articles 1–4 with groups of small spines on caudal side, no spines on frontal side. Mandible (Figs. 7, 8) with row of long fine hairs on 1 side of pars incisiva. Two longest setae of mandibular palp broken in holotype; in a female paratype specimen from USNM 250864, these setae sparsely plumed, subequal in length, their length about twice the distance from base of palp to distal end of mandible. Gnathobase of maxillule (Fig. 9) with 2 terminal teeth.

Maxilla (Fig. 10) lacking fine teeth on beak-like extension of article 3 usual in family. Maxilliped (Fig. 11) with 1 rather than usual 2 setae on article 2; articles lacking surface ornament.

Swimming legs 1–4 (Figs. 12–16), terminal articles of exopodite with total of 3, 3, 3, 3 spines and 5, 4, 4, 4 setae, respectively. Both rami of leg 1 and endopodite of leg 2 biarticulate, exopodite of leg 2 and both rami of legs 3 and 4 triarticulate. Article 2 of endopodite of legs 1 and 2 each with spiniform process on lateral margin (indicated by arrows in Figs. 12 and 13). Couplers of legs 1–3 without ornament; leg 4 coupler with 2 rows of tiny spines on posterior surface. Leg 4 endopodite 3 (Figs. 15, 16) about 1.2 times longer than broad, with 1 terminal spine; more distal medial seta of endopodite 3 inserted subterminally, separated from terminal spine by distance equal to breadth of base of spine.

TABLE 1. Measurements of *Diacyclops albus* n.sp.

		N	Range	Mean	SE	CV
Total length	♀	10	404–616	509	21	13
	♂	10	330–504	402	16	12
Ramus						
Length	♀	10	46–58	51	1.3	8.2
	♂	10	35–40	37	0.6	4.9
Width	♀	10	15–18	17	0.3	6.5
	♂	10	13–16	14	0.2	5.6
Inner seta	♀	8	13–19	14	0.7	14
	♂	10	12–18	14	0.6	13
Seta 2	♀	7	170–252	218	9.6	11
	♂	6	188–248	222	9.5	10
Seta 3	♀	8	105–148	120	5.0	12
	♂	9	107–125	114	1.8	4.8
Outer seta	♀	10	23–31	26	0.8	10
	♂	10	19–30	24	1.0	13
Dorsal seta	♀	10	33–42	38	1.0	8.6
	♂	10	30–42	34	1.2	11
Insertion ls	♀	10	30–43	35	1.2	10
	♂	10	22–26	23	0.4	6.0
P4 enp3						
Length	♀	10	18–21	20	0.4	6.0
	♂	10	17–20	19	0.4	6.2
Width	♀	10	15–17	16	0.2	4.1
	♂	10	13–15	15	0.2	4.8
Terminal spine	♀	10	14–22	18	0.7	12
	♂	10	16–20	17	0.4	7.8

NOTE: Dimensions are given in micrometres; P4 enp3, leg 4 endopodite 3; insertion ls, distance along outer margin of caudal ramus from anal somite to insertion of lateral seta; SE, standard error of mean; CV, coefficient of variation. All females are from flume samples, 16 Apr. 1990; males are from flume samples, 16 Apr. 1990 (5) and 20 Apr. 1990 (2), field sample, 3 Mar. 1990 (1), and weir sample, undated (2).

Length of medial terminal spine of leg 5 (Figs. 2, 17) equal to or slightly greater than length of article 2 of leg. Length of lateral terminal seta of leg 5 less than half length of genital segment.

Male

Length of allotype 340 µm; range of length and other body dimensions of allotype and 9 paratypes given in Table 1. Habitus (Figs. 18, 19), caudal rami, antenna, mouthparts, swimming legs, and leg 5 similar to those of female, except urosomite 1 much enlarged, rounded laterally. Antennule (Fig. 20) geniculate, apparently of 16 or 17 articles, articles 16 and 17 indistinctly divided; articles 1, 4, 9, and 13 with 3, 1, 1, and 1 broad esthetascs, respectively; article 12 with spine. Leg 6 (Fig. 19) consisting of articulated flap bearing slender ventral spine and median and dorsal setae, dorsal seta reaching nearly to posterior margin of succeeding somite.

ETYMOLOGY: From Latin *albus*, "white," for the pale color of the animal; also in appreciation of Mr. and Mrs. Ridgley White for permitting access to the study site in Goose Creek.

Comparisons

In the key of Reid (1988) to North American *Diacyclops*, emended by Reid et al. (1989), *D. albus* keys to *D. jeanneli putei* (Yeatman, 1943). *Diacyclops jeanneli putei* has legs 1–4 all with triarticulate rami (Yeatman 1943, 1944).

Three species of *Diacyclops* recorded in North America are similar to *D. albus* in having both rami of leg 1 and the leg 2 endopodite biarticulate, with the leg 2 exopodite and both rami of legs 3 and 4 triarticulate, with the leg 2 exopodite and both rami of legs 3 and 4 triarticulate. All are widely distributed

circumboreal species that occur mainly in benthic and ground-water habitats. In the United States and Canada they have been collected rarely because relatively few such habitats have been investigated on this continent. The species with fewest records in North America is *D. languidus* (G. O. Sars, 1863), recorded first by Leblanc et al. (1981) in Quebec, then from New York by Strayer (1988). *Diacyclops languidus* is unique among North American congeners in having the antennule of the female composed of 16 articles; in common with the following 2 species, it has 2 terminal spines on leg 4 endopodite 3. *Diacyclops nanus* (G. O. Sars, 1863) has been recorded several times from middle and eastern Canada and as far south as North Carolina in the United States (Coker 1938; Yeatman 1943, 1944). The antennule of this species has 11 articles in the female, as in *D. albus*, but in *D. nanus* there is a seta on the medial surface of exopodite article 1 of each of legs 1–4, a total of 5 setae on leg 3 endopodite 3, and the lateral caudal seta inserted at midlength of the caudal ramus. *Diacyclops languidoides* (Lilljeborg, 1901) s.l. is widely distributed in Canada and was recently reported and redescribed from Montana and Colorado in the United States by Reid et al. (1991). It is most similar of the three to *D. albus*, the major difference being possession of 2 terminal spines on leg 4 endopodite 3. A more subtle distinction is that in *D. albus* the apparent fusion point between the original two distal articles of the endopodites of legs 1 and 2 is marked by a lateral spinous process. In *D. languidoides* s.l. from Montana and Colorado, fusion of these articles is complete, with no spinous process present except that proximal to the lateral seta (Reid et al. 1991). Such processes are, however, evident in at least some European subspecies of the *languidoides*-complex (Gurney 1933).

The lack of an exopodite seta on the antenna is a feature shared by *D. albus* and many subterranean and benthic cyclopids (Pesce and Galassi 1985). Additional morphological attributes of *D. albus* that are typical of subterranean cyclopids include the short leg 4 endopodite with its reduced armament, the short antennule with relatively few articles in the female, and the enlarged genital segment in both sexes.

FAMILY Parastenocarididae Chappuis, 1933

GENUS *Parastenocaris* Kessler, 1913

Parastenocaris palmerae n.sp.

Figs. 21–43

MATERIAL: Holotype ♀, field sample F6, 6 cm, 3 Mar. 1990, USNM 250867; allotype ♂, flume sample 9.6, 12 Mar. 1990, dissected on slide, USNM 250868. Paratypes: 3 ♀, flume samples 10.2 and 10.9, 12 Mar. 1990, and flume sample 13.6, 16 Apr. 1990, USNM 250869; 1 ♂, flume sample 20.7, 1990, USNM 250870; 1 ♂, flume sample 19.10, 1990, USNM 250871; 1 ♂, flume sample 22.10, 1990, USNM 250872. All undissected specimens alcohol preserved.

Female

Length of holotype, excluding caudal setae, 432 µm; range of length of paratypes 336–412 µm. Formalin-preserved specimens pale grey. Habitus vermiform; anal somite longer than preceding somite (Figs. 21–23). Cephalosome with dorsal ring-shaped hyaline "window"; genital segment with dorsal rectangular saddle-shaped window; dorsal windows of succeeding 2 urosomites each narrow, saddle-shaped. All urosomites with pitting, which is best seen by means of an oil-immersion lens: genital segment sparsely pitted over entire surface except in genital field and dorsal window; succeeding 2 urosomites each pitted near anterior margin except in dorsal window; anal somite densely

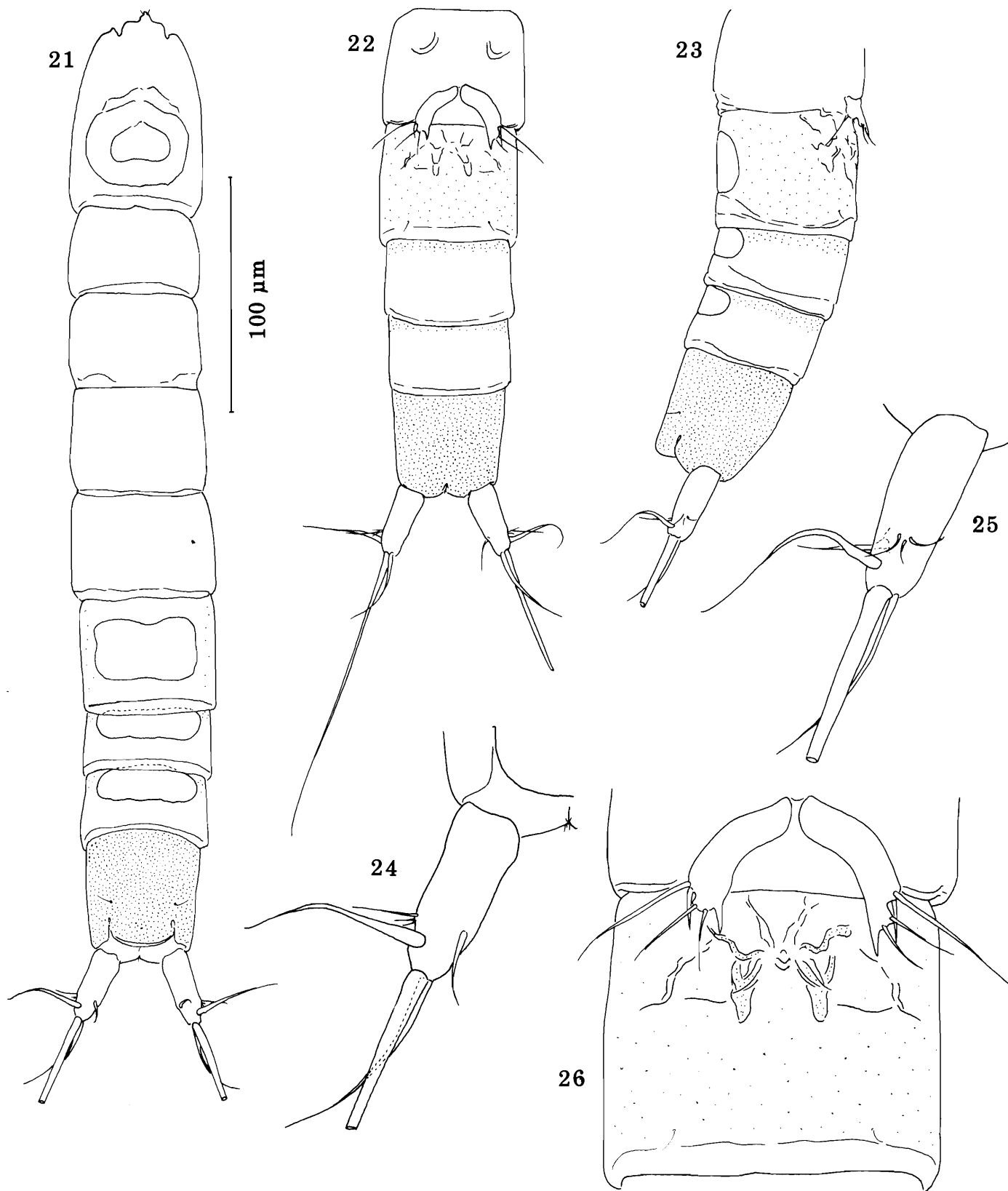
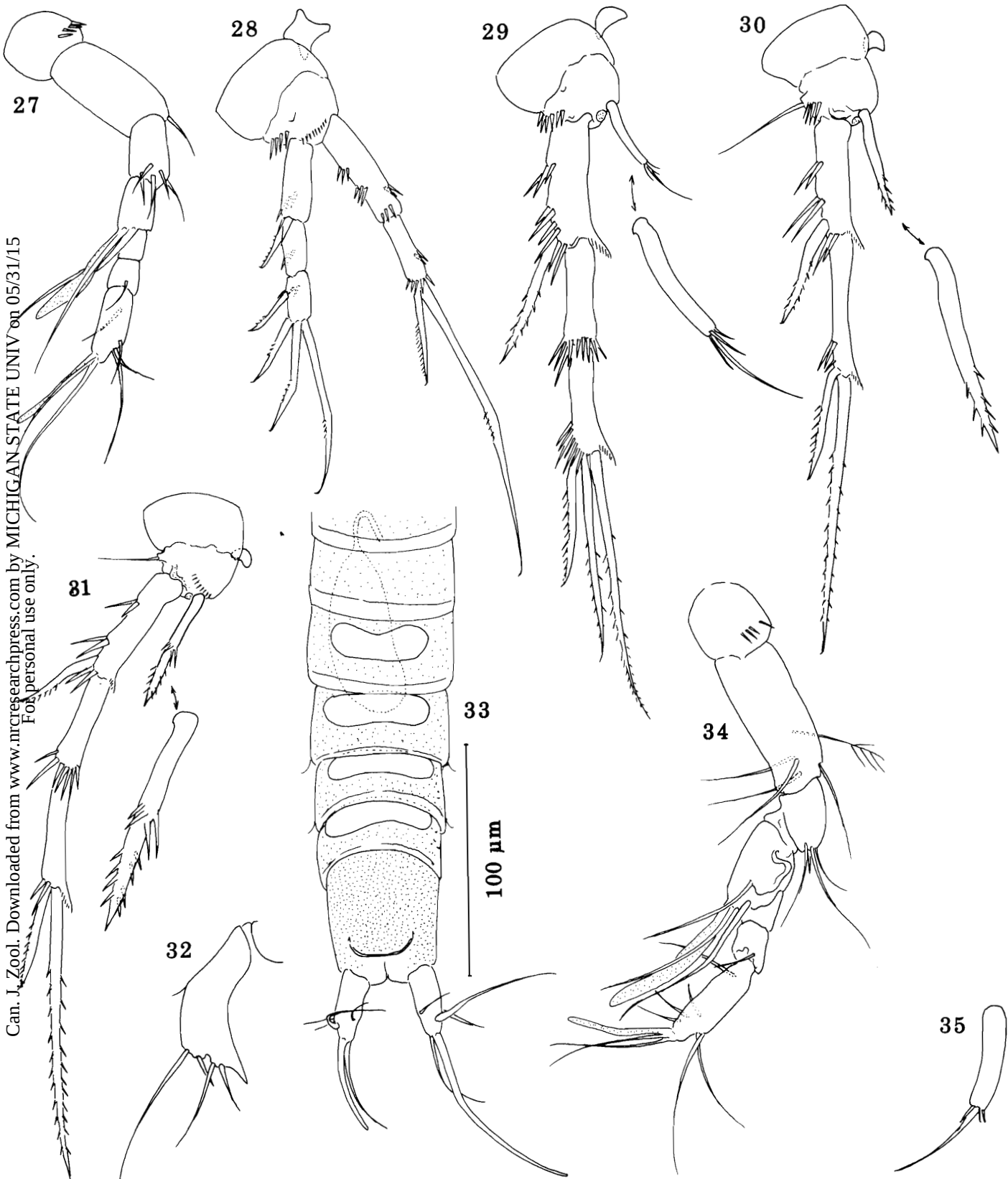
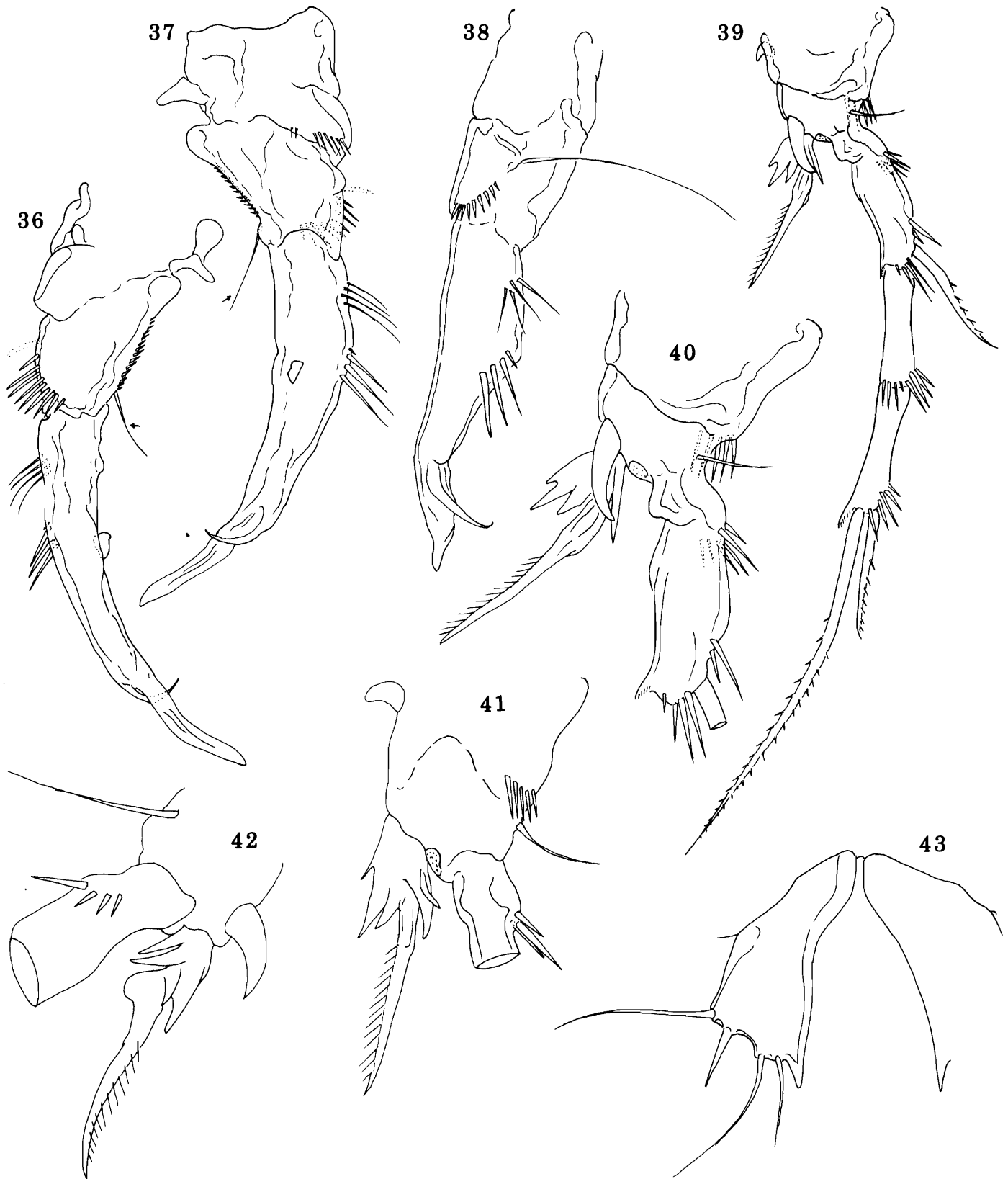


FIG. 21–26. *Parastenocaris palmerae* n.sp., female holotype, USNM 250867. Fig. 21. Habitus, dorsal. Fig. 22. Urosome, ventral. Fig. 23. Urosome, right lateral. Fig. 24. Left caudal ramus, dorsal. Fig. 25. Right caudal ramus, lateral. Fig. 26. Leg 5 and genital segment, ventral. Scale applies to Figs. 21–23 only; Figs. 24–26 drawn at 1000 $\times$.



FIGS. 27–35. *Parastenocaris palmerae* n.sp. (Figs. 27–32 show female holotype, USNM 250867; Figs. 33 and 35 show male allotype, USNM 250868; Fig. 34 shows male paratype, USNM 250871.) Fig. 27. Right antennule. Fig. 28. Right leg 1, anterior. Fig. 29. Right leg 2 and enlargement of endopodite, anterior. Fig. 30. Right leg 3 and enlargement of endopodite, anterior. Fig. 31. Right leg 4 and enlargement of endopodite, anterior. Fig. 32. Right leg 5, anterior-oblique. Fig. 33. Urosome, dorsal. Fig. 34. Left antennule. Fig. 35. Right leg 2 endopodite, anterior. Scale applies to Fig. 33 only; Figs. 27–32 and 34 drawn at 600 $\times$; Fig. 35 and enlargements of Figs. 29–31 drawn at 1000 $\times$.



FIGS. 36–43. *Parastenocaris palmerae* n.sp. male. (Figs. 36, 37, 39, 40, and 43 show allotype, USNM 250868; figs. 38, 41, and 42 show paratype, USNM 250871.) Fig. 36. Right leg 3, anterior. Fig. 37. Right leg 3, posterior–oblique. Fig. 38. Left leg 3, lateral. Fig. 39. Left leg 4, anterior. Fig. 40. Leg 4 endopodite and exopodite 1, anterior. Fig. 41. Leg 4 endopodite, posterior. Fig. 42. Leg 4 endopodite, lateral. Fig. 43. Right leg 5, ventral. Figs. 36–39 drawn at 600 $\times$; Figs. 40–43 drawn at 1000 $\times$.

pitted over entire surface. Anal operculum slightly convex in holotype, in some paratypes slightly concave. Caudal rami (Figs. 21–25) cylindrical, slightly tapering distally. Slender dorsal caudal seta and group of 3 lateral setae inserted at distal 3/4 of ramus; lateral subterminal seta displaced dorsally and laterally, inserted midway between group of lateral setae and distal end of ramus; medial subterminal seta inserted slightly ventral to base of long terminal seta. Lateral and medial subterminal setae stout, basally more than half as broad as base of long terminal seta. Genital field (Fig. 26) occupying anterior ventral half of genital segment.

Rostrum (Fig. 21) subtriangular with 2 subapical sensilla. Antennule (Fig. 27) of 7 articles, articles 4 and 7 each with esthetasc. Antenna (not figured) with allobasis; unarticulate exopodite bearing 1 terminal seta. Remaining mouthparts reduced as typical of family, maxilliped slender, prehensile.

Legs 1–4 (Figs. 28–31) with triarticulate exopodites except leg 3 with exopodite biarticulate. Proximalmost and distalmost articles of legs 2–4 each with inner distal corner fringed. Leg 1 endopodite 1, lateral surface with 2 groups of spines, medial surface with 1 group of spines near distal end. Legs 2–4 endopodites each composed of 1 cylindrical article. Leg 2 endopodite reaching midlength of exopodite article 1, with 1 long and 3 short terminal setae. Leg 3 endopodite nearly as long as exopodite article 1, with 2 marginal rows of small spines along distal third. Leg 4 endopodite reaching slightly past distal end of exopodite 1, bearing group of 4 small spines at midlength and 2 irregular longitudinal rows of small spines along distal half.

Leg 5 (drawn foreshortened in Fig. 26, in planar view in Fig. 32) subquadrate, medial margin convex proximally and concave distally, leg produced in acute distomedial tip. Lateral margin short, slightly convex. Oblique distal margin with 2 pairs of setae, each pair set on small rounded prominence, lateralmost and next medialmost setae longest, next lateralmost seta short, spiniform, directed posteriorly beneath next medialmost seta. Apparent proportions of leg 5 vary greatly with angle of view, but distinctive strongly curved medial margin was evident in all specimens.

Male

Length of allotype 390 μm ; range of lengths of paratypes 360–492 μm . Habitus (Fig. 33) similar to female except all somites pitted, pitting densest on anal somite. Urosomites 1–4 each with dorsal saddle-shaped hyaline window, window of urosomite 1 smallest; urosomites otherwise unornamented except for few hairs. Shape and ornamentation of caudal rami similar to female.

Antennule (Fig. 34) geniculate, of 7 articles, article 4 expanded, articles 4 and 7 each with esthetasc. Antenna and mouthparts similar to those of female.

Legs 1 and 2 similar to those of female except leg 2 endopodite (Fig. 35) with 3 short slender setae, these relatively shorter than corresponding setae of female. Leg 3 (Figs. 36–38) basipodite with long lateral seta (missing in allotype specimen, position indicated by broken lines in Figs. 36 and 37) inserted proximally to diagonal row of large spines along distal part of lateral margin; medial margin produced proximally into knob, and set with longitudinal row of about 14 small proximally directed spines between proximal knob and endopodite. Endopodite (indicated by arrows in Figs. 36 and 37) slender, seta-like, hyaline. Exopodite long, slender, produced into long distal hyaline tip and slender medially curved lateral claw; lateral

margin of exopodite with 2 groups of spines in proximal half, 4 spines of proximal group slender and curved, distal group consisting of 1 tiny proximalmost spine and 3 more distal stouter spines; medial surface of exopodite expanded proximally in small knob, medial surface also with small rounded knob at level of proximal group of lateral spines, and larger, notched, sclerotized knob set more posteriorly at level of distal group of lateral spines. Leg 4 (Figs. 39–42) exopodite article 1 with proximal 1/4 thickened, laterally curved, with lateral group of several spines at level of curve; exopodite otherwise slender, similar to that of female except longer terminal spiniform seta relatively longer than in female. Leg 4 endopodite consisting of hyaline structure divided distally into 6 pointed processes, these best visible in posterior view (Fig. 41), 5 short processes plus 1 long process extending slightly past distal end of exopodite 1, this latter process basally expanded, tapering distally, medially and anteriorly curved, haired along distal 2/3. Basipodite also with curved sclerotized claw inserted anteriorly and partly medially to endopodite; claw stout, base about 1/2 as broad as base of exopodite 1.

Leg 5 (Fig. 43) similar to that of female except medial margin less strongly curved and distomedial tip less pronounced. Setae similar to those of female except outermost seta more than twice as long as remaining 3 setae. Leg 6 consisting of unornamented trapezoidal flap.

ETYMOLOGY: Named for the collector, Margaret A. Palmer.

Comparisons

The records, biogeography, and ecology of most of the few species of *Parastenocaris* known from North America were reviewed by Whitman (1984). In addition, Strayer (1988) supplied partial figures of males of three previously undescribed species of this genus from interstitial habitats in the State of New York, without proposing names. Incomplete descriptions have led to doubt as to the status of several North American species. While the European *P. brevipes* (Kessler, 1913) has twice been recorded from North America (Pennak 1939; Wilson 1932), these early records are dubious. Likewise, the status of *P. wilsoni*, the name given by Borutzky (1952) to the species figured by Wilson (1932) under the name *P. brevipes*, needs to be verified (Rouch 1986). Without offering an opinion regarding the identity of *P. wilsoni*, I will compare it to *P. palmerae* on the basis of Wilson's (1932) description.

Parastenocaris palmerae is a member of the *brevipes*-group of Lang (1948), as are most known North American congeners, and can be distinguished from these by a series of characters. *Parastenocaris lacustris* Chappuis, 1957 (in Chappuis and Delamare Deboutteville 1957) has the lateral caudal seta or setae inserted in the proximal half of the caudal ramus, whereas *P. starretti* Pennak, 1939, *P. texana* Whitman, 1984, and *P. wilsoni* Borutzky, 1952 have the lateral and dorsal caudal setae inserted at midlength of the ramus. *Parastenocaris delamarei* Chappuis, 1957 (in Chappuis and Delamare Deboutteville 1957) is the only North American species that resembles *P. palmerae* in having the lateral caudal setae inserted in the distal half of the ramus.

Where described, the setation and shape of the fifth legs of most North American species differ from those of *P. palmerae*. The fifth legs of *P. lacustris* bear 2 setae in both sexes, and those of *P. wilsoni* bear 2 setae in the male and 3 setae in the female. Those of *P. delamarei* and *P. starretti* bear 3 setae in both sexes, and *P. texana* bears 3 setae in the male. Leg 5 of the female of

Parastenocaris texana bears 4 lateral setae, but in this species the leg is subtriangular, with the distal margin straight. Both sexes of all known North American species of *Parastenocaris* have the medial margin of leg 5 straight or convex; *P. palmerae* is unique in having the medial margin convex proximally and concave distally, although this shape is more pronounced in the female than in the male.

Parastenocaris sp. 1 of Strayer (1988) is most similar to *P. palmerae*. Only this species resembles *P. palmerae* in having the inner margin of the basipodite of leg 3 of the male with a longitudinal row of spines; these are very small, almost hair-line in the former species and large and more numerous in *P. palmerae* (confirmed by comparison of specimens). These species are also similar in having 2 medially placed knobs, 1 heavily sclerotized, on the leg 3 exopodite, but in *Parastenocaris* sp. 1 the knobs are close together at nearly the same level, opposite the proximal group of lateral spines. These spines, very slender in *P. palmerae*, are as stout as the distal group of lateral spines in *Parastenocaris* sp. 1. Likewise, the endopodite of leg 4 of the male is most similarly constituted in *Parastenocaris* sp. 1 and *P. palmerae*, consisting in both species of a complex hyaline basal structure with a long slender haired process, but in the former species the basal part of the endopodite is shallowly rounded rather than multiply incised as in *P. palmerae*, and has a single short spiniform distomedial process. Additional differences in leg 4 occur in the sclerotized claw, which in *Parastenocaris* sp. 1 is more slender and relatively about half the breadth of the claw of *P. palmerae*, and on the curved lateral margin of exopodite 1 there is a proximal group of fine hairs rather than the spines of *P. palmerae*.

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