

TWO NEW SPECIES OF *CIRROPHORUS* (POLYCHAETA: PARAONIDAE) FROM THE NORTHERN GULF OF MEXICO

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Abstract.—Two new species of paraonid polychaetes, *Cirrophorus perdidoensis* and *C. perkinsi*, are described from coastal waters off Perdido Key, Florida. The two species co-occur in moderately coarse sand substrate at depths from 1.6 to 7.0 m. *Cirrophorus perdidoensis* has slender, lyrate forked notosetae that are slightly asymmetrical; *C. perkinsi* has stout, acicular forked notosetae that are bayonet-shaped. The two new species and *C. juvenalis* (Hartmann-Schröder) are distinguished from other members of the genus by their small size, less than 4 mm, four or fewer pairs of branchiae, and by having two or more posterior segments reduced and represented only by dorsal podial lobes.

Specimens of two undescribed species of *Cirrophorus* occurred in benthic samples collected at Perdido Key (Escambia County), Florida, between October, 1989, and December, 1991. Sampling took place within the Gulf Islands National Seashore as part of a study on the effects of beach renourishment on shallow (1.6–7.0 m) near-shore sediments. Four transects (A–D), each consisting of nine stations ranging from 0 to 800 m from the beach, were established at 3 km intervals along the key. Samples were hand collected by SCUBA divers using 0.016 m² (12.5 cm sided) stainless steel box corers and screened through 0.5 mm mesh sieves. A more complete description of the study area and collecting methods was published by Rakocinski et al. (1993). Additional material from the Florida east coast and the Florida Keys is included. All material is associated with high salinity (28–35 ppt), highly oxygenated water (5.5–8.0 mg/l) and coarse sand substrate with the silt-clay composition not greater than 9%.

In his monograph of the Paraonidae, Strelzov (1973) combined the genera *Paraonides* Cerruti, 1909, and *Paradoneis* Hartman, 1965, with the genus *Cirrophorus* Ehlers, 1908, accounting for 10 species. He

defined the genus *Cirrophorus* as those species with forked setae, either lyrate, acicular, or both, present in some of the notopodial fascicles. The presence or absence of an unpaired cephalic antenna, previously the chief distinguishing character separating *Cirrophorus* from *Paradoneis*, was deemed less significant because of its age-related variability. The present work follows Strelzov's general definition of the genus except for the exclusion of *Paraonides*, as discussed below.

Some works published since Strelzov's 1973 revision retain the genus *Paradoneis* as distinct from *Cirrophorus*. This view apparently originated with Laubier & Ramos' opinion (1973:1141) that Strelzov, in his 1968 paper, mis-identified specimens of *C. lyriformis* collected in the Barents Sea and failed to cite Glémarec's (1966) description of *Paradoneis armata*. They felt that Strelzov probably had a mixture of species, including *P. armata*, in his Barents Sea material, some with and some without a prostomial antenna. Thus, his justification for synonymizing *Paradoneis* with *Cirrophorus* based on the insignificance of the antenna was unfounded. Katzmann & Laubier (1975:569) referred to this interpretation of Strelzov's 1968 work as rationale for re-

jecting the synonymy of the two genera, and papers that have since retained *Paradoneis* have cited Katzmann & Laubier (Hartley 1981, Castelli 1988, Mackie 1991). Strelzov (1973), however, upon re-examining specimens from two north Pacific collections, synonymized *C. lyriformis* with *C. branchiatus*, and included *Paradoneis armata* Glémarec, 1966, (as *Cirrophorus armata*), which differs from *C. branchiatus* mainly by the number of prebranchial setigers.

Strelzov included *Paraonides* under the genus *Cirrophorus* after observing lyrate notosetae in a specimen of *Paraonis* (*Paraonides*) *neopolitana* identified by Glémarec from the Bay of Biscay. This, the type species for the genus, was originally described by Cerruti (1909) from one specimen from the Gulf of Naples. Strelzov interpreted Cerruti's (1909) illustrations of leaf-shaped modified limbate notosetae as distorted lyrate setae caused by the specimen's orientation in the mounting medium; thus his conclusion that the species belonged to *Cirrophorus*. This opinion was disputed as circumstantial by Katzmann & Laubier (1975) and Castelli (1988) mainly because Strelzov did not use specimens from the type locality in his analysis. *Paraonides neopolitana* was redescribed as lacking lyrate notosetae by Fauvel (1927) and Laubier & Paris (1962); the species was reported from Mediterranean waters by Laubier & Paris (1962), Castelli (1988), and Katzmann & Laubier (1975). A short review of *Paraonides* listing six species was presented in the latter work.

Another species listed by Strelzov, *Cirrophorus harpagoneus*, was regarded as a junior synonym of *Paradoneis* (= *Cirrophorus*) *armata* by López-Jamar et al. (1987) after comparison of the holotype of *C. harpagoneus* with para- and topotype material of *C. armata*.

Since Strelzov's 1973 monograph, three additional species of Paraonidae with notopodial forked setae were described that should be transferred to the genus *Cirrophorus*: *Paraonis* (*Paradoneis*) *juvenalis* Hart-

mann-Schröder, 1974, *Paradoneis ilvana* Castelli, 1985, and *Paradoneis eliasoni* Mackie, 1991. An updated list comparing species belonging to *Cirrophorus* is presented in Table 1.

Few records exist of *Cirrophorus* in the Gulf of Mexico. Gaston (1984) reported scattered occurrences of *Cirrophorus branchiatus*, *C. cf. forticirratus*, and *C. americanus* in the northeastern Gulf and off Texas. Taylor (1971) reported *C. furcatus* from a few stations in lower Tampa Bay, Florida. It is possible that because of their small size (i.e., less than 4 mm long) the two species described herein have been confused with juveniles of larger species; however, most specimens contained large eggs or sperm masses in their abdominal segments, indicating that they were mature.

Holotypes, paratypes, and additional material from the type locality are deposited in the National Museum of Natural History, Smithsonian Institution (USNM), Washington, D.C. Other specimens are deposited in the museum of the Gulf Coast Research Laboratory (GCRL), Ocean Springs, Mississippi, the Marine Invertebrate Collection of the Florida Marine Research Institute, Department of Natural Resources (FSBC I), St. Petersburg, Florida, and in the personal collections of the authors.

Family Paraonidae Cerruti, 1909

Genus *Cirrophorus* Ehlers, 1908

Cirrophorus perdidoensis, new species

Fig. 1

Type material.—Northwest Florida, Perdido Key (30°17'31"N, 87°25'12"W). Holotype (USNM 168090), thirty paratypes (20, USNM 168091; 10, GCRL 1303), Station A9, 6 Oct 1989, 5.5 meters depth, sediment type: 99.7% sand, 0.3% silt-clay.

Additional material examined.—Perdido Key: 51 specimens from 19 collections, made between 20 Sep 1990 and 3 Dec 1991, 2.1–7.0 m depth, sediment type and hydrographic conditions similar to type material

Table 1.—List of species in the genus *Cirrophorus* with some comparative morphological characteristics for worms of maximum size. Includes data published by Glémarec (1966), Strelzov (1973), Hartmann-Schröder (1974), Castelli (1985), and Mackie (1991).

Species	Forked notosetae		Cephalic antenna	Acicular neurosetae	Prebranchial setigers (no.)	Branchiae (pairs)	Setigers (no.)
	Type	Start setiger					
<i>Cirrophorus perkinsi</i> n.sp.	acicular	2	absent	absent	3	3-4	37
<i>C. juvenalis</i> (Hartmann-Schröder, 1974)	acicular	4	absent	absent	3	1	36
<i>C. lyra</i> (Southern, 1914)	lyrate	1-6	absent	absent	3	12-14	108+
<i>C. perdidoensis</i> n.sp.	lyrate	3	absent	absent	3	3-4	42
<i>C. forticirratius</i> Strelzov, 1973	lyrate	4-6	absent	absent	3-4	17	104
<i>C. abbranchiatus</i> (Hartman, 1965)	lyrate	7-17	absent	absent	0	0	75
<i>C. eliasoni</i> (Mackie, 1991)	lyrate	4-8	absent	present	3	12	86+
<i>C. americanus</i> Strelzov, 1973	lyrate	2-3	present	present	3	46	90+
<i>C. furcatus</i> (Hartman, 1957)	lyrate	3	present	absent	3	33	70+
<i>C. brevicirratius</i> Strelzov, 1973	lyrate	6	present	absent	3	14-15	97
<i>C. armatus</i> (Glémarec, 1966)	both	3-10, lyrate 17-18, acicular	absent	absent	3	19	140
<i>C. ilvana</i> (Castelli, 1985)	both	4, lyrate 12-13, acicular	absent	absent	3	10	80
<i>C. branchiatus</i> Ehlers, 1980	both	5-8, lyrate 8-18, acicular	present	absent	4-5	25	140+

(USNM 168092, USNM 168093, USNM 168094, USNM 168095, USNM 168096, USNM 168097, USNM 168098, USNM 168099, USNM 168100, USNM 168101, USNM 168102, GCRL 1304, GCRL 1305, GCRL 1306, GCRL 1307, GCRL 1308, FSBC I 54472, FSBC I 54473, FSBC I 54474, FSBC I 54475). Florida Keys: Pigeon Key (24°50'N, 80°45'W), 1 specimen in seagrass kicknet sweeps, 1 m, coarse coralline sand, collected 17 Oct 1991 by J. McLelland.

Description.—Holotype 2.9 mm total length, 39 setigers, maximum body width 0.12 mm. Body circular in cross section. Prostomium approximately 1.5 times longer than wide, rounded anteriorly, lacking antenna (Fig. 1B). Pair of small, subdermal, reddish-orange eye spots, distinct but faint in preserved specimens. Two ciliary bands on head, anteriormost limited to dorsal surface anterior to eye spots, posterior band emerging laterally from nuchal slits and circumscribing ventral surface. Ciliary bands present on dorsum of prebranchial and branchial segments. First segment setigerous. Branchiae three (rarely four) pairs, beginning on setiger 4, each as long as segment width, lateral margins ciliated. Dorsal podial lobes (postsetal) short, tuberculate on prebranchial setigers, prominent and uniform in length on setigers 4 through 9; becoming tuberculate and reduced in size on setigers 10–31, then progressively longer toward end of body beginning 3–5 setigers from end. Pygidial region (Fig. 1C, D) with nine cirri consisting of three pairs arranged dorsolaterally to ventrolaterally, apparently representing dorsal podial lobes of three reduced segments, and three anal cirri, a single ventromedial one and a lateral pair; posterior cirri of nearly equal length, longer than pygidium, approximately as long as dorsal podial lobes of last setiger. Forked setae relatively slender, asymmetrically lyrate (Fig. 1E), one tine up to twice length of other, tines of equal thickness; occurring singly in inferior notopodial position from setiger 3

to at least 4th setiger from end. Remaining notosetae and all neurosetae simple capillaries.

Remarks.—Among the additional material examined, the number of setigers varied between 30 and 42; the largest specimen observed was 3.5 mm long. A few specimens were observed with four pairs of branchiae. In the posterior regions of several specimens, large eggs, nearly equal to the body width in diameter, occurred and dark granular material (sperm masses?) was observed in some presumed males. Similar gonadal conditions were also observed for *C. perkinsi* except that the eggs appeared proportionally smaller.

Cirrophorus perdidoensis is unique among members of the genus for its combination of small size, lyrate forked setae, and four or fewer pairs of branchiae. Among *Cirrophorus* species having lyrate forked setae, *C. perdidoensis* is similar to *C. furcatus* and *C. lyra* by having such setae beginning on the 3rd setiger, and by having podial lobes in the branchial region of uniform length and substantially longer than those of the prebranchial and most of the postbranchial lobes (Strelzov 1973, Mackie 1991). *Cirrophorus perdidoensis* differs from the former species, however, by lacking a cephalic antenna, and from both species by having substantially fewer setigers and pairs of branchiae (Table 1).

Etymology.—The specific name refers to the type locality, Perdido Key, Florida.

Cirrophorus perkinsi, new species Fig. 2

Type material.—Northwest Florida, Perdido Key (30°17'31"N, 87°25'12"W). Holotype (USNM 168103), two paratypes (USNM 168104), station A9, 12 Dec 1990, 6.1 meters depth, sediment type: 95.4% sand, 4.6% silt-clay.

Additional material examined.—Perdido Key: 58 specimens from 11 collections made between 6 Oct 1989 and 3 Dec 1991, 1.6–

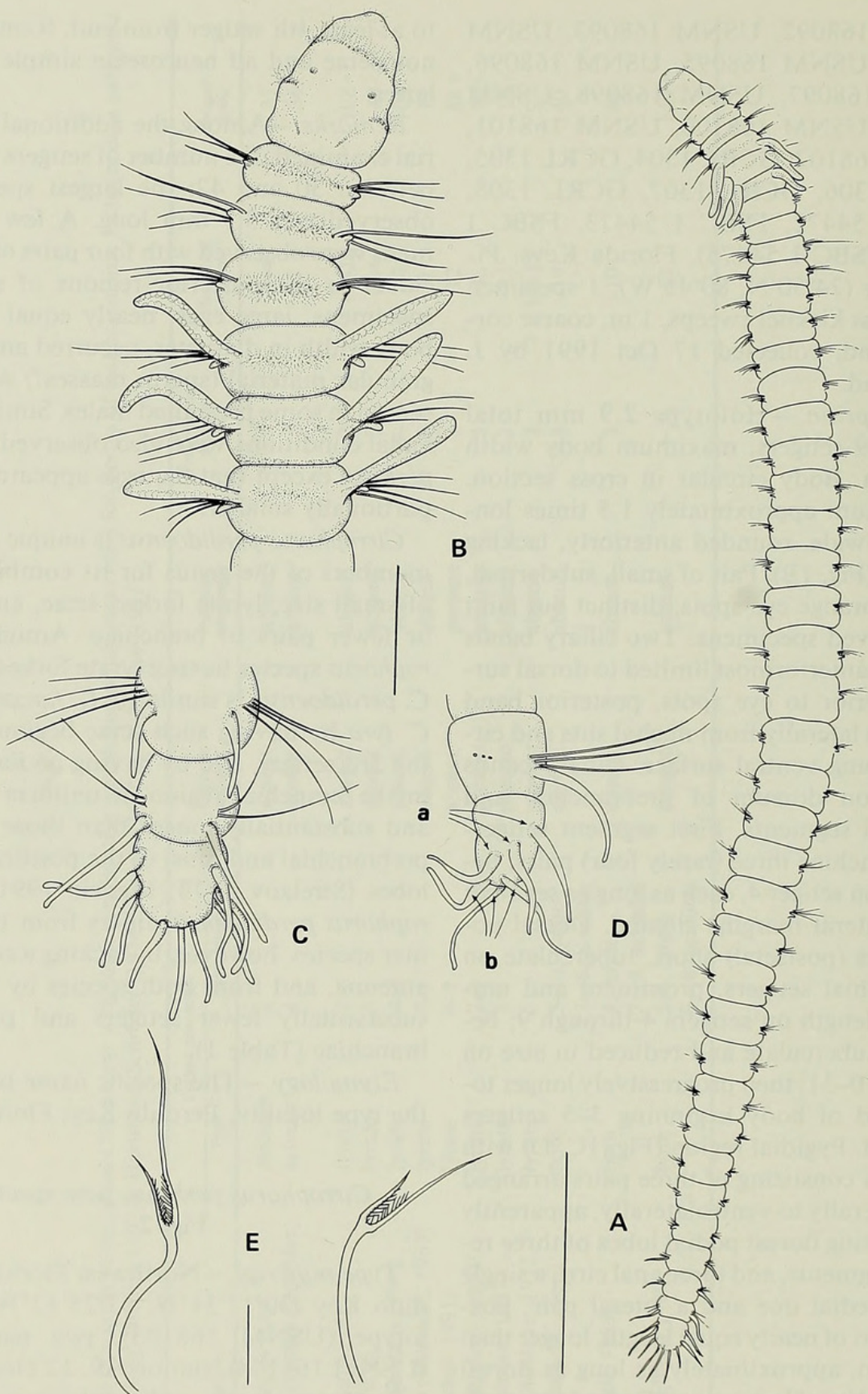


Fig. 1. *Cirrophorus perdidoensis*, new species. A. Entire animal, dorsal view. B. Anterior end, dorsal view. C. Posterior end, dorsal view. D. Posterior end, lateral view, neurosetae and cirri from right side omitted (a, podial lobes of reduced segments; b, anal cirri). E. Lyrate forked notosetae. Scales: A = 0.5 mm, B, C, and D = 0.1 mm, E = 0.01 mm.

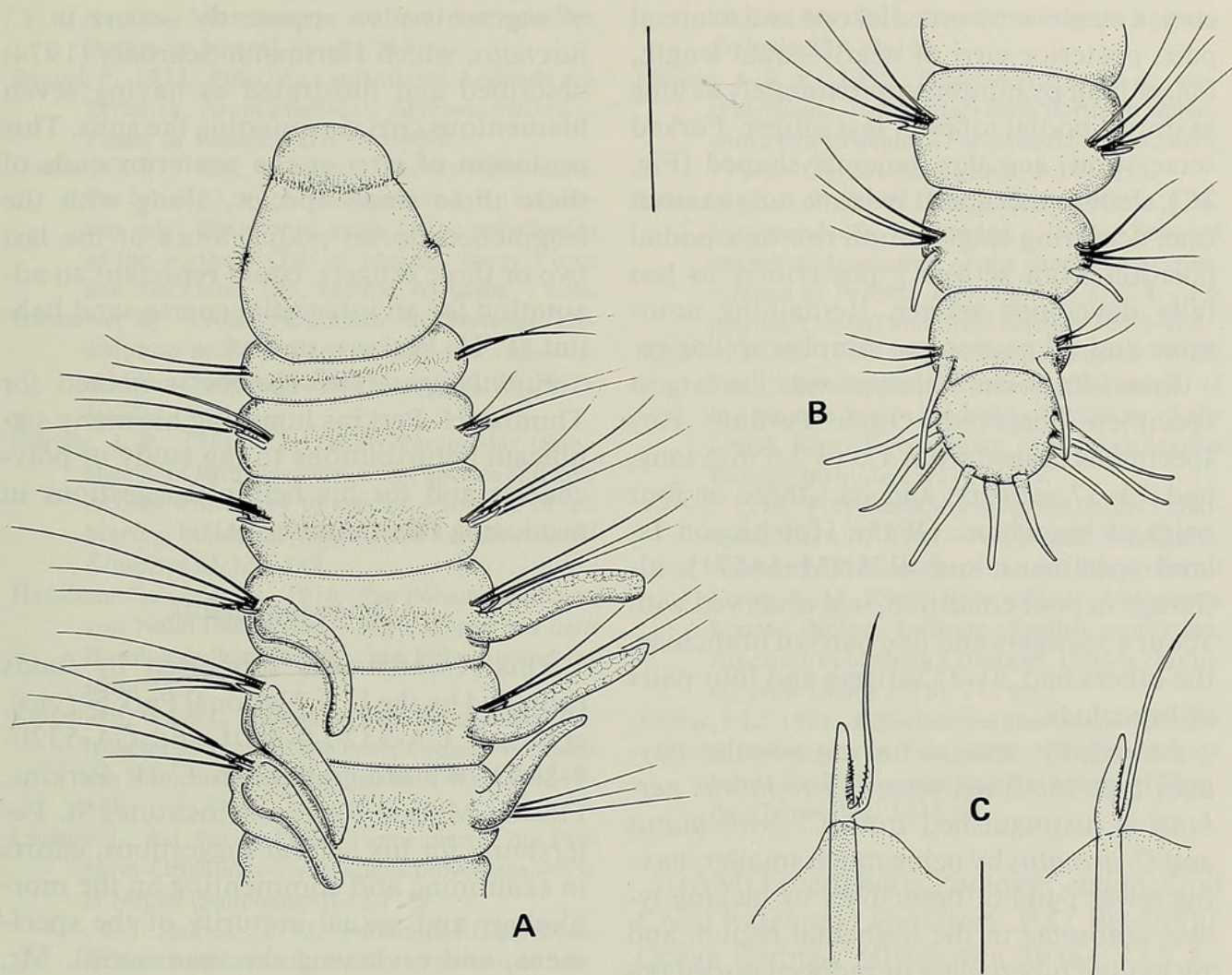


Fig. 2. *Cirrophorus perkinsi*, new species. A. Anterior end, dorsal view. B. Posterior end, dorsal view. C. Acicular forked notosetae. Scales: A, B = 0.1 mm, C = 0.01 mm.

7.0 m depth, sediment type and hydrographic conditions similar to type material (USNM 168105, USNM 168106, USNM 168107, USNM 168108, GCRL 1309, GCRL 1310, GCRL 1311, GCRL 1312, GCRL 1313, GCRL 1314, FSBC I 54476, FSBC I 54477). Florida east coast: six specimens from three collections off Hutchinson Island, St. Lucie County (27°21'N, 80°13'W), 10 May 1972 (USNM 54571), 2 Nov 1972 (FSBC I 39860) and 14 Mar 1977 (FSBC I 39861), all 10.9 m depth.

Description. — Holotype 2.5 mm total length, 37 setigers, maximum body width 0.18 mm. Body circular in cross section. Prostomium approximately 1.7 times longer than wide, rounded anteriorly, lacking

antenna; eye spots absent (Fig. 2A). Two ciliary bands on head, anteriormost limited to dorsal surface, posterior band emerging laterally from nuchal slits and circumscribing ventral surface. Ciliary bands present on dorsum of prebranchial and branchial segments. First segment setigerous. Branchiae simple, three to four pairs, beginning on setiger 4, each longer than width of segments, lateral margins ciliated. Dorsal podial lobes absent or reduced to small, indistinct tubercles on all but posterior two setigers where they are well-developed. Pygidial region (Fig. 2B) with nine cirri consisting of three pairs arranged dorsolaterally to ventrolaterally, apparently representing dorsal podial lobes of three reduced segments, and three anal

cirri, a single ventromedial one and a lateral pair; posterior cirri of nearly equal length, longer than pygidium, approximately as long as dorsal podial lobes of last setiger. Forked setae stout, acicular, bayonet-shaped (Fig. 2C), slender tine about twice as long as stout tine; occurring singly in inferior notopodial position from setiger 2 posteriorly to last fully developed setiger. Remaining notosetae and all neurosetae simple capillaries.

Remarks.—The holotype was the largest specimen observed. Other Perdido Key specimens ranged from 1.5 to 2.5 mm long, had 23–37 setigers, and had three or four pairs of branchiae. Of the Hutchinson Island specimens, one (USNM 54571), although in poor condition, was observed with about 45 setigers and five pairs of branchiae; the others had 30–35 setigers and four pairs of branchiae.

Among the species having acicular bayonet type modified setae, *Cirrophorus perkinsi* is distinguished from *C. branchiatus* and *C. armatus* by being much smaller, having fewer pairs of branchiae, by lacking lyrate notosetae in the branchial region, and by having tuberculate or reduced dorsal podial lobes throughout the body except for the pre-anal region. *Cirrophorus perkinsi* further differs from *C. branchiatus* by having three prebranchial segments instead of 4 or 5. *Cirrophorus juvenalis*, a small species from southern Africa, is similar to *C. perkinsi* in having only acicular type specialized notosetae and undeveloped notopodial postsetal lobes on all but the last two setigers, but *C. juvenalis* differs from *C. perkinsi* in having the specialized notosetae beginning on the 4th setiger rather than the 2nd setiger and having only one pair of branchiae rather than three or more (Table 1).

A reduction of three pre-anal segments, resulting in two remnant podial lobes per segment and a disappearance of setae, apparently occurs in *C. perkinsi* and in *C. perdidoensis*, giving the appearance of a pygidial region with nine anal cirri rather than the characteristic three. A similar reduction

of segments also apparently occurs in *C. juvenalis*, which Hartmann-Schröder (1974) described and illustrated as having seven filamentous cirri surrounding the anus. This profusion of cirri at the posterior ends of these three small species, along with the lengthened dorsal podial lobes of the last two or three setigers, could represent an adaptation for an interstitial coarse sand habitat (T. H. Perkins, in litt.).

Etymology.—The species is named for Thomas H. Perkins honoring his many significant contributions to the study of polychaetes and for his helpful suggestions in producing this manuscript.

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