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NEW GENUS AND TWO NEW SPECIES OF THARYBIDAE (COPEPODA CALANOIDA) FROM THE GULF OF MEXICO WITH REMARKS ON THE STATUS OF THE FAMILY

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ABSTRACT

A brief historical review of the family is presented. Several salient characters common to the Tharybidae, Scolecithricidae, Phaennidae, and Diaixidae are discussed. It is suggested that these families comprise a natural group within the Paracalanina.

The present difficulties in separating the Scolecithricidae from the Tharybidae on the basis of existing diagnoses are pointed out. The need for a thorough revision of the Scolecithricidae is stressed. Adding to previous revision of the Tharybidae, it is proposed that *Pseudotharybis* Scott, together with its two species, *P. zetlandicus* Scott and *P. dubia* Scott, be treated as incertae sedis. These taxa appear to lack characters fundamental to the other members of the family.

A diagnosis is presented for a new genus, *Parundinella*, that is related to *Undinella* Sars. The new genus is compared to other genera of the family in a synoptic key. Two new species of *Parundinella* from the Gulf of Mexico, *P. spinodenticula* (the generotype) and *P. manicula*, are described.

NEW GENUS AND TWO NEW SPECIES OF THARYBIDAE (*COPEPODA CALANOIDA*) FROM THE GULF OF MEXICO WITH REMARKS ON THE STATUS OF THE FAMILY

By Abraham Fleminger, *Fishery Research Biologist*

Two heretofore undescribed species representing a new genus of an obscure family of marine calanoids, the Tharybidae, have been found during studies on the copepod fauna of the Gulf of Mexico. The plankton samples that contained these forms are part of the extensive collections made by the U. S. Fish and Wildlife Service M/V *Alaska* in the Gulf of Mexico between 1951–1953. Apparently, this is the first record of tharybids from the western North Atlantic region.

REMARKS ON THE THARYBIDAE

Sars (1902) originally conceived of the family name Tharybidae to place *Tharybis macrophthalma* Sars, a northeastern Atlantic species of the monotypic genus *Tharybis* Sars. A second genus, *Pseudotharybis*, was added by Scott (1909a) for two species from waters off the British Isles. Tanaka (1937) proposed a third genus (monotypic) for a species from Suruga Bay, Japan, which Brodski (1950) recently synonymized under *Undinella* Sars. Brodski also removed *Undinella*, together with its three species, from the Scolecithricidae and placed it within the tharybid complex. It is apparent from the available data that Brodski's tharybid revision was justified.

The position of the Tharybidae in relation to the remaining families of the Calanoida has not been established satisfactorily. Although the family is usually included in Sars' section, the Isokerandria, it is now widely recognized that this section constitutes a heterogeneous complex unacceptable to a natural system. At present, it seems best to place the tharybids under Gurney's superfamily, Paracalanina, in a subgroup following the Phaennidae, the Scolecithricidae, and the Diaixidae. Although there is as yet little tangible evidence to support this move, it is noteworthy that these families are similar in the following basic characteristics: (1) the occurrence of sensoriform filaments and falcate spines on the second maxillae, (2) organization of the fifth legs, (3) segmentation of the swimming legs, and (4) form of the rostrum. Moreover, in the above order these families present an apparently natural and progressive line of development, to the extent of secondary specialization of the appendages (e. g., atrophy of the male cephalic appendages, complexity of the sensoriform filaments, development of the fifth legs, spinulation and flattening of the swimming legs). Admittedly, these similarities and their serial relations have been somewhat overgeneralized, but they strongly suggest a closer relation between these families than that generally held at present.

The need for a formal description of the tharybid complex is urgent but the lack of sufficient details concerning most of the species prevents its presentation at this time. For example, attempts at precise separation of the tharybids and scolecithricids meet with difficulty. The usual structures of significance (such as body and appendage segmentation, as well as arrangement and setal ornamentation of appendages) are for the most part similar, or at least tend to intergrade between the two families. In this respect *Scolecithricella ctenopus* (Giesbrecht) and the new genus described present major obstacles to such a separation.

Thus far a survey of the literature and study of a limited quantity of reference material has revealed that only the swimming legs appear to exhibit consistent differences. As to the thary-

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bids, in addition to the lack of conspicuous spinulation on the anterior and posterior faces of the rami, the endopodal segments are not broadened, nor is the lateral margin lamelliform and produced distad in a prominent spiniform process. Other distinguishing characteristics may be forthcoming from consideration of the mouth parts, especially the mandibular dentition, and the number of setae on the first and second maxillae. It should be stressed that thorough revision of the Scolecithricidae, suggested previously by Vervoort (1951), and restudy of extant tharybid material is necessary to resolve the present confusion.

Within the Tharybidae further revision is needed to complete the foundation laid down by Brodski. It appears that *Pseudotharybis* Scott must be removed from the family. According to Scott (1909a) the generotype (*P. zetlandicus* Scott) is distinguished from *Tharybis* by the lack of sensoriform filaments on the second maxillae and by the truncate nature of the mandibular gnathal lobe. As mentioned, the sensoriform filaments are characteristic of all other known species of Phaennidae, Scolecithricidae, Diaixidae, and Tharybidae. Although their function remains to be established, it seems obvious from preliminary examinations (unpublished data) that these filaments are significant, if not vital, sensory receptors. Moreover, many other workers have already suggested their probable sensory function. It does not seem reasonable, therefore, to assume that these filaments are secondarily lost in *Pseudotharybis*, nor is there any evidence that Scott's genus represents primitive tharybid stock.

There are also fundamental differences between the tharybids and known species of *Pseudotharybis* regarding the mandibular gnathal lobe. In contrast to that described by Scott for *Pseudotharybis*, the tharybid gnathal lobe is typically elongate and the teeth, excepting the two most ventral, tend to be spiniform or styliform.

Although Scott's (1909a, b) descriptions of both *Pseudotharybis* and his two species included therein, *zetlandicus* and *dubia*, are inadequate for determination of their actual phyletic relations, the eventual removal of these taxa from the tharybid complex appears a virtual certainty. For example, there are several interesting points of similarity between *Pseudotharybis* and *Drepanopsis* Wolfenden. Pending restudy of Scott's material however it is proposed that the genus and its species be treated as incertae sedis.

Genus *Parundinella*, new genus

Description.—Tharybids resembling those of the genus *Undinella*, according to Sars (1900:51) and Brodski (1950:275), although considerably smaller in size. Cephalon fused with thoracic segment I, thoracic segment IV fused with segment V; terminal portions of fusion segment IV–V produced posteriad in lobiform or spiniform processes; genital segment symmetrical, swollen laterad at midportion, ventral portion at most only weakly produced. Abdomen with 4 segments in female, 5 in male; anal segment in both sexes reduced in length, considerably shorter than preceding segment. Rostrum with simple bifurcated basal portion; each bifurcation articulating with a slender filament. First antennae with segments 8–9, 24–25 fused in female; segments 8–10, 20–21, 24–25 fused in male. Mandibular gnathal lobe elongate; only 3–4 monocuspidate spiniform teeth present, confined to dorsalmost portion of lobe. First maxillae with inner lobe 1 moderate in size, not broad or truncate. Second maxillae with lobe 5 bearing two sensoriform filaments, one normal seta, one enlarged falcate seta; terminal segments with 5–6 sensoriform filaments; filaments occasionally with apical flagellum. Exopodite of legs 1–4 three-segmented; endopodite of leg 1 one-segmented, leg 2 two-segmented, legs 3–4 three-segmented. External exopodal spines of legs 2–4 ornamented with small denticles along upper and lower margins. Female fifth legs minute, two-segmented; terminal segment with one or more distal acuminate processes and one robust medial spine bearing ventral spinules. Male fifth legs biramous, asymmetrical; left exopodite three-segmented, left endopodite two-segmented; right exopodite two-segmented, right endopodite in part fused with second basal segment. Remaining structures as in family.

P. spinodenticula, new species, is herewith designated the generotype of the new genus.

SYNOPTIC KEY TO THE GENERA OF THARYBIDAE

1. Segments 24 and 25 of first antennae fused; mandibular gnathal lobe with 3–4 monocuspidate spiniform teeth; female fifth legs with 2 segments; male right fifth leg with conspicuous endopodite; external exopodal spines of legs 2–4 bearing marginal denticles ..... *Parundinella*

   Segments 24 and 25 of first antennae separate; mandibular gnathal lobe with more than 4 monocuspidate spiniform teeth; female fifth legs with 3 segments; male right fifth leg with endopodite vestigial or lacking; external exopodal spines of legs 2–4 not ornamented or bearing fine hairs 2

2. Thoracic segment I and cephalon partially separated; segments IV and V fused or separated; rostrum with bifid basal portion; first maxillae with inner lobe 1 not of greater surface area than remaining lobes and rami, endopodite extending to or beyond distal border of inner lobe 1, exopodite with 2–3 setae; maxillipeds with segment 2 of uniform thickness; female fifth legs with segments more or less equal in length; terminal spine of legs 2–4 with fine shallow serrations; lobes of second maxillae crowded within distal half of appendage ..... *Undinella*

   Thoracic segment I fused with cephalon, segments IV and V fused; rostrum with rounded knob-like basal portion bearing 2 long filaments; first maxillae with inner lobe 1 large, extending beyond remainer of appendage, exopodite with 5 setae; maxillipeds with segment 2 swollen, greatest thickness at midlength; female fifth legs with terminal segment longer than preceding 2; terminal spine of legs 2–4 with coarse deep serrations; lobes of second maxillae extend over more than half of appendage ..... *Tharybis*

It is noteworthy that several of the characters used in separating the 3 genera tend to intergrade as follows: (1) ratio of surface area of inner lobe 1 to remaining lobes and rami of first maxillae (largest in *Tharybis;* less in *Undinella;* smallest in *Parundinella*); (2) segmentation of female fifth legs (3 segments of about equal length in *Undinella;* basal and mid-segments considerably reduced in *Tharybis;* loss of 1 segment, presumably the second, and reduction of basal segment in *Parundinella*); (3) segments 24 and 25 of the first antennae (separate in *Tharybis* and *Undinella;* fused in *Parundinella spinodenticula,* new species, but partially separated in *P. manicula,* new species).

Parundinella spinodenticula, new species

PLATE 1, FIGS. 1–16; pl. 2, FIGS. 1–11.

Localities, Material.—Gulf of Mexico: lat. 22° 20′ N., long. 87° 31′ W., (*Alaska,* cruise 4, station 11, 13 January 1952, 1 meter depth of plankton tow; 2 adult females, 1 intersexed individual); lat. 23° 18′ N., long. 97° 38′ W., (*Alaska,* cruise 2, station 11, 7 June 1951, 1 m. depth of plankton tow; 1 adult male).

Measurements.—Specimens measured in dorsal view. Length of cephalothorax along midsagittal plane from anteriormost limit of forehead to posterior margin of intersegmental membrane between thoracic fusion segment IV–V and genital segment; length of abdomen from anterior margin of genital segment to posteriormost limit of right furcal ramus. Measurements made at 100x magnification with aid of ocular micrometer; specimens immersed in aqueous solution of 50 percent glycerine. Slender glass rods used to support cephalothorax and abdomen in horizontal position during measurements of each specimen.

Measurements given include total length (TL) and cephalothorax-abdomen length ratio (CAR).

1. ADULT FEMALE: (holotype) TL 0.84 mm., CAR 3.1:1; (paratypes) TL 0.83 mm.; TL 0.84 mm.
2. ADULT MALE: TL 0.74 mm.; CAR 2.7:1.

Description.—A minute tharybid characterized at low magnifications by a robust ovate cephalothorax with first antennae extending to thoracic fusion segment IV–V and a short slender abdomen about half as long as the fourth pair of swimming legs.

ADULT FEMALE: Cephalothorax robust, greatest depth between maxillipeds and first legs; forehead strongly vaulted (pl. 1, figs. 3, 5; pl. 2, fig. 11). Rostrum with distal half of basal portion bifid, each process bearing a short rostral filament (pl. 1, fig. 8). Terminal portions of thoracic fusion segment IV–V in lateral view produced in a triangular lappet with rounded apex, extending posteriad beyond midlength of genital segment (pl. 1, figs. 3, 5).

Genital segment in dorsal view with moderate lateral swellings confined to anterior three-fourths of segment; segment narrowed abruptly just posterior to seminal receptacles (pl. 1, figs. 5, 16). Four abdominal segments and furcal rami with proportional lengths taken along midsagittal plane of 37, 19, 19, 8, 17 (=100). Furcal rami approximately twice as long as broad, each bearing 6 setae; 4 most terminal setae elongated, almost equal in length; lateral and medial setae shorter than ramus, unequal in length (pl. 1, fig. 5).

Cephalic appendages differing in several details from corresponding appendages of *Tharybis.* First antennae (pl. 1, fig. 4) with 23 visible seg-

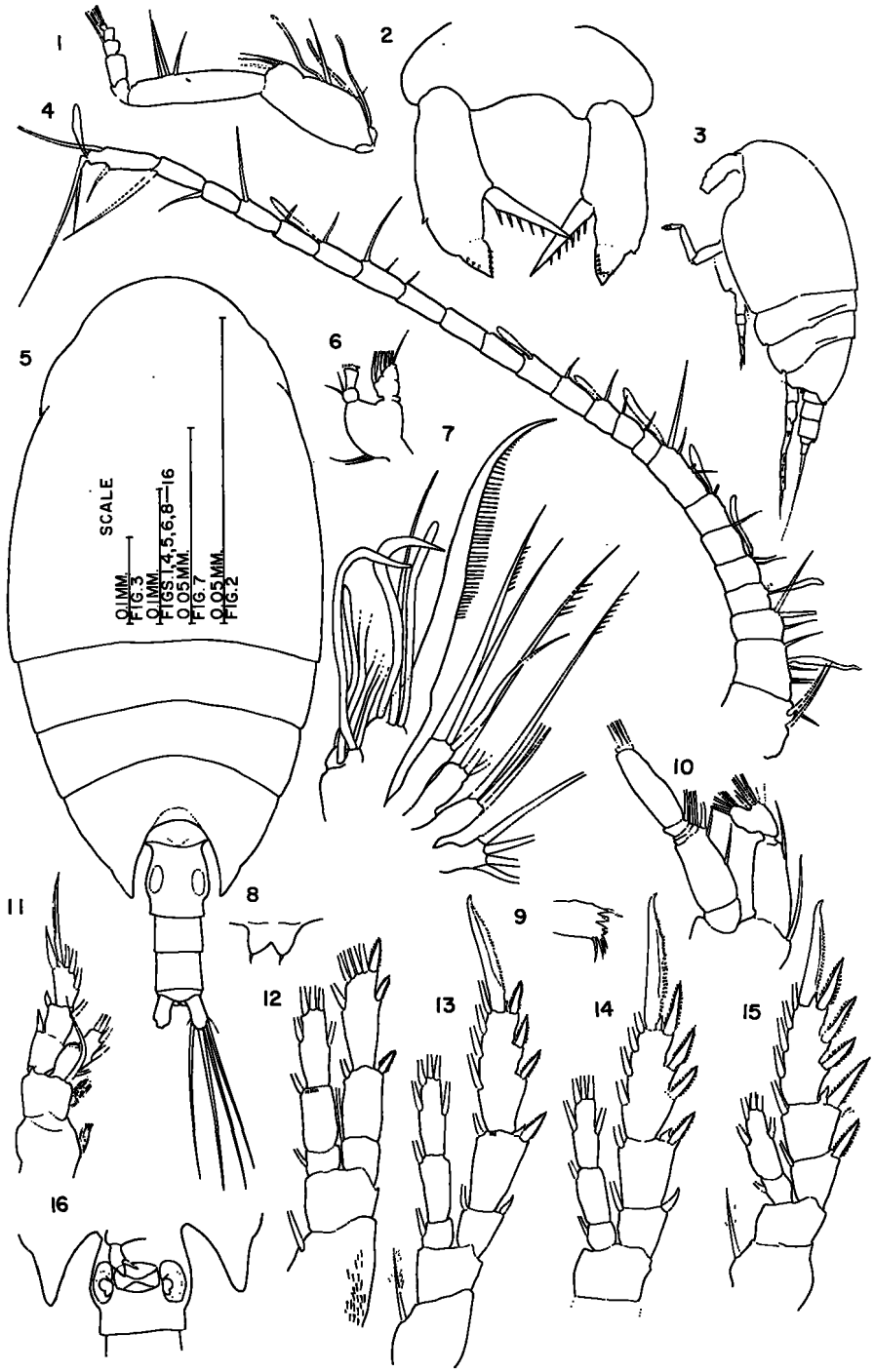

PLATE 1.—*Parundinella spinodenticula*, new species. Female: 1, Maxilliped; 2, Fifth legs; 3, Trunk, lateral view; 4, First antenna; 5, Trunk, dorsal view; 6, Mandibular palp; 7, Lobes of second maxilla; 8, Rostrum, anterior view; 9, Mandibular gnathal lobe; 10, Second antenna; endopodite with inner lobe of segment 2 damaged, lacking one or more setae; 11, First leg; 12, Fourth leg, abnormal; 13, Fourth leg; 14, Third leg; 15, Second leg; 16, Genital segment, fifth leg, terminal thoracic segment, ventral view. (All figures drawn with aid of camera lucida; all except figure 12 of holotype.)

ments, about as long as cephalothorax. Mandibular gnathal lobe (pl. 2, fig. 2) with more than half the cutting area comprised of molariform teeth, only dorsalmost 3 teeth setiform. First maxillae (pl. 2, fig. 8) with endopodite two-segmented, not fused with second basal segment; inner lobe 1 with 12 robust spines; lobe less than half total area of appendage. Second maxillae (pl. 1, fig. 7; pl. 2, fig. 9) with lobe 5 bearing two sensoriform filaments, one seta, and one robust falcate spine; terminal segments with total of approximately 5 sensoriform filaments (exact number could not be determined), each somewhat elongated, exceedingly thin-walled, and flexible; filaments apparently unspecialized at apex. Maxillipeds (pl. 1, fig. 1) with first segment bearing three sensoriform filaments and 2 setae on proximal lobe.

Swimming legs 1–4 as figured (pl. 1, figs. 11, 13–15); leg 4 approximately twice as long as abdomen (pl. 1, fig. 3). Leg 1 with each segment of exopodite bearing an external spine; spines unequal in length; endopodite with rounded lateral shoulder bearing numerous spinules. External exopodal spines of legs 2–4 with sagittiform denticles ornamenting upper and lower margins.

Fifth legs minute, symmetrical, uniramous, two-segmented (pl. 1, fig. 2); basal fusion segment shared by left and right rami; each unisegmental ramus with total of 3 processes, an apical cone bearing spinules along lateral and medial margins, a robust medial spine bearing a ventral row of spinules, and a small lateral spur just proximal to apical cone.

ADULT MALE: Thorax, cephalic appendages except for first antennae, and swimming legs similar to those in female. First antennae with 21 visible segments (pl. 2, fig. 1). Abdomen with 5 segments and furcal rami; second segment longest, anal segment shortest.

Fifth legs biramous; first basal segments partially fused, second basal segments separate, unequal in length, left side longer. Right exopodite with first segment elongated, curving mediad; second segment reduced, bearing 1 apical seta. Right endopodite with first segment fused to basal segment, second segment reduced, weakly sclerotized. Left exopodite three-segmented, proximal segment longest; short distal segment bearing terminal and proximal spines, medial face hirsute. Left endopodite two-segmented, shorter distal segment scoop-like.

Types (*cf. Localities, Material*).—All deposited in United States National Museum. Female holotype, No. 99189, selected from material of *Alaska*, cruise 4, station 11. Paratypes, Nos. 99190–99191.

Remarks.—The new species can be readily identified by the following combination of characters: the denticulated external spines of the swimming legs; the terminal lappets of thoracic fusion segment IV–V, which, in lateral view, are somewhat triangular and cover most of the genital segment; the conical apex and medial spine of the female fifth legs; the unusual endopodite of the male right fifth leg, consisting of an elongated process fused to the second basal segment and bearing a reduced apical segment.

Parundinella manicula, new species

PLATE 2, FIG. 12; PL. 3, FIGS. 1–13

Localities, Material.—Gulf of Mexico: Lat. 23° 18′ N., long. 97° 38′ W., (*Alaska*, cruise 2, station 11, 7 June 1951, 1 m. depth of plankton tow; two adult females).

Measurements.—Techniques as in preceding species.

ADULT FEMALE: two specimens, each with similar dimensions; TL 0.81 mm., CAR 3.0:1.

Diagnosis.—In general resembles *P. spinodenticula*, differing chiefly in details of rostrum, thoracic fusion segment IV–V, and swimming legs.

Terminal portion of each side of thoracic fusion segment in lateral view produced in short spiniform process barely overlapping genital segment (pl. 3, fig. 5). Rostrum with filaments longer than basal portion (pl. 2, fig. 12; pl. 3, fig. 7). Second maxillae with terminal segment bearing 6 sensoriform filaments; lobe 5 with 2 such filaments; at least 4 maxillary filaments with flagelliform apex (pl. 3, fig. 4). Leg 1 with shoulder of endopodite conical, bearing encircling row of spinules (pl. 3, fig. 12). Legs 2–4 with external spines of exopodite bearing fine hair-like denticles; endopodites of legs 2–3 with moderate number of spinules on posterior face (pl. 3, figs. 9–11). Fifth legs with two segments; basal segment reduced; terminal portion of distal segment with 3 outstretched spiniform processes fringed with hairs; medial margin of distal segment with robust spine bearing ventral row of spinules; face of distal segment ornamented with unevenly distributed spinules (pl. 3, fig. 13).

Types (cf. *Localities*).—The two adult females, from which *P. manicula* is described, were dis-

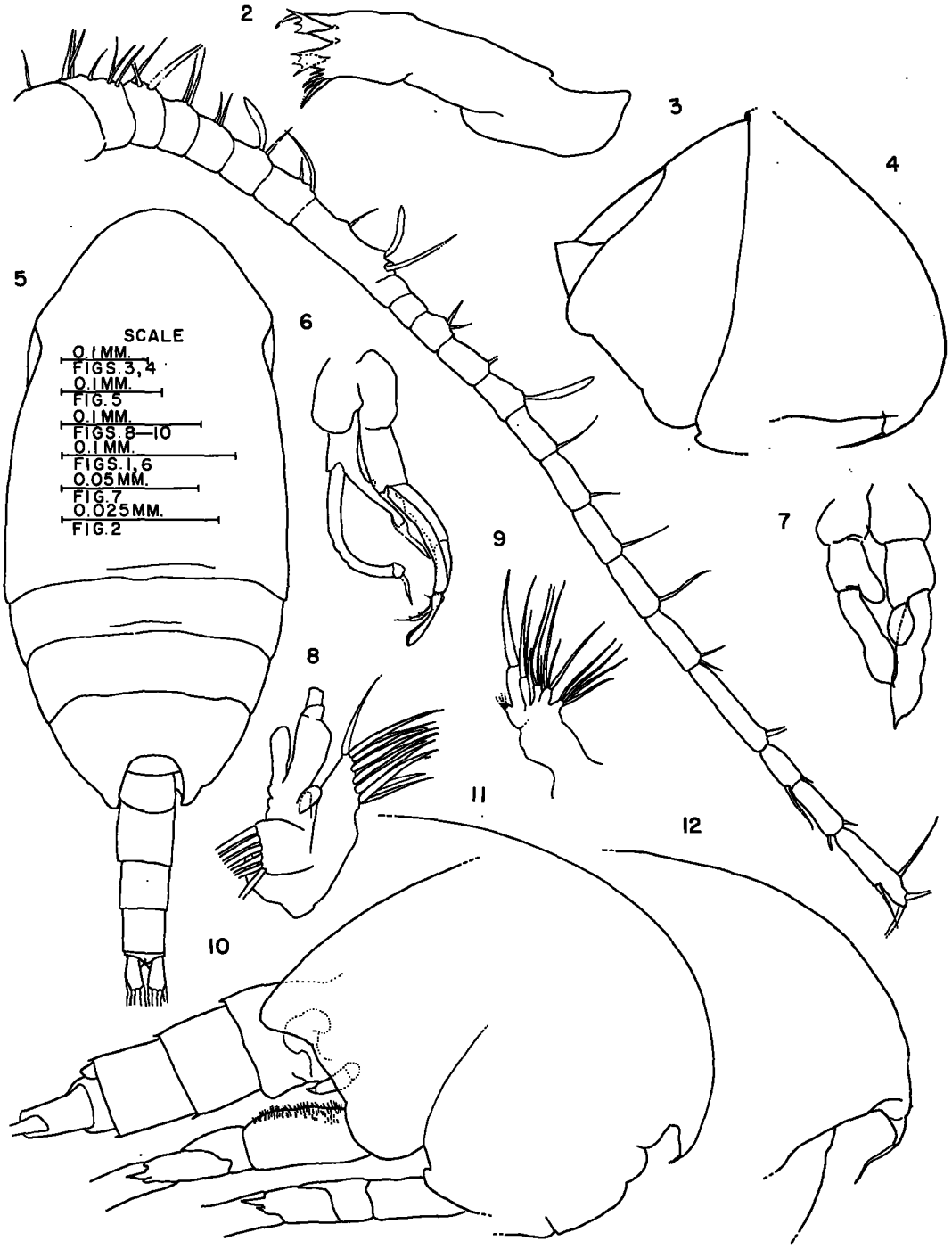

PLATE 2.—*Parundinella spinodenticula*, new species. 1, Male first antenna; 2, Female mandibular gnathal lobe; 3, Male thoracic segments IV–V, lateral view; 4, Male forehead, lateral view; 5, Male, dorsal view; 6, Male fifth legs; 7, Fifth legs of intersexed specimen; may be similar to those of penultimate male copepodite but genital segment in this specimen similar to that of mature female; 8, Female first maxilla, setae of rami, inner lobes 2–3, omitted; 9, Female second maxilla, terminal setae omitted; 10, Female abdomen, terminal thoracic segment, lateral view; 11, Female forehead, lateral view. 12, *Parundinella manicula*, new species; Female forehead, lateral view. (All figures drawn with aid of camera lucida; figures 1–11 of paratypes, figure 12 of syntype.)

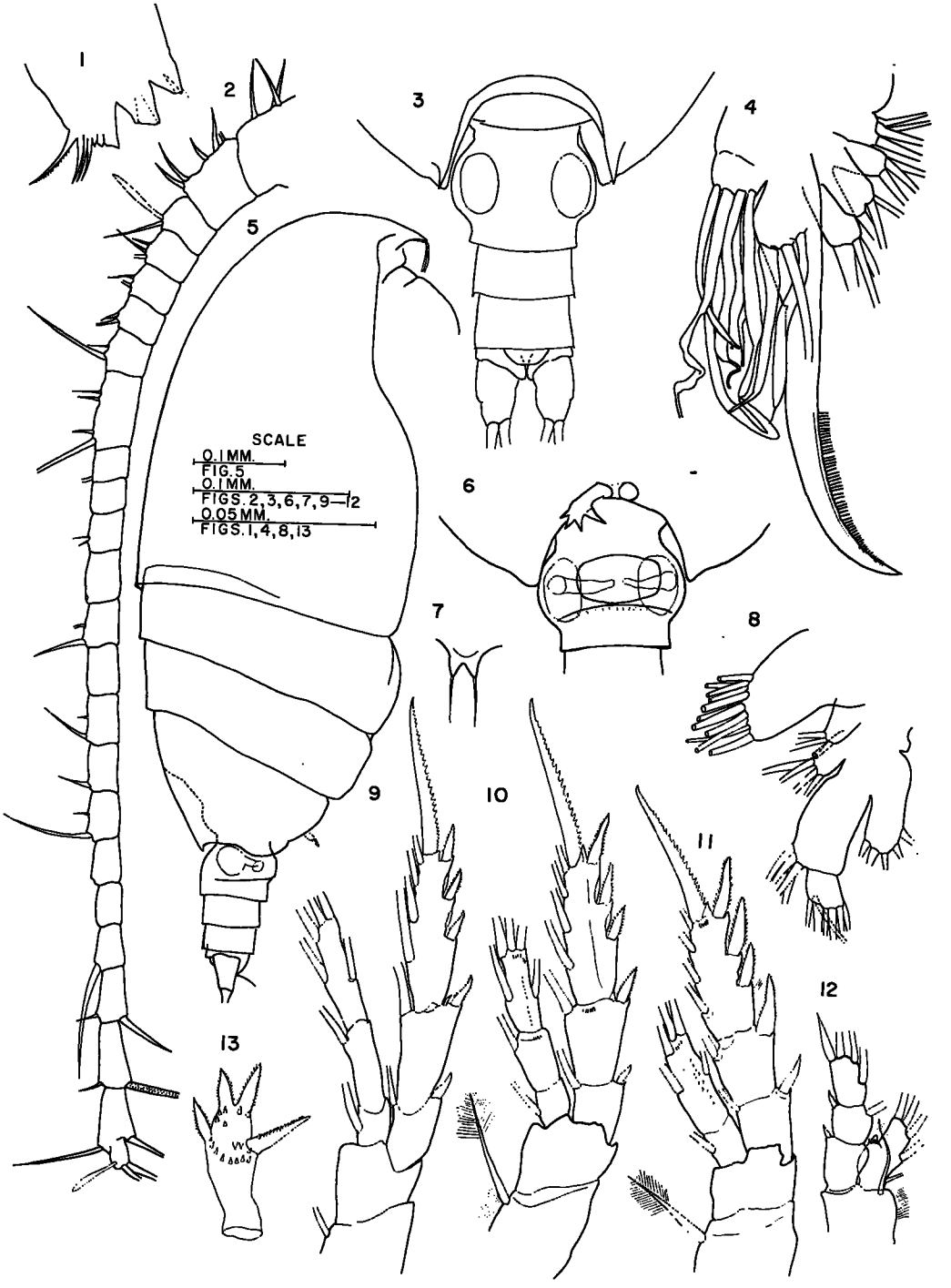

PLATE 3.—*Parundinella manicula*, new species. Female: 1, Mandibular gnathal lobe; 2, First antenna; 3, Abdomen, dorsal view; 4, Second maxilla; 5, Trunk, lateral view; 6, Genital segment, fifth legs, terminal thoracic segment, ventral view; 7, Rostrum, anterior view; 8, First maxilla; 9, Fourth leg; 10, Third leg; 11, Second leg; 12, First leg; 13, Fifth leg ramal segment. (All figures drawn with aid of camera lucida from syntypes.)

sected and the parts mixed during study before their status as new species became clear. They are herewith designated as syntypes since it is not possible to separate the dissected parts of one specimen from the other. Syntypes deposited in United States National Museum, No. 99192.

Remarks.—The new species is readily separated from *P. spinodenticula* by the terminal spiniform process of thoracic fusion segment IV–V, the three spiniform processes of the fifth legs, and the slender, almost hairlike, denticles ornamenting the external spines of legs 2–4.

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