

# B R E V I O R A

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## STELLICOLA DENTIFER N. SP. (COPEPODA, CYCLOPOIDA) ASSOCIATED WITH A STARFISH IN JAMAICA

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ABSTRACT. *Stellicola dentifer* n. sp., a lichomolgid copepod, is described from Jamaica, where it is associated with the asteroid *Luidia clathrata* (Gray).

### INTRODUCTION

The genus *Stellicola*, containing twenty species, has been reported from Europe, West Africa, the Indian Ocean, and the western Pacific Ocean. The new species described here extends the range to Jamaica, and brings to fifteen the number of species in the genus known to occur on asteroids.

The host of the new copepod, *Luidia clathrata* (Gray), is a common starfish in shallow water from North Carolina through the West Indies.

The figures have been prepared with the aid of a camera lucida. The letter after the explanation of each figure refers to the scale at which it was drawn. The abbreviations used are: A<sub>1</sub> = first antenna, A<sub>2</sub> = second antenna, MXP<sub>1</sub> = maxilliped, and P<sub>1</sub> = leg 1.

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## Family LICHOMOLGIDAE Kossmann, 1877

## Genus STELLICOLA Kossmann, 1877

STELLICOLA DENTIFER<sup>1</sup> n. sp.

## Figures 1-30

*Type material.* — 27 ♀♀, 17 ♂♂, and 4 copepodids from 13 *Luidia clathrata* (Gray) in a depth of 2 m, near mangroves, east of the small boat channel leading from the hurricane anchorage, Port Royal, Jamaica. Collected September 10, 1959. Holotype ♀, allotype, and 32 paratypes (21 ♀♀, 11 ♂♂) deposited in the United States National Museum, Washington, and the remaining paratypes in the author's collection.

*Female.* — The body (Fig. 1) has a moderately wide and only slightly depressed prosome. The length (not including the setae on the caudal ramus) is 1.39 mm (1.31-1.47 mm) and the greatest width is 0.48 mm (0.43-0.51 mm), based on 10 specimens in lactic acid. The ratio of the length to the width of the prosome is 1.47:1. The segment of leg 1 is incompletely separated from the head by laterodorsal furrows and bears a transverse band of fine striae on its dorsal surface. The epimeral areas of the metasomal segments are more or less rounded, except for that of the segment of leg 4, which is truncated.

The segment of leg 5 (Fig. 2) is  $104 \times 161 \mu$ . Between this segment and the genital segment there is a distinct ventral intersegmental sclerite (Fig. 3). The genital segment is  $180 \mu$  long, in dorsal view divided by lateral constrictions into a broad anterior half (width  $187 \mu$ ) with convex lateral margins and a much narrower and unexpanded posterior half (width  $120 \mu$ ) with almost straight margins. In lateral view (Fig. 3) the thicker anterior half is separated from the posterior half by an abrupt transverse dorsal constriction (indicated also in Fig. 2). The areas of attachment of the egg sacs are located laterally (Fig. 3), each area (Figs. 4 and 5) bearing two naked setae  $20 \mu$  and  $11 \mu$  in length and a spini-form process about  $8 \mu$  long. The three postgenital segments are  $81 \times 97 \mu$ ,  $55 \times 83 \mu$ , and  $83 \times 78 \mu$  from anterior to posterior. The posteroventral margin of the anal segment is smooth.

The caudal ramus (Fig. 6) is elongated,  $148 \mu$  in length, its greatest width proximally  $31 \mu$ , and its least width distally  $19 \mu$ . The

<sup>1</sup>The specific name *dentifer*, from Latin *dens* = a tooth, and *fero* = to bear, refers to the toothlike process on leg 5 in the female.

ratio of length to width (greatest dimensions) is 4.77:1. The outer lateral seta is  $78 \mu$  and the dorsal pedicellate seta  $29 \mu$ , both of them naked. The outermost terminal seta is  $81 \mu$ , finely barbed in its distal half. The innermost terminal seta is  $86 \mu$ , with a few minute barbules near its tip. The two median terminal setae are  $176 \mu$  (outer) and  $330 \mu$  (inner), both naked and inserted a little ventrally. There is a minute setule  $6 \mu$  long on the outer proximal area of the ramus. The ornamentation consists of a few small hairs.

The dorsal surface of the prosome and both dorsal and ventral surfaces of the urosome bear numerous hairs (sensilla) and refractile points. The ratio of the length of the prosome to that of the urosome is 1.1:1.

The egg sac (Figs. 1 and 7) is an elongated oval, about  $420 \times 200 \mu$ , extends as far as the anal segment, and contains 7-13 eggs, each approximately  $100 \mu$  in diameter, but somewhat variable in shape.

The rostrum (Fig. 8) has a broad and rather truncated postero-ventral margin.

The first antenna (Fig. 9) is 7-segmented, but a sclerotization on the ventral surface of the third segment (Fig. 10) suggests an intercalary segment. The lengths of the segments (measured along their posterior non-setiferous margins) are: 32 ( $48 \mu$  along its anterior margin), 75, 31, 33, 32, 20, and  $18 \mu$  respectively. The formula for the armature is 4, 13, 6, 3,  $4 + 1$  aesthete,  $2 + 1$  aesthete, and  $7 + 1$  aesthete, as usual in the genus. All the setae are naked.

The second antenna (Fig. 11) is 3-segmented, without a trace of division of the third segment. The first two segments are short, and each bears one seta. The longer third segment bears the usual inner group of three setae, is ornamented with a diagonal row of small spinules on its proximal posterior surface, and has distally three recurved claws and four setae. One claw ( $50 \mu$  along its axis and inserted terminally) is much larger than the other two claws (both about  $19 \mu$ , one inserted on the subterminal anterior surface of the segment, the other subterminally near the large claw). One of the setae has a swollen base, the others are slender. All the elements are naked.

The labrum (Fig. 12) has two divergent lobes, each with a small inner pointed process and a distal hyaline lamella. The mandible (Fig. 13) has on its concave margin a row of long slender spinules; its convex margin bears proximally a group of minute spinules followed by a large hyaline dentiform process and a row of smaller teeth. The long terminal flagellum has a row of spinules along the proximal half of its inner margin. The paragnath (Fig. 14) is a

small hairy lobe. The first maxilla (Fig. 15) bears four setae, three terminal and one subterminal. The second maxilla (Fig. 16) has an unarmed first segment. The second segment bears a surficial posterior seta and an inner setiform spine. The terminal lash has on its convex side a large, weakly-sclerotized tooth followed by a row of long slender spinules, and on its concave side a few barbules; across the base of the lash there is a diagonal row of small spinules. The maxilliped (Fig. 17) is 3-segmented. The slender first segment bears two minute distal inner spinules. The second segment is expanded medially and bears two naked setae and numerous spinules. The small third segment bears a barbed spine, a hyaline seta, and a minute spinule; the segment terminates in a large spiniform prolongation with an attenuated tip.

The ventral surface between the maxillipeds and leg 1 is slightly protuberant. A sclerotized line connects the bases of the maxillipeds (Fig. 18).

Legs 1-4 (Figs. 19, 20, 21, and 22) have the following armature (the Roman numerals indicating spines, the Arabic numerals representing setae):

P <sub>1</sub>	coxa	0-1	basis	1-0	exp	I-0	I-1	III, I, 4
					enp	0-1	0-1	I, 5
P <sub>2</sub>	coxa	0-1	basis	1-0	exp	I-0	I-1	III, I, 5
					enp	0-1	0-2	I, II, 3
P <sub>3</sub>	coxa	0-1	basis	1-0	exp	I-0	I-1	III, I, 5
					enp	0-1	0-2	I, II, 2
P <sub>4</sub>	coxa	0-1	basis	1-0	exp	I-0	I-1	II, I, 5
					enp	0-1	2, 1	

The inner seta on the coxa of legs 1-3 is long and plumose, but in leg 4 this seta is short (15  $\mu$ ) and naked. The inner side of the basis in leg 1 is smooth, but in legs 2-4 bears a row of hairs. The endopod of leg 4 (Fig. 22) is much shorter than the exopod, the ratio being about 1:2.3. The first segment is  $34 \times 29 \mu$ , with its inner seta 105  $\mu$ . The second segment is asymmetrical,  $43 \times 29 \mu$ , and armed with an inner seta 110  $\mu$  and two terminal setae 61  $\mu$  (outer) and 75  $\mu$  (inner). All four endopodal setae have very fine distal barbules. The outer margins of both segments bear a row of hairs, and the second segment has a row of very small spinules on its distal margin.

Leg 5 (Fig. 23) has a prominent, toothlike, distally-directed process on the inner margin of the free segment. This segment is 39  $\mu$  long, 34  $\mu$  in greatest width at the level of the tooth, and 46  $\mu$

in greatest diagonal dimension. The two terminal setae are  $91\ \mu$  and  $39\ \mu$ , and the seta on the body near the insertion of the free segment is  $31\ \mu$ . All three setae are naked. Near the outer side of the free segment there is a slight oblique dorsal ridge with a series of extremely small points (spinules?).

Leg 6 is probably represented by the two setae near the attachment of each egg sac (Fig. 5).

The color in life in transmitted light is opaque, the eye red.

*Male.* — The body (Fig. 24) has a prosome more pointed anteriorly than in the female. The length (without the ramal setae) is 1.18 mm (1.11-1.21 mm) and the greatest width is 0.35 mm (0.31-0.41 mm), based on 10 specimens in lactic acid. The ratio of the length to the width of the prosome is 1.74:1.

The segment of leg 5 (Fig. 25) is  $55 \times 112\ \mu$ . Between this segment and the genital segment there is no ventral intersegmental sclerite. The genital segment is  $156 \times 160\ \mu$ , with rather flattened lateral margins in dorsal view. The four postgenital segments are  $78 \times 99\ \mu$ ,  $73 \times 81\ \mu$ ,  $62 \times 68\ \mu$ , and  $62 \times 62\ \mu$  from anterior to posterior.

The caudal ramus resembles that of the female, but is smaller,  $110 \times 25\ \mu$ .

The rostrum, first antenna (with no aesthetes added), second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla are like those of the female. The maxilliped (Fig. 26) is slender and 4-segmented, assuming that the proximal part of the claw represents the fourth segment. The second segment bears two setae and two rows of spinules. The strongly recurved claw,  $159\ \mu$  along its axis, bears two very unequal proximal setae and is divided about midway.

The area between the maxillipeds and leg 1 resembles that in the female.

Legs 1-4 are similar to those in the female, with the same segmentation and armature, but the second segment of the endopod of leg 4 (Fig. 27) is more symmetrical.

Leg 5 (Fig. 28) has a free segment  $26 \times 13\ \mu$ , without an inner toothlike process. The two terminal setae are  $72\ \mu$  and  $32\ \mu$ , and the adjacent seta on the body is  $32\ \mu$ .

Leg 6 (Fig. 29) consists of the usual posteroventral flap on the genital segment, bearing two naked setae  $32\ \mu$  and  $44\ \mu$ .

The spermatophores (Fig. 30), attached to the female in pairs, are each about  $120 \times 48\ \mu$ , not including the neck.

The color in life resembles that of the female.

## COMPARISON WITH RELATED SPECIES

*S. dentifer* may easily be distinguished from all other species in the genus by the presence of the toothlike process on leg 5 in the female. The genital segment of the female also has a configuration unlike that of any other species.

In most species of *Stellicola* the caudal ramus is not more than twice as long as wide. Two species, however, have a relatively long caudal ramus. In *S. gracilis* (Thompson and A. Scott, 1903), the ratio of length to width of the ramus is 4:1, and in *S. affinis* Humes and Ho, 1967, it is 6.3-7:1 (in the female) and 7.5:1 (in the male). The new species is readily separated from these two species, both of which have a single claw on the second antenna and, in addition, differ in the two points mentioned in the previous paragraph.

*S. dentifer* seems to be most closely related to the four West African species described by Humes and Cressey (1958), *S. frequens*, *S. astropectinis*, *S. luidiae*, and *S. lautus*, all of which similarly have three claws on the second antenna. Unlike most other species of *Stellicola*, the inner edge of the free segment of leg 5 in these four species is somewhat swollen or irregular; a toothlike process is absent, however.

The twenty-one species of *Stellicola* may be grouped geographically on the basis of the number of claws on the second antenna. Those from the Indian and western Pacific oceans (15 species) have one such claw. The only known species from Europe and the Mediterranean Sea, *S. clausi* (Rosoll, 1889), has two claws (see Bocquet and Stock, 1962). The five species from the tropical Atlantic Ocean (four from West Africa and one from Jamaica) have three claws.

## SUMMARY

The new species *Stellicola dentifer* is associated with the asteroid *Luidia clathrata* (Gray) in Jamaica. The copepod may be recognized within the genus by the prominent toothlike process on leg 5 in the female. Four West African species of *Stellicola* appear to be related to the new Jamaican form.

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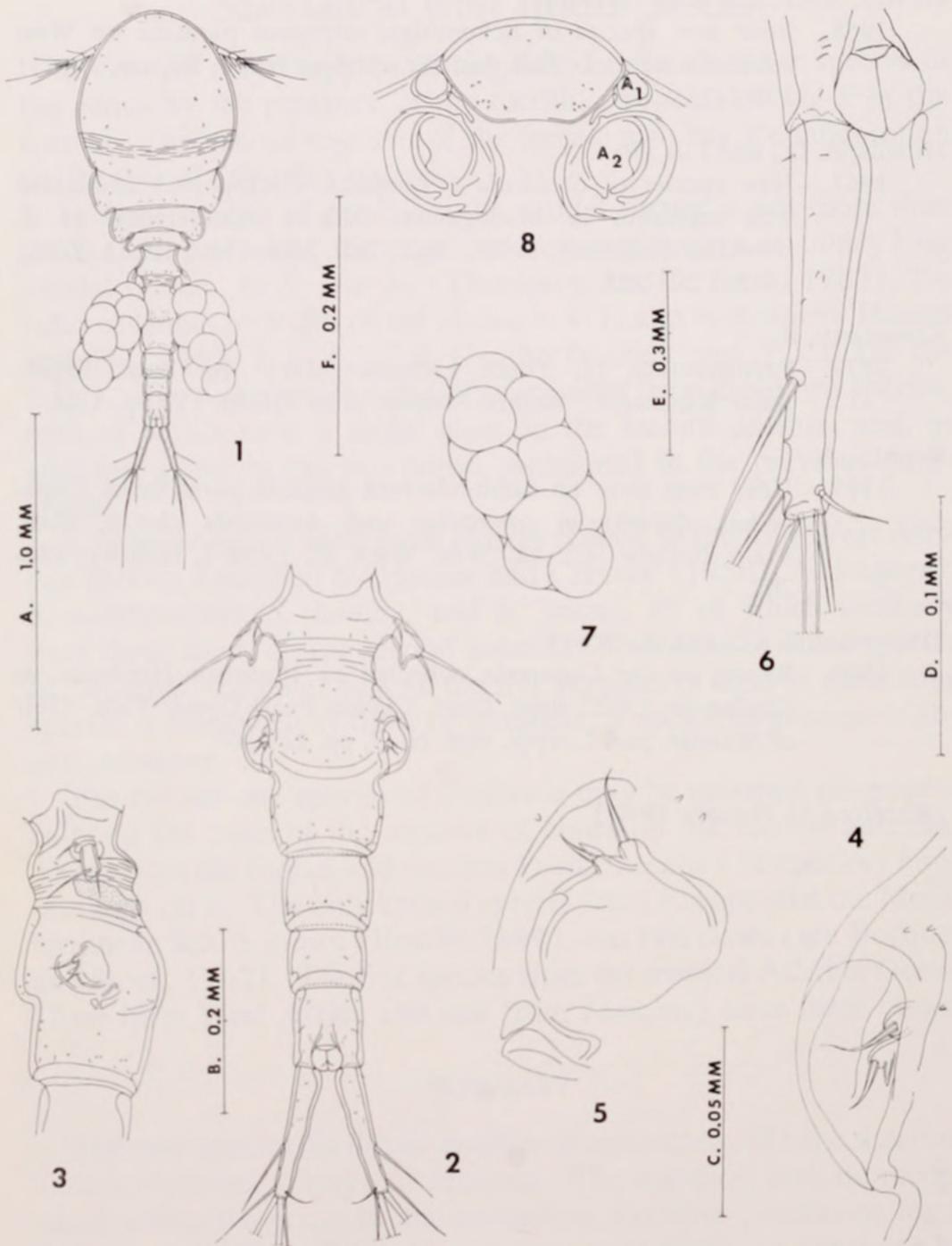
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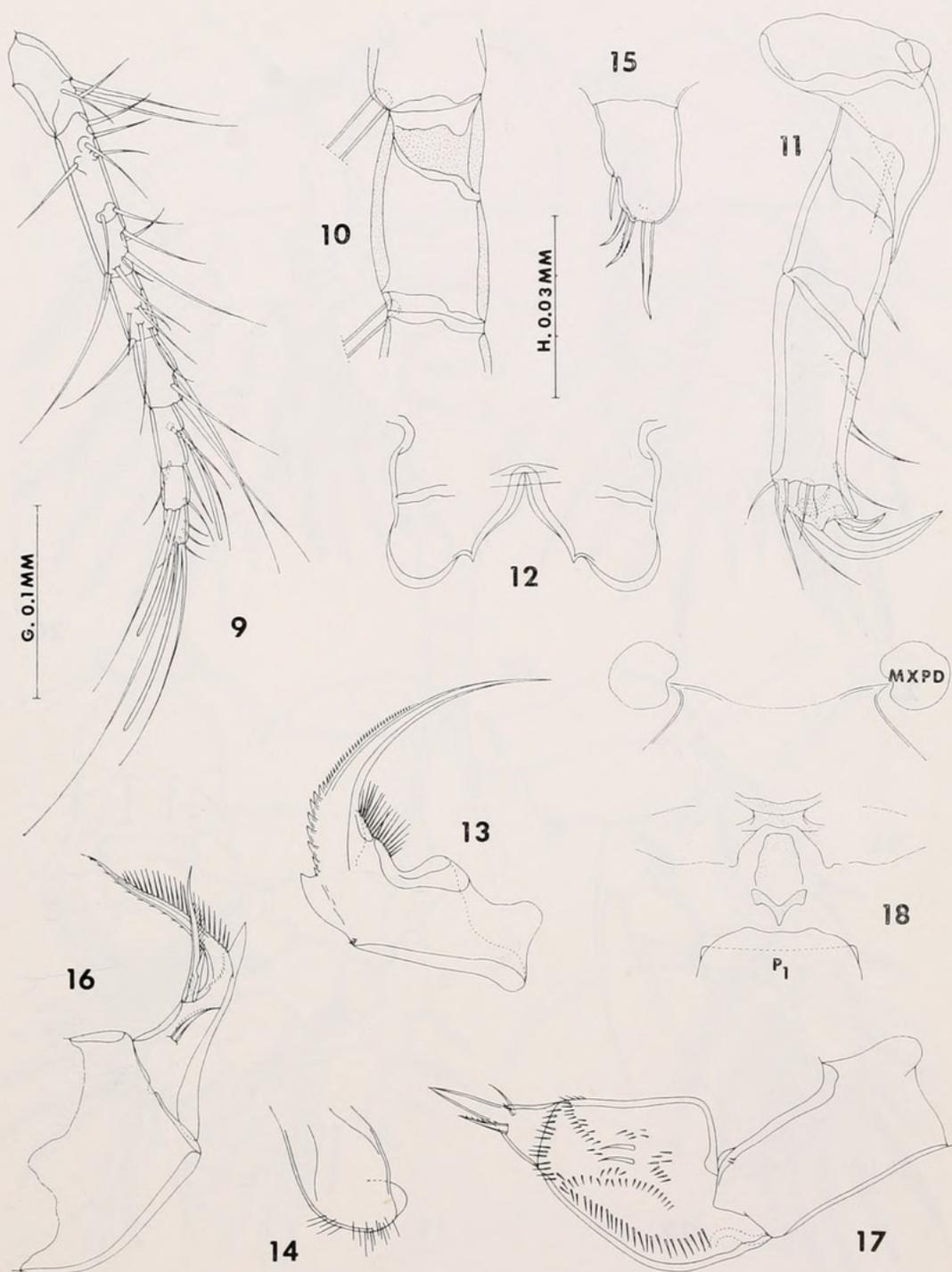
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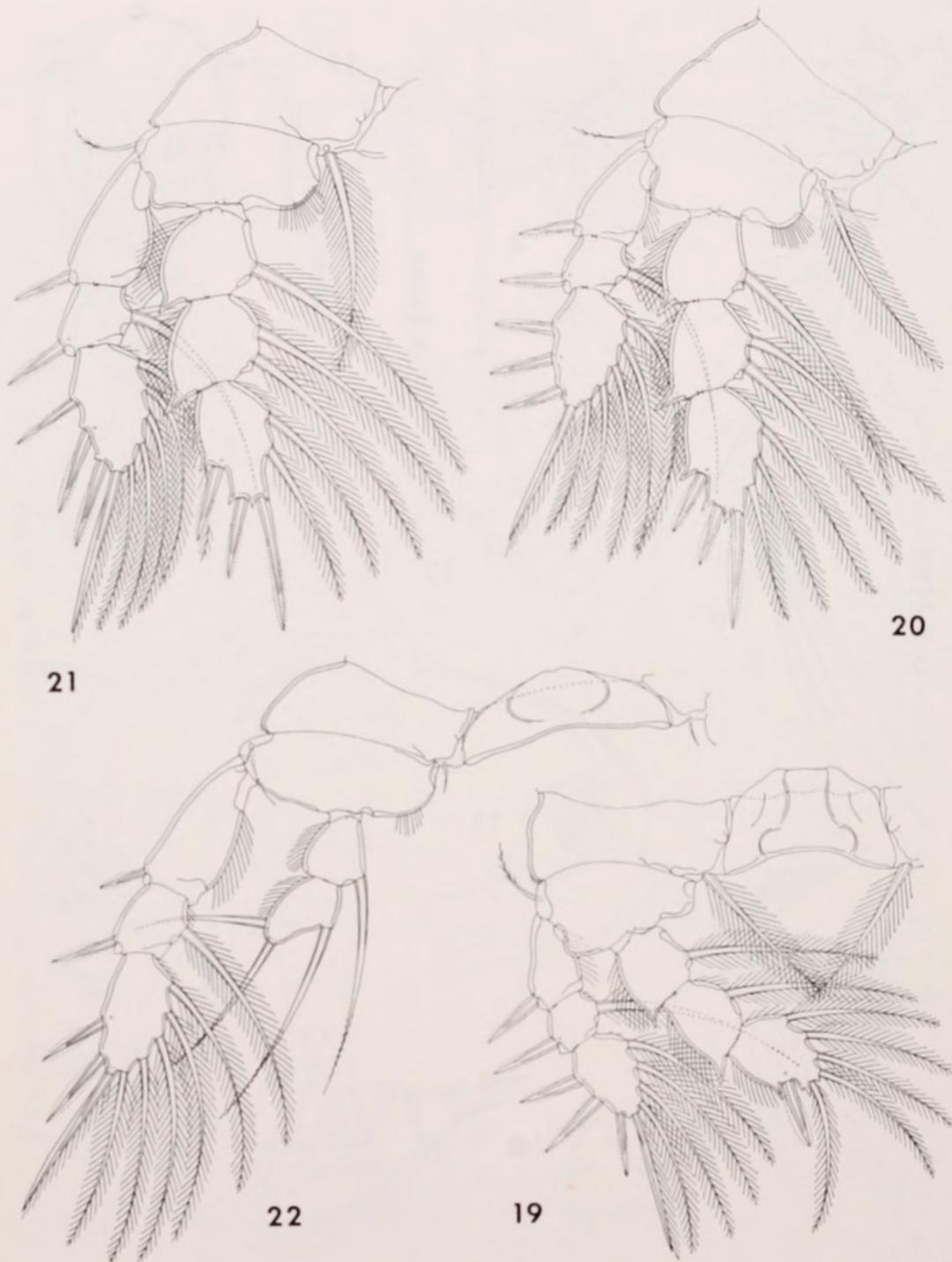
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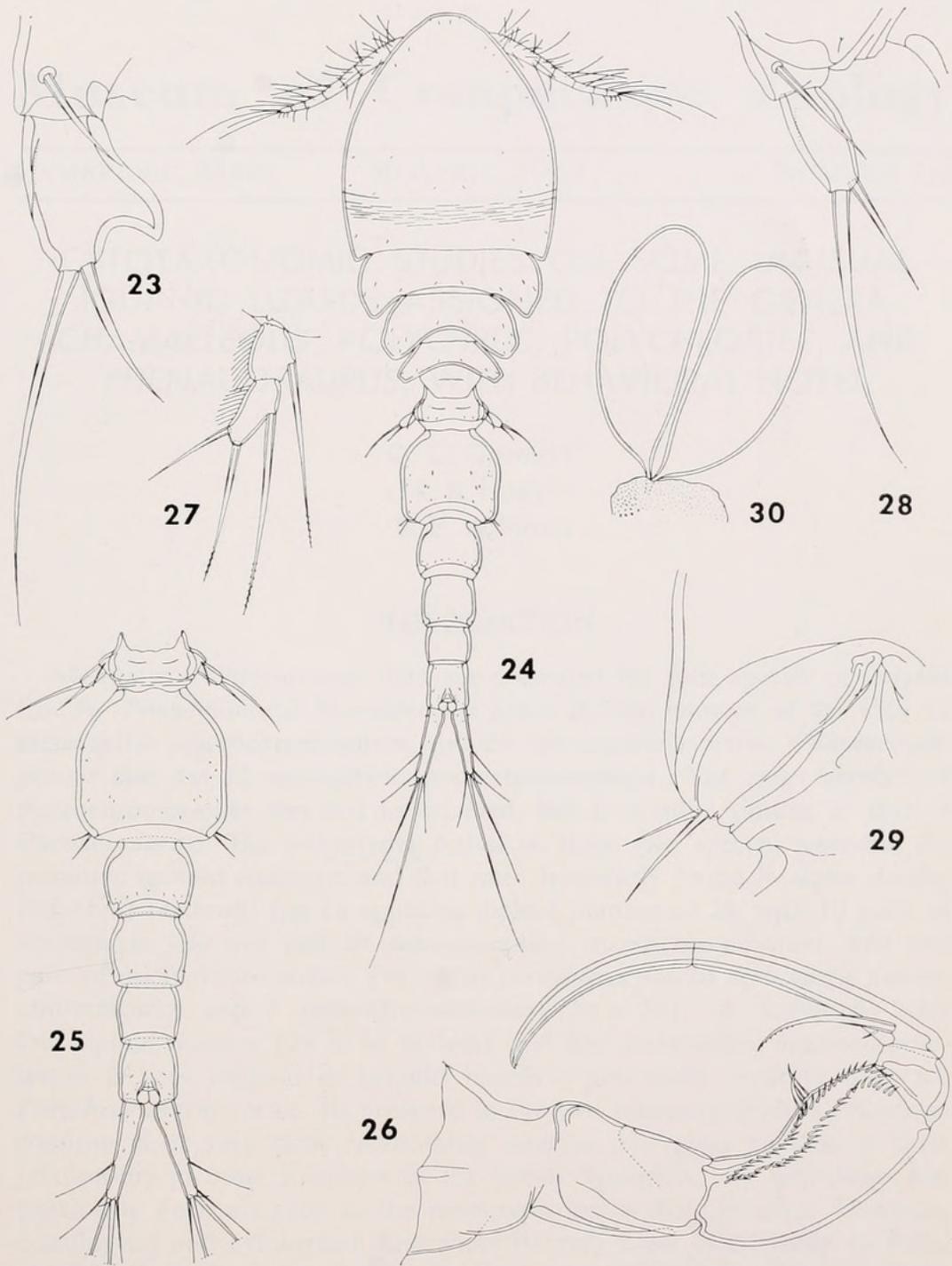
Figures 1-8. *Stellicola dentifer* n. sp., female: 1, dorsal (A); 2, urosome, dorsal (B); 3, segment of leg 5 and genital segment, lateral (B); 4, area of attachment of egg sac, dorsal (C); 5, area of attachment of egg sac, lateral (C); 6, caudal ramus, dorsal (D); 7, egg sac, dorsal (E); 8, rostrum, ventral (F).



Figures 9-18. *Stellicola dentifer* n. sp., female: 9, first antenna, anterodorsal (G); 10, third segment of first antenna, posteroventral (H); 11, second antenna, posterior (D); 12, labrum, ventral (D); 13, mandible, posterior (C); 14, paragnath, posterior (C); 15, first maxilla, posterior (C); 16, second maxilla, posterior (C); 17, maxilliped, antero-inner (C); 18, area between maxillipeds and leg 1, ventral (G).



Figures 19-22. *Stellicola dentifer* n. sp., female: 19, leg 1 and intercoxal plate, anterior (G); 20, leg 2, anterior (G); 21, leg 3, anterior (G); 22, leg 4 and intercoxal plate, anterior (G).



Figures 23-30. *Stellicola dentifer* n. sp. Female: 23, leg 5, dorsal (C), Male: 24, dorsal (E); 25, urosome, dorsal (B); 26, maxilliped, anterior (D); 27, endopod of leg 4, anterior (G); 28, leg 5, dorsal (C); 29, leg 6, ventral (D); 30, spermatophores, attached to female, lateral (G).



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