

A NEW CYCLOPOID COPEPOD, *PSEUDANTHESSIUS*
LIMATUS, ASSOCIATED WITH AN OPHIUROID
IN PANAMA (ATLANTIC SIDE)

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Abstract.—The poecilostome copepod *Pseudanthessius limatus*, new species, occurs on the disk rather than the arms of the ophiuroid *Ophiopsila* sp. in Panama. The host is buried in sand, completely so during the day, but with three arms extended during the night.

Copepods of the genus *Pseudanthessius* Claus, 1889, are infrequently associated with brittle stars (Ophiuroidea). The only known association is that of *Pseudanthessius deficiens* Stock, Humes, and Gooding, 1963, on *Ophioderma cinereum* Müller and Troschel in the West Indies (Curaçao, St. Martin, Puerto Rico). In Panama a second species of *Pseudanthessius* has been found on an ophiuroid, in this case *Ophiopsila* sp.

I am greatly indebted to Dr. Gordon Hendler, Smithsonian Tropical Research Institute, Balboa, Canal Zone, for sending me the specimens of the new species and for supplying observations on living copepods and the host.

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The observations and measurements were made on specimens cleared in lactic acid. All figures were drawn 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_1 = first antenna, A_2 = second antenna, MXP = maxilliped, and P_1 = leg 1.

Pseudanthessiidae Humes and Stock, 1972

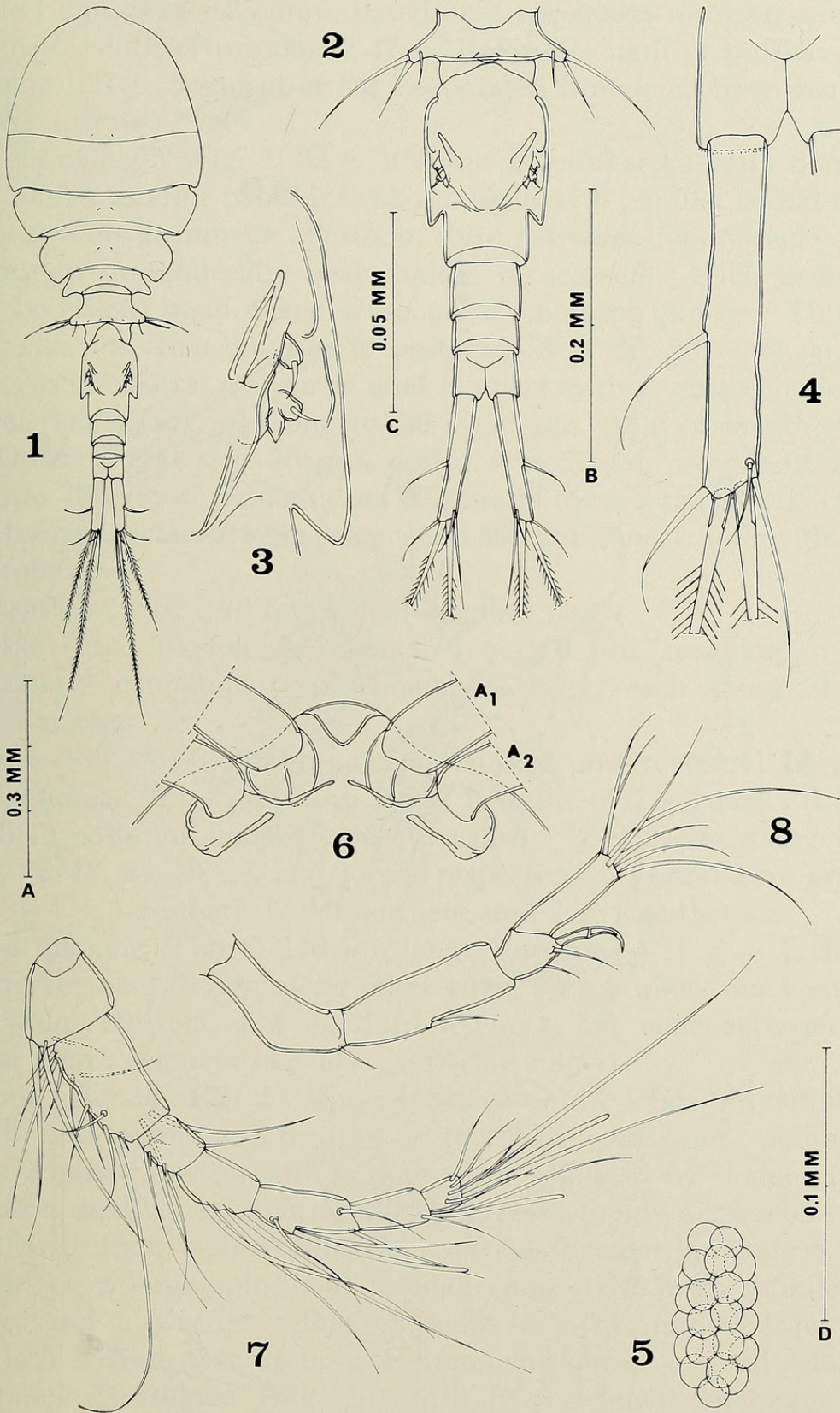
Pseudanthessius Claus, 1889

Pseudanthessius limatus, new species

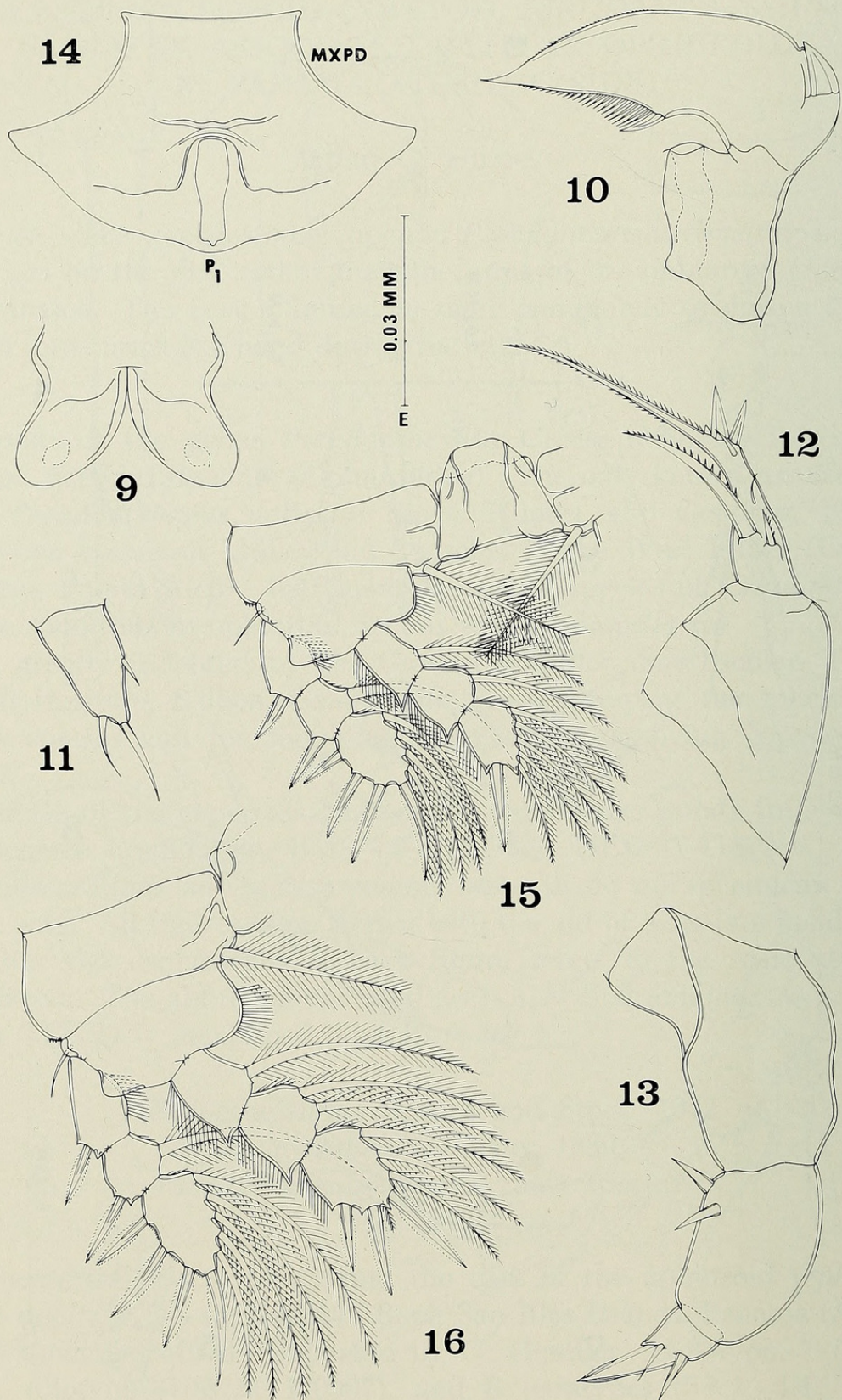
Figs. 1-25

Type-material.—8 ♀♀, 4 ♂♂ from the disk of the ophiuroid *Ophiopsila* sp., in a depth of 6-9 m, Korbiski Reef, San Blas Islands, Panama (Atlantic side), 5 November 1976. Collected by G. Hendler. Holotype ♀ (USNM 170306), allotype (USNM 170307), and 6 paratypes (5 ♀♀, 1 ♂, USNM 170308) deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C.; the remaining paratypes (dissected) in the collection of the author.

Female.—Body (Fig. 1) with moderately broad prosome. Length (not including setae on caudal rami) 0.80 mm (0.73-0.86 mm) and greatest



Figs. 1-8. *Pseudanthessius limatus*, female: 1. Dorsal (A); 2. Urosome, dorsal (B); 3. Genital area, dorsal (C); 4. Caudal ramus, dorsal (C); 5. Egg sac, lateral (A); 6. Rostrum, ventral (D); 7. First antenna, dorsal (D); 8. Second antenna, posterior (D).



Figs. 9-16. *Pseudanthessius limatus*, female: 9. Labrum, with positions of paragnaths indicated by broken lines, ventral (C); 10. Mandible, anterior (E); 11. First maxilla, posterior (E); 12. Second maxilla, posterior (E); 13. Maxilliped, inner (E); 14. Area between maxillipeds and first pair of legs, ventral (D); 15. Leg 1 and intercoxal plate, anterior (D); 16, Leg 2, anterior (D).

width 0.24 mm (0.23–0.25 mm), based on 4 specimens in lactic acid. Ratio of length to width of prosome 1.47:1. Ratio of length of prosome to that of urosome 1.21:1. Segment of leg 1 separated from head by a weak dorsal transverse furrow.

Segment of leg 5 (Fig. 2) $52 \times 104 \mu\text{m}$. Genital segment in dorsal view $122 \mu\text{m}$ long. Anterior two-thirds $86 \mu\text{m}$ wide with parallel lateral margins, posterior corners acuminate. Posterior third narrower, $59 \mu\text{m}$ wide. Genital areas located dorsolaterally near middle of segment. Each genital area (Fig. 3) bearing 2 small naked setae and a spiniform process. Three post-genital segments from anterior to posterior 39×50 , 26×44 , and $31 \times 44 \mu\text{m}$. Posteroventral margin of anal segment with minute spinules.

Caudal ramus (Fig. 4) elongate, $86 \times 13 \mu\text{m}$, ratio of length to width 6.6:1. Outer lateral seta $36 \mu\text{m}$, dorsal seta $22 \mu\text{m}$, outermost terminal seta $35 \mu\text{m}$, innermost terminal seta $52 \mu\text{m}$; all these setae naked. Two long median terminal setae $164 \mu\text{m}$ (outer) and $300 \mu\text{m}$ (inner), both with delicate lateral spinules.

Body surface with very few hairs (sensilla).

Egg sac (Fig. 5) elongate oval, $278 \times 120 \mu\text{m}$, reaching to end of caudal ramus, containing approximately 27 eggs each about $51 \mu\text{m}$ in average diameter.

Rostrum (Fig. 6) small with acutely rounded posteroventral margin.

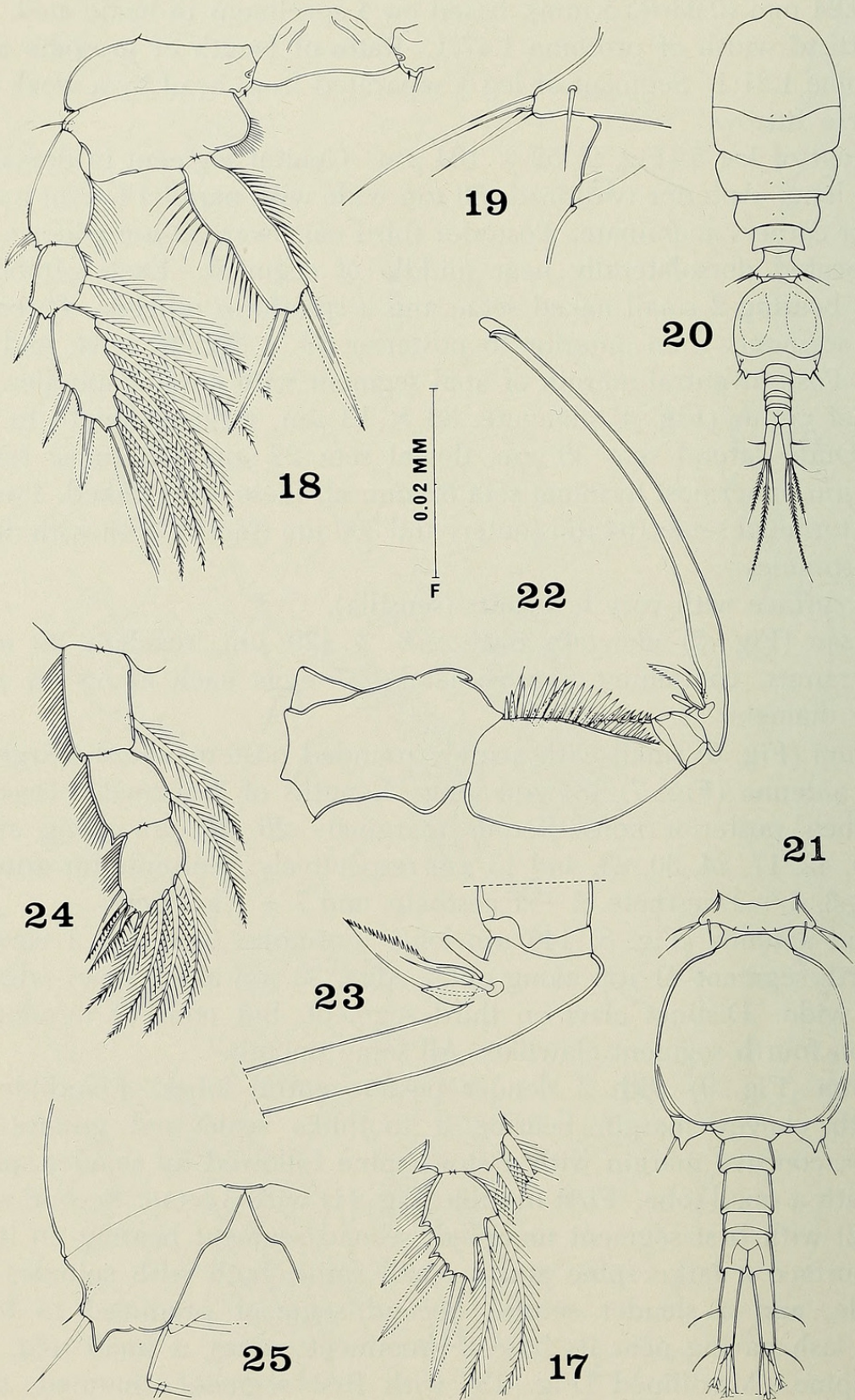
First antenna (Fig. 7) $181 \mu\text{m}$ long. Lengths of 7 segments (measured along their posterior nonsetiferous margins): 26 ($32 \mu\text{m}$ along anterior margin), 42, 17, 24, 30, 23, and $13 \mu\text{m}$ respectively. Formula for armature: 4, 13, 6, 3, $4 + 1$ aesthete, $2 + 1$ aesthete, and $7 + 1$ aesthete.

Second antenna (Fig. 8) $146 \mu\text{m}$ long. Formula: 1, 1, $2 + 1$ claw, and 7. Fourth segment $41 \mu\text{m}$ along outer edge, $33 \mu\text{m}$ along inner edge, and $12 \mu\text{m}$ wide. Distinct claw on third segment, but none of terminal elements on fourth segment clawlike. All setae smooth.

Labrum (Fig. 9) with 2 slender posteroventral lobes. Mandible (Fig. 10) with convex margin bearing a toothlike scale and minute distal spinules; concave margin with a stout spine followed by slender spinules. Paragnath a small lobe. First maxilla (Fig. 11) with 3 setae. Second maxilla (Fig. 12) with first segment unarmed; second segment bearing on its posterior surface a large spine and a small spine, both with spinules along one side, and a slender setule. Second segment produced to form a barbed lash having near its base 2 prominent spines, a small seta, and a small spine. Maxilliped (Fig. 13) with first segment unarmed; second segment with 2 smooth setae; third segment with 2 smooth setae and produced to form an acuminate tip with narrow lamellae.

Ventral area between maxillipeds and first pair of legs (Fig. 14) slightly protuberant.

Legs 1–4 (Figs. 15, 16, 17, 18) segmented as in other species of *Pseudan-*



Figs. 17-19. *Pseudanthessius limatus*, female: 17. Third segment of endopod of leg 3, anterior (D); 18. Leg 4 and intercoxal plate, anterior (D); 19. Leg 5, dorsal (D).

Figs. 20-25. *Pseudanthessius limatus*, male: 20. Dorsal (A); 21. Urosome, dorsal (B); 22. Maxilliped, posterior (C); 23. Detail of base of claw of maxilliped, anterior (F); 24. Endopod of leg 1, anterior (C); 25. Leg 6, ventral (D).

thessius. Formula for armature as follows (Roman numerals representing spines, Arabic numerals setae):

P ₁	coxa	0-1	basis	1-0	exp	I-1;	I-1;	III,I,4
					enp	0-1;	0-1;	I,5
P ₂	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III,I,5
					enp	0-1;	0-2;	I,II,3
P ₃	coxa	0-1	basis	1-0	exp	I-0;	I-1;	III,I,5
					enp	0-1;	0-2;	I,II,2
P ₄	coxa	0-1	basis	1-0	exp	I-0;	I-1;	II,I,5
					enp	II		

Inner margin of basis with hairs in all 4 legs. Inner coxal seta in legs 1-3 long and plumose, but in leg 4 minute, 3 μm . Leg 4 with exopod 102 μm long. Endopod 62 \times 20 μm , its 2 terminal fringed spines 47 μm (outer) and 53 μm (inner); bearing well developed setules along both inner and outer margins.

Leg 5 (Fig. 19) with 2 smooth setae 86 μm and 44 μm and an adjacent smooth dorsal seta 29 μm .

Leg 6 probably represented by 2 setae on genital area (Fig. 3).

Living specimens in reflected light transparent, egg sacs white.

Male.—Body (Fig. 20) with prosome more slender than in female. Length (excluding setae on caudal rami) 0.69 mm (0.66-0.72 mm) and greatest width 0.19 mm (0.17-0.20 mm), based on 4 specimens in lactic acid. Ratio of length to width of prosome 1.91:1. Ratio of length of prosome to that of urosome 1.17:1.

Segment of leg 5 (Fig. 21) 41 \times 71 μm . Genital segment 133 \times 133 μm (length including leg 6). Four postgenital segments from anterior to posterior 23 \times 42, 29 \times 38, 18 \times 34, and 26 \times 36 μm .

Caudal ramus (Fig. 21) 60 \times 13 μm , ratio 4.62:1, relatively shorter than in female.

Body surface with very few hairs, as in female.

Rostrum, first antenna, second antenna, labrum, mandible, paragnath, first maxilla, and second maxilla as in female. Maxilliped (Fig. 22) with unornamented first segment. Second segment with 2 smooth setae and 2 rows of spines. Small third segment unarmed. Claw 120 μm including terminal lamella, bearing proximally 2 unequal setae, one stout with distal barbed fringe, other slender and smooth. Near insertions of these 2 setae 2 processes (Fig. 23), one digitiform, other lamelliform.

Ventral area between maxillipeds and first pair of legs as in female.

Legs 1-4 similar to those of female except endopod of leg 1 (Fig. 24) where formula is 0-1; 0-1; I,I,4.

Leg 5 like that of female.

Leg 6 (Fig. 25) a posteroventral flap on genital segment, bearing 2 slender smooth setae 36 μm and 18 μm .

Fully developed spermatophores not seen.

Living specimens colored as in female.

Etymology.—The specific name *limatus*, Latin = polished or refined, alludes to the smooth nature of the body in this species.

Comparison with other species of Pseudanthessius.—In 27 of the 34 species presently attributed to the genus *Pseudanthessius* the caudal rami in the female have a length to width ratio of only 5:1 or less, distinctly shorter than in *Pseudanthessius limatus*. In three species, *Pseudanthessius concinnus* Thompson and A. Scott, 1903, *Pseudanthessius dubius* Sars, 1918, and *Pseudanthessius thorelli* (Brady, 1880), the caudal ramus is much longer (at least 9:1) than in *P. limatus*. The remaining four species, in which the length of the caudal ramus approaches that of *P. limatus*, may be distinguished from the new species by the form of the genital segment in the female, the genital segment in these having neither parallel sides nor acuminate points. Each of the four species may be distinguished from *P. limatus* on the other grounds also. In *Pseudanthessius gracilis* Claus, 1889, several elements on the fourth segment of the second antenna are claw-like. In *Pseudanthessius graciloides* Sewell, 1949, the long setae on the caudal rami are flattened and spinelike. In *Pseudanthessius aestheticus* Stock, Humes, and Gooding, 1963, none of the elements on the third segment of the second antenna is a well-formed claw but instead all are setiform. In *Pseudanthessius deficiens* Stock, Humes, and Gooding, 1963, one of the terminal elements on the fourth segment of the second antenna is a stout claw.

Observations on living copepods and their host.—One to several *Pseudanthessius limatus* occur on both dorsal and ventral surfaces of the disk, rather than on the arms of the ophiuroids. The copepods are motile and perch on the disk with their bodies arched between the prosome and urosome. An unidentified heterotrich is common on these *Ophiopsila*, but on the spines rather than on the disk.

Ophiopsila sp. lives in 1.5–12 m, buried usually in medium grain calcareous sand, with generally three arms extended almost straight out of the sand. These ophiuroids are seen only at night, when they extend their arms at dusk but withdraw into the sand by the first light of dawn.

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