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A NEW SHRIMP OF THE GENUS PERICLIMENES
FROM THE WEST INDIES

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The shrimp described below was first observed in 1954 by Harry Pederson of McAllen, Texas, who photographed its remarkable fish-cleaning habits at New Providence Island, Bahamas. Not until two years later were specimens collected by Conrad Limbaugh of the Scripps Institution of Oceanography, La Jolla, California, who is collaborating with Mr. Pederson on a study of fish cleaning by various marine shrimps.

Periclimenes (Periclimenes) pedersoni, n. sp.

Holotype.—Male; Lyford Cay, New Providence Island, Bahamas; August 1956; collected by Conrad Limbaugh; U. S. Nat. Mus. Cat. No. 101894.

Paratypes.—One ovigerous female; same locality as holotype (U. S. Nat. Mus.). One ovigerous female; same locality; August 8, 1957; collected by Conrad Limbaugh (U. S. Nat. Mus.). One male; small reef at north end of West Bay, Lyford Cay, New Providence, Bahamas; May 10-11, 1956; collected by Conrad Limbaugh (Acad. Nat. Sci. Philadelphia). One male, one female; old cement ship wreck, south shore of Hog Island, Nassau Harbor, Bahamas; May 19, 1956; collected by C. G. Chaplin and J. E. Böhlke (Acad. Nat. Sci. Philadelphia). Two males, three females (two ovigerous); Coral Harbor inside Lagoon Head, St. John Island, Virgin Islands; six to eight feet; April 24, 1958; collected by Conrad Limbaugh (U. S. Nat. Mus.).

Description.—Sexually dimorphic. Carapace of male (fig. 1) narrowed and bent upward in anterior two thirds, rostrum directed obliquely upward, barely or not reaching cornea of eye in adults, and unarmed ventrally; dorsal margin with three to five teeth, the first somewhat anterior to level of hepatic spine, the second just behind or just anterior to level of orbital margin. Carapace of adult female (fig. 3) not markedly narrowed or bent upward anteriorly; rostrum nearly horizontal, reaching to or beyond second segment of antennular peduncle, and armed with two to four ventral teeth in distal third; dorsal margin with five or six teeth, one slightly behind or slightly in front of level of hepatic spine, one just behind orbital margin, and three or four at slightly decreasing intervals on rostrum. Both sexes with hepatic spine

prominent and outstanding (fig. 2). Antennal spine small. Lower orbital angle blunt and strongly produced.

Abdomen with all pleura rounded. Third somite produced medially as a prominent, slightly compressed cap overhanging base of fourth somite. Sixth somite of male nearly twice as long as fifth and distinctly longer than telson. Sixth somite of female usually less than twice as long as fifth and shorter than telson. Telson (figs. 5, 6) with two dorsal and three posterior pairs of spinules, both dorsal pairs posterior to middle of telson.

Eye with subglobular cornea. Eyestalk fully twice as long as cornea.

First segment of antennular peduncle long (fig. 2). Stylocerite outstanding but not reaching beyond middle of eyestalk. Outer margin of basal antennular segment slightly concave and terminating in a prominent anterolateral tooth, which falls far short of anterior end of segment. Anterior margin of segment strongly and acutely produced laterally as far as middle of second segment. Margin between anterolateral tooth and end of segment setose but unarmed. Second segment slightly shorter and broader than third. Upper antennular flagellum with branches fused for 12 to 18 joints; free part of shorter branch one fourth to one third as long as fused part and consisting of 4 to 7 joints.

Antennal scale reaching about as far as antennular peduncle, more than two and one half times as long as wide in males, slightly broader in females. Outer margin nearly straight. Outer spine falling far short of variably subtruncate distal margin of lamella. Antennal peduncle reaching to or beyond middle of antennal scale. Basal antennal segment with outer spine at juncture with scale.

Mouth parts as illustrated (figs. 7-12). Inner lacinia of second maxilla simple, not cleft. Caridean lobe of exopod of first maxilliped narrow, epipod hardly bilobed. Third maxilliped small, scarcely reaching end of antennal peduncle; terminal segment three fifths as long as penultimate and slightly more than half as long as antepenultimate; exopod clearly shorter than antepenultimate segment.

First pereopod reaching beyond antennal scale by length of fingers to length of chela in males and by chela and at least one third of carpus in females; fingers (fig. 13) as long as palm; carpus distinctly longer than chela and subequal to merus. Second pereopods unequal, especially in males. Larger one overreaching antennal scale by chela and from one third to more than two thirds of carpus; fingers two thirds as long as palm or slightly longer; cutting edge of movable finger with two to five and of fixed finger with one to four low denticles in proximal half (fig. 14); carpus about four fifths as long as chela; merus about nine tenths as long as, or subequal to, carpus; ischium from slightly shorter to slightly longer than merus. Smaller second cheliped overreaching antennal scale by chela and sometimes by one third of carpus; fingers more than three fourths as long as palm; cutting edges with fewer denticles than those of major chela; carpus from four fifths to nearly as long as chela. Third leg exceeding antennal scale by dactyl and at least half of propodus; dactyl (fig. 15) bifid, about four times as long as broad and about one fourth as long as propodus; propodus about one third again as long as carpus and five sixths as long as merus. Fifth leg exceeding antennal scale by dactyl and at least half of propodus. Legs increasing proportionately in length with growth.

Endopod of first pleopod of male (fig. 16) broadly rounded distally, without processes. Appendix masculina on second pleopod (fig. 17) nearly half again as long as appendix interna in adult males.

Color in life.—The following description is based on color notes made by Conrad Limbaugh from an ovigerous female taken at St. John, Virgin Islands.

General appearance transparent with opaque white antennae and white lines running along body. Dorsal surface of abdomen and tail fan with violet dots, the larger ones outlined in white. Third maxillipeds and both pairs of chelipeds white banded with violet and orange brown. Walking legs transparent, faintly violet when viewed over a white background.

Longitudinal white lines on body converging dorsally near posterior margin of third abdominal somite. Between white lines on back of abdomen are crowded violet dots of irregular sizes, about 12 on first somite, 9 on second, and 16 on third. Outside of white lines on each side of posterior two thirds of third abdominal somite are three similar small dots of violet followed by a large, triangular violet patch edged with white. Two medium-sized median dots on each of fourth and fifth somites and about five slightly smaller dots diverging posteriorly on either side of midline of sixth somite. These, together with about seven dots of various sizes on either side of median row on fourth and fifth somites, are set in slightly opaque, bluish white wash which grades to complete transparency laterally. End of telson white with about three dots and a transverse bar of violet. Distal half of inner branch of uropods with oval, blue-violet spot grading irregularly from white near edge to violet at center. Basal half with outer margin partially white, a violet dot just inside margin, and another violet spot at base. Outer branch of uropod with similar large, oval spot of violet and, proximad to it, two violet dots and one white one. An opaque white line on ventral surface of body from bases of walking legs to telson.

Eyes opaque, pink. Eyestalks white with short, white, transverse dash at base and purple line below. Two small white dots on either side of rostrum [perhaps on antennular peduncle]. Outer antennular flagellum white from base; inner flagellum transparent. Antennal flagellum mostly opaque white but transparent in basal part.

Third maxilliped white at base and tip, with six or seven violet bands between. First cheliped evenly banded with purple and white or bluish white; fingers tipped with brown. Second cheliped white with purple bands on distal half of fingers, distal half of palm, and distal half of carpus; brown saddles on inner surface at base of palm and in basal half of carpus; and numerous small purple saddles on inner surfaces of merus and ischium. Walking legs translucent pale violet when observed over a white background; region of thoracic attachment pale brown.

Eggs translucent yellowish brown.

Size.—The carapace of the male holotype is 4.5 mm. long to the orbital margin. The other males have carapace lengths of 3.0 to 4.6 mm. The females have carapace lengths of 3.6 to 6.5 mm.; they may be ovigerous at a carapace length of 3.8 mm.

Ecology.—These shrimps were observed by Mr. Pederson and Mr. Limbaugh in two areas near New Providence Island, Bahamas: near Lyford Cay in depths of 5 to 18 feet and in Nassau Harbor from 5 to

30 feet. The species was also taken by Mr. Limbaugh at St. John, Virgin Islands, in depths of 6 to 8 feet. In general, it occurred in localities protected from violent surge. In every instance, the individuals were associated with the sea anemone *Bartholomea annulata*, either hanging directly from the anemone or on objects nearby. Also associated with this anemone, in a complex and variable pattern, were a red mysid, *Heteromysis actiniae*, the closely related spotted cleaning shrimp, *Periclimenes yucatanicus*, the purple snapping shrimp, *Alpheus armatus*, hermit crabs, the arrow crab, *Stenorynchus seticornis*, and two fishes, *Paraclinus grandicornis* and an apogonid. *Periclimenes pedersoni* generally occurs singly, but sometimes in pairs, and occasionally in groups of as many as five individuals with a single anemone. Oviparous females were present during the entire period of observation, from April through early August. The shrimps usually remained with the same anemone for from one to three weeks, and probably longer, but occasionally they disappeared completely or appeared a short distance away on another anemone. The fish-cleaning habits of the species will be discussed in a forthcoming paper by Limbaugh, Pederson, and Chace.

Remarks.—*P. pedersoni* is closely related to *P. yucatanicus* (Ives), a species with similar habits that occurs more commonly in the same region. The two species may be distinguished by the following characters:

P. pedersoni

Sexually dimorphic.

Rostrum of female with 5-6 dorsal teeth.

First segment of antennular peduncle with 1 anterolateral spine.

Pereiopods slender; carpus of second cheliped nearly as long as chela.

Marked with blue and white stripes and spots; antennae white; walking legs translucent pale violet.

P. yucatanicus

Not noticeably dimorphic.

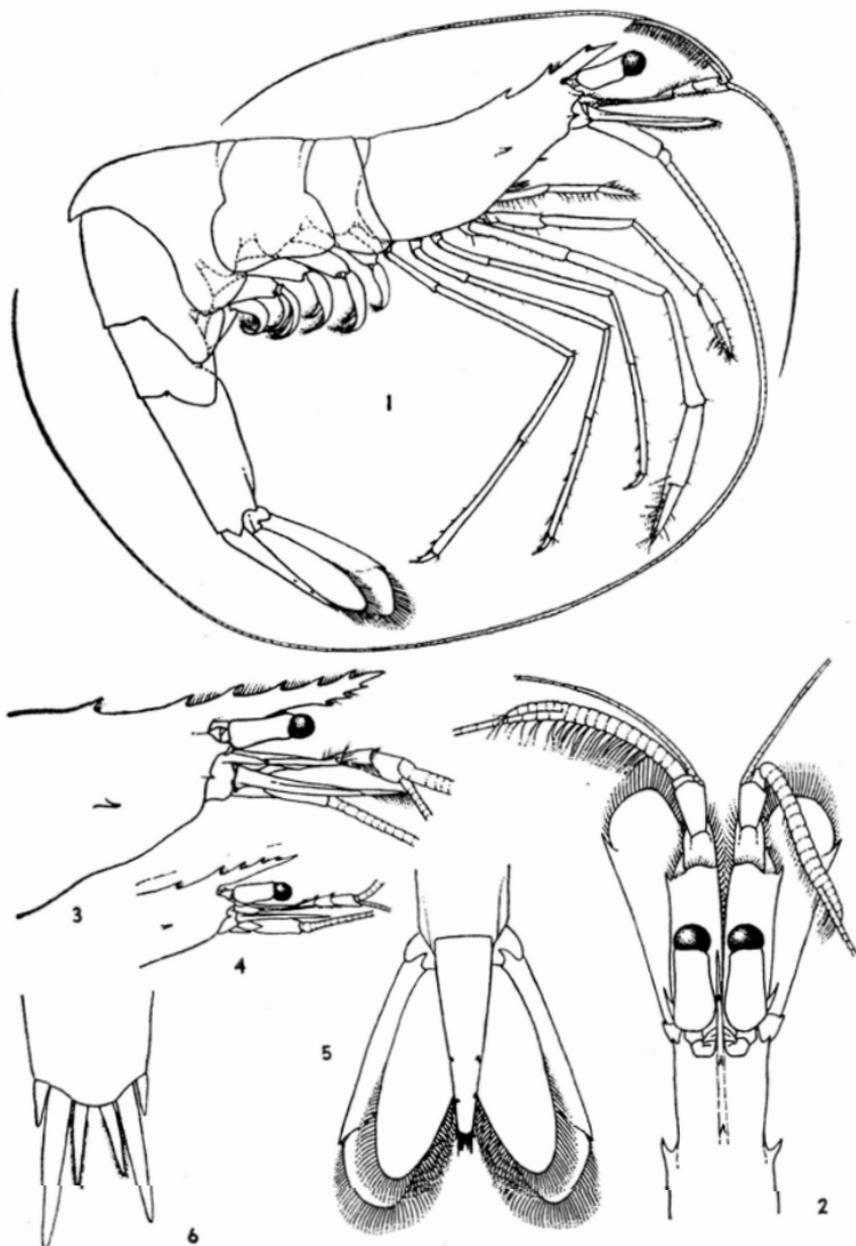
Rostrum of female with 7-9 dorsal teeth.

First antennular segment with 3-4 anterolateral spines.

Pereiopods stouter; carpus of second cheliped little more than half as long as chela.

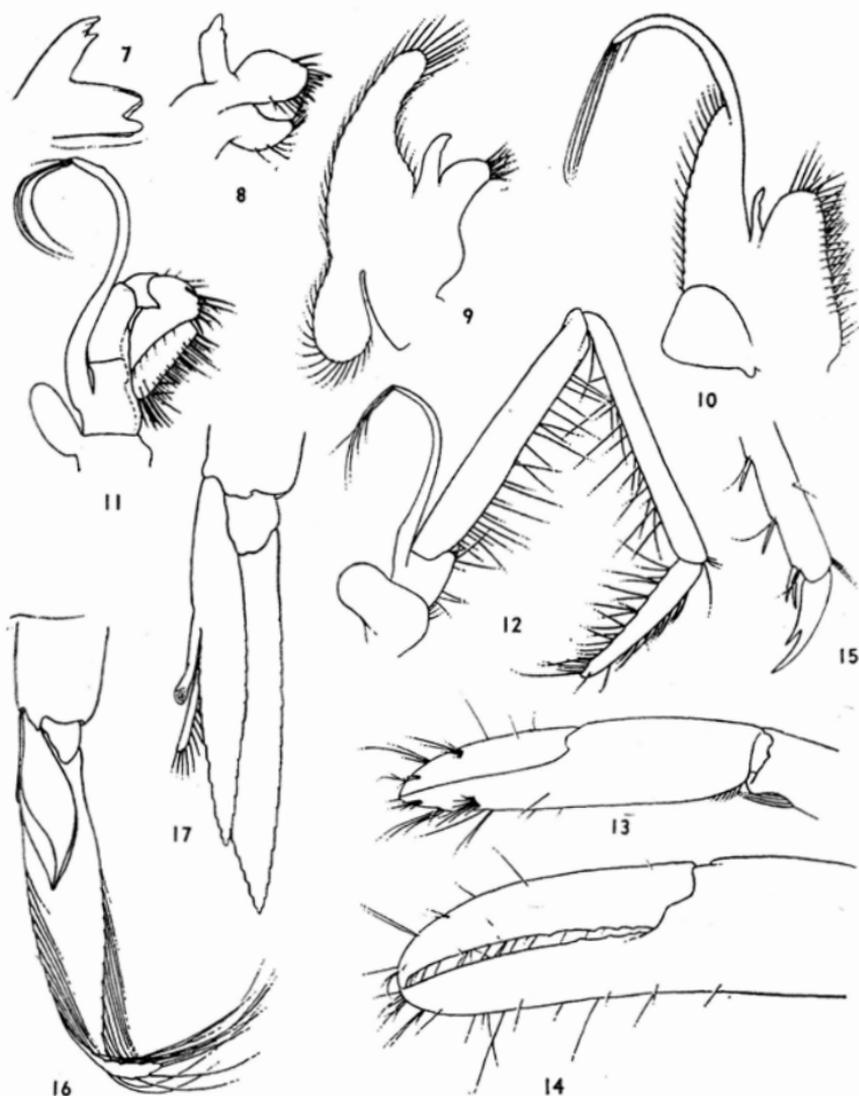
Marked with a few opaque white and tan spots; antennae white with red bands; walking legs purple with white bands.

The sexual dimorphism of *P. pedersoni* is less apparent in small specimens. Young males (fig. 4) resemble the females in having the rostrum longer and with more numerous dorsal teeth; young females resemble the males in having the rostrum directed obliquely upward and the ventral margin less distinctly dentate.



Periclimenes (Periclimenes) pedersoni

- Fig. 1. Male holotype from right side. x 5.
 Fig. 2. Anterior part of holotype in dorsal view. x 7.5.
 Fig. 3. Anterior part of female paratype from Bahamas. x 5.
 Fig. 4. Anterior part of male paratype from Virgin Islands. x 5.
 Fig. 5. Tail fan of holotype. x 7.5.
 Fig. 6. End of telson of holotype. x 50.



Periclimenes (Periclimenes) pedersoni

- Fig. 7. Right mandible of holotype. x 30.
 Fig. 8. Right first maxilla of holotype. x 30.
 Fig. 9. Right second maxilla of holotype. x 30 .
 Fig. 10. Right first maxilliped of holotype. x 30.
 Fig. 11. Right second maxilliped of holotype. x 30.
 Fig. 12. Right third maxilliped of holotype. x 25.
 Fig. 13. Chela of right first pereopod of holotype. x 25.
 Fig. 14. Fingers of right second pereopod of holotype. x 25.
 Fig. 15. Dactyl of right third pereopod of holotype. x 25.
 Fig. 16. Right first pleopod of holotype. x 25.
 Fig. 17. Right second pleopod of holotype. x 25.