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PONTONIDES SYMPATHES, A NEW SPECIES OF COMMENSAL SHRIMP (CRUSTACEA, DECAPODA, PONTONIINAE) FROM ANTIPATHARIA IN THE GALAPAGOS ISLANDS

by

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With 3 text-figures

During a stay at the Galapagos Islands (1975-1976), one of us (Ch. de Ridder) made a study of Gorgonaria and Antipatharia, paying special attention to commensals found with these corals.

On *Antipathes galapagensis* Deichmann, 1941, a species of the pontoniine shrimp genus *Pontonides* was observed, which proved to be new to science. The present paper describes the new species and its living conditions.

Pontonides sympathes new species (figs. 1-3)

Material examined. — Punta Pitt, north-east coast of San Cristobal Island, Galapagos Archipelago, Ecuador; on *Antipathes galapagensis* Deichmann growing on a lava bottom at a depth of 8 m; surface water temperature 23.9°C; 2 February 1976; Ch. De Ridder leg.; 1 ovigerous female holotype, and 29 paratypes.

Specimens of this species, on the same host, were observed in two other localities in the Galapagos Archipelago: near Daphne Major Island (depth 10 to 23 m), and near Champion Island (depth about 15 m). These specimens, however, were not collected.

Description. — The carapace is somewhat depressed. The rostrum is broad, short, and depressed; it reaches slightly beyond the base of the eyes

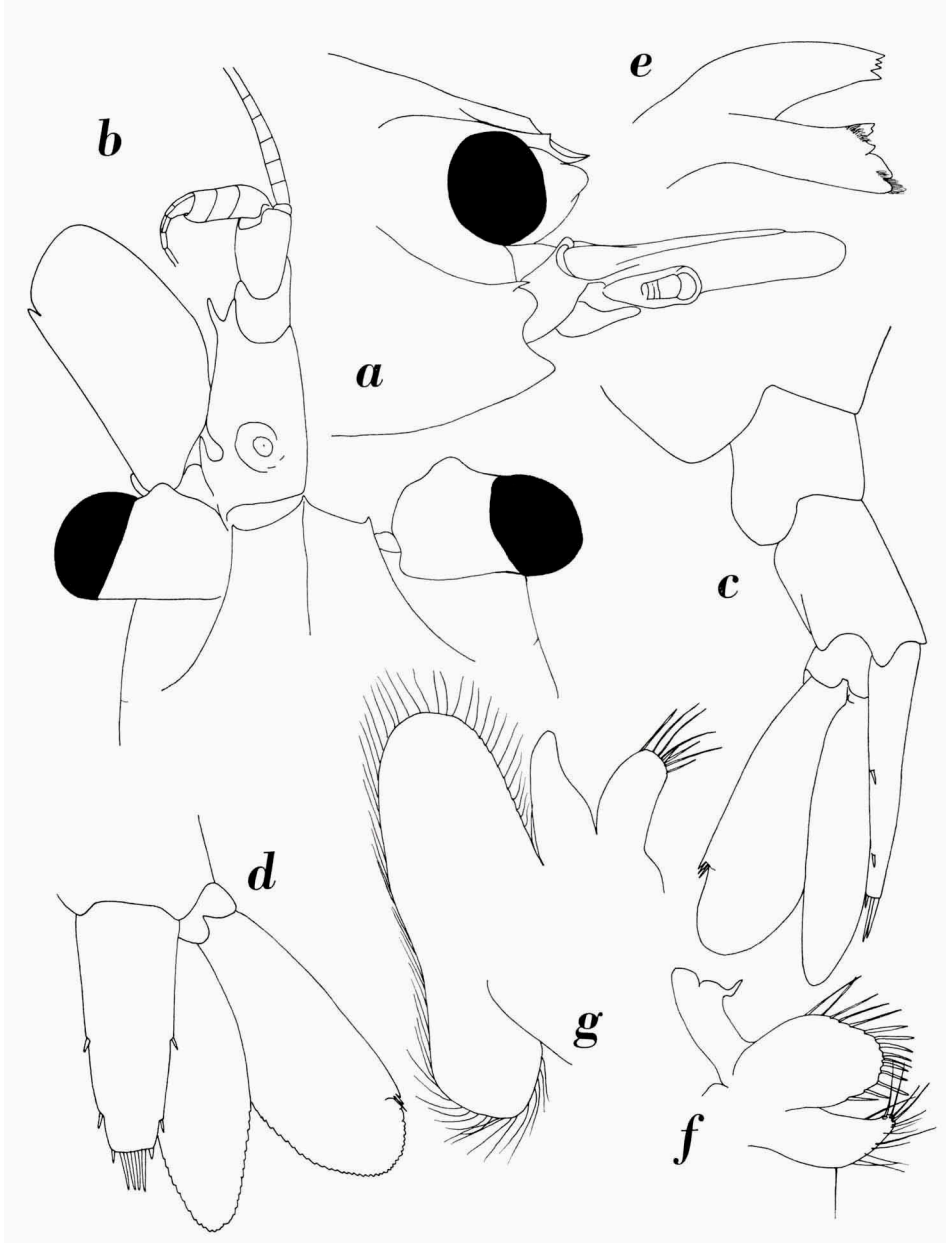

Fig. 1. *Pontonides sympathes* new species. a, anterior part of body in lateral view; b, anterior part of body in dorsal view; c, distal part of abdomen in lateral view; d, telson and right uropod in dorsal view; e, mandible; f, maxillula; g, maxilla. a-d, × 25; e-g, × 50.

and fails by far to reach the base of the antennular peduncles. It is flat and wide; its midrib is elevated, but rather low, unarmed and with a blunt dorsal angle in about the middle of its length. The lateral margin of the rostrum bears a distinct, though small tooth; in one of the specimens, on one of the lateral margins a second tooth is placed immediately behind the first, in all other specimens each lateral margin has only a single tooth. The margin between the tip of the rostrum and the lateral tooth runs obliquely backward and laterally, more laterally than posteriorly; hereby the isosceles triangle formed by the tip of the rostrum and the two lateral teeth is very low. Behind the lateral teeth the lateral margin is directed more posteriorly. The posterior part of the rostrum forms an eave, or pseudo-orbital margin, over the orbit. The lateral margins of the orbit are somewhat elevated, and between them and the midrib the rostrum is concave. The true orbit is rather narrow and shows a broadly curved lower angle, which reaches down and slightly forward toward a small triangular antennal lobe, on which the antennal spine is placed some distance behind the anterior margin of the carapace. Below and obliquely before the antennal lobe there is the pterygostomian lobe, which reaches strongly forwards, projecting even slightly beyond the tip of the rostrum. The carapace shows no hepatic, supra-orbital or pterygostomian spines. From the antennal spine a carina goes backward and slightly up, forming a kind of ventral pseudo-orbital margin. The upper and lower pseudo-orbital margins enclose a depressed post-orbital area, but they do not meet.

The abdomen has all the pleura broadly rounded. The fifth abdominal somite measures about 3/5 of the length of the sixth. The pleuron of the sixth somite is somewhat triangular and rounded, the posterolateral angle of the somite is oval and shows no teeth; the posterior margin of the somite is slightly convex and unarmed. The telson is 1.5 times as long as the sixth somite. It bears two small spinules on either lateral margin. The anterior of these spinules stands slightly behind the middle of the telson; the posterior spinule is somewhat closer to the posterior margin of the telson than to the anterior spinule. The posterior margin of the telson is wide and bears the usual three pairs of spinules, the outer pair of which is the shortest.

The eyes have the stalk somewhat longer than the cornea. A distinct blunt conical process is present on the anterior margin of the eyestalk. The cornea is well developed and rounded.

The antennula has the stylocerite short and pointed; it is distinctly shorter than half the basal antennular segment and is separated from the body of the segment by a deep excavation. The anterolateral angle of the basal antennular segment is produced into a strong slightly curved spine; the anterior margin

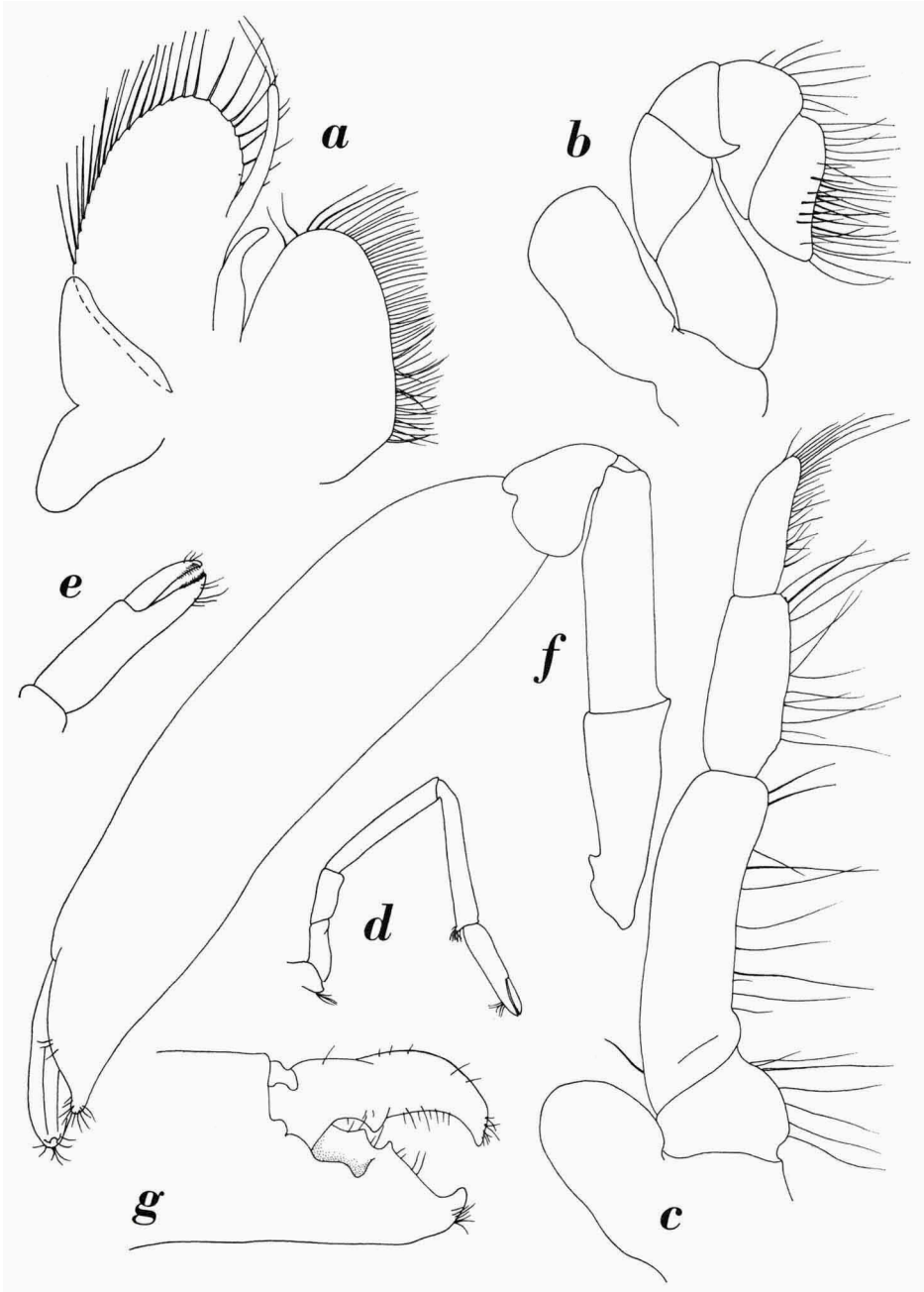

Fig. 2. *Pontonides sympathes* new species. a, first maxilliped; b, second maxilliped; c, third maxilliped; d, first pereiopod; e, chela of first pereiopod; f, larger second pereiopod; g, fingers of larger second pereiopod. a-c, × 50; d, × 12.5; e-g, × 25.

of the segment has the part lying against the outer margin of the second segment strongly produced; this lobe reaches almost as far forward as the anterolateral spine. Between it and the spine the anterior margin of the segment is deeply concave. The second segment of the antennular peduncle is the shortest of the three segments, being less than half as long as the first. The third segment is distinctly longer than the second. The upper antennular flagellum has the two rami fused for 3 segments; the free part of the shorter ramus also consists of three segments and is about half as long as the fused part.

The antennal peduncle shows no spines and its ultimate segment reaches about to the middle of the scaphocerite. Near the base of the scaphocerite a blunt triangular tooth is present. The scaphocerite is about twice as long as wide. The outer margin is about straight and ends in a short tooth. The lamella is distinctly produced beyond that tooth.

The mandible possesses no palp. The incisor process ends in about four small teeth. The molar process ends in some blunt teeth and shows rows of short bristles. The maxillula has the lower lacinia slender and triangular, the upper is somewhat broader and more oval; the palp is distinctly bilobed, the lower lobe ends in a curved point. The maxilla has the single endite narrow, a palp is present and the scaphognathite is oval in outline. The first maxilliped has the endite broad and undivided; the palp is slender; the exopod has the caridean lobe broadly rounded and there is a short distinct flagellum, which reaches beyond the caridean lobe; the epipod is distinct and bilobed. The second and third maxillipeds do not show a trace of an exopod. The second maxilliped has the endopod short and of the usual shape; a large epipod is present. The third maxilliped reaches the end of the antennal peduncle; it is rather slender; the distal segment is slightly shorter and narrower than the penultimate. The antepenultimate segment is about as long as the distal two segments together. A well developed epipod, but no exopod or gills are present at the base of the third maxilliped. Pleurobranchs are present at the bases of the five pereiopods.

The first pereiopod reaches with the carpus beyond the scaphocerite. The fingers are short, being about 2/3 of the length of the palm; the cutting edges show no teeth, but a row of short bristles is placed along the distal part of the edge. The carpus is almost 1.5 times as long as the chela and 6 times as long as wide. The merus is about as long as the carpus.

The second legs are strongly unequal in size. The larger leg is very robust and reaches with the carpus beyond the antennal peduncle. The fingers are short, measuring about 1/3 of the length of the palm; they end in strong curved, rather blunt tips. The cutting edge of the dactylus bears a single

strong tooth in the basal half; this tooth fits in a cavity, which is placed to the inside of the cutting edge of the fixed finger. The cutting edge of the fixed finger bears two distinct teeth. The palm is elongate and cylindrical, about four times as long as wide. The carpus is short and obconical, being about 1/6 as long as the chela; its anterior margin shows an indentation. The merus is about twice as long as the carpus and slightly longer than the ischium. The smaller second leg reaches with the carpus beyond the pterygostomian angle. Its fingers are about 1/3 as long as the palm; their tips carry some hairs, and the cutting edges are unarmed. The palm is cylindrical, and about 5 times as long as wide. The carpus resembles that of the larger leg, and has somewhat less than 1/3 of the length of the chela. The merus is about twice as long as the carpus and about as long as the ischium.

The third leg reaches with the carpus beyond the pterygostomian angle of the carapace. The dactylus is curved, simple and sharply pointed; its posterior margin carries a tubercle in the basal part, this tubercle disappears in a cavity of the propodus when the dactylus is curved backward. The propodus is less than three times as long as the dactylus; it is somewhat curved and shows no spines. The carpus is slightly less than half as long as the propodus and about half as long as the merus. The ischium is distinctly shorter than the merus. The fourth and fifth pereiopods are similar to the third.

The thoracic sternum is quite broad. In the female it widens gradually posteriorly, being widest at the bases of the fifth pereiopods. In the male, however, the sternum narrows conspicuously at the bases of the fifth legs. There are no spines on either the thoracic or the abdominal sternites of males and females.

The endopod of the first pleopod of the male is short and broad, with a rounded apex. The endopod of the second male pleopod has the appendix masculina much shorter than the appendix interna; it is provided with several long spines, the distal of which do reach beyond the appendix interna.

The uropods are longer than the telson. The protopodite shows a rounded lobe over the base of the exopod and one over the base of the endopod. The exopod is wider than the endopod; its outer margin is slightly convex and ends in a tooth, which has two spines placed at its inner side; the outer of these spines is the stronger, the inner is more like a strong seta.

Size. — The examined specimens have the carapace length between 1.3 and 2.9 mm and the total length between 5.2 and 10 mm. The carapace length of the four ovigerous females lies between 2.6 and 2.9 mm, their total length between 9 and 10 mm. The eggs are 0.4 to 0.5 mm in diameter.

Colour. — In life the animal is transparent with transverse yellow-pig-

mented areas. There are one or two of such transverse yellow areas on the carapace, and two on the abdomen. The anterior of the pigmented areas of the abdomen occupies the first and second abdominal somites and a small part of the third; the second area covers the fifth somite and the posterior part of somite 4.

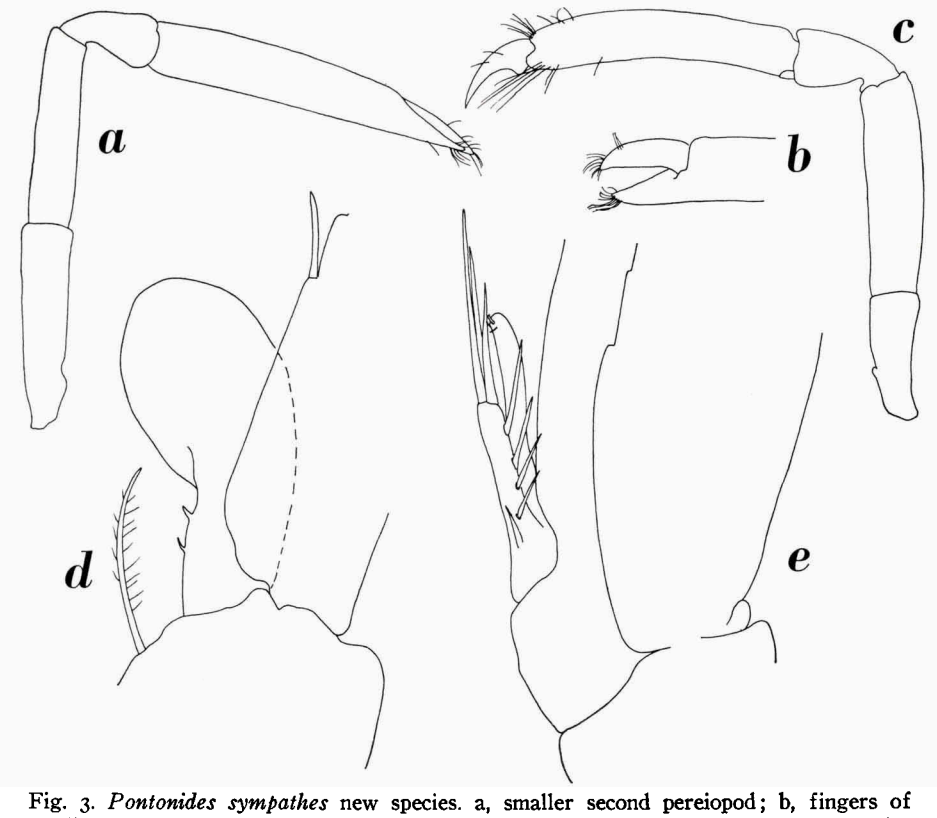

Fig. 3. *Pontonides sympathes* new species. a, smaller second pereiopod; b, fingers of smaller second pereiopod; c, third pereiopod; d, endopod of first pleopod of male; e, appendix masculina and appendix interna of second pleopod of male. a-c, × 25; d, e, × 100.

This coloration is protective as the brownish slender branches of the antipatharian host bear numerous yellow polyps with non-retractile tentacles that mask the branches almost completely. The yellow colour of the shrimp is very similar to that of its host.

Comparison with other species. — So far two species were known of the genus *Pontonides*, viz., *P. maldivensis* Borradaile, 1915, and *P. unciger* Calman, 1939. *Pontonides sympathes* resembles *P. unciger* in that the lateral margin of the rostrum shows a distinct sharp tooth; in *P. maldivensis*

no such tooth is present and the lateral margin is evenly convex. In *P. unciger* the rostrum is much longer than in *P. sympathes*, and the triangle formed by the tip of the rostrum and the lateral teeth is much higher, its height equals or exceeds its basal width, while in *P. sympathes* the basal width of the triangle far exceeds the height. Neither Borradaile (1915: 213; 1917: 387, pl. 57 fig. 28) for *P. maldivensis*, nor Calman (1939: 213, figs. 6, 7) for *P. unciger*, described or figured a tubercle on the ocular peduncle, while such a tubercle is a very striking feature in *P. sympathes*. However, in Holthuis's (1952: 219, figs. 108-110) specimen identified as *P. unciger*, a small tubercle is present. In *P. unciger*, and probably also in *P. maldivensis*, the flagellum of the exopod of the first maxilliped is extremely reduced or absent, in *P. sympathes* it is reasonably well developed. The outer part of the anterior margin of the basal antennular segment is far more deeply concave in *P. sympathes* than in *P. unciger*. Also the dentition of the larger of the second legs is different in *P. sympathes* than in *P. unciger*, where it is "with irregular teeth" (Calman, 1939: 215, fig. 7F). The sexual dimorphism found in *P. unciger* by Fujino & Miyake (1969: 87, fig. 1) is not shown by our extensive material of *P. sympathes*. In all second legs, whether male or female, the fingers are very short.

Symbiosis. — The specimens here dealt with were collected from the Antipatharian *Antipathes galapagensis* Deichmann, 1941. The antipatharian colony was found at a depth of 8 meters on a lava substratum; its maximum height was 24 cm and it maximum width 20 cm. The average diameter of the upper slender branches was 0.74 mm, that of the thicker branches 2.01 mm, while the main trunk had a width of 3.5 mm at its base.

Little is known about the symbiosis of the other species of *Pontonides*; in the original descriptions of neither *P. maldivensis* nor of *P. unciger* any information is given on this point. In 1968 Davis & Cohen (1968: 751, figs. 1, 3) reported *P. unciger* from the antipatharian sea whip *Cirripathes* spec. in Oahu, Hawaiian Islands, and from Tatagan Island, Borneo (depth 3-5 m). Castro (1971: 398) reported the same host for "*Pontonides* sp.", which he stated to "agree in most characters with Borradaile's description of *Pontonides maldivensis*". Castro's material came from Oahu, Hawaiian Islands (depth 20 m), and he was of the opinion that Davis & Cohen's (1968) material from Oahu might belong to the same species. Castro furthermore referred to an unpublished observation of *Pontonides* sp. from the antipatharian *Antipathes grandis* Verrill in Hawaii.

That *Pontonides* is not restricted to Antipatharia is shown by Fujino & Miyake (1969: 91) who reported *P. unciger* from branches of the scleractinian coral *Dendrophyllia ijimai* Yabe & Eguchi, taken at a depth of 30 to 40 fathoms near the Amakusa Islands, Japan.

Biology. — Observations on the behaviour and the coloration of *Pontonides sympathes* illustrate the perfect adaptation of the animals to their host. The shrimps usually cling motionless to the branches or walk along them. The host corals grow at depths where the influence of the surf is hardly felt and the water movements are such that the coral branches only make a slight swinging movement, which does not bother the shrimps. When a black coral colony is violently shaken, the shrimps swim away for a short distance and stay in the neighbourhood. When the shrimps are placed in an aquarium, they walk slowly over the floor of the aquarium until they meet with a branch of the coral, to which they then cling immediately and stay motionless.

Feeding was not observed, but examination of the oesophagus and stomach contents of the shrimps indicated the presence of nematocysts, fragments of filamentous algae and broken pieces of the skeletal axis of the antipatharian host (spines). Such material was also found in the mucus coating of the antipatharian, and it is very probable that the shrimps feed, at least partially, from the mucus and other material on the body of the host. They do not seem to damage the host on which no scars were observed.

Because of their immobility and protective coloration the shrimps are very difficult to distinguish when they are clinging to the branches of the *Antipathes*.

Sampling methods. — Observations were made on the spot when Scuba diving. To collect the fauna associated with *Antipathes galapagensis*, a thick polyethylene bag was gently slipped over the entire coral colony and closed completely at the base of the stem. After that the coral was separated from the lava substratum and carried to the shore to be observed in an aquarium. It proved impossible to bring the corals and their associates alive to the laboratory at Santa Cruz Island, as they did not survive the unfavorable conditions of the transport. Thus the observations provided above, were made by underwater observations of the coral in situ, and by aquarium observations made immediately after collecting.

Also, the antipatharians, when handled, secreted a large amount of mucus which spread inside the polyethylene bag and the aquarium, entangling and damaging the shrimps.

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