

## A new species of *Calaxius* Sakai & de Saint Laurent, 1989, from the Galapagos Islands (Crustacea: Decapoda: Axiidae)

Brian Kensley and Cleveland P. Hickman, Jr

(BK) Department of Systematic Biology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560-0163, U.S.A., e-mail: kensley.brian@nmnh.si.edu;

(CPH) Department of Biology, Washington and Lee University, Lexington, Virginia 24450, U.S.A., e-mail: hickman.c@rockbridge.net

*Abstract.*—*Calaxius galapagensis*, a new species, is described on the basis of two ovigerous females from coral rubble in shallow water at North Plaza off Isla Santa Cruz, Galapagos Islands. The species is compared with the eight previously described species of *Calaxius* Sakai & de Saint Laurent, 1989, and characterized by a strongly tridentate rostral apex, and by rows of corneous spine-like setae on pereopods 3 and 4.

While engaged in an ongoing survey of the crustacean fauna of the Galapagos Islands in August 1997, one of us (CPH) collected two female specimens of a creamy-yellow axiid shrimp bearing robust chelipeds fringed with long setae. The shrimp were at first identified as *Neaxius vivesi* (Bouvier, 1895), which they superficially resemble, but a more careful examination revealed that they were an undescribed species of the axiid genus *Calaxius* Sakai & de Saint Laurent, 1989.

The specimens were collected by hand at a depth of approximately 6 meters along the western end of North Plaza (Plaza Norte), one of a pair of small islets lying off the east side of Isla Santa Cruz. Both specimens were found beneath rocks in coral rubble where they had built burrows. This habitat parallels that of *Axiopsis baronae* Squires, 1977, an axiid shrimp that we have collected throughout the archipelago, (and also known from Pacific Colombia, Peru and Mexico). The specimens were photographed immediately after the dive, then preserved in 70% ethanol. The only other axiids known from the Galapagos are *Eiconaxius cristagalli* (Faxon, 1893), a sponge inquiline known from deep water (717 m) between Isla Santa Cruz and Isla

San Cristobal, and *Coralaxius galapagensis* Kensley, 1994, recorded from Sullivan Bay, Isla San Salvador.

USNM - National Museum of Natural History, Smithsonian Institution.

Carapace length is measured from posterior margin of orbit to posterior margin of carapace.

Family Axiidae Huxley, 1879  
*Calaxius* Sakai & de Saint Laurent, 1989  
*Calaxius galapagensis*, new species  
Fig. 1

*Material examined.*—Holotype, USNM 308977, ovigerous female, carapace length 11.9 mm, sta 97-384, west end of North Plaza, 6 m, coll. C. P. Hickman, Jr., 28 Aug 1997. Paratype, Charles Darwin Research Station 97-385, ovigerous female, carapace length 11.0 mm, same data as holotype.

*Description of holotype.*—Integument hard, brittle, with numerous scattered clumps of setae. Carapace (Fig. 1A) with posterodorsal region faintly rugose/pitted; rostrum (Fig. 1B) twice length of eyes, apically tridentate, with median spine set at lower level than 2 subterminal spines; strong supra-ocular spine; lateral carina extending posteriorly, bearing 2 strong spines

posterior to orbit, plus row of 5 spines decreasing in size posteriorly; submedian carina of 5 small spines; median carina having 3 strong spines anterior to tubercle, 5 small spines posterior to tubercle; 3 small spines between anterior median and submedian carinae. Abdominal somite 1 with triangular pleura ventrally subacute; pleura 2–6 (Fig. 1A) ventrally broadly rounded, bearing fringe of setae. Telson (Fig. 1C) as long as basal width, lateral margin with 2 or 3 serrations, posterior margin evenly convex, with 3 articulating spines posterolaterally (spines sometimes lost); dorsal surface bearing 2 pairs of fixed spines.

Rostrum reaching beyond antennular peduncle; flagella subequal in length to carapace. Antennal flagellum missing on both sides; acicle slender, crescent-shaped, reaching about midway along peduncle article 4; peduncle article 3 with strong dorsal and ventral spine. Maxilliped 3 (Fig. 1F), basis with strong posterodistal spine; merus with 2 strong spines in distal half of posterior margin, latter bearing elongate setae; carpus with small posterodistal spine; carpus, propodus and dactylus bearing strong clumps of setae. Pereopod 1, chelipeds (Fig. 1D, E) similar in length and spination, with right slightly more robust than left; ischium having 4 spines on lower margin; merus with row of 7–10 spines on lower margin, 2 distalmost spines strongest, 2 or 3 spines on distal part of upper margin; carpus having single strong spine distally on upper surface, flattened spine on flange of ventrolateral surface; propodus strongly setose, especially dorsally, with row of 5 strong curved spines along upper margin, dorsolateral surface granular, strong spine on lateral surface at base of fixed finger; fixed finger and dactylus with irregular tubercles on cutting edges. Pereopod 2 (Fig. 1G), merus with 3 spines on lower margin; dactylus, propodus and carpus setose along upper and lower margins; cutting edges of chela bearing fine spine-like setae. Pereopod 3 (Fig. 1H), merus with 3 or 4 spines on lower margin; propodus with 5 ventro-

lateral rows of spine-like setae, 3 rows near upper margin; dactylus with 3 spines on lateral surface. Pereopod 4 (Fig. 1I), merus with 3 spines on lower margin; propodus with 7 rows of spine-like setae along posterior margin, 4 rows near anterior lateral margin; dactylus with double row of fine spine-like setae. Pereopod 5 (Fig. 1J), propodus with 3 spine-like setae on posterodistal margin, row of spine-like setae along distal margin, plus strongly setose patch in distal half; dactylus ventrally hollowed. Pleopod 1 consisting of single slender ramus. Uropodal lateral ramus (Fig. 1C) bearing 6 serrations along lateral margin, 10 spines along transverse suture, 6 spines on dorsal surface; mesial ramus with 4 serrations along lateral margin, row of 5 strong spines on middorsal rounded ridge, distalmost reaching well beyond margin.

*Color*.—Body overall creamy yellow-orange, with diffuse red patches on dorsal carapace, anterior and posterior margins of pleura, mesial and lateral surface of pereopod 1 propodal palm, especially at base of fingers, margins of pereopodal articles, uropodal and telsonic spines. Tips of pereopod 1 chela fingers white. Strong red patch on epistome. Eggs yellow.

*Variation*.—Paratype: slight differences in spination from holotype. Rostrum (Fig. 1K) damaged, with apical and left subapical teeth fused. Foraminiferan on dorsal base of rostrum. Four pairs of small spines between median and submedian carinae of carapace (3 in holotype). Eight small spines on dorsal surface of uropodal lateral ramus (6 in holotype) (Fig. 1L); 7 serrations on lateral margin of mesial uropodal ramus (4 in holotype). Telson with 3 articulating spines posterolaterally on each side; tubes of 2 newly settled spirorbid polychaetes present on dorsal surface.

*Remarks*.—Sakai & de Saint Laurent (1989) included eight species in their new genus *Calaxius*, with *C. acutirostris* Sakai & de Saint Laurent, 1989, designated as the type species. These include three species from the western Atlantic and five from the

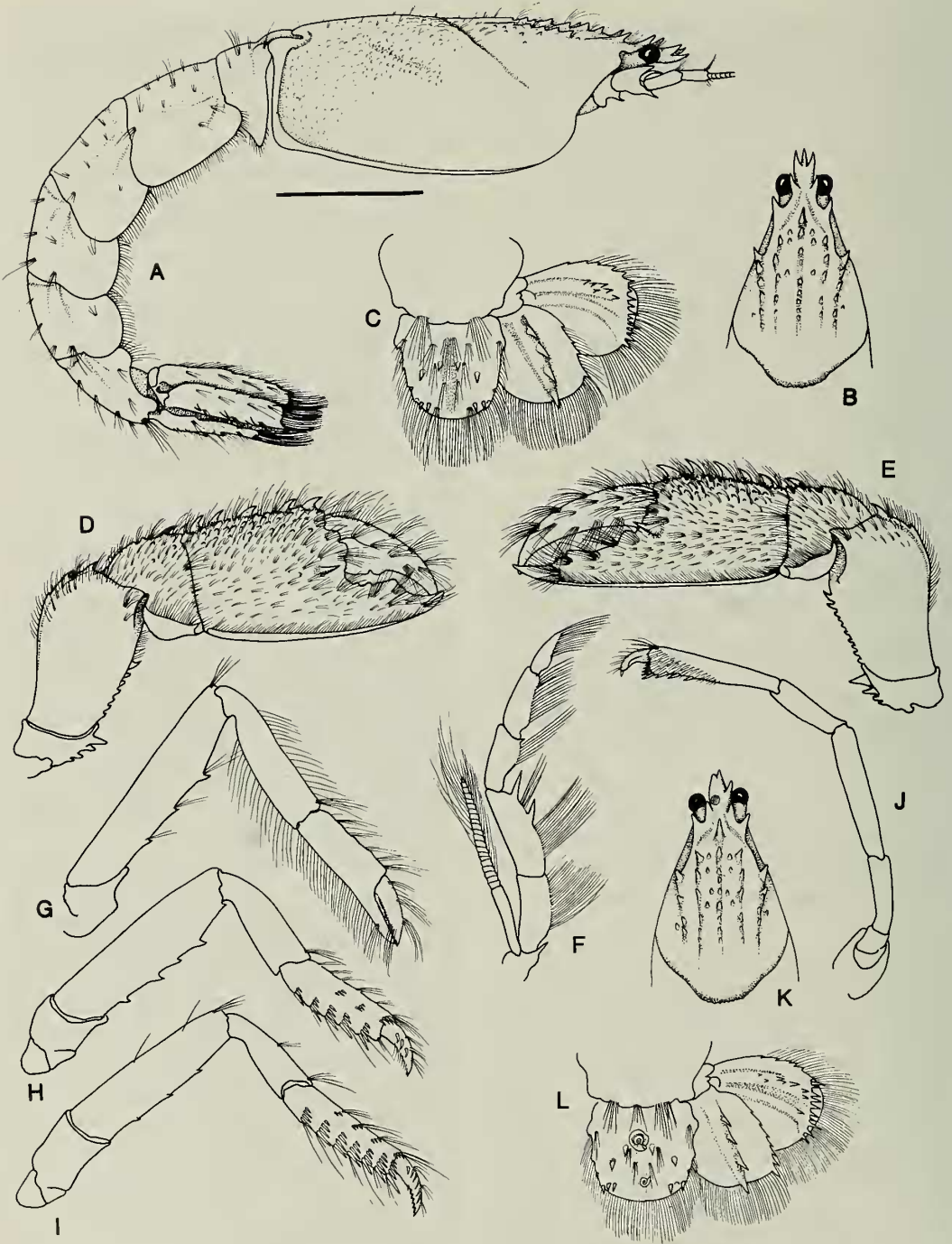


Fig. 1. *Calaxius galapagensis*, new species. A–J, holotype, USNM 308977; K–L, paratype, Charles Darwin Research Station no. 97-384. A, carapace and abdomen in lateral view, scale = 5 mm; B, anterior carapace in dorsal view; C, telson and right uropod; D, right pereopod 1; E, left pereopod 1; F, maxilliped 3; G, pereopod 2; H, pereopod 3; I, pereopod 4; J, pereopod 5; K, anterior carapace in dorsal view (with foraminiferan on rostrum); L, telson (with 2 spirorbid polychaete tubes) and right uropod.

Table 1.—Species of *Calaxius*, with type locality and shape of abdominal pleura.

Species	Type locality	Abdominal pleura
<i>Calaxius acutirostris</i> Sakai & de Saint Laurent, 1989	Madagascar; Philippines, 219–400 m	acute
<i>Calaxius manningi</i> Kensley, Lin & Yu, 2000	Taiwan, 500 m	acute
<i>Calaxius oxypleura</i> (Williams, 1974)	Straits of Florida, 365 m	acute
<i>Calaxius sibogae</i> (De Man, 1925)	Indonesia, 397 m	acute
<i>Calaxius galapagensis</i> , new species	Galapagos, Islands, 6 m	rounded
<i>Calaxius jeneri</i> (Williams, 1974)	North Carolina, 100 m	rounded
<i>Calaxius pailoensis</i> (Rathbun, 1906)	Hawaii, 250 m	rounded
<i>Calaxius euphthalmus</i> (De Man, 1905)	Indonesia, 397 m	rounded
<i>Calaxius inequalis</i> (Rathbun, 1901)	Puerto Rico, 289–309 m	rounded
<i>Calaxius mimasensis</i> (Sakai, 1967)	Japan, littoral	unknown

Indo-West Pacific and Hawaii. Additionally, *Calaxius manningi* Kensley et al., 2000, was described from Taiwan (Table 1). All of these species agree with the characters given by Poore (1994:97) in his definition of the genus, and are especially characterized by the narrowed and strongly spinose rostrum being about twice the length of the eyes; spinose median, submedian, and lateral carapace carinae; subequal and strongly setose first chelipeds, with the propodal palm dorsally strongly spinose, and a strong spine at the base of the fingers on the lateral surface of the propodus; epipods present on pereopods 1–4; pleurobranchs present above pereopods 2–4; lateral ramus of uropod with transverse suture. The present species agrees on all these features, but differs from all previously described species in the number and distribution of the carapace and pereopod 1 spines, while the strongly tridentate rostral apex seems especially characteristic. None of the previously described species seem to have the strong rows of corneous spine-like setae on the lateral surface of the propodus of pereopods 3 and 4.

The species of *Calaxius* fall into two broad groups, viz. those with strongly triangular and ventrally acute abdominal pleura, and those with ventrally rounded pleura (Table 1). Whether this character is of generic value is uncertain; its distribution does not seem to have any geographical significance.

*Etymology*.—The specific name is de-

rived from the type locality, the Galapagos Islands.

#### Acknowledgments

We thank Rafael Lemaitre, Department of Invertebrate Zoology, National Museum of Natural History, for his useful comments on this paper. The second author thanks the Galapagos National Park Service for providing the necessary collecting and export permits, the Charles Darwin Research Station (Robert Bensted-Smith, Director) for providing logistical support, and the crew of the research vessel *Beagle* for their assistance during the survey. Special thanks are extended to Rodrigo Bustamante, George Branch, Robert Day, and Hugh Jarrard for their direct help in collecting.

#### Literature Cited

- Bouvier, E. L. 1895. Sur une collection de Crustacés décapodes recueillis en Basse-Californie par M. Diguët.—Bulletin du Muséum National d'Histoire Naturelle, Paris, 1:6–8.
- Faxon, W. 1893. Reports on the dredging operations off the west coast of Central America to the Galapagos, to the west coast of Mexico, and in the Gulf of California, in charge of Alexander Agassiz, carried on by the U.S. Fish Commission Steamer "Albatross", during 1891, Lieut. Commander Z. L. Tanner, U.S.N., commanding.—Bulletin of the Museum of Comparative Zoology at Harvard College 24(7):149–220.
- Huxley, T. H. 1879. On the classification and the distribution of the crayfishes.—Proceedings of the Zoological Society of London 1879:752–788.

- Kensley, B. 1994. The genus *Coralaxius* redefined, with the description of two new species (Crustacea: Decapoda: Axiidae).—*Journal of Natural History* 28:813–828.
- , F.-J. Lin, & H.-P. Yu. 2000. Further records of thalassinidean shrimps from Taiwan (Decapoda: Axiidae and Calocarididae), with descriptions of three new species.—*Journal of Crustacean Biology* 20, Special Number 2:207–217.
- Man, J. G. de. 1905. Diagnoses of new species of macrurous decapod Crustacea from the Siboga Expedition.—*Tijdschrift der Nederlandsche Dierkundige Vereeniging* (2)9:587–614.
- . 1925. The Decapoda of the Siboga Expedition. Part VI. The Axiidae collected by the Siboga Expedition.—*Siboga Expedition, monographe* 39a5:1–127.
- Poore, G. C. B. 1994. A phylogeny of the families of Thalassinidea (Crustacea: Decapoda) with keys to families and genera.—*Memoirs of the Museum of Victoria* 54:79–120.
- Rathbun, M. J. 1901. The Brachyura and Macrura of Porto Rico.—*Bulletin of the U.S. Fish Commission* 20:1–137.
- . 1906. The Brachyura and Macrura of the Hawaiian Islands.—*Bulletin of the U.S. Fish Commission* 23:827–930.
- Sakai, K. 1967. Three new species of Thalassinidea (Decapoda, Crustacea) from Japan.—*Researches on Crustacea* 3:39–51.
- , & M. de Saint Laurent. 1989. A check list of Axiidae (Decapoda, Crustacea, Thalassinidea, Anomura), with remarks and in addition descriptions of one new subfamily, eleven new genera and two new species.—*Naturalists* 3:1–104.
- Squires, H. J. 1977. A new species of *Axiopsis* (*Axiopsis*) (Thalassinidea, Axiidae) from the Pacific coast of Colombia.—*Canadian Journal of Zoology* 55:1885–1891.
- Williams, A. W. 1974. Two new axiids (Crustacea: Decapoda: Thalassinidea: *Calocaris*) from North Carolina and the Straits of Florida.—*Proceedings of the Biological Society of Washington* 87:451–464.