Observations in life of *Eiconaxius baja* Kensley, 1996 (Crustacea, Decapoda, Axiidea, Axiidae), a sponge commensal lobster

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Abstract.— Three species of the sponge-dwelling lobster *Eiconaxius* are known from the eastern Pacific. Previous reports and descriptions were based on dead specimens. During a study by remotely operated vehicle, *Eiconaxius baja* was photographed *in situ* at the San Juan Seamount within a sponge of the family Phariidae. It tried to escape by swimming backward. Illuminated by the lights of the vehicle, the lobster had an orange color. The depth at which the lobster lives has no ambient light, so the function of the color remains uncertain.

Key words: lobster, *Eiconaxius*, commensal, sponge, Phariidae, northeastern Pacific

Members of the infraorder Axiidea Huxley, 1879, sometimes confusingly called “lobster shrimps”, range from the intertidal zone to great depths. There are 34 species of *Eiconaxius* (family Axiidae), of which only three are known from the eastern Pacific (Kensley, 1996). *Eiconaxius albatrossae* Kensley, 1996, collected off Pacific Panama, and *E. cristagalli* (Faxon, 1893), off Pacific Panama and the Galapagos Islands, are known only from their type material. (See Poore, 2017 for a discussion of the nomenclature of *E. albatrossae*). Species of *Eiconaxius* are thought to be sponge commensals.

Eiconaxius baja Kensley, 1996 previously was known from the type material, 10 specimens taken off Guadalupe Island, Baja California, Mexico (28°57'00"N 118°14'30"W), 1252 m, with sponge fragments, *Albatross* station 2986, USNM 2112495). Wicksten (1982, Fig. 1) reported two specimens of *E. baja* (as *Axius acutifrons* (Bate, 1888) recovered from hexactinellid sponges during trap studies south of Cortez Bank (32°15'N, 119°36'W–30°00'N 119°39'W, 1850–2310 m) and south of San Clemente Island (32°22.5'N 118°38.0'W, 1108 m). These specimens, deposited at the Natural History Museum of Los Angeles County (catalog

number LACM:DISCO:20367) were re-examined and found to be *E. baja*. The upturned rostrum is characteristic.

On 30 October 2020, the exploratory vessel *Nautilus* deployed the remotely operated vehicle *Hercules* at the San Juan Seamount (33°04.2'N, 120°58.8'W). *Hercules* was equipped with high resolution video cameras and both claw and suction collecting gear. A single ovigerous female *E. baja*, carapace length 9.8 mm, with 9 eggs, was photographed in a hexactinellid sponge (family Phariidae) and collected at 1077 m (Fig. 2). This lobster was deposited in the Marine Invertebrate Collection of Scripps Institution of Oceanography, SIO catalog number SIO-BIC-C14467. A tissue sample is available for genetic analysis. Video of the lobster showed that it clambered quickly within the sponge. It tried to escape by flipping the abdomen and swimming backward.

The lights of the ROV illuminated the lobster. There was no ambient light at the depth of collection. The color in life was orange, without pigment in the eyes (Fig. 1). Compared to other axiid lobsters living at depth, *E. baja* has a dark opaque color. *Eiconaxius acutifrons* Bate, 1888 and *E. goldobovi* Poore, 2019 are transparent white (Komai and Tsuchida 2012, Fig.

Fig. 1. *Eiconaxius baja* in sponge (Phariidae) at San Juan Seamount.

Fig. 2. Freshly collected specimen of *Eiconaxius baja*.

6; Poore 2019, Fig. 4). *Eiconaxius serratus* Kuo, Xu, Poore, Li & Wang, 2020, *E. bunibudi* Poore, 2020, *E. sibogae* (de Man, 1925) and *E. dangshaiensis* Poore, 2019 have pale orange to red marks, especially on the cephalothorax (Poore, 2019, Fig. 4; 2020, Fig. 12; Kou et al. 2020, Fig. 1.) *Eiconaxius demani* Sakai, 1912 shows some variation in color, one photographed individual having more red pigment on the anterior body than another (Poore, 2020, Fig. 12 B, C). The color would be unlikely to provide visual camouflage for a lobster living inside a sponge. The color could have been due to carotenoid pigments serving a physiological function, perhaps in strengthening the exoskeleton. Other benthic crustaceans at San Juan Seamount varied in color from dark red, as in the lithodid crab *Paralomis multispina* (Benedict, 1895) to dirty brown, as in the majoid crab *Chorilia longipes* Dana 1851, or white (unidentified *Munidopsis* sp.)

Hexactinellid sponges at San Juan Seamount and other offshore rocky habitats provide a habitat not only for axiids but also for ophiuroids as well as amphipods and caridean shrimps (family Thoridae, unidentified). A sponge can provide anchorage or hiding places. Further study is needed to determine if these associations are species-specific and what, if any, benefit accrues to the sponge.

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