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Research Notes

Rediscovery of the Laomediid Shrimp *Naushonia macginitiei* (Glassell, 1938) (Crustacea: Decapoda: Thalassinidea: Laomediidae) from off Southern California

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Introduction

The decapod crustacean genus *Naushonia* Kingsley, 1897, currently contains seven species of rare, burrowing shrimp-like thalassinoids (Goy and Provenzano 1979; Martin and Abele 1982; Berggren 1992; Alvarez *et al.* 2000). Species are known from mud and other soft sediments in temperate and tropical localities worldwide, with the exception of Asia (e.g. *N. crangonoides* from the east coast of the U.S, *N. panamensis* from the Pacific coast of Panama, *N. perrieri* from the Red Sea, *N. lactoalbida* from Moçambique, *N. manningi* from the Bahamas), but in almost all cases each species is known from very few specimens. The sole species known from the west coast of North America is *Naushonia macginitiei* (Glassell), described originally (as *Homoriscus macginitiei*) by Glassell based on two ovigerous females collected from La Jolla, California, in 1935 (Glassell 1938: 414). Soon after the species was described, Chace (1939) reassigned both known species of *Homoriscus* to the genus *Naushonia.* Goy and Provenzano (1979) briefly reviewed the genus *Naushonia* and mentioned a total of four specimens of *N. macginitiei* examined by them (including the ovigerous female paratype) in the collections of the U. S. National Museum of Natural History (USNM). However, Goy and Provenzano (1979) did not provide information on the collecting locality of those specimens, although that information has now been provided to us by the USNM (see below).

To date, the species is known from only two reports in the literature and a total of five specimens, possibly explaining why the species was not listed by Williams et al. (1989) in their list of the known decapod Crustacea from North America (an omission that has now been corrected by McLaughlin *et al.* 2005). In addition to the published reports noted above, additional specimens have been encountered during regional monitoring efforts of the Southern California Coastal Water Research Project (SCCWRP; see www.sccwrp.org). Stations where the species was collected during the SCCWRP Bight 98 project were 2259 (at a depth of 11.2 m; 1 specimen), 2259 (10.9 m; 1 specimen), and 2264 (10.1 m; 2 specimens), all of which were in San Diego Bay. During the SCCWRP Bight 03 project, one specimen was found at each of the following stations: BRI 17 (7 m), BRI 19 (9 m), and 4116 (4 m), with all stations again being in San Diego Bay (Don Cadien and Ananda Ranasinghe, personal communication). Additionally, there are unpub-

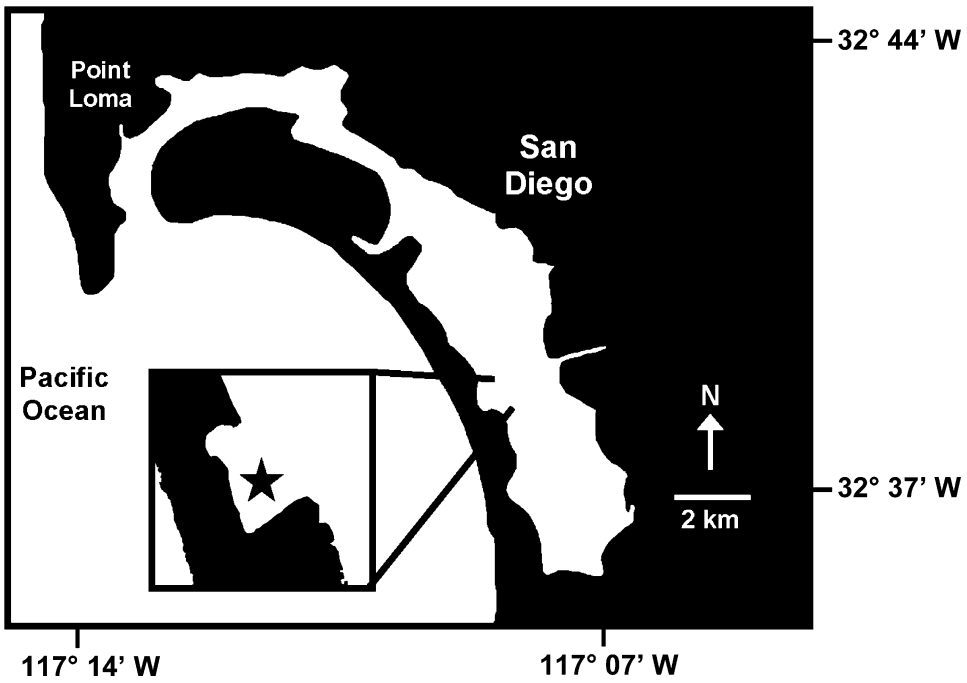

Fig. 1. Map of San Diego Bay with star indicating the location of the eelgrass harvesting experiment and specimen collection site.

lished reports by southern California biologists of laomediid larvae that almost undoubtedly belong to this species (as there are no other laomediids known from southern California) (Don Cadien, personal communication).

In January of 2004, a specimen of *Naushonia macginitiei* was collected from a large, shallow eelgrass (*Zostera marina*) bed south of Silver Strand Beach in San Diego Bay, California, marking the first time the species has been collected in nearly 70 years (apart from the unpublished observations noted above). The specimen, apparently only the sixth of this species ever recorded in print, was photographed soon after collecting, allowing us to comment on the coloration of the species for the first time.

Methods and Materials

Collection of the specimen was made by Brendan Reed and Lindsay Sirota as part of an ongoing San Diego State University master's thesis project focusing on the effects of harvesting eelgrass beds. The study site is San Diego Bay, a crescent shaped bay extending 25 km south from its mouth located near Point Loma (Fig. 1).

Study plots are in a large continuous eelgrass meadow (*Zostera marina*) located in southern San Diego Bay, just south of Silver Strands State Beach (Fig. 1). This expansive bed is fairly uniform in topography and is never fully exposed, although at extreme low tides the grass can be less than 1.5m deep. The currents in the south bay are quite mild, and water residence time can exceed a month. The sediment at this site consists of fine mud particles.

The specimen was collected during faunal surveying in January 2004. Epifauna were sampled with a 0.25m^2 throw-trap consisting of a circular metal frame with an attached 2mm vexar mesh collar that stands 1m high. The narrow opening of the conical collar (30 cm diameter) keeps epifauna from escaping the throw trap in field trials. Each throw trap was sampled with a diver-operated airlift suction sampler for one minute. Epifauna were collected into a narrow mesh bag (1600μm), rinsed and transferred into a plastic storage bag where they were frozen for future sorting in the laboratory.

The specimen was collected from a plot that had approximately 20% eelgrass removed by way of the scarring method, which removes large portions of eelgrass including all aboveground shoots and attached rhizomes. Sampling was conducted from late morning to early afternoon and in water no deeper than 2.5m. Photographs, taken with a digital Nikon Coolpix 995 (3.3 megapixel), were made shortly after the specimen was defrosted and sorted.

The specimen is deposited in the Crustacea collections of the Natural History Museum of Los Angeles County as LACM CR 2004-002.1.

Morphology

The specimen is immediately identifiable as a species of *Naushonia* by the elongate, subchelate, and somewhat oversized chelipeds (approximately equal in length to the carapace in this species and in most others; Fig. 2A, B), the sculptured carapace with well-developed linea thalassinica and broad, short rostrum (Fig. 2A, C), the similar morphology of pereiopods 3–5 but the distinctly different dactylus of pereiopod 2, the well developed suture on both uropods, and other characters of the genus (see Goy and Provenzano 1979; Alvarez *et al.* 2000). Our specimen in general agrees well with the original description given by Glassell (1938). Goy and Provenzano (1979), comparing USNM specimens of *N. macginitiei* (including the ovigerous female paratype) with those of other species in the genus, noted slight intra-specific variability in the number of teeth on the margin of the antennal scale (7 or 8), number of movable spines on the dactylus of the third pereiopod (20–22 in the paratype; up to 24 in two other specimens) and fourth pereiopod (15 to 18 spines). Carapace length of the specimens measured by them ranged from 7.6 mm in the paratype (the largest known to them) to 6.5 mm in USNM 144492 (which is actually USNM 171606 according to K. Reed; see below). Measurements and meristic counts in our specimen fall within these ranges, and the carapace length of our specimen (7.7 mm) is only slightly larger than the largest known specimen to date (the female paratype, measured by Goy and Provenzano [1979] at 7.6 mm carapace length). The abdomen length of our specimen is approximately 11.5 mm (approximate because of the bend of the abdomen), for a total length (rostrum to tip of telson) of approximately 19.2 mm.

The color in life is a surprisingly bright orange, with some of the appendages speckled with white or beige, lending an almost banded appearance to the pereiopods, and with the dorsal surface of the abdomen a more uniform beige or cream (Fig. 2). To our knowledge, this is the first observation of coloration in this species.

Known Distribution and Habitat

To date, *Naushonia macginitiei* has been reported only twice in the literature, first by Glassell (1938) in the original description (as *Homariscus macginitiei*)

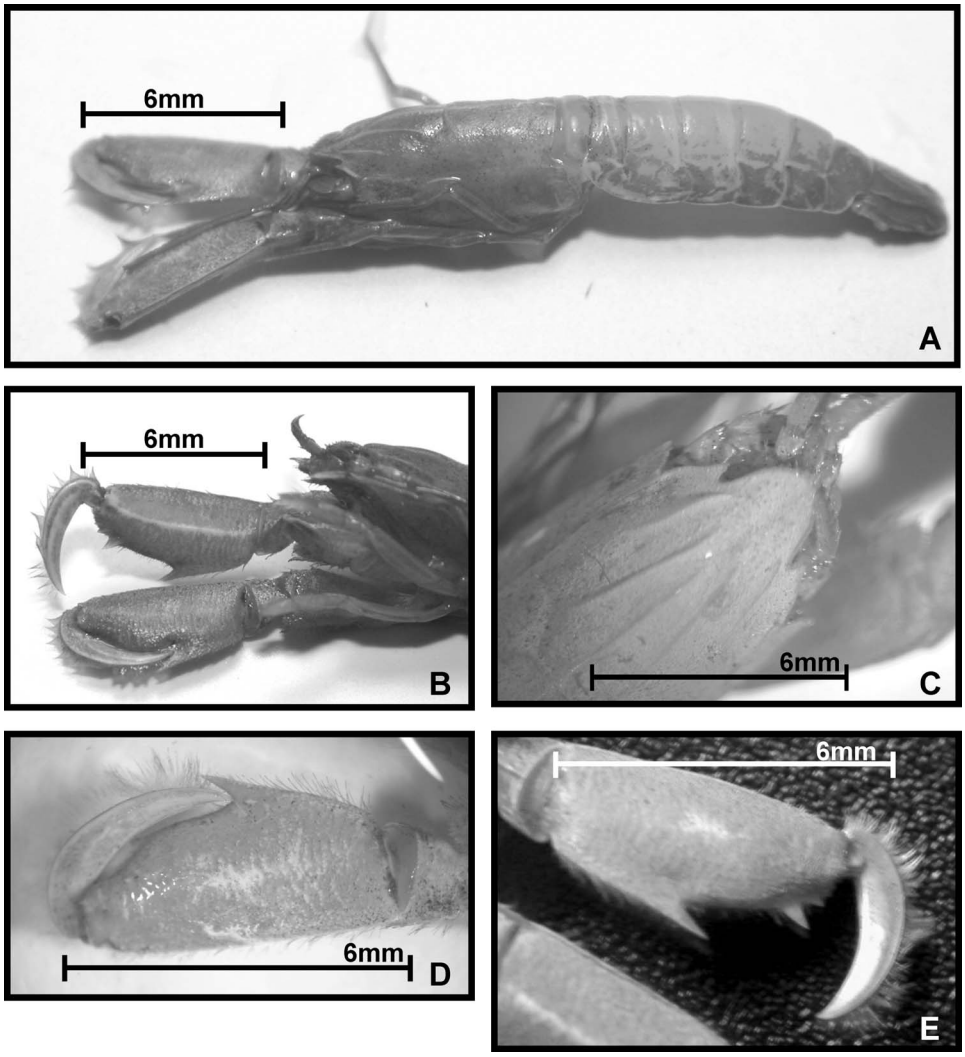

Fig. 2. LACM CR 2004-002.1, specimen of *Naushonia macginitei* (Glassell) from San Diego Bay described herein. A, entire specimen, dorso-lateral view. B, right and left chelipeds. C, rostrum and front half of carapace, dorsal view. D, right chela. E, opened left chela.

and later by Goy and Provenzano (1979). Goy and Provenzano (1979) examined additional specimens housed at the USNM, but did not give details of where those specimens were collected. The additional material discussed by Goy and Provenzano included collections made the Allan Hancock Pacific Expeditions using the R/V *Velero III,* and these records extended the known range south to Sonora, Mexico, and to Costa Rica (see below). In our introduction, we mentioned unpublished records of an additional 6 specimens, all collected from San Diego Bay and, interestingly, from depths of 4 to 11 m rather than the intertidal.

Glassell (1938) indicated that the holotype, one of two ovigerous females from La Jolla, California, was deposited in San Diego and assigned ''cat. no.1120, San Diego Society of Natural History.'' The holotype now resides in the San Diego

Natural History Museum where it is catalogued with the following information: *Homoriscus macginitiei*; holotype #3924; Crustacea acc.no. 1120; 1 specimen; female (with 1120 on the tag in the jar); ''Glassell 1938, p 414'' written on the label (pers. comm., Paisley Cato, San Diego Natural History Museum). The other female (the paratype) was deposited at the USNM, where it is now catalogued as USNM 171605 (see below)

Apart from the holotype, the known collections of this species (all housed at the USNM) are as follows (K. Reed, USNM, pers. comm):

USNM 155480, *Naushonia* cf. *macginitiei* (Glassell), North Pacific Ocean, Wafer Bay, Cocos Island: 5° 32′ 45″ North 87° 00′ 10″ West, rocky shoreline, coll. 1 March 1933, Allan Hancock Pacific Expedition, Velero III, station 105-33, identified by T. Biffar.

USNM 171604, *Naushonia macginitiei* (Glassell), Pacific Ocean, Newport Bay, California, 33° 36′ 58″ North 117° 54′ 12″ West, North and East of highway 101 bridge, intertidal, −1.6 ft. tide, dredged sand flats along shore, coll. 18 December, 1941, Allan Hancock Pacific Expedition, Velero III, station 1442-41, identified by O. Hartman.

USNM 171606, *Naushonia macginitiei* (Glassell), North Pacific Ocean, Gulf of California, Ensenada De San Francisco, Sonora, Mexico, coll. 30 March 1937, Allan Hancock Pacific Expedition, Velero III, station 739-37, identified by J. W. Goy.

USNM 171605, *Homoriscus macginitiei* Glassell (Paratype), 1 female, North Pacific Ocean, La Jolla, California, U.S.A., coll. 4 March 1935 (by G. MacGinitie), identified (described) by S. A. Glassell.

Goy and Provenzano (1979) must have been unaware of the Costa Rica record sent to us by K. Reed (USNM 155480 above), as it is not among the USNM material they listed. According to Karen Reed (USNM), there are also two minor errors in the paper by Goy and Provenzano: the lot they listed as USNM 144492 is actually USNM 171606, and there is only 1 specimen (rather than 2) in that lot (K. Reed, pers. comm.). However, Goy and Provenzano provided measurements and detailed anatomical observations for the two specimens in that lot, so there is some uncertainty surrounding the specimen(s).

To these records we now add the new specimen from San Diego Bay (LACM CR 2004-002.1), very close to the type locality. Thus, the known range of the species is from southern California south to Sonora, Mexico, and to the Gulf of Nicoya, Costa Rica.

Although all members of the genus *Naushonia* are assumed to be burrowers in mud or sand (e.g. see Goy and Provenzano 1979; Alvarez *et al.* 2000), there has always been some question as to the habitat of *N. macginitiei.* Glassell (1938) noted that the original 2 specimens were found (by G. E. MacGinitie) ''in a small pool at extreme low water, after he had turned some stones in search of *Typhlogobius californiensis* Steindacher (the Blind Goby)''. In addition to these two southern California specimens, two additional individuals were also collected from intertidal habitats, one from the Cocos Islands and the other from Newport Bay. Our finding of *N. macginitiei* in a large and rather uniform eelgrass meadow might indicate that the species can occur in more than one type of habitat. As this is the only known specimen collected in eelgrass it is difficult to speculate as to the importance of this habitat to *N. macginitiei.*

Acknowledgments

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NOTE ADDED IN PROOF

While the current paper was in press, the following publication, which expands the known range of the genus *Naushonia* to the western Pacific, came to our attention:

Komai, T. 2004. Rare mud shrimp genus *Naushonia* Kinglsey (Decapoda: Thalassinidea: Laomediidae) from Japan: description of a new species and new record of *N. lactoalbida* Berggren. Crustacean Research 33: 15–26.

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Alvarez, F., J.L. Villalobos, and T.M. Iliffe. 2000. *Naushonia manningi,* new species (Decapoda: Thalassinidea: Laomediidae), from Acklins Island, Bahamas. J. Crustacean Biology, 20: 192–198.

Berggren, M. 1992. *Naushonia lactoalbida,* new species (Decapoda: Thalassinidea: Laomediidae), a mud shrimp from Inhace Island, Moçambique. J. Crustacean Biology, 12: 514–522.

Chace, F.A. 1939. On the systematic status of the crustacean genera *Naushonia, Homoriscus,* and *Coralliograngon.* Annals and Magazine of Natural History. 11(3): 524–530.

Glassell, S.A. 1938. New and obscure decapod Crustacea from the West American Coasts. Trans. San Diego Soc. of Nat. Hist. 8(33):411–454.

Goy, J.W. and A.J. Provenzano Jr. 1979. Juvenile morphology of the rare burrowing shrimp *Naushonia crangonoides* Kingsley, with a review of the genus *Naushonia* (Decapoda: Thalassinidea: Laomediidae). Proc. Biol. Soc. Wash. 92:339–359.

Martin, J.W. and L.G. Abele. 1982. *Naushonia panamensis,* new species (Decapoda: Thalassinidea: Laomediidae) from the Pacific coast of Panama, with notes on the genus. Proc. Biol. Soc. Wash. 95(3):478–483.

McLaughlin, P. A., D. K. Camp, L. G. Eldredge, D. L. Felder, J. W. Goy, H. H. Hobbs III, B. Kensley, R. Lemaitre, and J. W. Martin. 2005. Order Decapoda. In: D. Turgeon, editor, Common and Scientific Names of Aquatic Invertebrates of the United States and Canada. American Fisheries Society Special Publication 31: 1–545.

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