

THE LAST PELAGIC STAGE AND JUVENILE OF *LYSIOSQUILLA SCABRICAUDA* (LAMARCK, 1818) (CRUSTACEA, STOMATOPODA)

Guillermo A. Diaz and Raymond B. Manning

*Lysiosquilla scabricauda* (Lamarck, 1818) ranges in the western Atlantic from Bermuda, the Bahamas, South Carolina, the Gulf of Mexico, and in the Caribbean to southern Brazil (Manning, 1969). Males can reach a total length of 275 mm and females 261 mm (Manning, 1969).

Knowledge of stomatopod larvae, both taxonomically and ecologically, is limited. Of the 350 known stomatopod species, only approximately 10% can be identified at their larval stages.

Manning (1995) recognized the genus *Neogonodactylus* for American species previously referred to *Gonodactylus* and transferred *Lysiosquilla glabriuscula* to the new genus *Lysiosquillina*. *Lysiosquilla scabricauda* was retained in *Lysiosquilla* s.s.

In the western Atlantic, only two species, *Neogonodactylus oerstedii* Hansen, and *N. bredini* Manning, have their larval development completely described (Morgan and Goy, 1987; Manning and Provenzano, 1963; Provenzano and Manning, 1978). One species, *Squilla empusa* Say, has its larval pelagic stages described, but not its propelagic stages (Morgan and Provenzano, 1979). Similarly, only the last pelagic stage of *Alima alba* (Bigelow) (Manning, 1962) and the first propelagic stage of *Coronis scolopendra* Latreille (Rodrigues and Manning, 1992) have been described. Diaz (1998) described the last seven pelagic larval stages of *Squilla* sp.

On 16 September 1994, one stomatopod larva was collected alive from a channel net located in Bear Cut, Miami, Florida. The larva was kept in a plastic container with an air supply at room temperature and was not fed. Three days later the larva molted to the post larval stage. The molt was preserved in ETOH 70%. This postlarva then was kept in the same container and fed live brine shrimp, but feeding was not observed. Seven days later the postlarva molted to the juvenile stage. The juvenile died 1 d later and was identified as a female of *Lysiosquilla scabricauda* (Lamarck).

It was observed that the molting of the postlarva, unlike that of the pelagic stages, occurs in stages. The post-larva does not molt all at once, instead it discards the old exoskeleton in parts. As a result, it was not possible to obtain a complete molt for description. The same phenomena was observed in *Pseudosquilla ciliata*.

DESCRIPTIONS

LAST PELAGIC LARVAL STAGE (Fig. 1A-K).—Rostrum bearing one spine ventrally (Fig. 1C). Carapace with one pair of supraorbital spines. Lateral margins armed ventrally with one spine. Posterior margin not notched and armed with a median dorsal spine. Postlateral spines armed with one ventral spinule (Fig. 1A-C). Mandible serrate (Fig. 1D). Maxillule with coxal endite bearing 15 marginal teeth and 3 medial setae, margin of basal endite with 2 setae (Fig. 1E). Antennule (Fig. 1G) with inner flagellum bearing 12 articulated segments. Median flagellum with 6 segments. Outer flagellum with 33 aesthetascs arranged in 11 groups of 3, one seta distally. Antenna (Fig. 1F) with 66 plumose seta.

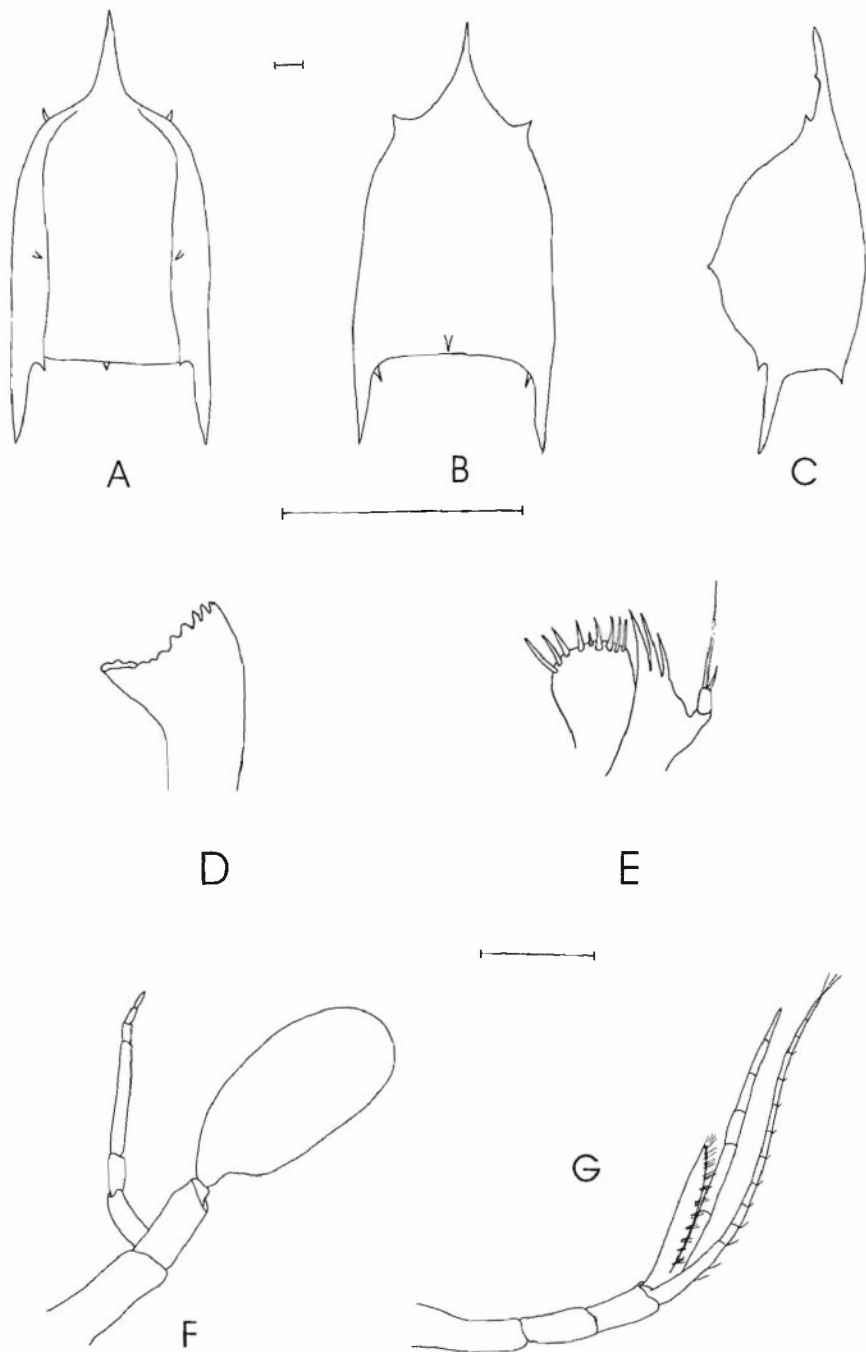
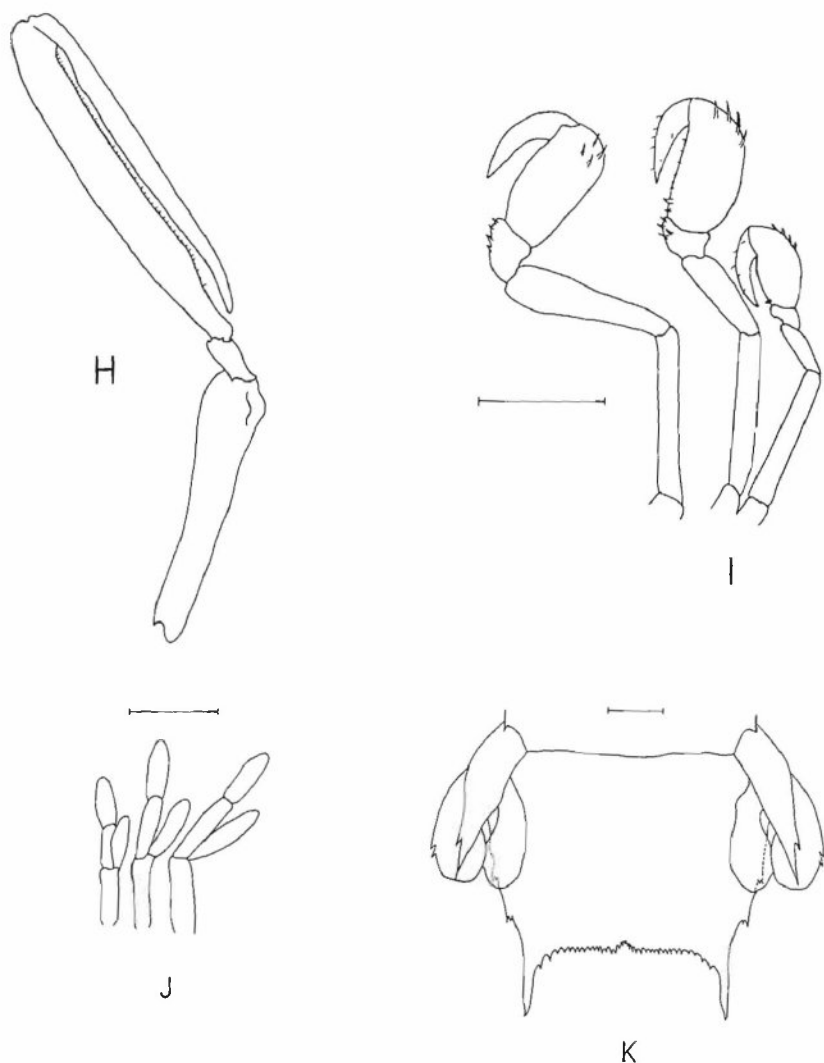


Figure 1. Last pelagic larval stage, A-C) ventral, dorsal, and lateral view of carapace, D) mandible, E) maxillula, F) antenna, G) antennula, (opposite page) H) second maxilliped (claw), I) third-fifth maxillipeds, J) first-third pereopods, K) ventral view of telson and uropods. Scale bars = 1 mm.



Endopod with 6 segments. First maxilliped was too damaged to be described. Second maxilliped with 50 minute denticles on propodus. Dactylus unarmed (Fig. 1H). Third maxilliped with propodus armed with 21 to 23 spinules, carpus with 5 spinules. Fourth maxilliped with propodus armed with 21 to 23 spinules, carpus with 4 spinules. Fifth maxilliped with propodus armed with 12 spinules, carpus with 1 spinule (Fig. 1I). Pereiopods with 2 segmented exopods, endopods unsegmented and shorter (Fig. 1J). Uropod with basal segment of exopod armed with 2 spines. Inner spine of basal prolongation much

larger than outer spine (Fig. 1K). Telson with 2 pairs of lateral teeth and 2 pairs of lateral denticles. One pair of intermediate teeth and 16-17 pairs of intermediate denticles. Ten to three minute spinules between each pair of denticles (Fig. 1K).

JUVENILE STAGE (Fig. 2A-C).—Eyes large, cornea bilobed; eyes extending to the end of second segment of antennular peduncle. Antennal scale suboval, antennal peduncle ex-

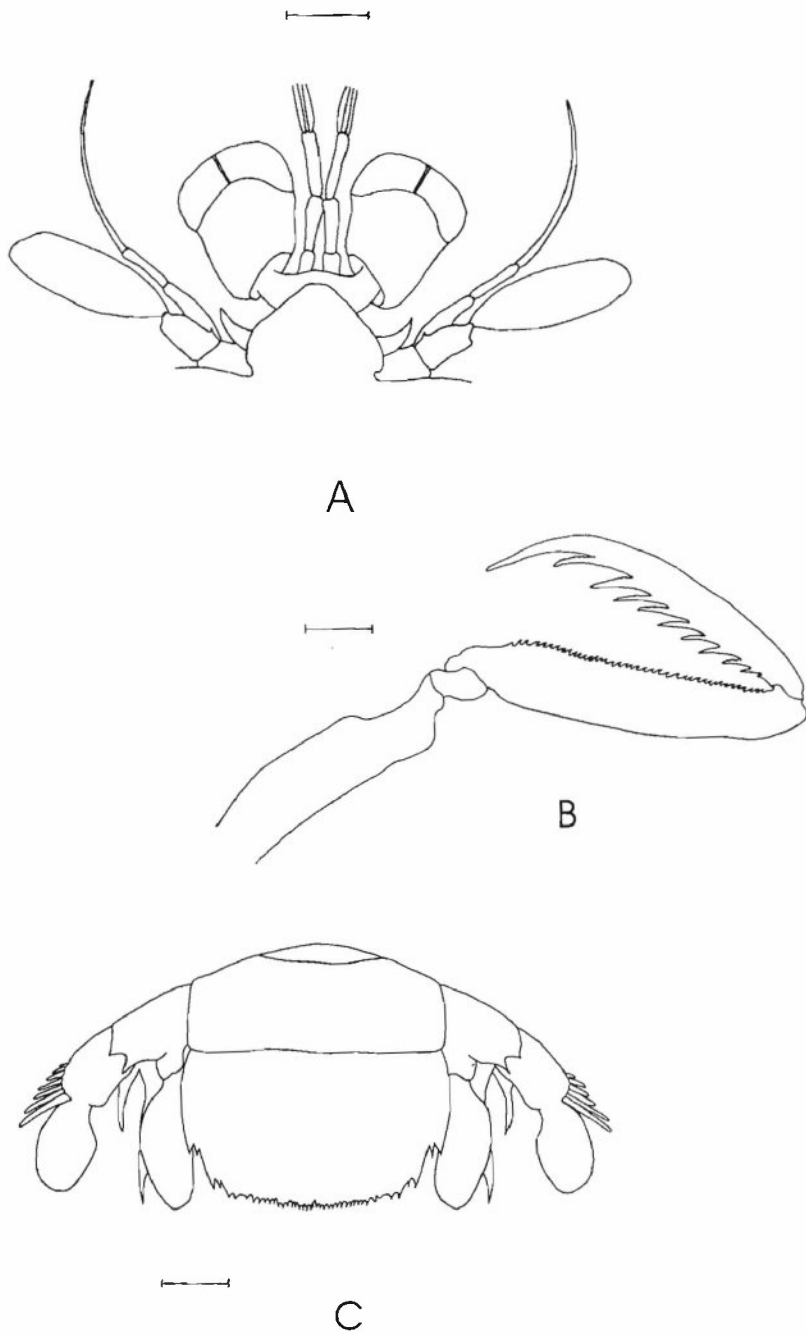


Figure 2. Juvenile stage, A) front, B) second maxilliped (claw), C) dorsal view of telson and uropod. Scale bars = 1 mm.

tending just beyond eye and with a dorsal spine, antennal flagellum about two times as long as scale, comprising about 12 articles. Rostral plate triangular, broader than long, apex rounded (Fig. 2A). Raptorial claw slender, dactylus armed with 11 teeth. Outer edge of opposable margin completely pectinate, inner edge with 2 movable spines (Fig. 2B). Telson broader than long with 2 intermediate teeth and 2 intermediate denticles. The telson has 2 pairs of submedian teeth and 17 submedian denticles (Fig. 2C).

Basal segment of uropod with two dorsal spines at articulation of exopod, basal prolongation of uropod consisting of 2 curved spines with bigger spine on inner margin. Outer margin of proximal of uropod with 7–8 movable spines (Fig. 2C). TL: 21 mm.

The juvenile of *L. scabricauda* can be separated from *L. glabriuscula* by comparing the antenna and claw. The antennal scale is broader in *L. glabriuscula* and it has an antennal peduncle lacking a projection or spine. Additionally, *L. glabriuscula* has a claw with fewer teeth than *L. scabricauda*.

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#### LITERATURE CITED

- Diaz, Guillermo A. 1998. Description of the last seven pelagic larval stages of *Squilla* sp. (Crustacea, Stomatopoda). *Bull. Mar. Sci.* 62: 753–762.
- Manning, R. B. 1995. Stomatopod crustacea of Vietnam: the legacy of Raoul Seräne. *Crust. Res.*, The Carcinological Society of Japan, spec. no. 4. 342 p.
- \_\_\_\_\_. 1969. Stomatopod crustacea of the western Atlantic. *Studies in Tropical Oceanography*, vol. 8. Univ. Miami Press, Coral Gables, Florida. 380 p.
- \_\_\_\_\_. 1962. *Alima hyalina* Leach, the pelagic larva of the stomatopod crustacean *Squilla alba* Bigelow. *Bull. Mar. Sci. Gulf Carib.* 12: 496–507.
- \_\_\_\_\_ and A. J. Provenzano Jr. 1963. Studies on development of stomatopod crustacea I. Early stages of *Gonodactylus oerstedii* Hansen. *Bull. Mar. Sci.* 28: 297–315.
- Morgan, S. G. and J. W. Goy. 1987. Reproduction and larval development of the mantis shrimp *Gonodactylus bredini* (Crustacea, Stomatopoda) maintained in the laboratory. *J. Crust. Biol.* 7: 595–618.
- \_\_\_\_\_ and A. J. Provenzano, Jr. 1979. Development of pelagic larvae and post-larva of *Squilla empusa* (Crustacea, Stomatopoda), with an assessment of larval characters within the Squillidae. *Fish. Bull., U.S.* 77: 61–90.
- Provenzano, A. J., Jr. and R. B. Manning. 1978. Studies on development of stomatopod crustacea II. The later larval stages of *Gonodactylus oerstedii* Hansen reared in the laboratory. *Bull. Mar. Sci.* 28: 297–315.
- Rodrigues, S. A. and R. B. Manning. 1992. First stage larva of *Coronis scolopendra* Latreille (Stomatopoda: Nannosquillidae). *J. Crust. Biol.* 12: 79–82.

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ADDRESSES: (G.A.D.) *University of Miami, Rosenstiel School of Marine and Atmospheric Science, Division of Marine Biology and Fisheries, 4600 Rickenbacker Causeway, Miami, Florida 33149;* (R.B.M.) *National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.*

