THE LARVAL DEVELOPMENT OF THE JONAH CRAB, CANCER BOREALIS STIMPSON, 1859, UNDER LABORATORY CONDITIONS (DECAPODA BRACHYURA)

BY

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INTRODUCTION

Two species of cancrid crabs occur on the east coast of North America with a wide geographic distributional range. The Rock Crab, Cancer irroratus Say, 1817, is distributed from Nova Scotia to South Carolina and its congener, the Jonah Crab, C. borealis Stimpson, 1859, is found from Labrador to Dry Tortugas, Florida and in the Bermudas (MacKay, 1943; Williams, 1965; Squires, 1966; Musick & McEachran, 1972). Both species occur in shallow waters in the north and offshore in the south. Turner (1954) found both species in high densities in and off Boston harbor off the coast of Cape Ann. Templeman (1966) reported both species in shallow waters in lobster fishing areas in the New England region. In Narragansett Bay, Rhode Island, C. irroratus occurs on sandy bottoms and C. borealis is found in rocky areas (Jeffries, 1966; Sastry & McCarthy, 1973).

The ecology and early life history of C. borealis has received much less attention than its congener, C. irroratus (Jones, unpublished; Krouse, 1973; Wright et al., 1974). Smith (1873) and Faxon (1882) partially described the Cancer larvae, but there is confusion in identification to species. Connolly (1923) reconstructed the larval development of C. irroratus Say (under the incorrect name C. amoenus Herbst, 1799), from planktonic material collected from the east coast of Canada, but he failed to recognize all the stages and the descriptions of some larval stages do not agree with those given for laboratory reared larvae of this species. Hillman (unpublished) also collected the Cancer larvae from plankton from Narragansett Bay, but they were not identified to species. This paper gives descriptions of the larval stages of C. borealis reared under laboratory conditions and compares them with those of C. irroratus previously described by Sastry (1977).

MATERIALS AND METHODS

Ovigerous female C. borealis were collected from a cove adjacent to Fort Wetherill in Narragansett Bay by a SCUBA diver. The methods for hatching eggs and rearing larvae were the same as described previously by Sastry (1970; 1977). The strands of eggs isolated from the pleopods were placed in compartments of plastic boxes containing 30o/o sea water and maintained in constant
temperature incubators between 10° and 25° C for hatching. Ovigerous females were also maintained in aerated sea water aquariums at different temperatures for hatching larvae. The early stage (orange) eggs incubated under these conditions deteriorated during their development to hatching. The late stage (dark) eggs incubated in the same manner developed to hatching, but the larvae released were mostly prezoea, although a few first stage zoea were released at the higher incubation temperatures. The first stage zoeeae released at 20° C in 30/00 were separated after hatching and reared at the same temperature and salinity using freshly hatched *Artemia salina* (L.) nauplii as food. Larvae of a known stage were removed for preparation of slides of whole mounts and appendages. Drawings were made with the aid of a camera lucida to scale.

**DESCRIPTION OF LARVAL STAGES**

**Prezoea**

The prezoea released from the eggs incubated at different temperatures settled on the bottom immediately after hatching. Mortality of prezoeae was very high and only a few developed into the first zoetal stage. Prezoeae have large eyes, a five-segmented abdomen and a forked telson. Dorsal and rostral spines were not present in this stage nor were the maxillipeds well differentiated. prezoeae developed into first stage zoeeae within a short time after their release from eggs. The cuticle splits and the dorsal and lateral spines emerge and the maxillipeds are extended. After developing into first stage zoea, the larvae swim to the surface. prezoea reared in the laboratory failed to survive beyond the first zoetal stage.

**First Zoea**

The cephalothorax has 4 spines, a dorsal and rostral spine of approximately equal length and 2 lateral spines (fig. 1A). The eyes are not stalked. The abdomen consists of 5 segments and a bifurcated telson. The posterior margin of each abdominal segment terminates as a short spine which overlaps the next segment. The second abdominal segment has a knob directed laterally. The antennule bears 3 terminal aesthetes, of which 2 are long and the third one-half the length of long aesthetes, and a small spine (fig. 1B). The protopodite of the antenna tapers into a point with several rows of setules (fig. 1C). The exopodite has a long terminal spine and 2 short setae. The mandible is small with an irregular cutting edge on the outer margin (fig. 1D). The endopodite of the maxillule has 6 spines in pairs on the distal segment and a single spine on the proximal segment (fig. 1E). The spinal arrangement on the endopodite is constant for all the zoetal stages. The basal and coxal endites of the maxillule bear 5 and 6 spines respectively. The scaphognathite of the maxilla has 5 plumose hairs (fig. 1F). The bilobed endopodite bears 5 spines on one lobe and 3 on the other. The spinal arrangement on the endopodite of the maxilla is also constant for all the zoetal stages. The basal and coxal endites are also bifurcate with a spinal arrangement of 4-5 and 3-3 respectively. The endopodite of the first maxilliped has 5 segments with a spinal