THE LARVAL DEVELOPMENT OF PETROLISTHES ELONGATUS
(H. MILNE EDWARDS) AND PETROLISTHES NOVAEZELANDIAE
FILHOL (ANOMURA, PORCELLANIDAE) WITH NOTES ON
BREEDING

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I. INTRODUCTION

There have been several descriptions of porcellanid larvae since attention was
first focussed on them by Thompson (1835), but the majority have been con-
cerned with Porcellana. Petrolistes larvae received little attention until Gurney
(1938) and Lebour (1943, 1950) compared them with larvae of Porcellana,
and pointed out generic differences. The two species described in the present
paper both exhibit characteristics which do not agree with other described larvae
of the genus, or are similar to those of Porcellana and Pisidia.

Petrolistes elongatus (H. Milne Edwards) is common throughout New Zealand,
and is also found in Tasmania and Australia (Thomson, 1898; McCulloch, 1913).
Adults occur beneath rocks and stones in intertidal and shallow subtidal regions of
rocky shore lines and boulder beaches. Petrolistes novaezelandiae Filhol is subtidal,
extending to depths of 40 fathoms and is recorded throughout New Zealand from
the Bay of Islands to Stewart Island (Thomson, 1898; Bennett, 1932).

II. METHODS AND TERMINOLOGY

Monthly samples of P. elongatus were taken from intertidal populations over
an 11 month period during 1960-1961. On each occasion, a transect down the
littoral zone to mean low water (M.L.W.) was selected at random and all the
individuals along it removed and preserved in 5% formalin. Care was taken to
ensure that as few as possible of the almost-transparent young stages were over-
looked. Some data from these samples are given in table I.

Representative sampling of P. novaezelandiae populations was not possible, but
adult individuals were obtained by dredging in the Hauraki Gulf in depths up
to 8 fathoms.

Larval stages of both species were obtained from plankton samples, and by
laboratory hatchings from ovigerous females. Various attempts were made to rear
larvae and although many ovigerous females of each were kept until larvae hatched,
no larvae lived longer than 10 days or beyond the first zoecal stage. Plunger jars
and various aquaria were used with variations in aeration, water supply and food (raw plankton, *Pomatoceros* trophophores, *Artemia* nauplii, powdered egg yolk) without success. Similar difficulties are found with many anomuran larvae (Mac Donald, Pike & Williamson, 1957; Boyd, 1960; Pike & Williamson, 1960).

Only the prezoea and stage I zoea were therefore obtained from laboratory hatchings. For other stages, larvae from plankton were identified by comparison with those reared in the laboratory and, where possible, kept in aquaria until some moulted to the next stage.

Measurements (to the nearest 0.1 mm) were made using a low power stereomicroscope with ocular scale. In adults, size was measured as carapace length in the mid-dorsal line from rostrum tip to posterior margin. In larvae, length of the rostrum was measured from its tip to the base of the orbit; length of the posterior carapace spines was measured from their tip to their origin; length of the carapace refers to the distance between the base of the orbit and the point of origin of the posterior spines.

Following the suggestion of Pike & Williamson (1960), the term "telson process" is used to include all structures arising from the posterior margin of the telson. These are numbered from the lateral border, thus the fifth long seta of Lebour (1943) is the seventh telson process.

Larval appendages and setation have been described in detail because, as pointed out by Costlow & Bookhout (1960a: 213), they may have potential diagnostic significance.

III. GENERAL CHARACTERS OF PORCELLANID ZOEAE

Larvae elongate; characterised by very long, tapering rostral and posterior carapace spines. Telson triangular, with convex posterior margin bearing several processes, the outer pair being short smooth spines, the second reduced to fine setae (as in most Anomura), the remainder long setose spines. Five free abdominal somites and no uropods. First and second maxillipeds functional, the third not. Pereiopods small and non-functional. Three or four pairs of pleopods in the later stages.

In aquaria the larva hatches from the egg as a prezoea still surrounded by an embryonic membrane (see below), but soon sheds this to emerge as a zoea.

Two major zoal stages, I and II are found in all known porcellanids (Lebour, 1943, 1950), but there may be substages Ia, Ib, IIA, IIb and IIc, these being reflected in changed body proportions rather than development of new features. Typically four substages occur in *Petrolisthes elongatus* and three, possibly four, in *P. novae-zelandiae*.

IV. PETROLISTHES ELONGATUS (H. MILNE EDWARDS)

(a) Notes on breeding

In the Hauraki Gulf area, ovigerous females were present in all collections of intertidal populations, from April 1960 to February 1961 inclusive (table I).