

ON THE LIFE HISTORY OF A PORCELLANID CRAB,  
*PETROLISTHES LAMARCKII* (LEACH), AS OBSERVED  
IN THE LABORATORY\*

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ABSTRACT

The life history of the porcellanid crab *Petrolisthes lamarckii* (Leach) has been worked out, thus extending the knowledge of the larvae of the genus to six species. In *P. lamarckii* two zoeal and a megalopa stages along with first crab-instar have been observed in the laboratory. These stages have been fully described and illustrated. Average number of days spent in each stage has been also given.

The validity of telson characters as of generic significance is discussed in the light of larval evidence in the six species described so far and in the other Porcellanid genus *Pachycheles*. Also a key to the first zoeal stage of the known species of the genus *Petrolisthes* is given.

INTRODUCTION

THE KNOWLEDGE of the larvae of the Porcellanid genus *Petrolisthes* has, so far, been limited to only five species: *Petrolisthes armatus* (Gibbes) was dealt by Gurney (1938) and Lebour (1943, 1950); *P. rufescens* (Heller) by Gohar and Al-Kholy (1957); *P. novaezealandiae* Filhol and *P. elongatus* (Milne-Edwards) by Wear (1964a, 1964b, 1965a, 1965b) and unluckily duplicated by Greenwood (1965) and *P. boscii* (Audouin) by Shenoy and Sankolli (1967). Menon (1937, 1940) described the entire life-history consisting of three zoeal and a megalopa stages of what he believed to be *Petrolisthes* sp. I and sp. II which, however, do not appear to be *Petrolisthes*. The present work, describing the entire life history of *P. lamarckii* (Leach), consisting of two zoeal and a megalopa stages, thus, extends the information on the *Petrolisthes* larvae to six species. The first zoeal stage of this species, though described by Sankolli (1967), is also incorporated mainly with a view to completing the account of life history.

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OBSERVATIONS

The berried females were collected from the rocky shores of Bombay (Chawpatty) and Ratnagiri (Bhatkarwada). The rearing technique followed was the same as described for *P. boscii* (Shenoy and Sankolli, 1967).

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Though the megalopae thrived well in the laboratory, no further moults could be obtained except in a single megalopa which moulted to the next instar after about 15 days. This crab juvenile was preserved immediately for further studies.

The following Table shows the average duration of each stage:

Stage	I	II	Megalopa
Number of days spent in each stage	7	7	12

#### DESCRIPTION OF LARVAL STAGES

##### First Zoea (Fig. 1)

Length of carapace—1.5 mm; Length of rostrum—8.5 to 9 mm; Length of posterior spine—2.6 to 2.8 mm.

Larva fairly large (Fig. 1 a), rostrum being 6 to 8 times longer than posterior spine. Rostrum armed with 5 to 6 rows of sharp spines almost upto the tip (Fig. 1 b). Posterior spine armed ventrally with a row of prominent sharp tubercles, of which the three proximal spines are large, the rest being unequal and small (Fig. 1 a). Posterior spine with a dorsal row of small, blunt tubercles and with a few such tubercles on the outer lateral surface. (In some larvae, posterior spines were longer, *i.e.* rostrum: posterior spine=4:1). Eyes partially free from carapace. Antennule simple, unsegmented, the antennal endopod being nearly 2/3 the length of exopod. The first and second maxillipeds with 4 setae each on exopod, the third maxilliped being a rudimentary biramous bud. Three pairs of uniramous pereopod buds present. Abdomen 5-segmented, the 4th and 5th segments each carrying a pair of postero-lateral spines which are longer on the 5th segment. Telson process formula 7+7, the 7th process being situated on the central prominence.

*Antennule (A1)* (Fig. 1 c): Simple, unsegmented, bearing at tip 3 aesthetascs and 3 unequal setae, one of which prominent, plumose and ventral in position. *Antenna (A2)* (Fig. 1 d): The basal segment has a knob distally, carrying a short stout endopod and a longer exopod which is distinctly articulated to peduncle. Endopod almost 2/3 length of exopod and bears a minute tooth distally and a small hair-like seta springing from inner angle of this tooth. Exopod has a tapering tip and bears 3 distal, delicate hairs on inner margin. *Mandible (Md)* (Fig. 1 e): slightly asymmetrical and their cutting edges armed with unequal sharp teeth. No palp. *First maxilla (Mx 1)* (Fig. 1 f): Coxal endite is smaller than basal, slightly rounded and bears 5 bristle-like and 3 simple setae. Basal endite large and armed with 3 big and 3 small serrated teeth and 3 simple setae. Palp unsegmented and bears 2 simple and 3 sparsely plumose setae terminally. *Second maxilla (Mx 2)* (Fig. 1 g): Of four lobes of two bilobed endites, proximal and distal most are larger than others. Number of setae borne on each of lobes of coxal and basal endites, is 7, 4, 6 and 8 respectively, from proximal to distal lobes. Palp unsegmented bearing 6 setae distally and 3 setae proximally on inner margin. Scaphognathite long, narrow, bearing 6 to 7 marginal plumose setae in distal half and a single long, plumose seta posteriorly. Inner margin of scaphognathite (in non-setose part) and outer margin of palp fringed with fine microscopic hairs. *First maxilliped (Mxp 1)* (Fig. 1 h): Has a 4-segmented endopod which is almost as long as exopod. First two segments of endopod bear 3 setae

each. Third segment longer than rest and bears 4 setae distally and 2 in middle of inner margin. On outer margin of this segment distally is a long plumose seta. Last segment has 7 setae at tip. Exopod 2-segmented, bearing 4 plumose setae terminally. Basis has about 4 setae on inner margin, 3 of which in a group distally. *Second maxilliped* (Mxp 2) (Fig. 1 i): Its 4-segmented endopod much smaller than exopod. First and second segments carry 1 and 2 setae respectively.

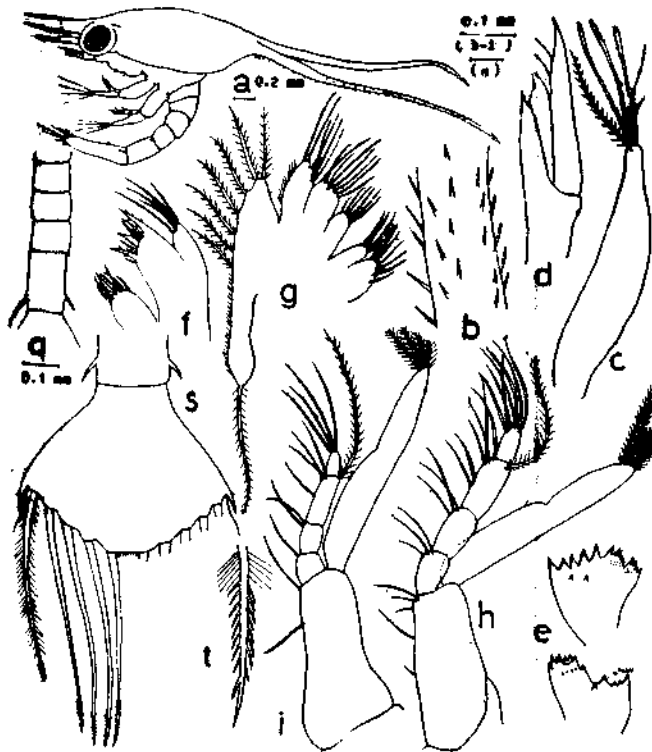


Fig. 1. *Petrolisthes lamarckii* (Leach) : Ist zoea. [a. entire larva/entire larva (rostrum partly shown); b. rostrum/front of carapace magnified; c. antennule; d. antenna; e. mandible; f. first maxilla; g. second maxilla; h. first maxilliped; i. second maxilliped; j. third maxilliped; k. pereiopod buds; l. first leg or cheliped; m. second leg; n. third leg; o. fourth leg; p. fifth leg; q. abdomen; r. pleopod (suffix indicates the number); s. telson; t. telson process highly magnified (suffix indicates the number); u. telson + uropods; and v. abdomen with telson + uropod].

Third segment long as in Mxp 1 but bears 2 distal and 1 median setae. Last segment bears 5 unequal setae apically and one long plumose seta proximally on outer margin. Exopod is similar to that of Mxp 1. Basis is also similar but has only 2 setae. *Other appendages*: Biramous Mxp 3 and 3 pairs of pereopods (Per) rudimentary. *Abdomen* (Ab) (Fig. 1 q): 5-segmented as in porcellanid larvae known, 2nd to 4th segments broader than long but 5th is long and cylindrical. A pair of postero-lateral spines on 4th and 5th segments, those on 5th being larger. No pleopod buds. *Telson* (T) (Fig. 1 s): 'Arrow-head' shaped, broader than long. Process formula is 7+7, 7th process being situated on central prominence. First process is a smooth simple spine; 2nd is reduced anomuran hair and sparsely plumose. 3rd to 7th processes are all plumose,

their tips being armed with peculiar hooks (Fig. 1 t), these hooks being larger on 3rd process. On central prominence, in between 7th processes are fine microscopic hairs, about 8 in number. Anal spine present.

In almost all larvae examined, and also moults, 1st T process or spine was observed to have an accessory spinule ventrally (Fig. 1 s). This character, however, was not noticed by Sankolli (1967) and was found to be absent in IIInd stage. Presence of this accessory spinule might be just an individual variation.



Fig. 2. *Petrolisthes lamarckii* (Leach): IIInd zoea (For explanation see fig. 1).

#### Second Zoea (Fig. 2)

Length of carapace—2.2 mm; Length of rostrum—15 mm; Length of posterior spine—4.7 mm.

Larva remarkably increased in size (Fig. 2 a), armature of rostrum being same as in 1st stage. Posterior spine, however, slightly changed. Ventral sharp tubercles now set apart from each other, whereas dorsal blunt tubercles closely arranged. Eyes stalked. A 1 segmented, with two rami now distinct. A rudimentary mandibular palp present. Mxp 1 and Mxp 2 with 12 to 13 and 14 plumose setae respectively on exopod, Mxp 3 still being rudimentary. All 5 pairs of pereiopod buds and gill buds develop in this stage. 6th Ab segment still fused with T and 4 pairs of pleopod buds present on 2nd to 5th segments. T process formula

[4]

7+1+7, there being a median plumose seta on central prominence as in *P. boscii* (Shenoy and Sankolli, 1967) and not a tooth or spine as described by Menon (1937) or a pair of plumose setae as observed in *P. novaezealandiae* and *P. elongatus* (Wear, 1964 a, b; Greenwood, 1965)

*A 1* (Fig. 2 c): There is a bud-like inner ramus which is fused with peduncle. Outer ramus now distinctly articulated to peduncle and more than twice inner ramus, bearing terminally 3 aesthetascs and 2 to 3 unequal hair-like setae and one plumose seta. Along inner margin are 11 aesthetascs (as in *boscii*) arranged in 4 groups as shown in figure. (It was rather interesting that all the aesthetascs showed a proximal joint which is not observed in any other species). At articulation of outer ramus 3 to 4 fine hairs, and one delicate seta at base of inner ramus. *A 2* (Fig 2 d): Both exopod and endopod now become distinctly articulated to peduncle. Exopod becomes much smaller. Endopod much elongated, nearly twice length of exopod, bearing at its tip 2 small unequal teeth and a small hair-like seta. *Md* (Fig. 2 e): A rudimentary palp present in this stage and teeth appear to have become more stronger. *Mx 1* (Fig. 2 f): Coxal endite now bears 8 bristle-like and 2 simple setae and basal has an addition of one big serrated tooth. Palp does not undergo any change. *Mx 2* (Fig. 2 g): Number of setae on endites increased slightly. Palp as in 1st stage. Scaphognathite now fully setose, bearing 24 marginal plumose setae of which those on anterior part and on posterior lobe, longer than the remaining ones; long posterior seta of 1st stage continues to be present in this stage also. *Mxp 1* (Fig. 2 h): Arrangement and distribution of setae on endopod segments do not show appreciable change. However, first and second segments bear on outer margin, a distal, plumose seta each. Third segment carries one plumose seta on middle of outer margin. Exopod bears 12 to 13 plumose setae distally (in *boscii*, there are 16). Basis has, in all 5 to 6 setae arranged in 4 groups, as shown in figure. *Mxp 2* (Fig. 2 i): Endopod segments bear on outer margin, plumose setae as in *Mxp 1*. Only second segment bears 2 additional setae on inner margin; rest as in 1st stage. Exopod bears 14 distal setae as against 10 in *boscii*. Basis has only 3 setae. *Mxp 3* (Fig. 2 j): Still rudimentary, but tip of exopod shows 2 papilla-like projection, thereby indicating beginning of setae. *Per*: Five pairs of buds present, the first being chelate, as seen through cuticle. In advanced larvae, these become much elongated and heavily formed. *Ab* (Fig. 2 a): Four pairs of pleopod buds are formed on 2nd to 5th abdominal segments. 6th segment is, as yet, not separated from T. *T* (Fig. 2 s): T process formula 7+1+7. A short median plumose seta on central prominence as in *boscii*.

There is no other change in the remaining processes except for the loss of the accessory ventral spinule of the 1st telson process, which was present in stage I. Anal spine was not observed in this stage.

#### Megalopa (Fig. 3, 4)

Length of carapace - 1.6 mm; Breadth of carapace + 1.2 mm

Megalopa resembles the adult in appearance. Carapace (Fig. 3 a) longer than breadth, oval and its anterior margin provided with a few short setae. Front broad, somewhat triangular (Fig. 3 b) and slightly produced to form lateral lobes on either side of deflected rostrum which has a knob-like process on either side of a median shallow cleft. Front not serrated, unlike as in *boscii* or *novaezealandiae* and *elongatus*. However, a group of 3 to 4 minute setae present on each lateral lobes. Orbital notch quite shallow and with no spines. The lateral margins of carapace

also smooth as in *boscii*. Eye-stalks without any spines and not produced beyond the margin of carapace.

*A 1* (Fig. 3 c): Biramous with a 3-segmented peduncle. Basal segment of peduncle is swollen and edged anteriorly with 8 to 9 blunt tubercle-like teeth and a few setae. Opening of statocyst lined with setae. Second segment smooth, rather elongated and last one has two distal setae, one on either lateral margin.

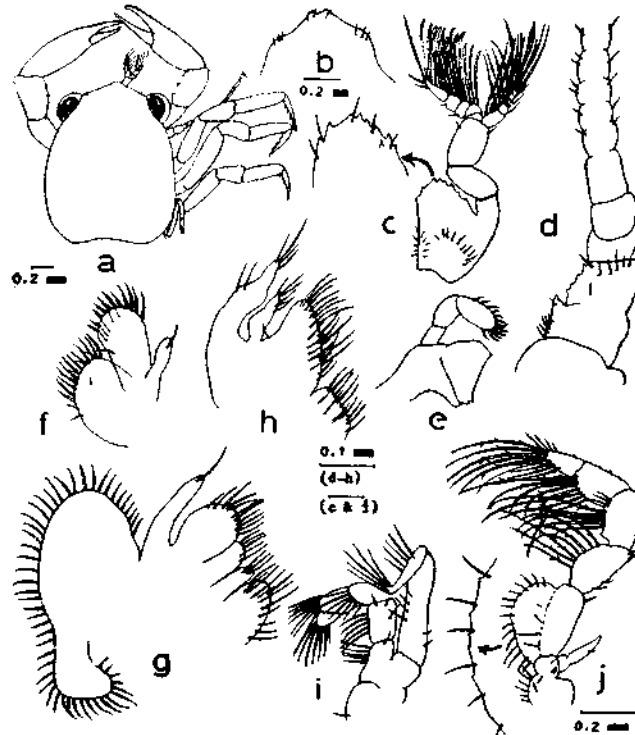


Fig. 3. *Petrolisthes lamarckii* (Leach): megalopa (For explanation see fig. 1).

Inner ramus 3-segmented. First segment is provided with 4 distal, long setae on inner margin and a small seta on outer. Second and third segments each bears a few short setae on either margin and long terminal setae on latter only. Outer ramus 5-segmented having in all 14-15 aesthetascs and 2 to 3 long setae on second to fifth segments. Besides, fifth segment has a long terminal seta, and a few short setae; latter also found on 4th segment. *A 2* (Fig. 3 d): Peduncle 4-segmented, second segment being produced distally into a blunt tubercle-like tooth. Third segment provided with 4 to 5 blunt tubercles on ventral margin. Such tubercles present in adult also. Fourth segment smooth. Flagellum composed of about 25 segments. No scale was observed in this species as well as in *boscii*, although its presence is described in *novaezealandiae* and *elongatus* by Wear. *Md* (Fig. 3 e): Now fully formed with a 3-segmented palp, terminal segment of which bears about 12 setae. Dorsal and ventral cutting edges provided with a single blunt tooth each. *Mx 1* (Fig. 3 f): As in *boscii*, consists of two endites and a simple unsegmented palp but palp in this species has a small distal seta. In New Zealand

species, the palp is, however, 2-segmented. Coxal endite larger, more rounded and bordered with about 23 setae whereas basal endite more elongated, broadening distally and armed with 9 to 10 conical teeth in addition to 4 plumose setae and a sub-distal row of about 5 setae. In the New Zealand species, all setae of endites uniform and plumose, unlike present species and *P. boscii*. *Mx 2* (Fig. 3 g): Two bilobed endites fully setose, coxal having two rows of setae and being more deeply clefted. Palp unsegmented as in *boscii* and *elongatus*, whereas in *novaezealandiae*, palp described to be three-segmented. Palp bears 1 to 2 simple setae distally as in *boscii*. Scaphognathite thin, flat with a broad anterior and a narrow, triangular posterior lobes. Fully fringed with setae along its entire margin. *Mxp 1* (Fig. 3 h): Exopod and endopod much reduced. Exopod unsegmented, scale-like as in *boscii*, although in New Zealand species, 2-segmented. It bears 2 setae on outer margin and 4 to 5 setae terminally. Endopod ribbon-like with about 6 setae distally. Both coxal and basal endites of protopod lined with setae. *Mxp 2* (Fig. 3 i): 5-segmented endopod bears a row of 7 and 6 setae respectively on inner margin of ischium and merus. Carpus, propodus and dactylus have each a tuft of setae distally, more densely arranged on last two segments. Exopod 2-segmented as in *boscii* with a large, somewhat broad, non-flagellar proximal segment with 2 setae on outer and 9 to 10 on inner margin. Distal flagellar segment with 4 to 6 terminal plumose setae. In the New Zealand species, flagellar portion of exopod 2-segmented which was not observed in any specimen of present material. Basis non-setose on inner margin but coxa has a few setae. *Mxp 3* (Fig. 3 j): Coxa lined with setae on inner margin and a few setae scattered on surface. Basis very small with a few setae. Endopod greatly enlarged; ischium bears a ventro-lateral plate-like expansion with a slightly toothed or serrated outer margin (Fig. 3 j) and a few setae. The remaining four segments unarmed except for long plumose filtering setae on inner margin, which are bent towards mouth region, outer margin being fringed with a row of small setae. In addition to these long filtering setae, there are also small bristle-like setae on third to fifth segments. Exopod very small, reduced and 2-segmented with a single minute seta as in *boscii* as against 3-segmented setose exopod of *novaezealandiae* and *elongatus*.

*Per*: Chelipeds or first pair of *Per* (Fig. 4 l) chelate and sub-equal. Ischium is a small joint with a few setae on inner and outer margins. Merus is smooth unlike in adult. However, spines on merus developed in next stage. Carpus almost equal to merus in length. 3 large spines on anterior margin as in *boscii* and a single, small distal tooth on posterior margin as in *elongatus* in which carpus is twice length of merus. Propodus smooth, longer than broad. Dactylus and fixed finger almost equal in length, their tips crossing each other. Cutting edges of both fingers smooth except for a row of setae. All segments covered with setae.

*Walking legs* (Fig. 4 m-o): Second to fourth legs structurally similar. Merus slightly flattened, almost twice length of carpus and as long as propodus. Spine on anterior margin of merus and carpus found in adult, is altogether absent in this stage. Propodus armed on its posterior margin, with 1 spine in middle and 3 longer ones distally as in adult. Dactylus slightly bulbous, ending in a pointed claw and armed with 3 spinules on posterior margin in same way as in adult. All segments setose. Spines of propodus and dactylus resemble those of *boscii*. Of the New Zealand species, all segments including dactylus smooth in *novaezealandiae* and in *elongatus* only carpus and propodus armed with one spine each and dactylus appears to be smooth.

*Fifth leg* (Fig. 4 p): Minutely chelate and slender as usual, bent and concealed beneath the carapace. Merus and carpus long segments. Propodus longer than broad but much shorter than both merus or carpus and forms a distinct chela with dactylus. Tip of chela provided with long setae which are plumose in distal portion but on inner side only. Both fixed finger and dactylus, of equal length and less than half length of propodus. All segments smooth being provided only with setae.

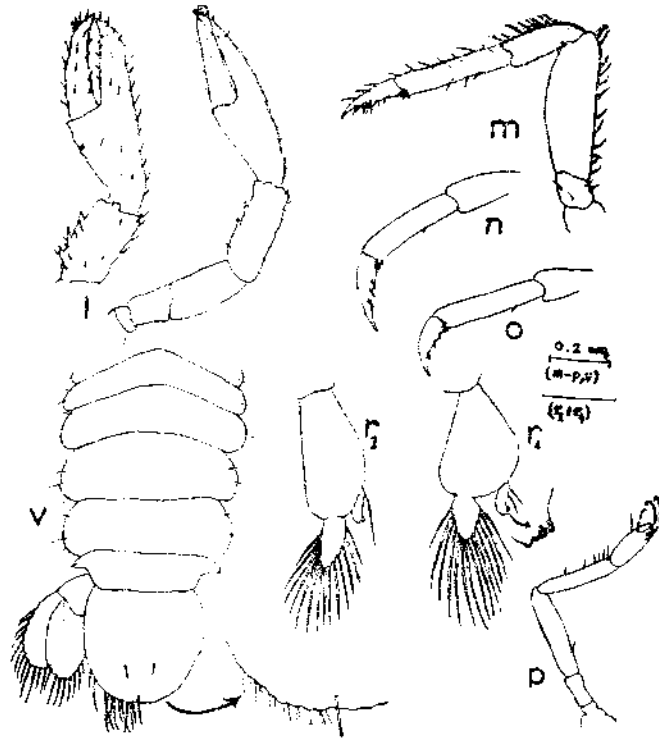


Fig. 4. *Petrolisthes lamarckii* (Leach): Megalopa (For explanation see fig. 1)

No epipod was observed on any of legs unlike as described in *novaezealandiae* and *elongatus*. *Ab* (Fig. 4 v): 6-segmented, 6th segment being free from T. Segments short, laterally expanded and dorso-ventrally flattened as in all porcellanids, first and last being smallest. 2nd to 5th segments bear four pairs of biramous pleopods which gradually decrease in size posteriorly. Each pleopod (Fig. 4 r<sub>1</sub>) has a broad and flat peduncle which bears an oval flat exopod and a small endopod which is half size of exopod. Exopod armed with about 14 long, plumose setae. Endopod has only 1 to 2 plumose setae on its inner margin but armed with a group of 5 to 7 microscopic hooks distally as in *boscii* wherein there are 12 to 14 hooks. Fourth pleopod (Fig. 4 r<sub>4</sub>) smallest with a broad and short peduncle. In both the New Zealand species, endopod does not possess any hooks. *U* (Fig. 4 v): Endopod and exopod of almost equal size. Exopod oval and bears 22 to 23 setae of which 14 situated on posterior and outer-distal margins are long and plumose;



3 to 4 on outer proximal and about 5 on inner margin are simple. Endopod bears 11 plumose setae on posterior margin and about 10 simple setae on inner and outer margins. *T* (Fig. 4 a) : Longer than broad and somewhat oval in shape. Median notch on posterior margin quite distinct and no other notches or their indications seen. Posterior margin, in each half, provided with 8 plumose and 7 to 8 simple hair-like setae. Scattered on dorsal surface are also a few small setae. *T* notches faintly marked in *boscii* and *elongatus*. In *novaezealandiae*, however, *T* completely divided into plates as in adult.

#### First crab instar (Fig. 5, 6)

Carapace slightly broader than long; unlike adult, almost smooth except for minute setae scattered all over especially on side; epibranchial or any other spines not present; front distinctly triangular with rounded tip as in adult, somewhat deflexed but median furrow of adult still wanting (Fig. 5 a).

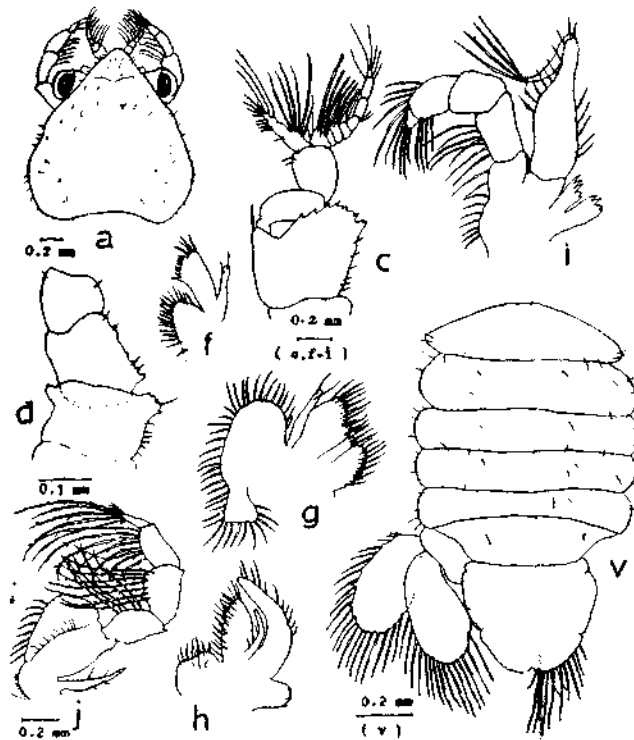


Fig. 5. *Petrolisthes lamarckii* (Leach): 1st crab-instar (For explanation see fig. 1).

*A1* (Fig. 5 c): First segment of peduncle broader than long and nearly  $1\frac{1}{2}$  times as broad as long and its anterior margin roughly semicircular and dentated unlike in adult where it is minutely undulated with a single tooth on its outer extremity only. Second segment sub-cylindrical and third broad distally. Outer flagellum 8-segmented with a number of aesthetascs and a few setae. Inner flagellum 3-segmented as in megalopa, bearing several setae both at tip and

along margin. *A2* (Fig. 5 d): Second segment of peduncle has now a distinct anterior crest as in adult but provided with about 3 to 4 irregular teeth. Short joint, seen between second and third segments in adult, not yet seen in this stage. Third segment is provided along its ventro-lateral margin with 6 to 8 small tubercles which are much smaller in adult. Fourth segment smooth.

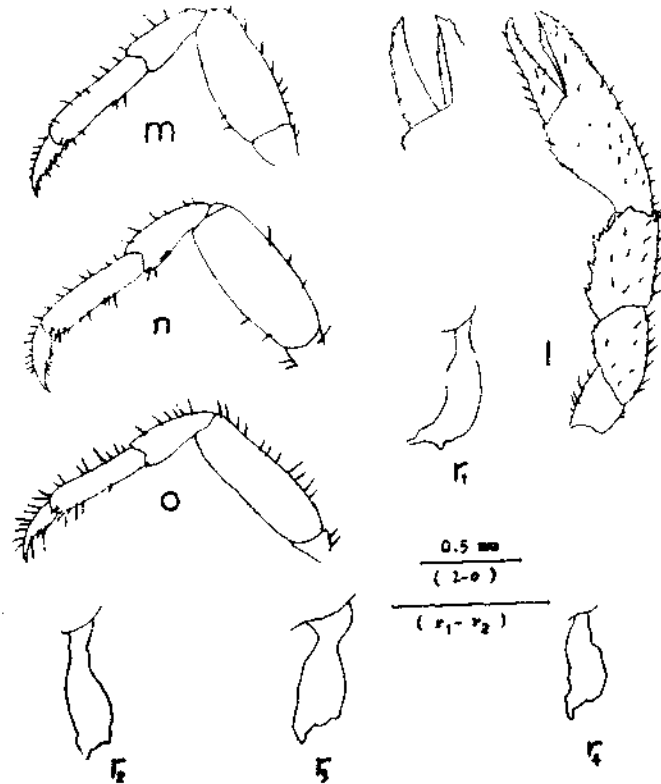


Fig. 6. *Petrolishes lamarckii* (Leach): 1st crab-instar (For explanation see Fig. 1).

*Other appendages:* All appendages from Md to Mxp3 (Fig. 5 e-j) resemble closely those of adult. *Chelipeds* (Fig. 6 l): Sub-equal. Merus has 3 to 4 minute teeth on anterior margin and about 7 such teeth along posterior margin. Anterior margin of carpus edged with 3 large and about 10 very small teeth, its distal end being produced into a tooth as in adult. Propodus has about 5 well spaced minute teeth on its anterior margin. Inner cutting edge of fixed finger bears about 4 minute teeth in distal part and that of movable finger is smooth, though its outer margin dentate with about 14 small teeth. Fingers leave no gap when closed as in adult. All segments provided with small setae arising from minute rugae-like elevations but these setae are scattered as on carapace. *Walking legs* (Fig. 6 m-o): Carpus of first walking leg bears only a minute antero-distal tooth. Propodus has 4 and dactylus has 3 spinules, in all legs, on posterior margin. *Ab* (Fig. 5 v): segments more setose than in megalopa, and bear four pairs of pleopods which are very much reduced, with exopod and endopod practically disappearing (Fig. 6 r<sub>1</sub>-r<sub>4</sub>). *U* (Fig. 5 v): Both exopod and endopods have become

more setose than in megalopa stage and show some spine-like teeth, especially on exopod, on their distal margins. T (Fig. 5 v): Shows a tendency to divide into 7 plates since notches of anterior, lateral and posterior plates somewhat clearly seen in this stage.

#### DISCUSSION

The taxonomic importance of telson characters of the Porcellanid larvae as of generic significance, has been discussed by Gurney (1938) and Lebour (1943, 1950). Lebour (1943), based on these characters, devised a key separating the Porcellanid larvae into two groups, *Petrolisthes* group and *Porcellana* group. Her information was, however, confined only to two genera *Petrolisthes* and *Porcellana*.

Among the six species, in which the larvae are so far known, of the genus *Petrolisthes*, the larvae of four species, viz. *P. armatus* (Lebour, 1950), *P. rufescens* (Gohar *et al.*, 1957), *P. boscii* (Shenoy and Sankolli, 1967) and *P. lamarckii* (present work) show consistency in telson characters—the 7th process situated on the central prominence in stage I and the presence of a median process in stage II—thus fitting in the *Petrolisthes* group of Lebour and also indicating the generic importance of telson characters. The larvae of the remaining two species, *P. novaezealandiae* and *P. elongatus* (Wear, 1964a, b; Greenwood, 1965), however, differ considerably in having the 7th process situated outside the central prominence in stage I of *novaezealandiae*, and a pair of processes, instead of a single median process, in stage II of both the species, thus separating from the *Petrolisthes* group.

The adult taxonomy of *Petrolisthes* reveals that this genus is not homogenous but comprises several natural groups and Haig (1960) suggests a further splitting of the genus. This is also substantiated by the above larval evidence of the four species on one hand and the two on the other.

In light of the recent knowledge on the larvae of more Porcellanid genera, particularly of *Pachycheles* (Kurata, 1964; Knight, 1966; Shenoy and Sankolli, 1973), it is found that the telson characters of *Petrolisthes* group are also shared by the larvae of *Pachycheles*. Thus it may be stated that despite their taxonomic importance, the telson characters may not necessarily be of generic significance.

#### KEY TO THE ZOEAL STAGES OF THE KNOWN SPECIES OF *PETROLISTHES*

1. The 7th telson process situated on the central prominence in stage I; in stage II, a single or a pair of median processes added on to central prominence.....2  
 The 7th telson process situated outside the central prominence in stage I; in stage II, a pair of processes added on to central prominence, posterior margin of telson with 6 pairs of dorsal hairs arising close to the base of 3rd to 7th processes.....*novaezealandiae* (after Wear)
2. Central prominence with fine hairs in stage I; in stage II, it is with a single plumose seta which is not tooth-like.....3  
 Central prominence without fine hairs in stage I; in stage II, it is with a single or a pair of median non-plumose, tooth-like processes.....4
3. Central prominence with less than 10 hairs in stage I; in stage II, the exopod of the first and second maxillipeds bear 12-13 and 14 setae respectively.....  
 .....*lamarckii* (present work)

- Central prominence with more than 10 hairs in stage I; in stage II, the exopods of the first and second maxillipeds bear 16 and 10 setae respectively.....  
 .....*boscii* (after Shenoy and Sankolli)
4. In stage I, telson process formula 6+6 or 8+8; in stage II, a single median process added to process formula.....5  
 In stage I, telson process formula is 7+7; in stage II, a pair of median processes added, instead of a single process.....*elongatus* (after Wear)
5. Process formula is 6+6 in stage I, central prominence indistinct; in stage II, the median process is short but not long.....*rufescens* (after Gohar *et al.*)  
 Process formula is 8+8 in stage I, central prominence distinct; in stage II, the median process is fairly long but not short.....*armatus* (after Lebour)

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