

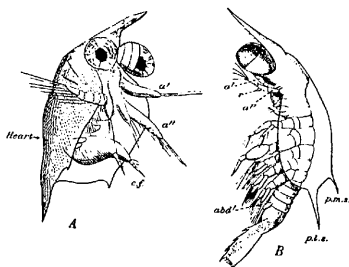
Note on a (? Stomatopod) Metanauplius Larva.

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THE larva to which I wish here to invite attention was caught in a tow-net out at sea, off the south coast of Tasmania,



A. The larva here described. (The right anterior antenna was omitted in the original drawing, and in order that the figure may be as far as possible a reproduction of this it is omitted here.)

B. The *Erichthoidina* stage of a Stomatopod. (From H. J. Hansen, *Isopoden, Cumaceen, und Stomatapoden der Plankton Expedition*, 'Ergebnisse der Plankton Expedition,' Bd. ii, G. c., pl. viii, fig. 14. *a'*, *a''*. First and second antennæ. *abd'*. First abdominal appendages. *c.f.* Caudal fork. *p.l.s.* Postero-lateral, and *p.m.s.*, postero-median spines (the latter is rather too large in *A*). *r.* Rostrum.

during daylight on December 25th, 1886. I had at that time very small acquaintance with larval forms of Crustacea, and

did not recognise the features of particular interest which this larva presented. Having made the drawing which is here reproduced (*A*) and a few notes, I paid no further attention to it. To my regret, I cannot now find the specimen. Although the evidence in my possession is thus very imperfect, I have, after some hesitation, decided to publish it, because it appears to throw some light, though far from a bright one, on an obscure corner of crustacean larval history.

As may be seen from the figure, the body is enclosed in a large transparent shield, produced anteriorly into a strong rostral spine, and posteriorly into a smaller median spine. On either side the lateral parts of the carapace fold round the body of the larva, and where the ventral and posterior borders meet, a small, backward pointing, postero-lateral spine is situated. A median eye is present beneath (in a ventral view) a low eminence, and two large globular compound eyes project on either side of the base of the rostral spine. Of the two pairs of antennæ, the first seems to have been simple, and the second is biramous, possessing a short endopodite, and a well-developed swimming exopodite, jointed and beset with long setæ. The body appears to have been unsegmented, and the posterior part is small, free from the dorsal shield, and, in the position drawn, strongly flexed ventrally. It terminates in a caudal fork, the divisions of which are articulated and setose. The dorsal region of the posterior part of the body was tinged with red. A note attached to the drawing calls attention to "rudimentary appendages" behind the second antennæ, and states that a heart was to be seen (in the position indicated) under the hinder part of the carapace. There is some indication in the drawing of an upper lip, between and a little behind the second antennæ, and the "rudimentary appendages" are shown to the number of perhaps three, between this and the flexed posterior part of the body.

It will, I think, be admitted that the larva is in the metanauplius stage. It seems improbable that the mandibles were really rudimentary, but the mandibular palp was at any rate inconspicuous, and two, perhaps, of the succeeding pairs of

limbs had already made their appearance. As far as the development of the limbs is concerned, the stage appears to correspond with that of *Euphausia pellucida*, represented by Metschnikoff in the 'Zeitschrift für Wiss. Zoologie,' Bd. xxi, plate 34, fig. 6. Further, it is clear from the character of the eyes that we have to do with a Thoracostracan form. It is, then, a Thoracostracan larva at about the metanauplius stage.

In the Cumacea the young leave the brood-pouch nearly in the form of the adult. The young of the Thysanopoda, among the Schizopods (as shown by Metschnikoff¹), as well, probably, as those of the Decapod *Peneus* (Fritz Muller²) are hatched as nauplii, while those of *Lucifer* (Brooks³) appear as metanauplii. But in all these the paired eyes are absent in the metanauplius stage, and are not fully developed until a long and fully segmented abdomen has been formed. The carapace is without spines in the metanauplius stage, and though in *Euphausia*, and also in *Lucifer*, spines make their appearance in later stages, corresponding in position with those above described, their shape in *Euphausia* and the shape of the shield in both genera are markedly different.

The remaining Thoracostracan group is the Stomatopoda. In *Squilla* (Paul Mayer⁴) and *Gonodactylus* (Brooks and Herrick⁵) the eggs have been seen to hatch as Alima larvæ in a stage which has been compared with the Zoœa stage of Decapods. But, as was shown by Claus,⁶ larvæ of Stomatopods also occur in another form, the *Erichthus*, of which stages are known prior to that at which the Alima larva is

¹ Loc. cit.

² "Die Verwandlung der Garneelen," Erster Beitrag, 'Arch. für Naturgeschichte,' Jahrg. 29, 1863.

³ "Lucifer: a Study in Morphology," 'Phil. Trans.,' vol. clxxiii, 1882, p. 57.

⁴ "Carcinologische Mittheilungen, IX," 'Mittheilungen aus dem Zool. Stat. zu Neapel,' vol. ii, p. 219.

⁵ "Embryology and Metamorphosis of the *Macroura*," 'Memoirs of the Nat. Acad. of Sciences,' vol. v, p. 353.

⁶ "Die Metamorphose der Squilliden," 'König. Gesell. d. Wissenschaften zu Göttingen,' Bd. xvi, 1871.

hatched. The youngest known member of this series of forms, the *Erichthoidina*, is represented in fig. *B*.

The carapace is furnished with spines resembling those of the larva shown in fig. *A*, and well-developed compound eyes are present. The first antennæ are obscurely biramous, while the second are uniramous. The thorax is distinctly segmented, and the five anterior segments bear biramous swimming feet, while the three following segments are without appendages. The first pair of abdominal feet are present, but behind the segment bearing them, the abdomen is unsegmented, and ends in a large truncated telson.

In succeeding stages the *Erichthoidina* larva changes into a *Zoëa*-like form comparable with the *Alima* larva of *Squilla* and *Gonodactylus*, but the stages which precede the *Erichthoidina* are unknown.

Now the development of the *Erichthus* larva differs from that of the *Schizopod* and *Decapod* larvæ with which we are acquainted, in one respect, among others, namely, that in a stage, the *Erichthoidina*, antecedent by many moults to the *Zoëa* stage, the paired eyes are already well developed. In this respect, as well as in the shape and large size of the carapace, the disposition and direction of its spines, and in the fact that it is a reduplication exclusively of the cephalic region, the larva under consideration resembles the *Erichthoidina*.

I would submit then, that it is rather probable that this larva is a *Stomatopod* larva at a stage prior to the *Erichthoidina* stage; that it is, in fact, a *Stomatopod metanauplius*.

The condition of the antennæ, the first apparently simple, and the posterior biramous, differs from that found in the *Erichthoidina* stage, but the difference is precisely that which from analogy with other nauplii we should expect to find in the *metanauplius* form. The first antenna of the stage figured by Hansen appears to be just acquiring its biramous character. The larva appears to be unique among those hitherto described in possessing well-developed compound eyes in the *metanauplius* stage. The articulated condition of the divisions of the caudal fork is also, so far as I know, peculiar

among the Malacostraca; and is interesting in view of the great prominence of these processes in that isolated and primitive Malacostracan form *Nebalia*, and in the Phyllopods *Apus* (in which again they are articulated) and *Branchipus*, with which *Nebalia* forms a connecting link.