

with the present studies (127-209 mm). Under laboratory conditions, the postlarvae of *P. monodon* attained 150 mm in about 9 months⁶. Pond studies in the Philippines showed that the postlarvae of this prawn attained an average size of about 141.9 mm and 152.6 mm after 6 and 7 months respectively⁷.

As stated above, the number of prawns in the catches declined considerably by June 1968 and no specimens were available in the subsequent months. A similar situation was noticed in the brackishwater farm at Adyar where the number of large prawns was always low.

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Studies on Upwelling Off the South West Coast of India

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Temperature, salinity and dissolved oxygen distributions during February-April 1970 in the shelf waters off the south west coast of India are presented in the form of vertical sections off Cochin, Alleppey and Quilon. Vertical movement of the isolines of these parameters indicates the presence of upwelling in these waters which commences in February.

THE phenomenon of upwelling and sinking along the West Coast of India was extensively studied. Upwelling between 8° and 15°N parallels was first reported by Banse¹. Subsequently, Ramamirtham and Jayaraman² also observed a sinking of off shore waters during December-February when the coastal current is directed northwards. Ramamirtham and Patil³ presented data on salinity, temperature and dissolved oxygen in waters upwelling along the continental shelf. Banse⁴ further tried to correlate the coastal circulation with the phenomenon of upwelling along the coastal waters. A study by Sharma⁵ on the seasonal variation of the thermocline depth in the coastal waters revealed that an upward shift of the thermocline takes place from the month of February onwards, which marks the beginning of upwelling.

In the present note temperature, salinity and dissolved oxygen data collected during the two hydrographic cruises of *Bluefin* during February-April 1970 have been presented. Fig. 1 gives the regions covered during these cruises, and the stations occupied along three transects -off Cochin, off Alleppey and off Quilon.

Water samples were collected from standard depths using Nansen reversing bottles fitted with reversing thermometers. Salinity was determined by Knudsen's method and dissolved oxygen by Winkler's method (Strickland and Parson⁶).

During February the upward tilt of the 28.9°C isotherm is conspicuously more than the slopes during April off Cochin (Fig. 2A). But off Alleppey these features are not so prominent and the surface layers are warmer than off Cochin (Fig. 2B). Moreover, Fig. 2A indicates a clear inversion to a depth of about 50 m. Again off Quilon, the upward tilt of the isotherm can be observed (Fig. 2C), and in all cases the extent of thermocline is limited between 75 and 150 m. A more or less uniform isothermal layer is evident in all cases from 0 to 50 m. Another distinctive feature at the stations is the upward shift in April of the colder waters (20° and 25°C isotherms).

Uniform distribution, more or less vertically, of salinity is one conspicuous feature during February with the core of maximum salinity situated around 100 m depth off Cochin (Fig. 3A). But during April the upward tilt of isohalines is not so clearly observed as in February. Off Alleppey the upward migration of the high saline waters is not so conspicuous (Fig. 3B). In the section off Quilon, the features are comparable to those of off Cochin with low salinities forwarding the coast in shelf waters (Fig. 3C).

In addition to the low temperature isotherms, low oxygen isolines also move up in April (1 and 2 ml isolines at Cochin, Fig. 4A; 2, 3, 4 and 5 ml isolines at Alleppey, Fig. 4B).

The movements of isotherms and oxygen isolines more clearly and isohalines to a less degree corroborate earlier conclusions regarding commencement of upwelling in February in these waters.

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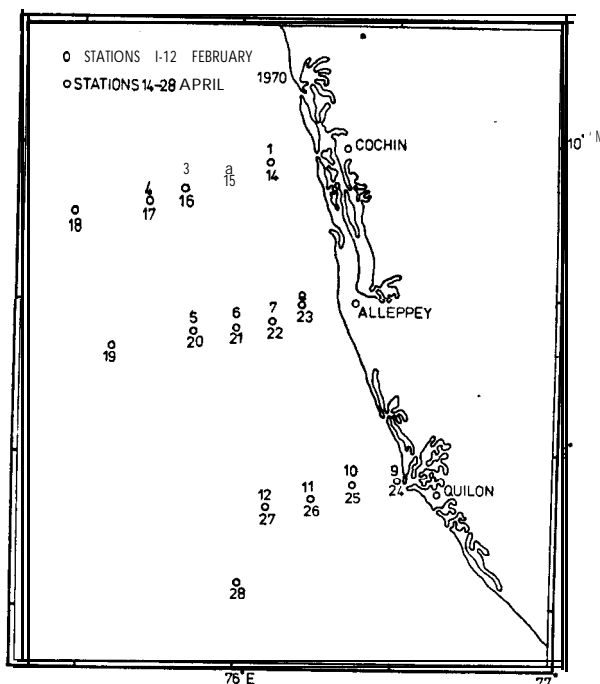
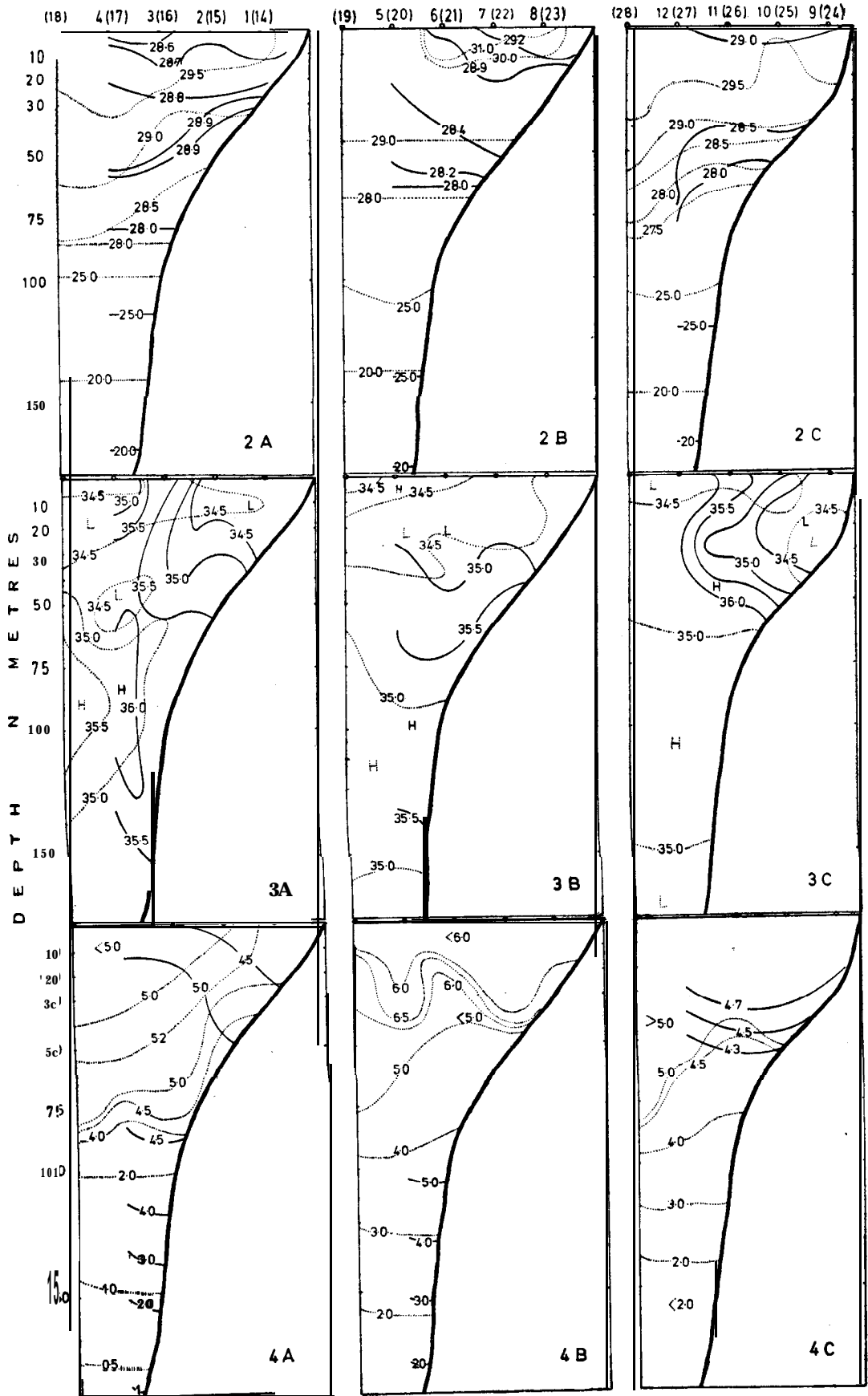


Fig. 1 — Stations covered along the 3 transects -off Cochin, Alleppey and Quilon



Figs. 2-4 — Vertical distribution of (2) temperature ($^{\circ}\text{C}$), (3) salinity (‰), and (4) oxygen (ml/litre) in the section (A) off Cochin, (B) off Alleppey, and (C) off Quilon [—, February 1970; and, ---, April 1970. Numbers in parentheses indicate stations covered during April cruise and those outside indicate stations covered during February]

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Larvae of Aristaeomorpha foliacea (Risso)
(Decapoda: Penaeidae) from the Indian Ocean

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While studying the larvae of prawns belonging to the family Penaeidae from the IIOE collections, 2 specimens with striking similarities to the post-larvae of *Funchalia woodwardi* are obtained from two stations (coast of Somalia, 07°46'N, 50°43'E and off Sumatra, 00°31'S, 91°38'E) located in the Indian Ocean. However, the two specimens differ from the larvae of *Funchalia* in characters like the presence of long dorso-median spines on the abdominal segments 2 to 6, exopodites on all the thoracic legs and 3 dorsal teeth on the rostrum. The larvae are assigned to the genus *Aristaeomorpha* and described in detail.

TWO larval specimens of a penaeid shrimp were obtained from two different regions in the Indian Ocean, one from the coast of Somalia (07°46'N, 50°43'E) and the other from off Sumatra (00°31'S, 91°38'E), while sorting out the material collected during the International Indian Ocean Expedition (IIOE). They differed from the larvae previously reported from this region. Similar larvae from the Mediterranean assigned to the genus *Aristaeomorpha* were described^{1,2} by a process of exclusion. Stephensen³ also came across similar larvae from the Mediterranean and following the 'identification of Lo Bianco² described the larvae as that of *Aristaeomorpha foliacea*. The present specimens completely agree with the description of Stephensen³ and hence they are identified as belonging to that species.

Distribution — Adults occur in the Mediterranean, East Atlantic Ocean and Indo-Pacific region from the east African coast to Japan. There is no record of a similar larval stage of this genus from the Indian Ocean and this is the first record of the larva from this region.

Description — The two specimens, though from two distant regions agree with each other in all details except that one of the specimens is a little bigger in size, has an additional pair of ventro-lateral spines on the 6th abdominal segment and the epigastric is more prominent. They are described below.

Rostrum long, extending beyond the 3rd segment of the antennular peduncle; 2 dorsal teeth and a small epigastric present towards the base. Carapace with well-developed hepatic, antennal and pterygostomian spines (Fig. 1a). Antennule with 2 flagella of equal length. Antenna with an unsegmented endopod, the scale without spine and with setae round the tip and the inner margin. A spiny seta present on the outer margin in the middle of the scale.

The mandible (Fig. 1b) quite different from that of the larva of *Funchalia*; incisor process not elongated but fringed with few denticular setae and molar part hard, palp unsegmented and without setae. Maxillule with a 3-segmented palp (Fig. 1c) with 3, 2, 4 setae respectively from the basal segment; protopodite produced into 2 endites, each with a number of short setae and a small exopod bearing 4 setae. Maxilla with a 4-segmented endopod (Fig. 1d); protopodite bearing 5 endites, each with setae and an enlarged exopod carrying 10 setae. Maxillipeds (Figs. 1e and f) with well-developed exopods and endopods.

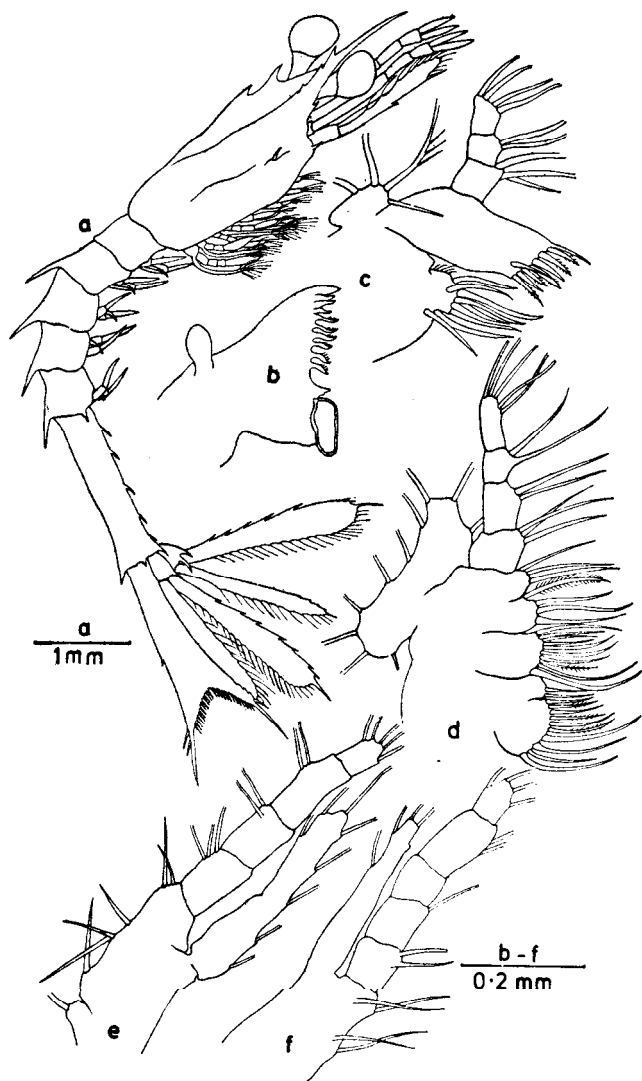


Fig. 1 — *Aristaeomorpha foliacea* larva [a, whole animal; b, mandible; c, maxillule; d, maxilla; e, maxilliped I; and f, maxilliped II]