

MARINE BIOLOGICAL AND OCEANOGRAPHIC INSTITUTIONS OF
THE WORLD

V. THE PORT ERIN MARINE BIOLOGICAL STATION OF THE
UNIVERSITY OF LIVERPOOL

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THE Marine Biological Station of the University of Liverpool is situated at Port Erin, Isle of Man, in the Irish Sea ; it is roughly equidistant from England, Scotland, Ireland and Wales.

The origins of the Station go back to 1886, when the Liverpool Marine Biological Committee opened a small laboratory on Puffin Island off Anglesey. After five years on Puffin Island, activities were transferred to Port Erin in 1891, and to the present building in 1902. For the first forty years the leader and guiding spirit was Professor Sir William Herdman, until in 1923 the administration of the biological station was transferred to the University of Liverpool, of which it has constituted a separate department since 1950. The buildings have been enlarged and improved during the past decade ; they contain a good, if small, library (with, of course, the full resources of the University library behind it), a dark-room, research rooms and laboratories, a fish hatchery, a workshop, two large students' laboratories and a public aquarium. The whole building is piped for sea water, which is delivered by gravity from a 20,000 gallon storage tank ; water is pumped every day into the latter from the sea nearby. There are also three sea water ponds in which stocks of breeding fish can be maintained.

For outside work there are three vessels :—the rowing-boat *Metanauplius* for working seine-nets and so on inside the Bay, the 30-foot motor boat *Cypris* for dredging, tow-netting and diving inshore, and, for most of the year, the 60-foot motor vessel *William Herdman* which can accommodate ten people and go anywhere in the Irish Sea.

There are seven people (including two phycologists) on the research staff, and usually five resident research students ; several visiting research workers also come each year to work at Port Erin. The two large students' laboratories are energetically used by many classes from universities and schools throughout England and Wales, who come, numbering with their teachers about 450 a year, on intensive vacation courses lasting about a week each. The public aquarium is kept well stocked with local fish and invertebrates, and is visited annually by some 40,000 people.

Port Erin is very well placed for work on marine biology. Depths down to 100 metres are easily accessible, and the sea-bed varies (as do the associated floras and faunas) from rock through gravel and shell-gravel to sand and mud. The shore, too, includes rocks of many shapes and exposures, sandy and muddy beaches, and a

useful little estuary at Castle town nearby. The water inshore is unusually clear for Britain, and is being increasingly exploited by means of the aqualung, even throughout the winter when the temperature of the sea is less than 7°C.

Among the lines of research work now being pursued there can be included : the scallop and herring fisheries ; plaice-rearing under controlled conditions ; the biology of small fish and several groups of invertebrates ; the parasites of fish ; the underwater distribution of seaweeds ; the taxonomy and life histories of seaweeds ; the behaviour of plankton ; the plankton, chemistry and water-movements of the Irish Sea.

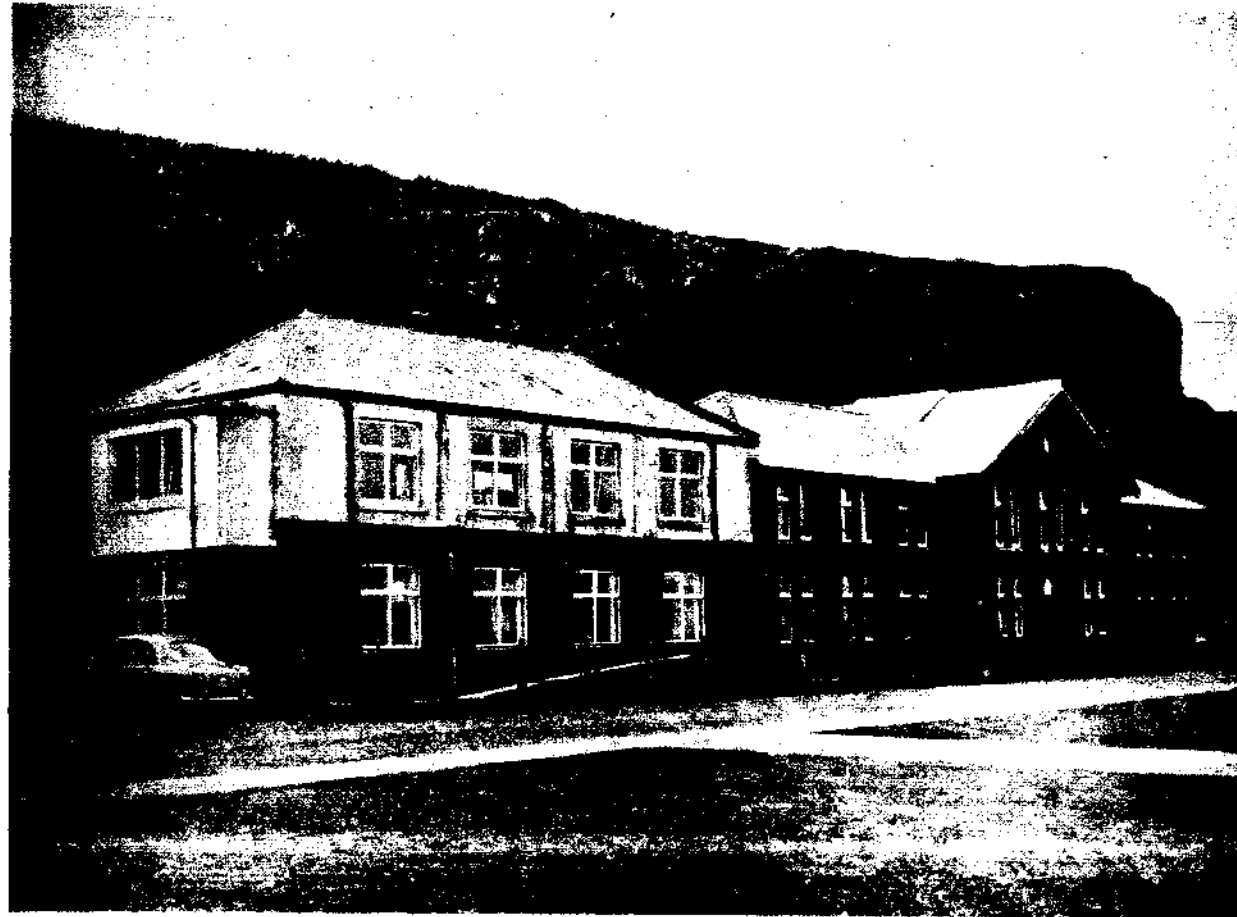


FIG. 1. Marine Biological Station, Port Erin ; General View. To the left, students' laboratories (ground floor 1932, top floor 1960). To the right, main building (1902) with research rooms and entrance to the aquarium.
(By courtesy of the Isle of Man TIMES)

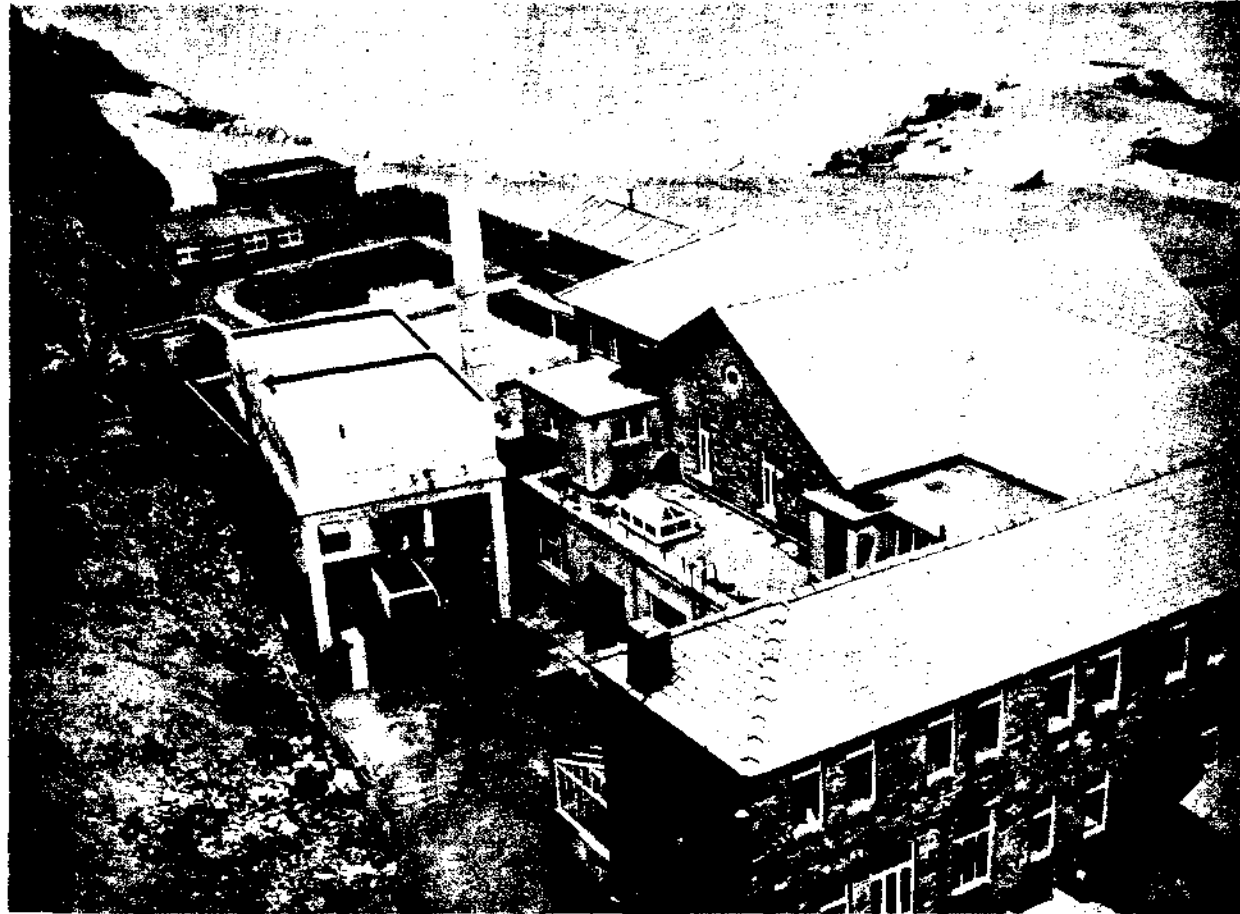


FIG. 2. Marine Biological Station, Port Erin; view of rear from cliff, showing sea water storage tank with fish ponds beyond. The library is beneath the skylight in the main roof. *(By courtesy of the Isle of Man TIMES)*

NOTES

A NOTE ON THE OCCURRENCE OF THE ANTHOMEDUSA *CLADONEMA* IN THE INDIAN REGION

On 30-3-1961 while cleaning one of the experimental aquaria, which was partly filled with sea water and not used for nearly three weeks, the occurrence of a large number of small medusae was observed. These were readily identified as the

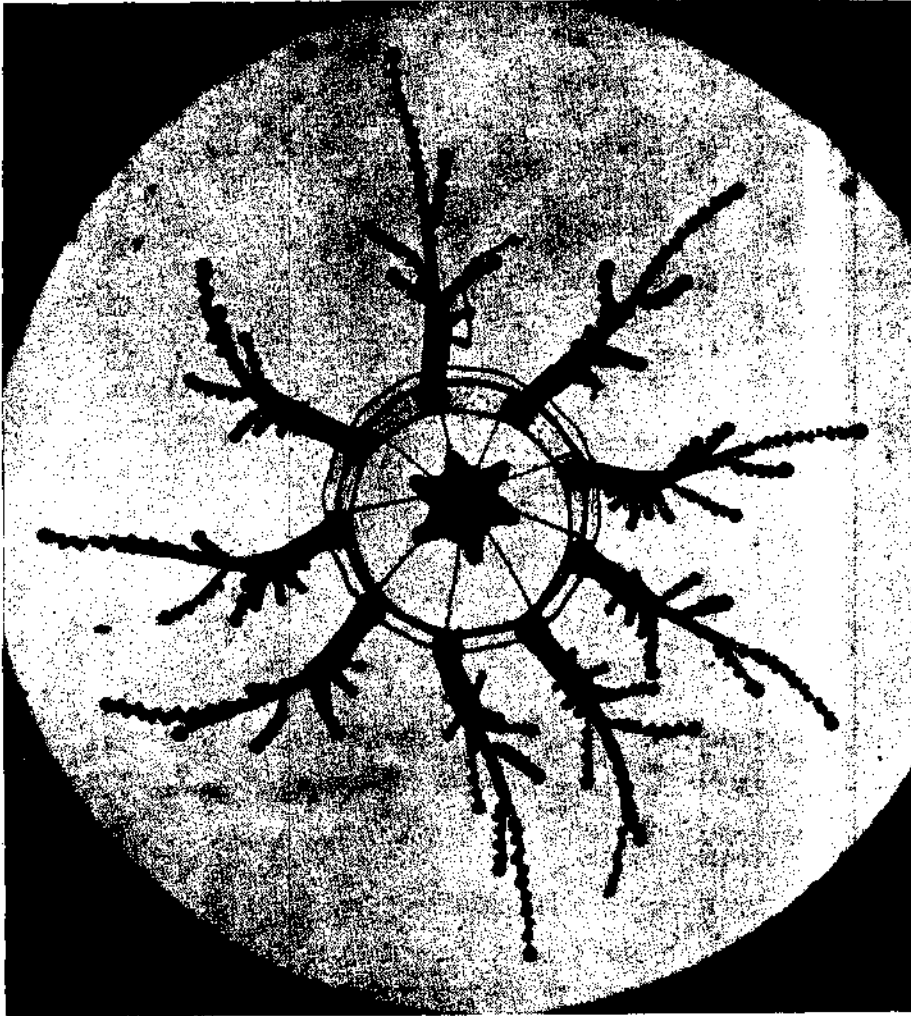


FIG. 1. *Cladonema radiatum* var. *mayeri*. ($\times 12$)

anthomedusa, *Cladonema* Dujardin. The identification of the species, however, has been more difficult because of slight variations in some of the characters from the available descriptions of the different species. After a critical study and comparison

of the specific characters of the present species with those already described, it became evident that the species obtained by us is *Cladonema radiatum* var. *mayeri* (Fig. 1). The species *mayeri* was originally described from Florida (see Kramp, 1928) but the present tendency is to regard the species as only a variety of *C. radiatum* (Russell, 1953). Prof. P. L. Kramp in a personal communication to one of us (R.R.P.) also agrees with the earlier authors who consider *C. mayeri* as a variety of *C. radiatum*. Except for some minor differences in a few specimens the present ones agree with the description given by Mayer (1910) for *C. mayeri*. The variations noticed are in the number of adhesive organs at the base of the marginal tentacles which goes up to 7 instead of the usual 6, and in the arrangement of the radial canals where 5 unbranched and two bifurcating ones make up the total of 9 as against 6 canals, every alternate one bifurcating. These characters are subject to variation (see Russell, 1953) and on account of the extreme variability of the species these are considered to be of no special significance.

Hitherto no species of *Cladonema* has been recorded from Indian waters. In the eastern hemisphere *C. radiatum* var. *mayeri* has so far been recorded only from Japan (Uchida, 1927 and Kramp, 1928) and from China (Chow and Huang, 1958). Since the record from China the species has not been reported from any other locality and as such the present finding is interesting.

Russell (1953) has remarked that the hydroid and the medusae of *C. radiatum* turn up occasionally in aquaria, having been found at the Zoological Gardens and the University College, London, and has discussed the habits of the medusa. In the sea the medusa is believed to live amongst seaweeds. The hydroid form of the species is a slender, simple or slightly branched colony of about 25 mm. in height. The hydroids must have been growing in the aquarium and would have escaped our notice when we first discovered the medusae in the tank. It is now certain that the species occurs in our waters and a careful search will reveal the presence of this at other places along the coast of India.

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ON TWO OPISTHOBRANCHIATE MOLLUSCS, *PLACOBANCHUS*
OCELLATUS HASSELT AND *DISCODORIS BOHOLIENSIS* BERGH,
FROM INDIAN WATERS NOT HITHERTO BEEN RECORDED

Placobranchus ocellatus Hasselt 1824.—In the month of July 1960 a small sea slug from among the sea weeds found on dead coral in the shallow water region of the Palk Bay in front of the fish farm was collected by Dr. S. Jones. Subsequently in October 1960 two more numbers of this form were obtained by him from the same locality. These were later identified as *Placobranchus ocellatus* van Hasselt under Family Elysiidae and Order Sacoglossa (Thiele 1931a).

The largest of the forms measured 3.8 cm. in length. The body is leaf-like and the lateral extensions of the mantle in the usual creeping position are folded upon the back, the edges of the opposite sides meeting along the mid-dorso-median line with the result that the morphological dorsal surface of the body is not exposed but completely hidden from view. The head is flat, broad and almost squarish in appearance with a pair of rhinophores which are thin and folded lengthwise upon themselves. The eyes are situated very close to each other in association with the nerve ganglia and are visible through the semi-transparent skin covering the head. When the lateral expansions are lifted up the dorsal surface of the body reveals a number of branchial ridges running lengthwise. Just behind the region of the head is a small bulging which marks the position of the crop lying within. The foot is long and broad and not distinctly demarcated from the lateral mantle folds. The mouth is terminal, anterior and median in position in the region of the head (Text Fig. 1 a and b).

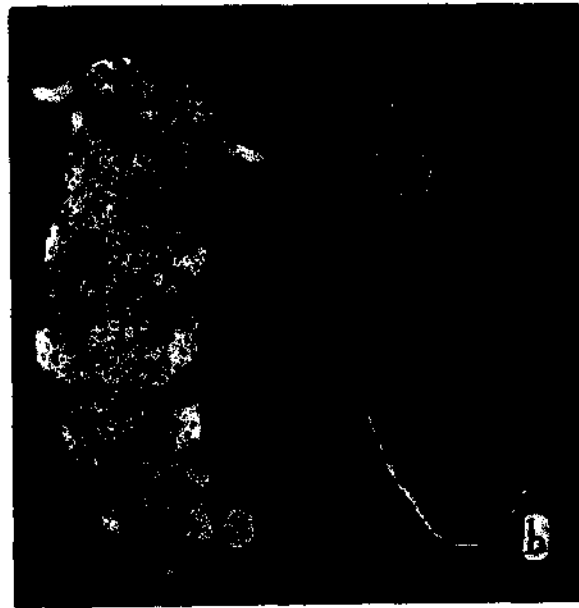


FIG. 1(a) *Placobranchus ocellatus* Hasselt, dorsal view x 2 ; (b) *P. ocellatus*, ventral view x 2.

The ventral surface of the head and of the foot bears dark spots. The dorsal region of the head and the exposed surface of the mantle folds also present numerous

close set dark, small and large markings most of which when magnified, appear as distinct rings. The entire foot region and the head are grayish white. On the surface of the mantle on either side are 4 to 5 areas where the colouration is light yellow. The spots on the foot and the mantle are black. The ring-like markings also are generally black but the larger ones, particularly those at sides, are tinged with violet. The inside of the folded rhinophores is of a pinkish or of a violet hue.

The radula presents the same general structure as in other members of the Sacoglossa. In *P. ocellatus* examined by me there were about 8 teeth in the ascending series, the same number in the descending series and nearly 40 worn out ones in the sac or ascus. The anterior half of each tooth had 10 denticles on either side (Text Fig. 2 *e* and *f*). In the specimen described by Eliot (1903) the marginal denticles on the teeth were about 12. *P. argus* Bergh from the Philippine region appears to be synonymous with *P. ocellatus* (Eliot 1903). *P. priapinus* Bergh (1872 and 1905*a*) seems to be distinct from *P. ocellatus* particularly in regard to its characteristic green colouration.

The species is now known to occur in the East African, Indian, Philippine and Australian waters.

Discodoris boholiensis Bergh, 1877.—Two specimens of this species belonging to Nudibranchiate Gastropoda under the family Dorididae and sub-family Discodori-dinae (Thiele 1931*b*) were obtained in the month of January 1961. One of these was of a medium size, measuring 4 cm. by 3 cm. from the Marine Bay, Port Blair, Andaman Islands and the other fairly large being 7.5 cm. by 5 cm. from the Gulf of Mannar near the Central Marine Fisheries Research Institute, Mandapam Camp.

In general the species has a widely spread out mantle which is roughly oval in outline in the living animal when it remains undisturbed. In the preserved specimens the borders of the mantle and the foot present usually an undulated appearance. The mid-dorsal region between the rhinophores and branchiae is closely mottled brown and prominently elevated lengthwise. The rhinophores are dark brown and are retractile into sheaths, the margins of which are wavy and of the same colouration. The branchiae arise from a pocket-like space the opening of which appears as a transverse slit (Text Fig. 2 *a*, *b* and *c*).

The dorsal edge of the mantle in the larger form is dark brown as described by Eliot (1903) and that of the smaller one has a row of deep brownish spots as shown in Fig. 9, Tafel I given by Bergh (1905*b*). The branchiae are six in number of which the posterior two are bifid. They are deep dark brown or almost black. The foot is oval in appearance and is much narrower than the mantle. Its margin all round is lined deep dark brown like the edge of the mantle. In regions other than those mentioned above, the general colour of the mantle, the sides of the body and the foot is pale yellow. The dorsal surface bears small papillae, some of which are pale yellow and others dark brown.

The labial cuticle has two plates formed of numerous small rod-like bodies. The radular structure with hamate teeth (Text Fig. 2 *d*) is the same as in the earlier accounts given by Bergh (1905*b*) and Eliot (1903).

Bergh reported the species from the Philippine region, northern and southern regions of Celebes and the nearby islands. Eliot's account deals with a form obtained from Zanzibar on the east coast of Africa. With the present new record of its occur-

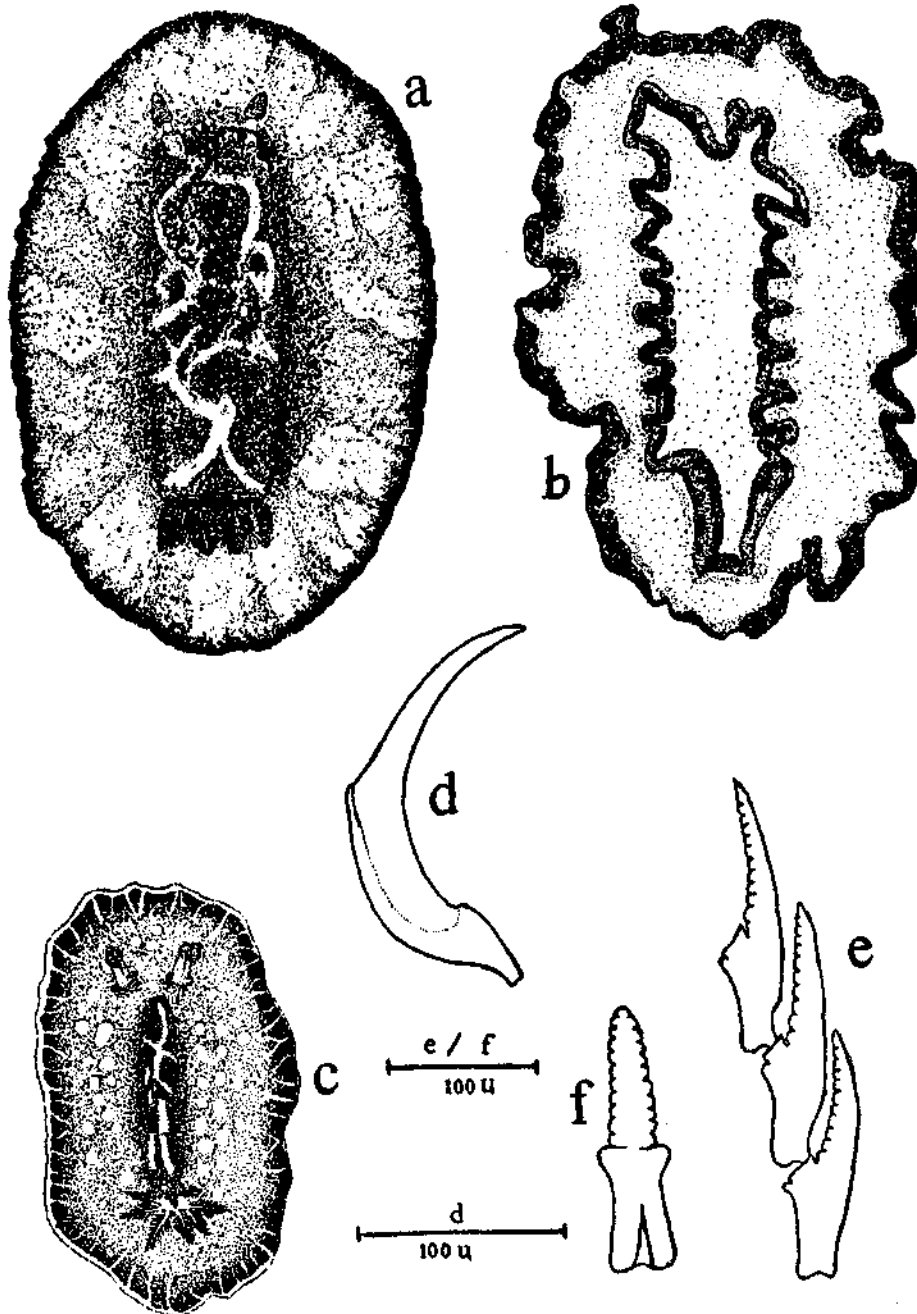


FIG. 2(a) *Discodoris boholiensis* Bergh, adult specimen from the Gulf of Mannar, dorsal view $\times 1$; (b) *D. boholiensis*, same as above when preserved, ventral view $\times 1$; (c) *D. boholiensis*, smaller individual from Andamans (Fig. after Bergh, *Siboga Expedite*, 1905) $\times 1$; (d) *D. boholiensis*, single tooth of the radula from the Andaman specimen; (e) *Placobranchus ocellatus*, three teeth of the radula as in lateral view; (f) *P. ocellatus*, view of a single tooth showing denticles on either side.

rence in the Gulf of Mannar and the Andaman Islands, it may be concluded that the species is distributed throughout the Indo-Pacific region.

I offer my very sincere thanks to Dr. S. Jones, Director, Central Marine Fisheries Research Institute, for making available the specimens of *Placobranchus ocellatus* which he himself had collected and for the interest he had shown in the presentation of this paper. I am also thankful to Shri K. G. Nambiar of the Research Institute for taking photographs of the specimens described here.

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EXTERNAL MORPHOLOGY AND EARLY DEVELOPMENT OF *PLEUROBRANCHUS (OSCANIUS) SP. FROM GULF OF MANNAR*

In a dredge collection from the Gulf of Mannar at one and a half fathoms depth near the Central Marine Fisheries Research Institute at Mandapam Camp four numbers of a species of sea-slug under the genus *Pleurobranchus* Cuvier and subgenus *Oscanius* (Leach) (*vide* Thiele 1931) along with their egg ribbons were obtained on 25th December, 1960. To the best of our knowledge the form obtained has not so far been described, although Bergh (1905) in his Report on Opisthobranchiata of Siboga Expedition in Tafel II, Fig. 2, gives an almost identical form as *Oscanius* sp. Unfortunately the original specimen of the Siboga Expedition as also the notes thereof were lost as stated under the legend to the figure referred to above.

The largest specimen in the collection measured 12 cm. long, 8 cm. wide and 3.5 cm. high. It has an ample mantle extending as a thin fold on either side and also on the posterior region of the body (Plate I, Fig. A, B & C). Anteriorly the extension of the mantle is comparatively narrower and also notched in the middle above the head wherefrom a pair of moderately long soft tentacles arises. The foot, like the

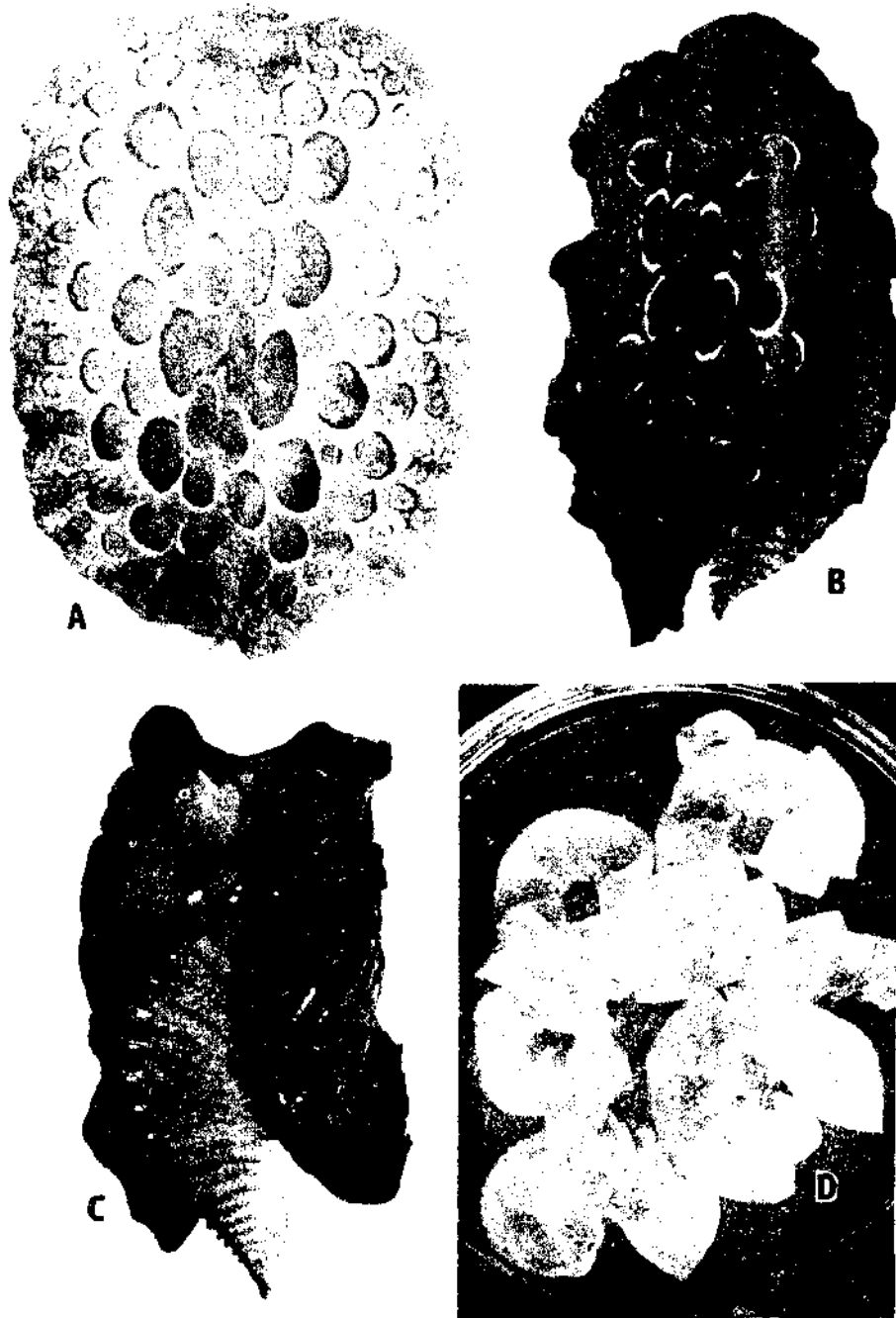


PLATE I. *Pleurobranchus (Oscanus)* sp. A. Dorsal view of lightly coloured specimen $\times \frac{1}{3}$. B. Dorsal view of darkly coloured specimen showing also the ctenidium. $\times \frac{1}{3}$. C. Side view of the animal showing the mantle, foot and the ctenidium. $\times \frac{1}{3}$. D. Freshly laid spawn. $\times \frac{1}{3}$.

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6

mantle, is large. It is flat and more or less oval. At the mid-posterior region on its surface, when viewed ventrally, there is an oval patch of a lighter colouration than the surrounding region denoting the position of the pedal gland as in other members of the genus. About one-third the length of the body from the anterior end the ctenidium arises on the right side close behind the genital orifices (Plate I, Fig. C). Posteriorly it extends slightly behind the region of the mantle.

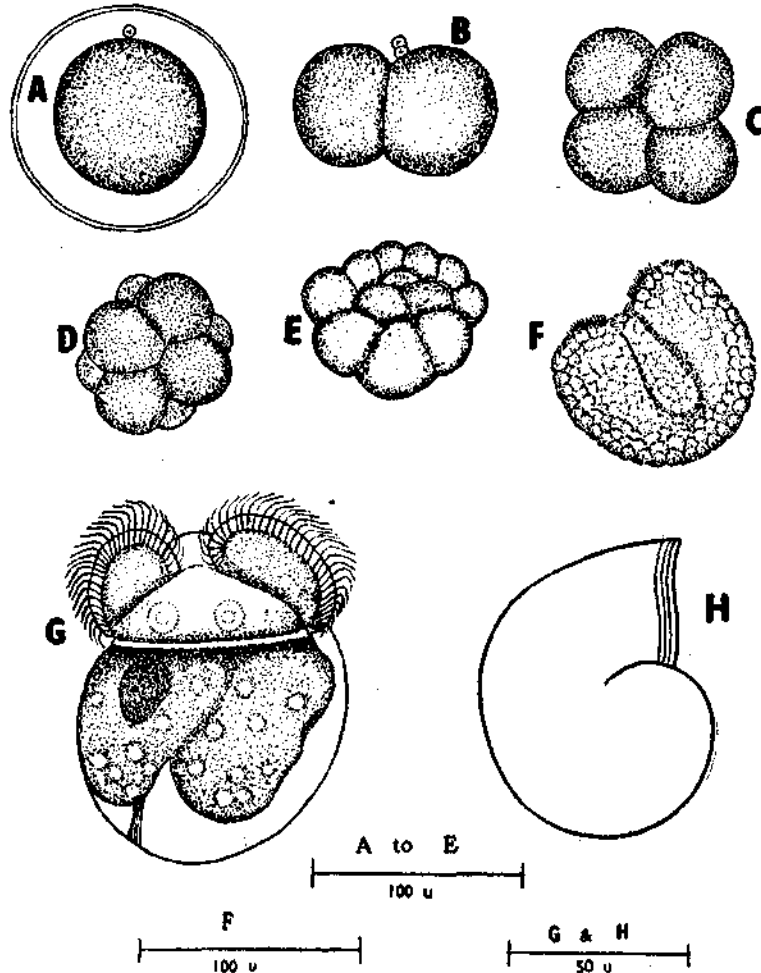


FIG. 1. Early developmental stages of *Pleurobranchus (Oscanus)* sp.
A. Egg enclosed in the capsule before cleavage. B. Two-cell stage. C. Four-cell stage.
D. Eight-cell stage. E. Formation of blastula. F. Gastrula. G. Veliger. H. Larval shell.

The mantle presents dorsally a finely tuberculated and tessellated appearance and bears a number of close set conspicuous oval or roundish markings. These are very large and mostly oval in the middle region and much smaller and circular in outline on the periphery of the mantle. Each of these markings, particularly the larger ones, has for its border a darker hue immediately followed by a whitish or light yellowish region like a halo. The markings on the mantle described here appear to

be very characteristic of the species and they are exactly similar to the ones noticeable in the figure given by Bergh (1905).

The general colouration of the dorsal surface of the mantle, ctenidium and the foot appears to vary widely in different individuals. Of the four specimens in the collection the ground colour in two was yellowish brown, in one it was of a deep pinkish hue and in the fourth a combination of yellow, brown and pink. The under surface of the mantle and the sides of the body are more or less pale white. The animal appears to change its ground colour possibly in relation to change in environment. The colouration along the border of the markings is invariably of a darker hue as stated above ranging from deep brown to greyish black. The ground colour of the original form as shown in Bergh's figure is deep orange yellow. The foot in the mid-posterior region is shown in his figure as having a deep cleft. If the present form is identical with the one figured by Bergh the cleft shown by him in the foot is possibly a mutilation which is not found in the specimens examined by us.

Embedded in the skin are numerous rod-shaped spicules.

The freshly laid spawn (Plate I, Fig. D) attached to the weeds and obtained in the dredge along with the adult specimens was gelatinous, ribbon-shaped and spirally twisted with the different whorls resting on the same plane. The largest of the spawn measured about 40 cm. long, 4 cm. wide and 2 mm. thick. The edges of the ribbon were parallel to each other while its surface within the whorls had undulations presenting a flower-like appearance when found on weeds and remaining in water undisturbed. On close examination, each ribbon revealed a large number of minute eggs arranged in parallel oblique rows. They were over a million in number in a moderately long ribbon.

As the entire ribbon being large, was found unwieldy for tracing the developmental stages, strips about a cm. long were separated from it and placed in finger-bowls containing aerated sea water which was frequently changed. Smaller bits of these pieces were carefully removed at intervals to study the course of development.

The eggs were spherical, whitish and laden with yolk, each measuring 75μ in diameter and enclosed in a separate double-walled transparent capsule of 120μ in diameter (Fig. 1, A). The space between the egg and the capsular membrane is filled with a transparent, colourless, albuminous fluid as in other species of *Opisthobranchs*. At first when the eggs were examined they did not show any cleavage but they had extruded one or two polar bodies. About 3 hours later the first cleavage took place in a vertical plane dividing the egg into two equal halves (Fig. 1, B). This was followed by a second cleavage in the same plane resulting in four cells (Fig. 1, C). In about six and a quarter hours after the extrusion of the polar bodies a stage had reached with four large and four other small cells (Fig. 1, D). Subsequent cleavages took place in rapid succession and in about twelve hours the embryo reached the blastula stage. This was followed by gastrulation which was completed by about twenty-nine hours. The gastrula (Fig. 1, F) with finely developed cilia began to rotate within the capsule and measured 85μ across. Further development led to the formation of the veliger with a conspicuous shell enclosing the soft body with prominent velar lobes, foot, digestive, excretory and sensory organs (Fig. 1, G). Close beneath the foot was seen the operculum. A pair of statocysts with a single statolith in each was clearly visible beneath the region of the velar lobes through the transparent tissues. The mouth, oesophagus, stomach and intestine were well developed. The liver lobes were prominent. There was a pink coloured excretory organ towards the

anterior right region, on account of which the entire ribbon with the developing embryo inside at this stage had assumed a pale pink colouration. Thorson (1946) observed in *Philine scabra* Muller a similar excretory organ, carmine in embryos and jet black in the pelagic larvae. In general, most of the tectibranch larvae in their free swimming stages possess a large black excretory organ. Several hours later the veligers were liberated from the capsule but they were without eyes. They measured each 105μ along the long axis and their shells presented near the aperture a few parallel striations (Fig. 1, H). Further stages could not be obtained as they were quickly attacked by ciliates.

A detailed systematic study of the present form is being attempted.

Our sincere thanks are due to Dr. S. Jones, Director, for the keen interest he has shown in the preparation of this note, to Shri S. Mahadevan who collected the materials and for having placed them at our disposal and to Shri P. R. S. Tampi of the Central Marine Fisheries Research Institute for taking the photographs.

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THE PEARL WING SHELL, *PTERIA PENGUIN* (RÖDING) FROM THE ANDAMAN ISLANDS, INDIA

During a recent visit to the Andaman Islands in January-February, 1961, the writer obtained two pearl wing shells which were collected by a diver in the waters of about six fathoms depth in the vicinity of the Havelock Island in Ritchie's Archipelago. As these shells are hitherto very little known from the Indian waters, in the following account their conchological characters are described with notes on the taxonomy and distribution of *Pteria penguin* (Röding) to which they have been ascribed under the family Pteriidae of Bivalvia. The shells from the aforesaid locality have also been compared with those of the same species from the pearl pairs of the Gulf of Mannar.

The shells from the Andaman Islands are inequivalve, the left valve in each being larger and deeper than the right valve which fits over the former like a lid. The hinge is fairly long and straight, the anterior and posterior auricles are well developed and the longest axis of the body of the shell is directed backwards forming an acute angle

with the hinge line from the umbonal region. The outer surface of the valves is scaly with the periostracal layer coloured black. It was tinged green when the animals were collected fresh. Oysters barnacles and some calcareous algae were found profusely infesting the shells. The internal surface of the valves is lined by a silvery white nacreous layer with a black non-nacreous border, which is wide in the mid-postero-ventral margin of each valve but gradually becomes narrower in front and behind. In the region of the anterior and posterior auricles the non-nacreous border is extremely narrow. The nacreous region is a little copper coloured along the border and it spreads over to a greater extent in the left valve than in the right valve. The anterior auricle is well developed and more or less triangular in shape, whilst the posterior auricle though equally well formed is narrow. There is a clear impression of the adductor muscle in the mid-postero-dorsal region of each valve. The shells are found attached by strong byssus to dead coral.

The inner views of both the valves of the two shells in Fig. 1 (A & B) and their linear measurements are given in Table 1. As could be seen from them both the

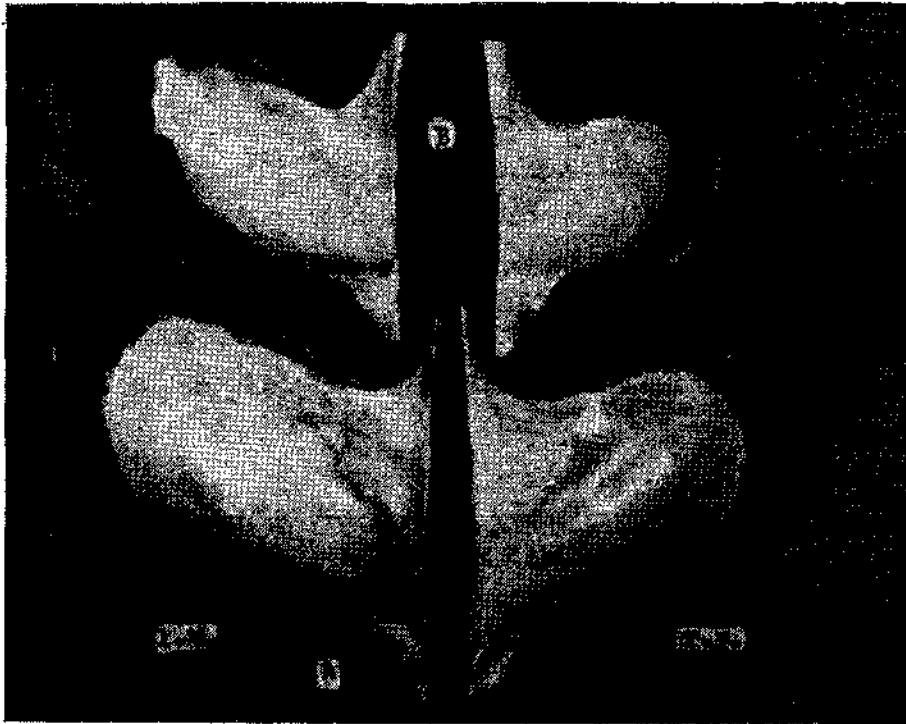


FIG. 1. *Pteria penguin* (Röding). A & B, specimens 1 and 2: l.v., left valves; r.v., right valves.

auricles, proportionately to the long axis of the body, are of greater size in the smaller shell than in the larger one. Apparently in these shells as growth takes place there is a greater increase along the long axis of the body than along the axis on the hinge line.

The genus *Pteria* Scopoli 1777, according to Jameson (1901) is divisible into three

sub-genera viz., (1) *Pteria* s.s. in which the hinge is large, the anterior and posterior auricles are well developed and the longest axis of the body of the shell is directed backwards at an acute angle from the hinge line, (2) *Margaritifera* (Synonymous with *Pinctada* Röding, vide Prashad and Bhaduri, 1933) where the hinge is of moderate length, the anterior auricle is well formed, the posterior auricle when present is poorly developed and the longest body axis is at right angles to the hinge line and (3) *Electroma* Stoliczka in which the hinge is short, the posterior auricle absent and the longest axis is as in *Pteria* s.s. directed backwards. It may be seen that the shells described here are referable to the subgenus *Pteria* s.s.

TABLE I

Linear dimensions in millimeters of *Pteria penguin* (Röding).

Particulars of dimensions	Specimen 1 (From Havelock Is.)		Specimen 2 (From Havelock Is.)		Specimen 3 (From Gulf of Mannar)	
	Right valve	Left valve	Right valve	Left valve	Right valve	Left valve
Hinge length ..	148	148	114*	115*	94	94
Umbo to anterior extremity of the hinge ..	24	25	25	25	34	32
Umbo to ventral extremity along the longest axis ..	186	185	124	123	156†	154†
Umbo to nacreous margin along the longest axis ..	127	152	85	106	116	150
Middle of byssal notch to anterior end of hinge ..	54	45	46	40	56	47
Length below the level of byssal notch ..	107	111	78	80	—	—
Thickness of the valve ..	20	32	16	22	34	32

* Tip of posterior auricle broken.

† Free borders broken.

The genus *Avicula* described by Reeve 1857 is synonymous with *Pteria* s.s. of Jameson. Two of the species figured by Reeve (1858) viz., *A. macroptera* and *A. lotorium* are of importance in assigning the systematic position of the Andaman shells. Most Conchologists are of the opinion that these two species are identical. Of the two species, *A. macroptera* has priority over *A. lotorium*. *Pinctada penguin* Röding 1798 having a priority over *A. macroptera* (Lamarck) and as the generic names *Pinctada* and *Avicula* are to be replaced by *Pteria*, the form should be named *Pteria penguin* (vide Prashad, 1932).

Some pearl wing shells from the pearl pairs of the Gulf of Mannar off Tuticorin coast have also been examined and the dimensions of one of the shells are given in Table 1. As compared with the shells of the Andaman sea those of the Tuticorin coast are much thicker in texture, the anterior auricles in both the valves are well developed and the posterior auricles are much reduced. The general contour is the same in shells from both the localities. A pearl wing shell from the Gulf of Mannar has been described as *Pteria lotorium* (Lamarck) by Satyamurti (1959), the identification of the shell having been based upon the smallness of the anterior auricle, which with a truncated edge as shown in his text figure 2 on page 75 is apparently broken,

Prashad (1932) is of opinion that the Lamarckian species, *P. lotorium* is based on slightly different shells of his earlier species, *P. macroptera* and that these two species are therefore synonymous. The configuration of the auricles alone, which is subject to variation according to size as revealed by the examination of shells from the Andamans, is of little significance in determining the species. The shells from the Andaman sea and from the Gulf of Mannar are referable to *Pteria penguin* (Röding).

P. penguin is a widespread species and the extent of its distribution is from 'Australia to Madagascar' (Prashad 1932). The species is common throughout the Indo-Pacific region. It abounds off the coasts of Japan and nearby islands where it is successfully employed by the Japanese technicians for culturing large sized hemispherical pearls.

The writer has great pleasure in offering his thanks to Dr. S. Jones for the interest he has shown in the preparation of this note and to Shri K. G. Nambiar for taking the photographs of the shells.

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A NOTE ON THE OCCURRENCE OF THE BLUE GREEN ALGA *APHANOCAPSA LITTORALIS* HANSG. VAR. *MACROCOCCA* HANSG. CAUSING COLOURATION OF THE SAND AND ITS RELATION WITH THE TIDES

Though there are many reports, from various parts of the world, about organisms inhabiting intertidal sands causing colouration and the tidal rhythm of the causative organisms, little attention seems to have been paid to these in India. Dixit (1936) reported the occurrence of *Aphanocapsa littoralis* var. *macrococca* on the Chowpathy sea-shore in Bombay but no information has been given about its relation with the tide. Recently, Ganapati, Rao and Rao (1959) reported the tidal rhythms of some diatoms and dinoflagellates inhabiting the intertidal sands of the Visakhapatnam Beach. The present note is based on the occurrence of a blue-green alga causing a green colouration of the sand at Karwar Beach in the North Kanara Coast.

At low tide, during February-April and sometimes also in August and October, the intertidal zone of the sandy beach is often found to exhibit widespread dull green colour which develops under the brilliance of the sun. Examination of this coloured sand revealed the presence of dense populations of *Aphanocapsa littoralis* Hansg. var. *macrococca* Hansg. adhering to the sand grains with the help of their mucilaginous envelope.

Individual cells varied from 3.5-6.0 μ in diameter and isolated individual cells kept in watch glasses showed active wriggling movement when agitated. Kept undisturbed, the cells clustered around the water margin in groups and adhered to the glass and the grains of sand.

During day time at low tide these organisms appear in thick, evenly spread, green patches in the sandy beach. At the time of high tide these green patches disappear and therefore, the occurrence of the colour seems to synchronize with the tidal periodicity.

It is observed, that no such colour develops in the beach when the low tide is exclusively confined to the night. However, the green patches that develop during day time at low tide continue to exist in the beach at night as long as that low tide remains. It shows that the development of the colour has some relation to light also and a more detailed study on this will throw light on the probable causes of this behaviour of the alga.

I am grateful to Dr. R. Prasanna Varma for identifying the alga. I wish to express my sincere thanks to Dr. R. Raghu Prasad, Research Officer (Marine Biology), Central Marine Fisheries Research Institute, Mandapam Camp, for helpful criticism.

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A VIVIPAROUS NEMATODE, *PHILOMETRA* SP. IN THE OVARIES OF *OTOLITHUS ARGENTEUS* (CUVIER)

While engaged in the study of spawning periodicity of certain teleostean fishes of Mangalore area, a parasitic nematode was observed in the ovary of *Otolithus argenteus* (Cuv.). The fish measuring 203 mm. in total length and harbouring the parasite within its gonads appeared to be normal in its external body features. The parasitised ovaries of the fish presented dark red colouration and through the semi-transparent ovarian walls some of the coils of the parasite within could be seen. Except in the anterior one-third of the left ovary and the apical region of the right one where a few ovarian immature eggs measuring 0.019 to 0.134 mm. were found, the rest of the space in both the ovaries was occupied by the coils of the parasite. When the coils were unravelled, it was observed that in the region of the oviduct the part of the body of the parasite lying within the left ovary was continuous with that lying in the right ovary.

The parasite worm which is a female is long and slender measuring 537 mm. in length and 1 to 1.5 mm. in diameter in the anterior and middle regions respectively. In the posterior region, however, the diameter is only about 0.5 mm. The anterior

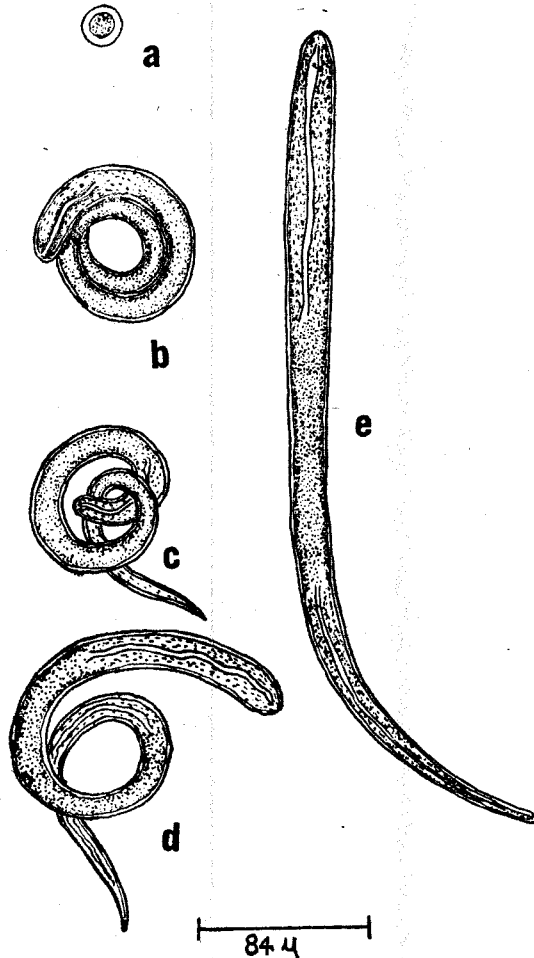


FIG. 1. Various stages of the developing stages of *Philometra* sp. (a) encysted egg; (b) coiled young parasite; (c, d) stage of the parasite emerging from the cyst; (e) completely uncoiled young parasite.

end is rounded having a mouth which is simple and without lip-like structures. The posterior end is bluntly rounded. The anal opening is sub-terminal. The uterine branches meet forming a continuous tube.

The parasite is viviparous and a large number of slender young ones varying in length from 0.30 to 0.67 mm. were found in the uterus. There were numerous encysted eggs in different stages of development. Some of the stages of the developing embryos are shown in Fig. 1 a to e.

The characters mentioned above agree very closely with those of the family Philometridae of the order Filarioidea, as given by Baylis (1939). The presence of a funnel shaped mouth, a short oesophagus and bluntly rounded short tail show that this form belongs to the genus *Philometra*, the adults of which are known to occur, 'in the body cavity, genital glands or connective tissues of fishes' (Baylis, 1939).

In all cases where the adult males have been recorded they are known to be much smaller than the females. No adult males of this parasite were obtained and hence it was not possible to ascribe it to any known species under the genus *Philometra*.

It may be of interest to note here that larval forms of *Porrocaecum* spp. have been recorded from *Otholithus maculatus* (Cuvier) as cited by Baylis (1936).

The presence of parasite in the gonads is undoubtedly harmful to the host fish as has been evidenced by the atrophy of the major part of the ovaries except the apical regions where alone a few but very immature eggs were found in the specimen examined.

The writer wishes to express his sincere thanks to Shri R. Velappan Nair and Shri K. Virabhadra Rao, for their kind suggestions and criticisms in the preparation of this note.

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A NOTE ON AN ABNORMAL *LEONNATES JOUSSEAUMEI* GRAVIER (FAMILY NEREIDAE—POLYCHAETA)

The power of regeneration of lost or damaged parts in polychaetes is very well known. In most of the Nereidiform polychaetes new segments replace the lost segments and they can be generally recognised by being smaller than the rest at first. Moreover, not only can new segments arise at the hind end, but a new head can be formed at the anterior end. These regenerated heads are smaller at first than the rest of the body, but soon grow to a normal size. This extensive power of regeneration generally remains latent till injury provides the stimulus and is of extreme value to the polychaetes.

On 14-10-1961, a worm measuring 75 mm. (97 setigers) was collected by breaking open a dead coral stone taken from Palk Bay near Mandapam at a depth of 1 metre and was identified as *Leonnates jousseumei* Gravier. Plate I shows the anterior end of the animal which exhibited an interesting type of abnormality. A dorso-lateral split has occurred at the anterior end affecting the first three setigers only, as a result of which it is divided into two unequal members. The smaller member on the right side carries four tentacular cirri and a single poorly developed palp. The

ventral portion is chitinized and all the mouth parts, except the soft paragnaths in the form of soft conical papillae, are missing. The larger member on the left side is more or less normal, slightly shifted towards the left from the median axis of the worm and carries a prostomium with four eyes, a single poorly developed palp, and a tentacular cirrus. The remaining three tentacular cirri are missing and their positions are indicated by three short cirrophores. The tentacles are also missing from the prostomium. The small horny paragnaths on the maxillary and the



soft conical papillae on the oral rings of the proboscis, which carries a pair of curved horny jaws, are normal. The ventral side of the proboscis is not chitinized. The parapodia on either side of the affected segments are normal. From the 4th setiger onwards the animal is normal with a parapodia carrying a dorsal bundle of homogomph spinigerous setae and a ventral bundle of falcate homogomphs with the terminal pieces hooked at the apex and serrate on the convex border. The colour of the animal is dark brown with a brownish horizontal red line on each segment on the dorsal side. There is a dark spot also at the base of the dorsal rami in each segment.

We have not come across such a type of abnormality in Nereids so far and it is quite clear that an injury has occurred to the worm at the dorso-lateral angle

affecting the first three anterior segments above the base of the parapodia and the healing has not united the damaged parts.

We wish to express our thanks to Mr. P. R. S. Tampi for the photograph.

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ON THE OCCURRENCE OF *MICROPROSTHEMA VALIDUM* STIMPSON IN INDIAN WATERS

Gravely (1927) recorded this species under the name *Stenopus robustus* and observed that it 'is not uncommon under stones on the reef south of Krusadai Island and in similar situations on Shingle Island'. Even though there is no reason to question the validity of the above observation, it is surprising that this species has not been recorded since then. I collected a single male from under the Adams bridge, Pamban, in 1959. The animal was found lurking in a depression on a submerged piece of rock, the colour of its translucent body harmonising very well with that of the stone. Scarcely was the animal touched with the tip of a forceps when it simply dropped its large chelipeds giving one the impression that it does not care the loss of such a formidable weapon. Autotomy is widespread among decapods, but it is generally resorted to as a means of escape. Here there was hardly sufficient provocation.

Holthuis (1946) has given a detailed description of this species emphasising its synonymy and intra-specific variation. In his subsequent publication (1955) he has reproduced Borradaile's (1910) figure which is not quite satisfactory. To my knowledge this species has not been satisfactorily figured. I give below a short illustrated description of this species so that the animal, if come across, could be easily distinguished by the successive batches of students who visit this locality every year.

Rostrum straight, reaching well beyond the antennular peduncle, with five dorsal spines, ventral or lateral spines absent. Dorsal surface of carapace spiny, lateral borders, especially its anterior half, with large spines. Cervical groove deep and arched forwards. Dorsal carina of first two abdominal segments very prominent, that of third indistinct. Telson as long as uropods, with a pronounced basal constriction, lateral border with two teeth, one median and the other distal, distal border of telson with a median spine, the border between the spines setose. Dorsal side of telson with two pairs of basal spines and two oblique longitudinal carinae, each with three sharp teeth.

Peduncle of the eye with three or four spines. Basal joint of antennular peduncle with a prominent stylocerite, second joint with a large outer and two small inner spines. Antennal scale broad, its outer border with three sharp spines behind the

spine-like apex. Merus of second pereopod with three denticles. Third pereopod massive, merus and carpus triangular in cross section, edges spiny, some of the spines large. Propodus oblong, with pustulose surface and a high dorsal crest with spiny border. Dactylus curved, slightly longer than the fixed finger and with two teeth closing on either side of a single tooth on the fixed finger. Fourth and fifth legs

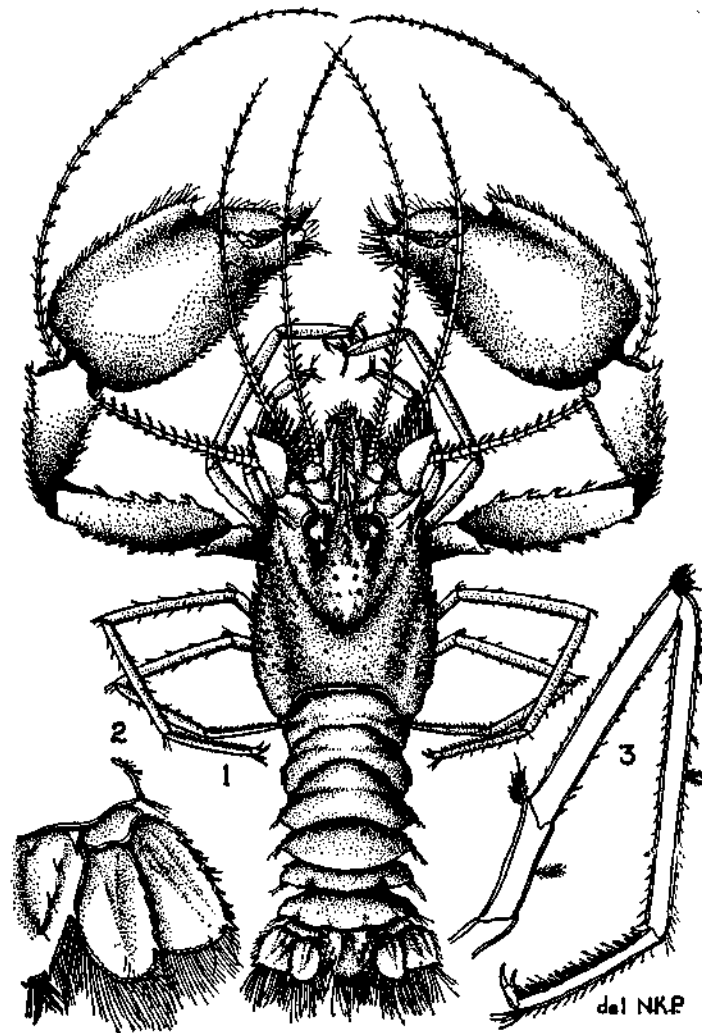


FIG. 1. *Microprosthema validum* Stimpson. 1. male, dorsal view; 2. uropod and telson; 3. penultimate leg.

subsimilar, propodus with a ventral row of fourteen to fifteen spines, carpus not divided, dactylus prominently biunguiculate. Exopod of uropod broader than endopod, its outer border with a row of ten teeth, the last tooth enlarged, dorsal

surface with two carinae. Endopod with a single dorsal carina, its outer border with five teeth, fifth tooth large and placed slightly away from the tip.

Total length 14.0 mm., length of carapace 6.0 mm.

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A RECORD OF *PANULIRUS PENICILLATUS* (OLIVIER) FROM THE INSHORE WATERS OFF QUILON (KERALA)*

Panulirus dasypus Latreille (Gravely 1927), *P. ornatus* Fabricius (Rai 1933 ; Chopra 1939 & 1943) and *P. polyphagus* Herbert (Chopra 1939 & 1943) and *P. burgeri* de Haan are the common species of lobsters recorded from the catches of the Indian coasts. In addition *P. versicolor* Latreille is not altogether uncommon along the Kerala coast. Alcock in 1901 described *P. angulatus* and indicated its availability in the Gulf of Mannar. This species is probably synonymous with *Peurulus sewelli* referred to in the scientific reports of the John Murray Expedition (Ramadan 1938). During the recent lobster gear investigations conducted from this Station with specially designed bottom-set gill nets along the south-west coast of India, in one net operated off Tangassery point (Quilon), a single large sized lobster, which is distinctly different from all others obtained at this place as well as from other fishing centres namely Varkala, Vizhinjam and Colachel-Muttam, was caught. On identification, it has been found to be *Panulirus penicillatus* (Olivier). So far the availability of this species and its occurrence along the Indian coasts have not been indicated in any of the published records.

The present note embodies a short description of the specimen collected at Quilon. According to the accounts of Barnard (1950), Sheard (1941) and especially de Man (1916), the general distribution of this species is throughout the whole of the Indo-Pacific from Gulf of Akaba to Fusan (Korea), Hawaii and Gambier Islands, New Hebrides, East Indies, North coast of Australia, Pacific Islands and Red Sea.

Topography of the place of capture :—One unit of bottom set gill nets of length 250 meshes, depth 10 meshes and 6" mesh made of nylon was set in the evening of 19-1-1960 at a place situated $\frac{1}{2}$ a mile off Tangassery point (8° 53-54' N Latitude and 76° 34' E Longitude). The depth of water was between 3 and 3½ fathoms and bottom was sandy with patches of laterite rocks, covered predominantly with a weedy vegetation. A second unit of net was laid parallel about 100 yards away in depth between

* Contribution No. 35 from the Central Fisheries Technological Research Station (Craft and Gear Wing), Cochin.

2½ and 3 fathoms. The weather was fair and sea calm with feeble currents. The nets remained overnight and they were hauled next morning. The first net unit was fully loaded with weeds and in addition to the specimens of *P. penicillatus* had as catch two perches, five small rays and one medium sized turtle. The second net unit recorded a catch of 22 lobsters (all *P. burgeri*) without any fish.

Brief description of the specimen :—The abdominal segments have transverse uninterrupted grooves and antennular segment has four conspicuous spines, each of the posterior spine being united at the base to its corresponding anterior spine (in conformity with the key of Barnard, *op. cit.*). The specimen is bluish green dorsally with light patches of different colours, and yellowish green ventrally with yellow spots, while all the legs have striking yellow longitudinal wavy lines on a light blue background. True to the popular name given to this species as 'Variegated cray fish' the lobster looks as if brushed with a variety of different hues and colours by an expert artist.

The total length from antennular margin of carapace to posterior end of telson is 323 mm. while the length of carapace from anterior margin to its posterior end is 142 mm. The specimen is a female and weighed 1.13 kg.

ACKNOWLEDGEMENTS

My grateful thanks are due to Shri M. Krishna Menon, Research Officer, Central Marine Fisheries Research Sub-Station, Ernakulam, for his kind help in identifying the specimen. My thanks are also due to Shri G. K. Kuriyan, Assistant Director (Gear), Central Fisheries Technological Research Station, Cochin, for kindly going through the manuscript and suggesting improvements.

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OCCURRENCE OF A VERY EARLY STAGE OF *PARAPEGASUS NATANS* (LINNAEUS) FROM THE NEAR-SHORE WATERS OF PORTO NOVO, SOUTH INDIA

Three species of Pegasidae have so far been recorded from the Indian waters, viz., *Pegasus draconis* (L) by Day (1889) from the Andamans, *Parapegasmus natans* (L) by Johnstone (1904) and by Munro (1955) from Ceylon, and *Parapegasmus volans*

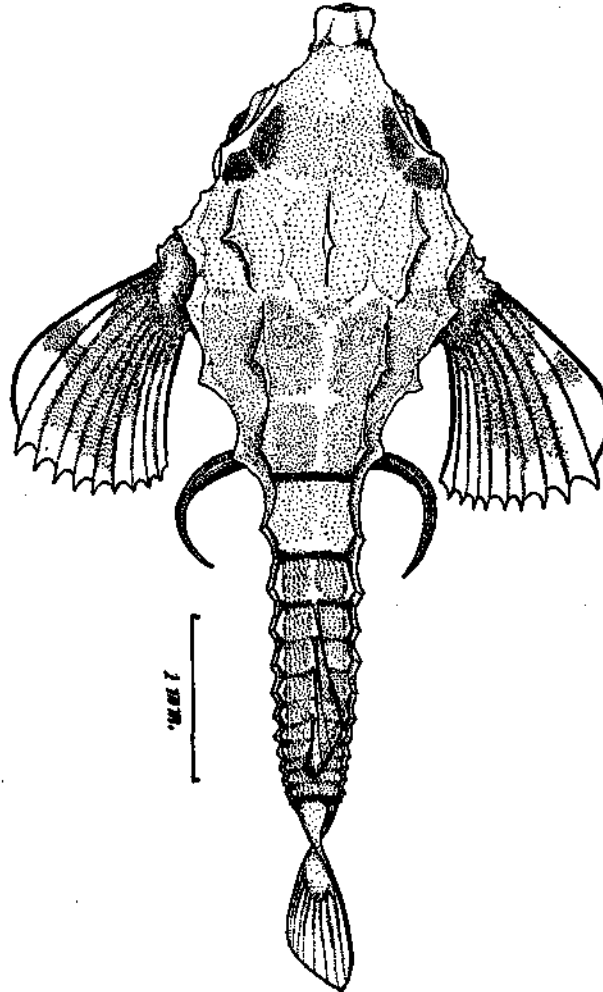


FIG. 1. Showing larva of *Parapegasmus natans* (L)

(L) by Munro (1955), also from Ceylon. Jones and Pantulu (1958) recorded 23 post-larval stages of *Parapegasmus natans* (L) from the Orissa coast. Of these, the earliest stage was reported to be 7.88 mm. in length.

The present note relates to the find of an earlier stage of *Parapegusus natans* (L) than has been known hitherto. A single larva of this species was obtained in the tow-net collection of plankton, taken at the 7-fathom line off Porto Novo, on the 23rd of July, 1961.

The measurements of the specimen are given below :

Total length	Head	Snout	Eye	Snout to Dorsal	Snout to Ventral
6.00 mm.	2.00 mm.	0.32 mm.	0.13 mm.	3.49 mm.	2.84 mm.

The larva now recorded, shows an overall resemblance to the stage I of the specimen described by Jones and Pantulu (1958). However, the following characteristics of the larva collected from Porto Novo, are worth mentioning.

The general colour of the specimen, when alive, is dark brown. The tip of the upper jaw is flexed upwards and this makes the lower jaw appear longer when viewed dorsally. The body is covered with bony plates anchylosed on the trunk. When the specimen is viewed dorsally, there is a short ridge comprised of three plates between the base of the pectoral fin and the posterior margin of the eye. This probably corresponds to the 'small bony frill immediately behind the eyes', observed by Jones and Pantulu in stage I of the specimens collected by them. The caudal fin in the present specimen is devoid of any pigmentation and is very transparent, unlike what has been reported by Jones and Pantulu in the stage I of their specimen. The eyes are prominent and pigmented.

ACKNOWLEDGEMENTS

It is a pleasure to record my grateful thanks to Prof. R. V. Seshaiya, Director and Professor, Marine Biological Station, Porto Novo, for encouragement and interest, Dr. P. Vijayaraghavan for kindly help and Mr. T. N. C. Ramaprasad for help in preparing the figure. I am thankful also to the Council of Scientific and Industrial Research for the award of a Junior Research Fellowship.

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ON THE CAPTURE OF A BALEEN WHALE AT KAKINADA ON THE EAST COAST OF INDIA

On 19th July 1959 at about 19.00 hours, in the wake of a large wave fishermen from a boat sighted a whale in the shallow waters of Chollangi Bay near Etumoga Village, Kakinada. It was seen drifting as a long black mass with the dorsal fluke protruding conspicuously above the water. The men approached it in the boat and threw a rope on to the dorsal fluke, but the whale moved away too fast carrying the rope along with it. Realising the futility of tackling such a monstrous creature from one boat, the fishermen returned to the shore and immediately proceeded to the spot with two other boats and a total complement of 25 crew. The boats were plying in such a way that the animal had to swim shore-wards. The boats were also kept reasonably close together to prevent its escape. In the last stages of the chase the animal actually ran aground frightened by the sound produced by beating the sides of the boats. Thus stranded, it was roped around the caudal region and hauled ashore by about 150 fishermen who formed part of the crowd watching the chase. After its capture the whale lived for about five hours and for sometime, soon after it was beached it roared repeatedly thereby attracting all the people from the village to the spot.

A temporary gunny enclosure was raised and the whale was kept on show from 20-7-1959 to 24-7-1959, during which time it was perfumed and disinfected with agarbathis, frankincense, naphthalene powder, and ice in husk was also applied as a preservative. Fifteen to twenty thousand people from Kakinada and nearby villages visited the spot paying 12 nP. for viewing the animal, the fishermen thus realising about Rs. 2,000 as gate money.

The whale had the following measurements :

Total length	..	26' 1"
Height of body	..	3' 6"
Length of pectoral flipper	..	3' 3"
Length of snout	..	5' 6"
Width of snout	..	2' 6"
Length of each caudal fluke from notch	..	3' 4"
Approximate weight	..	8 tons.

The entrails of the animal were removed on 24-7-1959. On the following morning the carcass was handed over to the local authorities of the Fisheries Department who removed the eyes, the baleen plates, the pectoral flippers with the bones, and the dorsal fluke for preservation, while the blubber was also taken by them for the extraction of oil. The oil extracted by treating the blubber in boiling water was not of rich quality as the blubber was poor and thin, and the animal itself young and dead for some days. At about 18 hours on the same day, the remaining carcass was buried there itself so that the skeleton could be exhumed at a later date.

The presence of a pair of blow holes, baleen plates with edges of a light colour, prominent dorsal fluke, pectoral flippers, moderate and numerous ventral furrows ending well in front of the umbilicus indicate it to be a baleen whale of the genus *Balaenoptera*.

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