

The life cycle of *Eutima commensalis* sp. nov. (Eutimidae, Hydromedusae)

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Abstract

Developmental stages of the medusa *Eutima commensalis* sp. nov. were obtained from plankton collections made at 2 fixed stations, one at Fareway Buoy and the other at Aroor in the Cochin backwater system. Six stages were arbitrarily assigned and described. The hydroid and the medusa of this form were found to occur in these waters throughout the year, except during the monsoon months from June to September. The hydroid is endocommensalic on wood-boring molluscs such as *Nausitora hedleyi*, *Teredo furcifera* and *Martesia striata*.

Introduction

Various stages of a certain type of medusa were gathered from the plankton collected from the Cochin backwaters. Detailed examination has made it possible to place them in the genus *Eutima* as *Eutima commensalis* sp. nov. The genus *Eutima* McCrady 1857 has been described by several authors (McCrady, 1857; Agassiz and Mayer, 1899; Browne, 1905; Uchida, 1925, 1964; Russell, 1953; Vanucci, 1957; Kramp, 1958). Ganapathi and Nagabushanam (1958) recorded the genus *Eutima* in their ecological studies on the east coast of India. Russell (1953) and Vanucci (1957) keep the species with nematocyst-laden adaxial papillae in the genus *Octorchis*, and confirm *Eutima* as a separate genus having no adaxial papillae (Uchida, 1964). The hydroid of the present species, which is endocommensalic on wood-boring molluscs (*Nausitora hedleyi*, *Teredo furcifera* and *Martesia striata*), has already been recorded (Santhakumari and Balakrishnan Nair, 1969). Brooks (1884) reared the primary polyp of *Eutima mira* and Russell (1949) reared that of *E. gracilis*.

Material and methods

The developmental stages of this medusa were obtained from fortnightly plankton collections made from January to December 1968 at 2 fixed stations located in the Cochin backwater system. A fraction of these plankton samples was examined, and the medusae were separated. The life cycle of *Eutima commensalis* is described. All the specimens were preserved in 4% formaldehyde, measurements were taken with an ocular micrometer, drawings were made with a camera lucida.

The hydroid

The hydroid of this medusa has been described in detail by Santhakumari and Balakrishnan Nair, 1969; the following brief description is included here to complete the description of the life cycle. The colonial hydroid lives embedded in the lamella of the ctenidia of wood-boring molluscs. The growth of the colony is monopodial, and the hydrocaulus spreads in a zig-zag fashion with an angle at the origin of each branch (Fig. 1). The height and size of the colony may vary depending upon the number of polyps. The length of the polyps varies from 225 to 1219 μ , and

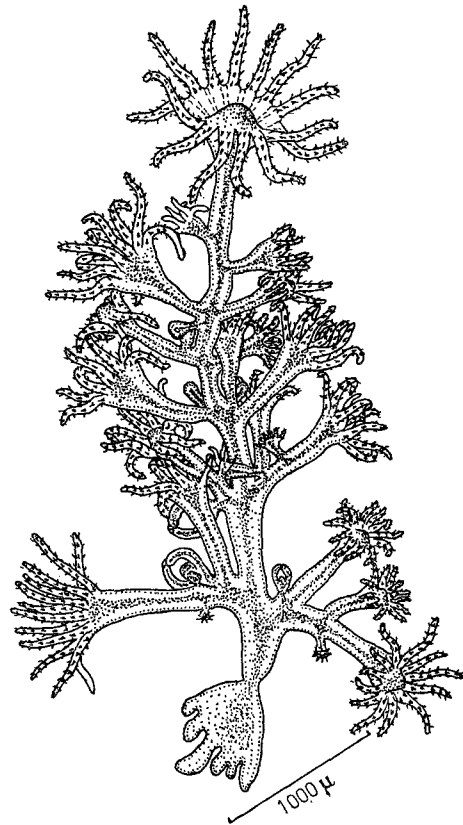


Fig. 1. A hydroid of *Eutima commensalis* taken from the ctenidium of *Nausitora hedleyi*

Table 1. *Eutima commensalis*. Changes in the marginal structures taking place during the development

Stage	Tentacle	Tentacular bulb, no tentacle	Lateral cirri	Marginal swellings	Marginal vesicles	Marginal warts with cirri	Marginal warts without cirri
I	0	4	16	4	8	0	0
II	2	2	16	4	8	0	0
III	4	4	16	0	8	16	16
IV	8	0	16	0	8	16	32
V	8	0	16	0	8	32	16
VI	8	0	16	0	8	32	16

the diameter of the polyps ranges from 44 to 125 μ . The hydroid has no theca. Each colony possesses a well-defined, large, and conspicuous basal disc implanted in the ctenidial tissue of the mollusc. The tentacles, which may vary from 6 to 20 in number, are arranged in a single whorl around the base of the hypostome, with webs between their bases. They are slender, and nematocysts are distributed throughout their length.

A peculiar type of polyp is found in the colony growing from small bud-like protuberances of the basal disc. This elongated polyp has 4 tentacles, no hypostome, and no intertentacular membrane. About 2 days after formation, this polyp transforms into a normal polyp by a reduction in total length and the length of the tentacles, and by addition of the intertentacular web.

The medusa bud develops as a small knob-like dilation from the base of the hydranth and becomes pear shaped. The manubrium of the medusa is visible, even in the early stages of development. The exact time taken for the development of the medusa has not been precisely ascertained; a full grown bud took not less than 20 h for liberation. Each bud gives rise to a single medusa.

The medusa

The stages of the medusa described below were chosen arbitrarily on morphological grounds. The measurements were taken from individuals preserved in 4% formaldehyde. Table 1 shows the structural changes taking place during development.

First stage; newly liberated medusa (Fig. 2)

Height: 0.32 to 0.40 mm; diameter: 0.41 to 0.50 mm. Jelly is fairly thick, nearly hemispherical, and without apical projection. The manubrium is short, with 4 very small lips, the 4 radial canals and ring canal are narrow, there are 4 thick perradial marginal bulbs, each flanked on either side by a lateral cirrus. In-between these marginal bulbs are 4 smaller interradial swellings. Eight marginal vesicles are present on either side of the perradial marginal bulbs. The velum is

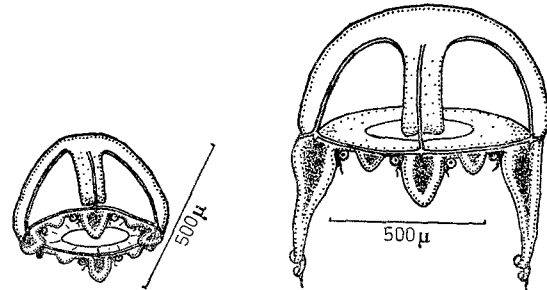


Fig. 2

Fig. 3

Fig. 2. Medusa of *Eutima commensalis*, stage 1

Fig. 3. Medusa of *Eutima commensalis*, stage 2

narrow. At this stage the medusa closely resembles the early stage of *Eucheilota menoni* (KRAMP, 1959).

Second stage (Fig. 3)

Height: 0.46 to 0.53 mm; diameter: 0.52 to 0.59 mm. At this stage, a pair of opposite perradial marginal bulbs enlarge into 2 tentacles.

Third stage (Fig. 4a, b)

Height: 1.90 to 2.24 mm; diameter: 2.86 to 3.06 mm. Two more tentacles develop from the perradial marginal bulbs, bringing the number to 4. A gelatinous peduncle has developed, its length being about half the length of the stomach. Four bulbs, flanked by cirri, are formed in the interradial. At the same time, 16 marginal warts with lateral cirri appear, 1 on either side of each marginal vesicle. Again, 16 minute projections, forerunners of a second set of marginal warts, without cirri, appear on the outer side of the already formed marginal warts. Thus, 4 fully formed, and 4 incipient, marginal warts are seen on each quadrant of the medusa; the latter have no lateral cirri.

Fourth stage (Fig. 5a, b)

Height: 2.13 to 2.45 mm; diameter: 4.10 to 4.65 mm. At this stage, 4 interradial marginal swellings enlarge

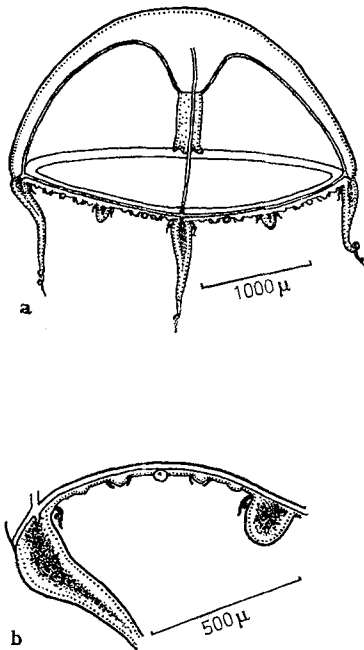


Fig. 4. Medusa of *Eutima commensalis*. (a) Stage 3; (b) enlarged view of marginal structures

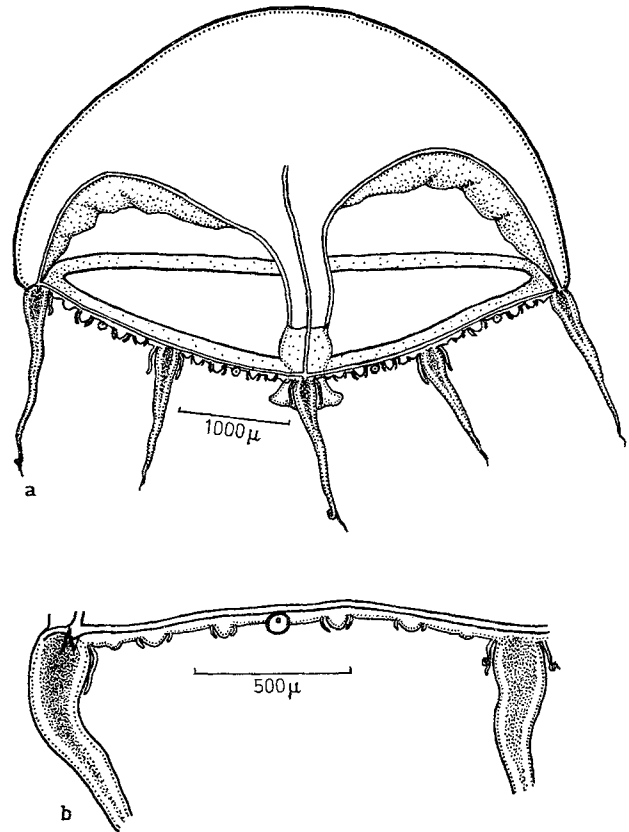


Fig. 6. (a) Fully matured *Eutima commensalis*. (b) enlarged view of marginal structures

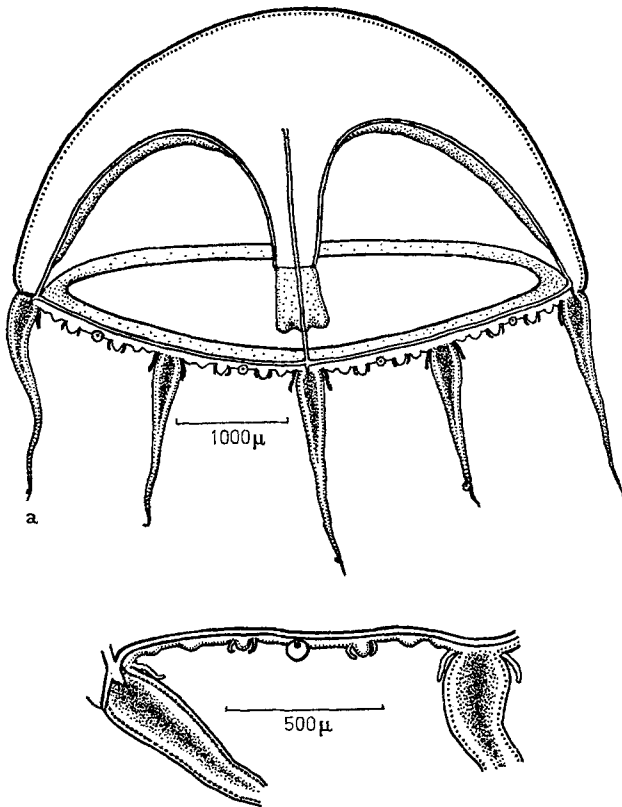


Fig. 5. Medusa of *Eutima commensalis*. (a) Stage 4; (b) enlarged view of marginal structures

and become tentacles. Besides the 32 already formed marginal warts, 16 small projections appear on the outer side of the outer marginal warts of the whole medusa. The gonads develop on the radial canals. The peduncle elongates.

Fifth stage; fully mature (Fig. 6a, b)

Height: 3.24 to 3.46 mm; diameter: 5.28 to 5.89 mm. No other additional marginal structure is seen at this stage, except an enlargement of the 16 marginal projections on the margin and extension of the peduncle and the stomach. At this stage, the medusa possesses a thick jelly; elongated peduncle; 4 gonads extending from a little beyond the bell margin to the peduncle; 8 tentacles, with lateral cirri; 8 marginal vesicles; in each octant 6 marginal warts, the two pairs of middle warts larger with lateral cirri and the outer ones smaller and without cirri. Except for the 16 marginal projections, the shape and extension of the gonads (which do not run a short way down the peduncle), this stage resembles the mature *Eutima japonica* (UCHIDA, 1925).

Table 2. Comparison of *Eutima* species described with *Eutima commensalis* sp. nov.

Characteristics	<i>E. brownei</i>	<i>E. coerulea</i>	<i>E. cuculata</i>	<i>E. curva</i>	<i>E. gentiana</i>	<i>E. gracilis</i>	<i>E. hartlaubi</i>
Diameter (mm)	15	10.0	8.0	10	10.0	13.0	15
Umbrella shape	hemi-spherical	broader than high	flat, thick in centre	—	—	hemi-spherical	flatter than a hemisphere
Jelly	thick	thick at apex	—	quite thick	—	thick	fairly thick
Peduncle	wide, conical, short	½ as long as bell diameter, slender, tapering	as long as bell diameter	as long as bell diameter	prismatic, as long as bell diameter	very long, narrow, conical base	slender, ½ as long as bell diameter
Gonads	4, on sub-umbrella	4, on peduncle to sub-umbrella	4, on sub-umbrella	4, on prismatic portion of peduncle	4, long, on peduncle	4, on narrow portion of peduncle	8, 4 on sub-umbrella and 4 on middle of peduncle
Tentacles	130, with 1—3 pairs of lateral cirri	32, with lateral cirri	4, without cirri	4, with lateral cirri	8, with 2 pairs of lateral cirri	2 or 4, long, usually with lateral cirri	12—14, without lateral cirri
Marginal warts	Nil	96, with cirri	no warts, (9—10 marginal cirri in each quadrant)	120—140, with cirri	16, with lateral cirri	40—80 or more, usually with lateral cirri	32, with cirri
Distribution	California	Bahamas; Florida	North Carolina, USA	Indo-west Pacific, from Seychelles to N.E. Australia	Canary Islands	North-western and western Europe; Mediterranean; west coast of Africa	Djibouti in East Africa Nicobar

E. cuculata should be transferred from the genus *Eutima* to the genus *Eutimalphes* because of having marginal cirri but no lateral cirri.

Sixth stage

At this stage, after shedding its sexual products, the medusa becomes spent and shrunk; the jelly has a flabby appearance, the measurements show a reduction in size when compared with previous stages.

Occurrence

It is interesting that the medusa and the hydroid occur in the area under review during the pre- and post-monsoon periods, with a peak during February. During the monsoon they are completely absent.

Discussion

The medusa has been placed in the genus *Eutima* because of the presence of 8 marginal vesicles, lateral cirri, marginal warts, marginal swellings without ad-axial papillae, and 2 to 32 tentacles.

The present form, however, does not fit in any

of the *Eutima* species hitherto described. Owing to paucity of information regarding the development of the medusa, the hydroid had been previously assigned to the genus *Eugymnanthea* (PALOMBI, 1935) by SANTHAKUMARI and BALAKRISHNAN NAIR (1969). Comparison of the young stages collected from the plankton, with those liberated from the hydroid, suggests that they belong to the same species. Hence, following the single system of classification of Hydrozoa, the generic name for the hydroid has been emended here to *Eutima*. SANTHAKUMARI and BALAKRISHNAN NAIR (1969) described the newly liberated medusa with 2 perradial tentacles; this corresponds to stage 2 described above. The explanation for this difference may be that, under controlled laboratory conditions, the medusa is liberated only after a slightly longer period, during the course of which development continues.

Detailed examination of the specimens makes it impossible to assign them to any of the existing species

Characteristics	<i>E. japonica</i>	<i>E. levuka</i>	<i>E. mira</i>	<i>E. modesta</i>	<i>E. neucaledonia</i>	<i>E. orientalis</i> (?)	<i>E. commensalis</i>
Diameter (mm)	4.5	15	30.0	8	9	5—6	5.9
Umbrella shape	—	Flatter than a hemisphere	as broad as high	flat with thin walls	very flat	—	nearly hemispherical
Jelly	thick	thin	—	—	—	—	thick
Peduncle	short	1½ times as long as bell diameter	long, slender, tapering	slender, ½ as long as bell diameter	slender, as long as diameter	twice as long as bell diameter	extends near the bell margin
Gonads	4, from bell margin to peduncle	8, 4 on peduncle and 4 on sub-umbrella	4, on peduncle and 4 on sub-umbrella	4, on sub-umbrella	4, on sub-umbrella	8, 4 on peduncle and 4 on sub-umbrella	4, on sub-umbrella
Tentacles	8, with lateral cirri	8, with lateral cirri	4, with or without cirri	16, with lateral cirri	8, without cirri	4, with lateral cirri	8, with lateral cirri
Marginal warts	32 (16 with cirri and 16 without cirri)	100, with cirri	100, some with cirri	16 or more, with lateral cirri	in each octant 6—7, some have cirri	60—80, with lateral cirri	48 (16 without lateral cirri and 32 with lateral cirri)
Distribution	Japan; Central north Pacific	Indo-west Pacific	east coast of North America; Brazil	Djibouti in East Africa	New-Caledonia	Indo-west Pacific from Africa to New Zeland	Cochin backwaters; Arabian sea; Indian Ocean

E. orientalis may have to be transferred to the genus *Octorchis* as a synonym of *O. gegenbauri* (RUSSELL, 1953).

of *Eutima*, and hence they are described here as belonging to a new species *Eutima commensalis* (Table 2). The specific name indicates the habit of the hydroid.

It appears that 2 different genera have been confused under the single name *Eugymnanthea*. The genus is valid for the species similar to *E. inquilina* PALOMBI, 1935, namely *E. polimanti* (CERRUTI, 1941) and *E. ostrearum* MATTOX and CROWELL 1951, in which the hydroid does not grow into branched colonies, has no intertentacular web or only a very slight one, and is commensalic on free-living lamellibranchs. The medusae are short lived and often degenerate, they have closed marginal vesicles, but no cirri. The genus has been placed by KRAMP (1961) among the Eucopida, however, MATTOX and CROWELL (1951) have shown that they would appear to be related to the Campanulariidae, more than to any other medusae. The present species unquestionably belongs to the family Eutimidae from the typical characteristics of both the hydroid and of the medusa; especially significant are

the intertentacular webs of the hydroid and the lateral cirri of the medusae, which may already be seen at liberation. The hydroid is endocommensalic in different species of lamellibranchs, all of them wood-boring. Unfortunately, UCHIDA (1964) seems to have united different species and genera under the name *Eugymnanthea*; thus, the medusa he has reared and called *Eugymnanthea cirrifera*, the hydroid of which remains undescribed, is a typical *Eutima* rather similar to the species described here. However, given insufficient data, and absence of adult medusa and hydroid descriptions, *Eugymnanthea cirrifera*, as described by UCHIDA (1964), should be considered a nomen nudum.

Summary

1. A brief description of the hydroid of *Eutima commensalis* is given.

2. A peculiar type of polyp had been observed earlier and is re-described here.

3. Very short accounts of the medusa bud and its formation have also been included.

4. The developmental stages of the medusa are described according to 6 arbitrarily chosen stages.

5. Owing to lack of information regarding the development and the adult medusa, the hydroid had been tentatively placed under the genus *Eugymnanthea* following the characteristics of the hydroid; it is now transferred to the genus *Eutima*.

6. Detailed study of this medusa resulted in the conclusion that it is impossible to place it under any of the described *Eutima* species; it is, therefore, described as a new species, *Eutima commensalis*.

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Literature cited

- AGASSIZ, A. and A. G. MAYER: Acalephs from the Fiji Islands. *Bull. Mus. comp. Zool. Harv.* **32**, 157—189 (1899).
- BROOKS, W. K.: On the life history of *Eutima* and on radial and bilateral symmetry in hydroids. *Zool. Anz.* **7**, 709—711 (1884).
- BROWNE, E. T.: Report on the medusae collected by Professor HERDMAN at Ceylon, in 1902. *Rep. Pearl Fish. Mannar. (Suppl. Rep.)* **27**, 131—166 (1950).
- CERRUTI, A.: *Mytilhydra polimantii* n. g., n. sp., idroide vivente sul mantello dei mitili. *Riv. Biol.* **32**, 1—18 (1941).
- GANAPATHI, P. N. and R. NAGABHUSHANAM: Seasonal distribution of the Hydromedusae off the Visakhapatnam Coast. *Andhra Univ. Mem. Oceanogr.* **2**, 91—99 (1958).
- KRAMP, P. L.: Hydromedusae in the Indian Museum. *Rec. Indian Mus.* **53**, 339—376 (1958).
- Some new and little known Indo-Pacific medusae. *Vidensk. Meddr dansk naturh. Foren.* **121**, 223—259 (1959).
- Synopsis of the Medusae of the world. *J. mar. biol. Ass. U.K.* **40**, 1—469 (1961).
- MATTOX, N. T. and S. CROWELL: A new commensal hydroid of the mantle cavity of an oyster. *Biol. Bull. mar. biol. Lab., Woods Hole* **101**, 162—170 (1951).
- MCCRADY, J.: Gymnophthalmata of Charleston Harbour. *Proc. Elliot Soc. nat. Hist.* **1**, 103—294 (1857).
- PALOMBI, A.: *Eugymnanthea inquilina* nuova leptomedusa derivante da un atecato idroide ospite interno di *Tapes decussatus* L. *Pubbl. Staz. zool. Napoli.* **15**, 159—168 (1935).
- RUSSELL, F. S.: On the hydroid of *Eutima gracilis* (FORBES and GOODSIR). *J. mar. biol. Ass. U.K.* **28**, 479—480 (1949).
- The Medusae of the British Isles, Vol. 4, 530 pp. Cambridge: University Press 1953.
- SANTHAKUMARI, V. and N. BALAKRISHNAN NAIR: A commensal hydroid from wood-boring molluscs. *J. nat. Hist.* **3**, 19—33 (1969).
- UCHIDA, T.: Some Hydromedusae from Northern Japan. *Jap. J. Zool.* **1** (3), 77—100 (1925).
- Some medusae from New Caledonia. *Publ. Seto mar. biol. Lab.* **12**, 109—112 (1964).
- VANNUCCI, M.: On Brazilian Hydromedusae and their distribution in relation to different water masses. *Bolm Inst. Oceanogr., S Paulo* **8** (1—2), 23—109 (1957).

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