

On some planktonic Anthozoan larvae in the Adriatic

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This report intends to supplement earlier descriptions of Anthozoan larvae collected from the Adriatic Sea. A planula, the cnidom of which is identical to that in adult specimens of the genus Corynactis is described. Some aspects of morphology and development are compared in Dianthea nobilis and Synarachnactis bournei larvae. The morphology of an actiniarian and a scleractinian planula is treated.

The terminology for adult specimens is used from STEPHENSON (1928) and CARLGREN (1949) and the nematocyst nomenclature follows those of WEILL (1934) and CARLGREN (1940, 1945).

INTRODUCTION

Cnidarian larvae make up a small, but permanently occurring part of the zooplankton in the Adriatic. This report intends to supplement earlier descriptions on anthozoan larvae collected in the Adriatic by GRAEFFE (1884), CORI & STEUER (1901), STEUER (1902, 1903, 1910), STIASNY (1908), PAX & MÜLLER (1962), and WIDERSTEN (1968, 1973).

With the exception of an actiniarian planula found off the island Vis in October, 1966, the larvae described in this paper were collected in 1982 by the Institut za oceanografiju i ribarstvo, Split.

A planula, the cnidom of which is identical with that in adult specimens of the genus *Corynactis* (Corallimorphidae, Corallimorpharia) is described. The ceriantharian larvae *Dianthea nobilis* and *Synarachnactis bournei* are compared what concerns some aspect of their morphology and development. The morphology of an actiniarian, and a scleractinian planula is treated.

The terminology used in this paper is the one erected by STEPHENSON (1928) and CARLGREN (1949) for adult specimens. The nematocyst nomenclature follows that, erected by WEILL (1934) and CARLGREN (1940, 1945). The dimension of the nematocysts were measured in undischarged capsules.

DESCRIPTIONS

Corallimorpharian larva

This ovate planula, collected south of Split in April 1982 with a Hensen net (150-0 m depth) was in the preserved state 1.7 x 1.5 mm in size. There is no tuft of lengthened flagellae in the aboral pole, but a well developed aboral nerve cushion, typical of most planktonic lecithotrophic actiniarian larvae (of. WIDERSTEN, 1968; Text-fig.16). The ectoderm, covered with a thin periderm, is composed of ca. 35 µm high supporting cells, and especially aborally, of scattered granular as well as agranular glands cells.

The ectoderm is furnished with a rich supply of spirocysts ($20.5 \times 3.3 - 30 \times 6 \mu\text{m}$), holotrichs ($13.5 \times 4.9 - 20 \times 7 \mu\text{m}$), and hoplotelous microbasic *b*-mastigophores (common; $18.5 - 21 \times 4.9 - 5.5$; ca. $13 \times 1.7 \mu\text{m}$).

The actinopharynx is short (ca. one-fourth of the length of the body), and wide. The siphonoglyph is indistinct. Of the six pairs of mesenteries developed in this planula, only the primary eight *Edwardsia* mesenteries are perfect. The sulcar and sulco-lateral mesenteries are provided with filaments, the cnidoglandular tracts of which are equipped with microbasic *p*-mastigophores ($13 \times 3.2 - 17.5 \times 3.8 \mu\text{m}$). The mesogloal layer of the body as well as of the mesenteries is thin. The very weak retractor muscles of the perfect mesenteries do not form distinct muscle bands. The imperfect mesenteries are devoid of retractors. No parietobasilar muscles are developed.

Twelve ovate fields, composed of large, in the preserved state vacuolated endoderm cells can be seen, shimmering through the ectoderm (Fig.1). Apart from these fields, the endoderm of the voluminous gastrocoel is thin.

The occurrence of one couple of more pronounced, lateral mesenterial insertions, as well as the differentiation of the body into an aboral, less transparent, and an oral-lateral part are characters, which were also found by CHUN in a number of anthozoan larvae, collected in the Gulf of Naples in October and November, 1886. Also in the material, collected by the German Deep-Sea Expedition in September, 1898, larvae with a similar morphology (equipped, however, with two siphonoglyphs) were found in dredges from 600-3000 m depth in the equatorial parts of the Atlantic (cf. CARLGREN, 1924, p. 455; Taf. 33, Figs. 11-13).

The rich supply of holotrichs, and the absence of basitrichs in the cnidom, should make it evident, that this planula is not of actiniarian origin. Actually, the structure of the different nematocyst types of this larva is identical with that found in the species of the corallimorphid genus *Corynactis* (cf. e.g. WIDERSTEN, 1976).

Morphologically, the larva "W" (CARLGREN, 1924; Pl. 38, Figs. 1-2) agrees in most respects with the planula from the Adriatic. The occurrence of twentyfour mesenteries and the

larger number of endocoelic fields, as well as the development of filaments on all the *Edwardsia* mesenteries in larva "W" suggest an extended planktonic life.

Actiniarian larva

A specimen of this ovate, uniformly ciliated planula was caught in plankton off the island Vis in October, 1966. The size of this, in the preserved state whitish larva, is $435 \times 325 \mu\text{m}$. The slightly depressed aboral part of the body is equipped with supporting cells with flagellae of moderate length. There is a slight concentration of basiepithelially located nerve cells in the aboral region (Fig.2). In the lateral ectoderm spirocysts (very common; $14.2 - 15.5 \times 3.3 \mu\text{m}$), and fusiform basitrichs (rare; ca. $11.5 \times 1 \mu\text{m}$) are developed. Scattered granular as well as agranular gland cells occur in the whole ectoderm. The perioral parts of the ectoderm as well as the short actinopharynx is armed with microbasic *p*-mastigophores ($12.5 \times 3.8 - 14.5 \times 5 \mu\text{m}$). The siphonoglyph is indistinct.

Of the eight developed mesenteries, only the sulcolateral couple is furnished with cnidoglandular tracts, richly supplied with gland cells but without any type of nematocysts. The muscle layer of the body as well as the diffuse retractors of the mesenteries are weak. Distinct parietal muscles are not developed. The gastrocoel is interseptally partly filled with large, in the fixed state vacuolated endoderm cells. In the perioral part of the gastrocoel, large yolk-rich cells as well as cleavage stages of unknown origin were found in the studied specimen (Fig. 3).

This rare planula differs in some ways from what is the rule in actiniarian planktonic larvae (cf. WIDERSTEN, 1968). Thus, the aboral concentration of nematocysts, gland cells, and nerve cells is less obvious than in most actiniarian larvae. The very long rootlets of the cilia in the actinopharynx, and the argentophilous, desmosomelike connection of spirocysts with the mesogloal layer (Fig.4) are other deviations.

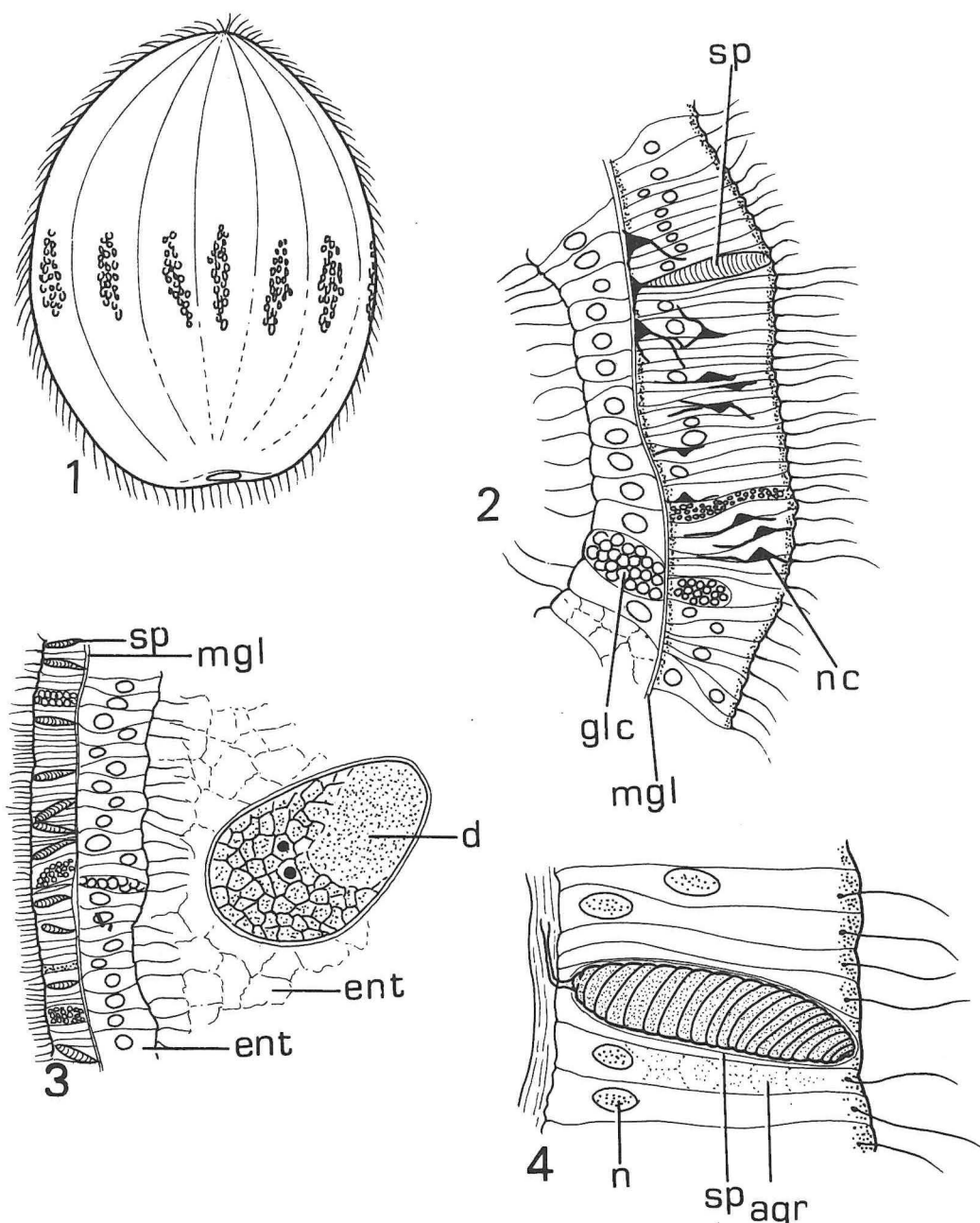


Fig.1. Corallimorpharian larva. x 30.

Fig.2. Actiniarian larva. Section through the aboral pole. x 500.

Fig.3. Actiniarian larva. Section through the oral-lateral part of the body, showing an aggregation of yolk-rich cells in the gastrocoel. x 250.

Fig.4. Actiniarian larva. Section through the ectoderm and mesogloal layer, showing the connection a spirocyst with the mesogloal layer. x 1000.

ABBREVIATIONS

agr	agranular gland cell	mgl	mesogloal layer
d	yolk	n	nucleus
ent	entoderm	nc	nerve cell
gl c	gland cell	sp	spirocyst

The cnidom of this larva is the most frequent in the actinarians and the antipatharians.

Scleractinean larva

This larva, collected in the central part of the Adriatic (off Palagruža, 165 - 0 m, 8. 4 1982, 1 specimen) and off Rovinj (55 - 0 m, 26. 3 1982, 1 specimen), shows in the arrangement and development of the mesenteries, the differentiation of the actinopharynx, and the structure of the aboral part of the body, similarities to the larva of *Caryophyllia cyathus* (ELLIS & SOLANDER), described from the neighbourhood of Naples by von KOCH (1897).

The size of the spherical, or barrel-shaped Adriatic specimens is 550 x 550, and 1200 x 960 μm . The uniformly ciliated, in the preserved state yellow larvae are devoid of an aboral tuft of flagellae, but are provided with a well developed aboral concentration of nerve cells, agreeing with that in most lecithotrophic actinarian larvae (cf. WIDERSTEN, 1968, 1973).

The ovate oral opening is continued in a wide, short actinopharynx, to which four couples of mesenteries are connected. Only the insertions of the two large couples of mesenteries are shimmering through the opaque lateral ectoderm. All the mesenteries are provided with filaments. The retractors are weak, of diffuse type.

The holotrichs of the ectoderm measure 20.5 x 6 - 31 x 10 μm . The microbasic *b*-mastigophores of the actinopharynx vary between 12 x 3.3 and 22 x 4.4 μm , while the hoplotelic microbasic *p*-mastigophores of the actinopharynx and the filaments measure 18.5 x 3.8 - 23 x 5.5 μm . No spirocysts were found in any part of the larva.

The different nematocysts types agree in their structure with those found in adult scleractinians (e.g. *Astroides calycularis* (PALLAS); cf. CARLGREN, 1940).

Ceriantharian larva (*Dianthea nobilis* (BUSCH))

This larva of *Cerianthus membranaceus* (L. SPALLANZANI) agrees in the youngest stages

morphologically with the larva (*Synarachnactis bournei* (FOWL.)) of *Cerianthus lloydii* GOSSE. In the *cerinula* stage of *Dianthea nobilis* the length of the body is ca. 370 μm , while the tentacles measure 450 μm in length. After the larvae have attained the stage with seven marginal tentacles the body grows, however, faster than the tentacles (length of column: 0.75 - 1.0 mm; length of tentacles: 0.8 - 0.9 mm).

In the stage with seven marginal and two labial tentacles the marginal tentacles are equipped with microbasic *b*-mastigophores (12 - 13.3 x 3.3; 25 x 4.9 - 30.5 x 5.5 μm) and spirocysts (16 x 3.7 - 33 x 5.5 μm). In the same stage of *Synarachnactis bournei* from the Swedish West coast, the size of the microbasic *b*-mastigophores is 10 x 2.8 - 20 x 3.7 μm , while the spirocysts measure 12 x 3.3 - 16.5 x 3.8 μm .

The filaments of the mesenteries are provided with microbasic *b*-mastigophores (13.5 x 2.7 - 22 x 4.4 μm). Apart from some small spirocysts (ca. 12 x 3.7 μm), nematocysts were not found in the column ectoderm.

Any distinct difference what concerns the structure of the gastrocoel and its amount of yolk could not be observed in comparisons between *Dianthea nobilis* and *Synarachnactis bournei*.

The development of the directive marginal tentacle as early as after the appearance of the second couple of marginal tentacles seems to be the only morphological character, which distinctly separates *Dianthea* from *Synarachnactis* (in which the directive tentacles does not develop until the third couple of marginal tentacles appear).

Dianthea nobilis is said to appear in plankton from June to October (cf. CARLGREN, 1924; PAX & MÜLLER, 1962). All the 67 specimens at my disposal from different parts of the Adriatic (off Istria, the coast waters off the river Neretva, and the open sea) were collected in March, 1982.

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O nekim planktonskim ličinkama Anthozoa u Jadranu

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KRATKI SADRŽAJ

Dana je dopuna opisa nekih već ranije opisanih antozojskih ličinkama iz Jadrana. Opisuje se planula, čiji je knidom istovjetan s onim kod adultnih primjeraka roda *Corynactis* (Corallimorphidae, Corallimorpharia), zatim planule jedne aktinijarije, koja se u nekim obilježjima donekle

razlikuje od karakterističnih obilježja ličinaka aktinijarija, te ličinka jedne skleraktinijarije, koja po nekim obilježjima pokazuje sličnost s ličinkom vrste *Caryophyllia cyathus*, opisane 1897. u Napuljskom zaljevu. Uspoređuju se također ličinke vrsta *Dianthea nobilis* i *Synarachnactis bournei* (Ceriantharia) s obzirom na neke aspekte njihove morfologije i razvoja, kao i morfologija ličinaka planula aktinijarija i skleraktinijarija.

Sve opisane ličinke, s izuzetkom planule aktinijarije, koja je nađena u planktonu kod otoka Visa u listopadu 1966, su sakupljene tijekom 1982. (kod Rovinja, Splita i Palagruže) od strane Instituta za oceanografiju i ribarstvo u Splitu.
