

Description of egg masses of three species of sedentary polychaetes of the Mediterranean Sea

Descripción de las masas de huevos de tres especies de poliquetos sedentarios del mar Mediterráneo

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There is little information about the reproductive season, types of batches and post-embryonic development of sedentary polychaetes. In some species, eggs are placed in burrows or tubes with egg masses associated with the mouth of the tubes or, lacking that possibility, affixed to some object. The batches of the majority of the species correspond to gelatinous masses that vary in size and form, where the eggs are visible or not according to the degree of transparency. The relatively consistent mucous substance containing the eggs must be impregnated with bactericidal substances so that the egg develops protected from bacterial decomposition (Benkendorff, 2001).

According to the criteria of Fauchald (1983), the developmental patterns of the polychaetes can be divided into three types: 1) annual species, which live between one and two years and spawn only once, producing a large number of small eggs; 2) species that live for more than one year and reproduce several times during their lifetimes and produce relatively few eggs which are large and therefore very yolky; 3) species with a lifetime of less than a year which produce eggs several times during this period with small batches of large eggs that are rich in yolk.

After the embryonic development of the egg, a metamorphosis of the trochophore larva has to take place. During metamorphosis, the first step that occurs is the gradual lengthening of the zone between the mouth or

apex and the pygidium, with the body beginning to develop segments, which leads to the appearance of the first setigerous segments. In some species, metamorphosis occurs inside the egg and the organism hatches in a more advanced state of post-larval-type or late trochophore development (Pearse *et al.*, 1987). This is the case with one of the most common species in the Mediterranean, *Eupolymnia nebulosa* (Montagu, 1818), which after three days hatches as a trochophore larva with formed prototroch, telotroch and neurotroch; after four days it is possible to see the first constrictions of the trunk which indicate its segmentation; after 6 days the first segments show the presence of setae (Bhaud & Grémare, 1988).

On the coast of Granada, batches of three species of sedentary polychaetes have been seen on repeated occasions. Their form, size, colour, type of substrate and the time of year in which they appear are presented here.

Over three consecutive years, 2000-2003, a series of weekly samplings were carried out on the coast of Granada. Four sampling stations were established, whose geographic coordinates are: Cantarrijan ($3^{\circ} 46' 48, 430W$; $36^{\circ} 44' 18, 691N$); Punta del Vapor and the adjoining beach of Marina de Este ($3^{\circ} 43' 41, 474W$; $36^{\circ} 43' 27, 127N$); Piedra del Hombre (La Herradura) ($3^{\circ} 44' 15, 310W$; $36^{\circ} 43' 29, 598N$); Two additional sites were sampled sporadically: Calahonda ($3^{\circ} 24' 42, 707W$; $36^{\circ} 42' 11, 448N$) and La Rijana ($3^{\circ} 23' 18, 217W$; $36^{\circ} 42' 40, 940N$).

Sampling usually took place between a depth of 0 and 15 m. The study was done by immersion using equipment with autonomous diving gear, by simple, direct observation. These samplings were performed with the goal of increasing our knowledge of different aspects relating to the biology of different groups of invertebrates. During this study period, gelatinous masses of different colours and consistencies were observed that corresponded to egg masses of an animal type that was unknown at first. More than a year had to pass before it was possible to see the same batches associated with the progenitor individual to be able to connect them with their species. Portions of the batches of the different species were transported in refrigerators to the laboratory and placed in an aquarium in order to follow their embryonic development and their post-embryonic development, when possible.

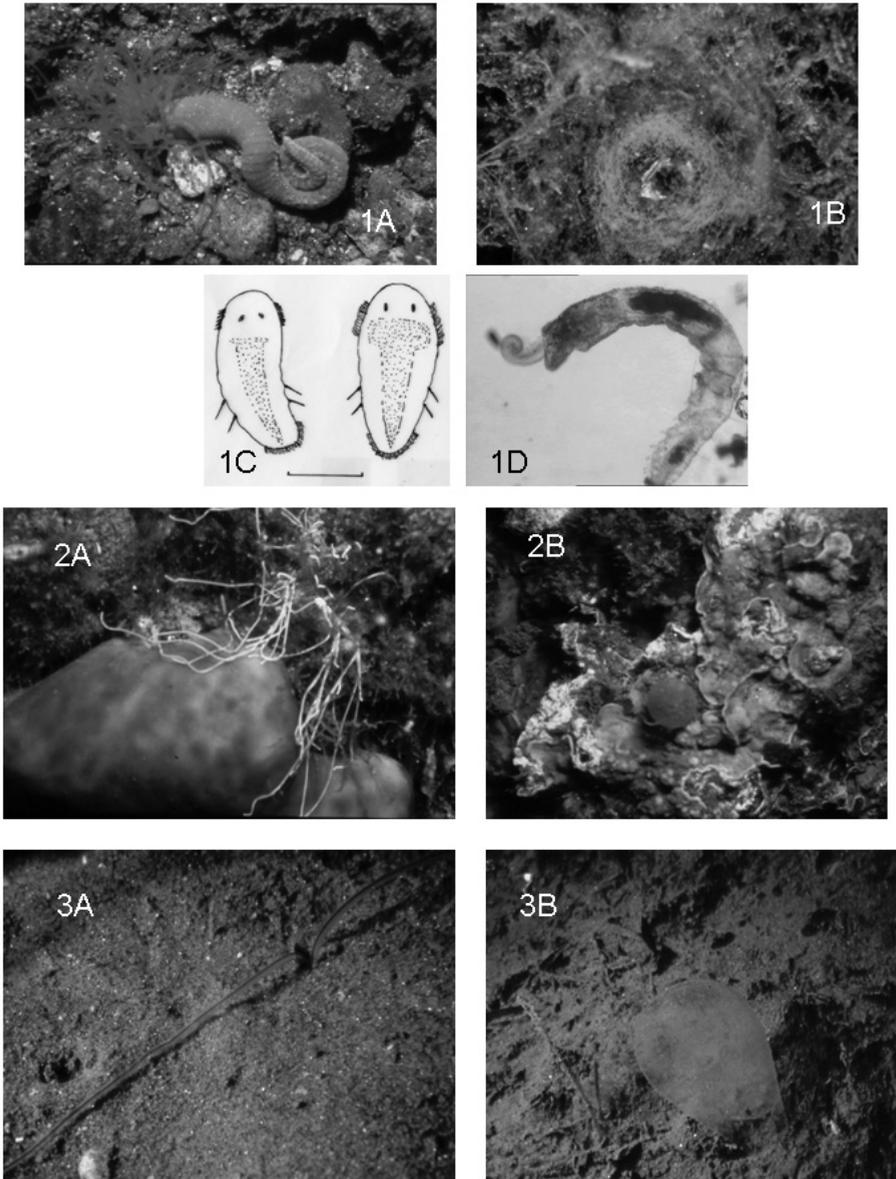
Batches of eggs from three species of sedentary polychaetes were studied: *Eupolymnia nebulosa* (Montagu, 1818); *Polycirrus* sp. and Spionidae gen. sp.

Eupolymnia nebulosa (fig. 1A) is a species that lives under rocks, easy to observe from lifting and replacing relatively large rocks in communities of calcareous algae and sea urchins and in communities of photophilic algae in calm areas (Sánchez-Tocino & Ocaña, 2003) in all the sampling

stations. This community is also found below or between small rocks which are densely covered with algae, although sighting them here is much more difficult. However, batches were observed in association with both rocks and algae masses. It is common to see batches from this species from December to April-May. The batch (fig. 1B) consists of a transparent ovoid gelatinous mass in which it is possible to see the distinct individual orange-coloured eggs. After a few days, the batch loses its consistency. The size of batches ($n = 10$) varies between 3.0-6.0 cm (4.3 ± 1.0 cm) wide and 3.0-7.0 cm (4.6 ± 1.4 cm) long. Observation of egg development in the laboratory showed that metatrochophores appeared at two weeks (fig. 1C) and the post-larval stage with proboscis at 3 weeks (fig. 1D). *E. nebulosa* appears to have a Type 1 development pattern since the eggs, which are small and numerous, can be seen individually in the transparent batch.

Polycirrus sp. (fig. 2A) is very common and abundant in vertical or slightly inclined rocky walls, forming part of the precolonigenous community (Sánchez-Tocino & Ocaña, 2003), in all of the sampling stations. The batch (fig. 2B) is observed associated with the mouth among the set of tentacles. It consists of a translucent gelatinous mass, glassy grey or even with green tones, with the form of a small lemon. The size of batches ($n = 10$) varies between 1.0-2.0 cm (1.4 ± 0.3 cm) wide and 1.5-2.4 cm (1.8 ± 0.3 cm) long. These batches were observed during the study period between the months of December and March. It was not possible to observe how many eggs this capsule contained transparently and it was not possible to follow the development of the eggs in the laboratory.

Spionidae gen. sp. (fig. 3A) is found in communities of fine infralittoral sand (Sánchez-Tocino & Ocaña, 2003), in all of the sampling stations. The batch (fig. 3B) was only observed at the Piedra del Hombre sampling station at 10 m depth, coinciding with the full moon, in June, 2003. In this sampling station and at this depth the sediment was covered with hundreds of batches. The batch consists of a mucous mass coming out of the mouth of the tube, translucent foggy white in colour and somewhat ovoid. The size of batches ($n = 10$) varies between 4.0-5.3 cm (4.7 ± 0.4 cm) wide and 5.7-7.3 cm (6.5 ± 0.5 cm) long. It was not possible to observe how many eggs this capsule contained transparently and it was not possible to follow the development of the eggs in the laboratory.



Figures 1-3.—1A: Photograph of an individual of *E. nebulosa*; 1B: batch of *E. nebulosa*. 1C: two metatrochophores of *E. nebulosa* at two weeks; 1D: a post-larval stage with proboscis of *E. nebulosa* at 3 weeks. 2A: photograph of an individual of *Polycirrus* sp. 2B: batch of *Polycirrus* sp. 3A: photograph of an individual of Spionidae gen. sp. 3B: batch of Spionidae gen. sp.

Figuras 1-3.—1A: Fotografía de un individuo de *E. nebulosa*; 1B: puesta de *E. nebulosa*. 1C: dos metatrocóforos de *E. nebulosa* a las dos semanas; 1D: un estadio post-larval con probóscide de *E. nebulosa* a las tres semanas. 2A: fotografía de un individuo de *Polycirrus* sp. 2B: puesta de *Polycirrus* sp. 3A: fotografía de un individuo de Spionidae gen. sp. 3B: puesta de Spionidae gen. sp.

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