

# OVARIES DEVELOPMENT OF PARAPENAEUS LONGIROSTRIS (CRUSTACEA: PENAEIDAE) IN THE SARDINIAN WATERS

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## Abstract

In this paper, we report a description of female maturity stages of the deep-water rose shrimp *Parapenaeus longirostris* caught in the Sardinian waters between 250 and 440 m. Macroscopic and histological analysis were performed on 665 females. The observation on the ovaries leads to conclude that there are six stages of development.

*Keywords: Decapoda, Reproduction, Western Mediterranean*

## Introduction

The deep-water rose shrimp *Parapenaeus longirostris* (Lucas, 1846) is one of the most important commercial shrimps in many Mediterranean and Atlantic fisheries [1,2,3,4]. The aim of this paper is to identify and classify the maturity stages of females based on macroscopic and microscopic features of the ovaries.

## Materials and Methods

Observations on the reproduction were made through monthly samples collected by commercial trawlers on epi-bathyal bottoms off Sardinian waters (central western Mediterranean Sea) between 250 and 440 m of depth. A total of 665 females were examined. Parameters recorded included carapace length (CL, mm) and sex; moreover, on the basis of size, shape and colour of gonads, the female maturity stages were defined. The ovarian tissues, preserved in saline formol 5%, were processed. Transverse sections (3.5 µm) were stained with sodium iodoeosine and toluidine blue (Dominici's method) [5].

## Results and Discussion

The specimens showed a range in size between 17.3 and 39.8 mm CL. Macroscopic and microscopic examination of the ovaries revealed six maturity stages:

Stage 1A (immature, virgin): typical of young immature specimens (17.3-18.1 mm CL). Thin and translucent ovaries with a tubular appearance and adherent to the dorsal portion of the digestive gland. A large number of oogonia, found grouped in the germinal zone, start to divide and can be observed at all stages of maturation. The primary oocytes (PO) with a large nucleus are visible.

Stage 2A (developing) / 2B (recovering): whitish or pale yellow ovaries, larger in volume than the previous stage ones. The paragastric lobes start to cover the sides, while the caudal extensions occupy all abdominal somites. These two stages differ only for the body size (2A: 20-24.1 mm CL; 2B: 25-38 mm CL). Microscopically, in the maturative zone, PO, surrounded by a monolayer of follicle cells, show a large nucleus with nucleoli flattened around the periphery.

Stage 2C (maturing): dark yellow-light green ovaries. Frontal lobes and caudal extensions are turgid and well defined (20.3-38 mm CL). From the histological analysis, besides all the previous cell types, primary (Y1) and secondary (Y2) vitellogenic oocytes were also visible. The first ones had a polyhedral shape with a nucleus containing several round nucleoli and the cytoplasm field with yolk granules and lipidic vesicles;

Stage 2D (mature): turgid ovary of different shades of dark green, completely developed occupy the entire thoracic cavity. The eggs are well visible (20.3-39.8 mm CL). All previous microscopic cells type are present. The nucleus of Y2 oocytes migrate to the peripheral zone and the ready-to-spawn oocytes show a characteristic margin of peripheral "rod-like bodies" [6].

Stage 2E (spent): green-brown ovaries that lose the characteristic turgidity of the previous stage and become flaccid (25.9-37.1 mm CL). Empty ovarian tissue and characterized by oocytes in reabsorption. The fully mature oocytes were still visible. The maturation process of *P. longirostris* ovaries exhibited progressive changes in color and volume from immature stages to mature ones. The gonad extends through the abdominal cavity since the first stage of the development.

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