

Morphological and histochemical examination of male and female gonads in *Homarus gammarus* (L. 1758)

Research Article

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Abstract: The reproductive organs of both male and female European lobsters (*Homarus gammarus*) are H-shaped gonads that lie dorsal to the gut on the large hepatopancreas. The ovary consists of a pair of tubular, parallel lobules with a connecting bridge. The germarium of the ovary containing oogonia is concentrated in the center of the ovarian lobe. As oogenesis proceeds, the oocytes move to the peripheral regions of the ovary. The follicle cells begin to surround the oocytes in the previtellogenic stage, and the mature oocytes are completely surrounded by the follicle cells. Carbohydrates exist in both early and late vitellogenic oocytes that give PAS positive reaction. However, their rising protein content in late vitellogenic oocytes makes them stain with Bromophenol blue. Testes show convoluted lobules with a germinal epithelium and a central collecting duct, and the paired vasa deferentia have three distinct parts. Spermatophores are nonpedunculate and tubular, which extrude as a continuous column and consist of a sperm mass covered with primary and secondary layers. The primary layer stains with Bromophenol Blue and gives a PAS positive reaction. But the secondary layer only weakly stains with Bromophenol Blue. The histochemical results may indicate that the function of the two layers is different.

Keywords: *Homaridae* • *Reproductive biology* • *Ovary* • *Testis*

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1. Introduction

The European lobster (*Homarus gammarus*) has a geographical distribution that starts from the Lofoten islands of North Norway and the south-west coast of Sweden and Denmark in the north (except the Baltic Sea), south through the coasts of Britain and Ireland, ending in the south at the Atlantic coast of Morocco. This species also is widely distributed throughout the Mediterranean Sea, among the Mediterranean islands and east to the point where the Dardanelles meet the Aegean Sea [1,2]. *H. gammarus* is an endangered species in Helgoland [3] and has high commercial value as food [3,4]. Overfishing, habitat destruction, increasing sea temperatures and increased industrial pollution cause difficulties for the reproduction of *H. gammarus* and its natural stocks are harmed accordingly [5]. For these reasons, like other important sea products, the management of *H. gammarus* has become vitally important [6,7]. Published studies on reproduction of *H. gammarus* are very limited, but are

important to protecting natural stocks and to solving problems regarding their reproduction. Hence, basic studies on the structure of gonads and reproduction of this species need to be performed, to increase this body of knowledge.

Various studies have investigated reproduction in *H. gammarus*. These include: growth, reproduction, movement and abundance of the European lobster, *H. gammarus*, at the rocky island of Helgoland, North Sea [8], improvement of rearing conditions for juvenile lobsters by co-culturing with juvenile isopods (*Idotea emarginata*) [3], growth, reproductive cycle, and movement of berried European lobsters in a local stock off southwestern Norway [9], reproduction in the European Lobster [10], studies on the developmental conditions of the European lobster [8], and variation on size at onset of egg production [11]. However, basic studies concerning the male and female reproductive system, gonad structure and histochemistry are missing.

The aim of this study is to describe the female and male reproductive system of *H. gammarus* in detail,

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