

# Biological Study To Determine The Breeding Season of Mediterranean Lobsters *Scyllarides Latus* (Latreille, 1803)

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## Abstract:

In this research, a Biological study determined the breeding season of Mediterranean lobsters *Scyllarides latus* (latreille, 1803). This species was chosen due to its presence on the Syrian coast within the natural marine environment and its economic importance as it is one of the most expensive marine species in the region. Individuals were collected from the coast of Latakia in the Ibn Hani area. The water temperature values ranged between (18.2 - 29.3 C), and the highest value was recorded in August / 2019, while the lowest value was recorded in February / 2019. The salinity percentage in the region's waters ranged between (36.5 - 38.6 g / l), and the highest value was recorded in August / 2019 and the lowest value in February / 2019. The stages of ovarian development are divided into six stages. The GSI values ranged between (0.1447 - 0.2742), the highest value was recorded in August, and the lowest value was in December.

**Keywords:** *Scyllarides latus*, GSI, ovarian development.

## I. Introduction

The species *Scyllarides latus* is a very important species found in the Mediterranean and the eastern Atlantic Ocean. It is an edible species with a high nutritional value[1].

It is one of the world's rare species [2] due to its exposure to depletion by overfishing[3]. So, it is a declared species in need of protection in the western Mediterranean [4]. Its abundance has decreased dramatically [5], especially against Italy's coast (the Azores island), and this decline may not be reversible. Therefore, this species was selected for study and culture experiments due to its high nutritional value and the possibility of breeding it within large densities as it has great resistance to diseases. But the biggest problem inbreeding is the extent of the larval period compared to other species. This species and other species of crustaceans (Decapoda: Reptantia) are considered a threat with extinction in recent years in several regions, so many Mediterranean countries seek to develop a global strategy that should be applied to protect the stocks of these species at sustainable levels.

It should be concentrated on habitats characterized by rock formations, caves, and pits because these habitats are preferred by the Mediterranean lobster [6].

A global decline of its existing was recorded, and more research should be done to determine whether the reason for this decrease was the lack of abundance or simply the high fishing effort. In the last few years, many advanced technologies and methods used in spawning several important economic species have been developed [7].

The cultivation of this species is useful in enriching nature with larvae and enhancing its presence in the marine environment, as well as creating synthetic benthic substances suitable for the growth of this species to protect it from predators and to provide suitable benthic substances for it when it was released into the natural marine environment. The species has been described and determined by its year-round distribution in the US marine environment [8]. The carapace is large, rectangular in shape, its length is approximately equal to its width, and is covered with large protrusions. The antennae are modified to become like paddles.

It often lives in groups of 2-3 individuals in low water depth (15- 30 m) when the temperatures are about 15-16 ° C. When the temperature increases to 26-27°C, they migrate to other water depths, more than 40 m. At the Azores island, females have been found laying their eggs between July and August and molting in deep waters during the period extending between December and February [8]. Several studies indicated this species' existence on the Syrian coast [9],[10].In this research, we conduct a biological study of the species *Scyllarides latus* (Scyllaridae). It has been selected as an economically important species due to its high nutritional value and the demand for its consumption locally and internationally. It is also one of the species that tolerates changes in environmental factors and is available in Syrian waters.

This research's scientific importance is evidenced by the fact that the first biological study of the species *Scyllarides latus* on the Syrian coast.

## II. Materials and Methods

The individuals of the species *Scyllarides latus* were collected from the marine waters of the Latakia coast. They were selected due to the availability of appropriate conditions for the studied species' growth and reproduction in terms of the benthic substance and the depth between 40 – 90 m (Figure 1).





**Fig. 1: Study area (Latakia coast)**

64 samples were collected (members of the species) during the period from January 2019 to December 2019, at a rate of once per month. The sea trips were carried out by a fishing boat using gill nets with a length of 100 m and a height of 1 m, and a mesh diameter of 20 mm (which is the smallest diameter of openings allowed for use in this type of nets).

The nets were placed in the evening at depths ranging between 20-70 m and more than five hours. Then the net was drafted in the early morning between the hours of five and seven AM. A sandy bottom characterized the collecting area. The studied species members are nocturnal, as they fixed themselves on the rocks from the underside and in the caves during the day as a mechanism to hide from predators. The sampling coincided with measuring some of the hydrological factors of the marine medium's surface waters (water temperature and salinity, by WTW Multi 340 i / Set). The depth was determined using a Fishfinder 400c sonar. The sex of the individuals was determined morphologically depending on the difference in the location of genital openings.

### III. Results and Discussion

(Table 1) and show the monthly changes of both the surface water temperature and the salinity percentage in the study area.

The water temperature values ranged (18.2 - 29.3 C), and the highest value was recorded in August / 2019, while the lowest value was recorded in February / 2019 (Figure 2). The observed temperature changes are normal and correspond to monthly and seasonal climate changes.

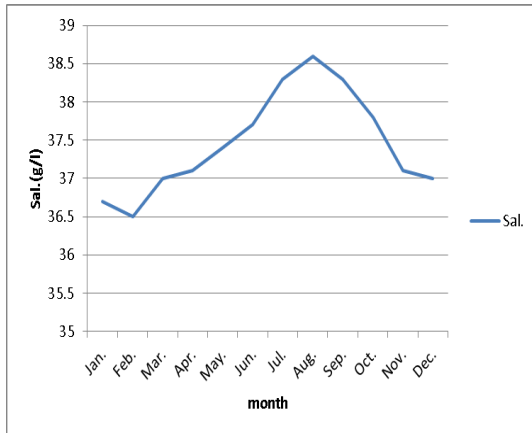
The salinity percentage in the region's waters ranged between (36.5 - 38.6 g / l), and the highest value was recorded in August / 2019 and the lowest value in February / 2019. According to the different seasons, these differences occur due to changing temperatures and the occurrence of rainfalls, and the difference in evaporation rates (figure 3). In a study related to the research, periods of reproduction were determined to determine the suitable medium conditions for spawning from temperatures and salinity, which we must apply to our experiment.

Samples were distinguished morphologically into males and females depending on the difference in the location of the genital openings. In males, these openings were found at the base of the fifth pair of walking legs, while they were found at the base of the third pair of walking legs in females, in addition to the transformation of the end of the legs from the fifth pair into hooks that are used when the female was laying eggs.

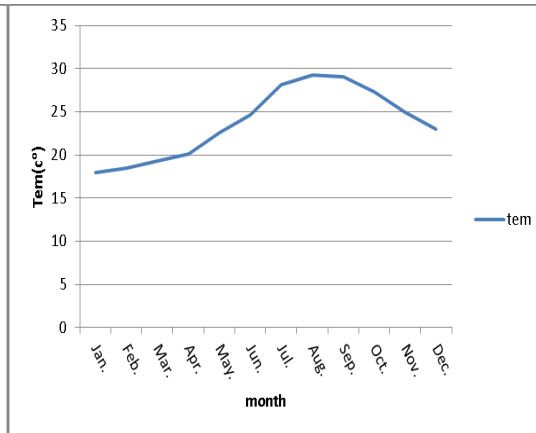
**Table (1): The monthly changes in water temperature (Tem.), And salinity ratio (Sal.) Within a year**

Date	Tem.C°	Sal. (g/l)
Jan./2019	18	36.7
Feb./2019	18.5	36.5
Mar./2019	19.3	37.0
Apr./2019	20.1	37.1
May/2019	22.6	37.4
Jun./2019	24.6	37.7
July/2019	28.1	38.3

Aug./2019	29.3	38.6
Sep./2019	29.1	38.3
Oct./2019	27.3	37.8
Nov./2019	25.0	37.1
Dec./2019	23.0	37.0



**Fig. 2: The temperature percentage**



**Fig. 3: The salinity percentage**

The stages of ovarian development:

(The ovary is immature): the ovary is filamentous and hyaline (a).

(Pre-maturity ovary): The ovary is slightly enlarged and elongated and is hyaline white (b).

(The ovary is at the beginning of maturity): the ovary continues to enlarge and becomes yellowish-orange in color; at this stage, it is possible to notice the eggs within the ovarian tissue (c).

(The ovary is mature): the ovary becomes larger and occupies a larger area of the body and becomes a dark orange color, and we notice that it is filled with eggs (d).

(Ovary upon spawning): the ovary is orange with white spots as a result of spawning. At this stage, the ovarian size decrease (e).

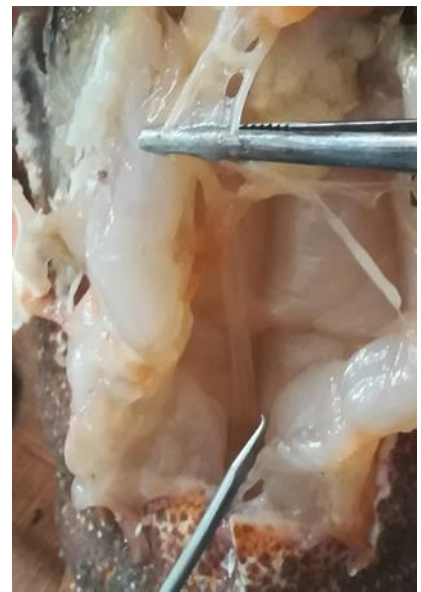
(Post-spawning ovaries): The ovaries are flabby, bright orange, or creamy white (f) (Figure4).



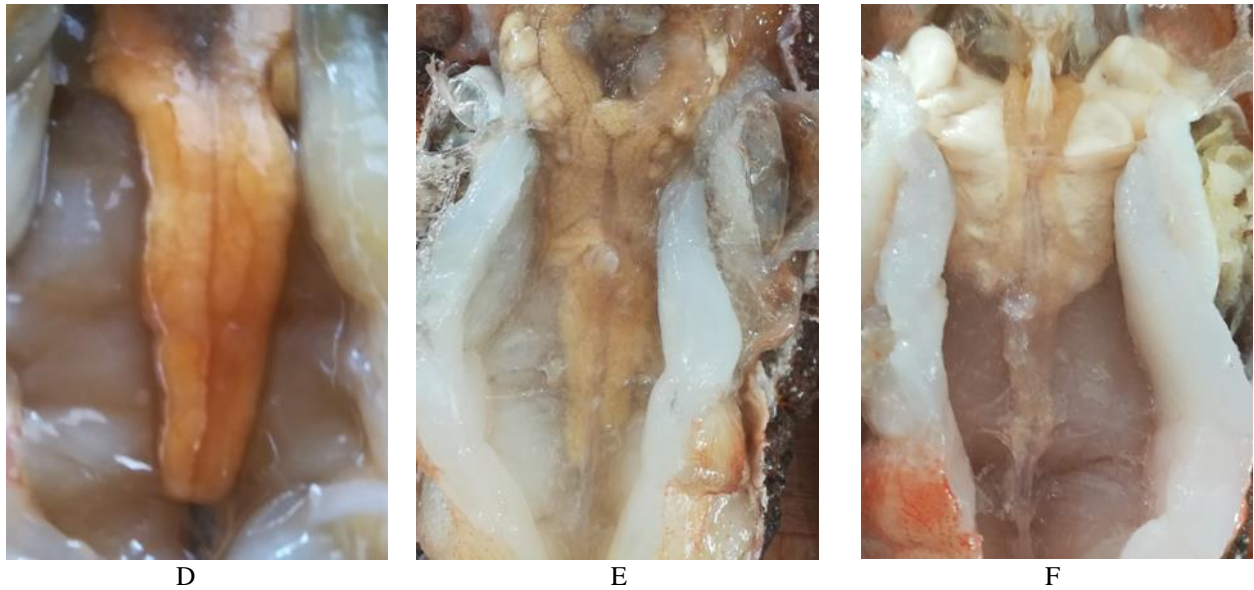
C



B



A



**Fig. 4: The stages of ovarian development**

**Gonadosomatic Index (GSI):**

The values of the coefficient of sexual maturity were determined for all the females collected during the study period, and (figure 5) shows the monthly average values for it. The values ranged between (0.1447 - 0.2742). The highest value was recorded in August, where the temperature was 29.3°C, the salinity was 38.6 g/l, and the lowest value was in December when the temperature was 23°C, the salinity was 37 g/l.

The GSI values started to rise from May (0.1301) at 22.6 °C and salinity 37.4 g/l until they peaked in August and reached (0.2742) at 29.3 °C and salinity. 38.6 g/l, and it gradually decreased until December, reaching (0.1447) at 23 °C and salinity 37 g/l.

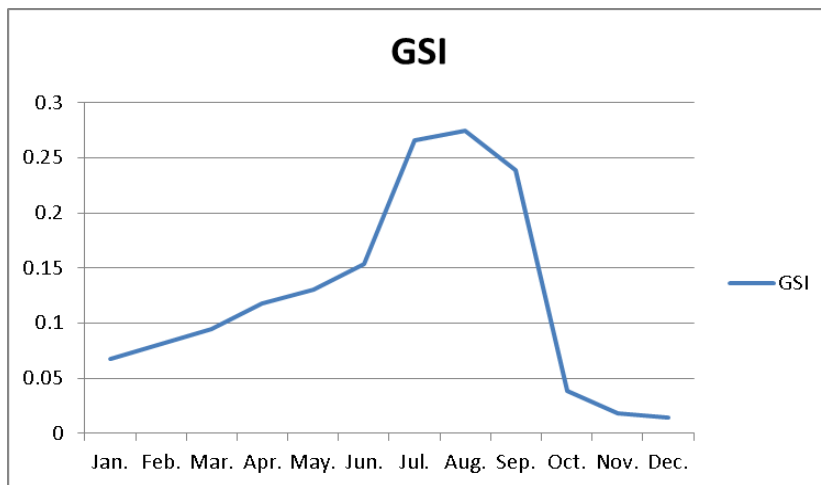
We conclude from the foregoing that there is one peak indicating the reproduction process in the summer months of the *Scyllarides latus* (August), as the high temperature and the increase in lighting hours encourage the lobsters to

ripen and shed eggs before migrating deeper to the low-temperature area.

**Molting:**

Individuals molting when temperatures decrease and the individuals' size increase; therefore, they exchange the exoskeleton to accommodate the increase in body size. When molting begins, the old exoskeleton is broken in the dorsal region, which separates the head thoracic region and the abdomen. Then the animal withdraws from it with its new body. Moulting happens to adult individuals once a year. Most specimens of lobster moult between December and February when temperature decreases.

One of the individuals had moulting in the breeding tank in February (figure 6). Moulting began with the occurrence of softness in the exoskeleton about 15 days before the moulting happened, and the new exoskeleton took about 3 weeks to be solid, and it became bolder. We noticed the exuvia did not move and stay in their places in the breeding tank during this period.



**Fig. 5: The GSI values**



**Fig. 6: The moulting signs**

### Conclusion

We conclude through experience and the accompanying field study data that:

\* The water temperature values ranged between (18.2 - 29.3 C), and the highest value was recorded in August / 2019, while the lowest value was recorded in February / 2019;\* The salinity percentage in the waters of the region ranged between (36.5 - 38.6 g / l), and the highest value was recorded in August / 2019, and the lowest value in February / 2019.

\*The stages of ovarian development were divided into six stages. The GSI values ranged between (0.1447 - 0.2742), the highest value was recorded in August, and the lowest value was in December.

\* The most suitable periods for obtaining spawning parents for farms from nature are during July and August

\* We recommend rationalizing the hunting of Mediterranean lobsters and preventing them during breeding periods in which there is a high presence of mature females to allow them to lay eggs.

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