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Morphometric aspects of *Scyllarides latus*

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Abstract

The slipper lobster, Scyllarides latus (Latreille, 1803), is the only representative species of the genus Scyllarides in the Mediterranean Sea. In this study, we examined some biological aspects of this species sampled in the Straits of Messina. The specimens were sexed, measured and weighed. The relationships between body measurements (length and width of the carapace, antennal length) and length-weight relationship were calculated. Furthermore, the correlation matrix (Pearson's coefficient) was calculated. Two hundred specimens were collected, ranging in size from 81 to 305 mm in total length, and between 21 and 1490 g in weight. A rare juvenile of 39 mm CL was recorded. A sex ratio of 1:1 was found. The carapace length – weight relationship was almost isometric. The wide size range sampled and the presence of a juvenile, indicate an interesting habitat for studying the presence and growth of Scyllarides latus in the Straits of Messina.

Keywords: Straits of Messina; Slipper lobster; Mediterranean Sea.

Introduction

The Slipper lobster, *Scyllarides latus* (Latreille, 1803) lives in the Mediterranean Sea (Fisher, 1973), as well as along the Canaria (GONZALES PÉREZ, 1995) and Atlantic coasts (HOLTHUIS, 1991), up to the Azores (MARTINS, 1985) in a depth range from a few meters down to about 300-400 m. In many areas, this resource, as well as other large crustaceans (Decapoda: Reptantia), has become scarce during the last years; catching of slipper lobsters, once quite common, has now become occasional and the species is represented only by juvenile specimens. Moreover, this species has completely disappeared from some localities. This decline is probably due to different reasons: the commercial importance that increased fishing pressure (bottom-trawling, scuba-diving), the human modification of the coastal habitats and the lack of recruitment (SPANIER, 1991; BANNISTER, 1993). Despite its importance, the knowledge of the ecology of S. *latus* is limited (MARTINS, 1985; SPANIER *et al.*, 1988).

In the last years, the slipper lobster's behaviour was carefully observed in artificial habitats (SPANIER & ALMOG-SHTAYER, 1992; BARSHAW & SPANIER, 1994). The study of its feeding behaviour showed that *S. latus* feeds on the bivalve *Mytilus galloprovincialis* (Lamark), the gastropods *Haliotis lamellosa* (Lamark), and *Patella caerulea* (Linnaeus) (SPANIER *et al.*, 1993).

The aim of this study is to evaluate the presence and availability of this resource in the Straits of Messina, through the analysis of various morphometrical data and the valuation of some biological aspects.

Materials and Methods

Description of sites studied

The Straits of Messina (Fig. 1) have a funnel-shaped geographical conformation, with the wide part facing south towards the Ionian Sea and the narrow part in the north-west, towards the Tyrrhenian Sea. The underwater profile follows a sharp decrease in

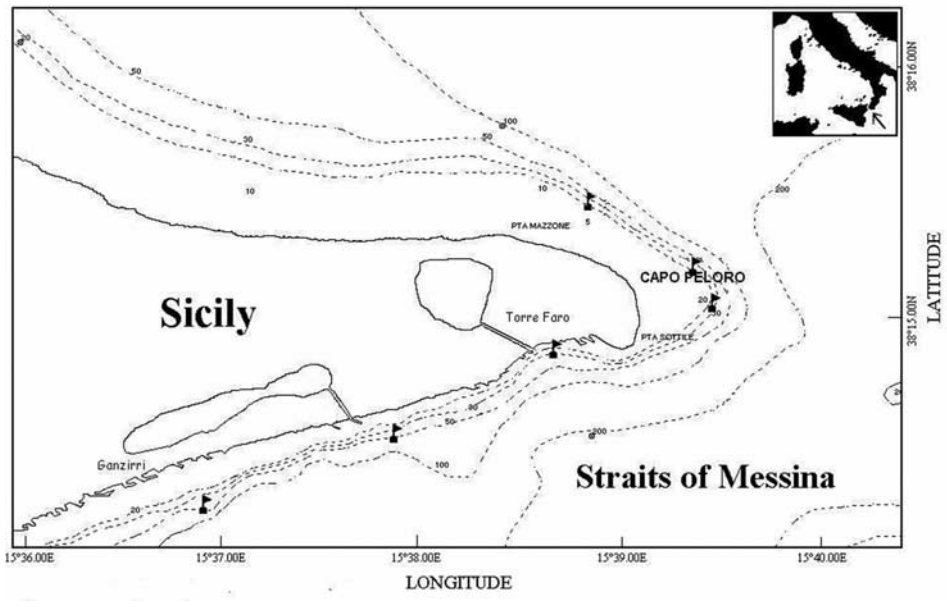

Fig. 1: *Sampling area (Straits of Messina).*

depth from south to north, from about 1,500 m to a minimum of about 72 m along the Ganzirri-Punta Pezzo. This conformation, in addition to the different physicochemical characteristics (DE DOMENICO, 1987), causes intense hydrodynamic movements. In these waters, there is a fair presence of *Scyllarides latus* that finds a favourable habitat for its settlement. Indeed, the bottom of this area, which is characterized by a mixture of sand and rock and is full of ravines and steep walls, represents a perfect habitat for the slipper lobster.

Sampling and data analysis

The specimens were collected by divers and fishermen at depths between 15 and 60 m from March to July 2000. The jagged coastline, mixed with coralligenous biocoenosis was the principal catching site, where the slipper lobster is feeding. The specimens were weighed to the nearest g and measured to the nearest mm. They were kept in oxygenated tanks and released by the scuba divers after measuring and weighing. For each specimen, the following biometrical measurements were taken: total length (TL), carapace length (CL), carapace width (CW) and antennal length (AL). Their sex was determined macroscopically, by inspecting the position of the sexual orifices and the conformation of the tip of the pereiopod: the position of the sexual orifices is on the fifth pereiopod in males, instead of on the third in females, and the fifth periopod has a sub-chelate shape. Sex ratio was calculated as F/M. The carapace length frequency distribution, at 1-cm intervals, was studied. Mean and standard deviation of each morphological parameter were computed. The Student's t-test was used to test the significance of the morphometric parameters. The carapace length-weight relationship was calculated for each sex by the exponential function: $W = a\,CL^b$. Correlations between different body measurements, such as length and width of carapace and antennal length, were calculated by Pearson's coefficient, in males and females; this correlations has been also tested by the Student's t-test.

Results and Discussion

Two hundred specimens were collected, 105 females and 95 males. The size (TL) ranged from 154 to 305 mm (mean 221 ± 39.3 SD) and from 81 to 290 mm (mean 219 ± 31.0 SD) for females and males, respectively. Regarding the total weight, the values ranged from 238.0 to 1490.0 g (mean 576.0 ± 226.50 SD) for females and, from 21.33 to 975.0 g (mean 560.0 ± 186.12 SD) for males. Although similar, the Student's t-test indicated that the mean values of the morphometric parameters significantly differed between the two sexes (TL: $t = 2.91$, $p < 0.01$; CL: $t = 6.48$, $p < 0.01$; AL: $t = 10.2$, $p < 0.01$; CW: $t = 8.1$, $p < 0.01$). Miminum, maximum, mean and standard deviation values of these morphometric parameters for both males and females are shown in Table 1. The size frequency distribution (CL) showed a unimodal trend for

Table 1
Minimum, maximum, mean and SD of the morphometric and weight values for females and males of Scyllarides latus.

	Females				Males			
	min	max	mean	SD	min	max	Mean	SD
Weight (g)	238.0	1490.0	576.0	226.50	21.33	975.0	560.0	186.12
Carapace length (mm)	85	152	111	12.6	39	137	109	13.1
Carapace width (mm)	69	125	89	12.6	32	106	87	13.1
Total length (mm)	154	305	221	39.3	81	290	219	31.0
Antennal length (mm)	35	75	58	10.7	20	69	60	8.4

both sexes with a prominent mode at 110 mm for males and 100 mm for females, (whereas total length has a mode of 220 and 200 mm in males and females, respectively) (Fig. 2). A male of *S. latus* of 39 mm CL (21.33 g) was recorded, but it was not considered for the length-weight analysis and the Pearson's coefficient correlation because it was the only specimen of this small size. Morphometric parameters of that juvenile are reported in Table 1 as minimum values sampled. The smallest specimen was caught by trammel net, at a depth of 40 m between Torre Faro and Ganzirri, in a horizontally orientated shelter, during the night. The largest specimen, a female of 1,490 g, with a total length of 152 mm, was caught by a scuba diver in the same area, at a depth of 60 m. The ratio between males and females was almost balanced (1:1). In 28 cases, females with eggs were observed; in five cases, females carried eggs and spermatophores simultaneously. The carapace length-weight relationship was almost isometric in both sexes: females b = 2.98, males b = 2.93 (see Fig. 3). These values were very similar to those found in the Strait of Sicily (BIANCHINI *et al.*, 2001). On the contrary, the total length–weight relationship was allometric for males (b = 1.78) and isometric for females (b = 2.81). Pearson's coefficient showed significant correlations only for parameters referred to females, in accordance with data reported in the literature (BIANCHINI *et al.*, 1998). In particular, a statistically significant correlation was observed for females, both between carapace length and antennal length, where the coefficient of correlation was $r = 0.877$, ($n = 105$, $p < 0.005$) and between antennal length and carapace width ($r = 0.833$, $n = 105$, $p < 0.005$). The highest value was found in the correlation between carapace length and carapace width ($r = 0.980$, $p < 0.005$). Only in this last case a significant correlation was obtained also for males ($r = 0.733$, $n = 94$, $p < 0.005$).

From the analysis of the results, it can be shown that the high value of standard deviation, related to the mean weight, was

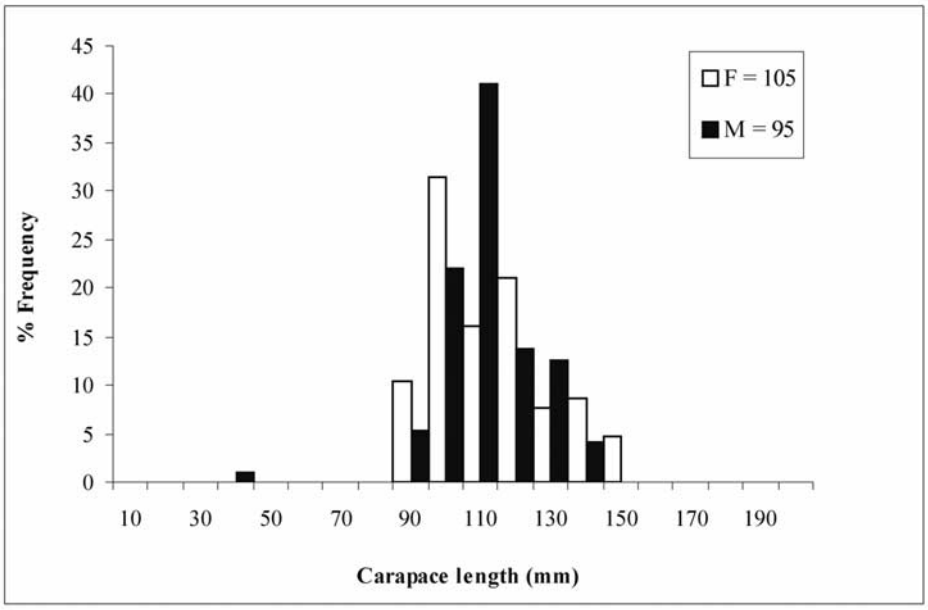

Fig. 2: *Length frequency distribution (carapace length in mm) for males and females of Scyllarides latus sampled in the Straits of Messina.*

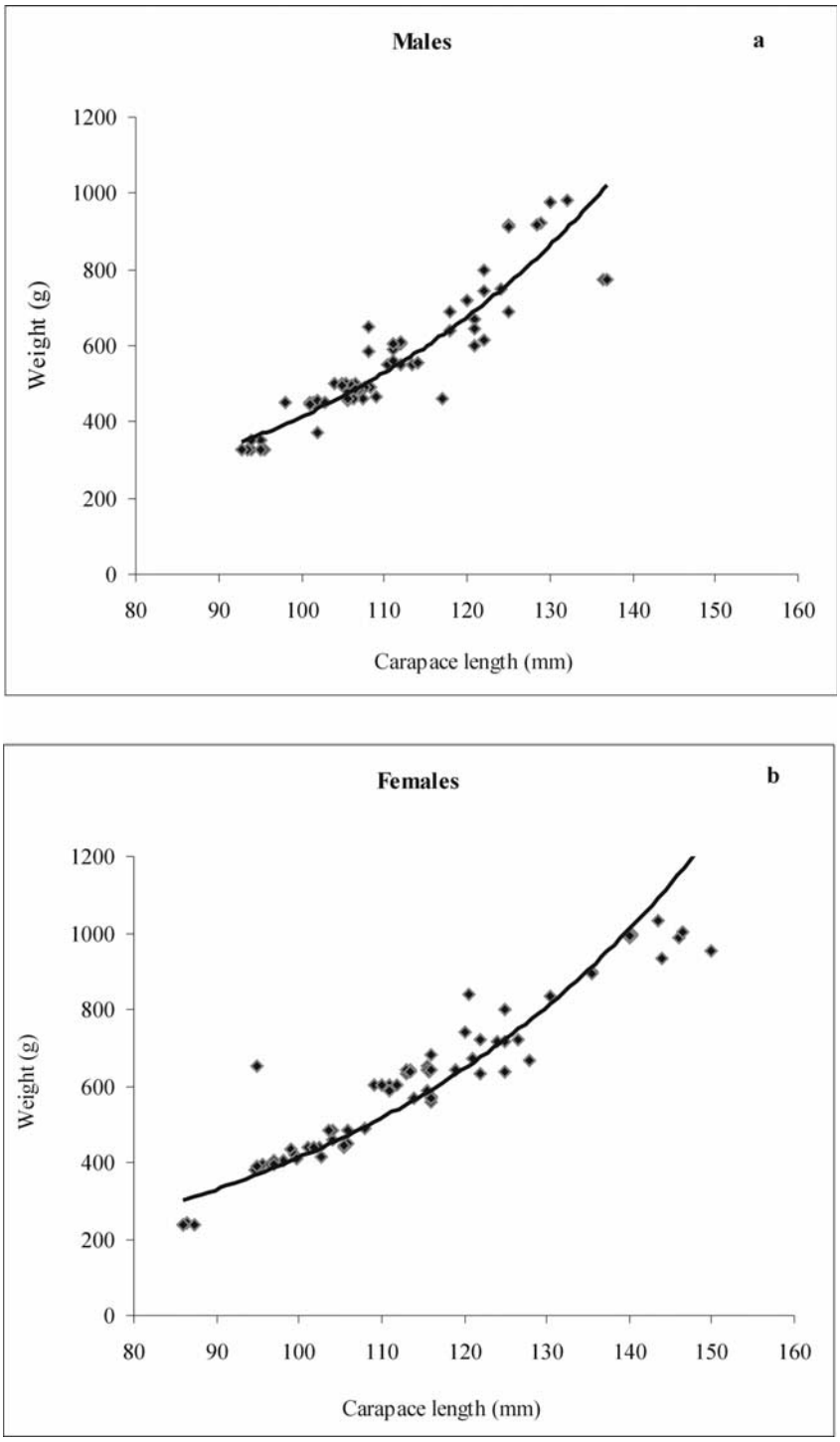

Fig. 3: *Length-weight relationship (mm, g) for males (a) and females (b) of Scyllarides latus.*

determined by the presence of some larger specimens that have a different weight from the mean weight range included between 300 and 600 g. In the South-eastern Mediterranean, ALMOG-SHTAYER (1988) reported a maximum weight of 987 g. The larger specimens in the present study can be considered as the first record for *Scyllarides latus*, sampled in the Central Mediterranean Sea. The largest specimen caught by BIANCHINI *et al.* (1996) in the South-eastern Mediterranean was smaller than that of the present study. The collection of the juvenile of a very small size is interesting for a species that is seldom caught below 200 g and never under 100 g (BIANCHINI *et al.*, 1996). The only record already reported was a male of 34.3 mm, deposited in the Museum of Zoology of the University of Florence, collected by a scientific trawl in Italian waters at a depth of 400 m (SPANIER & LAVALLI, 1998). The two specimens collected so far, represent an interesting finding for this area, because they provide evidence for the identification of a peculiar habitat for the conservation of the species. The slow growth rate and the excessive exploitation in the past made this crustacean a vulnerable resource. Today, the slipper lobster belongs to the protected species and is included in the Bern Convention (1998) and the ASPIM protocol (Protected Areas of Mediterranean Importance) that prohibit its catching and regulate its exploitation. The deep waters of the Straits, where the species spends the longest period of its life (SPANIER, 1988), together with the hydrodynamic characteristics and the harsh depths (MOSETTI, 1995), become factors of natural protection of *S. latus*.

As a matter of fact, this species becomes not very accessible both to fishing devices (trammel net, bottom trawl) and to scuba divers. In other areas of the Mediterranean Sea, such as western Sicily–Linosa Island (BIANCHINI *et al.*, 2001) and the Eolian Islands (Consorzio Mediterraneo, 2001) some restocking attempts have been successfully realized. Although we consider this study as a preliminary research in the Straits of Messina and restricted to a short sampling period, according to the data emerged (among which a sex-ratio of 1:1, a wide size range and the presence of a juvenile), we could suggest that the Straits of Messina may represent an ideal habitat for a 'natural restocking' of this crustacean of considerable commercial interest.

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