ABSTRACT

The blackmouth catshark \textit{Galeus melastomus} (Rafinesque, 1810) (Chondrichthyes Scyliorhinidae) is an accidentally caught species and it acts as a sentinel, by reflecting the state of the region’s fish stocks. Its vulnerability to the impact of fishing, along with the low fertility and late reproduction, do not ensure a good renewal. Data, collected during 13 months from November 2015 to November 2016, were analysed to enrich our knowledge on the population, reproductive biology, growth, and feeding strategy of the blackmouth catshark from the Western coast of Algeria. A total of 551 specimens, 360 males and 191 females, were caught. Their size ranged from 25 cm to 56 cm for both sexes. The length of the first sexual maturity was stunted at 54 cm in females. The asymptotic length was deduced from the von Bertalanffy growth equation to be higher for males than females (females: $L_\infty = 51.79$ cm; males $L_\infty = 52.14$ cm) and the study of the height-weight relationship revealed allometric growth. 551 stomachs were examined and the vacuity index was found to be 63.75%. The preys identified belonged primarily to three major groups: Crustaceans, Osteichthyes, and Cephalopods. Our results show that the feeding strategy of \textit{G. melastomus} is to be considered generalist and differs from one month to another.

KEY WORDS

\textit{Galeus melastomus}; Western Algerian coast; reproductive biology; growth; feeding.

INTRODUCTION

The Blackmouth catshark, \textit{Galeus melastomus} (Rafinesque, 1810) (Chondrichthyes Scyliorhinidae) is a small Elasmobranch distributed in the eastern Atlantic Ocean, from Norway to Senegal, and in the whole Mediterranean Sea (Compagno, 1984). Although its bathymetrical distribution is quite wide and ranges from 55 to 1,750 m of depth (Stefanescu et al., 1992; Relini et al., 1999), \textit{G. melastomus} prefers muddy bottoms from 200 to 500 m in depth (Fisher et al., 1987; Compagno, 1984). In the western basin, it lives between 400 and 1,400 m in depth (Moranta et al., 1998). \textit{Galeus melastomus} has a strong distribution, due to its morphological characteristics and quick adaptation to the environment, and is very abundant and frequent in the west coast of Algeria (Hemida, 2005). In the Mediterranean Sea the distribution, behaviour and biology of \textit{G. melastomus} have been studied, mainly in the central area including Tunisia (Capapé & Zaouali, 1976, 1977), Italy (Relini Orsi &
The hydrodynamic environment of the northern African coast is mainly conditioned by the strong influence of water interchange through the Strait of Gibraltar, a shallow and narrow channel 320 m deep and 14 km wide that connects the Mediterranean to the Atlantic Ocean. This strait allows low-density Atlantic waters to intrude into the Mediterranean as surface waters, while denser Mediterranean waters (high salinity waters resulting from low freshwater supply and high evaporation) travel at mid-depths into the Atlantic Ocean. The inflow of Atlantic water spreads along the Algerian coast, resulting in a general, anti-clockwise flow that forms the Almeria-Bouzedjar front, an anti-cyclonic gyre that joins the Iberian Peninsula to Algeria, and which also has small cyclonic gyres linked to it (Millot, 1999). The Atlantic waters flow into the Algerian sub-basin as the “Algerian current”, a relatively narrow and deep current, 30–50 km wide and 200–400 m deep at the coast, which becomes thinner (in depth) and wider (in horizontal extension) in an easterly direction (Benzohra & Millot, 1995). The instability of this current leads to the development of a series of coastal eddies, associated with a non-wind-induced upwelling. The Mediterranean deep waters also flow along the Algerian continental slope with a general anticlockwise circulation, and it is hypothesized that they induce intense currents in the whole deep layer and near the bottom (Millot et al., 1997) (Fig. 1).

MATERIAL AND METHODS

Study area

The hydrodynamic environment of the northern African coast is mainly conditioned by the strong influence of water interchange through the Strait of Gibraltar, a shallow and narrow channel 320 m deep and 14 km wide that connects the Mediterranean to the Atlantic Ocean. This strait allows low-density Atlantic waters to intrude into the Mediterranean as surface waters, while denser Mediterranean waters (high salinity waters resulting from low freshwater supply and high evaporation) travel at mid-depths into the Atlantic Ocean. The inflow of Atlantic water spreads along the Algerian coast, resulting in a general, anti-clockwise flow that forms the Almeria-Bouzedjar front, an anti-cyclonic gyre that joins the Iberian Peninsula to Algeria, and which also has small cyclonic gyres linked to it (Millot, 1999). The Atlantic waters flow into the Algerian sub-basin as the “Algerian current”, a relatively narrow and deep current, 30–50 km wide and 200–400 m deep at the coast, which becomes thinner (in depth) and wider (in horizontal extension) in an easterly direction (Benzohra & Millot, 1995). The instability of this current leads to the development of a series of coastal eddies, associated with a non-wind-induced upwelling. The Mediterranean deep waters also flow along the Algerian continental slope with a general anticlockwise circulation, and it is hypothesized that they induce intense currents in the whole deep layer and near the bottom (Millot et al., 1997) (Fig. 1).

Study of reproduction

A series of biological samples were conducted on specimens of *G. melanostomus* caught by the commercial trawlers in the sampling area of Oran and Arzew (Fig. 1) during the period from November 2015 to November 2016. Specimens were measured and weighted; sex and maturity were reported for the females that represent the object of our study. Three different stages of maturity have been defined, according to Mellinger (1989), Rodriguez-Cabello et al. (2007) and Capapé et al. (2008) (Table 1).

In reference to the work of Cabello-Rodriguez (2008) and Capapé et al. (2008), to specify the spawning period, we used the oviduco-somatic index (*OSI*) which is the seasonal evolution of the weight of the capsules (*CW*) compared to the total weight of the individual (*TW*) expressed as a percentage, defined by the relation:

\[
OSI = \left(\frac{CW}{TW}\right) \times 100
\]

To follow the evolution of egg-laying, the hepatosomatic index (*HSI*) was calculated using the following equation:

\[
HSI = \left(\frac{LW}{TW}\right) \times 100
\]

where *LW* is the liver’s weight and *TW* the total weight of the specimens. Variations in *OSI* and *HSI* related to sexual maturity stages were examined in
females, in order to know the morphological variations, the degree of overweight or fineness resulting from the genital development and the state of repletion of the target species.

Condition factor ($K_n$) (Le Cren, 1951) was studied in females in order to show differences related to time, according to the formula:

$$ K_n = \frac{W}{W_{th}} $$

where $W$ is the total weight, $W_{th}$ is the theoretical weight, $a$ and $b$ are the coefficients of the relative growth between weight and length and $L$ is the total length.

The size of first sexual maturity was described by Fontana et al. (1969) as the size for which 50% of individuals are mature. This size is determined from the abscissa corresponding to the ordinate 50% ($L_{50}$) of the logistic curve linking the percentage of mature females at size classes (Nelder 1961; Cardenas et al., 1997) corresponding to the expression:

$$ p_i = \frac{\exp (a+b \times L_{i})}{1 + \exp (a+b \times L_{i})} $$

where $p_i$ is the proportion of the mature females, $a$ and $b$ are the coefficients of the equation and $L_{i}$ is the total length.

The sex-ratio analysis was performed by studying the global sex-ratio, sex-ratio by length classes and sex-ratio by seasons using the STATISTICA Software logistic model (StatSoft Inc, 2001) and calculating the $\chi^2$ heterogeneity test with one degree of freedom, $p < 0.05$.

**Growth study**

The objective of this part of the study was to define several biological characteristics, such as the structure of the population size, and the growth and the age of *G. melastomus* in the study area.

There are several mathematical models to express the growth in Elasmobranchs. A detailed review was made by Beverton & Holt (1957), Ursin (1967), Gulland (1983), Sparre & Venema (1996), and Pauly & Moreau (1997). The most popular model is Von Bertalanffy growth equation:

$$ L_t = L_{\infty} [1-e^{-kt}] $$

where $L_t$ is the expected size at age $t$ and $L_{\infty}$ is the average maximum size.

In this study, the numerical method ELEFAN (Electronic Length Frequency Analysis; Pauly & Moreau, 1997) and the LFDA software (Kirkwood et al., 2001), for mathematical modeling, were used. Analyses were made for males and females, separately.

**Study of diet and feeding strategy**

This study, carried out during 13 months of sampling, allowed us to know the diet of *G. melastomus* in natural habitat, in addition to its feeding behavior and its trophic migrations, which could explain the influence that could exist on its reproduction (Stergiou & Kapouzi, 2002). This study also allowed to determine the different species that are a part of the same assemblage as the target species as well as the inter and intra specific relationships that can exist between them, for a better understanding of the structures and dynamics of marine stands (Silva, 1999).

**Stomach sampling and analysis**

551 stomachs were examined, of which 205 were full and 346 empty, the extracted stomachs were isolated, weighed and then placed in pill containers containing a 10% formalin solution, to (i) preserve stomachs samples while hardening the wall tissue of the stomachs and the prey’s tissues to facilitate observation; and (ii) interrupt the activity of the gastric digestion performed by the stomach acids still present in the stomachs after landing (Olaso et al., 2005; Cabello-Rodriguez, 2008; Taleb Bendiab, 2014). Generally speaking, the analysis of stomach content is based on two analyses, a qualitative one which makes it possible to draw up a list as complete as possible of the preys ingested, and a quantitative one to stress the relative importance of the different preys found in the overall composition of the food and to highlight the possible variations of the diet (Quinius, 1978). The vacuity index ($C_v$) was calculated according to the formula proposed by Hureau (1970):

$$ C_v = \frac{N_{ev}}{N} \times 100 $$

expressing the percentage of empty stomachs ($N_{ev}$) relative to the total number of stomachs studied ($N$).
Three indices of prey classification were calculated to provide a representative interpretation of the diet of *G. melastomus*:

1. Index of relative importance (*IRI*) (Pinkas & al., 1971), \( IRI = F + (Cn + Cp) \), where \( F \) = frequency of occurrence of the food item, \( Cn \) = percentage number of a prey species and \( Cp \) = percentage by weight of a prey species. According to the value of the \( IRI \), preys are classified as follows: Main prey \((200 < IRI < 20,000)\); Secondary prey \((20 < IRI < 200)\); Accidental prey \((IRI < 20)\).

2. Food index (*IA*) of Lauzanne (1975), \( IA = F \times Cp / 100 \), where \( F \) = frequency of occurrence of the food item; \( Cp \) = percentage by weight of the food item: based on its values it is possible to distinguish: Secondary prey \((IA \leq 10)\); Not negligible prey \((10 < IA \leq 25)\); Essential prey \((25 < IA \leq 50)\) and Dominant prey \((IA > 50)\).

3. The food coefficient (*Q*) (Hureau, 1970), \( Q = Cn \times Cp \), where \( Cn \) = percentage number of a prey species and \( Cp \) = percentage by weight of a prey species, According to the value of the \( Q \), preys are classified as follows: Preferential \((Q > 200)\); Accessory \((Q < 20)\).

**RESULTS**

**Reproductive aspects and maturity stage**

In order to specify the spawning period and to follow its evolution, we used three biological indexes, the oviduco-somatic index (*OSI*) specific to Elasmobranchs, the hepato-somatic index (*HSI*) and the condition index (*Kn*). These indices allowed us to evaluate the morphological changes of the specimens and to determine the breeding season by studying the evolution stages of ovarian maturity.

The monthly results of the macroscopic observations of the gonads and the maturity stage of *G. melastomus* females are shown in figure 2. Following the calculation of the monthly averages of the *OSI* and *HSI* from 191 females, we drew up a graph illustrated in figure 3. The peaks observed correspond to the annual spawning period of the population. The highest values of *OSI* were found in December, March, April and May, while the lowest values in February, June, August, September and October. The highest values of the *HSI* occurred in December, April and May, the lowest in January, February, March, June and July (Fig. 3). The evolution of the condition factor (*Kn*) as a function of months on *G. melastomus* females over a period of 13 months is illustrated in figure 4. The values of *Kn* above 1 reveal a breeding period all along the annual cycle with the lowest values confirming a maturation period in December, March, and May.

**Size at first maturity L50**

The size at first maturity (L50) was estimated as 54 cm. We found substantially the same values in the Mediterranean, with differences in other regions of the world. All data are combined in Table 4.

**Sex-ratio analysis**

After sexing 551 specimens, we obtained a total femininity rate of 35.09% for a total masculinity rate of 64.90% (Table 2). According to the \( \chi^2 \) significance test, we notice that males outnumber females. The length/abundance curve is shown in figure 5, and figure 6 shows the variation in percentage of males and females per month. The percentage of males is always dominant during all months.

**Growth Parameters results**

Table 4 includes the growth parameters \( L_\infty \) (asymptotic length), \( K \) (coefficient of growth), \( t_0 \) the theoretical age at which the size is zero, and \( \phi \) (growth index) calculated in this study. These values, once estimated for *G. melastomus* specimens, were then replaced in the equation of Von Bertalanffy; the parameters obtained from the equation did not differ significantly between the two sexes. We obtained a value of the asymptotic length \( L_\infty \), the growth coefficient \( K \) and the growth index \( \phi \), slightly different in favour of males (Table 5). The results of the height-weight relationship show a significantly lower allometry in both sexes, i.e., the weight does not grow faster than the cube of the length.

The adjusted values of \( a \) and \( b \) \((W = a L^b)\) were used as input data in the stock assessment models. The biometric relations observed by analysis of relative growth are shown in Table 6. These results are close to the results obtained by other authors in different study areas (Table 7).
After 13 months of sampling, from November 2015 to November 2016, with 346 empty stomachs and 205 full stomachs operated, we also determined ingested preys. For this period, the average \( C_v \) was 63.75%. Figure 7 represents the maximum values of the vacancy coefficient that were noted in August and October, summer and autumn, while the lowest values were recorded in May and December for males and females, respectively. This trophic activity could be related to the period of maturation and spawning. This nutritional need would provide sufficient energy for the development of the genitalia.

### Diet composition (qualitative analysis)

The diet of *G. melastomus* in the waters of the western Algerian coasts was rather varied and mainly based on the undigested hard parts or whole
Table 7. Relation length weight of *Galeus melastomus* according to different authors.

<table>
<thead>
<tr>
<th>Sex</th>
<th>length (Cm)</th>
<th>a</th>
<th>b</th>
<th>r²</th>
<th>Areas</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>9.5-60</td>
<td>0.0025</td>
<td>3.02</td>
<td>0.981</td>
<td>Portuguese coast Mediterranean</td>
<td>Mendes et al. (2004)</td>
</tr>
<tr>
<td>F</td>
<td>11.1-66.1</td>
<td>0.0017</td>
<td>3.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>13.5-50</td>
<td>0.078</td>
<td>3.019</td>
<td>0.981</td>
<td>Tyrrenian Sea Mediterranean</td>
<td>Rinelli et al. (2005)</td>
</tr>
<tr>
<td>F</td>
<td>14-50</td>
<td>0.084</td>
<td>2.960</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>9-19</td>
<td>0.002</td>
<td>3.052</td>
<td>0.981</td>
<td>Aegean Sea Sigacik gulf Mediterranean</td>
<td>Öztütemiz et al. (2007)</td>
</tr>
<tr>
<td>F</td>
<td>34-64</td>
<td>0.038</td>
<td>2.93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32-69</td>
<td>0.0024</td>
<td>3.06</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>25-55</td>
<td>0.0035</td>
<td>2.909</td>
<td>0.934</td>
<td>Rockall Trough Atlantic</td>
<td>Moore et al. (2012)</td>
</tr>
<tr>
<td>F</td>
<td>29-56</td>
<td>0.0085</td>
<td>2.809</td>
<td>0.938</td>
<td>Western algerian coasts</td>
<td>Present study</td>
</tr>
</tbody>
</table>

Table 8. Diversity of prey ingested by *Galeus melastomus*.

<table>
<thead>
<tr>
<th>phylum</th>
<th>class</th>
<th>subclass</th>
<th>superorder</th>
<th>order</th>
<th>family</th>
<th>genus</th>
<th>species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crustacea</td>
<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Pasiphaeidae</td>
<td>Pasiphaea</td>
<td>sivado</td>
</tr>
<tr>
<td>Arthropoda</td>
<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Pasiphaeidae</td>
<td>Pasiphaea</td>
<td>multikomata</td>
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<tr>
<td>Arthropoda</td>
<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Nephropidae</td>
<td>Nephrops</td>
<td>norvegicus</td>
</tr>
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<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Penaeidae</td>
<td>Penaeus</td>
<td>longipenis</td>
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<td>Arthropoda</td>
<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Sergestidae</td>
<td>Sergestes</td>
<td>avricus</td>
</tr>
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<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Gonaspidae</td>
<td>Gonaspis</td>
<td>rhamboides</td>
</tr>
<tr>
<td>Arthropoda</td>
<td>Malacostraca</td>
<td>Eumalacostraca</td>
<td>Eucarida</td>
<td>Decapoda</td>
<td>Gonaspidae</td>
<td>Gonaspis</td>
<td>mapponegus</td>
</tr>
<tr>
<td>Mollusca</td>
<td>Cephalopoda</td>
<td>Coleoidea</td>
<td>Octopodiformes</td>
<td>Octopoda</td>
<td>Octopodidae</td>
<td>Octopus</td>
<td>vulgaris</td>
</tr>
<tr>
<td>Mollusca</td>
<td>Cephalopoda</td>
<td>Coleoidea</td>
<td>Decapodiformes</td>
<td>Decapoda</td>
<td>Myopsida</td>
<td>Loliginidae</td>
<td>Loligo</td>
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<td>Chordata</td>
<td>Actinopterygii</td>
<td>Gadiformes</td>
<td>Gadidae</td>
<td>Micromesistius</td>
<td>Micromesistius</td>
<td>poutassou</td>
<td></td>
</tr>
<tr>
<td>Chordata</td>
<td>Actinopterygii</td>
<td>Perciformes</td>
<td>Carangidae</td>
<td>Trachurus</td>
<td>Trachurus</td>
<td>trachurus</td>
<td></td>
</tr>
<tr>
<td>Annelida</td>
<td>Polychaeta</td>
<td>Ind</td>
<td>Ind</td>
<td>Ind</td>
<td>Ind</td>
<td>Ind</td>
<td>Ind</td>
</tr>
</tbody>
</table>

Table 9. Ranking of prey ingested by *Galeus melastomus* according to Hureau’s methods (1970), Lauzanne (1975), and Pinkas et al. (1971).
organisms of three categories of preys: Crustaceans, Osteichthyes and Cephalopoda, of which 719 preys were counted (see Table 8). The determination of the different preys ingested by *G. melastomus* allowed us to calculate the different values of the dietary indices. Crustaceans are significantly present in both sexes with a value of 52.83%, then come the Cephalopoda with 24.25% and Osteichthyes with a value of 19.26% (Fig. 8).

**Quantitative composition of the diet of *Galeus melastomus***

The calculated values of the different indices, Q, IRI, IA, show that Crustaceans are essential or preferential preys for males and females (Tables 9 and 10). Osteichthyes as well as Cephalopoda represent secondary preys, not insignificant. From the study of the different food indices we classified the different ingested preys as shown in Table 10.

**DISCUSSION**

From a sample collected during 13 months represented by a total workforce of 551 *G. melastomus* individuals sexed, the results show that the number of males was higher than the number of females, as already reported in the Mediterranean Sea, in the Alboran Sea, in the South Tyrrenian Sea, in Gulf of Euboea and Corinth, and North-Western Aegean off the Greek coasts and in Aegean Sea (Sığacik Gulf) (Rey et al., 2005; Rinelli et al., 2005; Özütemiz et al., 2007; Christoforos et al., 2015). We noted a fluctuation in the rate of masculinity with a significant dominance during autumn and winter, which could correspond to the maturation periods. We also observed a clear statistically significant decrease in the rate of masculinity tending to reach a numerical equality with females at the beginning of summer, i.e., in July, August and September, which could correspond to sexual rest or post-spawning periods. Regarding the correlation between sex and body size, one can observe that size classes between 25 and 55 cm of total length are almost significantly dominated by males, with only the two size classes 31 and 56 cm being dominated by females. This difference in size was also reported by other authors in the Mediterranean Sea, including in the south coast of Portugal (Costa et al., 2005), in the southern Tyrrhenian Sea (Rinelli et al., 2005), in the Alboran Sea (Rey et al., 2005) and in the Gulf of Euboea, Corinthis, and North-Western Aegean (Christoforos et al., 2015), all pointing out the size difference between females and males, which could be explained by the fact that large females are likely to be less accessible to fishing gear as they move to specific reproduction areas (Rodriguez- Cabello et al., 1998). From the three indexes studied (OSI, HSI and Kn) we have determined the spawning period of the species. Moreover, from a macroscopic approach, we studied the sexual cycle of the species The breeding that appears to be annual with maximum phases of maturation occurs in December, April and May during the laying period, with interruptions occurring in February, August, September and October, which is the period of sexual rest or repletion of the target species. Many other authors (Capapé, 1977; Rey et al., 2005; Rinelli et al., 2005; Capapé et al., 2008) maintained that the reproduction would be annual, while we found periods of strong maturation of ovaries that differ from one fishery to another, probably influenced by variations in the environmental conditions and by fluctuations in bodies of water (Harris, 1952; D’Onghia et al., 1995).

To accurately determine breeding and spawning periods of species, either demersal or benthic, several indices are used. Referring to a work from ISRA-IRD (1979), it is recommended to use at least two indices when studying the reproduction of a target species. We note that the trend of the values of OSI and HSI is opposite to that of the condition factor (Kn). As for the latter studies, its values above 1 reflect an overweight, and therefore reveal a repro-

<table>
<thead>
<tr>
<th>Method used</th>
<th>Ranking</th>
<th>Nature of prey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hureau (1970)</td>
<td>preferential prey Q &gt; 200</td>
<td>Crustaceans, Cephalopoda</td>
</tr>
<tr>
<td></td>
<td>secondary prey 20 &lt; Q &lt; 200</td>
<td></td>
</tr>
<tr>
<td></td>
<td>accessory prey Q &lt; 20</td>
<td></td>
</tr>
<tr>
<td>Louzanne (1975)</td>
<td>IA &gt; 5 dominant prey</td>
<td>Crustaceans</td>
</tr>
<tr>
<td></td>
<td>25 &lt; IA ≤ 50 essential prey</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 &lt; IA ≤ 25 not negligible prey</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IA ≤ 10 secondary prey</td>
<td>Cephalopoda, Osteichthyes</td>
</tr>
<tr>
<td>Pinkas (1971)</td>
<td>200 &lt; IRI &lt; 2000 preferential prey</td>
<td>Crustaceans</td>
</tr>
<tr>
<td></td>
<td>20 &lt; IRI &lt; 200 accessory prey</td>
<td>Cephalopodes, Osteichthyes</td>
</tr>
</tbody>
</table>

Table 10. Classification of prey ingested by *Galeus melastomus* according to Hureau’s methods (1970), Lauzanne (1975), and Pinkas et al. (1971).
ductive period all along sampling and confirm a period of strong maturation in the intervals of December, March, April and May where the $Kn$ values are relatively low. We estimated the size of first maturity ($L_{50}$) at 54 cm, which is greater than that reported for the Mediterranean fisheries, as can be seen in Table 3. Tursi et al. (1993) also found that sexual maturity in *G. melastomus* would be reached around the third or fourth year of life and Capapé (1977) in Capapé & Brahim (1984) stated that maximum total length and size at first maturity are random in some species of selachians and, notably, that there could be very important variations within the Scyliorhinidae family. Notably, results obtained in our study confirm and support the results of the various authors mentioned above and the different
breeding parameters of \textit{G. melastomus} differ from one region to another, under the influence of different environmental and geographical features (Leloup et al., 1951; Relini & Orsi-Relini, 1987; Demestre & Martin, 1993; Guijarro et al., 2007), such as the passage of Atlantic currents (rich in organic matter) entering the Mediterranean through the Gibraltar Strait, and the existence of many canyons providing enrichment of deep Algerian waters (Cartes et al., 2002).

The conclusions drawn from this work is that \textit{G. melastomus} has a broad food spectrum, reflecting the richness of the environment in which it lives and the diversity of the assemblages of which it is a part of. This small shark feeds mainly on Crustaceans that represent its preference, whatever the age or sex, and on cephalopods and teleosts (mostly Gadidae) which represent secondary preys, in line with the conclusions of other authors regarding the importance of these three categories of preys in the diet of \textit{G. melastomus} (Olaso et al., 2005; Neves et al., 2007; Fanelli et al., 2009; Anastasopoulou et al., 2013). The blackmouth catshark moves from the juvenile state to the adult state by changing its environment and the older it gets the more it moves to the coastal environments where the waters get less deep. This species has also been described as an active benthic eater using a wide range of active senses to find the preys (Olaso et al., 2005; Kimber et al., 2009). As previously reported (Olaso et al., 2005; Neves et al., 2007), \textit{G. melastomus} food composition shows a certain heterogeneity of ingested preys - confirming that the species is both a generalist and an opportunistic - which means that the population occupies a large niche, where the individuals have much narrower niches. Taking into account the lack of reference works on this item, this study contributed to widen the knowledge of \textit{G. melastomus} habits on the western Algerian coasts. Nevertheless, further studies are certainly still needed to deepen our knowledge on this very important and fascinating species.

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**REFERENCES**


