

Age, growth and sex of *Lipophrys pholis* from the North coast of Portugal

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INTRODUCTION

Lipophrys pholis (Linnaeus 1758), commonly referred to as shanny, has a wide geographical distribution from Norway to northern Morocco (Zander, 1986). However it is located at a much higher latitude than other European blennids, indicating that is a species adapted to colder waters (Almada et al 1990). *L. pholis* is an intertidal species highly abundant along the Portuguese coast (Almada et al 1990).

Is an iteroparous species with 3 to 8 batches over the course of its lifetime (Qasim 1957). In Portugal the reproductive season occurs from early Autumn to middle Spring (October/November to May) (Faria et al 1996), but in Great Britain it takes place earlier during spring and early summer (March/April to August) (Qasim 1957). During the breeding period males exhibit a typical dark coloration pattern and establish territories in crevices or spaces under stones where spawning takes place (Qasim 1957; Almada et al 1990).

It can live up to 13 years (Dunne 1977), but the available data concerning the sex, age and growth of this species is, at present, scarce for the Portuguese coast.

MATERIAL AND METHODS

- Three sampling campaigns were conducted during Autumn and Winter of 2013 and Spring of 2014 (November, March and May) in Póvoa do Varzim beach



Lipophrys pholis habitat



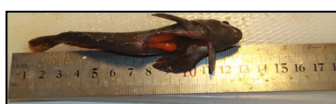
Adult collected with hand net
n=185, TL (range) = 30 – 172 mm



Transportation to the laboratory

Sex identification

Visual identification (male and female gonads)



Histological procedure



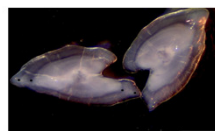
Chemical fixation (Bouin solution) → Dehydration (alcohol solutions (70%, 80%, 90%, 100%)) → Paraffin incorporation (56-58°C) → Cut microtome (5-7 µm) → Staining (hematoxylin-eosin) → Slides with gonads to analyzed through conventional optical microscopy.

The gonads and the liver were excised and weighed (WG:g and WL:g) and the mean gonadosomatic (GSI) and hepatosomatic (HSI) value for each year season was calculated [$GSI: 100 \text{ WG (WT)}^{-1}$; $HSI: 100 \text{ WL (WT)}^{-1}$].

Age determination



Otolith removal using a binocular stereo microscope



Validate the annual pattern deposition rings

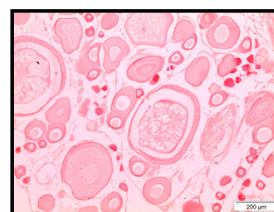
RESULTS AND DISCUSSION

Autumn - November		
Sex	Mean GSI ± SD	Mean HSI ± SD
Female	0.71 ± 0.62	1.93 ± 0.97
Male	0.58 ± 0.39	2.43 ± 1.64
Winter - March		
Sex	Mean GSI ± SD	Mean HSI ± SD
Female	1.86 ± 1.90	2.04 ± 0.59
Male	1.73 ± 0.47	1.81 ± 0.57
Spring - June		
Sex	Mean GSI ± SD	Mean HSI ± SD
Female	0.69 ± 0.63	1.66 ± 0.73
Male	0.40 ± 0.46	1.51 ± 0.68

For females the highest GSI and HIS values were recorded in March, whilst the lowest GSI and HIS values were observed in June (tab. 1).

For males the highest GSI and HIS values were recorded in March and the lowest GSI and HIS values were recorded in June too (Tab. 1)

This results agree with previous parental care studies, suggesting that for *L. pholis*, there is a reduction in the feeding activity when breeding season begins. During this season males spend more time guarding the eggs instead feeding. For that reason they registered lower HIS than females, who have a significant fertility during breeding season that is maintained at the expense of higher rates of feed, leading to energy accumulation in the liver, which is directed to the yolk process. (Gonçalves 1997).



Fi.1 – Female ovary with oocytes in different maturation stages

Histological observations showed that different oocytes development stages were represented in the ovaries (Fig. 1) during all 3 seasons studied, suggesting that *L. pholis* is an asynchronous spawner, with eggs being recruited in several batches during the breeding season. Similar results was found for males, suggesting males are also capable of multiple spawnings episodes during breeding season.

According with these results it is possible that the asynchronous production of multiple batches functions as a bet hedging strategy, allowing the eggs to be distributed among several males, thus reducing the risks of complete loss of progeny because of inadequate mate choice, environmental constraints and failure in larval recruitment, among other equally valid causes (Ferreira et al 2012)

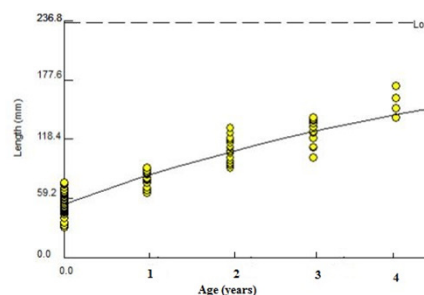


Fig. 2 – Von Bertalanffy *Lipophrys pholis* curve

The mean sizes of fishes with 0+ and 4+ age - group range between 30 mm and 172 mm. The VBF population growth curve gave results of $L_{\infty} = 23,6$ cm, $k = 0.17$ and $t_0 = -1.50$

CONCLUSIONS

The highest GSI for *L. pholis* female and male is during Winter;

Lipophrys pholis female and male are capable to spawn several times during the breeding season;

In Winter sampling it was possible, through visual identification, distinguish *L. pholis* sex in fishes with TL=55 mm;

Fish collected during the three campaigns belong to 0+ and 4+ age groups.

References

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