AGE AND GROWTH OF THE THREATENED PEN SHELL *PINNA RUDIS*, LINNAEUS, 1758 IN A MPA

Maite Vázquez-Luis [1]*, Elisabet Nebot [1], José R. García-March [2] and Salud Deudero [1]
[1] Instituto Español de Oceanografía (IEO) - maitevazquezluis@gmail.com
[2] Instituto de Investigación en Medio ambiente y ciencia Marina (IMEDMAR-UCV)

Abstract
Age and growth *of Pinna rudis* were studied in Cabrera National Park MPA. To determine age and growth, the shells were processed to study the growth records across the posterior adductor muscle scar. The absolute growth of studied population was asymptotic, with a maximum longevity and length of 28-31 years and 45 cm respectively. This is the first study on age and growth determination of this protected species.

Keywords: Bivalves, Growth, Mediterranean Sea

Introduction
The bivalve *Pinna rudis*, Linnaeus 1758is a protected species, but its biology and ecology are largely unknown. Sclerochronology has proven to be a very useful technique to assess individual age and population growth rates. The Von Bertalanffy growth model (VBGM) is commonly applied in mollusc research because it fairly represents size at age. The aims of the present study were to estimate for the first time age and growth parameters of this species. For this aim empty shells of a population inhabiting the MPA were collected and their growth records analyzed.

Materials and methods
The study was carried out at the marine protected area (MPA) of Cabrera National Park in the Balearic Islands (W Mediterranean), protected since 1991. A total of 19 empty shells of dead individuals were collected by scuba diving during July 2011 and July 2012. To determine age and growth, the shells were processed to study the growth records across the posterior adductor muscle scar using the methodology proposed by [1]. A Von Bertalanffy growth model (VBGM) was fitted to the size-age data obtained from the shells using a non-linear mixed-effects model (NLME), considering L_{max} random and t_0 and k fixed (this method requires knowledge of the age of the bivalves at each measurement).

Results and Discussion
In the MPA, the studied *P. rudis* exhibited an asymptotic growth, and reached a maximum longevity of 28-31 years and a maximum shell length of 45 cm (Table 1).The growth equation for studied population was C1 (Table 1). The resulting parameters suggested that first nacreous layers of *P. rudis* are too thin to be observable under binocular lens (Figure 1), and therefore, a second equation C2 was calculated (adding 3 missing years) fitting better with in situ observations (Table 1).

Tab. 1. Growth parameters for *P. rudis*. *k*: speed at which the maximum asymptotic size of the population is reached, L_{max}: maximum length of the population, n: number of individuals within the population, t_0: age at length 0.

Equation	Populations	*k*	t_0	L_{max}	n
C1: $L_{(t)} = 45.27 \cdot (1 - e^{-0.14\,(t + 3.80)})$	Cabrera MPA	0.14	-3.80	45.27	14
C2: $L_{(t)} = 45.27 \cdot (1 - e^{-0.14\,(t + 0.80)})$	Cabrera MPA +3	0.14	-0.80	45.27	14

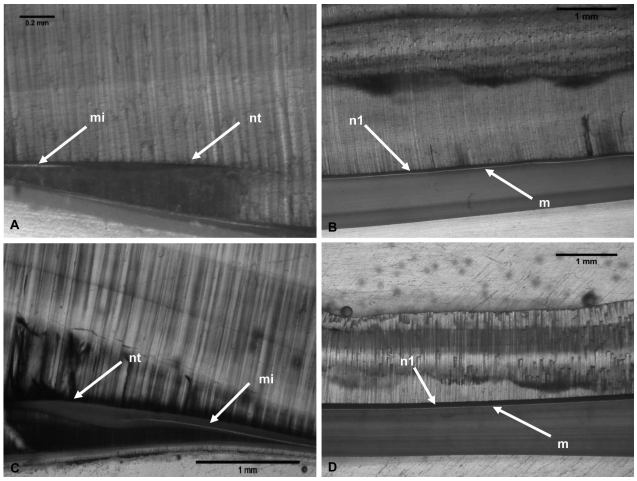

Fig. 1. A), B): Inner record of *Pinna rudis* shells; C), D): inner record of the congeneric *Pinna nobilis*. Abreviations: nt, nacre tongue; m, miostracum layer; mi, miostracum intrusion; n1, nacreous layer 1.

References
1 - García-March J.R. Márquez-Aliaga A. Wang Y.G. Surge D. Kersting D.K., 2011. Study of *Pinna nobilis* growth from inner record: How biased are posterior adductor muscle scars estimates? Journal of Experimental Marine Biology and Ecology, 407:337-344.