PRELIMINARY OBSERVATIONS ON THE RELATIVE AND ABSOLUTE GROWTH OF THE SMOOTH CLAM, *CALLISTA CHIONE* (L, 1758) (BIVALVIA: VENERIDAE) FROM THE THRACIAN SEA, NE MEDITERRANEAN

P.K. Leontarakis [1] * and C.A. Richardson [2]

[1] Fisheries Research Institute, N.AG.RE.F., Nea Peramos, Kavala, Greece - * fri@otenet.gr
[2] School of Ocean Sciences, University of Wales, Bangor, Menai Bridge, LL59 5AB, Anglesey, U.K - c.a.richardson@bangor.ac.uk

Abstract

The relative and absolute growth of the smooth clam, *Callista chione* (L, 1758) from the Thracian Sea was determined at two sites. The relationships amongst several size variables of the flesh and shell showed clearly that growth was allometric. Age determination was carried out from rings on the external shell surface and acetate peel replicas of shell sections. Von Bertalanffy growth parameters were estimated. *C. chione* is a slow-growing bivalve, attaining a size of 70-75 mm and an age of 11 to 16 yr.

Keywords: Callista chione; Bivalvia; Allometric relationships; Age; Growth

Introduction

The smooth clam, *Callista chione* (L, 1758), is a shallow-burrowing filter feeder, inhabiting sandy sediments mainly in Mediterranean Sea, from just offshore to a depth of about 130 m [1]. Despite its economical importance, available information on its biology and ecology is limited. The present work is the first attempt to study various aspects (e.g. relationships between several shell and flesh size variables, age, growth) of its biology in the Thracian Sea.

Materials and methods

During December 2001 to June 2002, smooth clams were collected from two sites off Thassos Island, at depths between 1 and 3 m at a 0.5 m interval, using a metal box quadrat (100X100X10 cm). Shell length, height, width (as defined in [2]; to the nearest 0.1 mm), shell weight, wet flesh weight and dry flesh weight (to the nearest 0.0001 g) were measured in the pooled sample (shell length: 16-72mm). Linear regressions were fitted to the $\log_{10}$-transformed data, while *t*-test [2] was used to identify allometry. Rings on the external shell surface and characteristic microgrowth patters apparent on acetate peel replicas of shell sections [3], were used for age determination. The von Bertalanffy equation [4] was fitted to the size-at-age data.

Results and discussion

The relationships (Table 1) between shell size variables reflect changes in the shell shape with increasing body size. The shell of *C. chione* tends to become proportionally higher, wider and heavier with increasing size, possibly providing better anchorage in the mobile sediment for larger animals. The flesh grew relatively faster than shell length, while the water content was reduced as the clams grew. It is known that bivalve shell growth and shape depend on both environmental (e.g. latitude, depth, currents, type of substrate) and ontogenetic factors (e.g. burrowing behaviour), so differences in morphometric relationships may indicate distinct environmental conditions occurred between the different geographical areas. However, results of the present study, concerning the relationships of shell height and width against length, are surprisingly similar to those reported from southern Portuguese waters [2]. The von Bertalanffy growth curves (Fig. 1), fitted to mean observed size-at-ages, in the two areas indicate a slow-growing species, as is also the case from northern Adriatic [5, 6, 7]. *C. chione* attained a size of 70-75 mm and a lifespan of 11-16 yr in the study area. Records from Plymouth waters [8] indicate slower growth rate (K=0.021 1/yr), possibly due to different environmental conditions prevailing in the two areas.

Table 1. Morphometric relationship parameters for *Callista chione* from Thassos Island, NE Mediterranean (SH=shell height, SL=shell length, SW= shell width, SWt= shell weight, WFWt=wet flesh weight, DFW=dry flesh weight, SE_b= standard error of slope; 60 individuals were measured; all regressions significant at $P<0.001$).

Morphometric relationship	Equation	r^2	SE_b
SH / SL	LogSH= -0.18+1.03.LogSL	0.96	0.006
SW / SL	LogSW= -0.56+1.12.LogSL	0.95	0.012
SWt / SL	LogSWt= -4.06+3.08.LogSL	0.94	0.033
WFWt / SL	LogWFWt= -4.81+3.30.LogSL	0.86	0.043
DFWt / SL	LogDFWt= -5.94+3.49.LogSL	0.83	0.051
WFWt / DFWt	LogWFWt=0.81+0.93.LogDFWt	0.82	0.016

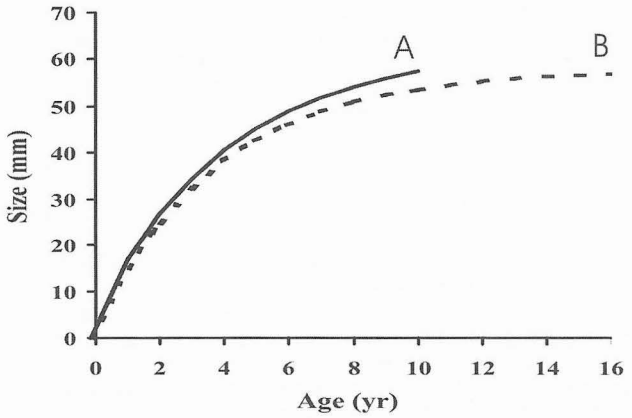

Fig. 1. Von Bertalanffy growth curves for *Callista chione* at two sites off Thassos Island, NE Mediterranean. A: $L_t = 62.70\ (1\text{-}e^{-0.24\ (t+0.32)})$, $SE_{L\infty}$= 2.03, SE_K= 0.02; B: $L_t = 57.83\ (1\text{-}e^{-0.26\ (t+0.15)})$, $SE_{L\infty}$= 1.47, SE_K= 0.03.

References

1 - Tebble N., 1966. British bivalve seashells: a handbook for identification. Trustees of the British Museum (Natural History), London.
2 - Gaspar M.B., Santos M.N., Vasconcelos P., Monteiro C., 2002. Shell morphometric relationships of the most common bivalve species (Mollusca: Bivalvia) of the Algarve coast (Southern Portugal). *Hydrobiologia,* 477: 73-80.
3 - Richardson C.A., Crisp D. J., Runham N.W., 1979. Tidally deposited growth bands in the shell of the common cockle *Cerastoderma edule* (L.). *Malacologia,* 18: 277-290.
4 - von Bertalanffy L., 1938. A quantitative theory of organic growth (inquiries on growth laws II). *Hum. Biol.,* 10: 181-213.
5 - Hall Jr. C.A., Dollase W.A., Corbató C.E., 1974. Shell growth in *Tivela stultorum* (Mawe, 1823) and *Callista chione* (Linnaeus, 1758) (Bivalvia): annual periodicity, latitudinal differences and diminution with age. *Palaeogeog., Palaeocl, Palaeoec.*, 15: 33-61.
6 - Strada R., Zocco M., 1985. Dati preliminary sull' accrescimento di *Callista chione* in Adriatico settentrionale. *Oebalia,* X(1-3): 829-831.
7 - Keller N., Del Piero D., Longinelli A., 2002. Isotopic composition, growth rates and biological behaviour of *Chamelea gallina* and *Callista chione* from the Gulf of Trieste (Italy). *Mar Biol,* 140: 9-15.
8 - Forster C.R., 1981. The age and growth of *Callista chione*. *J. Mar. Biol. Assoc. UK*, 61: 881-883.