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Some Biological Aspects of Scallop *Chlamys varia* (Linnaeus, 1758) (Bivalvia: Pectinidae) from Aegean Sea coast of Turkey

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Abstract

This research has been carried out to investigating of some biological aspects of scallop, *Chlamys varia* distributing in Gulf of Gerence (Aegean Sea), June 2011 – December 2012. A total of 326 samples were collected, 86 (26%) female, 94 (29%) male and 146 (45%) were immature. Height and weight of the samples varied between 30.98 – 63.12 cm (50.68 ± 6.03) total height and 3.34 – 28.19 g (16.20 ± 4.74), respectively. The size and dry weight frequency distribution and height – dry weight relationships for each sex of the scallop were studied. The relation between height (H) and dry weight (W) was determined as $W = 0.0004H^{2.701}$ ($r^2 = 0.903$). This was calculated for females as $W = 0.0005H^{2.660}$ ($r^2 = 0.937$), and for males $W = 0.0002H^{2.848}$ ($r^2 = 0.954$). The regressions of dry weight – height, dry weight – breadth were computed allometric; breadth – height and thickness – hight were found linear relationship.

Keywords: *Chlamys varia*, Pectinidae, biological aspects, Aegean Sea, Turkey

INTRODUCTION

Scallops of the bivalve family Pectinidae are very valuable shellfish and the subject of various important commercial fisheries around the World [1]. Pectinidae family consists of approximately 400 known living species. There are 24 species within the genus *Chlamys* of Pectinidae family [2]. They are either free-living or attached on sandy, rocky, and muddy bottoms in the infralittoral zone [3] and [4]. This will usually be to depths of around 100 m [5]. They generally prefer clean, full salinty sea water but they are sometimes found in estuaries and inlets, especially on rocky coasts [6].

The variegated scallop, *Chlamys varia* (Linnaeus, 1758**)** is widespread and common across the British Isles, to the Mediterranean and West Africa [3], [4] and [5]. It is a shallow-living species, living up to about 100 m in depth along coastal rocky areas [7]. The shell of *C. varia* ranges in color (white, pink, red, orange, yellow, purple). Both valves are symmetrical except for the ears on either side of the umbos. The shell does not usually exceed 6 cm in length. It is a sequential hermaphrodite, maturing as a male, and changing gender several times; the breeding season is from spring to autumn [4].

Allometric growth is differential growth of body parts (x and y) expressed by the equation "$Y = aX^b$", where "a" and "b" are fitted constants [8]. Allometric relations can be studied during the growth of a single organism or different organisms. Althought, in bivalves allometric growths have been widely studied in many species and used as one parameter to describe the trophic conditions of bivalve species in different habitats [9], [10], [11] and [12]. There is no published information available concerning on biological aspects of scallop, *C. varia* in the Aegean Sea which is a part of Mediterranean Sea. The aim of the present study was to investigate some biological properties of *C. varia* for the first time from Aegean Sea coast of Turkey.

MATERIALS AND METHODS

Scallop *C. varia* samples were collected in spring season, in 2013 in the Gulf of Gerence (Aegean Sea of Turkey) from an anthropogenically contaminated area, near the Bluefin Tuna Fish Farm (Fig. 1).

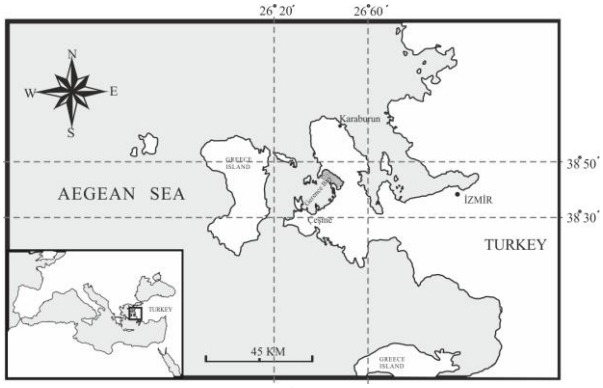

Figure 1. Sampling location site for scallop *Chlamys varia* in the Gulf of Gerence, Aegean Sea

A total of 326 various sizes of scallops were collected by SCUBA diving from fixed rope materials. In case of animal might have contained different materials; all specimens first dried (at 60°C for 48 hours), and then removed all fouling organisms on the shells. All dried individuals were weighed to the nearest 0.01 g and measured

with digital calipers. Height (H), breadth (B) and thickness (T) of the *C. varia* were measured by digital caliper (Fig. 2).

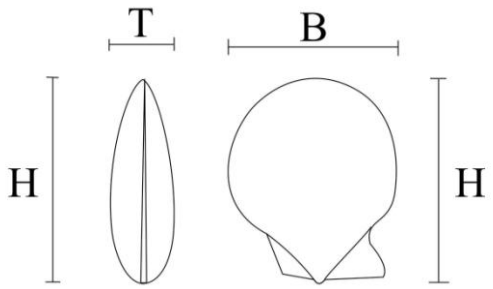

Figure 2. Linear measurements used in *Chlamys varia* for this study. B: breadth; H: height; T: thickness

The dry weight of the whole body and somatic tissue were recorded to the nearest 0.01 g. The species was identified; females and males were sorted by opening shells and check visually by the colour of gonads; orange or reddish gonads as females, and pale-whitish gonads as males. Degenerated (brownish) gonads were categorized to immature.

The samples were used to determine height and dry weight frequency, size (height, breadth, thickness) - dry weight and tissue weight relationship of the scallop. The size – dry weight relationships of *C. varia* were determined by the general formula $W = a \times L^b$, where "W" is the weight in grams, "L" the sizes (height, breadth, thickness) in cm, and "a" and "b" are the constants to be calculated. The statistical analysis of "r^2" and 95% confidence limits of the parameters "a" and "b" were calculated [13] and [14].

SPSS 18.0 statistical software was used for statistical analysis in this study.

RESULTS AND DISCUSSION

Height frequency distribution

In this study, a total of 326 specimens of *C. varia* are analysed, 86 (26%) samples were female, 94 (29%) samples were male and 146 (45%) samples were immature. The mean size for females was 51.24 ± 5.6 cm, ranging from 33.38 cm to 63.12 cm; for males 49.12 ± 6.5 cm, varying from 30.98 cm to 60.13 cm. Other dimensions (breadth and thickness) were used to determine the size of the study by calculating the frequency. However, during the evaluation process, according to the example of studies conducted, only height and dry weight frequencies were calculated. The heigth frequency distribution diagrams for male and female were given in fig. 3.

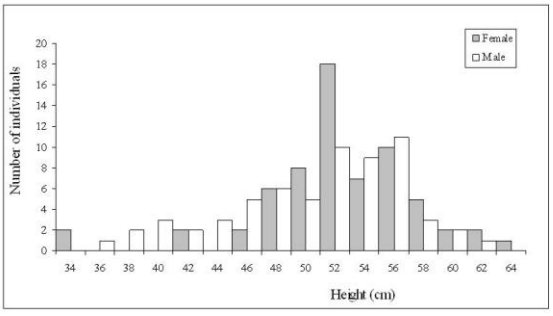

Figure 3. Height frequency distribution of males and females

Dry weight frequency distribution

The mean dry weight for males was 15.28 ± 5.18 g, ranging from 3.34 g to 24.8 g; for females 16.64 ± 4.3 g, varying from 4.27 g to 28.19 g. The dry weight frequency distribution diagrams for male and female were given in fig. 4.

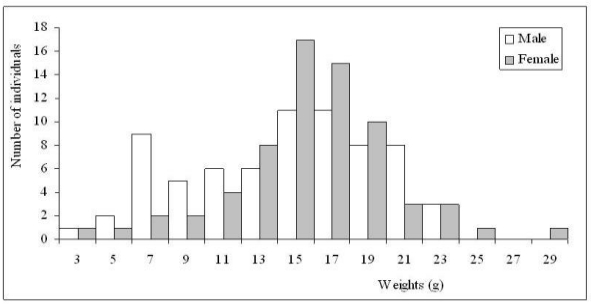

Figure 4. Dry weight frequency distribution of males and females

Size – dry weight relationship

The height – dry weight and breadth – dry weight relationships were calculated and shown in figs. 5, 6 and 7. The height – dry weight relationships were determined separately for the males and females. From visual inspection of the height-dry weight and breadth-dry weight relationship curves, allometry in growth was observed negative in both males and females and pooled data. Significant differences were found between the sexes in the analysis ($P<0.05$; t test).

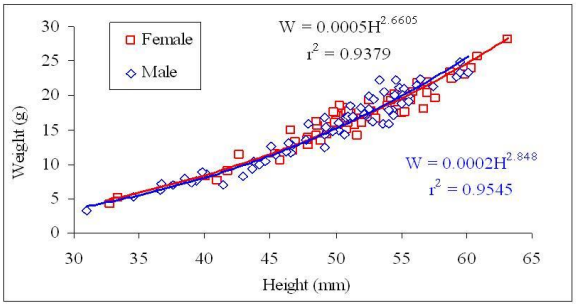

Figure 5. Height – dry weight relationship for males and females

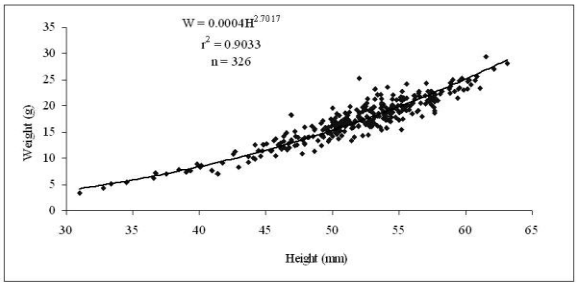

Figure 6. Height – dry weight relationship of pooled data

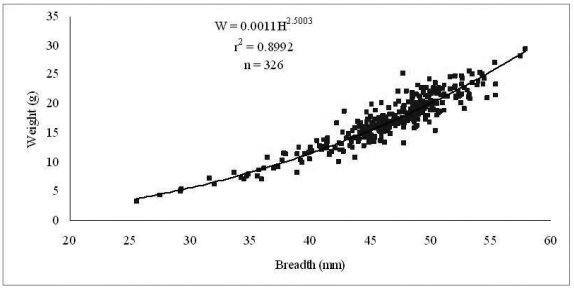

Figure 7. Breadth – dry weight relationship

Breadth – height and thickness – height relationship

The regression of log breadth on log height and thickness on height were given a linear relationship expressed by log W = log a +b log L (Figs. 8 and 9).

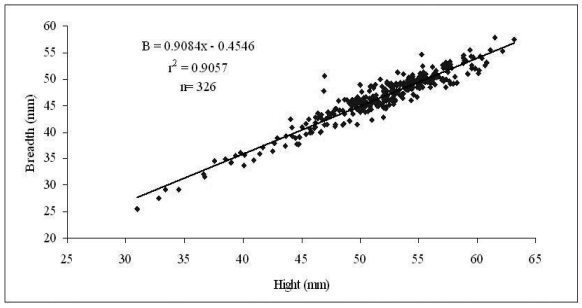

Figure 8. Breadth - height relationship

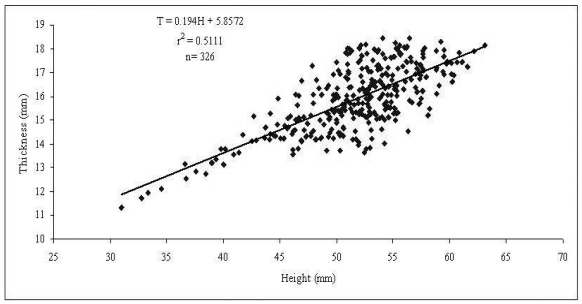

Figure 9. Thickness - height relationship

Bivalves exhibit progressive changes in the relative proportions of the shell with increasing body size. These changes are the result of differential growth vectors operating at different points around the mantle edge [15] (Seed, 1980). Shell height (length) and dry weight represented some of measurements that have been commonly used to determine growth or increase in biomass [12] and [16].

In this study, allometric relationships were computed between sizes – dry weight measurements of scallops, *C. varia* in the Gulf of Gerence, Aegean Sea. The slopes of sizes – weight regressions were found less than 3 (negative allometry). According to this result; the shell weight increase at a comparatively lesser than the height and breadth. Similar results were reported for the same species in a previous study in Lanveoc, Bay of Brest, France [17].

The relationships between linear measurements (height, breadth, thickness) were calculated by log W = log a +b log L formula. According to results; there were found linear and regular differences between measurements. Similar results were found by Shafee [17].

In our study, significantly differences were found between sexes ($P < 0.05$) in spring season of 2012. Shafee (1981) found regular significant differences in respect to seasons in Lanveoc, Bay of Brest. According to these results, Mediterranean samples of scallop *C. varia* have the similar biological aspects as Atlantic samples.

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