

Biochemical composition of Date shell, *Lithophaga lithophaga* L.

Biokemijski sastav prstaca, *Lithophaga lithophaga* L.

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INTRODUCTION

Date shell, *Lithophaga lithophaga* (Bivalvia: Mytilidae) occur in the Mediterranean, Lusitanian and Red Sea (Nordsieck, 1969; Parenzan, 1974). Very little is known of their biology and ecology. Rocks and stones are habitats of this species in which they drill canals. Owing to their very tasteful flesh they are highly esteemed as food.

There is no literature dealing with the biochemical composition of this species. This paper is an initial contribution to the knowledge of the biochemical composition of date shell.

MATERIALS AND METHODS

Stones inhabited by date shell were taken from the sea at a depth of approximately 10 m in the vicinity of Split. Specimens were selected thus to have all the length classes available. The total weight (with intervalval water) was taken of each specimen, as well as flesh weight, shell weight and length. From 0.6 to 1 g of flesh was taken from each individual specimen for the analysis of biochemical macroconstituents. Flesh of several specimens was joined together so as to obtain a sufficient quantity of flesh for analysis of very small individuals (up to 30 mm length). Tissue sample was added 10 ml of water and homogenized at Ultra-Turrax homogenizer for 1 min. Aliquot homogenate parts were taken from such prepared sample for two sub-samples which were used for the analysis of protein, total lipid, total carbohydrate, dry weight and ash.

Protein was determined according to the method of Lowry *et al.* (1951) with bovine serum albumin (Sigma) as standard. Lipid extraction was made after the method of Folch *et al.* (1957). After extraction, total lipid was determined by gravimetry. After hydrolysis with TCA, carbohydrate was measured by the method of Dubois *et al.* (1956) with glucose as standard.

The dry weight of the sample was obtained by drying at 105°C for 24 hours and ash by heating dry residue at 550°C for 24 hours.

RESULTS AND DISCUSSION

Biochemical composition was determined from 45 samples. Length of analyzed shellfish ranged from 1.9 to 7.7 cm, total weight (with intervalval water) from 0.46 to 26.91 g. Relative content of biochemical macroconstituents with respect to dry and wet weight are summarized in Table 1.

Table 1. Morphometric characteristics and content of biochemical macroconstituents of soft parts of *Lithophaga lithophaga* (n — the number of analyzed specimens; $\bar{X}$ — mean value; SD — standard deviation; CV — coefficient of variation in percentages)

Parameter	n	$\bar{X}$	SD	CV
Length (cm)	45	4.60	1.59	34.4
Weight (g)	45	7.66	6.80	88.8
Shell weight (g)	45	2.69	2.32	86.0
Flesh weight (g)	45	2.26	1.98	87.9
(% of total weight)				
Shell	45	36.3	3.75	10.3
Flesh	45	30.3	4.58	15.1
(% of wet flesh weight)				
Water	45	73.99	3.07	4.2
Protein	45	9.87	1.90	19.2
Lipid	45	2.24	1.06	47.3
Carbohydrate	45	3.67	0.86	23.5
Ash	45	3.88	0.82	21.2
(% of dry flesh weight)				
Protein	45	37.93	5.43	14.3
Lipid	45	8.57	3.64	42.4
Carbohydrate	45	14.05	2.63	18.7
Ash	45	10.82	2.90	26.8

Coefficient of variation of shell length was lower than the coefficient of variation of weight. Hence the shellfish rate of growth in weight exceeds the rate of growth in length. Relative relationship between shell weight and soft part weight is fairly constant value what was concluded from the small coefficients of variation. Flesh weight is proportional to shell weight with the coefficient of proportionality 0.834 ($r = 0.98$).

Relative protein levels in date shell flesh varied within the ranges reported for some other species of the Bivalvia class in the Adriatic. Bakić and Škare (1969) found the protein content to range from 4.1 (*C. edule*) to 14% (*P. nobilis*) with respect to wet weight for *Arca noae*, *Mytilus galloprovincialis*, *Modiolus barbatus*, *Perna nobilis*, *Ostrea edulis*, *Venus verrucosa*, *Vene-*

rupis descussata and *Cardium edule*. Date shell showed higher level of lipid than that found in other Bivalvia, the maximum of which was recorded from *P. nobilis*, 1.7%. Relative content of carbohydrate fluctuated from 6 to 18% of dry flesh weight. Similar was found in *Abra alba* (Ansell, 1974) and *Tellina tenuis* (Ansell and Trevallion, 1967). Bakić and Škare (1969) reported the carbohydrate values ranging from 0.5% to 3.7% of wet weight in Bivalvia from the Adriatic Sea. Taking into account the seasonal variations of biochemical composition of dry flesh weight in *Mytilus galloprovincialis*, Bressan and Marin (1985) found carbohydrate to range from 2 to 32%, protein 30–52% and lipid 2–13%.

Lithophaga lithophaga ash and water contents are not high and are lower than those reported for some other Bivalvia (Ansell and Trevallion, 1967; Ansell, 1974; 1974a).

Applying appropriate energy equivalents of 23.8 kJ/g for protein, 39.5 kJ/g for lipid and 17.6 kJ/g for carbohydrate and transforming biochemical data, energy content of date shell flesh was obtained to range from 2.43 to 6.94 kJ/g of wet weight.

In general, it is well known that water percentages are either in lower or higher negative correlation with the rest of biochemical constituents of tissues, so that these regression equations were applied also to date shell (Table 2).

Table 2. Correlation coefficient (r), number of determinations (n), intercept (a), regression coefficient (b) and level of statistical significance (P) for the equation $y = bx + a$

Y*	X	n	r	a	b	P
Protein (%)	Water (%)	45	−0.51	33.31	−0.32	0.001
Lipid (%)	Water (%)	45	−0.46	13.90	−0.16	0.01
Carbohydrate (%)	Water (%)	45	−0.59	15.81	−0.16	0.001
Ash (%)	Water (%)	45	−0.33	7.73	−0.07	0.05
Energy (kJ/g)	Water (%)	45	−0.71	17.88	−0.19	0.001

* wet weight

Even though the equations are statistically significant correlation coefficients do not show high correlation between biochemical constituents and water. The exception is the energetic content of date shell flesh.

Bivalvia are liable to seasonal changes of biochemical composition (Ansell and Trevallion, 1967; Ansell, 1974; 1974a). Therefore, the future researches will be concerned with the seasonal aspect of *Lithophaga lithophaga* biochemical composition.

CONCLUSION

Approximately one third of date shell weight (with interval water) is made up by the soft part. Flesh weight and shell weight are proportional, shell being heavier.

Records of relative content of basic biochemical macroconstituents of *Lithophaga lithophaga* show similarity with the records for other species of Bivalvia class.

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KRATKI SADRŽAJ

Analizirani materijal ulovljen je u blizini Splita u mjesecu veljači. Relativna količina biokemijskih makrokonstituenata s obzirom na mokru težinu mesnatog dijela je: bjelančevina 9,87%, ukupne masti 2,24%, ukupnih ugljikohidrata 3,67% i ekvivalentni energetske sadržaj 3,88 kJ/g.

Težina mesnatog dijela i težina ljuštore prstaca su direktno proporcionalne s koeficijentom 0,83. Od ukupne težine (s intervalvalnom vodom) bez obzira na veličinu, oko 1/3 otpada na mesnati dio prstaca.