FOLIA MALACOLOGICA
Folia Malacol. 2: 77–82
Cracow, 1988
http://dx.doi.org/10.12657/folmal.002.006

ANALYSIS OF SOME SHELL FEATURES OF *VALVATA CRISTATA* O. F. MÜLLER, 1774 (PROSOBRANCHIA: VALVATIDAE) FROM FISH-POND IN LIGOTA-ZABRZEG (UPPER SILESIA)

IZABELA REMBECKA

Faculty of Biology, Silesian University, Bankowa 9, 40-007 Katowice, Poland

ABSTRACT: Height and breadth of shells of *Valvata cristata* O. F. Müller, 1774 were measured; growth lines on the shells were counted. The shell height was found to range from 0.5 to 1.4 mm, while the shell breadth from 1.0 to 3.5 mm; there was no significant correlation between the shell size and growth 1ines number. Samples of 50 individuals chosen at random each month (from May to October) were divided into size-classes and the distribution pattern of the classes in the vegetation period was analysed. Young individuals were found to appear in July.

KEY WORDS: shell, seasonal variability, Silesia, Poland

Folia Malacologica 2/1988 was originally published as No. 1112 of Scientific Bulletins of University of Mining and Metallurgy, Cracow. This digitalised version was prepared by the Association of Polish Malacologists and first published on-line on December 30th, 2016.

Ministry of Science and Higher Education
Republic of Poland

This digitalised version of Folia Malacologica is funded by the Ministry of Science and Higher Education, Republic of Poland under the agreement no. 646/P-DUN/2016 allocated to the activities of disseminating science and by the courtesy of the Rector of the AGH University of Science and Technology, Cracow

ZESZYTY NAUKOWE
AKADEMII GÓRNICZO-HUTNICZEJ IM. STANISŁAWA STASZICA

Nr 1112 Folia Malacologica z. 2 Kraków 1988

IZABELA REMBECKA

ANALYSIS OF SOME SHELL FEATURES OF VALVATA CRISTATA O. F. MÜLLER, 1774 (PROSOBRANCHIA, VALVATIDAE) FROM FISH-POND IN LIGOTA-ZABRZEG (UPPER SILESIA)

A b s t r a c t : Height and breadth of shells of Valvata cristata O.F. Müller, 1774 were measured; growth lines on the shells were counted. The shell height was found to range from 0.5 to 1.4 mm, while the shell breadth from 1.0 to 3.5 mm; there was no significant correlation between the shell size and growth lines number. Samples of 50 individuals chosen at random each month (from May to October) were divided into size-classes and the distribution pattern of the classes in the vegetation period was analysed. Young individuals were found to appear in July.

INTRODUCTION

Valvata cristata O.F. Müller, 1774 was never found in sinkhole ponds and sand pits in Uppersilesian Industrial Region (Strzelec, Serafiński 1984) nor in fish-ponds in Gołysz and Landek (Kownacka 1963). In my previous study on snails of fish-ponds in Silesia and its vicinity (Rembecka in press) this species was found in only two ponds per thirteen. In one of them: Sokół D V. cristata constituted 19.30% of all the snails found. It was the reason for more detailed studies on the population living there and for comparison of the results with the data from other territories.

The aim of the present study is to show the variation in V. cristata shell and to analyse the seasonal changes in its mean width in the fish-pond.

THE DESCRIPTION OF THE STUDIED AREA

The fish-pond Sokół D is situated in the borderland of the katowickie and bielskie voivodships in Ligota-Zabrzeg village. The pond area amounts to 3.5 ha., the depth to 0.3 - 0.4 m. The pond is supplied with infiltrating water and never dries out. Its Bottom is slimy-clayey. There is a lot of organic suspension in the water. The water hardness oscillated in the study period from 6.67°g to 8.15°g. The vegetation in the pond is composed mainly of Salvinia natans (L.), Alisma plantago-aquatica L., Lemna trisulca L., Phragmites communis Trin., Acorus calamus L., Typha latifolia L.

MATERIAL AND METHODS

Specimens of V. cristata were collected from May to October at month intervals in three different sites. Fifty individuals were taken out at random from every sample and height and width of each shell were measured. Additionally, the number of growth lines on the shell were counted.

All the results were statistically analysed.

The specimens were divided in seven classes according to the width of shell (measured with accuracy up to 0.1 mm): class I $\leqslant$ 1.3 mm; class II 1.4 - 1.7 mm; class III 1.8 - 2.1 mm; class IV 2.2 - 2.5 mm; class V 2.6 - 2.9 mm; class VI 3.0 - 3.3 mm; class VII $>$ 3.3 mm. The increase of individual size in vegetation season was analysed on this base.

RESULTS

A. Shell characteristic

The shape of shells of V. cristata is slightly variable (Fig. 1). Among 300 specimens only in one shell the last whorl was not stuck. Most of the shells were yellowish grey beige, with transverse stripes. Sometimes they were translucent, and occasionally dark brown, matt and more solid, with organic coat.

In the studied material 281 shells were characterized by distinct, transverse growth stripes in number from 1 to 5. No significant correlation between the shell size and number of those stripes was observed

(r = +0.27). In the material of the same month there occurred the specimens of the same size, but with various number of growth lines, e.g. the shell 1.0 mm high and 2.7 mm wide had 5 lines, whereas another of similar size had 2 lines only.

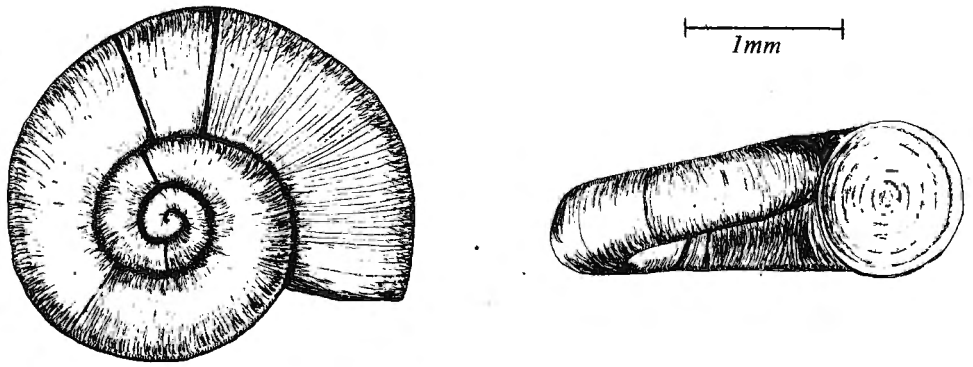

Fig. 1. The shell of Valvata cristata

B. Shell dimensions

The dimensions of the shell are: height 0.5 - 1.4 mm; width 1.0 - 3.5 mm. The correlation between these dimensions equals r = +0.91 by $sd_{\bar{x}}$ = = $\pm$0.16; $sd_{\bar{y}}$ = $\pm$0.50. The maximal and minimal height and width, correlation, V_i and the averages for every month are shown in Table 1. It seems that the width of the shell is more variable than the height ($V_{\bar{y}}$ = 22.20%, $V_{\bar{x}}$ = 16.86%).

C. Seasonal shell variability

The analysis of the seasonal variability in the shell (Fig. 2) shows that the smallest individuals appear in July, their number increases in August and September and then decreases in October. It seems that the breeding period of V. cristata starts in June and continues at least to October. In spring the individuals of classes V and VI occur and only in summer the smaller individuals (of classes II and III) appear numerously. In autumn all the size classes occur in similar numbers.

DISCUSSION

The informations about V. cristata are very scanty and concern almost only morphological characteristics. The size of its shell according to different authors amounts to: Žhadin (1952): height 1.2 mm; width 2 - - 3 mm; Ehrmann (1956): height 1.2 - 1.24 mm; width 3 - 3.5 mm; Urbański (1957): height 1.0 - 1.2; width 2 - 3 mm; Ložek (1964): height 1.2- 1.3 mm; width 3 - 3.3 mm; Piechocki (1979): height 1 - 1.3 mm; width 2 - 3.5 mm. The maximal sizes of the shells given by those authors are smaller than these found in the present study.

Urbański (1957) and Piechocki (1979) consider that V. cristata prefers stagnant water bodies with muddy bottom and rich vegetation. Hubendick (1947) considers, however, that this species lives on clayey bottom covered with detritus in never drying out water bodies. Boycott (1936) considers that V. cristata prefers slimy bottom with rich vegetation and slow water current.

In the present study both the proportions of this species in the whole sample and the size of the shells suggest, that in the studied pond the V. cristata population found very good conditions, namely the clayey--slimy bottom and rich vegetation.

The informations about the V. cristata biology are very scarce. Piechocki (1979) considers that the breeding period begins in spring and the embryonal development is lasting 30 - 40 days. In the studied fish--pond the reproduction did not start before June and went on till the end of September.

The growth lines in Planorbidae are frequently considered the result of the inhibited growth during hibernation. Recently it has been found (Strzelec 1985) that they may appear in the reproduction period as well. In V. cristata the growth lines are not correlated with size, what enables the supposition that they are not only an effect of seasonal factors, but a result of endogenous mechanisms of growth as well.

This would be the subject of further studies.

CONCLUSIONS

1. There is no significant correlation between the shell size and the number of growth lines ($r = +0.27$).

2. The maximal height and width of the V. cristata shell are, on the average, somewhat greater than the given by some authors.

3. It seems that the breeding period starts in late spring and goes on till autumn.

Table 1

Seasonal changes in mean dimensions of Valvata cristata shells

Date	Height $\bar{x}$ (mm)	width $\bar{y}$ (mm)	x_{max} (mm)	y_{max} (mm)	x_{min} (mm)	y_{min} (mm)	$SD^{\pm}\ \bar{x}$	$SD^{\pm}\ \bar{y}$	V_x (%)	V_y (%)	r	$\frac{\bar{x}}{\bar{y}}$
May	0.990	2.496	1.3	3.3	0.7	1.4	0.158	0.523	15.960	20.954	0.901	0.397
June	1.050	2.850	1.4	3.5	0.8	1.9	0.145	0.412	13.810	14.456	0.882	0.368
July	0.906	2.140	1.2	3.2	0.6	1.1	0.154	0.515	16.998	24.065	0.930	0.423
August	0.912	2.072	1.2	3.2	0.6	1.0	0.156	0.511	17.105	24.662	0.875	0.440
September	0.888	2.100	1.2	3.0	0.5	1.1	0.176	0.545	19.820	25.952	0.938	0.423
October	0.858	2.076	1.2	3.2	0.5	1.0	0.150	0.480	17.483	23.121	0.931	0.413

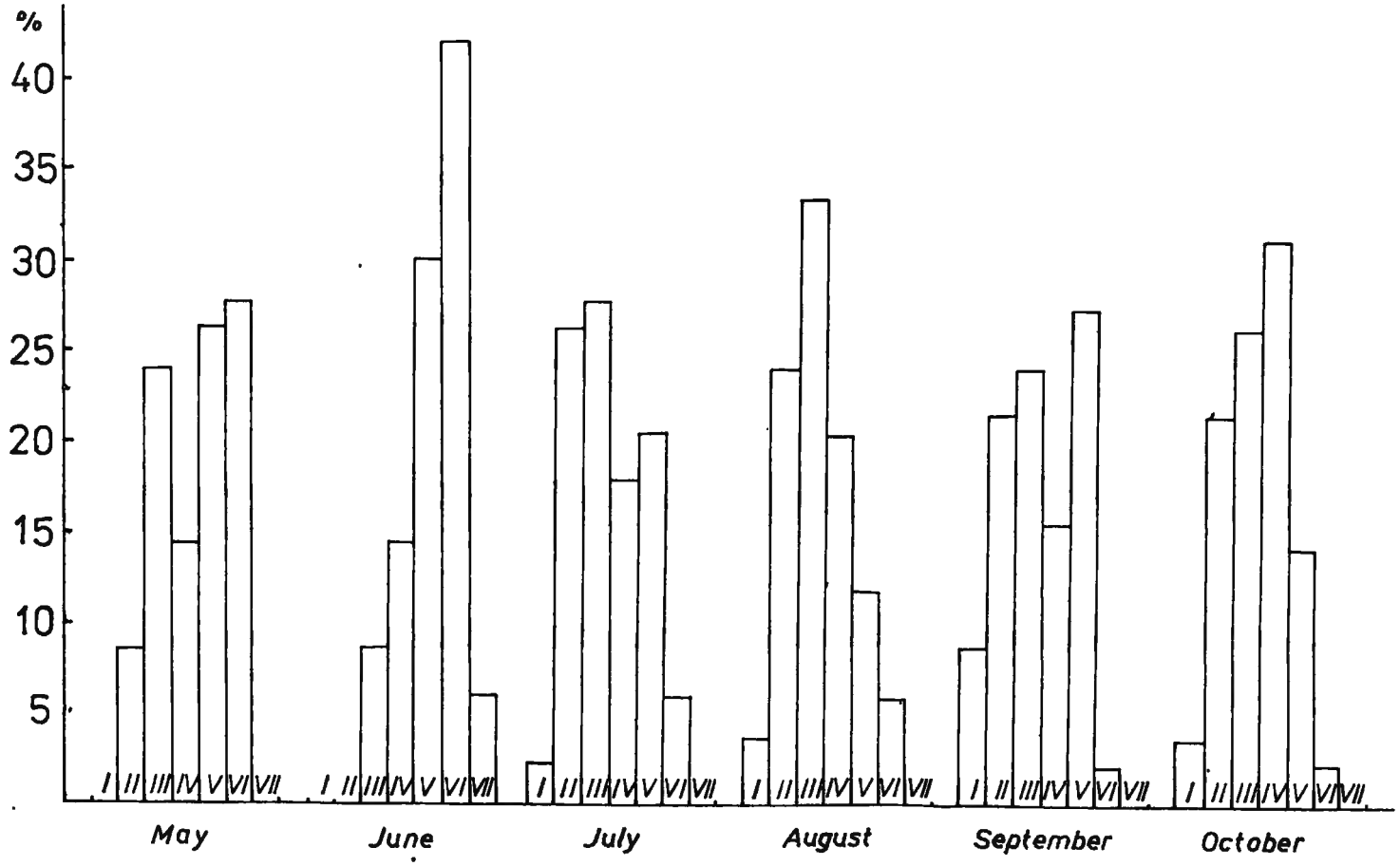

Fig. 2. Seasonal shell variability

REFERENCES

BOYCOTT A.E. 1936. The habitats of fresh-water Mollusca in Britain. J. Animal Ecology 5: 116-186.

EHRMANN P. 1956. Mollusca (Weichtiere). in: P. Brohmer, P. Ehrmann, G. Ulmer (ed.), Die Tierwelt Mitteleuropas, II. Verl. v. Quelle und Meyer, Leipzig.

HUBENDICK B. 1947. Die Verbreitungsverhältnisse der limnischen Gastropoden in Südschweden. Zool. Bidr. Uppsala 24: 419-556.

KOWNACKA M. 1963. Ślimaki stawów rybnych w Gołyszu i Landeku. Acta Hydrobiol. 5, 2-3: 173-188.

LOŽEK V. 1964. Quartermollusken der Tschechoslowakei. Rozpr. Ustr. Urt. Geol. 31: 182-203.

PIECHOCKI A. 1979. Mięczaki (Mollusca), Ślimaki (Gastropoda). Fauna słodkowodna Polski 7, PWN, Warszawa-Poznań.

REMBECKA I. in press. Freshwater snails (Mollusca: Gastropoda) of fish ponds in Silesia (Southern Poland). Folia Malacologica 3.

STRZELEC M., Serafiński W. 1984. Ślimaki (Gastropoda) zbiorników wodnych powstałych w wyniku eksploatacji górniczej w Górnośląskim Okręgu Przemysłowym. Przegl. Zool., 28, 2: 185-191.

STRZELEC M. 1985. Występowanie i zmienność Planorbis planorbis (L.) w zbiornikach antropogenicznych Górnośląskiego Okręgu Przemysłowego. D. sc. thesis. Library of Faculty of Biology. Silesian Univ. Katowice.

URBAŃSKI J. 1957. Krajowe ślimaki i małże. PZWS, Warszawa.

ZHADIN V.I. 1952. Molljuski presnych i solonovatych vod SSSR. Opredeliteli po faunie SSSR, 46, Zool. muz. Ak. Nauk SSSR, Moskva-Leningrad.

Silesian University
Faculty of Biology
40-007 Katowice (Poland)
ul. Bankowa 9

ANALIZA WYBRANYCH CECH MUSZLI VALVATA CRISTATA O.F. MÜLLER, 1774 (PROSOBRANCHIA, VALVATIDAE) ZE STAWU RYBNEGO W LIGOCIE-ZABRZEGU (GÓRNY ŚLĄSK)

S t r e s z c z e n i e : Przeprowadzono pomiary (wysokość, szerokość) muszli Valvata cristata, liczono również liczbę prążków zahamowanego wzrostu. Stwierdzono, że wysokość muszli wynosi 0,5 - 1,4 mm, szerokość 1,0 - 3,5 mm oraz że nie ma istotnej korelacji pomiędzy wielkością muszli a liczbą prążków zahamowanego wzrostu. Wybierając z próby losowo 50 osobników w każdym miesiącu (od maja do października) podzielono je na klasy wzrostu i przeanalizowano rozkład poszczególnych klas w sezonie wegetacyjnym (rys. 2). Stwierdzono, że młode osobniki pojawiają się w lipcu.