

Size, age and sex ratio in *Maackia herderiana* (Gerstfeldt, 1859) (Gastropoda: Caenogastropoda: Baicaliidae) from South Baikal Lake

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ABSTRACT. Size distribution, age, and sex ratio were studied for a population of baikalian endemic gastropod *Maackia herderiana* living on shallow-water rocky platform in South Baikal Lake. Six size groups were recognized. The age was determined from the number of annual growth rings on the shell. Each of groups I-V contained snails of two ages corresponding most probably to different generations: spring and autumn. Snails of 4 to 8 years old were assigned to the group VI. The sex ratio in *M. herderiana* was generally close to 1:1. A tendency to deficiency of females in older snails was similar to that described earlier by Kozminsky [2003] for *Bithynia tentaculata*. It could be explained by a longer life span of males and higher reproductive expenses of females.

Introduction

Size-age composition and sex ratio are the main indices of the demographic situation in animal populations. The age in gastropods is usually determined by counting the lines of annual growth interruption (= «annual rings») on the shell [Abe, 1932; Hunter, 1953; Franz, 1971; Vincent, Vailancourt, 1981; Gorbushin, 1993; Kozminsky, 2003; 2006; etc.] or on the operculum [Golikov, 1980; Selin, 2003]. To reveal the age structure of populations, A.N. Golikov [1970] suggests to use the method of “cohorts” based on the fact that individuals of one macrogeneration weakly differ from each other in size, which allows to recognize several size groups or “cohorts” in a population with prolonged reproduction and to determine their age.

Despite more than a hundred-year history of studies on the Baikal malacofauna, the data on the size-age and sex structure, as well as on longevity of Baikalian gastropods are limited by two publications [Slugina, 1983; Slugina, Kamaltynov, 1981].

Maackia (Eubaicalia) herderiana (Gerstfeldt, 1859) is one of the dominating species on rocky littoral of South Baikal. Its maximum abundance was recorded at 3-5 m depth [Kozhov, 1931; Kaplina, 1974]. Most abundant are here individuals with well discernible spiral ribs on the shell, that are assigned to the nominotypical subspecies [Kozhov, 1936]. *M. herderiana* is dioecious species, and its

protoconch size and microsculpture, the structure of female reproductive system and the morphology of egg capsules have been described [Kozhov, 1936; Sitnikova et al., 2001]. It is known that the gut content of *M. herderiana* consists mainly of microorganisms [Rodina, 1954] and planktonic diatoms [Röpstorf et al., 2003]. The duration of embryogenesis is 7.5 to 11.5 months, depending on seasonal changes in the near-bottom water temperature [Sitnikova et al., 2001]. A field experiment on growing of hatched juveniles has shown that the shell of *M. herderiana* increases on average by 1 whorl per year. The shell virtually stops growing in winter months, which leads to formation of a well-seen dark-brown line of winter growth interruption. It demarcates the newly formed and old parts of the grayish-green shell [Röpstorf, Sitnikova, 2006].

Based on the correlation between weight and shell height, Slugina and Kamaltynov [1983] identified the longevity of *M. herderiana* as 3-4 years.

The goal of the present work was to study the size and sex structure of *M. herderiana* population and to determine its age from the markings of annual (winter) growth interruption lines on the shell.

Material and methods

Individuals of *M. herderiana herderiana* were collected by scuba diving on a rocky site near interdisciplinary ground at Berezovyi Cape (southwestern shore of Baikal), at 3 m depth [Timoshkin et al., 2005]. A total of 34 quantitative samples of zoobenthos were processed. The samples were taken on 29.08.2000, 02.11.00, 27.02.01, 09.04.01, 03.07.01, and 27.08.01 by an accounting frame with the area of 0.1 m², 5 times in each series, and three large boulders were sampled separately. The samples were washed in a scoop net with mesh No. 65, then fixed in 4% neutral formaldehyde and 80% ethanol. Processing of samples and calculation of numbers and biomass was performed with methods standard for hydrobiology [Zhadin, 1956]. The following parameters were measured: shell height (H) (in 1237 spms) and width (W), aperture height (ah) and width (aw) (in 360 spms), inaccuracy of meas-