

## PF-2

# Sexual Maturation of the Top Shell, *Omphalius rusticus* (Gastropoda: Trochidae), on the Western Coast of Korea

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## Introduction

The top shell, *Omphalius rusticus* (Gastropoda: Trochidae), is marine mollusk inhabiting underneath a rock in the intertidal zone of the coasts of Korea and Japan, and it is one of the edible gastropods. This species is a herbivorous animal.

Up to now, there have been some reports on the Trochidae: aspects of classification, spawning periodicity, production, growth and size-frequency distribution of living populations, feeding, reproductive cycle, and induction of larval metamorphosis. To date, however, I could not find out any histological study on the reproductive biology of *O. rusticus*. Therefore, this study aims to define the gonadal development, reproductive cycle, gametogenesis, gonad index, meat weight rate, and first sexual maturity of this species based on the histological examinations.

## Materials and Methods

Live specimens of the top shell, *O. rusticus* were monthly collected by hand from the rocky intertidal zone of Daehang-ri, Buan-gun, Jeollabuk-do, on the western coast of Korea, from January to December 1999.

A total of 275 snails (4.0~24.2 mm in shell height) were used for the histological observations. The specimens were kept alive during transportation to the laboratory, and then the shell height and shell width were measured to the nearest 0.1 mm by a vernier caliper, and the total weight, meat weight and shell weight were weighed to the nearest 0.01 g by an electronic balance.

To examine gonadal phases, the soft body of the snail was separated by hitting the shell with a hammer, posterior appendage including the gonad and liver was dissected out using surgical instruments and fixed in Bouin's solution for 24h. The fixed specimens were subjected to standard histological techniques (dehydrated in ethanol and embedded in paraffin). Serial sections were performed at 4  $\mu\text{m}$  to 5  $\mu\text{m}$  on the embedded specimens. The sections were attached on glass slides, stained

with Bohmer's haematoxylin-1% alcoholic eosin, mounted in balsam, and examined under a light microscope.

The percentages of the first sexual maturity were histologically investigated to confirm the shell heights of the specimens which took part in the reproduction during the breeding seasons.

## Results and Summary

Monthly changes in the gonadal development, reproductive cycle, gonad index, meat weight rate, and first sexual maturity of the top shell, *Omphalius rusticus* were investigated on the basis of specimens taken monthly during the period from January to December 1999 in the western coast of Korea.

*O. rusticus* was dioecious and oviparous. The gonad was widely situated on the surface of the liver which was located in the posterior spiral meat part in the shell. The ovary was composed of a number of oogenic lobules, and the testis was composed of several spermatogenic tubules. Ripe oocytes were approximately 120~130  $\mu\text{m}$  in diameter. The meat weight rate peaked in June (27.7%), and then rapidly decreased in September (19.5%). Monthly changes of gonad index values in both sexes reached the maximum in June (47.9 in female and 46.0 in male), and then sharply decreased in September (17.2 in female and 18.7 in male). The minimum size for first sexual maturity in both sexes was above 9.0 mm in shell height. Reproductive cycle could be classified into five successive stages: in females, early active (October to April), late active (December to June), ripe (April to September), spawning (July to September) and recovery (September to January); in males, early active (November to March), late active (December to June), ripe (April to September), spawning (July to September) and recovery (September to December). Gonadal development, gametogenesis, sexual maturation, reproductive cycle, and spawning were closely related to the seawater temperature. Gametogenesis was immediately initiated after spawning.

## References

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