

Two Apple Snails Species Recently Introduced into Korea; *Pomacea canaliculata* and *P. insularis*

Pyung-Rim Chung, Gab-Man Park¹⁾ and Younghun Jung

Department of Parasitology, Inha University College of Medicine, Incheon 400-103, Korea

¹⁾Department of Parasitology, Yonsei University College of Medicine, Seoul 120-752, Korea

ABSTRACT

The apple snails of the genus *Pomacea* have been introduced by the snail breeders illegally into Korea. Authors confirmed that the natural life cycle of at least two pomacean species, *Pomacea canaliculata* and *P. insularis*, has been already settled down locally in the southern areas of Korea.

Keywords: *Pomacea canaliculata*, *P. insularis*, Apple snails, Korea

INTRODUCTION

The gastropod family Pilidae (Ampullariidae) is commonly found in tropical freshwater systems throughout the world. The apple snails of genus *Pomacea* being usually found in South America, Central America, the West Indies and the Southern USA (Pain, 1972), were also discovered in Thailand in 1984 (Keawjam and Upatham, 1990).

The snails of *Pomacea* are moderately amphibious; the snails take two ways of respiration using branchia solely in water or lung out of water (Michelson, 1961). The pomacean snails prefer low marshy banks of rivers and swamps or ponds to running water. They have a long siphon located on the left side of their body to take in atmospheric air. Due to high

temperatures in Thailand, generally above 25°C, the animals can breed and deposit their eggs all year around. The eggs are small (4-5 mm in diameter), calcareous, pigmented, and are attached to objects above water level. The operculum is chitinous and can close the aperture tightly, allowing the animal able to withstand a period of desiccation (Keawjam and Upatham, 1990).

For the comparative studies of apple snails, the shell morphology, reproductive anatomy and genetic enzyme patterns of *Pila* (Keawjam 1986a, 1986b, 1987a, b) and three species of the genus *Pomacea* (Keawjam and Upatham, 1990) in Thailand have been reported. Furthermore, allometric growth and insight on sexual dimorphism in *P. canaliculata* (Estebenet, 1998) have been studied quite recently.

Medical importance of freshwater apple snails in Thailand has been reported (Burch and Lohachit, 1983; Burch and Upatham, 1989). *Ampullarium canaliculatus* (= *P. canaliculata*) may transmit a nematode parasite, *Angiostrongylus cantonensis* (Chao *et al.*, 1987), the "rat lung worm" which causes eosinophilic meningoencephalitis in humans. Natural parasitic infections in the golden apple snail, *P. canaliculata*, and its susceptibility to [the three groups of amphistome, distome and echinostome metacercariae] have been also observed in the parasitological points of view (Keawjam *et al.*, 1993; Banpavichit *et al.*, 1994).

The authors collected these apple snails in Korea for last several years, and confirmed that at least two species of these snails had been already established their natural life cycles in many southern areas of Korea. This is the first report of two pomacean species, *Pomacea canaliculata* and

Received March 25, 2000; Accepted May 20, 2000

Corresponding author: Chung, Pyung-Rim

Tel: (82) 32-890-0981, e-mail: chungpr@dragon.inha.ac.kr

1225-3480/16104

© The Malacological Society of Korea

P. insularis introduced into Korea.

TAXONOMIC POSITION

Class Gastropoda Cuvier, 1804
Order Mesogastropoda Thiele, 1929
Superfamily Viviparoidea Gary, 1847
Family Viviparidae Gary, 1847
Family Pilidae (=Ampullariidae) Gray, 1847
Genus *Pila* Roding, 1798
Genus *Pomacea* Perry, 1811
(=*Ampullarius* Montfort, 1810)
Pomacea canaliculata (Lamarck, 1819)
Pomacea insularis (d'Orbigny, 1839)

DESCRIPTION

1. *Pomacea canaliculata* (Lamarck, 1819) (Figs. 1a, 2a)

Morphological observations: The shell size is large with 35-50 mm of width and 40-60 mm of height. The shell is moderately thick and subglobose or globose in shape with depressed spire. There are 4-5 whorls well rounded or evenly convexed. The shell is light brown or yellow-green in color and is generally banded. The shell aperture is widely oval, with strongly reflected lip. The operculum is oval in shape, moderately thick with concentric nucleus, and olive-brown in color with distinct spiral lines.

Distributions: The specimens of *Pomacea canaliculata* in Koheung, Kimhae, Sangju areas (Fig. 3) were collected by Dr. Gab-Man Park, who is one of the authors of this paper since in 1997. Catalog numbers of *P. canaliculata* collected are as follows: IUMC 101, Nae-dong, Sajeong-ri, Kwanuok-myun, Koheung-gun, Chonnam, 27 Oct. 1997; IUMC 109, Nae-dong, Sajeong-ri, Kwanuok-myun, Koheung-gun, Chonnam, 24 Aug. 1999; IUMC 103, Okchon, Jangdam-ri, Jeoman-myun, Koheung-gun, Chonnam, 29 Oct. 1997; IUMC 108, Okchon, Jangdam-ri, Jeoman-myun, Koheung-gun, Chonnam, 3 Nov. 1998; IUMC 102, Kwandong-kyo, Kwandong-ri, Jangyu-myun, Kimhae-gun, Kyungnam, 27 Oct.

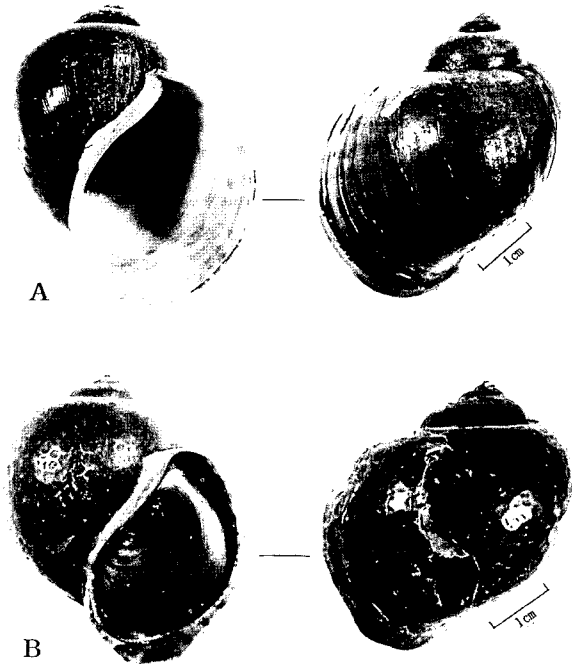


Fig. 1. The shells of *Pomacea canaliculata* (A) and *P. insularis* (B).

1997; IUMC 106, Kwandong-kyo, Kwandong-ri, Jangyu-myun, Kimhae-gun, Kyungnam, 26 Oct. 1998; IUMC 104, Kuhyang-ri, Hamchang-eup, Sangju-gun, Kyungbuk, 3 May 1998; IUMC 110, Kuhyang-ri, Hamchang-eup, Sangju-gun, Kyungbuk, 20 Sept. 2000.

Habitats: The habitats of this snail species are usually in low marshy banks of rivers, ditches

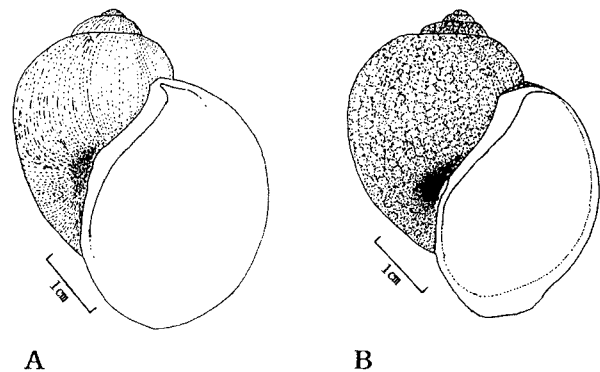


Fig. 2. Drawings of *Pomacea canaliculata* (A) and *P. insularis* (B).

and swamps or ponds.

2. *Pomacea insularus* (d'Orbigny, 1839)
(Figs. 1b, 2b)

Morphological observations: The shell size is medium to large with 23-35 mm of width and 25-45 mm of height. The shell is moderately thick, less thicker than the shell of *P. canaliculata*. It is subglobose or globose in shape with a low spire. There are about 4 and 1/4 whorls and they are well rounded. The shell is yellow-brown or yellow-olive in color and is unbanded. The shell aperture is widely oval, with strong, and slightly reflected lip. The operculum is moderately thick, glossy, with nucleus.

Distributions: Dr. Gab-Man Park also collected this snail species with *P. canaliculata* in Jindo and Jinhae areas (Fig. 3). Catalog numbers of *P. insularus* collected are as follows: IUMC 105, Changpo-kyo, Changpo-ri, Eeshin-myun, Jindo-si, Chonnam, 6 May 1998; IUMC 107, Wungdong-kyo, Sosa-dong, Jinhae-si, Kyungnam, 27 Oct. 1998.

Habitats: This snail species was found in the same habitats as those of *P. canaliculata*, i.e., in ditches, swamps or ponds.

DISCUSSION

Pomacea canaliculata is morphologically similar to *P. insularus*, except that its shell size and color are different from each other. Keawjam and Upatham (1990) discussed the shell morphology, reproductive anatomy and electrophoretic enzyme banding patterns of three species of genus *Pomacea* in Thailand. They observed good distinguishable characteristics of these *Pomacea* species. Our specimens of two *Pomacea* species have mostly same shell characteristics of *Pomacea* collected in Thailand as described by Keawjam and Upatham (1990) except smaller shells in size.

We followed the identification keys of *Pomacea* species of Keawjam and Upatham (1990); but, the anatomical and genetic studies of these two pomacean species have not been done yet.

We believed that these apple snails of the genus *Pomacea* have been introduced by local snail breeders illegally into Korea. Initially, the *Pomacea* snails were discovered in southern areas of Korea. However, these *Pomacea* snails were recently found even in the Sangju area. It seems to be a possibility that they might be occurring widely to further areas of the central regions of this country. Furthermore, the natural life cycles of these two snail species have been already settled down locally. This report concerns about not only that they may cause ecological problems with their breeding habits, but also that they may play a medically important role as the transmitter of human parasitic diseases such as angiostrongylus cantonensis. Therefore, we need to pay more attentions on these introduced apple snail species

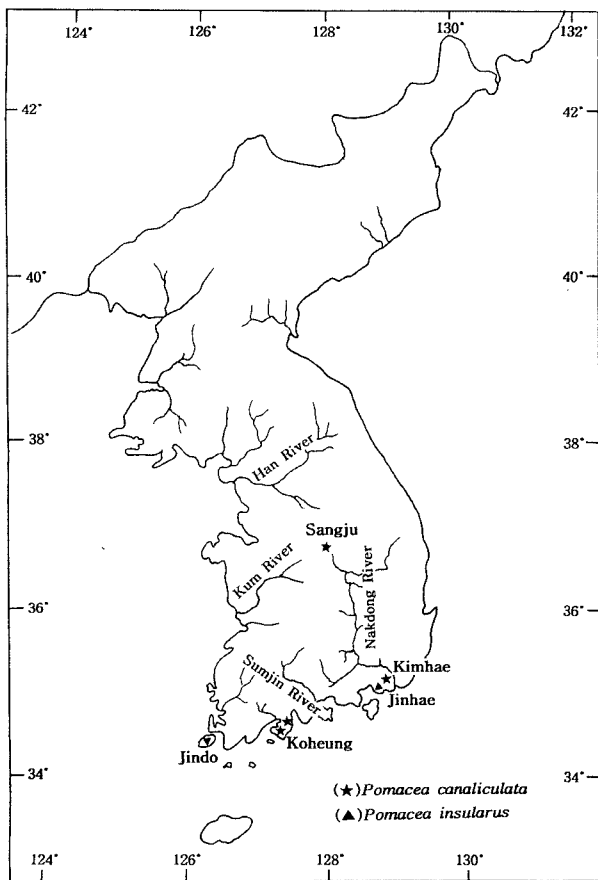


Fig. 3. The distribution of *Pomacea canaliculata* and *P. insularus* in Korea. (★) *P. canaliculata*; (▲) *P. insularus*.

in terms of geographical distribution and medical aspect.

REFERENCES

- Banpavichit, S., Keawjam, R.S. and Upatham, E.S. (1994) Sex ratio and susceptibility of the golden apple snail, *Pomacea canaliculata*. *The South-east Asian Journal of Tropical Medicine and Public Health*, **25**(2): 387-391.
- Brandt, R.A.A. (1974) The non-marine Mollusca of Thailand. *Archiv für Molluskenkunde*, **105**(1-4): 1-423.
- Burch, J.B. and Lohachit, C. (1983) Snails of medical importance in Thailand. *Walkerana*, **1**(5): 395-398.
- Burch, J.B. and Upatham, E.S. (1989) Medically important mollusks of Thailand. *Journal of Medical and Applied Malacology*, **1**: 1-9.
- Chao, D., Lin, C. and Chen, Y. (1987) Studies on growth and distribution of *Angiostrongylus cantonensis* larvae in *Ampullarium canaliculatus*. *The South-east Asian Journal of Tropical Medicine and Public Health*, **18**(3): 248-252.
- Estebenet, A.L. (1998) Allometric growth and insight on sexual dimorphism in *Pomacea canaliculata* (Gastropoda: Ampullariidae). *Malacologia*, **39**(1-2): 207-213.
- Keawjam, R.S. (1986a) Laboratory maintenance, narcotization and induction of aestivation of apple snails (Mesogastropoda: Pilidae). *Malacological Review*, **20**: 111-112.
- Keawjam, R.S. (1986b) The apple snails of Thailand: distribution, habitats and shell morphology. *Malacological Review*, **19**: 61-81.
- Keawjam, R.S. (1987a) Guide for the identification of freshwater snails of the family Pilidae in Thailand. *Walkerana*, **2**(8): 173-186.
- Keawjam, R.S. (1987b) The apple snails of Thailand: aspects of comparative anatomy. *Malacological Review*, **20**: 69-89.
- Keawjam, R.S. and Upatham, E.S. (1990) Shell morphology, reproductive anatomy and genetic patterns of three species of apple snails of the genus *Pomacea* in Thailand. *Journal of Medical and Applied Malacology*, **2**: 45-57.
- Keawjam, R.S., Poonswad, P., Upatham, E.S. and Banpavichit, S. (1993) Natural parasitic infection of the golden apple snail, *Pomacea canaliculata*. *The South-east Asian Journal of Tropical Medicine and Public Health*, **24**(1): 170-177.
- Michelson, E.H. (1961) On the genetic limits in the family Pilidae (Prosobranchia: Mollusca). *Breviora*, **133**: 1-10.
- Pain, T. (1972) The Ampullariidae, an historical survey. *Journal of Conchology*, **27**(7): 453-462.