Apple snail, *Pomacea canaliculata* Lamarck, 1822

Invasion, spread and Control in China

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General biology

- Apple snail (golden apple snail in Taiwan), *Pomacea canaliculata,* is basically tropical or subtropical species, originally distributed in South America countries including Argentina and Uruguay. It is extremely polyphagous, feeding on vegetal (floating or submersed higher plants), detrital, and animal matter.

Conchological variation of *Pomacea canaliculata*

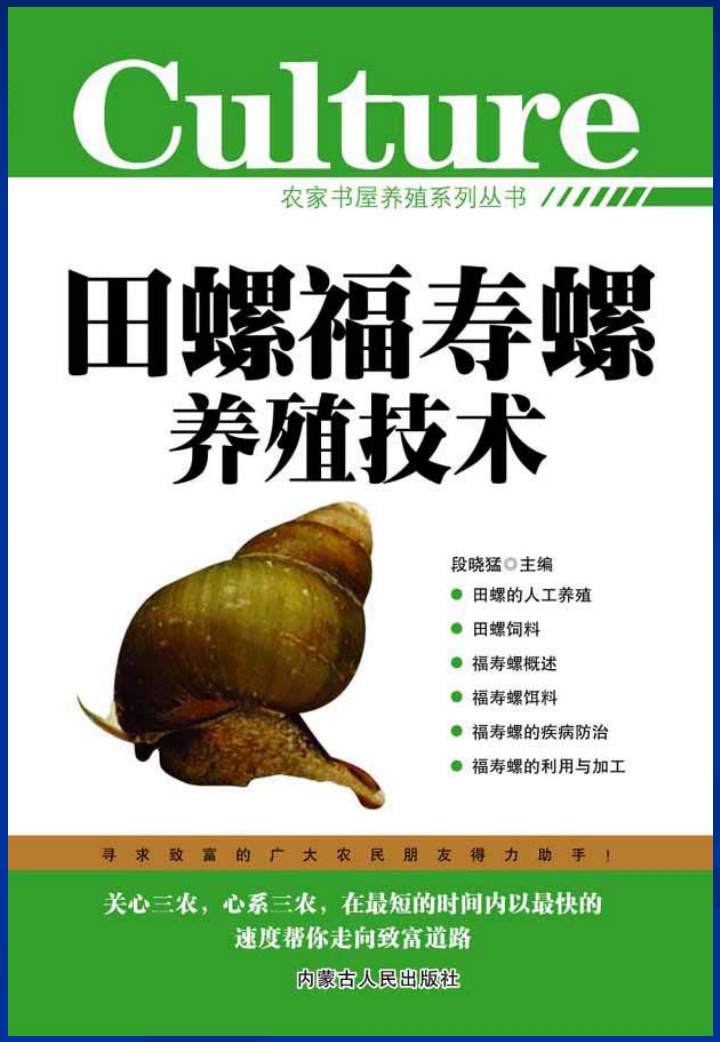
- The shells of the apple snails are globular in shape. Normal coloration typically includes bands of brown, black, and yellowish-tan; color patterns are variable. Albino and gold color variations exist.

Privately brought to Taiwan in 1980

- The eggs of snail *Pomacea canaliculata* (egg lump) was intentionally brought into Taiwan by an argentine Chinese from Argentina for aquaculture purpose in the early 1980s.

Introduced to mainland China in 1981

- In 1981, *Pomacea canaliculata* was introduced to China. Due to the easiness and low cost in culture, it was then extended to culture in more 20 areas in Guangxi, Zhejiang, Beijing. Many relevant institutes involved in the application and dissemination of culture technology of apple snail.



Diminishment of *Pomacea canaliculata* culture

- Graduatlly, people realized that cultured apple snail do not taste as good as as expected, which resulted in market decrease.
- Meanwhile, the harmful effects of this snail were realized with the spread of its distribution and increase of population, particularly in the rice field.

Ecological disaster of introduced snail

- In Taiwan, 170, 000 hm^2 of rice field inflicted damages of snail *Pomacea canaliculata*.
- Damaged rice and other crops were ever reported in 7 provinces in China, which involved an area of 40,667 hm^2 (many reports did not indicate the area of damage).

Damaged rice due to piles of snails in rice field in Guangxi

- In 2006, in an area of 2, 500, 000 mu of rice field, apply snail population broke out and resulted in damage of the rice.
- Local government had to wage a war against snails in the rice field by chemical pesticides.

Pomacea canaliculata firstly reported to be Infected with *Angiostrongylus cantanensis*

- Pan CW et al. (1997) firstly detected the third stage larvae of *Angiostrongylus cantonensis* from examination of 361 individuals of *Pomacea canaliculata* in Wenzhou, Zhejiang Province, the prevalence was up to 69.40% and mean intensity was about 32.6. Then many other similar reports from other parts of China were sporatically published.

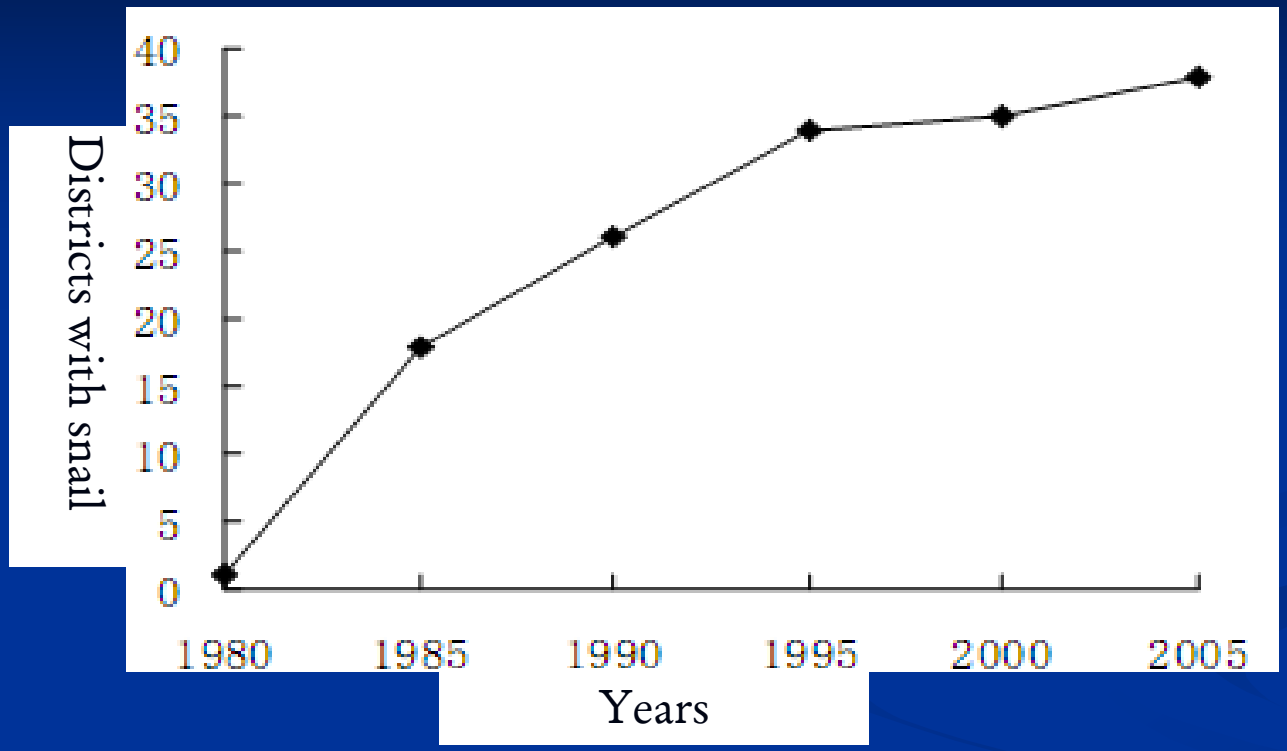
In 1997, Angiostrongyliasis in Wenzhou, Zhejiang Provinces

- In a dining party in Wenzhou, in 1997, a total of 184 people had meal together in a restaurant. Among 105 people who ate undercooked apple snail, 47 got angiostrongyliasis, morbidity of 44.80％。For the 77 people who did not eat the snail in the same meal, nobody had this disease.

2006, Angiostrongyliasis in Beijign, after eating undercooked apple snail

- In 2006, 87 people in Beijing got angiostrongyliasis of different symptoms after eating undercooked apple snails transported from Guangxi province. (Left picture: http://bjyouth.ynet.com/article.jsp?oid=11794904; Right picture: http://health.163.com/special/00181AE0/Apple_Snail.html)

Distribution area of *Pomacea canaliculata* in China since 1980



- **In 1980s, it spread passively by aquacultural activity; after 1995, it invades new inhabitats actively.**
- （From：Yang YX et al，Chinese Agricultural Science Bulletin，2010，26：245－250）

Control of *Pomacea canaliculata* - molluscicides

- There are commercialized molluscicides in the market. The ingredients of these molluscicides are mainly niclosamide (as in the right picture), crystal copper sulfate, Tea seed cake, sodium pentachlorophenate, fentin acetate, metaldehyde, niclosamide ethanolamine and aqueous saponins nicotine.

Control of *Pomacea canaliculata* – manually picking out

- When the snails are not too abundant, farmers prefer to pick out the snails and egg lumps from the rice field.

Control of *Pomacea canaliculata* – breeding ducks in rice field

- Farmers culture ducks in rice field so that ducks can eat snails in the rice field.

Our proposal for the control of this snail

Besides duck and many aquatic birds, Apple snail has more than 40 natural enemies, such as common carp, black carp, shelled turtle, tortoise, frogs, toads and even ants. It also includes rats that is the definitive hosts of *Angiostrongylus cantanensis*.

Thanks for attention

Hi, Anything else you can do to me?