

# Apple Snails

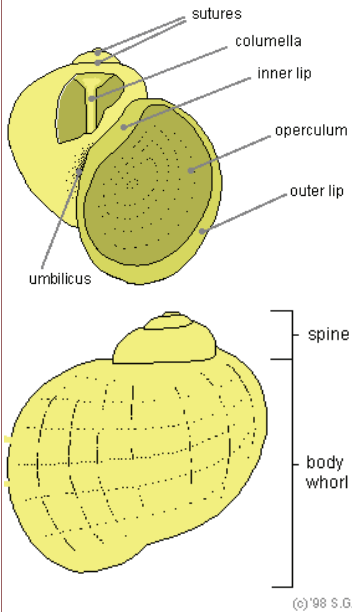
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## Shell Morphology



This publication is intended to educate farmers about apple snails, it is not meant to be a guide for definitive identification.

## Snails: A Common Aquarium Product

Apple snails, Family Ampullariidae, are well-known and popular aquarium snails throughout the world because of their feeding characteristics that clean aquariums and attractive appearance, shape and size. Members of the apple snail family are the biggest living freshwater snails on earth.



A common apple snail in aquarium shops is *Pomacea bridgesi* (spike-topped apple snail). The pictures shown here illustrate the different shell colors, from brown to albino or yellow and even blue, with or without banding, found in the aquarium trade and produced in Florida (a yellow variant is known in the trade as the “golden mystery snail”). The living tissue also varies in color from black to yellow or gray. These wonderful combination of colors makes this snail an attractive and interesting addition to hobbyist aquariums.



## U.S. Regulations concerning Apple Snails

The United States Department of Agriculture, Animal and Plant Health Inspection Service (USDA-APHIS), implemented existing regulations on April 5, 2006 to: 1) require importers and interstate sellers of marine and freshwater aquatic snails to acquire a three-year permit, 2) prohibit the importation or interstate movement of all members of the Family Ampullariidae, and 3) routinely inspect shipments of aquatic plants and

aquarium supplies that may contain aquatic snails.

Interstate movement of *Pomacea bridgesi* (*diffusa*) does not require a permit.



*P. canaliculata*

The USDA permit was supported by the actions of a variety of states and nations. The State of Mississippi prohibited all members of the apple snail family Ampullariidae calling them “destructive plant eating apple snails.” Texas, Hawaii, California and Louisiana have identi-



*P. canaliculata* yellow phase

fied *P. canaliculata* as an agricultural pest that can negatively impact rice, taro and the production of other aquatic plants.

Florida biologists first observed channeled apple snails in 1987 in the canal systems south of Lake

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## Apple Snail Identification

Apple snails can be confused with snails from the Family Viviparidae. The snails from this family look very similar in shape and color, but they do lack a lung, a siphon and labial tentacles (the small tentacles near the mouth). In contrast with the egg-laying Ampullariidae snails, the Viviparidae snails are live bearing.

If a snail grows over four inches, and has somewhat indented sutures like *P. canaliculata*, then the animal is probably *P. maculata*. This species is considered to be the largest freshwater snail on earth. More common, and also rather large, is *P. haustrum*.



The extended siphon allows a submerged apple snail to breathe.

When the snail has a flat shell and has a size over one inch, with or without dark stripes, it probably is *Marisa cornuarietis*, giant ramshorn snail. This snail is not always recognized as an apple snail due to its different ap-

pearance.

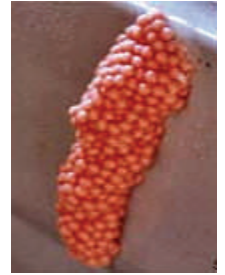
Similar in size and shape to *P. bridgesi* and *P. canaliculata* is an apple snail native to Florida, *P. paludosa*, the Florida apple snail.



*Marisa cornuarietis*

A quick method for differentiating apple snails can be based on shell

shape. When attempting to identify snails ignore the animal and shell colors when comparing them with pictures. Many color variations (shell and body) exist within a single species



*P. canaliculata* egg mass.

(please note the variety of colors for each species pictured in this technical bulletin). An excellent source for color pictures and an interactive, three-dimensional representative of each species, please visit <http://www.apple snail.net>.

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## U.S. Regulations (continued from page one)

Okeechobee and assumed they were *P. canaliculata*.

Genetic work indicates the animal is the island apple snail, *P. insularum*, a close relative to the channeled apple snail and a member of what is being termed the *canaliculata* complex. Within the past



*P. canaliculata*: yellow phase

10 years, channeled apple snail populations have greatly expanded throughout the state and anecdotal evidence suggests that these snails may effect native aquatic plant populations which are important habitat for native fish and wildlife.

Ampullariidae species (apple snails) are not prohibited or re-

stricted in the State of Florida. Commercial aquaculturists culturing aquatic snails must annually acquire an Aquaculture Certificate of Registration from the Florida Department of Agriculture and Consumer Services, report the species they are culturing, include their certificate number on invoices and packaging, and implement Aquaculture Best Management Practices.



## Apple Snail Taxonomy

Apple snails belong to the phylum Mollusca, class Gastropoda (snails), subclass Prosobranchia, order Mesogastropoda, family Ampullariidae (apple snails). The Ampullariidae family is divided into several genera with about 120 different species. The



*P. f. flagellata*

genera *Asolene*, *Felipponea*, *Marisa*, and *Pomacea* are the New World genera (South America, Central America, the West Indies and the Southern United States), while the genera *Afropomus*, *Lanistes* and *Saulea* are found in Africa. The genus *Pila* is native in

both Africa and Asia.

However, the number of genera is open to debate and much work needs to be done to identify all species, rule out the misidentified species, and remove synonymous species.



*P. haustrum*

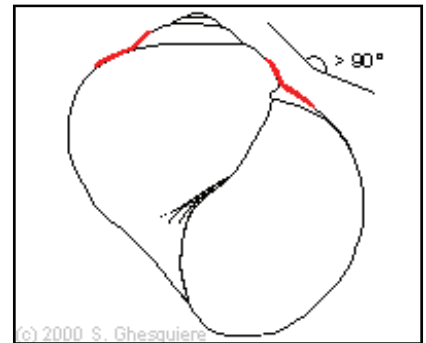
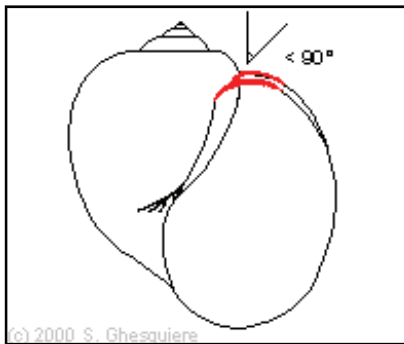
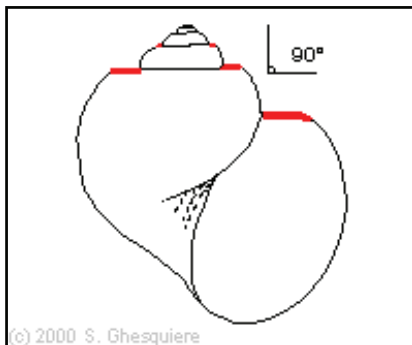
# Apple Snail Identification (continued from page two)

The shell of *P. bridgesi*, spike-topped apple snail, has about 5 to 6 whorls. The most obvious characteristic of the shell are the square shoulders (flat at the top of the whorls) with almost 90° sutures. The shell opening is large and oval, the umbilicus (the deep pit in the center of the shell) is large and deep. The size of the shell varies from 40-50 mm wide and 45-65 mm high. The spire is high and sharp, hence the common name, spike-topped apple snail.

*P. canaliculata* and *P. insularum*, channeled and island apple snail, have a globose (round) shell and the shell can be relatively heavy (especially in older snails). The 5 to 6 whorls are separated by deep, indented sutures (hence the name 'canaliculata' or 'channeled') that are less than a 90° angle. The shell opening is large and oval to round. Males are known to have a rounder aperture than females. The umbilicus is large and deep. The size of this snail varies from 40 to 60 mm

wide and 45 to 75 mm high.

*P. paludosa*, Florida apple snail, is globose with a shell opening that is large and oval. The umbilicus is large and deep. The overall size can vary from 40 to 55 mm wide and 45 to 65 mm high. This apple snail has almost flat sutures with greater a than 90° angle, which gives the snail a cone shaped shell top (spine).



## Apple Snail Biology

Apple snails inhabit a wide range of ecosystems from swamps, ditches and ponds to lakes and rivers. Most apple snail species prefer still rather than moving water.

The respiratory system of the apple snail is highly adapted to tropical climates that consist of wet and dry

seasons. The seasonal abundance of water is reflected in the apple snails respiration system: a combination of both a gill and a lung.

Apple snails can remain active throughout the year or enter periods of aestivation depending on environmental conditions. The main

factors that determine apple snail activity are temperature, rainfall and food availability. Temperature and rainfall are the prime determinants. During aestivation apple snails bury in mud and their metabolism slows down. Apple snails that inhabit areas without a distinctive dry-wet season (continued on page four)

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the environment and supporting  
Florida agriculture.*

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## Florida Prohibited Snails

The following terrestrial snails are considered injurious to Florida agriculture. Introduction or distribution of these snails to Florida is prohibited under Chapter 5B-43, Phytophagous Snails, Florida Administrative Code. This prohibition includes snails in all live stages of development. Dead, canned or non-living, processed snails are exempt:

- *Achatina spp.* (Example: giant African snail).
- *Helix spp.* (Example: brown garden snail).
- *Theba pisana* Muller (white garden snail).
- *Megalobulimus oblongus* Muller (giant South American snail).
- Any other plant-feeding snail (i.e., phytophagous) which may be determined by Florida Department of Agriculture and Consumer Services order or rule to be injurious to Florida agriculture.

In addition, certain states and regions of the world are known to be infested with these snails. Materials shipped from those areas that can harbor the snails must include a certificate issued by and bearing the signature of an authorized inspector of the government of origin, certifying that materials contained in the shipment were inspected and found to be free of the plant-feeding snails listed above. For additional information, contact the Division of Plant Industry, Bureau of Plant and Apiary Inspection, at 352-372-3505.

## Apple Snail Biology (continued from page 3)

will have a temperature-based life cycle and occasionally hibernate if food availability decreases in the cold season. All apple snails require subtropical or tropical temperatures and do not inhabit regions where the temperature drops below 50°F in the winter months.

Apple snails are herbivorous, generally preferring soft vegetation. They will consume tougher plants and algae as long as they are able to grasp pieces with their radula (rasping organ). Although the radular system is almost identical throughout the apple snail species, some species have stronger and lar-



*P. canaliculata* surface feeding

ger teeth than others.

Another strategy used to attain food is surface film feeding when food is floating. The snail crawls to the surface and forms a foot-funnel in which particles

from the surface are trapped and eaten.

Many apple snail species are known to eat other snail eggs. Egg consumption is quite common, while snail predation occurs during periods of starvation, but can happen when food is in excess. In extreme cases (prolonged starvation) apple snails are known to be cannibalistic.

Apple snails also consume all kinds of dead animals including fish, frogs, crustaceans, insects and the eggs of fish, frogs, snails and insects. The high nutritional value of these food sources fits well in their survival strategies.

The reproductive cycle of apple snails is determined by food availability and water temperature. During periods of high temperature and abundant food, some apple snail species have a very short life cycle from egg to adult of less than three months (60 days in the case of *P. canaliculata*) and can reproduce throughout the year. The total number of eggs laid is species dependent and can vary from 100 to 1,000.