

The New Guinea Land Planarian: A New Invasive Species

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A new species of land planarian (a terrestrial predatory flatworm) has been introduced into South Florida. *Platydemus manokwari* (Platyhelminthes, Geoplanidae) has been carried by human commerce to numerous islands in the tropical Pacific and Indian Oceans. It was first found in Florida in 2012 in Dade County and was detected in San Juan, Puerto Rico in 2014. It had been previously found in Oahu, Hawaii, but the Florida introduction was the first record from the mainland Americas (North or South America).

The primary ecological concern is due to their feeding habits. *Platydemus manokwari* is a predator of land snails (Fig. 1). While they happily feed on whatever snail is most abundant, such as invasive snail species like *Zachrysis provisoria*, the Cuban brown snail, or *Lissachatina fulica* (formerly *Achatina fulica*) the giant African land snail, they also pose a threat to native snails including endemic tree snails of Florida. The New Guinea land planaria has caused the decline of some Hawaiian tree snails in Oahu.

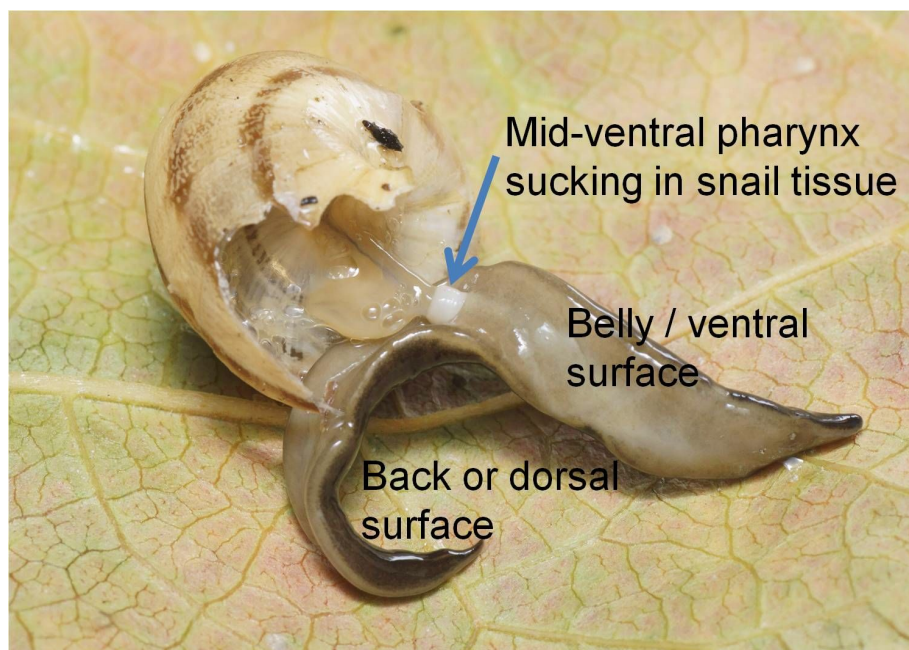


Figure 1. *Platydemus manokwari*, the New Guinea land planaria feeding on a European land snail in France. Modified from DOI: [10.7717/peerj.297/fig-5](https://doi.org/10.7717/peerj.297/fig-5)

The second concern with the New Guinea land planaria comes from its potential to act as a mechanical paratenic (transport) vector of rat lungworm (*Angiostrongylus cantonensis*). The giant African land snail, *Achatina fulica*, another invasive species, is known to be a particularly good host of rat lungworm. If a human eats J3 infective stage rat lungworm larvae, it could result in an infection causing human eosinophilic (type of white blood cell) meningitis.

What sequence of events is required for the New Guinea land planaria to transport rat lungworm and infect a human? (Capinera and Walden 2013)

- Roof rats or Norway rats in the area must be infected with adult rat lungworm.
- The Juvenile (J)1 lungworm larvae are dispersed by the rat in its feces.
- The J1 larvae are ingested by snail host when it eats the rat's feces.
- The lungworm grows and molts twice inside the snail to become an infective J3.
- At this stage, usually the rat eats the snail and a J3 larva infects the rat, or a person who accidentally eats something covered in snail slime that contains the infective larvae and becomes a dead end host.
- But sometimes, a predatory land planaria eats an infected host snail. The infective lungworm larvae ride on the land planaria's slime and the slime may be deposited on a leaf or fruit that a person eats without washing or cooking.

Each of these steps has a probability that it will occur at a given place. Imagine 5 index cards with a randomly placed hole on each card which reflects the probability that each of the steps above would happen. The holes range from the size of a quarter, to the size of a paper punch or a pin hole. Without looking, line up the cards just by their edges. Now hold the stack of cards up to a light. The probability that a person could become infected with a rat lungworm from a New Guinea land planaria would be estimated as the area where all the holes lined up. Only one hole needs to be out of alignment for infection not to be possible. This has also been called the "Swiss Cheese Analogy".

IDENTIFICATION. The previous two introduced species of land planaria, *Bipalium kewense* and *Dolichoplana striata*, have been in Florida for a considerable period, perhaps as long as 100 years. They are a nuisance or a curiosity, but not considered serious pests. They are predators on earthworms in wet environments.



Figure 2. The three Florida land planaria or flatworms. (Left) *Bipalium kewense*, with the shovel shaped head, (middle) *Dolichoplana striata*, (right) the New Guinea land planaria, *Platydemus manokwari*.

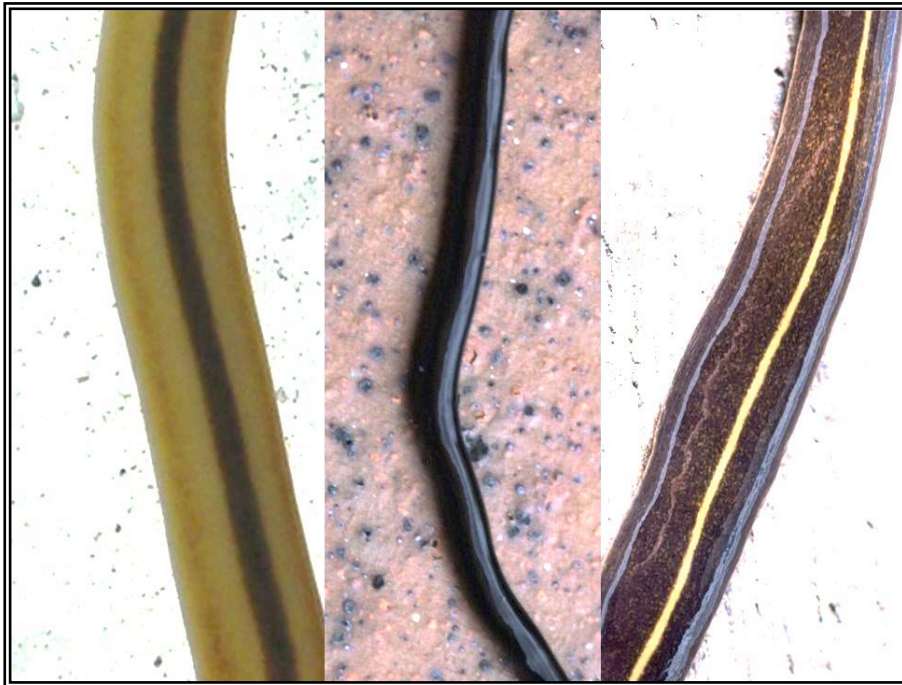


Figure 3. The dorsal pattern of the three Florida land planaria or flatworms. (Left) *Bipalium kewense*, tan with a dark median stripe. (Middle) *Dolichoplana striata*, generally black or dark gray with no lines. (Right) the New Guinea land planaria, *Platydemus manokwari*, has a dark back with a median light stripe and the belly is distinctly lighter than the back. In the picture to the right, the thin, light, bluish lines along the sides are only light reflections and not part of the animal's pattern.

CONTROL. There are no pesticides registered for land planaria control. Habitat manipulation, i.e., decreasing moisture, has been used on worm farms to reduce damage from *Bipalium* or *Dolichoplana*. Dry weather causes land planaria to retreat into moist refugia, in the soil. Limiting their food supply by controlling pest snails would likely be the most effective measure homeowners or pest control professionals could use to reduce New Guinea land planaria populations. Registered snail baits should always be used according to the label directions. Local rat control would also help reduce the miniscule risk of rat lungworm accidental infection.

Additional Information:

Capinera, J. and H. S. Walden. 2013. Rat lungworm: *Angiostrongylus cantonensis*. Featured Creatures, EENY- 570 University of Florida.

http://entnemdept.ufl.edu/creatures/nematode/rat_lungworm.htm

Choate, P. M. and R. A. Dunn. 2015. Land Planaria. Featured Creatures, EENY- 049 University of Florida. http://entnemdept.ufl.edu/creatures/misc/land_planarians.htm or

<http://edis.ifas.ufl.edu/pdf/files/IN/IN20600.pdf>

Florida Department of Health Fact Sheet on Rat Lungworm Parasite. Florida Division of Environmental Health, Bureau of Environmental Public Health Medicine, Tallahassee, Florida

<http://www.freshfromflorida.com/content/download/23822/485844/fdh-gals-faq-rat-lungworm-parasite.pdf>

Giant African Land Snail vs. Other Common FL Snail ID Sheet. Florida Department of Agriculture and Consumer Services. <https://www.freshfromflorida.com/content/download/23825/485859/snail-id-sheet.pdf>