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## MESSAGE FROM KALANI

I am pleased with the actions our community has taken since our special issue on rat lungworm disease. Precautionary measures will continue to combat the disease, while education will be the goal of our office. I ask the community to stay vigilant and alert to the dangers that threaten our health. We will coordinate private donations of rat traps and other items for a rapid response, as the State ramps up its campaign through the Department of Health and other agencies.

# SENATOR J.KALANI ENGLISH

HAWAI'I STATE SENATE 7TH DISTRICT

HĀNA, EAST AND UPCOUNTRY MAUI,  
MOLOKA'I, LĀNA'I AND KAHO'OLAWÉ



Maui Senators: Keith-Agaran, English and Baker and 500 rat traps. April 27, 2017.

## RAT LUNGWORM DISEASE COMMUNITY ACTION ALERT UPDATE

**Rat lungworm disease has been found in our district. Therefore, we must take immediate action to control and eliminate the spread of the disease.**

In March, the State Health Department confirmed a case of rat lungworm disease on Maui and is investigating four more cases. Rat lungworm is caused by a round worm parasite. The adult parasite is only found in rats. The infected rats can pass the larvae in their droppings. Snails and slugs become infected by eating the larvae. People can get the disease by eating raw produce with tiny snails or slugs that have eaten the lungworms. We might also get the disease from eating under cooked freshwater prawns/frogs that have become infected from water contacting infected slugs and snails.

On April 26, in collaboration with Jonathan Starr Foundation, Senator English's staff, Senate and House Colleagues and other community leaders, gathered over 500 rat traps that will be distributed at the East Maui Taro Festival on Saturday, April 29th. "A big mahalo to Jonathan Starr and his foundation for collaborating with us on combating rat lung-worm disease on Maui." said Sen. English, "Our Hāna community is putting together a task force to help neighbors with tools and education as well."

Our communities need to take immediate action through prevention and control of the disease. First, the community must control the rodent population by using appropriate traps. Secondly, **DO NOT** eat raw or under cooked snails or slugs, which maybe in vegetables or on fruits. Thoroughly **wash and inspect fresh produce and vegetables**, especially if eaten raw. Finally, eliminate snails and slugs near houses and in the garden. Follow tips and read information provided herein. If you have suspicious symptoms see your physician.

# RAT LUNGWORM HEALTH ALERT UPDATE

## HAWAI'I DEPT. OF HEALTH HOSTS INFORMATION TOWN HALL IN HĀNA

An estimated 250 - 300 people attended the DOH sponsored community meeting in Hāna at Helene Hall on April 6.

Dr. Lorrin Pang, Hawai'i Dept. of Health; Kay Howe, Professor, College of Pharmacy, UH Hilo; Lissa Fox Strohecker, Maui Invasive Species Committee (MISC); and Robyn Pfahl, Hawai'i Farm to School Coordinator, teamed up to inform an anxious East Maui community after three confirmed cases of *Angiostrongylus cantonensis* (rat lungworm disease) have emerged. Local Health Care Professionals, Farmers, Gardeners, Parents, Educators, Keiki, and Food Handlers were in attendance.

Dr. Pang presented a thorough introduction of the systematic pathology of transmission of the parasite to humans through ingestion and the effect of parasitic meningitis as the human immune system is triggered to fight the parasite.

Prof. Howe shared her and her son's terrifying first-hand experience with the disease. She also shared her profound depth of research and knowledge from years of study on Hawai'i Island which has a long history of battling this disease.

Prof. Howe stressed that while much is being learned through the tragic first-hand cases locally and the subsequent research at UH Hilo, federal funding and support is essential for broader studies of this health crisis and eradication efforts. Help from USDA is needed for pest control. Recent data revealed that of 557 rats collected and tested, all were infected. MISC will require additional support for surveying, specimen and data collection.

Robyn Pfahl stated that there has been support for education and prevention from Sen. English, CTAHR (College of Tropical Ag. and Human Resources), Maui County and UH Hilo. Through her outreach program, partnering with Lehn Huff, Maui School Garden Network Coordinator, has education material available for Dept. of Education (DOE). Cooperation and support with Dept. of Ag. will extend crop protection, rat and snail protection for farm operations.

Robyn and Lehn arranged additional meetings scheduled by Maui School Garden Coordinators for Hāna School and a RLW workshop at UHMC on April 7, 2017. A video will soon be made available of Prof. Kay Howe's presentation and distributed to CTAHR, UHMC Ag Department, Maui County Farm Bureau, Hawai'i Farmers Union United, Maui Invasive Species Committee, Department of Health, Maui District Health Office.



On April 11, Cynthia Nazario-Leary, Lynn Nakamura-Tengan and Kylie L.T. Wong from UH Mānoa Extension CTHAR faculty returned to Hāna to address a group of growers, landscapers and home gardeners from Hāna, Kīpahulu and Nahiku. They shared updated procedures for hygiene, rat and slug control and all discussed and shared tips on avoiding transport of slugs, trapping and disposing. Also discussed were the different behaviors and habitats of the semi-slug only recently found in the area. A variety of pesticides, trapping methods and safe disposal were demonstrated. The group collectively expressed their concerns for market product and public consumer protection.



Dr. Pang fielded questions from the audience. Here are some of the questions raised and answered by the team and with information contributed by health professionals, farmers and two survivors:

**Q** - When someone survives the meningitis provoked by ingesting the parasite, do they develop any immunities against a second infection if ingested again?

**A** - No, though further studies are needed.

**Q** - Are dogs and cat at risk, livestock?

**A** - Yes. In puppies it is deadly. (see Precautions for prevention)

**Q** - Does UV light or chlorine kill the parasite in catchment water tanks?

**A** - No. Boiling water in question is the safest practice.

**Q** - Is the parasite communicable between humans?

**A** - Only through blood transfusion.

**Q** - Are mongoose, like rats, a preferable host for the parasite?

**A** - Unknown, take same precautions around mongoose feces.

**Q** - Does vinegar, food grade hydrogen peroxide, soap or UV light kill the parasite during the washing?

**A** - No. Parasite thrives in an acidic environment so vinegar is not advisable. Hydrogen peroxide and UV light has not proven effective.

**Q** - Are there alternative parasitic drugs or purge methods tested that can halt the parasite if ingestion is suspected?

**A** - Only if treatment kills the parasite before it reaches the brain. Treatment should be done immediately or within 3 weeks.

**Q** - How soon after ingesting slug do symptoms appear?

**A** - 1-3 weeks.

**Q** - How long can the parasite survive outside the host?

**A** - 3 hours.

**Q** - Which slugs are the preferred carriers?

**A** - Cuban slug, Semi-slug, African Snail, prawns, crabs. But all slugs should be treated with cautionary suspicion.

"Good turnout and questions," said Dr. Pang, "it reflects the community's attitude to resolving this complex issue and they continue to work on this long after the meeting has ended".

"I am pleased that our community is quickly responding and taking action to a real threat that could affect all of our lives," adds Sen. English. "This is not the first time that we come together to combat a regional health problem while in its initial stages and prevent it from becoming an actual hazard in the State and affecting residents and visitors as well."



## RAT LUNGWORM HEALTH ALERT UPDATE CONTINUED

We have learned that particular ecosystems, just like East Maui, are ideal for the transmission of the parasite. Since it has emerged here, it is imperative that our way of living has to change - being observant, proactive, informed is more critical than ever. The team outlined the fundamental hygienic practices necessary as a preventative. The parasite is not visible so to get an upper hand on controlling the spread of the parasite calls for a war on rat feces - minimizing and eradicating rats, slugs and snails.

Rats' lungs host the first stage of incubation, the larvae is passed through the rat feces, the slugs that travel over the rat feces ingest and carry the parasitic third stage larvae as they raid the veggie garden, banana bunches, papayas, pineapples, damp garages, pet food dishes by night leaving the third stage slime trail behind them. By morning they all flee to dark places, some smaller slugs hide in the dark folds of vegetation by day. If ingested by human (or some animals) the larvae enter the bloodstream through the intestines and the body's natural defense attacks the larvae.

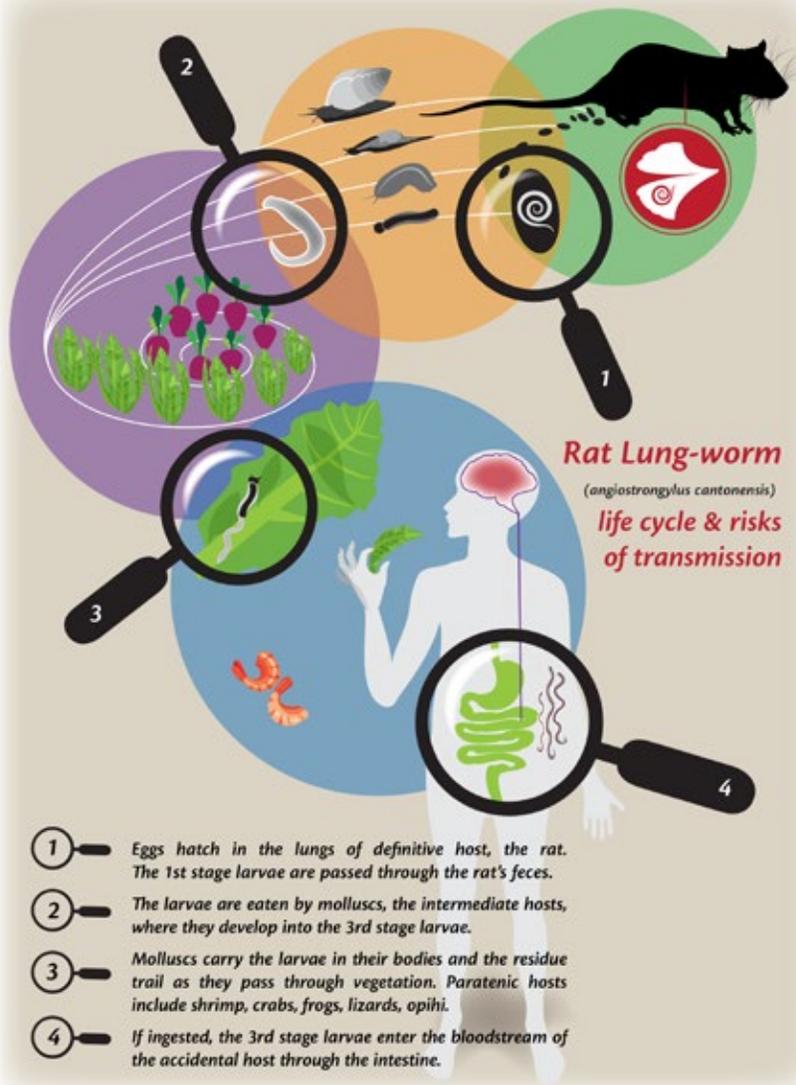
The larvae will eventually die, humans do not pass the larvae on through their feces, however the ensuing battle takes a deleterious toll on the body, often with long term effects, especially devastating in children's developing and vulnerable systems. Crabs, frogs, snails, prawns and possibly opihi may be carriers and if not cooked properly when eaten may introduce the third stage larvae through the intestinal track.

### Smart Precautions

All water consumed and used for washing fruits and veggies should be potable standard.

Adopt a hyper cleaning habit with fruits, veggies, cooking surfaces, cutting boards, knives, refrigerator, etc. Food brushes and food thermometers are important handy tools.

If on a catchment system, clean tank roof and gutters often. Change water filters regularly,



a **1 micron** filter is preferred.

Generally slugs are active by night and hide in cool, damp, dark places by day. They can be found along the under plastic and terracotta planters, along the lip of pots, under leaves and rocks, in damp dark garages, shops and laundry rooms, under petfood bowls and in pet food storage containers.

**Use gloves or utility tools** clearly marked for this purpose. Store tools in a antiseptic solution. - **never handle** slugs, snails, dead rats or feces with bare hands. Dispose of slugs and snails in a jar with tight fitting lid filled with a 15% salt water solution. This kills the slug and prevents pets or rats from eating. Do not leave dead slugs out in the open. They may be dead but the parasite is transmittable for hours.

Commercial slug bait is effective, read labels carefully, some are toxic to pets. There

are simple methods to attract and trap/kill slugs. One method demonstrated uses a dark tarp or black plastic garbage bag. Lay flat on the ground - folded 3 times with water sprinkled between layers. Place a rock on top to secure in place overnight. Using gloves and utility tongs, unfold the layers and remove the slugs gathered between folds. Place in salt water jar.

Use appropriate traps to kill rats. Do NOT handle carcass without gloves, place in sealed plastic bag, dispose in trash containers with lid firmly closed.

If transporting potted plants, truckloads of dirt or rock, inspect contents thoroughly before distributing on your property. The parasitic nematode can survive deep in the soil.

Properly cook prawns, crabs, opihi, frogs, vegetables, (165°) or freeze for 24 - 48 hours.

Adopting these practices daily will become second nature in a short time and will reduce the risk of interaction and exposure to the parasite.

### Be alert to symptoms

Hypersensitivity to skin, headache, paresthesia (a burning or prickling sensation that is usually felt in the hands, arms, legs, or feet, but can also occur in other parts of the body), pain that moves from one area of the body to another - neck and shoulder, leg next day, back to head. The vague initial symptoms mimic other diseases, like leptospirosis and typhus, these must be diagnosed and treated with antibiotics quickly. If these or flu- like symptoms appear, see your doctor immediately.

### Treatment

Currently, a spinal tap is the only method of diagnosis. Large doses of steroids counter affect of inflammation from meningitis. Pain medication are administered to help relieve symptoms. The parasites cannot age or reproduce in humans and will eventually die.

**J. KALANI ENGLISH**  
Senate Majority Leader

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**HOW TO REACH US**

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**CAUTION AND PREVENTION OF  
RAT LUNGWORM DISEASE**

**TAKE ACTION NOW**

Prevention and control of the disease  
is important to avoid the disease from  
spreading.

- Control the rodent population by using appropriate traps.
- Avoid eating raw or undercooked snails or slugs, which may be in vegetables or on fruits.
- Thoroughly wash and inspect fresh produce and vegetables, especially if eaten raw.
- Eliminate snails and slugs near houses and in the garden. Do not handle slugs/snails! With designated utility chopsticks or tongs.
- Dispose of snails and slugs in a solution of 15% salt water in a container with tight fitting lid.



**RESOURCES**

RLW in East Maui by Chad Meyer MD  
<https://adobe.ly/2puvFxP>

College of Tropical Agriculture and Human  
Resources and UHMC Ag Department  
<https://www.ctahr.hawaii.edu/site/>

[http://manoa.hawaii.edu/ctahr/  
farmfoodsafety/rat-lungworm/](http://manoa.hawaii.edu/ctahr/farmfoodsafety/rat-lungworm/)

Maui County Farm Bureau  
<http://www.mauicountyfarmbureau.org>

Hawai'i Farmers Union United [hfuhi.org](http://hfuhi.org)  
Hāna Chapter  
[hfuhi.org/chapters/maui-hana-chapter/](http://hfuhi.org/chapters/maui-hana-chapter/)

Haleakalā Chapter  
<http://www.mauifarmershaleakala.com>

Maui Invasive Species Committee  
[http://mauiinvasive.org/2016/06/21/  
rat-lungworm-disease/](http://mauiinvasive.org/2016/06/21/rat-lungworm-disease/)

<https://mauiready.org/ratlungworm>

[http://health.hawaii.gov/docd/disease\\_lic-  
ing/rat-lungworm-angiostrongyliasis/](http://health.hawaii.gov/docd/disease_listing/rat-lungworm-angiostrongyliasis/)

[http://pharmacy.uhh.hawaii.edu/rlw/educa-  
tion.php](http://pharmacy.uhh.hawaii.edu/rlw/educa-tion.php)

<http://pharmacy.uhh.hawaii.edu/rlw/faq.php>