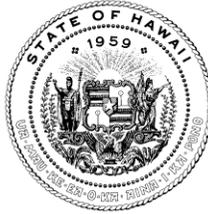


# HB474 HD1

RELATING TO RAT LUNGWORM DISEASE.  
Appropriates funds to the University of Hawaii at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.  
(HB474 HD1)

DAVID Y. IGE  
GOVERNOR OF  
HAWAII



**STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES**

POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

**Testimony of  
SUZANNE D. CASE  
Chairperson**

**Before the Senate Committees on  
HIGHER EDUCATION  
and  
AGRICULTURE AND ENVIRONMENT**

**Thursday, March 15, 2018  
1:15 PM  
State Capitol, Conference Room 224**

**In consideration of  
HOUSE BILL 474, HOUSE DRAFT 1  
RELATING TO RAT LUNGWORM DISEASE**

House Bill 474, House Draft 1 proposes to appropriate funds to the University of Hawaii at Hilo to support research relating to rat lungworm disease. **The Department of Land and Natural Resources (Department) supports this measure provided that its passage does not replace or adversely impact priorities indicated in the Executive Supplemental Budget request.**

The Department recognizes the threat of rat lungworm disease and the lack of information on statewide distribution of the parasite *Angiostrongylus cantonensis* and its hosts. The Department also notes that the Hawaii Invasive Species Council (HISC), which is administered by the Department, received proposals for research and education to address this disease in Fiscal Years 16 and 17, but was unable to identify adequate resources to support all of the proposed efforts. Additional funding support for a more comprehensive research program, as described in this measure, would be strongly beneficial for the protection of public health and the local agricultural industry.

Thank you for the opportunity to comment on this measure.

**SUZANNE D. CASE**  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT

**ROBERT K. MASUDA**  
FIRST DEPUTY

**JEFFREY T. PEARSON, P.E.**  
DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES  
BOATING AND OCEAN RECREATION  
BUREAU OF CONVEYANCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
CONSERVATION AND COASTAL LANDS  
CONSERVATION AND RESOURCES ENFORCEMENT  
ENGINEERING  
FORESTRY AND WILDLIFE  
HISTORIC PRESERVATION  
KAHOOLAWE ISLAND RESERVE COMMISSION  
LAND  
STATE PARKS



# UNIVERSITY OF HAWAII SYSTEM

## Legislative Testimony

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Testimony Presented Before the  
Senate Committee on Higher Education  
and  
Senate Committee on Agriculture and Environment  
March 15, 2018 at 1:15 p.m.  
By  
Carolyn Ma, PharmD, BCOP  
DEAN  
UH Hilo - Daniel K. Inouye College of Pharmacy

### HB 474 HD1 – RELATING TO RAT LUNGWORM DISEASE

Chairs Kahele and Gabbard, Vice Chairs Kim and Riviere, and members of the committees:

My name is Carolyn Ma, and I am the Dean for the UH Hilo Daniel K. Inouye College of Pharmacy (DKICP). As designated lead for the UH Hilo and on behalf of Interim Chancellor Marcia Sakai, the University of Hawai'i at Hilo fully supports this bill that will address the control and treatment of Rat Lung Worm (RLW) Disease.

UH Hilo's DKICP has both a basic science researcher and a pharmacy practice (pharmacist) faculty on the RLW Working Group.

A most recent study (in publication) has shown that Hawai'i Island has the highest *Angiostrongylus cantonensis* infection rates in rats (94%) and in mollusks (*Parmarion martensi*, semi-slugs 77%) in the country and the increase in human infection appears linked to the arrival of semi-slugs. A baseline recent study was conducted on Kauai between March-May 2017 and tested for the presence of *Angiostrongylus cantonensis* (Rat Lungworm), of which 17.2% of semi-slugs tested positive. Our basic science researcher has been active in conducting valuable research.

1. Jarvi lab has developed a 'death assay' to distinguish live from dead larvae. Continued study in this area will help complete studies determine how effective commercially available vegetable washes or other solutions are at killing infective RLW larvae.
2. Simulated catchment water systems have been initially conducted to test two different size filters in an attempt to filter out infective larvae. However, tests have shown that larvae can still travel or move around certain size filters. Continued evaluation of the possibility of RLW transmission in water is necessary by conducting laboratory and household catchment studies to optimize maintenance

and treatment design that prevents RLW larvae entering household and agricultural water supplies.

3. A pilot study has been completed to determine if a blood-based test can help to diagnose RLW, rather than the current diagnosed procedure of a spinal tap. Continued study of protein isolates from infected rats will help to evaluate the reliability and validity of such a test.
4. The lab continues to develop ways of reducing larval burdens in rats. Vaccination study was unsuccessful under given conditions. Further study in possibly deworming rats may be a more appropriate strategy.

Our Pharmacy Practice faculty has been working with Dr. John Martell in performing a retrospective chart review to better understand the treatment scheme and outcomes of the 70+ cases of RLW that have occurred in Hawai'i. Funding would help to continue this investigation and further study to determine the most effective medical treatment for the various stages of RLW in humans, domesticated animals and farm livestock.

UH Hilo supports this bill if the passage does not replace or adversely impact priorities as indicated in our University of Hawai'i BOR Approved Supplemental Budget.

**DAVID Y. IGE**  
Governor

**DOUGLAS S. CHIN**  
Lt. Governor



**SCOTT E. ENRIGHT**  
Chairperson, Board of Agriculture

**PHYLLIS SHIMABUKURO-GEISER**  
Deputy to the Chairperson

State of Hawaii  
**DEPARTMENT OF AGRICULTURE**  
1428 South King Street  
Honolulu, Hawaii 96814-2512  
Phone: (808) 973-9600 FAX: (808) 973-9613

**TESTIMONY OF SCOTT E. ENRIGHT  
CHAIRPERSON, BOARD OF AGRICULTURE**

**BEFORE THE SENATE COMMITTEES ON HIGHER EDUCATION AND  
AGRICULTURE & ENVIRONMENT**

**MARCH 15, 2018  
1:15 P.M.  
CONFERENCE ROOM 224**

**HOUSE BILL NO. 474 HD1  
RELATING TO RAT LUNGWORM DISEASE**

Chairperson Kahele, Chairperson Gabbard and Members of the Committees:

Thank for the opportunity to testify on House Bill No. 474 HD1, relating to rat lungworm disease. The Department supports the intent of this measure and defers to the University of Hawaii on carrying out the bill's mandates and appropriations.

Rat lungworm disease is a serious and relatively new pathogen to plague the consumption of fresh produce grown in the islands. There is a great need to conduct research into the biology of the carriers of the disease, the ways in which it can be spread, outreach to the public in understanding the condition, and methods that can be employed to control and/or contain it.

Thank you for the opportunity to testify on this measure.



**HB-474-HD-1**

Submitted on: 3/13/2018 2:15:11 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Elena Cabatu	Testifying for Hilo Medical Center	Support	No

Comments:

Hilo Medical Center supports HB474 HD1 in the fight for research, diagnosis and prevention efforts against Rat Lungworm Disease.

Harry Kim  
Mayor



Wil Okabe  
Managing Director

Barbara J. Kossow  
Deputy Managing Director

County of Hawai'i  
Office of the Mayor

25 Aupuni Street, Suite 2603 • Hilo, Hawai'i 96720 • (808) 961-8211 • Fax (808) 961-6553  
KONA: 74-5044 Ane Keohokālole Hwy., Bldg C • Kailua-Kona, Hawai'i 96740  
(808) 323-4444 • Fax (808) 323-4440

March 12, 2018

Senator Kaiali'i Kahele, Chair  
Committee on Higher Education  
Hawai'i State Capitol, Room 224  
Honolulu, HI 96813

Senator Mike Gabbard, Vice-Chair  
Committee on Higher Education  
Hawai'i State Capitol, Room 224  
Honolulu, HI 96813

Dear Chair Kahele, Vice-Chair Gabbard and Committee Members:

**Re: HB 474, HD 1 Relating to Rat Lungworm Disease**  
**Hearing Date: 03-15-18 – 1:15 pm; Conference Room 224**

Thank you for this opportunity to testify in support of funding for activities aimed at the prevention and eradication of rat lungworm disease. Until those goals have been achieved, a third worthy aim of the bill, clearly reflected in the amendments (although not specified in the preamble) is better treatment for those who fall victim to this illness.

The Daniel K. Inouye College of Pharmacy at the University of Hawai'i at Hilo established the Hawai'i Island rat lungworm disease working group. It has been conducting research and educational outreach on the disease for the past four years, and it is my understanding that it has been doing very valuable work.

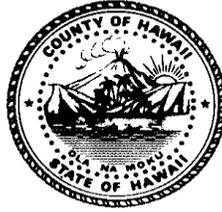
Apparently the impact of this disease has been different in Hawai'i than on the mainland, with unusually severe consequences reported for Hawai'i victims. Therefore, the funding of local research is uniquely important.

If UH-Hilo feels that the requirement of 1:1 matching funds is realistic, I urge you to support a generous appropriation to deal with this dreadful disease.

Respectfully submitted,

Harry Kim  
Mayor, County of Hawai'i

**Eileen O'Hara**  
Council Member  
Council District 4



**Phone:** (808) 965-2712  
**Fax:** (808) 961-8912  
**Email:** eileen.ohara@hawaiicounty.gov

**Chair:** Environmental  
Management Committee

**Vice Chair:** Planning Committee and  
Agriculture, Water & Energy  
Sustainability Committee

**County of Hawaii**  
**Hawaii County Council**

25 Aupuni Street, Suite 1402 • Hilo, Hawai'i 96720

Senator Kaiali'I Kahele  
Chair, Senate Committee on Higher Education  
Hawai'i State Senate

March 12, 2018

**Re: In Support of House Bill 474, from Hawai'i County Council District 4**  
**To be heard by HRE on 03-15-18 1:15PM in conference room 224**

Aloha Chair Kahele and Committee Members:

I'm writing to express my support for House Bill 474, which appropriates funds to the University of Hawai'i at Hilo, the Department of Health, Department of Land and Natural Resources, and Department of Agriculture for programs, studies, and activities related to rat lungworm disease.

Further research, treatment, prevention, and education efforts are desperately needed for all of those living with, or at risk of, contracting this devastating disease. Since the disease has come to Hawai'i from Asia, its effects have become more virulent and severe. The disease has also been found in Florida and a case was recently diagnosed in Tennessee. Without aggressive research, there is potential for rat lungworm to spread to other mainland locations.

Local institutions like the University of Hawai'i at Hilo, College of Pharmacy, are already equipped to conduct the necessary research to gather critical information about this disease. Incidences of it are grossly understated, and this research could provide more rapid diagnoses that would allow us to provide acute care in the early onset and prevent serious permanent disabilities. Diligent and effective treatment at this phase would save a tremendous amount of tax payer money required to provide long term care for individuals who have been affected by the disease.

I do not hesitate to support any measure to research and prevent rat lungworm. Please consider the important impacts that passing this bill will have on our economy and health, and contact me if you have any questions about my support or knowledge of the subject.

Sincerely,

Eileen O'Hara  
Council Member  
Council District 4



**HUI MEMBER  
ORGANIZATIONS:**

Farm to Keiki  
(Preschool/ECE)

FoodCorps Hawai'i

Grow Some Good

Hawai'i Association of  
Independent Schools  
(HAIS)

'Iolani School/O'ahu Farm  
to School Network

Kamehameha Schools

Kōkua Hawai'i Foundation

Mala'ai: Culinary Gardens  
of Waimea Middle School

Mālama Kaua'i/Kaua'i  
School Garden Network

Maui School Garden  
Network

Pacific Resources for  
Education and Learning  
(PREL)

Sustainable Molokai/  
Molokai School Garden  
Network

The Kohala Center/Hawai'i  
Island School Garden  
Network

Date: March 14, 2018

To: The Honorable Kaiali'i Kahele, Chair  
The Honorable Donna Mercado Kim, Vice Chair  
Members of the Senate Committee on Higher Education

The Honorable Mike Gabbard, Chair  
The Honorable Gil Riviere, Vice Chair  
Members of the Senate Committee on Agriculture and Environment

From: Lydi Bernal, Coordinator, Hawai'i Farm to School Hui  
Hawai'i Public Health Institute (HIPHI)

Re: SUPPORT for HB474 HD1, Relating to Rat Lungworm Disease

Hearing: March 15, 2018 at 1:15pm in Conference Room 224

Thank you for the opportunity to testify in **support of HB474 HD1**, which appropriates funds to the University of Hawai'i at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

**Rat Lungworm Disease (RLWD) is a serious issue for Hawai'i. The RLWD research and education work of the University of Hawai'i at Hilo College of Pharmacy is pioneering in the state and internationally, and fully deserving of expedited state-level support.**

The Hawai'i Farm to School Hui stands ready to assist with educational outreach to Hawai'i's students and schools. We have created a School Garden Safety Manual that includes information on RLWD and we continue to host workshops around the state to bring this information to educators. The manual, poster, school garden safety video, and RLWD activity book (published by University of Hawai'i at Hilo College of Pharmacy) are available for free download online at [www.farmtoschoolhui.org](http://www.farmtoschoolhui.org).

The Hawai'i Farm to School Hui is also actively working to support the dissemination of a series of RLWD lesson plans that have recently been published by the University of Hawai'i at Hilo College of Pharmacy in order to involve students, Grades 5-8, as citizen scientists and partners in education on the subject of RLWD in Hawai'i. The lessons are available for free download at <http://pharmacy.uhh.hawaii.edu/rlw/lessonplans.php>.

**HB474 HD1 provides critical support for RLWD research and outreach. We respectfully ask you to pass this measure out of committee.**

Me Ke Aloha,

Lydi Bernal  
Coordinator, Hawai'i Farm to School Hui, HIPHI

The **Hawai'i Farm to School Hui** is a statewide network whose mission is to strengthen Hawaii's farm to school movement by supporting our island networks in the areas of capacity building, resource development and sharing, professional development, and policy development and advocacy. The Hui is comprised of five island-level networks, community organizations and schools, and representatives from the Hawai'i Departments of Agriculture, Education, and Health and the University of Hawai'i. The Hui formed in 2010 and became a program of the Hawai'i Public Health Institute (HIPHI) in 2017.



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Phone: (808) 848-2074; Fax: (808) 848-1921  
e-mail [info@hfbf.org](mailto:info@hfbf.org); [www.hfbf.org](http://www.hfbf.org)

March 15, 2018

HEARING BEFORE THE  
SENATE COMMITTEE ON HIGER EDUCATION  
SENATE COMMITTEE ON AGRICULTURE AND ENVIRONMENT

**TESTIMONY ON HB 474, HD1**  
RELATING TO INVASIVE SPECIES

Room 224  
1:15 PM

Aloha Chair Kahele, Chair Gabbard, Vice Chair Kim, Vice Chair Riviere, and Members of the Committee:

I am Randy Cabral, President of the Hawaii Farm Bureau (HFB). Organized since 1948, the HFB is comprised of 1,900 farm family members statewide, and serves as Hawaii's voice of agriculture to protect, advocate and advance the social, economic and educational interests of our diverse agricultural community.

**The Hawaii Farm Bureau supports, with comments, HB 474, HD1**, which appropriates funds to the University of Hawaii at Hilo for testing, studies, outreach, research, and other activities related to the prevention and eradication of rat lungworm disease.

Providing safe and wholesome food is a priority for the Farm Bureau and its members. Unfortunately, not enough is currently known about Rat Lungworm Disease, or angiostrongyliasis, to fully protect the public. For example, although we know that people in Hawaii can get the disease by eating food contaminated by the larval stage of *A. cantonensis* worms found in raw or undercooked snails or slugs, and we know that people have also become infected by eating raw produce that contains a small infected snail or slug, or part of one, it is *not* known whether even just the slime left by infected snails and slugs is able to cause infection.

This is critical information since the disease can cause a rare type of meningitis (eosinophilic meningitis) that is extremely painful, debilitating, and can be deadly. Because there is no specific treatment for the disease, patients are only given supportive therapy and pain medication.

As more people are encouraged to grow their own food in backyard gardens, and school gardens are becoming more prevalent, the risk of being infected with this disease increases. Nutritionists advise the public to eat plenty of fresh leafy  
However, without knowing enough about the transmission of rat lungworm disease, this advice may be risky in areas infested by snails and slugs, unless proper preventative measures are taken. The public needs to know what pre-consumption measures will prevent transmission. Backyard gardeners and others who may not practice pest management to effectively control snails and slugs, or those who purchase greens from these sources, may be particularly at risk.

HFB supports funding of the University of Hawaii at Hilo for research related to the rat lungworm disease, however, we prefer the language in HB 2104, HD1 which proposes a comprehensive and collaborative strategy for the prevention and eradication of rat lungworm disease.

Thank you for the opportunity to provide testimony on this measure.

BIISC  
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Hilo, HI 96720  
(808) 933-3340  
[biisc@hawaii.edu](mailto:biisc@hawaii.edu)  
[www.biisc.org](http://www.biisc.org)



RE: HB474 Relating to Rat Lungworm Disease

Aloha,

I am writing on behalf of the Big Island Invasive Species Committee to express the Committee's support for HB474, allocating resources for research into angiostrongylosis (rat lungworm disease) to the University of Hawaii-Hilo.

The rat lungworm parasite is a serious threat to both our health and our economy. Primarily carried through the activity of two common invasive species, rats and slugs, the parasite has caused debilitating illness, pain, and even death for some of our community members, making it a priority for public health.

We are very concerned by the potential from transmission of the parasite in catchment water. Not only a significant number of our island's residents on catchment, with no alternative water source, many of our farmers depend on catchment to irrigate their crops. As the semi-slug continues to expand its range on the Big Island, more of our agricultural regions are at risk from invasion, threatening the safety and viability of Big Island agriculture.

We have seen the work being done at College of Pharmacy to investigate rat lungworm and are very impressed with the efforts of Dr. Sue Jarvi and her team. This disease is of growing interest and impact globally, and UH-Hilo is well positioned to take a leading role in rat lungworm research. A program working on this important disease has the potential to raise the profile of the University and establish UH as a leader in this field.

We depend on the University to provide us with the information, education and materials we need to promote a message of safety and health in our community, and this is the case with angiostrongylosis. We ask that the necessary funding be put in place to ensure that this effort is maximized.

Mahalo for your consideration,

Franny Kinslow Brewer  
Communications Director

**HB-474-HD-1**

Submitted on: 3/12/2018 3:25:25 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Jacqui Hoover	Testifying for Hawaii Island Economic Development Board	Support	No

Comments:

Hawaii Island Economic Development Board (HIEDB) strongly supports this measure and humbly requests your approval to provide funding and support to the University of Hawaii at Hilo for research and activities to prevent and eradicate rat lungworm disease.

Mahalo for the opportunity to support HB471 HD1.

**HB-474-HD-1**

Submitted on: 3/12/2018 3:33:35 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Rodger Hansen	Individual	Support	No

Comments:

Aloha Senators - it is imperative for the legislature to fund the RESEARCH at UHH College of Pharmacy. We must get this funding passed this year for research. Too much is at stake for the public health. This is not a short term illness - has long reaching medical and pain ramifications. Please pass funding for this bill.

Mahalo-

Rodger Hansen,

Hakalau HI 9671

Testimony Presented Before the Senate Committees on Higher Education and Agriculture and Environment.

Thursday 03-15-18 1:15 pm

## **HB2506 - RELATING TO RAT LUNGWORM DISEASE**

Chair Kahele and Chair Gabbard and members of the Committees

My name is Dr. Susan Jarvi and I am a Professor in the Department of Pharmaceutical Sciences at the University of Hawaii at Hilo, Daniel K. Inouye College of Pharmacy. My lab has been the lead in rat lungworm education and research for the past 6 years in the state. I am speaking as a concerned individual in strong support of HB 474 Relating to Rat Lungworm Disease (RLWD).

Hawaii is the epicenter for RLWD (angiostrongyliasis) in the United States, and is among the most serious threats to human health of all diseases carried by wildlife in Hawaii. Most infections are presumed to be due to the ingestion of infected slugs or snails on fresh produce or possibly from untreated catchment water (see Howe and Jarvi ,2017; Jarvi et al., 2018 for review). The nematode reproduces in rats and develops in slugs and snails. Although most human cases have originated in east Hawaii Island, there have been cases reported on all of the major Hawaiian Islands, including a recent outbreak on Maui. Why so many cases originate on Hawaii Island is unclear and a better understanding of disease transmission, basic biology, diagnostics, treatment, and long term effects is needed. Thus, funding is requested to address these issues.

My lab recently completed a study to isolate adult RLW from the hearts and lungs of rats to harvest worms to isolate the proteins needed to develop a blood-based diagnostic and also to estimate infection rates in rats trapped in the Hilo area (Jarvi et al., 2017). Of 545 rats captured, ~94% of them were positive for RLW parasites. This is the highest reported rate in the country and likely the world. Hawaii has likely been exporting RLW with rats jumping on and off ships. During this experiment we observed that older black rats appear to have a mechanism to limit development of larvae to reproducing adults. This was not seen in the young black rats or the Polynesian rats of any age. This means that in the management of rats, killing large numbers of black rats might result in more young black rats moving into that vacated area, which might actually increase transmission. Another option is to determine the effectiveness of deworming rats to reduce transmission. With adequate funding, this could be done in collaboration with USDA-APHIS and others.

Funding is also needed to determine which approved vegetable washes or solutions are most effective at killing larvae so people can better wash their produce, and continue to eat local and fresh produce safely. East Hawaii has the highest use of catchment water in the state. We need to know if the infective stage of the larvae can be detected in catchment water and the best practices for treating catchment water. We have already demonstrated that infective stage RLW larvae can live in rainwater for many weeks. We also would like to test the effectiveness of UV light as used in catchment systems on killing RLW parasites. Lastly, we are testing multiple anti-parasitic drugs on different stages of RLW larvae that develop in humans. All of these studies

require an assay to be able to determine that the larvae are truly dead and therefore not infective. We have worked out a differential staining method that appears to distinguish live from dead larvae but we now need to validate this assay in rats. We received \$16,000 in contingency funding from the Hawaii County Council to pay a technician for 2 months and buy supplies and rats to run this trial with USDA-APHIS. Additional funding is requested to then run the other three studies.

We have completed an antibody-based study to estimate exposure to RLW in 435 volunteers most from east Hawaii Island with our Thailand collaborators (Jarvi et al., ms. In prep). We are currently in the process of isolating proteins from Hawaii isolates of RLW to use as antigen in another diagnostic study. Funding is needed to expand this serological study to include multiple areas on Hawaii Island, as well as statewide. We have successfully detected RLW DNA in the blood of infected rats (Jarvi et al., 2015). We request funding to continue to investigate other avenues for diagnosis of angiostrongyliasis.

RLWD impacts the people of Hawaii and its visitors, it impacts public health as a global emerging infectious disease, it impacts agriculture through the loss of public confidence in locally grown produce, and it puts food self-sufficiency and food security (especially with the Farm to School Bill) for all of Hawaii at risk. RLWD has already caused multiple deaths; many victims suffer long-term disability

Our research group has already built a strong research and educational foundation with which to carry out these studies. Our lab has submitted 30 grant proposals including 12 federal grants but have yet to receive federal funds. Likely the main reason for lack of federal support for rat lungworm research is lack of education about this disease. Many reviewers and agencies have never heard of it and don't consider it seriously. This is a considerable issue to overcome. We are now poised to provide the research and curriculum-based educational efforts needed to truly begin to prevent rat lungworm disease in Hawaii and elsewhere. The state of Hawaii needs to take immediate action. Collaboration between UHH, UHM, DOH, DLNR, DOA and the Task Force is needed to develop a statewide plan for effective control of RLW parasites. Please support HB474 with full, necessary funding.

#### References:

- Jarvi SI, Howe K, Macomber P. Angiostrongyliasis or Rat Lungworm Disease: A Perspective from Hawaii. 2018. Current Tropical Medicine Reports. <https://doi.org/10.1007/s40475-018-0132-z>
- Howe K, and Jarvi SI. 2017. Angiostrongyliasis (Rat Lungworm Disease): Viewpoints from Hawaii Island. ACS Chemical Neuroscience. DOI: 10.1021/acschemneuro.7b00299.
- Jarvi, SI, Quarta, S, Jacquier S, Howe K, Bicakci D, DaSalla C, Lovesy N, Snook K, McHugh R, Niebuhr C. 2017. High prevalence of *Angiostrongylus cantonensis* (rat lungworm) on eastern Hawaii Island: a closer look at life cycle traits and patterns of infection in wild rats (*Rattus* spp). PLoS ONE 12(12): e0189458. <https://doi.org/10.1371/journal.pone.0189458>
- Jarvi, S.I., Pitt WC, Farias MEM, Shiels L, Severino M, Howe K, Jacquier S, Shiels AB, Amano K, Luiz B, Maher D, Allison M, Holtquist Z, Scheibelhut N. 2015. Detection of

*Angiostrongylus cantonensis* in the blood and peripheral tissues of wild Hawaiian rats (*Rattus rattus*) by a quantitative PCR (qPCR) assay. PLOS ONE DOI:10.1371/journal.pone.0123064 April 24, 2015.

Jarvi S.I., Farias, M.E.M., Howe, K., Jacquier, S., Hollingsworth, R. & Pitt, W. 2012. Quantitative PCR estimates *Angiostrongylus cantonensis* infection levels in semi-slugs (*Parmarion martensi*). *Molecular and Biochemical Parasitology* 185: 174-176.

**HB-474-HD-1**

Submitted on: 3/12/2018 4:52:51 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
David S. De Luz, Jr.	Individual	Support	No

Comments:

**HB-474-HD-1**

Submitted on: 3/12/2018 5:49:33 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Lisa Kaluna	Individual	Support	No

Comments:

Aloha,

I am writing in support of HB474 for funding to be directed to the UH Hilo Daniel K. Inouye College of Pharmacy Rat Lungworm Research Lab under the direction of Dr. Susan Jarvi. To be clear, my support is solely for the funding to go to this institution and no other research, educational, or health institution.

On a personal note, my husband was born and raised in the Puna district. The vast majority of our family and closest friends live in East Hawaii. EVERYONE we know that lives here, knows someone who contracted a very severe case of RLWD. People are scared and they are taking drastic measures to try and protect themselves and their families. Self diagnosing and subsequent self medicating with drugs from local farm supply stores is more common than you can imagine (no we don't advocate for this, but we regularly hear stories). As Hawaii State Legislatures, if do not personally know a victim of RLWD (a severe case), please take the time to find and talk with someone about their experience and how it has altered their life before you cast your vote on this bill. While there are many mild and moderate cases that do fully recover, the devastation people face who contract a very severe case is horrific. We cannot let our people and our community suffer like this. I would not wish this disease on my worst enemy. Please, do not wait until this disease comes knocking on your doorstep. Please vote in support for funding Rat Lungworm Research at the UH Hilo Daniel K. Inouye College of Pharmacy.

Thank you for your time and consideration.

**HB-474-HD-1**

Submitted on: 3/12/2018 2:50:12 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Kirsten Snook	Individual	Support	No

Comments:

While the Department of Health has gotten funds to produce informational material to be distributed to the public, the research behind the recommendations they are broadcasting is nonexistent. The people most at risk are on Hawaii Island and are on catchment water. Research is needed into the viability of the parasite in catchment systems; many rely on that method of water collection and are told by the DoH to "wash their vegetables". If they are washing their vegetables in contaminated water, this is misinformation.

Dr. Jarvi at the DKU School of Pharmacy has done outstanding work with very limited resources, collaborating with researchers throughout Asia and the Pacific Rim where this disease is better known. She has begun developing rapid-assay blood testing and even a vaccine for this disease. A rapid test would help visitors and residents find out immediately if they are infected, and treatment is more effective the earlier it is administered.

Simply put, RLW is an emerging tropical disease of growing importance in Hawaii and the southern US. Funding the excellent research at UHH puts Hawaii researchers at the forefront of this growing threat and helps Hawaii residents find out what they actually need to do to protect themselves and their family. Facile TV commercials and brochures telling people to wash their veggies are not sufficient. It would behoove the great state of Hawaii to get in front of this problem and prevent more illness rather than wait for dengue-like numbers of infection to amass before they address this threat to the lives and livelihoods of our kama'aina.

Mahalo,

Kirsten Snook, MSPH

**HB-474-HD-1**

Submitted on: 3/12/2018 3:07:43 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
elizabeth hansen	Individual	Support	No

Comments:

Aloha Senators: It is a critical situation that you fund RESEARCH about Rat Lungworm Disease this year. We need to stop the cycle of terrible long term illness that impacts those affected by this disease. We need funding now.

Thank you.

Elizabeth Hansen, Hakalau 96710

**HB-474-HD-1**

Submitted on: 3/12/2018 5:54:16 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Barry Gitelson	Individual	Support	No

Comments:

Please allow UH-Hilo to study Rat Lung Worm disease by funding the bill. This disease endangers our local population and visitors from around the world.

**HB-474-HD-1**

Submitted on: 3/12/2018 6:41:06 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Sherrell Watson	Individual	Support	No

Comments:

As a Big Island resident (Puna district), I am very concerned about rat lungworm, particularly since I am on a rain catchment system. UH Hilo has already been studying this issue (with limited funds) and should be given the funds to expand and take their studies further.

Mahalo!

**HB-474-HD-1**

Submitted on: 3/12/2018 6:33:37 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Shannon Rudolph	Individual	Support	No

Comments:

**Strongly Support - You SHOULD have given it to UH-Hilo LAST year!!! :(**

**HB-474-HD-1**

Submitted on: 3/12/2018 9:32:50 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Dee Fulton	Individual	Support	No

Comments:

I am a new resident of Hawaii Island. I quickly became acquainted with the rat population as I heard their little feet scampering over my roof at night. Rat lungworm disease is a serious threat to the citizens of Hawaii and visiting tourists. Let's start working toward effective means to resolve this disease threat by empowering our researchers.

Mahalo,

Dee Fulton

Holualoa, HI

**HB-474-HD-1**

Submitted on: 3/12/2018 11:30:48 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
marjorie erway	Individual	Support	No

Comments:

This is important to allow the UH-Hilo to continue the work that has begun on Ratlung disease. Please vote YES!!!!

Mahalo for your consideraiton.

**HB-474-HD-1**

Submitted on: 3/12/2018 11:00:58 PM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Scott Garris	Individual	Support	No

Comments:

Strong support, the health effects are horrendous, we need to know how to protect ourselves and this study will help.

**HB-474-HD-1**

Submitted on: 3/13/2018 7:22:23 AM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Kirsten C.	Individual	Support	No

Comments:

**HB-474-HD-1**

Submitted on: 3/13/2018 7:38:05 AM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
M. Kathleen Howe	Individual	Support	No

Comments:

I support HB 474 which supplies funding to UHH to continue the excellent research being conducted by the Jarvi Lab on rat lungwor and rat lungworm disease. Lack of monies spent on research puts other islands and the U.S. mainland at risk due to the incredibly high infection rates found statewide and particularly on Hawaii Island and near the port of Hilo. The lack of action over the past 15 years, when this was noted to be a public health problem, has only exacerbated the problem. Hawaii needs to get real and provide ample funding to deal with this very serious problem that affects public health, Hawaii's agriculture, and it's golden egg, tourism. Please support HB 474.

**HB-474-HD-1**

Submitted on: 3/13/2018 9:05:31 AM

Testimony for HRE on 3/15/2018 1:15:00 PM

<b>Submitted By</b>	<b>Organization</b>	<b>Testifier Position</b>	<b>Present at Hearing</b>
Doran Vaughan	Individual	Support	No

Comments:

Please support HB 474 Relating to Funding UHH for Research Related to Rat Lungworm Disease. Funding is imperative for the UHH School of Pharmacy to continue research to aid in prevention of further spread of the disease to both residents of and visitors to Hawaii.