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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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**Testimony of
SUZANNE D. CASE
Chairperson**

**Before the House Committees on
HEALTH & HUMAN SERVICES
and
HIGHER EDUCATION**

**Wednesday, March 21, 2018
10:00 AM
State Capitol, Conference Room 329**

**In consideration of
SENATE BILL 3097, SENATE DRAFT 2
RELATING TO THE UNIVERSITY OF HAWAII**

Senate Bill 3097, Senate Draft 2 proposes to appropriate funds to the University of Hawaii at Hilo for research related to the control and prevention of rat lungworm disease. **The Department of Land and Natural Resources (Department) supports this bill, provided that its passage does not replace or adversely impact priorities indicated in the Executive Supplemental Budget request.**

The Department is a collaborator on biosecurity issues with the University of Hawaii and the Hawaii Department of Health, as described in the Hawaii Interagency Biosecurity Plan. Rat lungworm disease is recognized in the Biosecurity Plan as a serious threat to human health and agriculture in Hawaii, vectored by invasive snails and rodents. While the Hawaii Invasive Species Council (HISC), which is administered by the Department, has received funding requests from the University of Hawaii at Hilo to conduct research and education on this important issue, sufficient funding has not been available via HISC to support the broad level of education, research, and control activities needed to mitigate this threat.

Thank you for the opportunity to comment on this measure.



UNIVERSITY OF HAWAII SYSTEM

Legislative Testimony

Testimony Presented Before the
House Committee on Health & Human Services and
House Committee on Higher Education
March 21, 2018 at 10:00 a.m.

By
Carolyn Ma, PharmD, BCOP
DEAN
UH Hilo - Daniel K. Inouye College of Pharmacy

SB 3097 SD2 – RELATING TO THE UNIVERSITY OF HAWAII

Chairs Mizuno and McKelvey, Vice Chairs Kobayashi and Hashem, 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 University of Hawai'i at Hilo and on behalf of Interim Chancellor Marcia Sakai, UH Hilo fully supports the intent of 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 Kaua'i from 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 from 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 provided that its passage does not replace or adversely impact priorities as indicated in our University of Hawai'i BOR Approved Supplemental Budget.

Thank you for the opportunity to testify.



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March 21, 2018

HEARING BEFORE THE
HOUSE COMMITTEE ON HEALTH AND HUMAN SERVICES
HOUSE COMMITTEE ON HIGHER EDUCATION

TESTIMONY ON SB 3097, SD2
RELATING TO THE UNIVERSITY OF HAWAII

Room 329
10:00 AM

Aloha Chair Mizuno, Chair McKelvey, Vice Chair Kobayashi, Vice Chair Hashem, and Members of the Committees:

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 SB 3097, SD2, which appropriates funds to the University of Hawaii at Hilo for research related to rat lung worm 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.

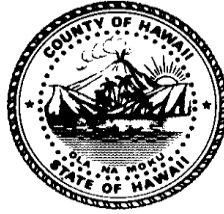
As more people are encouraged to grow their own food in backyard gardens, and school gardens are becoming more prevalent, the risk of being infected with this disease increases. Nutritionists advise the public to eat plenty of fresh leafy

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 SB 2471 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.

Eileen O'Hara
Council Member
Council District 4



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Chair: Environmental
Management Committee

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

County of Hawaii
Hawaii County Council

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

Representative John M. Mizuno
Chair, House Committee on Health & Human Services
Hawai'i State House of Representatives

March 20, 2018

Re: In Support of Senate Bill 3097, from Hawai'i County Council District 4
To be heard by HHS on Wednesday, 03-21-18 10:00AM in House conference room 329

Aloha Chair Mizuno and Committee Members:

I'm writing to express my support for Senate Bill 3097, which appropriates moneys to the University of Hawai'i at Hilo for research 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

Testimony Presented Before the House Committees on Higher Education and Health and Human Services.

Wednesday 03-21-18 10 am

SB3097 - RELATING TO RAT LUNGWORM DISEASE

Chair Mizuno and Chair McKelvey 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 SB 3097 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 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 SB 3097 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.

SB-3097-SD-2

Submitted on: 3/16/2018 4:31:53 PM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Ronald Taniguchi, Pharm.D.	Individual	Support	No

Comments:

SB-3097-SD-2

Submitted on: 3/17/2018 9:56:07 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Denise Mazurik	Individual	Support	No

Comments:

SB-3097-SD-2

Submitted on: 3/18/2018 9:16:18 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
marianne jones	Individual	Support	No

Comments:

This bill is critical for Hawaii Island for farmers, residents and visitors.

SB-3097-SD-2

Submitted on: 3/18/2018 9:34:10 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Deborah Umiamaka	Individual	Support	No

Comments:

I support this bill funding research on rat lungworm disease. by UHH.

SB-3097-SD-2

Submitted on: 3/19/2018 12:46:52 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Chuck Flaherty	Individual	Support	No

Comments:

Aloha members of the joint Committees of Health and Human Services and Higher Education,

I am testifying in support of SB3097 SD2.

New Invasive species and climate change have become an increasing problem for Hawai'i. However, some present a greater danger to the health, safety, and welfare of the citizens of Hawai'i. Rat lung worm disease is one of the most dangerous and deadly.

As with the dengue fever outbreak, we must come together and focus resources, awareness, and efforts jointly and effectively. The plans put forth in SB3097 SD2 are well-reasoned and realistic start towards understanding and eliminating the grave threat of rat lung worm disease.

Please vote in support of this proposed legislation. Every life that is affected or lost is one too many. We must act swiftly and with perseverance to eliminate this threat to the citizens of Hawai'i.

Mahalo,

Charles Flaherty

SB-3097-SD-2

Submitted on: 3/19/2018 1:50:09 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Shannon Rudolph	Individual	Support	No

Comments:

Support.

Too bad some legislators were so hard headed last year and didn't direct this funding to UH-Hilo - I've read some of the researchers that were working on ratlung disease have already moved away from Hawai'i because their positions were not funded; unlikely they will want to come back.

SB-3097-SD-2

Submitted on: 3/19/2018 7:10:48 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
M. Kathleen Howe	Individual	Support	No

Comments:

I support SB 3097 and ask that you do too. The incredibly high infection rates we are seeing in host animals on Hawaii Island puts all other islands and ports that Hilo ships to at risk. Hawaii needs to realize that it will need to spend serious money on this problem for a number of years to get it under control because it was ignored for so long. This disease is horrible. Tourists and visitors to the island, residents, children, pets, zoo animals are getting this disease. If you talk to anyone who has gotten it they will tell you how incredibly painful it is, how they thought they were going to die, or wished that they could die. Some did die. It is time to stop beating around the bush with this serious issue. Support and pass SB3097.

SB-3097-SD-2

Submitted on: 3/19/2018 5:37:13 PM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
elizabeth hansen	Individual	Support	No

Comments:

Dear Representatives:

It is imperative that we fund RESEARCH on Rat Lungworm Disease NOW! UHH Pharm School Lab has been at the forefront addressing this terrible disease, which is such a scary potential for those who live and visit Hawai'i. Please address this issue and provide research funding to UHH.

Mahalo

Elizabeth Hansen, Hakalau HI

SB-3097-SD-2

Submitted on: 3/19/2018 5:41:40 PM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Rodger Hansen	Individual	Support	No

Comments:

Aloha:

Funding for Research by UHH Pharm School must be given now!

This is a critical public health issue that must be addressed.

Please support funding for this bill.

Thank you.

Rodger Hansen, Hakalau HI 96710

SB-3097-SD-2

Submitted on: 3/19/2018 6:47:56 PM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Lisa Kaluna	Individual	Support	No

Comments:

Aloha,

I am writing in support of SB3097 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. Most 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 I don't advocate for this, but I 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. 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,

Lisa M. Kaluna

SB-3097-SD-2

Submitted on: 3/20/2018 8:32:46 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Melodie Aduja	Oahu County Committee on Legislative Priorities of the Democratic Party of Hawai'i	Support	No

Comments:

To the Honorable John M. Mizuno, Chair; the Honorable Bertrand Kobayashi, Vice Chair and the Members of the House Committee on Health & Human Services:

To the Honorable Angus L.K. McKelvey, Chair; the Honorable Mark J. Hashem, Vice Chair and the Members of the House Committee on Higher Education:

Good morning. My name is Melodie Aduja. I serve as Chair of the Oahu County Committee ("OCC") on Legislative Priorities of the Democratic Party of Hawaii. Thank you for the opportunity to provide written testimony on **SB2926 SD1 HD1** relating to Rat Lungworm Disease; University of Hawaii at Hilo; and an appropriation.

The OCC Legislative Priorities Committee is in favor of **SB2926 SD1 HD1** and supports its passage.

SB2926 SD1 HD1 is in accord with the Platform of the Democratic Party of Hawai'i ("DPH"), 2016, as it appropriates moneys to the University of Hawaii at Hilo for research related to rat lungworm disease, effective 7/1/2050.

The DPH Platform states that "[a]ccess to health care is a basic human need. Our citizens and visitors have an inherent right to high quality, high standard health care. The state legislature and the federal government should take all appropriate steps to create and support a health care system of public, for-profit, and nonprofit hospitals and other medical facilities that follow best practices to enhance and protect and preserve life. (Platform of the DPH, P.7, Lines 360-364 (2016)).

Given that **SB2926 SD1 HD1** appropriates moneys to the University of Hawaii at Hilo for research related to rat lungworm disease, effective 7/1/2050, it is the position of the OCC Legislative Priorities Committee to support this measure.

Thank you very much for your kind consideration.

Sincerely yours,

/s/ Melodie Aduja

Melodie Aduja, Chair, OCC Legislative Priorities Committee

Email: legislativepriorities@gmail.com, Text/Tel.: (808) 258-8889

SB-3097-SD-2

Submitted on: 3/20/2018 11:45:35 AM

Testimony for HHS on 3/21/2018 10:00:00 AM

Submitted By	Organization	Testifier Position	Present at Hearing
Meleana Judd-Cox	Waihuena Farm	Support	No

Comments:

Aloha,

The UH Hilo Jarvi lab needs funding to continue with critical research on this terrible parasite.

as a small farmer I am grateful for what they have already done but know the whole state needs information to keep us safe. I want to continue growing healthy food but need more information to feel confident doing so

mahalo