

# The



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# eterinarian



*Horseshoe crabs mating at the National Aquarium in Baltimore. See pages 16-19.*

Volume 11, Number 2  
Second Quarter, 2017



**WHO ARE WE****MISSION**

The Mission of the World Aquatic Veterinary Medical Association is to serve the discipline of aquatic veterinary medicine in enhancing aquatic animal health and welfare, public health, and seafood safety in support of the veterinary profession, aquatic animal owners and industries, and other stakeholders.

**OBJECTIVES**

- A.** To serve aquatic veterinary medicine practitioners by developing programs to support and promote our members, and the aquatic species and industries that they serve;
- B.** To be an advocate for, develop guidance on, and promote the advancement of aquatic animal medicine within the veterinary profession and with associated industries, governments, non-governmental entities and members of the public;
- C.** To develop and implement aquatic veterinary education programs, certifications and publications, including a credentialing process to recognize day-one competency in aquatic animal medicine;
- D.** To foster and strengthen greater interactions among: aquatic veterinarians, related disciplines, veterinary allied and supportive groups and industries, governments and animal owners.

*The ideas presented in this publication express the views and opinions of the authors, may not reflect the view of WAVMA, and should not be implied as WAVMA recommendations or endorsements unless explicitly stated.*

*Information related to the practice of veterinary medicine should only be used within an established valid Veterinarian-Patient-Client Relationship.*



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ISSN 2329-5562

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Dusan Palic, Treasurer	2007-2010
Nick Saint-Erne, Treasurer	2011-2014

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**Editor’s Note**

We are midway through the year 2017 and it has been a very busy year. The best is yet to come, though, as we prepare for our WAVMA Conference and the Annual General Meeting in Romania in September. This will be an exciting event and there is still time to register and make your travel plans! See page 14 for more information about the conference.

This is also the time to consider supporting your Association and directing the future of WAVMA by becoming a member of the Executive Board. Our annual elections will be held soon and we really need more members to volunteer. If you don’t want to stand for Office, at least step up and join a committee (see page 8). There are a lot of ways members can support aquatic veterinary medicine. And if you can’t give of your time, you might consider giving some funds to the WAVMA Scholarship Committee for future awards for veterinary students so they can further their education in Aquatic Veterinary Medicine (see page 11).

Some of the students that received Pitts Aquatic Veterinary Education Awards this year attended the AQUAVET Program at Roger Williams University, in Bristol, Rhode Island. In its 41st year, the AQUAVET Program is a great educational opportunity, and you will be able to read the student’s reports about their time there in future issues of *The Aquatic Veterinarian*. I was fortunate to have been a lecturer at AQUAVET this year, which I originally attended as a veterinary student in 1982. It was great to be back!

Last year I went to the National Aquarium in Baltimore, and you will see several pictures I took there to supplement an article about the aquarium’s veterinarian, Dr. Leigh Clayton. It would be nice for more aquarium veterinarians to write up an article about their work for the Colleague’s Connections feature for future issues. If you are an Aquarium Vet, let me know and I will help you put together the information.



**Nick Saint-Erne,**  
DVM, CertAqV  
Executive Editor  
[TAVeditor@wavma.org](mailto:TAVeditor@wavma.org)

*The Editor at the  
National Aquarium  
in Baltimore, MD,  
USA.  
October 2016.*

Download a QR reader onto your Smart Phone and scan the Quick Response Code to the right. It will take you to the WAVMA.org website page for accessing all of the past WAVMA Newsletters.



You will need your WAVMA User ID and Password to access the most recent issues of *The Aquatic Veterinarian*.

The latest editions are available for download at <https://www.wavma.org/TAV-Current-Issues>.

Past years’ editions are available for download at <https://www.wavma.org/TAV-Archives>.

**Cover Photo:**



*Atlantic Horseshoe crabs (Limulus polyphemus) mating at the National Aquarium in Baltimore. See pages 16-19.*

*Photo by Nick Saint-Erne*

*The Aquatic Veterinarian*

**The Quarterly Magazine of the  
World Aquatic Veterinary Medical Association**

**Consider promoting your products, services  
or programs to aquatic veterinarians,  
veterinary students, nurses &  
paraveterinary professionals  
throughout the world**

**Advertising Rates (per issue)**

	Commercial	Non-Profit
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<b>1/4 page (~3.5 x 4.5")</b>	\$30	\$15

**WAVMA Members**

Free 1/8 page (business card size) advertisement  
**Contact [TAVeditor@wavma.org](mailto:TAVeditor@wavma.org) for information on advertising and payment options.**

## President's Report

As a follow-up of the events in the year's first quarter, the WAVMA Board and Committees have been actively contributing to the implementation of proposed projects, as planned at the end of the past year. At the same time, WAVMA has continued to increase our international visibility and status, through engaging in actions and subject matters relevant to the veterinary profession worldwide, such as the development of an overarching policy as guidance on aquatic animal welfare for WSAVA, and creation of a working group for the development of WVA Aquatic Animal Welfare Fact Sheet.

Highlights of most important actions taken by the Executive Board during the second quarter are listed below:

**WAVMA Fellowship awarded to Dr. Nick Saint-Erne:** On March 20<sup>th</sup>, Dr. Nick was granted, with unanimous favourable votes, the WAVMA Distinguished Fellow title. This is a well-deserved award for all the long-term efforts that Dr. Nick has put into serving and supporting the Aquatic Veterinary Medicine discipline and the WAVMA. A big thank you to Dr. Nick!

**CertAqV Program Updates:** The Credentialing Committee developed a process for email voting by consensus for CertAqV applicants. The Committee is also currently seeking to refine the certification requirements of the program for future applicants.

**Pitts Education Awards Program, 2017:** A total of 27 applications were submitted for evaluation this year. The notifications were sent out in May to the lucky winners. These are: Shiva Prasad Bhusal (Nepal), Theadora B'ey (USA), Laura Burns (USA), Christine Casey (USA), Sarah McConnachie (Canada), Nicole Nietlisbach (USA), Zachary Ready (USA), Courtney Wright (USA).

Let's congratulate this year's winners and wish them good luck in fulfilling their educational ambitions!

**Multilingual WAVMA Brochure:** For the first time since its foundation, WAVMA is providing for their international members the new brochure promoting WAVMA's programs and member benefits translated into Portuguese, Spanish, French, Italian, German and Romanian/Moldavian. I would like to take this opportunity to warmly thank the Communications Committee members for making this possible.

The brochure can be found at: <https://www.wavma.org/About-wavma>

**Developing guidelines for WAVMA Affiliate members:** The Membership Committee is currently seeking for ways to develop guidelines for Affiliate membership for other veterinary and aquatic animal organizations and associations. Additionally, the committee will look into developing packages of benefits to encourage general membership to enrol with various committees, where to undertake new projects for WAVMA. It is our hope that these packages would encourage general membership to become more active in developing WAVMA. As a first step in rewarding its diligent members, the Board has recently agreed to waive membership for the year 2018 for those members who have already presented webinars this year and any other member who will provide a webinar during the year 2017.

If you are willing to be a speaker for one or more webinars this year, please contact [the program administrators, at administrators@wavma.org](mailto:administrators@wavma.org)

**Changes of the Student Committee Leadership:** Since May, the Committee is run by the two co-chairs, Natalie Torkelson and Elizabeth Works, and the Committee's Secretary, Fernanda Gusmao. Good luck!

**WebCEPD Program Administration:** WAVMA is currently looking for members willing to help with administration of the Webinar program. If interested in getting involved with this project, please contact the program administrators, at [administrators@wavma.org](mailto:administrators@wavma.org)

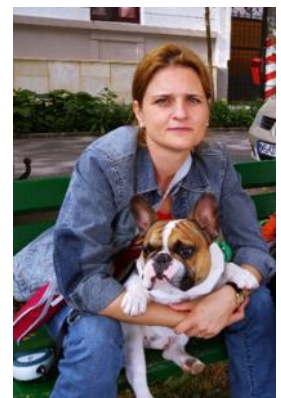
**WAVMA Conference and AGM, 2017:** Abstract submission for Oral presentations is now closed. Abstracts for Poster presentations can still be submitted, by August 1st, to Dr. Julius Tepper, at: [cypcarpio@aol.com](mailto:cypcarpio@aol.com). More information about the event, as well as the scientific program, are available at: <https://conferences.wavma.org/events/tirgu-mures-romania-12-sep-2017/scientific-information>.

**Refined WAVMA Bylaws:** Amendments to the WAVMA Bylaws are now available and requesting members' vote. To cast your vote please, click the link below

[https://www.surveymonkey.com/r/2017\\_Bylaws\\_Amendments](https://www.surveymonkey.com/r/2017_Bylaws_Amendments)

With my best wishes,

**Laura Urdes**, PhD DVM PgDip  
CertAqV  
WAVMA President  
Bucharest, ROMANIA  
[president@wavma.org](mailto:president@wavma.org)



## Secretary's Report

Dear WAVMA members,

I am happy to report that the current board under the presidency of Dr. Laura Urdes and with valuable contribution from all members, including our newest members Dr. Howard Wong and Dr. Trista Becker, has been chartering a progressive course thus far as we reach the halfway mark of its mandate. We will continue in our endeavor to bring more visibility to WAVMA and its work in promoting aquatic veterinary medicine, and continue to create new opportunities and benefits for all our members.

We continue to see new members signing up, an indication of the important role that WAVMA is continuing to play. An important aspect of being a full member of WAVMA is the possibility of having your voices heard in relation to the direction you wish to see the organization go. To this end, a survey to members for voting on the bylaws amendments was created and distributed. Please exercise your right as a member and participate in this process.

More veterinary students are expressing an interest in pursuing a career in aquatic veterinary medicine and WAVMA will continue to support their capacity building in this thrust. One such way is through the development of student chapters with the Univ. Pretoria (Ondestepoort) and the Oregon Student Chapters being the most recent ones to be approved by the Board. Another way is WAVMA's support of the activities that are planned by these chapters. Four lectures and a wet lab on fish necropsy were performed at the Exotics Symposium at the University of Missouri this year. The Students Committee continues to be progressive new members getting involved in its work. Another expression of our support in this regard is through WAVMA's support to the John L. Pitts Aquatic Veterinary Education Awards Program. More about the scholarship can be found at <http://www.wavma.org/scholarships>. WAVMA facilitated 10 veterinary students to attend the Fish Health Section Meeting and the Eastern Fish Health Workshop (2-6 April, 2016). In addition, WAVMA will continue to support the endeavors of the IVSA.

More members have begun the process of being certified with day one competency in Aquatic Veterinary Medicine. I wish to congratulate those that have successfully completed the process in the first half of the year. The Credentialing Committee is working assiduously to have a smooth process in place which would see the conferral of the honor in the shortest possible time. If you may be considering this or intend to embark on the process, more details are available at <http://www.wavma.org/CertAqV-Pgm>.

Progress is being made in relation to WAVMA's 2017 Conference and Annual General Meeting under the theme "Current Concepts in Aquaculture and Orna-

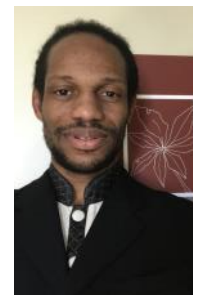
mental Fish Practice", to be held on September 12-14, 2017, in Transylvania, at the Hotel Plaza, Piața Trandafirilor 46-47, Târgu Mureș, România. This event will provide a framework for discussion and reflection on the role of veterinarians in continuing to foster the sustainable development of worldwide aquaculture and ornamental fish industries, with a special focus on development and options in the Eastern Europe region. Members are encouraged to attend the event which promises to be exciting. More information can be found at <https://conferences.wavma.org/events/tirgu-mures-romania-12-sep-2017>.

WAVMA continues to collaborate with international organizations such as FVS, WASAVA and WCS. The WAVMA Board approved Dr. Dusan Palic as the WAVMA nominee for the WVA Councilor Position representing International organizations. If he is successfully elected, it will allow WAVMA to play a more intimate role in the World Veterinary Association. WAVMA will be fielding talks on various themes on aquatic medicine at the World Small Animal Veterinary Association (WSAVA) congress to be held in Copenhagen from September 25-28, 2017. WAVMA members wishing to attend this congress, benefit from a special member rate. We continue to explore other avenues which would ultimately bring added benefits to all WAVMA members in other organizations.

As secretary, I am also tasked with chairing the Communications Committee. Recently, a project was launched to update and produce WAVMA brochures in various languages. An appeal was made to the general membership and a favorable response was received. I wish to thank those that have contributed to this project and wish to inform everyone that these brochures have already been uploaded to the website. Additional edits to these documents can be provided by any member via email. Also I wish to inform you that website changes are being made continuously to improve its delivery to you our members and to the wider audience.

A Membership Committee has been re-established to examine ways of improving our membership services. This committee may be reaching out to you in the future so please support their work by responding favourably to their requests in this regard. We remain committed to serving you through the second half of the year and appreciate you informing us of ways in which we can serve you better.

**Devon Dublin**, PhD. DMVZ, MSc.  
CertAqV  
WAVMA Secretary  
Global Environment Facility -  
Satoyama Project  
6-7-22-451 Conservation International-  
Shinjuku, Tokyo, 160-0022, Japan  
[Secretary@wavma.org](mailto:Secretary@wavma.org)



**Treasurer's Report**

Our income so far this year has exceeded our expenditures, and with more members expected to join as the year progresses we should meet our budget. Register now online for the AGM in September!

SUMMARY	ACTUAL	BUDGETED
Total income	25,171.84	32,300.00
Total expenses	20,251.74	36,080.00
<b>Income less expenses:</b>	4,920.10	-3,780.00

INCOME DETAILS	ACTUAL	BUDGETED
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<i>Memberships:</i>		
Veterinarian	11,500.00	13,000.00
New Graduate	700.00	500.00
Vet Student	4,450.00	5,000.00
Vet Tech/Nurse	100.00	100.00
Affiliate (Non-vet)	400.00	200.00
Allied Veterinary Organization	0.00	0.00
Library	0.00	200.00
CertAqV Applications	2,500.00	5,000.00
CertAqV Renewals	0.00	0.00
Advertising Income	400.00	0.00
Webinar Income	252.75	800.00
WebShop Income	0.00	0.00
<i>Pitts Award Donations:</i>		
Corporate/Organization	0.00	500.00
Individual	2,250.00	2,000.00
WAVMA Conference Income:	0.00	4,000.00
IAVBC	1,756.07	
Romania	863.02	
St. Kitts	0.00	
Conference Website Income:	0.00	1,000.00
IAVBC	0.00	
Romania	0.00	
St. Kitts	0.00	
<b>Total Income:</b>	25,171.84	32,300.00



**Sharon Tiberio,**  
DVM, CertAqV  
WAVMA Treasurer  
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[srtiberio@att.net](mailto:srtiberio@att.net)

**New Members (2nd Quarter 2017)**

Members are the life-blood of any professional Association. Please join us in welcoming the following new WAVMA members:

**New Veterinarian Members**

Bridget Baker	United States
Jose Barrio Nieves	Spain
Jayson Johnston	United States
Parinda Kamchum	Thailand
Irma Revah	United States
Barry Rickman	United States
Brandon Spolander	United Kingdom

**New Graduate Veterinarians**

Christine Lange	Germany
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**Vet Student Members**

Erik Briner	Grenada
Chelsey Ellingson	Saint Kitts and Nevis
Hadar Friedman	United States
Arjuna Govindasamy	Australia
Stacia Greene	Saint Kitts and Nevis
Delaney Hartson	Saint Kitts and Nevis
Nancy Hoecker	Saint Kitts and Nevis
Damian Holden	Australia
Haley Hunt	United States
Melissa Johnson	United States
Laura Krogman	United States
Benjamin Kwok	Australia
Samantha McIntosh	United States
Hanna Morehead	Saint Kitts and Nevis
Ashleigh Radford	Australia
Taylor Tvede	St. Kitts & Nevis
Nikki Wuestenhagen	United States
Elizabeth Wyatt	United States

**Vet Tech/Nurse Members**

Heather Leimer	United States
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**Affiliate Member (Non-Veterinarian)**

Robert Hoover	United States
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**Discover core knowledge, skills & experience needed to become a WAVMA Certified Aquatic Veterinarian (CertAqV)**

Did you know that WAVMA's **CertAqV Program** offers members the opportunity to become recognized and certified as having competency in 9 core areas deemed necessary to practice aquatic veterinary medicine? Find out more information online at: <http://www.wavma.org/CertAqV-Pgm>.

## PRIVILEGES & BENEFITS OF WAVMA MEMBERSHIP

### Aquatic Veterinary e-Learning

Supporting WAVMA's WebCEPD, PubCEPD  
CertAqV & Clinical Cases Programs.



- Enjoy on-line e-Learning programs & courses to advance your knowledge & skills
- Get continuing education credit through *WebCEPD, PubCEPD & Clinical Corner*
- Discover core knowledge, skills & experience needed to become a WAVMA Certified Aquatic Veterinarian (*CertAqV*)
- Receive *discounted* subscriptions to publications & meetings
- Utilize WAVMA's *picture & video libraries* for your own presentations
- Join *listservs* to discuss clinical cases & other issues
- Mentor & be mentored to expand your and other's aquatic veterinary skills
- Publish your articles in WAVMA's quarterly journal: *The Aquatic Veterinarian*
- Find world-wide externships, internships, residencies & jobs in all aquatic vet areas
- Access *Member Directories* & have your Clinic/Hospital listed on-line
- Benefit from *Educational grants* for vet students & new veterinary graduates
- Form & participate in *veterinary school chapters* throughout the world
- Participate in veterinarian and client surveys
- Help build additional member programs by serving as an Officer, Director or Committee Member

### WAVMA Committees

As a member-driven organization, WAVMA relies on volunteers to help implement programs useful for all members. Any WAVMA member can volunteer on a Committee to help shape the direction of the Association, meet new colleagues, forge valuable and lasting relationships, and help address key issues affecting aquatic veterinary medicine today. To find out more about serving on a Committee, please contact the Committee Chair or the WAVMA Parliamentarian.

#### Budget and Finance Committee

This Committee develops and regularly revises the Association's annual budget and assists the Treasurer, as necessary, in developing the Association's annual financial reports and tax materials.

This Committee shall consist of the Treasurer (Chair); the President-Elect; and one other member of the Executive Board who will volunteer to serve a one-year renewable term.

Chair: Sharon Tiberio, [Treasurer@wavma.org](mailto:Treasurer@wavma.org)

#### Communications Committee

This Committee manages the communications among members and others involved with aquatic veterinary medicine. It oversees the listservs, membership lists, publication of WAVMA's quarterly journal *The Aquatic Veterinarian*, e-News, Facebook, Twitter, LinkedIn and other social media accounts.

Chair: Devon Dublin, [DevDub@yahoo.com](mailto:DevDub@yahoo.com)

#### Credentialing Committee

This Committee oversees and administers the Cert-AqV Program for credentialing aquatic veterinary practitioners, and evaluates aquatic veterinary educational programs useful to members.

Chair: Tim Miller-Morgan [tim.miller-morgan@oregonstate.edu](mailto:tim.miller-morgan@oregonstate.edu)

#### Meetings Committee

This Committee oversees and coordinates logistics for WAVMA-organized or sponsored aquatic veterinary educational meetings, including the Annual General Meeting.

Chair: Julius Tepper, [cypcarpio@aol.com](mailto:cypcarpio@aol.com)

#### Membership Committee

This Committee oversees membership issues to optimally serve individual members and the organization. Chris Walster, [chris.walster@onlinevets.co.uk](mailto:chris.walster@onlinevets.co.uk)

#### Student Committee

This Committee facilitates networking between student members and helps development of student programs and services.

Chair: TBD



**Certified Aquatic Veterinarians**

Giana Bastos-Gomes	Australia
Heather Bjornebo	USA
James Bogan	USA
Todd Cecil	USA
Michael Corcoran	USA
Emily Cornwell	USA
Darren Docherty	UK
Simon Doherty	UK
Devon Dublin	Japan
Mohamed Faisal	USA
Ari Fustukjian	USA
Christopher Good	USA
Orachun Hayakijkosol	Australia
Kerry Illes	New Zealand
Colin Johnston	New Zealand
Kasper Jorgensen	Denmark
Brian Joseph	Canada
Elizabeth Kaufman	Israel
Jack Kottwitz	USA
Richard Lloyd	UK
Richmond Loh	Australia
Adolf Maas	USA
Matthijs Metselaar	UK
Tim Miller-Morgan	USA
Haitham Mohammed	Egypt
Ross Neethling	UK
Dušan Palić	Germany
Brian Palmeiro	USA
David Pasnik	USA
Ayanna Phillips	Trinidad & Tobago
Jena Questen	USA
Aimee Reed	USA
Stephen Reichley	USA
Komsin Sahatrakul	Singapore
Nick Saint-Erne	USA
Jessie Sanders	USA
David Scarfe	USA
Khalid Shahin	UK
John Shelley	USA
Melissa Singletary	USA
Esteban Soto	USA
Win Surachetpong	Thailand
Gillian Taylor	S. Africa
Julius Tepper	USA
Sharon Tiberio	USA
Laura Urdes	Romania
Greta Van de Sompel	Belgium
Christopher Walster	UK
Scott Weber	USA
Trista Welsh	USA
Peter Werkman	Holland
Howard Wong	Hong Kong

**Credentialing Committee**

The WAVMA CertAqV Program is administered by the WAVMA Credentialing Committee, along with the assistance of other Certified WAVMA members who serve as mentors and adjudicators.

To be credentialed by WAVMA as a Certified Aquatic Veterinarian and utilize the CertAqV honorific, individuals must be a WAVMA member, have a veterinary degree from a nationally recognized veterinary school, college or university and have demonstrated general knowledge and competency in core subject areas that are currently considered necessary to practice aquatic veterinary medicine. Students of a nationally recognized veterinary institution of higher education can register for the program, but will not be certified or entitled to utilize the CertAqV honorific until they graduate.

Individuals that desire to participate in the WAVMA CertAqV Credentialing Program are required to:

- Register for the Program (application at <https://www.wavma.org/CertAqV-Pgm>).
- Identify a mentor to assist the registrant through the Program. The potential mentors would be available WAVMA Certified Aquatic Veterinarians.
- Provide the mentor with written evidence of satisfactory completion of each of the core Knowledge, Skills and Experience (KSE) subject areas.
- Be adjudicated by the Credentialing Committee for recognition of completion of all KSE requirements after the mentor has approved the documentation.
- Have the CertAqV certification approved by the WAVMA Executive Board.

The WAVMA Certified Aquatic Veterinarian (CertAqV) program has now certified 58 aquatic veterinarians. Congratulations on our newest Certified Aquatic Veterinarians:

Krystan Grant,  
Stephanie Grimmett,  
James Johnson,  
Amy Kizer  
Eric Littman  
Alissa Mones

There are an additional 43 other WAVMA members currently in the process of being certified. For more information, see the WAVMA website:

<http://www.wavma.org/CertAqV-Pgm>.

**Tim Miller-Morgan**, DVM, CertAqV  
2017 Credentialing Committee Chair

## Fellows Advisory Council

WAVMA has established a fellowship program to recognize those world-renowned veterinarians who have advanced aquatic veterinary medicine as a discipline and devoted their time and efforts to serve WAVMA's mission. The Fellows Advisory Council allows Fellows to advise the Executive Board with guidance on their initiatives, and mentor applicants for Aquatic Veterinarian Certification (CertAqV).

Our WAVMA Distinguished Fellows are:

Dr Peter L. Merrill  
Dr Ronald J. Roberts  
Dr A. David Scarfe  
Dr Julius M. Tepper  
Dr Christopher I. Walster  
Dr Dusan Palic  
Dr Grace Karreman  
Dr Marian McLoughlin  
Dr Mohamed Faisal  
Dr. Nick Saint-Erne

See: <http://www.wavma.org/wavma-fellows.cfm?>

## Executive Board Responsibilities

The Executive Board has the responsibility for charting the course of WAVMA, fiduciary oversight of all issues, and, with input of committees, provides the oversight and approval for all WAVMA programs and services that fulfill the Mission and Objectives of the organization. The Board generally meets once a month through teleconferences, to discuss and approve WAVMA programs, services, and policies that drive the organization and issues that affect aquatic veterinary medicine. Members may submit items for discussion at the next Executive Board by contacting the [WAVMA Secretary](#).

## WAVMA Shop

A number of WAVMA branded items  
(including shirts, mugs, caps) are available  
at the WAVMA Store. Get yours today!



Go to: <http://www.wavma.org/Shop>

## WAVMA VETERINARY SCHOOL CHAPTERS

<https://www.wavma.org/WAVMA-Student-Chapters>

**Auburn University, [College of Veterinary Medicine](#) (established 2013)**  
**2016 Officers** - Kate Butzen (President), Patricia Debow (Vice President), Erika Gibson (Treasurer), Lindsay Lawreck (Secretary); **Faculty Advisors** - Drs. Ray Wilhite & Jack Kottwitz; **Chapter Contact** - [click here](#).

**Mississippi State University, [College of Veterinary Medicine](#) (estd 2014)**  
**2016 Officers** - Elizabeth Works (President), Taylor James (Vice-President), David Mills (Treasurer), Madeleine Hendrix (Secretary); **Faculty Advisor** - Dr. Wes Baumgartner; **Chapter Contact** - [click here](#).

**Murdoch University, [School of Veterinary & Life Sciences](#) (estd 2014)**  
**2016 Officers** - Ming Jun Lim (President), Cheryl Tan (Vice President), Chermaine Lim (Treasurer), Jia Wen Lim (Secretary); **Faculty Advisors** - Drs. Lian Yeap & Richmond Loh; **Chapter Contact** - [click here](#).

**Ross University, [School of Veterinary Medicine](#) (established 2015)**  
**2016-2017 Officers** - Larissa Menke (President), Erika Brigante (Vice President), Jean Fournier (Secretary), Robin Sayres (Treasurer), Michelle Sparks (Wetlab Coordinator), Mandy Murti (Fundraising Chair); **Faculty Advisors** - Drs. Don Bergfelt & Mark Freeman; **Chapter Contact** - [click here](#).

**Oregon State University, [College of Veterinary Medicine](#), USA (estd 2017)**  
**2017 Officers** - Katharine Onofryton (President), Holly Arnold (Vice-President), Linda Yang (Secretary), Katie Royer (Treasurer), Courtney Pace (lab coordinator); **Faculty Advisor** - Dr. Tim Miller-Morgan; **Chapter Contact** - [click here](#).

**Tuskegee University, [School of Veterinary Medicine](#) (established 2012)**  
**2016 Officers** - Jacqueline Elliott (President), Jennifer Algarin (Vice Prs), Jennifer Algarin (Secy), Aaron Judson (Treas.), Ayxa Rosado (Historian), TBD (Fundraising Chair); **Faculty Advisor** - Dr. Kenneth Newkirk; **Chapter Contact** - [click here](#). View the Chapter's [Facebook](#) page.

**University of Florida, [College of Veterinary Medicine](#) (established 2013)**  
**2016 Officers** - Haley Violetta (President), Riley Shugg (Vice President), Kaylee Brown (Treasurer), Megan Joyce (Secretary); **Faculty Advisor** - Dr. Tom Waltzek; **Chapter Contact** - [click here](#).

**University of Georgia, [College of Veterinary Medicine](#) (established 2015)**  
**2016 Officers** - Kristina Pascutti / Laura Burns (Co-Presidents), Sara Collins (Vice-President), Jaclyn Levin (Treasurer); **Faculty Advisor**, Dr. Alvin Camus; **Chapter Contact** - [click here](#).

**University of Minnesota, [College of Veterinary Medicine](#) (established 2016)**  
**2016 Officers** - Sarah Knowles (Chair), Angela Jackson (Secretary); **Faculty Advisor** - Dr. Amy Kizer; **Chapter Contact** - [click here](#).

**University of Pretoria, Onderstepoort [Faculty of Veterinary Science](#), South Africa (established 2017).** **2017 Officers** - Varushka Naidoo (Chair), Aminah Vahed (Dpty Ch), Joanel Van Zyl (Secretary), Jodi Botha (Treas), George Woodley (Social Media), Robynne Britz & Vianca Naidu (Funding); **Faculty Advisor** - Dr. Jan Myburg; **Chapter Contact** - [click here](#).

**University of Sydney, [Faculty of Veterinary Science](#) (established 2014)**  
**2016 Officers** - Ellen Rasidi (President), Arthur Chau (Secretary), Dr. Paul Hick (Treasurer); **Faculty Advisor** - Dr. Paul Hick; **Chapter Contact** - [click here](#).

**University of Tennessee, [College of Veterinary Medicine](#) (estd 2012)**  
**2012/13 Officers** - Wesley Siniard & Grace Normann (Co-Presidents), Krista Lipe (Vice President), Carrie Dobe (Secretary), Samantha Schraith (Treasurer), Bree Dell (Wetlab Coordinator); **Faculty Advisors** - Dr. Michael Jones & Dr. Debra Miller; **Chapter Contact** - [click here](#). View the Chapter's [Facebook](#) page or [website](#).

**University of Wisconsin-Madison, [School of Veterinary Medicine](#) (established 2014)** **2016 Officers** - Katherine Hausmann (President), Nikki Wuestenhagen (Vice President), Geoffrey Gieni (Secretary), Jenna Newman (Treasurer), Jenna Epstein (Activities Coordinator); **Faculty Advisor** - Dr. Mike Collins; **Chapter Contact** - [click here](#).

**Western University of Health Sciences, [College of Veterinary Medicine](#) (established 2014).** **2016 Officers** - Andrew Switaj (President), Alexis Wohl (Vice President), David Abolnik (Secretary), Hali Jungers (Treasurer); **Faculty Advisor** - Dr. Suzana Tkalcic; **Chapter Contact** - [click here](#). View the Chapter's [Facebook](#) page.

Click here to get [WAVMA Student Chapter Guidelines](#) .

**SCHOLARSHIP COMMITTEE:**

The John L. Pitts Aquatic Veterinary Education Awards Program is excited to announce recipients for the 2017 Award Cycle! The following individuals were selected to receive an award from a large pool of applications. Please join us in congratulating them on this prestigious recognition.

**2017 John L. Pitts Scholar**

Shiva Prasad Bhusal – class of 2018,  
Agriculture and Forestry University (Nepal)

**Other Awardees**

Theadora B'ey – class of 2019,  
Colorado State University (USA)

Laura Burns – class of 2018,  
University of Georgia (USA)

Christine Casey – class of 2018,  
University of Georgia (USA)

Sarah McConnachie – class of 2018,  
Atlantic Veterinary College (Canada)

Nicole Nietlibach – class of 2019,  
University of Wisconsin-Madison (USA)

Zachary Ready – class of 2020,  
Purdue University (USA)

Courtney Wright – class of 2019,  
The Ohio State University (USA)

To support future student scholarships, please make a donation today to the Scholarship Fund!

[www.wavma.org/scholarships](http://www.wavma.org/scholarships).

Since its inception in 2010, the John L. Pitts Aquatic Veterinary Education Awards Program has awarded over \$47,000 to 73 veterinary students and recent graduates from 40 colleges and universities across 4 continents. These funds, which have come from a small number of individuals and organizations, allow recipients to explore a career in aquatic veterinary medicine through participation in externships at public, private, and academic institutions and attendance at conferences, workshops, and short courses all over the world.

The Program was started to honor the late John L. Pitts, DVM, who was passionate about student involvement in the profession and a global approach to aquatic veterinary medicine. His service to the profession began as a veterinary student in 1969 when he helped create a national chapter for the Student American Veterinary Medical Association. John also helped in the formation of the National Association of State Aquaculture Coordinators, the Aquaculture and Seafood Advisory Committee of the AVMA, and he worked tirelessly to shape and encourage the passage of the Minor Uses and Minor Species Act of 2004. To continue John's vision, a small all-volunteer committee comprised of individuals representing private practice, academia, past recipients, WAVMA student members, and the Pitts family work to administer this program.

For more information regarding the Program and to make a donation for future awards, please visit:

[www.wavma.org/scholarships](http://www.wavma.org/scholarships).

Stephen Reichley  
Scholarship Committee  
[stephen.reichley@gmail.com](mailto:stephen.reichley@gmail.com)

**Aquatic Veterinary e-Learning**  
Supporting WAVMA's WebCEPD, PubCEPD,  
CertAqV & Clinical Cases Programs

**Did you know?**

**WAVMA maintains an aquatic vet video library.** Currently the videos cover a wide range of topics, including surgical procedures, diagnostic methods and guidance on how to be an aquatic veterinarian.

The videos can be accessed at:

<http://www.wavma.org/WAVMAs-Aquatic-Vet-Video-Library>

In addition, if you have a video that you would like to make available to other WAVMA members, kindly contact

[WebAdmin@wavma.org](mailto:WebAdmin@wavma.org).

## WAVMA ANNUAL ELECTIONS

Nominations will soon be open for election to the 2018 WAVMA Executive Board. To meet bylaws requirements, and as the WAVMA AGM has been scheduled for September 13, 2017 (at the WAVMA Conference in Romania), here is the schedule for the election: nominations are open from July 15 and will close on August 15. At this point the online (absentee) voting system will open and will close on September 12, so make your vote count.

In person voting will occur at the Annual General Meeting for Full Members present there who have not voted online. The votes will be tallied at the AGM, with the election results being announced thereafter.

Voting is open to all full WAVMA members. All full members should consider running for a position and self-nomination is accepted. Please watch the WAVMA.org website for more information on the upcoming election. The following Executive Board positions are open for nominations:

President-Elect

Secretary

Treasurer

Director-at-Large—3 positions

Please consider standing for election as one of these positions. Current officers and directors can also run again for their positions.



*The Aquatic Veterinarian* is meant to be read as a 2-page spread (like a paper magazine!). To view it this way on your computer, open the pdf document using Adobe Acrobat or Adobe Reader, then go to the menu bar at the top of the computer screen and click on View, then Page Display, then Two Page View. That will allow you to scroll thorough the issue seeing the cover page by itself first, followed by two pages side by side for the rest of the issue. Doing this, you will be able to see the Centerfold picture in all its ginormous glory!

## Zoo Med Celebrates 40 Years in Business By Pet Product News

Zoo Med Laboratories is celebrating 40 years in business. The company aims to help keep reptiles, amphibians, fish, birds and other exotic pets happy and healthy. In 1993, Zoo Med developed the first UVB lamp for reptiles, which

changed the way all zoos, herpetologist, and hobbyists keep reptiles in captivity, according to company officials.

“Never in a million years would I have imagined myself here or that this is what I would be doing,” said Gary Bagnall, ZooMed founder. “I think I am good at putting good people together and allowing them to create magic.”

Other hallmark Zoo Med innovations include the release of the first specialized reptile multivitamin, the first natural food products for reptiles, the introduction of canned insect foods, the release of patented turtle docks, as well as the first modular LED Lamp for Aquatics. Zoo Med currently has over 30 patents and manufactures over 50 percent of its 1,200 SKU product line at company headquarters in San Luis Obispo, Calif.

Zoo Med also has an extensive reptile breeding program and currently houses 490 turtles, 76 tortoises, 125 lizards, and 12 amphibians. Since 2009, the company has successfully hatched over 1,500 of the above animals (46 species; many of them endangered).

“To me, it has never been about the destination, but the journey,” Bagnall added. “I have gotten to do amazing things, and each one led to the next. And now, here I am.”

Zoo Med also supports 10 conservation organizations, and regularly donates to over 100-plus aquarium, reptile and avian societies.



[http://www.petproductnews.com/News/Zoo-Med-Celebrates-40-Years-in-Business/?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=PetSmart%20Charities%20Supports%20Pet%20Partners%20Conference&eid=345085332&bid=1803626](http://www.petproductnews.com/News/Zoo-Med-Celebrates-40-Years-in-Business/?utm_source=newsletter&utm_medium=email&utm_campaign=PetSmart%20Charities%20Supports%20Pet%20Partners%20Conference&eid=345085332&bid=1803626)

### Instructions for Authors and Contributors

While any information relevant to aquatic veterinary medicine might be published, we particularly invite contributions for the following regular columns in *THE AQUATIC VETERINARIAN*:

#### Colleague's Connection

An article explaining why and how a veterinarian became interested in aquatic veterinary medicine and what that veterinarian has done in their aquatic veterinary career.

#### Peer-Reviewed Articles

Original research or review of any aquatic veterinary topic. Articles will be reviewed by 3 veterinarians and comments and changes referred back to the author prior to publication. The text for an article begins with an introductory section and then is organized under the following headings:

- Materials and Methods
- Results
- Discussion (conclusions and clinical relevance)
- References (cited in the text by superscript numbers in order of citation).

#### Clinical Cases

Clear description of a distinct clinical case or situation and how it was resolved. These may be submitted for peer-review. Begin with the signalment (species, age, sex, body weight or length) of the animal or animals, followed by a chronologic description of pertinent aspects of the diagnostic examination, treatment, and outcome, and end with a brief discussion.

#### Book Reviews

Brief review of a published book, including an overview and critique of the contents and where to obtain the book.

#### Publication Abstracts

Abstracts of published veterinary and scientific journals with full citation/reference (authors, date, title, and journal volume and page numbers – ½-1 page).

#### News

Brief synopsis or information about aquatic veterinary news published elsewhere. List original source of information.

#### Legislative & Regulatory Issues

Synopsis or description of emerging legislation or regulations with information on how to access further detailed information or a link to website.

#### Meetings and Continuing Education and Professional Development (CE&PD) Opportunities

Description or synopsis of upcoming aquatic veterinary or (veterinarian-relevant) non-veterinary in-person or on-line educational meetings noting the meeting title, dates, location, and contact person or website.

#### Jobs, Internships, Externships or Residencies

Description with specific contact information for veterinary student externships and post-graduate internships or residencies at private practices, institutions, universities or organizations. Description of available full or part-time employment for aquatic veterinarians, with contact information.

#### Advertising

See advertising rates on page 4.

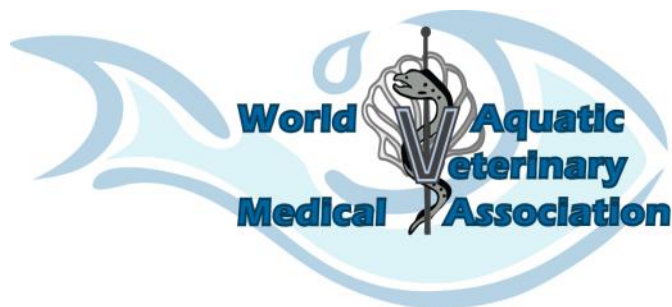
#### Please send articles, clinical reports, or news items to the editor by the following submission dates:

- Issue 1 – February 15 (published in March)
- Issue 2 – May 15 (published in June)
- Issue 3 – August 15 (published in September)
- Issue 4 – November 15 (published in December)

All submissions should be in 10-point Arial font, single spaced. Submissions may be edited to fit the space available.

We can also use editors to proof-read submissions or review articles. Please contact the Editor if you are interested in assisting.

The World Aquatic Veterinary Medical Association also has opportunities for members to assist with committees. Contact any member of the Executive Board to volunteer to help.



**DO YOU HAVE A STORY TO TELL ABOUT  
 HOW YOU BECAME  
 INVOLVED WITH AQUATIC  
 VETERINARY MEDICINE?**

Send your article (<1,000 words) with pictures to  
[TAVeditor@wavma.org](mailto:TAVeditor@wavma.org).

### WAVMA Annual General Meeting and Conference

**Location:** Plaza Hotel in Târgu Mureș (Tg. Mureș), located in the North-central part of the Transylvania region of Romania.

**The climate:** Tg. Mureș climate is mild, mostly humid. In September, the average temperature is 16° C (60 F) and humidity reaches 74%.

**Currency:** The currency is Romanian Leu/RON (*pl. Lei/Roni*). One RON/leu is divided into 100 Bani. The exchange rates of the RON conversion are established on a daily basis, by the National Bank of Romania (BNR).

1 EUR = ± 4.55 RON

1 USD = ± 4.26 RON

**Dialing code:** 004 (national code - Romania); (0)265 (Tg. Mureș area code)

**Electricity:** 230V-400V/50-60 Hz. Plugs are two round prongs.

**Visa requirements:** Please, see visa requirements and further travel information on the official website of the Romanian Ministry of Foreign Affairs, at: <https://www.mae.ro/en/node/2084>

**To see if a visa is required for you to entry Romania,** go to: <https://www.mae.ro/en/node/2040>

#### Airport transfer to Plaza Hotel

Transfer route from [Avram Iancu International Airport Cluj \(CLJ\)](#) to Plaza Hotel.



Most commonly, transfers from the Cluj airport to nearby cities is by car. Hotels in these cities usually provide transfer to/from the airport. Plaza Hotel will be able to offer transport services to participants, at request. This is a chargeable service and must be booked and acknowledged in advance (7-10 days prior to the arrival). For transfer to/from the venue, please contact directly Laura Urdeș: [urdeslaura@gmail.com](mailto:urdeslaura@gmail.com)

Arrival by air: Avram Iancu International Airport Cluj (CLJ) is located in Cluj-Napoca city, at 62.0 miles (99.8 km) away from Târgu Mureș. A number of airlines operate on this airport. Major European capitals are connected directly to Cluj. TAROM and BlueAir are Romanian companies. TAROM - a SkyTeam Alliance member, is the Romanian national airline company. Approximate flight time from most European capitals is 1.50-3 hours.

More information about the flights are available at: <http://airportcluj.ro/>

### Places of Interest Around Targu Mures

#### Apollo Palace (*Palatul Apollo*):

Piata Trandafirilor No. 5.

The Apollo Palace was built between 1820 and 1822 at the initiative of count Teleki Sámue. Today, the building is home to the local Art School.

#### Old Prefecture Building (*Cladirea Vechii Prefecturi*): Str. Bolyai No. 5.

The former seat of the Prefecture has been in use since 1711. The ground floor served throughout the years as a prison and on the top floor as an assembly hall. Currently, these spaces are used as workshops by the artists of Targu Mures.

#### Palfy House: Str. Bolyai No. 12.

Among the first representations of Baroque architecture built in Targu Mures, the Pálffy House, built around 1640, reflects an evolutionary stage that surpasses typical Renaissance architectural elements such as those of the oldest buildings of Targu Mures.

#### Prefecture Building (*Palatul Prefecturii*):

Str. Primariei No. 2.

The present headquarters of the Mures County Council, together with the Culture Palace, make up a spectacular secessionist ensemble built in Targu Mures at the beginning of the 20th century.

#### St. Michael Wooden Orthodox Church (*Biserica din Lemn Sf. Arh. Mihai*): Str. Saguna No. 13 A.

The oldest Orthodox Church in Targu Mures harmoniously combines Romanian rural traditions with Baroque influences. The church was built between 1793 and 1794.

#### Teleki Library (*Biblioteca Teleki*):

Str. Bolyai No. 17.

The Teleki Library, founded at the end of the 18th century by Sámuel Teleki, chancellor of Transylvania, contains a large collection of first editions and important manuscripts documenting Transylvanian history, as well as mathematical and scientific works.

#### Targu Mures Fortress (*Cetatea medievala*):

In 1492 Prince Stefan Bathory ordered for a castle-fortress to be erected around the Franciscan monastery and church. A few of the original elements have been preserved, among them wall fragments on the Southern and Western sides, the tower on the Southern wing, attached to the furriers' bastion, and ruins of the South-Western tower, included nowadays in the tanners' bastion. The structure of these towers and the fact that they are square-shaped are indicative of a medieval type military architecture.

**Questions & Answers from the WAVMA Listserv**  
([WAVMA\\_Members-L@wavma.org](mailto:WAVMA_Members-L@wavma.org))

**Parasitic Copepod Treatment**

Hi WAVMA members,

Some marine perch are in need of treatment for a gill parasite, which is presumed to be a copepod (*Clavella* spp). The fish are wild caught, and are housed in tanks for a research trial.

They have undergone a formalin treatment - 1 hour bath at 200 ppm, alternate days for 3 treatments in total - which seemed to have some effect. The parasites have also been manually removed. More perch will be collected from the wild, and we are looking for better treatment options.

Any input or advice would be very much appreciated.  
Thanks,

**Mykolas Kamaitis DVM**  
Veterinarian

Marine Harvest Canada

[mykolas.kamaitis@marineharvest.com](mailto:mykolas.kamaitis@marineharvest.com)

You might try an in-feed treatment, like emamectin benzoate, that will be less stressful for the fish. Depends how this might interfere with any subsequent trial and how easy an in-feed treatment would be to administer (pellets in fish bits). But if it's possible to add to the food, *Clavella* and other copepods should be killed effectively.

**Mark Freeman (RUSVM)**  
[mafreeman@rossvet.edu.kn](mailto:mafreeman@rossvet.edu.kn)

I'd use diflubenzuron. It can be added to the water at 0.03-0.10 mg/L, or given orally 75 mg/kg BW (15g/kg of food if mixing in food).

This treatment is very safe for fish. Diflubenzuron interferes with invertebrate chitin synthesis, so it may also kill non-target invertebrates (insects and crustacea). Over 76% is persistent in the environment after 1 week.

Yours sincerely,

**Dr Richmond Loh**

DipProjMgt, BSc, BVMS, MPhil (Pathology), MAN-ZCVS (Aquatics & Pathobiology), CertAqV, NATA Signatory.

Aquatic Veterinary Medical & Diagnostic Services.

Web: <http://www.thefishvet.com.au>

**Freshwater Sponge in Koi Pond Filter**

Dear WAVMA Members,

Today I visited a pond of a mate, who asked for help. Besides many other problems, I checked the filter, there I have seen something new to my eyes. It would be nice if someone more experienced could help me to identify this type of "layer".



The flow rate is very low, and in a chamber without aeration. I don't know if this additional info is useful: He is using a phosphate binder and something called Reduc, I think it is H<sub>2</sub>O<sub>2</sub> but the retailer is not giving any info what is inside.

The pond is running many years with this filter material, plastic helix beads, which is in touch with this layer and isn't covered with normal biofilm.

Is this fungus, some kind of bacteria or something else, has anyone seen this before?

Thanks for your help.

**Manuel Künzel** (Vet student from Germany/LMU)

Manuel,

That's a tough call, since we can't see or feel the texture, or smell it. Sometimes you just gotta taste it...

How about putting a bit on a slide and looking at it under a microscope? You can easily stain it with India ink for cellularity, iodine for fungus, and dif-quick for bacteria. Might be very telling.

It's tough to interpret without more information.

Cheers,

**Adolf K. Maas**, DVM, DABVP (Reptile and Amphibian Practice), CertAqV.

ZooVet Consulting, PLLC

[www.zoovet.us](http://www.zoovet.us)

From the photos, it looks like a freshwater sponge. Adolf's suggestions of microscopic examination, with or without staining, would be very helpful in identifying if it is a sponge.

See these links for more information:

<https://en.wikipedia.org/wiki/Spongilla>  
<http://animals.irank.org/pages/1453/Sponges-Porifera-FRESHWATER-SPONGE-Spongilla-lacustris-SPECIES-ACCOUNTS.html>

**Nick Saint-Erne**, DVM, CertAqV

**Meet Dr. Leigh Clayton:  
How Does an Aquarium Veterinarian Work?**

By Jacob Brogan

For this podcast episode, which you can listen to via the link at the end of the article, we spoke with Dr. Leigh Clayton, director of animal health and welfare at the National Aquarium in Baltimore, Maryland USA. She and her team are responsible for the care of something like 800 distinct species—close to 15,000 animals in all. Though that's a huge range, learning their peculiarities isn't necessarily that difficult. All veterinarians, Clayton says, have to be adaptable, taking "facts you know and approaches you know from one species and applying them to similar species."

Diagnosing a sick fish, she says, also isn't all that different from diagnosing any other animal. As she explains, "We often are looking for changes in their behavior and changes in how they look."

A fish that's ill may fall behind the others in its school or hold its fins differently than it otherwise would, for example. In other circumstances, they sometimes change color, much as you or I might go pale when we get hit by stomach bugs. Even the diagnostic tools—X-rays, ultrasounds, and so on—are similar to those that other veterinarians use to test more familiar terrestrial mammals.

Clayton tells us that one of the things that surprises visitors most is that you actually can take a fish out of water to perform surgery on it. In this episode, she goes into that and more, and also shares a story about a particularly memorable thyroid surgery on a gecko lizard. She also talks about the shape of a typical day and leads us through what happens in an emergency. And, of course, she goes into the aquarium's relationship with the nearby Chesapeake Bay, including the institution's involvement with local animal rescue groups when wild animals in the region are in crisis.

For Clayton, the aquarium's facilities—and their links to the surrounding environment—offer educational opportunities as well. "There's a lot of fish out there. It's fun to point [them] out," she says of the harbor that abuts the aquarium. "People have no idea."

"As the Director of Animal Health, a typical day for me includes overseeing any necessary animal procedures, checking on the animals, and dealing with any emergency cases that arise. My staff and I often give tours or have shadowing veterinarians and veterinary students to interact with," states Dr. Clayton.

She also shares some thoughts about what it's like to work with octopuses; strikingly complex and often individually eccentric animals.



*Dr. Leigh Clayton, director of animal health and welfare at the National Aquarium in Baltimore, Maryland.*  
Heather Moran/National Aquarium

Hear the podcast at:

[http://www.slate.com/articles/podcasts/working/2017/05/how\\_does\\_leigh\\_clayton\\_the\\_national\\_aquarium\\_s\\_director\\_of\\_animal\\_health.html](http://www.slate.com/articles/podcasts/working/2017/05/how_does_leigh_clayton_the_national_aquarium_s_director_of_animal_health.html)

Go to the National Aquarium in Baltimore Website:

<https://aqua.org/>





**The National Aquarium—Baltimore, Maryland USA**  
Photos by Nick Saint-Erne, DVM, CertAqV



*Panther Grouper (Cromileptes altivelis)  
swimming among corals at the  
National Aquarium in Baltimore.  
Photo by Nick Saint-Erne*





### The spread of pathogens in Montana rivers requires thoughtful, scientific responses

By Sid Gustafson, DVM

[www.sidgustafson.com](http://www.sidgustafson.com)

Mar 2, 2017

The mountain whitefish (*Prosopium williamsoni*) in Montana's rivers are dying *en masse*. The fish have Proliferative Kidney Disease—the work of a highly contagious parasite that kills between 20 and 100 percent of infected hosts. This aquatic infectious disease is caused by a pathogen present in a river environment that achieves successful reproduction in a vulnerable host, often at the host's expense. The myxozoan parasite *Tetracapsuloides bryosalmonae* has been identified as the cause of the whitefish epidemic in the Yellowstone and Big Hole Rivers, home of the endangered grayling.

An appreciation of the whitefish epidemic requires consideration of three factors: 1) the host(s), 2) the warming river environment, and 3) the pathogen(s). Epidemics — including the whitefish epidemic — are preceded by essential predisposing conditions affecting all three factors: warming temperatures, low water flows, silting, proliferation of the pathogen *T. bryosalmonae*, diminished oxygenation of the water, increasing salinity, septic seepage, chemical runoff, altered riverbanks, recurrent contamination with other pathogens and invasive species, river sporting, boating, fly-fishing, water diversion and irrigation, and riparian residential, commercial and agricultural practices along the river are the primary environmental factors that facilitated the Yellowstone River epidemic. While all the aforementioned factors play a role, the warming of the river was the critical factor in this epidemic. Had the river not warmed to the critical temperature, thought to be around 15 degrees Celsius (59 degrees Fahrenheit), the epidemic would not have happened despite the presence of the pathogen and the vulnerability of the whitefish.

The parasite *Tetracapsuloides bryosalmonae* is a native North American pathogen that has resided in American rivers for centuries. The pathogen has also spread to European rivers. In the Yellowstone, this infectious agent has adapted to infect whitefish, finding them more vulnerable than trout. The native mountain whitefish, a salmonid fish, is our host of concern. The fish is called the mountain whitefish because it thrives in cold mountain rivers.

The aquatic pathogen *T. bryosalmonae* is unusual among the myxosporea (of which the whirling disease pathogen is a relative) in that it requires a bryozoan as an intermediate host to complete its life-cycle. The bryozoan in this case may be *Plumatella*

*fungosa*. This freshwater jellyfish becomes infected with *T. bryosalmonae* and then releases fish-infective spores into the river. When waters warm high enough to manifest disease, about 60 degrees F, these floating spores attach to the whitefish's gills before entering the bloodstream and proceeding to cause proliferative kidney disease

Depending on the fish's health, resistance, environmental conditions, adaptability, infective dose, and immune status, the fish survives to perhaps be resistant to future infections, or it dies. As the fish dies, the pathogen enters the water. At this stage of this complex life-cycle, rather than finding another fish, the pathogen finds a *Plumatella fungosa* sponge to complete its lifecycle. In this process, the infectious organism begins to flourish in the river and gains momentum to create an epidemic.

Multiple measurable factors preceded the whitefish epidemic, an epidemic a long time coming, an epidemic that veterinary medical technology had the ability to predict had aquatic veterinary medicine been employed to keep Montana rivers and their fish populations prosperous and healthy.

The hosts of this disease have historically been salmonids, whitefish among them. As any Yellowstone guide knows, a whitefish is no salmon. While considered undesirable by some, the whitefish is an indicator species reflective of river health. Like trout, whitefish and grayling are salmonids. Whitefish require pristine rivers. Grayling, the previous indicator species, were extirpated by sullied river systems. Historically, whitefish often decline next.

To monitor and predict future epidemics, competent aquatic veterinarians sample, test, analyze and interpret the host health, river health, intermediate host presence, along with the pathogen load in the river system. With this information, aquatic veterinarians can manage the health of the watershed, river, and fish to minimize the impact of infectious disease -- all of this ahead of time. The aquatic veterinary goal is to prevent epidemics, or at least predict them, something beyond biologists' ability at this time.

Veterinarians have a long and effective history of successfully managing the health of animal populations threatened by infectious disease, be they wild or domestic. Veterinarians have the appropriate knowledge and experience to sustain fish and river health. The time has come to look to veterinarians to manage river health in Montana as rivers are managed in progressive fisheries throughout the world where the economy depends on fish health and prosperity. There is a lot to learn about this epidemic, and veterinarians are the best learners regarding management and prevention of infectious disease.



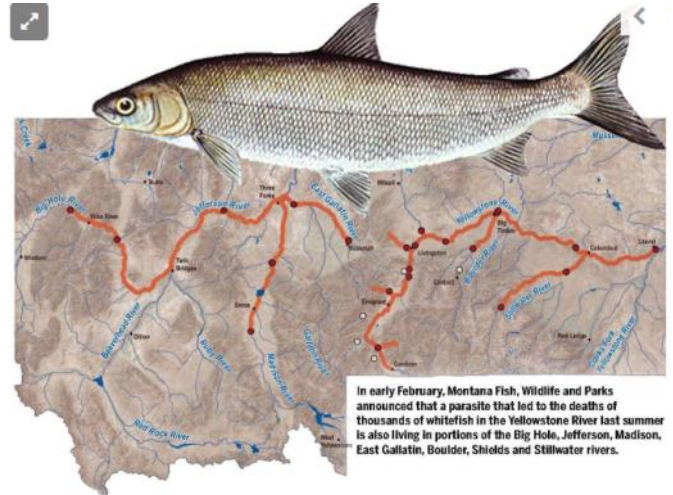
The resolution of this epidemic could be similar to the resolution of the whirling disease epidemic. The whitefish and trout survivors will perpetuate offspring that are more resistant than their immunologically naïve predecessors. Disease resistance will develop. The fish will adapt to and/or find a balance with their pathogen and intermediate host. An equilibrium between pathogens and hosts emerges over time if the river system is kept healthy and cool. The trout may have previously acquired a resistance from their experience with the whirling disease organism, and now with this experience, the trout appear to be developing resistance to infective pathogens of various sorts.

An antimicrobial agent to kill the aquatic pathogen is not a viable method of control or prevention, as the river environment would be further deteriorated by the drug's side-effects and unintended victims.

The jellyfish host, *Plumatella fungosa*, could be medically manipulated, sterilized, or genetically altered to block the two-host disease transmission cycle, and that is a consideration. The environment (the river) can be made healthier: water cooled, flow quickened, and oxygenation enhanced using progressive river management techniques (limiting water drawouts, averting septic and manure seepage, and halting chemically contaminated runoffs). The fish populations could be treated more kindly and carefully by educating guides and anglers on the principles of animal welfare (fish are sentient beings) and the principles of disease transmission.

Humans can spread the parasite from one water source to another. Fishing hooks, boats, gear, and fishermen transmit fish diseases near and far. This needs to be evaluated and addressed. Fishing stress and disease vulnerability can be significantly reduced by regulating fishing and/or floating in consideration of the fish, rather than the fisherman, accountants, and irrigators. Catch-and-release practices and their relationship to perpetuating and spreading fish diseases require investigation. Harvesting can be considered a possible disease management measure. Stressed or injured fish should not be released back into the river.

Rest is the oldest remedy to manage disease. While naïve to the vagaries of infectious animal disease, the Montana FWP is to be commended for closing the river and giving her a long-needed rest. Periodic rest during critical times appears to be one solution of many. Whitefish populations can balance trout populations, and overpopulations, keeping fish numbers balanced and healthy. Pathogens often find imbalanced populations vulnerable. The microbe often has the last word (when the humans don't pay attention). Aquatic veterinarians pay attention. In order to maintain a healthy Big Hole grayling fishery, available aquatic veterinary medicine techniques should be implemented.



*Dr. Sid Gustafson is a renowned equine veterinarian and an acclaimed novelist. His third novel, "Swift Dam," was published in 2016. This year, Gustafson was a writer in residence in the Mining City Writing Project, a collaboration between The Montana Standard, the Butte-Silver Bow Public Archives, and the Root & The Bloom Collective, with funding from Humanities Montana. Gustafson is Conrad, Montana native.*

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Continued on next page.

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A version of this article originally appeared in the Montana Standard. View it here:

[http://mtstandard.com/lifestyles/outdoors/spread-of-pathogen-in-montana-rivers-requires-thoughtful-scientific-response/article\\_53d0439e-1c71-5b18-a740-59ace78f7468.html](http://mtstandard.com/lifestyles/outdoors/spread-of-pathogen-in-montana-rivers-requires-thoughtful-scientific-response/article_53d0439e-1c71-5b18-a740-59ace78f7468.html)

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**South Australian Disease Surveillance:  
 A Pacific oyster mortality syndrome focus**

By Shane Roberts 1 & Nicole Stubin 2

1 Primary Industries and Regions, South Australia &  
 2 Fisheries Research and Development Corporation,  
 Australia

Aquatic animal health is critical to the success of fisheries and aquaculture management in South Australia. Monitoring of production activities and requirements to report high mortalities and suspected disease incidents (passive surveillance) provides an early detection system to enable rapid emergency disease response. These requirements are outlined in legislation (e.g. Aquaculture Regulations 2016, Livestock Act 1997) and in industry-agreed policies (e.g. disease response plans).

In South Australia, passive surveillance of oysters is largely based on reports of mortalities, which generally occur annually during summer, and the subsequent investigations, which to date have ruled out infectious and notifiable diseases. Another example of passive surveillance in South Australia is the abalone industry requirement to report mortalities and subsequent investigations, and for aquaculture abalone farmers to routinely batch test abalone for trade, which provides data on disease status. Primary Industries and Regions SA (PIRSA) undertakes active surveillance to confirm disease status or freedom from disease for the purpose of emergency response or to support policy (e.g. livestock translocation). Active surveillance of oysters in South Australia has occurred as specific surveys for Pacific oyster mortality syndrome (POMS). Effective and ongoing aquatic animal health surveillance is critical for proving that South Australia remains free from notifiable diseases, such as POMS.

This freedom from disease provides for a sustainable and productive seafood industry and ongoing access to domestic and international seafood markets.

POMS is a disease that is specific to Pacific oysters, causing mortalities of up to 100% in a matter of days. POMS is caused by a highly pathogenic ostreid herpesvirus 1 microvariant (OsHV-1  $\mu$ var) and is known to occur in New South Wales and Tasmania. South Australia is the only Pacific oyster-growing state in Australia to remain free of POMS.

With an estimated impact of more than \$12 million, a February 2016 outbreak of POMS in Tasmanian oyster farms highlighted the need for rapid and effective management responses to aquatic animal health emergencies. After the detection of POMS in Tasmania, PIRSA immediately implemented the State Disease Response Plan for POMS to safeguard South Australia's \$32 million oyster-growing industry.

No significant oyster mortalities occurred in South Australia following the Tasmanian outbreak but PIRSA's response to the outbreak included active surveillance to aid early detection and confirm South Australia's claim of freedom from POMS.

Prior to the Tasmanian POMS outbreak, South Australian oyster farmers regularly received consignments of oyster spat from well-established hatcheries in Tasmania. As part of the South Australian response, an immediate ban on live Pacific oyster imports, including spat, was implemented through a Livestock Standstill Notice and consignments received by South Australian producers up to 2 weeks prior to the POMS detection in Tasmania were tested using polymerase chain reaction (PCR) procedures. All 669 samples tested (from 22 consignments across 20 farms) returned negative results, enabling oyster farming (including intrastate movement of oysters and equipment) to proceed in South Australia. The ban on importing all life stages of Pacific oysters and oyster-farming equipment from Tasmania remains in place until 31 March 2017.

The ban on Pacific oyster imports has been vital to reduce the risk of POMS entering South Australia. However, the undersupply of Pacific oyster spat has created a challenge for South Australian oyster growers. The state government has worked closely with industry to ensure local supply of spat through:

- providing \$320,000 in funding for two existing South Australia oyster hatcheries (Sustainable Aquatic Industries and EP Shellfish) to help increase Pacific oyster spat production,
- enhancing the hatchery capacity at South Australian Research and Development Institute (SARDI), a division of PIRSA, which enabled it to commence Pacific oyster spat production,
- providing assistance to new companies to establish hatcheries and nursery facilities in South Australia, with Cameron of Tasmania Pty Ltd and Eyre Shellfish Pty Ltd now approved to establish new operations on the Eyre Peninsula.

POMS is a disease that is specific to Pacific oysters, causing mortalities of up to 100% in a matter of days. The threat of POMS being introduced into South Australia is ongoing, with commercial and recreational vessel movements between Australian ports. In July 2016, a construction barge arriving in South Australia (Port Adelaide) from New South Wales was discovered with 'thousands' of Pacific oysters attached to its hull. Fortunately, the company had contacted PIRSA and the barge was dry docked and quarantined immediately upon arrival. Of 54 oyster samples collected from the vessel and tested, one returned a positive result for OsHV-1  $\mu$ var. Given water temperatures were well below the generally accepted minimum threshold of 17°C for POMS outbreaks, it was unsur-

prising that prevalence was low and clinical disease was not evident. The barge was successfully isolated, de-fouled and cleaned, and the Australian Chief Veterinary Officer was notified. This incident did not constitute an outbreak, and South Australia remains free of POMS.

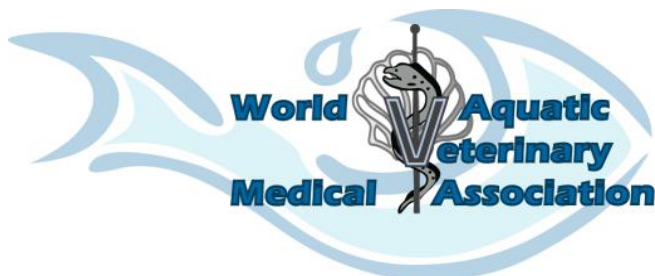
To further enhance surveillance for POMS in South Australia, PIRSA has engaged the South Australian state veterinary diagnostic laboratory (Gribbles) to establish local expertise to undertake PCR testing for OsHV-1  $\mu$ var. Previously, samples needed to be sent to the CSIRO Australian Animal Health Laboratory for testing, resulting in delays for diagnostic results due to sample dispatch times from South Australia's west coast. Establishing PCR testing capability in South Australia will facilitate ongoing active surveillance initiatives being progressed by industry with assistance from PIRSA and funded research projects, including the Commonwealth Cooperative Research Centres — Projects for Oysters.

South Australia's freedom from many significant diseases supports trade and market access, but it also demonstrates the need for ongoing surveillance in fisheries and aquaculture as an early detection system. Continued passive surveillance for early detection and rapid response to disease threats is critical for eradication or effective containment of disease to reduce adverse impacts. Active surveillance can provide a complementary level of early detection and can support policy (e.g. livestock translocation measures) and facilitate trade and market access. Combining surveillance programs with appropriate disease response plans, emergency response training and border controls further enhances disease prevention and preparedness for our valuable fisheries and aquaculture industries and provides the tools to address known and unknown threats that may arise.

For more information contact PIRSA's Manager, Aquatic Animal Health Unit, Dr Shane Roberts, +61 (88) 429-0505 or [shane.roberts@sa.gov.au](mailto:shane.roberts@sa.gov.au).

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More information on Pacific oyster mortality syndrome (Herpes virus OsHV-1) is available at: <http://www.eurl-mollusc.eu/Main-activities/Tutorials/Herpes-virus-OsHV-1>.



## AQUATIC VETERINARY ABSTRACTS:

### Aquatic Invertebrates

Compiled by David Scarfe

#### First report of infestation by a parasitic copepod (*Pennella balaenopterae*) in a harbour porpoise (*Phocoena phocoena*) from the Aegean Sea

Danyer E, AM Tonay I Aytemiz, A Dede, F Yildirim & A Gurel (2014). *Veterinari Medicina*, 59(8): 403–407 (open access publication available at: <http://vri.cz/docs/vetmed/59-8-403.pdf>).

#### Abstract

An adult, female harbour porpoise (*Phocoena phocoena relicta*) was found stranded on the southern Aegean Sea coast of Turkey. Thirteen holes made by copepods were observed on the lateral sides of the porpoise. The copepods were identified as *Pennella balaenopterae*, based on the morphological characteristics and measurement. Tissue samples were collected from embedded parts of parasites, histopathologically examined and panniculitis findings were observed. Although this parasite copepod had been reported on several marine mammals, this is the first report in the harbour porpoise, and in the Aegean Sea.

#### A new microsporidian parasite, *Heterosporis saurida* n. sp. (Microsporidia) infecting the lizardfish, *Saurida undosquamis* from the Arabian Gulf, Saudi Arabia: ultrastructure and phylogeny

Al-Quraishy S, AS Abdel-Baki, H Al-Qaktani, M Dkhil, G Casal & C Azevedo (2012). *Parasitol.*, 139 (4): 454 – 462.

#### Abstract

A new microsporidian that infects the lizardfish *Saurida undosquamis* (Richardson, 1848) that are caught in the Arabian Gulf in Saudi Arabia is described here. This parasite invades the skeletal muscle of the abdominal cavity forming white, cyst-like structures containing numerous spores. The prevalence of the infection was 32.1% (135/420).

The spores were oval to pyriform in shape and measured approximately 3.3  $\mu$ m  $\times$  2.0  $\mu$ m. The developing spores were found within parasitophorous vacuoles. In mature spores, the polar filament was arranged into 5 coils in a row. Molecular analysis of the rRNA genes, including the ITS region, and phylogenetic analyses using maximum parsimony, maximum likelihood, and Bayesian inference were performed.

The ultrastructural characteristics and phylogenetic analyses support the recognition of a new species, herein named *Heterosporis saurida* n. sp.



**Population pharmacokinetics of enrofloxacin in purple sea stars (*Pisaster ochraceus*) following an intracoelomic injection or extended immersion**

Rosenberg JF, M Haulena, BE Phillips, CA Harms, GA Lewbart, LL Lahner, & Mark G. Papich. (2016). *Amer. J. Vet. Res.*, 77:1266–1275.

**Abstract**

**Objective:** To determine population pharmacokinetics of enrofloxacin in purple sea stars (*Pisaster ochraceus*) administered an intracoelomic injection of enrofloxacin (5 mg/kg) or immersed in an enrofloxacin solution (5 mg/L) for 6 hours.

**Animals:** 28 sea stars of undetermined age and sex.

**Procedures:** The study had 2 phases. Twelve sea stars received an intracoelomic injection of enrofloxacin (5 mg/kg) or were immersed in an enrofloxacin solution (5 mg/L) for 6 hours during the injection and immersion phases, respectively. Two untreated sea stars were housed with the treated animals following enrofloxacin administration during both phases. Water vascular system fluid samples were collected from 4 sea stars and all controls at predetermined times during and after enrofloxacin administration. The enrofloxacin concentration in those samples was determined by high-performance liquid chromatography. For each phase, noncompartmental analysis of naïve averaged pooled samples was used to obtain initial parameter estimates; then, population pharmacokinetic analysis was performed that accounted for the sparse sampling technique used.

**Results:** Injection phase data were best fit with a 2-compartment model; elimination half-life, peak concentration, area under the curve, and volume of distribution were 42.8 hours, 18.9 µg/mL, 353.8 µg h/mL, and 0.25 L/kg, respectively. Immersion phase data were best fit with a 1-compartment model; elimination half-life, peak concentration, and area under the curve were 56 hours, 36.3 µg h/mL, and 0.39 µg/mL, respectively.

**Conclusions & Clinical Relevance:** Results suggested that the described enrofloxacin administration resulted in water vascular system fluid drug concentrations expected to exceed the minimum inhibitory concentration for many bacterial pathogens.

**Tricaine Methanesulfonate (MS-222) Sedation and Anesthesia in the Purple-Spined Sea Urchin (*Arbacia punctulata*)**

Applegate JR, DS Dombrowski, LS Christian, MP Bayer, CA Harms & GA Lewbart (2016). *J. Zoo Wildlife Med.*, 47(4): 1025-1033.

**Abstract**

The purple-spined sea urchin (*Arbacia punctulata*) is commonly found in shallow waters of the western Atlantic Ocean from the New England area of the United States to the Caribbean. Sea urchins play a major role in ocean ecology, echinoculture, and biomedical research. Additionally, sea urchins are commonly displayed in public aquaria. Baseline parameters were developed in unanesthetized urchins for righting reflex (time to regain oral recumbency) and spine response time to tactile stimulus.

Tricaine methanesulfonate (MS-222) was used to sedate and anesthetize purple-spined sea urchins and assess sedation and anesthetic parameters, including adhesion to and release from a vertical surface, times to loss of response to tactile stimulus and recovery of righting reflex, and qualitative observations of induction of spawning and position of spines and pseudopodia. Sedation and anesthetic parameters were evaluated in 11 individuals in three circumstances: unaltered aquarium water for baseline behaviors, 0.4 g/L MS-222, and 0.8 g/L MS-222. Induction was defined as the release from a vertical surface with the loss of righting reflex, sedation as loss of righting reflex with retained tactile spine response, anesthesia as loss of righting reflex and loss of tactile spine response, and recovery as voluntary return to oral recumbency. MS-222 proved to be an effective sedative and anesthetic for the purple-spined sea urchin at 0.4 and 0.8 g/L, respectively. Sodium bicarbonate used to buffer MS-222 had no measurable sedative effects when used alone.

Anesthesia was quickly reversed with transfer of each individual to anesthesia-free seawater, and no anesthesia-related mortality occurred. The parameters assessed in this study provide a baseline for sea urchin anesthesia and may provide helpful comparisons to similar species and populations that are in need of anesthesia for surgical procedures or research.



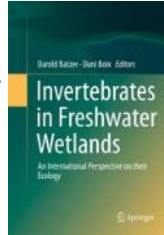
Purple sea star image from:

[https://en.wikipedia.org/wiki/pisaster\\_ochraceus](https://en.wikipedia.org/wiki/pisaster_ochraceus)

Rejoignez-nous à la Conférence Scientifique Internationale et à l'Assemblée Générale Annuelle de l'Association Mondiale des Médecins Vétérinaires Aquatiques (WAVMA), sur les concepts actuels en aquaculture et pratique du poisson décoratif, du 12 au 14 septembre 2017, Târgu Mureş, Transylvanie, Roumanie.

**Invertebrates in Freshwater Wetlands:  
An International Perspective on their Ecology**

Editors: Darold Batzer, Dani Boix ISBN: 978-3-319-24976-6 (Print) 978-3-319-24978-0 (Online)  
Springer International Publishing (2016)  
([www.springer.com](http://www.springer.com))



This book covers basic aspects of freshwater wetland habitats and information about the invertebrate fauna that exploits freshwater wetlands. We describe the kinds of invertebrates that inhabit wetlands and how these organisms are ecologically controlled (by hydrology, oxygen supplies, plants, predators), and review some of the major contributions of wetland invertebrates.

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## Know Your Freshwater Aquarium Shrimp

Cherry Shrimp—*Neocaridina davidi* var. red



Photo Credit: [https://en.wikipedia.org/wiki/Cherry\\_shrimp](https://en.wikipedia.org/wiki/Cherry_shrimp)

The natural colouration of the shrimp is green-brown, however the red color morph is more frequently available for aquarium keeping. The density of coloration on adult shrimp, dependent on breeding, determines their sale price and "quality."

The cherry shrimp is fairly hardy and adapts to a wide range of water conditions. Because of the red cherry shrimp's small size and relatively low bioload these shrimp can usually be kept in smaller confines. Larger tanks are needed to keep multiples alive and happy for the longer term, though.

**Size:** up to 3-4 centimetres (1.6 in) long.

**pH:** 7-8

**Origin:** Taiwan

**Temperature:** 70–80 F / 21-29 C

**Water Hardness:** 3 - 15 dkh

**Cherry Shrimp Life Span:** 1-2 years

**Temperament:** Very Peaceful

**Cherry Shrimp Breeding:** these shrimp are easy to breed. The females will start to turn very red and you will see yellow eggs being held in their swimlets. The females will release hormones into the water and the males will find her and mate. The females can store sperm. The female will hold the eggs until they hatch and release the baby shrimp. The shrimp are miniature replicas of the adults. You do not need to worry about the parents eating their young. For best breeding results keep shrimp without fish.

**Tank size:** 1 gallon or more. If you keep up with your water changes you can keep 10-15 per gallon.

**Cherry Shrimp Tank Mates:** Most community fish. Do not put with bigger or aggressive fish or your shrimp will be eaten.

**Diet:** Will eat biofilm from plants. Also, will eat various algae types of algae and sinking pellets/ fish food.

**Gender:** Females are reddish and males are clear

**Reference:** [www.theshrimpfarm.com](http://www.theshrimpfarm.com)

These shrimp have previously been classified as *Neocaridina heteropoda* and *Neocaridina denticulata sinensis*, however are now known as *Neocaridina davidi*, which is based on the oldest known published description of the species.

Crystal Bee Shrimp -  
*Caridina cantonensis*

The bee shrimp is a species of small freshwater shrimp in the family Atyidae. It is native to China. These shrimp are filter feeders, and also eat small pieces of decayed vegetation and algae. Bee shrimp have a life span of about 18 months. Bee shrimp are in demand as aquarium pets.

The black bee shrimp, sometimes called the Crystal Bee, is the most common variety. Some of the other varieties have been developed from it through selective breeding. The blue bee shrimp is a wild shrimp that is being harvested from streams in China to supply aquarium owners. The golden bee shrimp has a white shell and orange-gold flesh. The crystal red shrimp (called "red bee shrimp" in Japan) is a red and



white variety specially bred for the aquarium hobby industry. In 1996 Hisayasu Suzuki of Japan discovered among his population of Black Bee shrimp a red one; and later two more.

By selectively breeding these, over time he and other shrimp breeders obtained shrimp with intense red and white stripes with various patterns,

From: [https://en.wikipedia.org/wiki/Bee\\_shrimp](https://en.wikipedia.org/wiki/Bee_shrimp)

*Crystal Bee Shrimp photos by Nick Saint-Erne*



### Major shark die-off in San Francisco Bay

By Paul Rogers, Bay Area News Group  
05/13/17—Excerpt

At least 80 leopard sharks — docile spotted animals that don't eat people — have washed up dead in recent weeks. Scientists suspect the sharks are being killed by a fatal brain infection linked to a fungus that may have been spread around by the huge amounts of rain California received this year. The historic storms also reduced the bay's salinity in ways that could have weakened the sharks, some researchers say.

Leopard sharks have been found dead on beaches in Foster City, Hayward, San Francisco, Berkeley and other locations. The die-off has probably killed as many as 1,000 since early March, experts say, because the animals sink to the bottom of the bay when they die in the open water. And the deaths show no signs of slowing down. Similarly, unexplained die-offs of leopard sharks occurred in 2006 and 2011, even as far back as 1967.

Leopard sharks, which can grow up to 5 feet long, are the most abundant sharks in San Francisco Bay, and are found from Oregon to Mexico. Although they are not endangered, the sharks are a key part of the food chain in the bay, eating clams, worms, crabs and small fish.

In March, the bay water near San Francisco International Airport was so diluted from this winter's storms that its salinity hit 9 parts per thousand — the lowest during any March in 31 years, and far below the historic March average of 21 PPT [2.1% salinity], according to Jim Cloern, a research ecologist with the U.S. Geological Survey in Menlo Park who has studied the bay since 1976.

"I don't think we should be surprised that these extreme events that very rapidly flush sea salts out of the bay have effects on organisms," Cloern said. "I wouldn't be surprised if there have been die-offs of other species, like oysters and clams."

Cloern predicted the leopard shark population will recover fairly quickly. But others working on the issue say even if that occurs, the die-off raises big questions about whether bayfront communities should rescue sharks trapped behind tidal gates and the role human pollution is playing in contributing to the fungal blooms.

"There are so many of them dying," said Sean van Sommeran, executive director of the Pelagic Shark Research Foundation, a Santa Cruz nonprofit that has collected many of the dead sharks. "They are attractive. They don't bite people. They are the nicest shark you are going to find."

For complete article with photos, go to:

<http://www.santacruzsentinel.com/environment-and-nature/20170513/major-shark-die-off-in-san-francisco-bay>

### Viruses in the Oceanic Basement

By Nigro OD, Jungbluth SP, Lin H-T, Hsieh C-C, Miranda JA, Schvarcz CR, Rappé MS, Steward GF.  
2017. *mBio* 8:e02129-16.

Address correspondence to Olivia D. Nigro, [onigro@hawaii.edu](mailto:onigro@hawaii.edu), or Grieg F. Steward, [grieg@hawaii.edu](mailto:grieg@hawaii.edu).

Microbial life has been detected well into the igneous crust of the seafloor (i.e., the oceanic basement), but there have been no reports confirming the presence of viruses in this habitat. To detect and characterize an ocean basement virome, geothermally heated fluid samples (ca. 60 to 65°C) were collected from 117 to 292 m deep into the ocean basement using seafloor observatories installed in two boreholes (Integrated Ocean Drilling Program [IODP] U1362A and U1362B) drilled in the eastern sediment-covered flank of the Juan de Fuca Ridge. Concentrations of virus-like particles in the fluid samples were on the order of  $0.2 \times 10^5$  to  $2 \times 10^5 \text{ ml}^{-1}$  ( $n = 8$ ), higher than prokaryote-like cells in the same samples by a factor of 9 on average (range, 1.5 to 27).

Electron microscopy revealed diverse viral morphotypes similar to those of viruses known to infect bacteria and thermophilic archaea. An analysis of virus-like sequences in basement microbial metagenomes suggests that those from archaeon-infecting viruses were the most common (63 to 80%). Complete genomes of a putative archaeon-infecting virus and a prophage within an archaeal scaffold were identified among the assembled sequences, and sequence analysis suggests that they represent lineages divergent from known thermophilic viruses.

Of the clustered regularly interspaced short palindromic repeat (CRISPR)-containing scaffolds in the metagenomes for which a taxonomy could be inferred (163 out of 737), 51 to 55% appeared to be archaeal and 45 to 49% appeared to be bacterial. These results imply that the warmed, highly altered fluids in deeply buried ocean basement harbor a distinct assemblage of novel viruses, including many that infect archaea, and that these viruses are active participants in the ecology of the basement microbiome.

The hydrothermally active ocean basement is voluminous and likely provided conditions critical to the origins of life, but the microbiology of this vast habitat is not well understood. Viruses in particular, although integral to the origins, evolution, and ecology of all life on earth, have never been documented in basement fluids. This report provides the first estimate of free virus particles (virions) within fluids circulating through the extrusive basalt of the seafloor and describes the morphological and genetic signatures of basement viruses.

<https://doi.org/10.1128/mBio.02129-16>.

### Shrimp Farming in Diller, Nebraska USA

By Sam Craig Daily Sun Staff Writer  
May 5, 2017

Dr. Scott Pretzer, a veterinarian, stands between the eight tanks of shrimp growing in an old hog confinement barn in Diller, Nebraska. With the thousands of new inhabitants already moved in, there's a briny, almost sweet smell inside the barn. It's like a fishing village in early summer--it's warm and the air feels salty.

Scott Pretzer runs Rock Creek Aquaculture and he's got tanks full of Pacific white shrimp that are just about ready for a scampi or the deep fryer. Boasting some of the freshest shrimp around, Pretzer's delicious decapods will be going on sale to the public in the next couple of months. It'll be a direct retail operation, he said, offering the public something they don't often get in the landlocked Midwest: fresh seafood straight from the water.

"They'll be dipped live out of a tank," Pretzer said. "Then they can go home on ice. Farm to table, ready to go home and prepare."

It's a wholesome, locally raised product, he said, dipping a net into one of the eight tanks of shrimp. They're lively and good jumpers, too, which is one reason the tanks all have plastic sheeting covering them. The shrimp are translucent and difficult to see, except for the two black eyes on their heads and the tiny black vein running down their backs.

In the nine months that Pretzer and his family have been working on the aquaculture farm, they've made some big changes to the building. The pits below the floor were filled in with sand and a new concrete floor was laid. The walls were painted, the concrete, walls and attic were insulated and Pretzer installed new plumbing, with a tankless water heater and a compressed air filter. Pretzer said you couldn't ask for a much better place for a shrimp farm than in an old hog barn.

The shrimp tanks are lined up in two rows. With a total of eight tanks—which look like large above-ground swimming pools—Pretzer plans on installing eight more in the future. You enter the tank room through a shower. Then, there's a small office which Pretzer has turned into a lab for testing water quality.

It's a constant 73 degrees F inside and the radiant heat pipes running overhead keep the tanks at 81 degrees. That means no matter how hot or cold it gets outside, it's always perfect weather for shrimp inside.

Pretzer gets his shrimp from a nursery in Indiana that sends him post-larvae shrimp. They're about an inch long and it takes nearly two and a half months from the time they're put in the tanks until they're



*Pacific white shrimp—Sam Craig Daily Sun Staff*

ready for the dinner table. He's planning to put in his own nursery eventually, but growth needs to be at a steady pace, he said.

The whole operation will have zero impact on the environment, he said. The saltwater in the tanks will be recycled and reused without ever having to discharge any of it. The sediment tanks have naturally-occurring bacteria that eat the ammonia the shrimp give off as a waste product. The bacteria process the ammonia and use the nitrogen to replicate, continuing the cycle. The shrimp and the bacteria can't live without each other, so each tank is its own symbiotic ecosystem, he said.

When they open to the public, Pretzer said, they'll be opening for tours for anyone who wants to see how they do it, as well as for agritourism groups.

While Rock Creek is the only operation in town for the moment, indoor shrimp farming is becoming increasingly popular around the Corn Belt, he said. Showing off another agriculture technique and playing up the farm-to-table element is what it's all about.

It was Scott's dad, Verne Pretzer, who first spotted an article about raising shrimp in a farming magazine and showed it to his son. "Shrimp don't run you over, and they don't smell too bad," Verne said.

Facebook page

<https://www.facebook.com/nebraskashrimp/>

[http://beatricedailysun.com/news/local/shrimp-farming-in-diller/article\\_9bb23718-6ec0-5c43-aff5-cbc7055e816f.html?utm\\_content=buffer0fde3&utm\\_medium=social&utm\\_source=facebook.com&utm\\_campaign=LEEDCC](http://beatricedailysun.com/news/local/shrimp-farming-in-diller/article_9bb23718-6ec0-5c43-aff5-cbc7055e816f.html?utm_content=buffer0fde3&utm_medium=social&utm_source=facebook.com&utm_campaign=LEEDCC)

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**Scientists discover contagious mussel cancers**By [Sarah Kaplan](#)

June 22, 2017

All along the western Canadian coast, mussels are dying. Their blobby bodies are swollen by tumors. The blood-like fluid that fills their interiors is clogged with malignant cells. They're all sick with the same thing: cancer. And it seems to be spreading. For all its harrowing, terrifying damage, the saving grace of cancer has always been that it dies with its host. Its destructive power comes from turning victims' own cells against them and making them run amok.

But when molecular biologist Stephen Goff from Columbia University biopsied these mussels, he found something strange. The tumor cells didn't have the same DNA as their host. Instead, every mussel was being killed by the same line of cancerous cells, which were jumping from one individual to the next like a virus. The mussels, as well as two other species of bivalve examined by Goff and his colleagues, are dying from contagious cancer.

Goff's [study](#), which was published in the journal *Nature*, suggests that contagious cancers might be more common than previously thought, and may be communicable across species. And in one case, clams were being killed by cancer cells that come from an entirely different species.

Goff and his colleagues found a third example of this phenomenon last year in soft shell clams living along the Atlantic coast. A colleague working at the Marine Biological Laboratory at Woods Hole, Mass., asked him to come take a look at her dying clams, which she thought were suffering from a virus. Instead, they were being killed by a form of bivalve leukemia.

But the discovery got him wondering whether transmissible cancers might be more common than anyone realized. So he set about collecting specimens from sick bivalve colonies on opposite sides of the world: mussels from near Vancouver and cockles and golden carpet shell clams on the coast of Spain. All three species were dying from cancer, he found. And all three of the cancers were genetically different from their hosts (the cockles suffered from two distinct strains).

Goff and his colleagues suggest that cancerous cells from sick bivalves are expelled when the creatures defecate or die. The cancers can survive in the water for at least a few hours until they find a new host — and since bivalves are filter feeders, they're susceptible to accidentally consuming these malignant cells. Mussels, cockles and clams also have fairly undeveloped immune systems and few resources to fight off the disease.

<https://www.washingtonpost.com/news/science/wp/2016/06/22/scientists-just-doubled-the-number-of-known-contagious-cancers/>

**Mussel gloop can be used to make wounds knit without any scars**By Alice Klein—[Daily news](#)

12 May 2017

The humble mussel could soon help us prevent scarring. A sticky substance naturally secreted by the marine animal is one element of a glue that closes skin wounds seamlessly and could be used to prevent unsightly scars after accidental cuts or surgical operations. Scars form when the collagen scaffolding in skin is broken apart. Instead of re-forming in their original and neat basket-weave arrangement, the collagen fibres grow back in parallel bundles that create the characteristic lumpy appearance of scars. One way to reduce scarring is to apply decorin, a skin protein involved in collagen organisation. But because decorin has a highly complex physical structure it is hard to synthesise and therefore not used clinically.

To get round this problem, Hyung Joon Cha at Pohang University of Science and Technology in South Korea and his colleagues have created a simplified version of decorin. They combined a small section of the decorin protein with a collagen-binding molecule and a sticky substance secreted by mussels. The resulting glue was tested on rats with deep, 8-millimetre-wide wounds. The glue was spread over each wound and covered with clear plastic film. Rats in a control group had their wounds covered in plastic without any glue. By day 11, 99% of the wound was closed in the treated rats compared with 78% in the control group. By day 28, treated rats had fully recovered and had virtually no visible scarring. In comparison, control rats had thick, purple scars. Closer inspection under the microscope confirmed that collagen fibres in the treated wounds had returned to their original basket-weave arrangement. The new skin had also developed hair follicles, blood vessels, oil glands and other structures that aren't regenerated in scars.

The glue is able to promote normal collagen growth because negative charges on the decorin fragments hold the fibres apart, says Cha. In doing so, the fibres are more easily able to weave in and out between each other instead of sticking together randomly.

There is still a way to go before the results can be translated to humans. Rats have loose skin, whereas humans have tight skin, and rats tend to heal better and have less scarring. As a result, the glue may not be as effective in people as in rats. Cha says that the glue will now be tested in pigs, whose skin better resembles our own.

Journal reference: *Biomaterials*,  
[DOI: 10.1016/j.biomaterials.2017.04.041](https://doi.org/10.1016/j.biomaterials.2017.04.041)

### Invasive snail blamed for Mississippi River bird kill

By CHRIS HUBBUCH, River Valley Media Group  
Nov 17, 2016

An invasive snail is being blamed for killing hundreds of waterfowl on the Upper Mississippi River in 2016. Field workers have found almost 1,000 dead coot and lesser scaup washed up on the shores near Genoa since early October, according to the U.S. Fish and Wildlife Service. The birds are believed to be the victims of an intestinal parasite found in faucet snails (*Bithynia tentaculata*), which the birds eat during stopovers on their fall migration.

Die-offs have become an annual event during the past 15 years, since the arrival of the faucet snail. Native to Europe, the snails were introduced to the Great Lakes in the late 1900s and have since made their way into inland waterways. Faucet snails were first discovered in Lake Onalaska in the early 2000s and are now prevalent on the river between La Crescent and McGregor, Iowa.

"They came in and basically out-competed native snails," said Roger Haro, associate dean for the College of Science and Health at the University of Wisconsin-La Crosse. "They've been around for a while but they never caused a detectable problem with waterfowl."

While the snails provide a food source for waterfowl, they carry a parasite known as trematodes that can infect the birds and cause them to die within three to eight days, according to the Fish and Wildlife Service. Though trematodes can affect up to 19 species of waterfowl, Haro said they are most harmful to coot and scaup.

The outbreaks are a concern because about 40 percent of all North American waterfowl follow the Mississippi River flyway during their annual migration, stopping to feed as they make their way south each fall and back north in the spring.

Haro said the infected birds do not appear to be a threat to other species, instead providing an abundant food source for bald eagles and vultures.

[http://www.wionadailynews.com/news/local/invasive-snail-blamed-for-annual-mississippi-river-bird-kill/article\\_1da5d1a2-c4d8-52b7-baf5-c572ca14c205.html](http://www.wionadailynews.com/news/local/invasive-snail-blamed-for-annual-mississippi-river-bird-kill/article_1da5d1a2-c4d8-52b7-baf5-c572ca14c205.html)

Faucet snail photo from:  
[https://en.wikipedia.org/wiki/Bithynia\\_tentaculata](https://en.wikipedia.org/wiki/Bithynia_tentaculata)



### Cone snails wander in circles, lose focus with boosted CO<sub>2</sub>

By [Elizabeth Eaton](#)  
February 2, 2017



Cone snails are normally stealthy hunters, but they become clumsy and unfocused in water with increased levels of carbon dioxide. Oceans absorb CO<sub>2</sub> from the atmosphere. As atmospheric CO<sub>2</sub> levels rise, those in the oceans do too, changing the chemistry of the seawater.

Cone snails (*Conus marmoreus*) that spent several weeks in water dosed to simulate CO<sub>2</sub> levels expected at the turn of the century had trouble catching their favorite snack, jumping snails. Only 10 percent caught and ate their prey, compared with 60 percent of snails living in water with current CO<sub>2</sub> levels, researchers report February 1 in *Biology Letters*.

While the higher-CO<sub>2</sub> snails were more active in general, they moved in "wiggly lines, and some even went in a circle," says study coauthor and marine biologist Sue-Ann Watson of James Cook University in Townsville, Australia.

In a previous study, Watson showed that jumping snails were less able to escape attacking cone snails when exposed to higher levels of CO<sub>2</sub>. Together, the studies are the first to show the effects of ocean acidification on the behavior of both invertebrate predators and their prey, Watson says.

<https://www.sciencenews.org/blog/science-ticker/cone-snails-wander-circles-lose-focus-boosted-co2>



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**Poll shows near total support for legislation protecting Hawaii's reefs and marine life from overharvest by the aquarium trade**  
May 31, 2017

Ninety percent of Hawaii's residents support legislation that would protect Hawaii's threatened reefs through sustainability measures and caps on permits to capture reef wildlife for aquariums, according to a new poll. Support was also high for ending this practice altogether.

The statewide poll, conducted by Honolulu-based QMark Research and commissioned by For the Fishes, The Humane Society of the United States and its international arm, Humane Society International, surveyed 476 residents, with 90 percent responding in favor of a bill aimed at regulating the aquarium trade that would require sustainability measures and cap permits at current levels. That bill, SB1240, passed the state legislature as a compromise measure with strong support and requires Governor David Ige's signature to become law.

The Department of Land and Natural Resources is tasked with protecting Hawaii's reefs from activities, especially those of a commercial nature, that may "disturb, degrade, or alter the marine environment." DLNR has long held the position that no take or permit limits are necessary to protect reefs. That position is in sharp contrast to the growing concerns of the vast majority of Hawaii residents who cited environmental impacts as the most important issue related to the aquarium trade. Compared to a similar poll conducted five years ago, which showed 66 percent supported ending the trade, results from this poll show a 17-point surge of public awareness and support for ending the trade, to 83 percent.

"These poll results confirm what humane, marine, environmental and native Hawaiian groups have long conveyed to state elected officials: The commercial collection of Hawaii's cherished reef wildlife is not supported by the vast majority of Hawaii's residents," said Keith Dane, Hawaii policy advisor for The HSUS. "This natural resource belongs to us all, but the aquarium trade only benefits a relative handful of Hawaii residents and a much larger number of outside interests."

In 2014 and 2015 Hawaii experienced unprecedented coral bleaching and subsequent coral die-offs. DLNRs recently released Coral Bleaching Recovery Plan identified herbivore management as "critical to post-bleaching coral recovery in Hawaii." These fish are valuable in the wild because they keep algae from overgrowing recovering corals. Parrotfishes and surgeonfishes, in particular, are widely acknowledged for their importance in reef resilience and recovery.

Catch reports filed with DLNR document that at least 700,000 fish, hermit crabs and other reef creatures are captured and sold for personal aquariums outside Hawaii each year. Hawaii is the world's third-largest supplier of reef wildlife to the U.S. aquarium trade.

"Hawaii residents are obviously well-informed, solution-oriented, and counting on Governor Ige to do the right thing" said Rene Umberger, executive director of For the Fishes. "Experts agree that herbivore populations are key to coral reef health, and it's no coincidence that the herbivores taken for aquariums are missing from our reefs by the millions. SB1240 recognizes the true value of this marine life and we hope the Governor will heed the wishes of his constituents and sign this important legislation."

The poll also found that 82 percent agreed that only captive-bred fish should be kept in saltwater aquariums, even if this meant the number of species available for purchase was dramatically decreased.

Note: Statewide poll conducted by QMark Research in May 2017, with 476 samples and a confidence level of 95 percent (margin of error + - 4.58 percent).

**Questions Raised About HSUS Polling Data in Hawaii's Aquarium Fishery Debate**

28 Jun, 2017

In the ongoing debate over Hawaii's Marine Aquarium Fishery, 2017 saw the release of some peculiar numbers from The Humane Society of the United States (HSUS). The release's title summed it up succinctly; "Poll shows near total support for legislation protecting Hawaii's reefs and marine life from overharvest by the aquarium trade."

According to state fishery biologists, there is no "overharvest" taking place by the aquarium trade, and social media discussions that followed seemed mostly dismissive of the HSUS report straight away, given that both HSUS, Humane Society International, and Hawaii-based anti-aquarium group For The Fishes commissioned the study. With large scale investments made in the past few years in attempts to end the fishery, these organizations clearly have a well-funded agenda.

The results of this poll were heavily promoted in support of Hawaii's S.B. 1240, which was framed as a "compromise" but in actuality designed as a ban through attrition, a sunset on the Hawaiian marine aquarium fishery. The bill currently awaits final action from Hawaii's Governor Ige, who has recently signaled his intent to veto the measure before him.

<https://www.reef2rainforest.com/2017/06/28/questions-raised-hsus-polling-data-in-hawaiis-aquarium-fishery-debate/>



### **Hawaii Star-Advertiser editorial advocates against SB 1240**

Posted by Honolulu Star Advertiser on June 27, 2017

PIJAC is pleased to republish the below editorial from the Hawaii Star-Advertiser. It advocates against Senate Bill 1240, a scientifically unsound measure that would ban aquarium fishing in Hawaii. The editorial was published considering Hawaii Governor David Ige's declaration of intention to veto SB 1240.

One function lawmakers fulfill is setting reasonable limits to human activities or government programs. The aim might be to maintain fair treatment under the law or, in the case of the ever-controversial aquarium-collections bill, to manage resources wisely. Gov. David Ige has applied this principal correctly in setting up Senate Bill 1240 for a veto, a measure that places limitations that, the governor has correctly concluded, are unwarranted.

That bill was posted on Ige's website along with 14 others on his "intent to veto" list. According to the governor's description, it "requires the Department of Land and Natural Resources to define 'sustainable' and establish a policy for sustainable collection practices through take limits." It also would bar the department from issuing new aquarium fish permits authorizing the use of fine-meshed traps or fine-meshed nets. And it would prohibit the transfer of permits after five years. These moves are essentially aimed at phasing out the industry through attrition, because as currently permitted aquarium-fish collectors leave the trade, new ones will not be able to enter.

DLNR, the agency tasked to define "sustainable" and thereafter establish take limits on the fishery, opposes the bill, its officials asserting that there is no basis for establishing the limits by a 2019 deadline set in the measure. DLNR Director Suzanne Case said the department opposes the measure, "as we could not possibly establish catch limits for all reef species by 2019, and likely not for all aquarium fish species by 2019, and there is no biological basis to prohibit the issuance of new aquarium permits."

A veto would acknowledge the need to justify such a categorical crackdown on an industry. The governor said more studies are needed for that step, and he's right.

It might even be possible to manage the resource through less draconian means, such as setting a temporary "kapu" boundary prohibiting fishing in an area shown to be environmentally stressed, similar to limited restrictions set for other species in specific zones.

<http://pijac.org/blog/hawaii-star-advertiser-editorial-advocates-against-sb-1240>

### **Hawaii Governor has Senate Bill 1240 on the chopping block, based on advice from DLNR**

by Big Island Video News—Jul 3, 2017

A bill that would phase out aquarium fish collecting in Hawaii is headed towards a veto from the governor. Gov. David Ige announced on June 23 that he intends to veto Senate Bill 1240 because "there is concern that the science does not support the claims made by the bill. It will be premature to ban aquarium collection before doing the necessary studies." Ige also says the DLNR "is committed to working with all stakeholders to come up with a better solution."

SB 1240 requires DLNR to submit proposed legislation to the legislature by the 2019 regular session including a definition of "sustainable", a policy for sustainable collection practices of near shore aquatic life, a process for determining limits on collection practices of near shore aquatic life, and any additional resources required by the department. Prohibits issuance of new aquarium permits. Prohibits transfer of current permits subject to certain provisions. Prohibits renewal of permits that have not been renewed for five or more years.

The Department of Land and Natural Resources wrote in its testimony that it "appreciates the intent of the measure and supports sustainability, but opposes this measure, with respect to setting sustainable rates of collection, as we could not possibly establish catch limits for all reef species by 2019, and likely not for all aquarium fish species by 2019 and there is no biological basis to prohibit the issuance of new aquarium permits."

The Department has extensive baseline data for aquarium fish on West Hawai'i. The Department has collected extensive underwater visual survey data on the status of reef fishes along the Kona Coast of West Hawai'i Island for over fifteen years. A report of these surveys was submitted to the 2015 Legislature in compliance with Section 188F-5, HRS. The data indicates that the West Hawai'i aquarium fishery is currently operating at a level that does not indicate significant population declines or major shifts in species diversity in areas where collecting is occurring.

The West Hawai'i Aquarium Project (WHAP) has been monitoring West Hawai'i reefs since 1999 and a number of long-term studies extend over multiple decades. Fifteen years after closure, the population of Yellow Tang has increased 64.5% in the closed areas while its abundance in the open areas has not declined significantly. Overall, Yellow Tang abundance in the 30'-60' depth range over the entire West Hawai'i coast has increased 58% from 1999 to 2013.

<http://www.bigislandvideonews.com/2017/07/03/video-gov-intends-to-veto-aquarium-life-bill/>



### MEETINGS OF INTEREST TO AQUATIC VETERINARIANS

Veterinarians attending these meetings may be awarded veterinary CE/PD credit towards annual re-licensure or re-registration to practice veterinary medicine. Individuals should check with the organizers to see if CE/PD certificates are provided.

#### WAVMA Annual General Meeting & Conference

September 12-14th, 2017

Plaza Hotel, Piata Trandafirilor 46-47,  
Tirgu Mures 540053.



#### 2017 Shrimp Pathology Short Course

"Disease Diagnosis and Control in Marine Shrimp Culture"

July 17-22, 2017

University of Arizona, Tucson, AZ (USA)

The Aquaculture Pathology Laboratory will again offer an intensive one-week course combining lectures with hands-on laboratory sessions, demonstrating the methods used for detection and diagnosis of the diseases farmed shrimp.

Registration is limited to 30. Cost: \$2,500 (USD) if the deposit is received on or after June 2, 2017.

For more information about the course or to register, go to <https://acbs.cals.arizona.edu/aqua>, or contact:

Dr. Arun K. Dhar or Ms. Deborah Huie  
Aquaculture Pathology Laboratory  
School of Animal and Comparative Biomedical  
Sciences

University of Arizona  
1117 E. Lowell Street, Room 102  
Tucson, Arizona 85721 USA  
Phone: 520-621-4438; Fax : 520-626-5602  
Email: [adhar@email.arizona.edu](mailto:adhar@email.arizona.edu);  
[dhuie@email.arizona.edu](mailto:dhuie@email.arizona.edu)



#### American Association of Fish Veterinarians 4th Annual Conference,

September 24 & 25, 2017

Dallas, Texas.

This year we will be holding our conference in conjunction with the American Association of Zoo Veterinarians, the Association of Exotic Mammal Veterinarians and the Association of Reptilian and Amphibian Veterinarians Annual Conference – September 23-29.

This event will bring together the best exotic pet, zoo and wildlife veterinarians from all over the world to contribute to the scientific, continuing education, networking and hands-on learning that make our careers enriching and fulfilling.

We look forward to seeing you in September!

[For more information click here.](#)

#### Asian-Pacific Aquaculture 2017

July 25-27, 2017

Kuala Lumpur, Malaysia

Asian-Pacific Aquaculture 2017 is the place to learn about the latest in aquaculture, see the newest technology in the trade show with exhibits from around the world and enjoy the many tourist sites in Malaysia. APA 2017 will have a large exhibition featuring international companies showcasing the latest in products, services and all aquaculture related information. Click here for [more details](#).

Don't miss this opportunity to see the items that will enhance your aquaculture operation. **Booths:** contact: [mario@marevent.com](mailto:mario@marevent.com).

More info on [www.was.org](http://www.was.org).

**Discover core knowledge, skills & experience  
needed to become a WAVMA Certified Aquatic  
Veterinarian (CertAqV)**

Did you know that WAVMA's **CertAqV Program** offers members the opportunity to become recognized and certified as having competency in 9 core areas deemed necessary to practice aquatic veterinary medicine? Find out more information online at: <http://www.wavma.org/CertAqV-Pgm>.

**Unusual Pet and Avian Veterinarians' Conference**  
August 11-14, 2017.  
Queensland, Australia

The Unusual Pet and Avian Veterinarians' Conference will be held in conjunction with the FASAVA conference, to be held at the Gold Coast in Queensland, August 11-14, 2017.  
[Click here for more information](#)



**World Small Animal Veterinary Association**  
September 25-28, 2017  
Copenhagen, Denmark  
<http://www.wsava2017.com/>

**Aquaculture Europe 2017**  
October 17-20, 2017  
Dubrovnik, Croatia

EAS and our Aquaculture Europe 2017 event will be held in Dubrovnik, Croatia from October 17-20 next year. We will very soon be making the web page for AE2017. Meanwhile, you can see the AE2017 brochure at [http://www.easonline.org/images/stories/Meetings/AE2017/AE2017\\_flyer\\_web.pdf](http://www.easonline.org/images/stories/Meetings/AE2017/AE2017_flyer_web.pdf).

Kind regards,  
Alistair Lane - Executive Director,  
European Aquaculture Society

Federation of Asian Small Animal Veterinary Associations

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4 CONGRESSES FOR THE PRICE OF 1!

EARLY BIRD CLOSES 31 MAY 2017

**8th International EAFP Conference on Diseases of Fish and Shellfish**  
4-8 September 2017  
Belfast, Northern Ireland, UK

A brief description:  
<https://eafp.org/belfast-2017-second-announcement/>

Contact person & website link: <http://eafp2017.com/>

Junte-se a nós na Conferência Científica Internacional e na Assembleia Geral Anual da World Aquatic Veterinary Medical Association (WAVMA), com o tema "Conceitos Actuais em Aquacultura e Clínica de Peixes Ornamentais", 12-14 de Setembro de 2017, Târgu Mureş, Transilvânia, Roménia.

**World Veterinary Congress to be an Annual Event**

In its July conference call, the WVA Council approved the proposal from the Standing Committee for the World Veterinary Congress to hold the WVC as an annual event. Following the 33rd World Veterinary Congress that will take place in Incheon, Korea on 27-31st August 2017, the WVA Council agreed to hold the 34<sup>th</sup> WVC in Barcelona, Spain in April 2018. WVA and Korean Veterinary Medical Association already started to prepare the WVC in Korea in 2017.



JULY 21-25, 2017

Indianapolis, Indiana

INDIANA CONVENTION CENTER

To Register: <https://www.avma.org/Events/Convention/Pages/default.aspx>

Aquatic Veterinary Continuing Education &amp; Professional Development Program

## FRIDAY, JULY 21

3:00 PM - 3:50 PM

LOCATION: 233

*Ornamental Fish Care and Medicine I (1400)*

Speaker: Gregory Lewbart MS, VMD, DACZM, DECZM (ZHM)

4:00 PM - 4:50 PM

LOCATION: 235

*Ornamental Fish Care and Medicine I and II (1400)*

Speaker: Gregory Lewbart MS, VMD, DACZM, DECZM (ZHM)

## SATURDAY, JULY 22

4:00 PM - 4:50 PM

LOCATION: 231

*CE for USDA NVAP Renewal**Module 13: Aquatic Animal Health Regulations and Health Certification (1866)*

Speaker: A. David Scarfe PhD, DVM, MRSSAf, CertAqV

5:00 PM - 5:50 PM

LOCATION: 231

*CE for USDA NVAP Renewal**Module 14: Evaluation of Aquatic Animals for Detection of Reportable Diseases and Pathogens (1867)*

Speaker: A. David Scarfe PhD, DVM, MRSSAf, CertAqV

## SUNDAY, JULY 23

10:00 AM - 10:50 AM

LOCATION: 235

*Goldfish Woes: How to Treat Sick and Injured Goldfish (1001)*

Speaker: Jessie Sanders DVM, CertAqV

1:00 PM - 1:50 PM

LOCATION: 235

*Surgical Techniques in Koi and Goldfish (1154)*

Speaker: Jessie Sanders DVM, CertAqV

2:00 PM - 2:50 PM

LOCATION: 235

*Koi Medicine and Surgery: Advanced Topics (1000)*

Speaker: Jessie Sanders DVM, CertAqV

4:00 PM - 4:50 PM

LOCATION: 235

*Oral Foreign Bodies in Koi (1263)*

Speaker: Julius Tepper DVM, CertAqV

5:00 PM - 5:50 PM

LOCATION: 235

*Skin Lesions in Freshwater Fish (1715)*

Speaker: Sharon Tiberio DVM, CertAqV



**JULY 21-25, 2017**

**Indianapolis, Indiana**

INDIANA CONVENTION CENTER

To Register: <https://www.avma.org/Events/Convention/Pages/default.aspx>

**Aquatic Veterinary Continuing Education & Professional Development Program**

**MONDAY, JULY 24**

**8:00 AM - 8:50 AM**

**LOCATION: 231**

**CE for USDA NVAP Renewal**

**Module 15: Disease Prevention and Biosecurity in Aquaculture (1868)**

**Speaker:** A. David Scarfe PhD, DVM, MRSSAf, CertAqV

**8:00 AM - 8:50 AM**

**LOCATION: 236**

**Prophylaxis in Aquaculture (1162)**

**Speaker:** Esteban Soto DVM, MSc, PhD, Dipl.ACVM

**9:00 AM - 9:50 AM**

**LOCATION: 236**

**Diagnosis of Diseases in Cultured Fish (1163)**

**Speaker:** Esteban Soto DVM, MSc, PhD, Dipl.ACVM

**10:00 AM - 10:50 AM**

**LOCATION: 236**

**Microbial Disease of Finfish (Bacterial and Fungal Case Studies) (1164)**

**Speaker:** Esteban Soto DVM, MSc, PhD, Dipl.ACVM

**1:00 PM - 1:50 PM**

**LOCATION: 236**

**The Veterinarian's Role in Restoring Salmon Ecology in the Pacific Northwest I (1487)**

**Speaker:** Nora Hickey DVM

**2:00 PM - 2:50 PM**

**LOCATION: 236**

**The Veterinarian's Role in Restoring Salmon Ecology in the Pacific Northwest II (1487)**

**Speaker:** Nora Hickey DVM

**4:00 PM - 4:50 PM**

**LOCATION: 236**

**Carp Edema Virus, The Practitioner's View (1258)**

**Speaker:** Sherri Kasper DVM, MS

**5:00 PM - 5:50 PM**

**LOCATION: 236**

**Using Quarantine to Prevent Disease (1259)**

**Speaker:** Sherri Kasper DVM, MS

**TUESDAY, JULY 25**

**8:00 AM - 8:50 AM**

**LOCATION: 234**

**Viral Diseases of Ornamental Fishes (1122)**

**Speaker:** Thomas Waltzek MS, PhD, DVM

**9:00 AM - 9:50 AM**

**LOCATION: 234**

**Water Quality Basics for the Private Practitioner (2403)**

**Speaker:** Thomas Waltzek MS, PhD, DVM

**10:00 AM - 10:50 AM**

**LOCATION: 234**

**Aquatic Invertebrates for Dummies (1173)**

**Speaker:** Ashley Emanuele DVM



AQUATIC

# Action

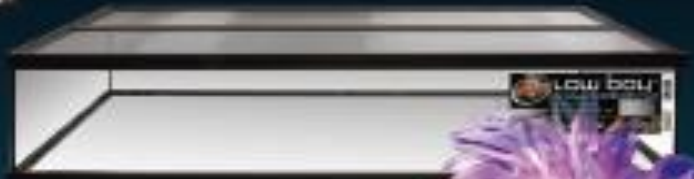
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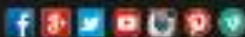
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