

# The



# quatic

# eterinarian



*Photo of shark at the New England Aquarium  
by Alyssa M. Capuano, Class of 2019  
University of California, Davis  
School of Veterinary Medicine  
See Student Reports on pages 16-22.*

Volume 12, Number 3  
Third Quarter, 2018



**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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Devon Dublin, Secretary	2014-2017
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Nick Saint-Erne, Treasurer	2011-2014
Sharon Tiberio, Treasurer	2015-2017

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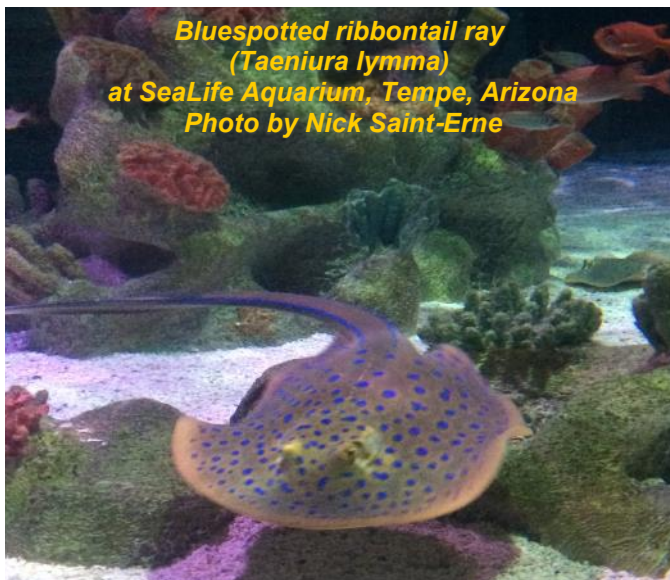
**Editor’s Note**

In many of the issues of *The Aquatic Veterinarian*, we try to put together a theme, or have multiple related articles. Good examples of issues heavy with articles on a specific topic are the water turtle issues [Vol 10 (3), 11(1)], aquatic invertebrates [11(2)] and marine mammals [11(3)]. In this issue, there are three recurring themes: seadragons and seahorses (pages 24-26, 32-34), hardness and alkalinity (pages 26-30) and blood sampling in stingrays (pages 19, 23).

While not all issues have multiple articles on the same topic, I think it does make for interesting reading when there are, and so I am proposing to make the fourth quarter (December 2018) issue devoted to koi fish. This topic is based on the availability of material, and the interest in them by koi pond hobbyists and aquatic veterinarians. Read the Colleague’s Connection article on page 15 to see how veterinarians in practice see koi as a mainstay in their business. Also, at our WAVMA Conference in St. Kitts, there will be the first annual meeting of the Koi Practitioners Working Group (KoiPrax1) as part of the conference on Nov. 10, 2018. This should provide for us several articles that can be published in the December issue.

If you have any particular topics that you are interested in, please email me and I will see what we can put together for future issues. With over 300 members of WAVMA this year, we certainly have enough good practitioners who could write up case reports or provide articles on the interesting work they are doing. Please help your colleagues out and submit some articles for future issues!

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



**Bluespotted ribbontail ray  
(*Taeniura lymma*)  
at SeaLife Aquarium, Tempe, Arizona  
Photo by Nick Saint-Erne**

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:**

*Shark photo at the New England Aquarium  
by Alyssa M. Capuano, Class of 2019  
University of California, Davis  
School of Veterinary Medicine.  
See Student Reports on pages 16-22.*

*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**

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**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 we move towards the end of summer, with almost two-thirds of the year under our belts it is time to consider a number of things planned for the remainder of the year and prepare for 2019.

Nominations for 2019 Officers and Directors-at-Large to help give direction to the organization are now open, and we hope that many of you will consider running for a position and infusing great, new ideas for future WAVMA programs. Self-nominations are encouraged and need to be submitted by October 9. Simply go to <https://www.wavma.org/elections> for details. If the timing works out as hoped, we'll be able to announce the results of the elections at the 2018 WAVMA Annual General Meeting in St. Kitts. But serving as an Executive Board member is not the only way for members to help out – we encourage everyone to consider joining one of the WAVMA Committees. All you have to do is contact a chair, or any of the Board members.

Thinking of the 2018 WAVMA Conference in St. Kitts, the scientific programs will provide great opportunities for more than 30 hours of RACE-approved CEPD, including lectures, wetlabs and an aquaculture biosecurity workshop. It will also be the first time we've been able to run a wetlab that will give attendees the opportunity to do a clinical exam on live dolphins, under the direction of staff veterinarians at Dolphin Discovery.

We are also very lucky to have Dr. Árni Mathiesen, the Assistant Director-General of FAO Fisheries and Aquaculture as a keynote speaker to inspire everyone about major FAO aquaculture initiatives, feeding the world's growing populations and the "Blue Revolution." A reception on the first evening, and an opportunity to interact with students on the second, will provide wonderful networking opportunities.

As St. Kitts is a vacation destination, it's a great opportunity to bring the family. As a reminder, we encourage everyone interested in attending to look over the tentative final program on the Conference website, and consider registering and booking hotel rooms by October 1, before registration costs go up. For all information about the 2018 conference, simply go to: <https://conferences.wavma.org/events/2018-WAVMA-Conference>.

Developing CEPD sessions and having a booth at other meetings has been a great opportunity to get the word out about aquatic veterinary medicine, WAVMA and WAVMA programs. In 2018 we've had the opportunity to do this in February at Aquaculture America in Las Vegas (USA), and at the World Veterinary Association Congress in Barcelona (Spain) in May. In July, activities at the International Veterinary Student Conference in Krakow (Poland) and American Veterinary Medical Association Convention in Denver (USA) saw a jump in membership, and the International Symposium on Aquatic Animal Health in Prince Edward Island (Canada) in September provided a wonderful opportunity for WAVMA members. Of interest to many, after several years of talking about forming a new aquatic veterinary organization, it was at the 2005 ISAAH meeting in San Francisco that several of us got together to make concrete plans for forming WAVMA.

The next meeting several of us will attend will be the joint Congress of the World Small Animal Veterinary Association and Federation of Asian Small Animal Veterinary Associations in Singapore in late September. As this meeting will have a full day finfish wetlab and 1½ days of aquatic lectures and case studies, it is anticipated to attract a large number of Asian, Indonesian and Malaysian veterinarians interested in ornamental fish medicine.

**David Scarfe PhD, DVM, MRSSAf, CertAqV**

President 2018

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

Below:

*Attendees at the 2018 ISAAH meeting in Canada.*



**Secretary's Report**

As the 2018 calendar year approaches its end, WAVMA continues our strong activities. The program for the 3<sup>rd</sup> WAVMA Conference and Biosecurity Workshop, along with Ross University School of Veterinary Medicine and the International Aquatic Veterinary Biosecurity Consortium, that is being held in St. Kitts in November has been finalized. In addition to the great sessions, social activities, and tours, the 2018 WAVMA Annual General Meeting will be held at the workshop. We are looking forward to seeing many WAVMA members there.

The nomination process for 2019 Executive Board members has begun. I highly encourage all members to consider making a nomination (including self-nomination). It is imperative for WAVMA to have active, engaged members participating in the leadership of the organization. WAVMA continues to be the preeminent organization for global aquatic veterinary medicine, and I look forward to continued growth and incorporation of new ideas as new members join the Executive Board. My time on the Executive Board over the past 3 years have been professionally and personally rewarding. If anyone has any questions regarding an Officer or Director position, please do not hesitate to reach out to me.

If an Officer or Director position is not the best fit for you, please consider joining a WAVMA committee. Commitments on the committees are minimal, yet it is a great way to impact the organization and meet colleagues from around the world.

On a closing note, our membership continues to grow and we have added several Student Chapters during 2018. We have several more schools at various stages of the application process. This is an indicator of a strong future for WAVMA. Thanks to our Executive Board, and most importantly our Treasurer Dr. Nick Saint-Erne, WAVMA maintains its strong financial position, which only adds to our positive outlook for future growth and impact to our great profession.

**Stephen Reichley, DVM, PhD, CertAqV**  
WAVMA Secretary  
[Secretary@wavma.org](mailto:Secretary@wavma.org)

**Treasurer's Report**

This year has set a record for WAVMA membership! Currently we have 413 members, that's 23 more than last count for the second quarter of this year. We have had an increase in every category of membership since last quarter. For the different categories of membership, the numbers so far are as follows:

Veterinarian Members -	197
Veterinarian Member (New Grad: 1st yr) -	28
Vet Graduate Student, Intern or Residents -	31
Vet Student Member (enrolled in Vet Curriculum) -	148
Vet Tech/Nurse Member -	4
Affiliate Member (Non-Veterinarian) -	5

This is remarkable growth in our association, considering the novelty of the field of aquatic veterinary medicine. But, it also shows the importance of this field around the world, which is also indicated by the numerous job openings listed on the WAVMA website:

<https://www.wavma.org/available-jobs>

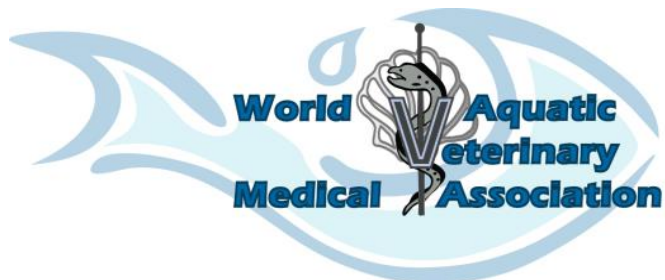
The number of positions available, and the interest in aquatic medicine by the veterinary students, as indicated by the student membership and the number of student chapters (see page 10), is very encouraging, and makes me hopeful for the continued success of this association and aquatic veterinary medicine.

Another encouraging factor is the fullness of the WAVMA coffers, which allows us to do so many programs for our membership (see page 8), including the upcoming WAVMA Conference and Annual General Meeting at St. Kitts in November (see page 38). A full year-end financial report will be in the December issue of *The Aquatic Veterinarian*, after the conference has concluded and the expenses paid.

One last plug is for your donations to the John L. Pitts Aquatic Veterinary Education Awards Program (see page 13). That money funds all of the awards given to our student members (see pages 16-22).

[Sorry, the editor got ahold of this Treasurer's Report!]

**Nick Saint-Erne, DVM CertAqV**  
WAVMA Treasurer  
[Treasurer@WAVMA.org](mailto:Treasurer@WAVMA.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>.

**Allied Organisations Report—WVA**

Dear WAVMA Members,

MSD Animal Health and WVA are delighted to announce the 2018 Veterinary Student Scholarship Program to enhance the academic experience of veterinary students from countries in the regions of Latin America, Africa, North Africa/Middle East and Asia/Oceania (the regions of North America and Europe are under the scholarship programs of [AVMF](#) and [FVE](#)).

The WVA would like kindly to ask your assistance to promote the 2018 scholarship program and disseminate the attached information to veterinary schools in your country and in your region. Thank you very much,

Dr. Zeev Noga  
Deputy Executive Director



**World Veterinary Association (WVA)**

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[secretariat@worldvet.org](mailto:secretariat@worldvet.org)  
<http://www.worldvet.org>

**New Members—3rd Quarter 2018**

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

**Veterinarian Members**

Raphael Malbrue	United States
Katharina Hagen	Switzerland
Michele Pfannenstiel	United States
H N Tejaswi	India

**New Graduate Veterinarian Members**

Duncan Houston	Australia
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**Vet Graduate Student, Intern or Resident**

**Vet Student Members**

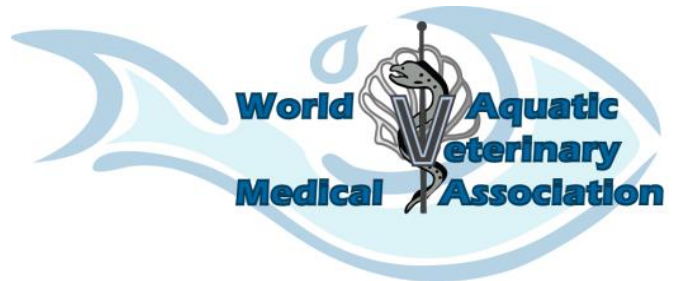
Kelley Unruh	United States
Kristen Rothdeutsch	United States
Adam Krantz	United States
Hayley Bernal	Granada
Lezith Chavez	United States
David Minich	United States
Shannon Smith	United States

**Vet Tech/Nurse Member**

Antonio Mignucci-Giannoni	Puerto Rico
Jasmine Worthy	United States

**Affiliate Member (Non-Veterinarian)**

Breanna Berger-Tzabar	United States
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**MSD ANIMAL HEALTH / WORLD VETERINARY ASSOCIATION**

**VETERINARY STUDENT SCHOLARSHIP PROGRAM 2018**

*Grants of 5,000 US\$ available for 41 Veterinary Students from four world regions with the aim of enhancing their academic experience.*

MSD Animal Health and WVA call for applications for the Veterinary Student Scholarship Program 2018. The program is open to veterinary students (2<sup>nd</sup> and 3<sup>rd</sup> year) from countries in the regions of:

Latin America  16 grants	Africa  10 grants	North Africa/Middle East  10 grants	Asia/Oceania  5 grants
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The Scholarship program announcement (including applications) in English, French and Spanish can be found [HERE](#)

Completed application must be submitted by 1<sup>st</sup> January 2019, 12:00 pm (Brussels time)

**QUICK LINKS TO WAVMA PROGRAMS & SERVICES:**  
(Press control then click on item using computer mouse)

- [Online Member Directory](#)
- [Certified Aquatic Veterinarian Program \(CertAqV\)](#)
- [WebCEPD](#)
- [The Aquatic Veterinarian](#)
- [Aquatic Veterinarian Jobs Listing](#)
- [WAVMA Student Chapters](#)
- [Veterinary Student Externship Listing](#)
- [John L. Pitts Aquatic Veterinary Education Awards Program](#)



## 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: Nick Saint-Erne, [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: Stephen Reichley, [Secretary@wavma.org](mailto:Secretary@wavma.org)

#### 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: Jena Questen, [fish@drquesten.com](mailto:fish@drquesten.com)

#### 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: Emily Munday, [emily.munday@gmail.com](mailto:emily.munday@gmail.com)



### 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 76 aquatic veterinarians from 22 countries. Congratulations on our newest Certified Aquatic Veterinarians:

**Dr Rebecca Crawford**  
**Dr Azureen Erdman**  
**Dr John Howe**  
**Dr Constance Silvernagle**  
**Dr Marcus Webster**

There are an additional 53 other WAVMA members currently in the process of being certified. For more information, see the WAVMA website: <http://www.wavma.org/CertAqV-Pgm>.

**Jena Questen, DVM, CertAqV**  
2018 Credentialing Committee Chair

### Certified Aquatic Veterinarians

Giana Bastos-Gomes	Australia
Heather Bjornebo	USA
James Bogan	USA
Pierre-Marie Boitard	France
Todd Cecil	USA
Michael Corcoran	USA
Emily Cornwell	USA
Rebecca Crawford	Australia
Darren Docherty	UK
Simon Doherty	UK
Devon Dublin	Japan
Ashley Emanuele	USA
Azureen Erdman	USA
Mohamed Faisal	USA
Ari Fustukjian	USA
Christopher Good	USA
Krystan Grant	USA
Miguel Griolo	Portugal
Stephanie Grimmett	UK
Orachun Hayakijkosol	Australia
John Howe	USA
Kerryn Illes	New Zealand
Jimmy Johnson	USA
Colin Johnston	New Zealand
Kasper Jorgensen	Denmark
Brian Joseph	Canada
Sherry Kasper	USA
Parinda Kamchum	Thailand
Elizabeth Kaufman	Israel
Amy Kizer	USA
Jack Kottwitz	USA
Eric Littman	USA
Richard Lloyd	UK
Richmond Loh	Australia
Adolf Maas	USA
David Marancik	Grenada
Colin McDermott	USA
Matthijs Metselaar	UK
Tim Miller-Morgan	USA
Haiham Mohammed	Egypt
Alissa Mones	USA
Danny Morick	Israel
Ross Neethling	UK
Dušan Palić	Germany
Brian Palmeiro	USA
Christine Parker-Graham	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
Galit Sharon	Israel
John Shelley	USA
Constance Silvernagle	USA
Melissa Singletary	USA
Esteban Soto	USA
Win Surachetpong	Thailand
Gillian Taylor	South Africa
Julius Tepper	USA
Sharon Tiberio	USA
Laura Urdes	Romania
Greta Van de Sompel	Belgium
Sarah Wahlstrom	USA
Chris Walster	UK
Scott Weber	USA
Marcus Webster	USA
Trista Welsh	USA
Peter Werkman	Holland
Howard Wong	Hong Kong
Taylor Yaw	USA
Irene Yen	St. Kitts & Nevis

### 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>.

### 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>

### Student Committee

The committee plans to talk with the WAVMA website manager (IT person) about adding externship listings to the website and adding some fields to the submission form. There are already externship entries on the WAVMA website, but they need to be edited and updated. The entries should be divided into "externships", "internships", "fellowships" using a drop down menu (like the video page). These could potentially be broken up by externship type (e.g., aquaculture, aquariums) depending on the difficulty of doing so. When clicking a link, it can open a new page/pop-up window so the person looking doesn't lose their place on the list. When the list is active, share on the WAVMA list-serve, Facebook, etc to make sure people know about it (including non-members).

The committee also wants to start a Journal Club via the student member listserv (Students-L). There are currently about 80 subscribers. Some might have graduated or just subscribe even if they aren't a student. A Journal Club might help get students talking more. We can pick out an article to read each month and discuss by email on the listserv. Can ask the Members-L for article recommendations. Can also tell the Members-L to sign up for the Student-L if they want to participate. This will allow for inclusion of newer grads or anyone who would be interested.

Use the Student-L to communicate with other students about informal events / meet-ups / room sharing for veterinary conferences, to help facilitate activities for students.

Now, students can use the member directory to search for potential mentors in their area / by geographic region. Include the mentors program in the PSA/email about opportunities to vet students to spread word about the program. In future, when we email/blast about WAVMA student opportunities, include the mentoring program information.

### WAVMA VETERINARY SCHOOL CHAPTERS

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

There are 16 WAVMA Student Chapters in veterinary schools around the world. If you are a veterinary student, please join your school's WAVMA chapter, or start one if your veterinary school does not have one yet! Find out more about the veterinary school chapters on the WAVMA website, where you can download the WAVMA Student Chapter Guidelines to help create or run your own school's chapter.

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

**WAVMA Elections**

Please think about standing for election for a 2019 officer or director on the WAVMA Executive Board. The positions of President-Elect, Secretary, Treasurer, and three directors are up for election each year. We rely on our veterinarian members to run for positions on the Executive Board to help keep the organization moving forward. The Executive Board meets monthly via Skype and we have had board members from all around the world. It doesn't matter where you live—only that you are willing to help out!

All of the great programs and features you get from WAVMA membership are provided by volunteers. We are always looking for more helpers, whether veterinary students or graduate veterinarians, to join us on the committees as well. If you are not interested in running for office, but would like to provide your input and guide the future of WAVMA, join one of our committees (no previous experience necessary!). See a list of our committees on page 8. Contact our Secretary or the committee chair for more information about the committee and the dates of the next meeting (also done via Skype). All are Welcome!

Nominate someone or yourself for a WAVMA office, or join a WAVMA Committee today!  
 Go to: [www.wavma.org/elections](http://www.wavma.org/elections)

**TO SUPPORT FUTURE STUDENT  
 SCHOLARSHIPS, PLEASE MAKE  
 A DONATION TODAY  
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[WWW.WAVMA.ORG/  
 SCHOLARSHIPS.](http://WWW.WAVMA.ORG/SCHOLARSHIPS)

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



*WAVMA is on Facebook!*



**“Like” WAVMA's Facebook Page and join the WAVMA Facebook group to keep up-to-date with WAVMA activities and aquatic veterinary medicine topics from around the world.**

Search for WAVMA at [www.facebook.com](http://www.facebook.com).

[www.facebook.com/WAVMA](http://www.facebook.com/WAVMA)

*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 through 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!

**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  
[TAEditor@wavma.org](mailto:TAEditor@wavma.org).

**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).



### Meetings Committee

Having already past the mid-year, the Meetings Committee can report that we have enjoyed being at both the AVMA Convention in Denver, Colorado with our booth, and at the IVSA Conference in Krakow, Poland, with Past-President Laura Urdes giving presentations for the vet students. At the time of this writing, President Dave Scarfe has begun his trip to the ISAAH conference in Prince Edward Island, Canada, where WAVMA will again host a day-long series of talks. I, along with Past Presidents Nick Saint-Erne and Richmond Loh, and President Dave Scarfe, will soon be leaving for Singapore, where we will be running both a wet-lab and presenting several lectures at the WSAVA conference.

The following are veterinary meetings that WAVMA is attending or sponsoring for the end of 2018:

- 2018 ISAAH – Prince Edward Island, Canada (Sept 2-6)
- 2018 WSAVA – Singapore (25-28 September 2018)
- 2018 WAVMA/RUSVM/IAVBC Conference – St. Kitts (November 2018)

I would like to spotlight this last meeting as our highly anticipated, stand-alone Aquatic Veterinary Medicine Conference and our Annual General Meeting. We are looking forward to seeing you on this lovely Caribbean island during the cold, dreary November days. What a great place for CE and family fun!!! This conference will have something for all aquatic practitioners.

### KoiPrax 1 1st Annual Koi Practitioners Working Group Sat. Nov. 10, 2018

The first annual meeting of the Koi Practitioners Working Group (KoiPrax1) will take place in conjunction with the WAVMA St. Kitts Conference on Nov. 10, 2018. The mission of KoiPrax will be to serve the discipline of koi health, welfare and medicine. The objective will be to meet annually to discuss and catalog the collective knowledge about this veterinary specialty. We welcome the input and participation of all aquatic veterinarians interested in this subject. We also invite those in the hobby and industry to help us identify issues of interest and concern pertaining to koi keeping. Experienced koi practitioners featured for our roundtable discussions will be:

**Julius M. Tepper, DVM, CertAqV** - Long Island, NY, USA

**Richmond Loh, BVMS, MPh, MANZCVS, CertAqV** - Perth, Australia



**Tim Miller-Morgan, DVM, CertAqV** - Oregon State University, Oregon, USA

**Jessie Sanders, DVM, CertAqV** - California, USA

The program will start with introductions, the structure and format for these talks, and tentative issues to be discussed. The afternoon will be devoted to discussing current issues and finish with a Q and A session. This day-long meeting will be free to all WAVMA members. Non-members fee is \$100. Space will be limited, so please register with J. Tepper email: [cypcarpio@aol.com](mailto:cypcarpio@aol.com)

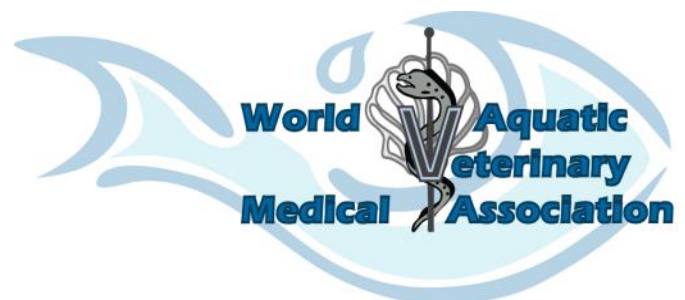
The program and schedule for KoiPrax1, as well as the other talks for the conference can be seen on the WAVMA conference tab on the website:

<https://conferences.wavma.org/events/2018-WAVMA-Conference/Daily-Schedule>

**Julius M. Tepper, DVM, CertAqV**

Meetings Committee Chair

[cypcarpio@aol.com](mailto:cypcarpio@aol.com)



**Meeting Report**  
**WAS Aquaculture America 2018**

Las Vegas, NV

February 19-22, 2018

By David Scarfe, WAVMA President

As an Associated Sponsor of all World Aquaculture Society conferences, and since WAVMA organizes one or more days of Aquatic Veterinary Sessions for veterinary CEPD credit during the conference, WAVMA is provided with free booth space to promote WAVMA and the role of aquatic veterinary medicine to 1,800+ attendees of the Aquaculture America Conference.

- Approximately 100 individuals visited the booth that was staffed by Jessie Sanders and David Scarfe.
- Jessie Sanders and David Scarfe moderated the full day WAVMA session (~75 attendees).
- David Scarfe reviewed two other sessions (Zebrafish Health and Management and Veterinary Feed Directives) that, along with the WAVMA session were approved for AAVSB/RACE approval see <https://www.was.org/meetings/pdf/AA2018AquaticVet-RACE-CE-Sessions.pdf>

About 35 CEPD certificates were provided to veterinarians.

At the request of World Aquaculture Conference Management Committee, David Scarfe, Jessie Sanders and George Sanders will develop a process to evaluate all abstracts submitted for the 2019 International Triennial Aquaculture Conference to be held in New Orleans (March 6-10, 2019).

For conference website, go to:

<https://www.was.org/meetings/default.aspx?code=AQ2019>

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 SCHOLARSHIPS.](http://WWW.WAVMA.ORG/SCHOLARSHIPS)**

**The John L. Pitts Aquatic Veterinary Education Awards Program**

Since its inception in 2010, the John L. Pitts Aquatic Veterinary Education Awards Program has awarded over \$50,000 to 82 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 (now called the Aquatic Veterinary Medicine Committee), 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). Please help us support the next generation of aquatic veterinarians, donations of all amounts help tremendously.

**Stephen Reichley, DVM, PhD, CertAqV**  
[PittsEduAwards-Admin@wavma.org](mailto:PittsEduAwards-Admin@wavma.org)

Chair, John L. Pitts Aquatic Veterinary Education Awards Program



### 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 length).

#### 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.

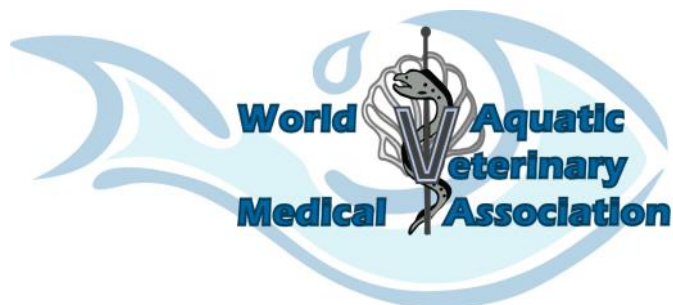
#### Please send articles, clinical reports, or news items to the editor by the following submission dates:

- 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.



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



**Got a sick fish?****Call West Seneca's Aquatic Veterinarian**

By Jane Kwiatkowski Radlich

Published July 15, 2018

*The Buffalo News* (Excerpt)

Baby Blue had lost considerable weight by the time Dr. Helen E. Sweeney examined the anorexic koi in her West Seneca office. The fish had not eaten in weeks, yet it unleashed a flurry of tail flaps as the veterinarian approached its tank. Sweeney, unfazed, trained her eyes on the pale blue fish. As she reached into the tank with one hand, its tail began to redden, a sign of stress.

"Fish are never happy to see me," said Sweeney, wiping pond water from her face. "The owners are, usually. It's the owners who are interesting. They have the same bond with fish that some people have with a dog or cat."

Sweeney is one of about 10 veterinarians in the state of New York who practice aquatic medicine.

"It's something a lot of people don't think about," said Sweeney. "We are a small niche group on the ground level of veterinary medicine. There's not a lot of formal education available, so when you practice you can add to the knowledge base. Much of the knowledge was extrapolated from food fish practice."

In 2017, about 139 million freshwater fish were owned by Americans, making fish the most popular pet in the United States. By comparison, there were 70 million dogs and 74 million cats owned as pets in the U.S., according to the AVMA.

Gregory A. Lewbart, 59, is a professor of aquatic animal medicine at North Carolina State University, one of the pioneer academic programs of its kind in the country. Lewbart believes there are up to 400 exotic animal veterinarians in the country who are proficient in primary fish care.

"Aquatic animal medicine is a viable and growing area of the profession," Lewbart said. "It's not going away. It boils down to the human-animal bond, and in this country pets are at a premium. That bond can form with any species. People can get attached to a fish and many owners certainly will pay the cost to care for it."

And it's not just private pet owners who utilize the new specialty. The Aquarium of Niagara Falls relies on Dr. Ed Latson, a veterinarian with aquatic expertise who works at Central Park Animal Hospital on Main Street, said Daniel Arcara, the aquarium's collection manager.

"The medical care of fish can be somewhat challenging, yet it's critical for our day-to-day care," said Arcara, who pointed to a recent incident involving a sick axolotl. The Mexican salamander developed fungus on its gills, Arcara said.

"Dr. Latson recommended frequent water changes and lowering the water temperature, and the fungus dissipated."

Sweeney built a bank of knowledge on koi. Petite with aquamarine eyes, Sweeney attended the University of Georgia College of Veterinary Medicine. She wrote *Fundamentals of Ornamental Fish Health*, a clinical guide for practitioners of aquatic medicine. Sweeney once treated an egg-laden koi, a concern with indoor fish who don't get the natural cues to spawn, she said.

"Twenty years ago, pet fish were a challenge to treat, but it was something interesting," said Dr. Michael J. Weiss of All Creatures Veterinary Care Center in Philadelphia and Sewell, N.J.

"It boils down to multiple appointments of longer duration. I could care for six dogs or cats in the time it takes to see one fish. Some fish owners choose not to spend that money. They have already put a lot of money into their tanks. An entire visit could run \$1,000."

Koi are popular pond pets, often large and colorful. Their cost usually does not top \$100 each, but they can be sold for \$20,000 to \$30,000 with some fetching as much as \$100,000, depending on their lineage, said Weiss.

One of the factors driving the increasing number of aquatic veterinarians is the rising popularity of koi, said Lewbart. Aquatic animal medicine in the last 15 years is becoming more mainstream, following the same path as avian medicine, Lewbart said.

"From 1993 to 2003, the fish were coming to me by FedEx. If a lady in Iowa had a sick fish, she would mail it to me. If she called me today, I could find someone in driving distance who would treat her fish," Lewbart said. "There are more vets now with experience who are providing primary care for fish."

Dr. Brian Palmeiro is a board certified veterinary dermatologist who established a koi hospital in Allentown, Pa. It was Palmeiro's passion for fish medicine that led him to convert a former pond maintenance supply store into a fish hospital. The Lehigh Valley Veterinary Dermatology & Fish Hospital serves koi and other ornamental fish recovering from surgery that require overnight care as well as day care.

"Dr. Sweeney's taken care of my fish since I got them," Baby Blue's owner, Frank O'Neill, said. "Whatever she decides to do, I'll go with it. It's like going to your doctor. They know best."

For the full article, go to:

<https://buffalonews.com/2018/07/15/got-a-sick-fish-call-the-aquatic-medicine-doc/>

### International Veterinary Students' Association (IVSA) Conference

A New Approach to Veterinary Medicine: the 67th Congress;  
16-27 July 2018  
University Centre of Veterinary Medicine Ju-AU,  
Univ. of Agriculture, Krakow, Poland  
By Laura Urdes



### St. George's University WAVMA Student Chapter 2017-2018 Update

By Chris McMonagle  
President,  
SGU WAVMA Club

IVSA has a global outreach to veterinary students and to other organisations (e.g., IVSA is also an affiliate organization member of the WVA, and it is collaborating closely with WSAVA and other professional organisations). IVSA can provide education and training to WAVMA members by the means of IVSA summer schools and/or conferences.

During the conference, I participated in two events of main importance to WAVMA: the Official dinner (on July 25th) and a 60-minute presentation I gave on Aquatic Veterinary Medicine - a new approach to veterinary medicine (on July 26th). At the dinner, I liaised with the Dean, Emma van Rooijen (IVSA Past President), the IVSA President Elect, Magda Jannasch, and others. My presentation lasted for 60 minutes and was followed by a round of enquiries from the audience, generally, aquaculture-focused. Attendance at the lecture was circa 60 participants, from South Africa, Hong Kong, China, Japan, U.K., U.S., Ireland, Czech Rep., Poland, Romania and others.

On the 25<sup>th</sup>, I ran the WAVMA booth at the venue, with the WAVMA banner and flyers, in the lecture hall. Students were invited to register with WAVMA, form WAVMA chapters, apply for the Pitts Student Awards Program. Email addresses of those interested were collected to be added to the WAVMA e-News listserve.

In 2019, the IVSA Congress will take place in Zagreb, Croatia. The suggestion of preparing workshops on Aquatic Veterinary Medicine to present to participants on this occasion was received with enthusiasm by students and President Elect. The President Elect also requested that announcements of potential interest to IVSA students be sent to IVSA to publish/promote via their communication means. From all programs presented at the meeting, the Pitts student awards program, the WebCEPD and forming of WAVMA Student Chapters raised the most interest.

The relationship with veterinary students must be continuous to ensure vet student generations are informed about the existence and benefits of WAVMA, as well as on the training requirements for those interested in pursuing aquatic veterinary medicine.

Link to conference information:

<https://congress.arsveterinariakrakov.com/en/itinerary/>

St. George's University chapter of WAVMA is heavily involved in the Grenadian community, both with education and physical outings. Working alongside SAVMA's Green Consortium, our club members took part in numerous dives to help keep our ocean clean. We found and removed all types of plastic, aluminum cans, and even a few car tires. Not only do our efforts help to preserve our coral reefs and coastal environments, but it also helps to reinforce to both our student community and the locals the detrimental effects pollution has on our ecosystem. These dives are usually shallower and near the coast line, offering a relaxing study break while working towards a worthy cause.

Grenada is located in the south of the Caribbean and is home to an invasive lionfish population. Lionfish are apex predators with no predators of their own, since they are originally fish of the Indo-Pacific waters. With traditional "Hawaiian sling" spears, our club members and an experienced divemaster from a local dive shop explore Grenada's coral reefs as we attempt to collect as many lionfish as possible. After the dive, we filet the fish to cohost a Gator/Lionfish Roast with the Exotics and Wildlife Society. Through this bi-annual event, we are able to offer veterinary and medical students alike a chance to taste the lionfish and learn about the impacts they have on local fish populations as well as local fishing operations. We hope to expand these dives into an educational experience for local fishermen, and veterinary and medical students within the community.

When we are not out enjoying our beautiful island, we host many different speakers (either in person or via Skype). Here are just a few examples: Marine Environmental Monitoring with Drones & Quantifying Harmful Algal Blooms (Dr. Peter J. Spacher), Fish Pharmaceuticals (Michael Ness, MSc.), Catfish Production and Diseases (Dr. Joe Newton). Having the opportunity to hear from experts in these fields is a great way to round out our education and apply the concepts we have learned so far in our veterinary studies. We are so grateful for the amazing opportunities afforded to us by living on our rock, and we are looking forward to next year!







Left:  
Camille Richie,  
Vice President and  
Chris McMonagle,  
President of the  
SGU WAVMA  
Student Chapter

Right:  
Lionfish / Gator  
Barbecue  
Spring 2018



Underwater photos:  
Spear fishing for  
Lionfish; placing  
them in tube for  
safe handling!



Below right:  
SGU WAVMA SC  
spearfishing team  
with their catch.





**2018 Pitts Education Awards Program Report:  
Internship at the Veterinary Medical Aquatic  
Animal Research Center (VMARC) in Thailand**  
By Manuel Künzel

After an 11-hours overnight flight to Bangkok, I was very much looking forward to finally get some sleep. But before that occurred, I was picked up by Dr. Phichanont Chiyangsvata, a former exchange student and friend of mine, who took me directly to the clinic. I would later on become a member of the VMARC-Team, there. The university building I entered—only one of many—belongs to the Veterinary Science Department of the Chulalongkorn University and is located on the second floor of a 10-floor complex. Across from the lecture halls there is a sliding glass-door that leads directly to a friendly smiling lady, who welcomes you to the clinic's registration office.

The first impression I had of the clinic surpassed my expectations. It took me a while to get used to the very warm and long room, which provided living space for a wide range of animals: soft-shell turtles shared one of the two shelves with red-eared sliders, Malayan snail-eating turtles, box turtles and yellow-headed temple turtles. All of them living in plastic containers appropriate to their size and with access to UV-light. Next to those aquatic turtles there was also a variety of tortoises that were in similar plastic boxes, waiting in this area for their daily treatment. There were no closed glass terrariums, as cleaning them was not feasible and it was definitely hot and humid enough in this room, so no supplemental heat was source needed. This area used 10% of the space in this room, which was 4 or 5 times longer than its width and divided by a low wall in the middle, with the turtle shelves were on one side, directly across the entrance to the diagnosis and treatment room.

A work desk right at the start of the middle wall provided room for Siamese fighting fish patients and sometimes frogs, alongside the plastic bags and other transport materials. The rest of the middle wall was packed with chest-high aquarium racks holding 60-litre aquariums, inhabited by fancy goldfish, flowerhorn cichlids, discus and parrot cichlids, which I would come to treat later. Wandering along the two side walls with windows, I could also make out bigger plastic fish tanks (chest-high) covering the wall. They were placed elevated on an open drain channel system, and provided living space for different types of fish belonging to the research department itself. In front of these tanks, a second row with knee-high 300-litre holding-tanks was set out for the bigger patients like koi, arowana, alligator gar, giant gourami, fresh water stingrays, catfish and a sea turtle. The

big freshwater conditioning system on the side of the room facing the entrance, spreads its pipes like tentacles through the room. It is joined by the pipes from the squeaking air pump, standing on the other end of the room.

After some days of adaption to the new time zone and climate, I started my internship in the clinic area, where I met Dr. Malinee Kitkumthorn and Dr. Thanida Hetrakul who introduced me to her clinic team. Some days later I met the head of the department, Associate Professor Dr. Nantarika Chansue, Ph.D.

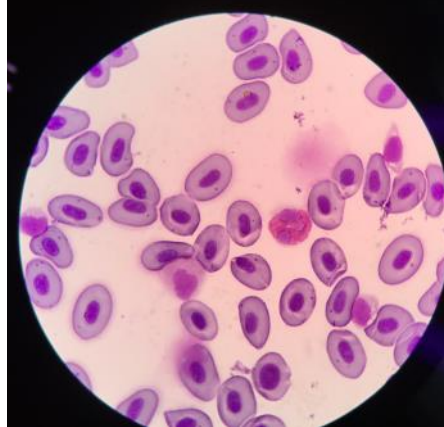
Even though the before-mentioned clinic for aquatic animals sounds like a huge institution that takes care of fish and other animals in the wet element in the whole country and also in other countries, in fact aquatic veterinary medicine remains a marginal sector of veterinary science in Thailand. This sector definitely needs more experts, as I had mentioned in my application for the John L. Pitts Aquatic Veterinary Education Awards Program. What I realised during my time in Thailand is that the people that have chosen a career in the field of aquatic veterinary medicine bring an inspiring passion and attitude to that field, which makes the sector so unique! As this area gains more practitioners, hopefully those high levels of enthusiasm will remain.

Every single person in this clinic was extremely polite and kind, and in additional to that, I saw strong ardour in this team to ensure optimal care within a range. Be it hand feeding a Siamese fighting-fish blood worms, performing endoscopic diagnostics in a sea turtle, taking care of a guitar fish that had been caught by accident by a fisherman at the coast of Rayong, or a field trip to perform basic and extended health care on yellow-headed temple turtles and other turtles living in the ponds near the temples. I cannot describe all the tasks that had been made my responsibility, but at least I want to list the things which were and are important to me.

I started training under two skilled practitioners, who taught me to provide basic healthcare for turtles and fish, like handling, injection and bleeding sites, and administration of medicine. The doctors of veterinary medicine have been very patient with me and gave me time to calculate and double-check, and doing the things in a correct and safe way at my pace.



*Manuel Künzel at fish farm*



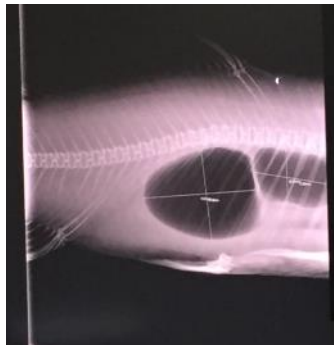
After a while, two part-time vets gave me additional training next to the daily business. They taught me many of their little tricks, which made work easier for a student entering the practical part of his studies. For example, they taught me when, why and how to force-feed a stingray or how to gently convince a turtle to open its arms to have easier access for further procedures. I also attended different minor surgeries, including the excision of external tumours, adjusting the buoyancy with a needle and syringe in fish, the removal of fishhooks from the oesophagus, and abscess removal from the hind limbs in turtles.

I am proud to say I even received special training by Prof. Dr. Nantarika Chansue. She was always eager to share her knowledge with me and to connect me to people to share their knowledge, which took away my shyness really quickly, and I admire her pragmatic attitude to try-out ideas into reality. Her special training went beyond her extraordinary vet skills: handling and treating a bacterial infection of man-made skin lesions and bleeding of wild guitar fish, and implanting a tracking device subcutaneously in a giant fresh water stingray, which was only one part of a elaborated research project, have been the highlights of the practice with her. We also visited a sea bass farm, a koi retailer and the Sea Turtle Conservation Centre. Between those activities, we even used lunch time to discuss different cases and practical techniques. So much that one day her napkin was the most-wanted item on the table (after the plates were empty), as she sketched the position of the veins in sharks and sting rays for me and explained the best spot and angle to have access to them.

I also found a role model in her; when it comes to standing up for ideals in a strong way and communicating them, I think her social skills ignite a fair deal of her team's passion. Thanks to her open-minded way, I gained a small glimpse into the tons of work and effort that is needed behind realising ideas, like doing animal conservation work, opening a new animal clinic or do-

ing research work with animals in an area where attention by media is not really pursued. Prof. Dr. Nantarika Chansue also presented me to her family and demonstrated that she is not only a high-ranking expert, but also a caring and loving mother and wife in her private life. I am very thankful for that experience!

Additional to that training, I was involved in research work on a dietary supplement for fish. That research project offered me more than laboratory work. Apart from being involved in planning and working on procedures in the lab, I was able to gain a deep insight into daily, weekly and monthly duties and the management tasks on a fish farm. I saw almost everything there, a very enriching experience, helping me to develop personal progress in understanding the whole picture of such a place. All in all, I saw many more things than I had hoped to see, learned way more than I expected to learn. I achieved not only practical vet skills, but also social skills of very high value. And apart from that, I made contacts, friends and formed relationships that are priceless. I am looking forward to use and share those skills in the future. This whole experience had been made possible by people who are aware of the importance of networking and education, and therefore, I want to give my special thanks to my Professors Dr. Dušan Palić and Dr. Nantarika Chansue and to WAVMA, for helping me with the John L. Pitts Aquatic Veterinary Education Awards Program to make ideas real.



*Photos:  
Drawing blood  
from a stingray;  
Stingray blood  
smear;  
Hypomelanistic  
stingray;  
Koi radiograph;  
Temple turtle  
rescue.*





**2018 John L. Pitts Award Recipient Report**

**Nicole E. Himebaugh,**

North Carolina State University,  
College of Veterinary Medicine,  
DVM Candidate, Class of 2020

This summer, I was fortunate to spend my time at the Marine Biological Laboratory in Woods Hole, MA. As a third-year student at North Carolina State College of Veterinary Medicine with limited experience in aquatics, I was eager to conduct research at a world-class facility. Before this opportunity, I was inspired by a week-long intensive course on invertebrate medicine where I was introduced to many aquatic species. I was especially captivated by cephalopods and their potential value to the scientific community, both in human and animal medicine. I was surprised to find out that the cephalopods aren't included in the IACUC guidelines for animal welfare, despite evidence that they can feel pain and are extremely intelligent. The goal for our project was to improve our understanding of cephalopod anesthesia to establish anesthetic guidelines and improve welfare.

Most of my time at Woods Hole was dedicated to studying cephalopod anesthesia in three different cold-water species; the common cuttlefish (*Sepia officinalis*), wild-caught longfin inshore squid (*Doryteuthis pealeii*), and the California two-spot octopus (*Octopus bimaculoides*). Our study was focused on measuring neural signal and observing behavioral indicators to determine the depth of anesthesia using magnesium chloride and ethanol.

One of the challenges in cephalopod anesthesia is to determine if these agents cause true anesthesia or if they are just muscle paralytics. Neural signal was recorded by attaching an electrode to the pallial nerve, which could be easily placed after minimal dissection of connective tissue. Once the anesthetic solution was added, the animal was pinched every minute to determine the magnitude of neural signal and physical response. When there was no traceable neural signal or behavioral response after a pinch, the animal was reversed in fresh seawater.

During the reversal phase, the pinching and neural signal recording ensued to determine total time taken for recovery. We were also able to gather data to compare age differences in the octopuses and cuttlefish, which will be insightful to researchers using different parts of the cephalopod life cycle. We are currently analyzing our data and hope to publish our findings soon.



My time at Woods Hole was an invaluable experience that opened my eyes to future career opportunities in aquatic veterinary medicine and research. Besides conducting my own research project on cephalopod anesthesia, I learned clinical skills by working alongside the head veterinarian. I assisted in treatment plans, practiced fish anesthesia, collected samples for pathology, assessed water quality, learned about IACUC procedures, and collaborated with experts in the marine biology community.

Because the veterinary position at the Marine Biological Lab is unique, I was able to see the value that veterinarians provide in research settings. Veterinarians are crucial for implementing the highest standards of animal welfare. One of my favorite qualities

about my summer experience was the collaborative and supportive environment made up of researchers in different disciplines. Every week, I participated in a meeting about cephalopod research, where post-doctorate fellows, aquarists, and senior scientists would share current trends in the cephalopod field. These meetings were invaluable due to the group discussions and collaborative troubleshooting for current projects.

With the conclusion of my summer studies, I am eager to dedicate myself to learning more about these fascinating species as well as aquatic animal health in general.





### AQUAVET I Experience

By Josh Zlotnick

North Carolina State University,  
College of Veterinary Medicine,  
DVM Candidate, Class of 2020

I am extremely grateful for the support from the John L. Pitts Education Awards to attend AQUAVET I from May 27<sup>th</sup> – June 23<sup>rd</sup> at Roger Williams University in Bristol, Rhode Island. I would like to detail some of my experiences here at the AQUAVET program, which showed me that a career in aquatic animal medicine is indeed possible.

As many know, AQUAVET I is an intensive 4-week program covering all aspects of aquatic animal medicine. My specific interest has always been in fish medicine ever since I was a student at the Duke University Marine Laboratory, so the aquaculture aspects of the course were particularly appealing for me. The first week of the course opened my eyes to aquatic invertebrate medicine and shellfish aquaculture, a completely new field to me. The middle two weeks of the course focused mainly on fish medicine. I could not get enough of the lectures on tropical aquaculture, catfish, coldwater fish diseases, pet fish cases, aquaculture economics, and the like. I was presented with a comprehensive introduction to the aquaculture industry from a veterinary perspective and an understanding of the breadth of material to learn. In the final week, we learned about marine mammal medicine, which was very interesting given my background interning at The Marine Mammal Center. Overall, more than forty lecturers provided us students with great resources and networking opportunities.

Labs at AQUAVET I helped me build and improve on skills that will be very useful in the future. We are very lucky at NC State to have amazing aquatic animal veterinarians, like Drs. Stoskopf, Lewbart, and Harms, who organize many aquatic animal medicine opportunities. In this way necropsies on birds, turtles, marine mammals, and fish were for me a second or third time experience. Likewise, the striped bass surgery was another chance to practice my skills in fish surgery and anesthesia. I was able to help guide the first year students this time around as I felt comfortable with the procedures and the anatomy. The water quality and microbiology labs were also very helpful in assimilating these important topics.

Interspersed between days full of lectures and labs were field trips to many of the aquatic animal institutions in the region. We spent a day each at New Eng-

land, Long Island, and Mystic Aquariums, getting behind the scenes tours and conversing with their veterinary staff. The trip to the Sandwich Fish Hatchery on Cape Cod was particularly enlightening as we learned about their water system, the trout production cycle, and diseases of concern.

I think one of the most important things I learned at AQUAVET I was from a classmate who taught me to have an insatiable curiosity for everything and anything in this field. New venipuncture site for Baitoids presented at IAAAM in Long Beach, California?

We should try it on this cadaver! How many different eyeballs can we examine under the dissecting microscope? Let us find out! We spent many hours playing around with a \$14 endoscope that attaches to a smartphone, trying to learn anatomy in situ and even practicing procedures like ovariectomies in turtles. Spending time with someone who wants to try new techniques for the sake of trying them, and is truly curious about the minutiae of every anatomical structure made me realize that a healthy curiosity is a key to becoming a competent and adaptable clinician.

I can without a doubt say that AQUAVET I was an amazing foundation for a career in aquatic animal medicine. My goal is to serve as a veterinarian in the aquaculture industry, ideally

working with food fish. Following AQUAVET I with an internship at Kennebec River Biosciences, an aquaculture diagnostics laboratory in Richmond, Maine, made me realize how much I learned this past month and is continuously reinforcing the lecture material through real world application. In the first week alone I read slides to look for Whirling Disease, took samples to test for Bacterial Kidney Disease, listened in on a client consultation about a potential *Flavobacterium columnarae* infection, and much more. AQUAVET I gave me the foundation, resources, and the network to propel my career in aquatic animal medicine and I am very grateful for this scholarship that helped make attending it possible.



Go Wolfpack! – Woods Hole, MA



Striped Bass Surgery - Splenectomy and Ovariectomy

**John L. Pitts Veterinary Education Award Report**

Alyssa M. Capuano, Class of 2019  
University of California, Davis  
School of Veterinary Medicine

The John L. Pitts Veterinary Education Awards Program supported my ability to attend AQUA-VET® I at Roger Williams University in 2018. This 4-week course fulfilled a portion of my externship rotations during my clinical year at UC Davis, where I am pursuing a focus in aquatic animal health. Despite the importance of this field, most veterinary schools do not offer comprehensive classes in aquatic animal medicine. AQUAVET® offers an excellent solution to this gap in our education by providing an extensive curriculum to enhance our knowledge through lectures, labs, and field trips. As Dr. Donald Abt mentioned, we were graced with a “parade of stars,” the best-of-the-best when it comes to veterinarians and scientists at the forefront of aquatic animal medicine.

Week 1 began with an overview of marine invertebrates and included a trip to collect and study invertebrates from the intertidal habitat at Roger Williams University. We learned about the ecology of animals from barnacles to horseshoe crabs through collection and microscopic evaluation. This week was also spent in lectures and labs focused on fish anatomy, physiology, nutrition, diseases, and diagnostic approaches. We thoroughly discussed the common question, “do fish feel pain?” The importance of water quality was introduced this week and remained a theme throughout the course. Our first week finished with a trip to Cape Cod to go whale watching! We were thrilled to see magnificent megafauna including fin whales and a breaching humpback whale.



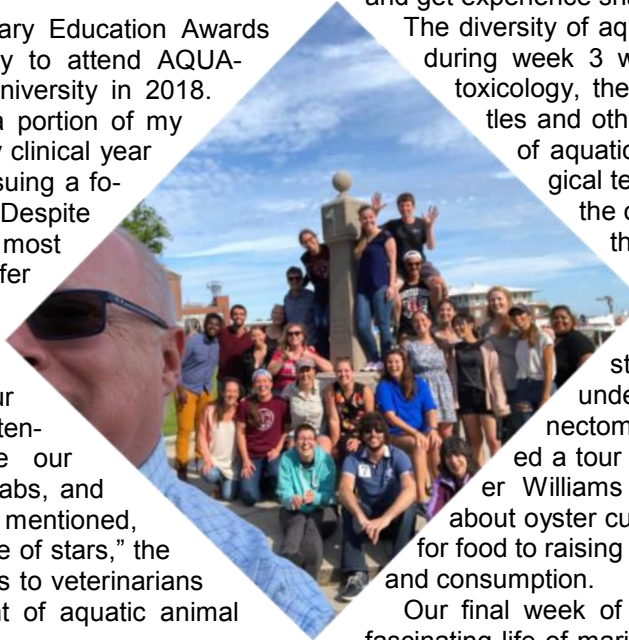
During week 2 we attended classes in aquarium larval culture, aquaculture of fishes, shrimp, and oysters along with aquaculture regulations and specific systems. We had visiting experts teach us all about fish histopathology and hematology, diseases of cold and warm water fishes, aquatic birds, penguins, and corals. We visited the Sandwich fish hatchery on Cape Cod to learn about local trout aquaculture. Throughout the course, students attending AQUA-

VET® gave seminars on a topic of their choice. This gave everyone the opportunity to study a special interest in more detail or present primary research to the class, which was an excellent way to stimulate learning and get experience sharing science.

The diversity of aquatic animal medicine continued during week 3 when we learned about aquatic toxicology, the economics of aquaculture, turtles and other reptiles, amazing adaptations of aquatic eyes, fish anesthesia and surgical techniques, pet fish medicine, and the ornamental fish industry. We had the great experiences of touring the New England Aquarium with the veterinary staff, performing necropsies on cold-stunned sea turtles, as well as undertaking our first surgical splenectomy on fish! This week also included a tour of the shellfish hatchery at Roger Williams University, where we learned about oyster culture from the initial algal culture for food to raising oysters for research, restoration, and consumption.

Our final week of AQUAVET® was all about the fascinating life of marine mammals. This included taxonomy, anatomy, physiology, diseases, regulations, water quality, clinical cases, ethical considerations, husbandry, clinical techniques, and pathology. We traveled to Woods Hole Oceanographic Institute to participate in necropsies of stranded pinnipeds and cetaceans with the International Fund for Animal Welfare as well as attend lectures on marine mammal stranding response in this region. We also visited the Long Island Aquarium this week where we were able to examine aquarium penguins, rescued grey seals, and learn to frag coral. Our last day was spent at the Mystic Aquarium where we had fantastic encounters with the aquarium beluga whales, penguins, and pinnipeds.

Directors of the program, Drs. Donald Stremme, Laurie Landeau, Robert Maze, and Rod Getchell, put a tremendous amount of work into organizing a successful program for the students. Not only did we learn more than we could possibly imagine, we were able to network with fellow veterinary students and professionals to make connections that will last throughout our careers.





**Aquatic Veterinary Abstracts: Stingrays**

Compiled by David Scarfe

**Comparison of hematology, plasma biochemistry, and blood gas variables between 2 venipuncture sites in Southern Stingrays (*Dasyatis americana*)**Phillips BE, EF Christiansen, MK Stoskopf, H Broadhurst, R George & CA Harms  
*Vet. Clin. Pathol.*, (2016).**Abstract**

**Background:** The Southern Stingray (*Dasyatis americana*) is a batoid elasmobranch frequently exhibited in zoological institutions. Blood is commonly collected from the caudal hemal arch at the tail base in stingrays for the purpose of health assessment and clinical pathology tests. An alternative site that allows a dorsal or ventral approach without necessitating puncture of a cartilaginous structure has been identified between the cartilaginous pectoral fin rays (ceratotrichia).

**Objectives:** The purpose of the study was to compare CBC, plasma biochemistry analytes, and blood gas variables between blood samples collected from the caudal and pectoral fin vasculature sites of the Southern Stingray.

**Methods:** Fifteen captive Southern Stingrays (10 females, 5 males) from 4 zoo and aquarium facilities were sampled. Lithium heparinized blood samples were collected from the caudal and pectoral venipuncture sites of each animal. Values from estimated total and differential leukocyte counts, plasma biochemistry analytes, and blood gas variables were compared.

**Results:** There were no statistically significant differences between venipuncture sites for the measured analytes except for CK activity, which was statistically significantly higher in the pectoral site samples. Levels of agreement between sites were good or moderate for 22 analytes and poor for ALT, AST, CK, pO<sub>2</sub>, lactate, monocytes, and eosinophils.

**Conclusions:** The good agreement between sampling sites for the majority of the measured analytes and the lack of differences that would alter clinical interpretation support the use of the pectoral site as an alternative to the traditional caudal fin venipuncture site in Southern Stingrays.



Southern Stingray

Photo from:

[https://en.wikipedia.org/wiki/Southern\\_stingray](https://en.wikipedia.org/wiki/Southern_stingray)

**Plasma biochemistry reference values of wild-caught southern stingrays (*Dasyatis americana*).**

Cain DK, CA Harms &amp; A Segars

*Amer. J. Zoo. Wildl. Med.*, 35(4):471-476.(2004)**Abstract**

Stingrays are prominent marine animals; however, there are few published reference values for their blood chemistry and hematology. Twenty-eight southern stingrays (*Dasyatis americana*) were caught using the bottom trawl nets of fishery-independent boats operated by the South Carolina Department of Natural Resources during June and July 2002 from Winyah Bay, South Carolina, to St. Augustine, Florida.

Median values of blood and plasma obtained from live animals promptly after capture are as follows:

packed cell volume = 0.22 L/L (22%),

total solids (TS) = 56.5 g/L (5.65 g/dl),

total protein (TP) = 26 g/L (2.6 g/dl),

sodium = 315 mmol/L,

potassium = 4.95 mmol/L,

chloride = 342 mmol/L,

calcium = 4.12 mmol/L (16.5 mg/dl),

phosphorus = 1.5 mmol/L (4.7 mg/dl),

urea nitrogen = 444 mmol/L (1,243 mg/dl),

glucose = 1.69 mmol/L (30 mg/dl),

aspartate aminotransferase = 14.5 U/L,

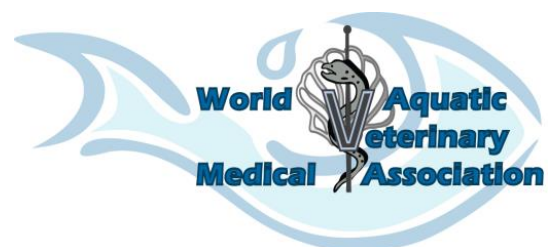
creatinine phosphokinase = 80.5 U/L,

osmolality = 1065 mOsm/kg,

lactate = 3.1 mmol/L.

Bicarbonate was less than the low end of the instrument range (5 mmol/L) in all but three samples. Anion gap was negative in all samples. Albumin was less than the low end of the instrument range (1 g/dl) in all except one sample. Osmolality was significantly higher in the rays caught in the southern region. TS and TP values were linearly related to each other, and the equation for the fitted line is  $TS = (11.61 \times TP) + 25.4$  (in g/L) [or  $TS = (1.161 \times TP) + 2.54$  (in g/dl)].

The reference ranges reported in this study can be used to aid in the management of aquarium stingrays and to create a baseline for health monitoring of the wild *Dasyatis* spp.







*Seahorse at the SeaLife Aquarium,  
Tempe, Arizona  
Photo by Nick Saint-Erne, 2014*





*Seahorse at the OdySea Aquarium,  
Scottsdale, Arizona  
Photo by Nick Saint-Erne, 2016*

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

**Treating Seahorses with Acetazolamide**

Hello, WAVMA Members,

I am currently working with an owner to treat a seahorse with gas bubble disease. We tried the acetazolamide tablets diluted in a stock solution and added to the water as well as Fortaz (ceftazidime) injections IM. The seahorse appears to be doing much better.

We ordered the 500 mg vial of acetazolamide and we are trying to figure out if as a hospital we can reconstitute, aliquot, and freeze doses of this medication, as we do with ceftazidime? Or is it something that we reconstitute and use twice for dosing within a week and then open another bottle for the next round of doses. Any insights from experience with storing, handling, and prescribing this medication is much appreciated.

Thank you for your time and consideration,

**Azureen Erdman, DVM**

[azuregal1224@gmail.com](mailto:azuregal1224@gmail.com)

*Associate Veterinarian*

*Kensington Bird and Animal Hospital*

I've ordered acetazolamide as an injectable in the past. I imagine if it's not given as an injectable, the injectable form may still be easier to aliquot out for oral or immersion purposes.

**Ronit Lavie, DVM**

Conejo Valley Veterinary Hospital

3580 Willow Ln, Thousand Oaks, CA 93116

(805) 495-4671

[Rlavie@gmail.com](mailto:Rlavie@gmail.com)

I have always frozen aliquots at 5mg/ml and 50mg/ml concentrations. I don't know if the product you ordered is any different from the lyophilized product I have used. If it is similar, you should be fine to reconstitute and freeze aliquots. Who knows how long they will maintain their integrity frozen long-term. I have stuff that has been frozen for over 6 years and still seems to work.

**Michael Hyatt, DVM**

Adventure Aquarium

Camden, NJ

[mwhyatt@gmail.com](mailto:mwhyatt@gmail.com)

Website: [www.adventureaquarium.com](http://www.adventureaquarium.com)

Dr. Charlie Innis at the New England Aquarium reported 95% potency in a sample that they had reconstituted and then kept refrigerated for several months. Certainly, this supports the anecdotal evidence that it might be as stable as we all think/hope.

**Ari Fustukjian, DVM**

[FishGuy@dvm.com](mailto:FishGuy@dvm.com)

(727) 421-8067

**Alkalinity and Hardness For Bass Production**

I have a client with a new pond on an old well. The owners are raising bass. We have other issues right now, but one concern is the alkalinity and hardness. The fish were out in the pond before the water was completely tested. The alkalinity and hardness are both over 500 mg/L on a Hatch test. He rechecked it on the well water directly and it was the same. It must be on a bed of limestone. We usually have a clay base in the area, so this is not an issue.

I know some fish are sensitive to this hardness. Does anyone know if bass are a problem with this alkalinity and hardness? The bass farmers he has talked to say it is fine. But it seems unlikely that this will be okay to me.

The pH is 7.8.

Sincerely,

**Sherri Kasper DVM CertAqV Ms**

[skvet098@gmail.com](mailto:skvet098@gmail.com)

It is hard for me to believe your alkalinity number, have an independent lab test it. A hardness of 500 ppm is not abnormally high for our area, where it routinely is well above that, but even where the hardness is over 1000 the alkalinity will be 150-160 mg/L.

**Michael D. Stafford DVM**

Fair Grove Veterinary Service

417/759-7803 ph/fax

[Egvs@aol.com](mailto:Egvs@aol.com)

I know there are parts of Florida where the norm for some of the well water for ornamental producers is 400-450 ppm (mg/L), due to the surrounding limestone. I believe this case is in Florida, so the readings don't necessarily surprise me. Unfortunately, I just don't know if any of those producers are raising bass.

Cheers,

**Johnny Shelley**

[thejohnnyshelley@yahoo.com](mailto:thejohnnyshelley@yahoo.com)



**Water Quality Requirements of the Striped Bass:**

- Temperature: optimum for growth is 78-82°F; can survive 32-95°F. Growth slows to near zero below 55°F and above 95°F
- Dissolved Oxygen: 6 ppm or higher
- Ammonia: below 0.6 ppm TAN is optimal, 0.5 ppm un-ionized may cause severe stress or death
- pH: between 6.5 and 8.5
- Nitrite: below 2 ppm and maintain a 6:1 Cl to NO<sub>2</sub> ratio
- Alkalinity: above 50 ppm, above 150 ppm is best to prevent fluctuations in pH
- Hardness: best above 25 ppm
- CO<sub>2</sub>: must be kept below 110% of saturation

From: Striped Bass Aquaculture Curriculum Guide  
<http://www.aces.edu/dept/fisheries/education/documents/SpeciesModuleStripedBassComplete.pdf>

**Water Hardness**

Hardness, or General Hardness (GH) is used to describe the characteristic of water that represents the total concentration of polyvalent metal cations, expressed as their calcium carbonate (CaCO<sub>3</sub>) equivalent. Calcium (Ca<sup>++</sup>) and magnesium (Mg<sup>++</sup>) are the main ions that contribute to hardness, along with aluminum, barium, copper, iron, lead, strontium, and zinc to a lesser extent. The greater the concentration of metals cations in the water, the higher its hardness.

Terms used to describe calcium carbonate concentration in water (CaCO<sub>3</sub> mg/L H<sub>2</sub>O):

VERY SOFT WATER	0 - 25 mg/L (ppm)
SOFT	25 - 75
MODERATELY HARD	75 - 150
HARD	150 - 250
VERY HARD	Over 250

Hardness, alkalinity, and pH are very closely related water properties. Soft water is usually acidic, while hard water usually has a basic pH. Highly alkaline waters also have a basic pH. Alkalinity measures the mineral anions and hardness measures the metal cations, but since calcium carbonate is the single largest source of these ions in natural waters, the alkalinity and hardness values expressed as mg CaCO<sub>3</sub>/L water will be similar.

Another term for measuring hardness is DH or dH, which stands for Deutsche Hartgrad or "German degrees of hardness." This is often called degrees hardness, and 1 DH is 1 part CaO in 100,000 parts of water, which equals 17.9 mg CaCO<sub>3</sub>/L H<sub>2</sub>O. Thus, very soft water would have a DH of approximately 1-1.5.

Hard water reduces osmotic work required for fish to replace blood electrolytes (sodium, potassium, calcium, chloride, phosphorus, bicarbonate) lost in urine. Most fish species will do well in water with hardness of 100 mg/L or more, but very hard water, with higher pH, will increase ammonia toxicity and so increases in ammonia levels must be avoided in water with high hardness and pH.

The hardness of water will increase with time as water evaporates, leaving behind and concentrating the dissolved minerals. Removing water from the pond or aquarium (partial water change) will take out the old hard water, and replacing it with fresh water will lower the total hardness. In ponds or aquariums with too soft water, calcium carbonate (limestone, crushed oyster shells, or commercial pond blocks) or calcium hydroxide (slaked lime) can be added to raise the hardness.

**Water Alkalinity**

Buffers help to reduce abrupt or radical changes in water chemistry that could be harmful to the fish. Water's buffering capacity is measured as alkalinity, which is the ability of the water to resist changes in the pH. The greater the alkalinity, the more stable the pH of the water will be. However, increasing alkalinity will cause an increase in the pH value (making it more basic).

Alkalinity, also called carbonate hardness (kH) is due to dissolved mineral anions: mainly carbonate (CO<sub>3</sub><sup>--</sup>), bicarbonate (HCO<sub>3</sub><sup>-</sup>), and hydroxide (OH<sup>-</sup>), and in lesser amounts borate, chloride, phosphate, silicate, and sulphate. Total alkalinity measures all of the mineral anions, but is expressed in terms of calcium carbonate (mg CaCO<sub>3</sub>/L H<sub>2</sub>O). The optimum alkalinity is 100 mg/L, but most fish will do well in water with 20-300 mg/L alkalinity.

Add calcium carbonate (CaCO<sub>3</sub>), calcium hydroxide [Ca(OH)<sub>2</sub>], or sodium bicarbonate (NaHCO<sub>3</sub>) to soft water to increase its alkalinity. Sodium bicarbonate is common baking soda, and can be added safely to the water at 1 teaspoonful/10 gallons whenever the alkalinity is too low in order to buffer the water and raise the pH.

Hardness and Alkalinity information excerpted from:  
**Advanced Koi Care** (2010) Nick Saint-Erne, DVM

**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).

**The role of general hardness, calcium and magnesium in ill-thrifty African cichlids.**

**Authors:** Kyle Farmer<sup>1</sup> & Richmond Loh.<sup>2</sup>

1. AquaTactics Fish Health, Kirkland, WA, USA.  
[aquatactics.com/](http://aquatactics.com/)
2. The Fish Vet, Perth, WA, Australia.  
[TheFishVet.com.au](http://TheFishVet.com.au)

**Introduction**

Husbandry, particularly water quality, can play a pivotal role in many disease processes. Many species can survive outside their ideal range; however, chronic problems may appear with prolonged deviations from ideal ranges. As part of a preliminary research project, we attempt to determine the role that water parameters play in ill-thriftiness of cichlids.

In freshwater tanks, aquarists commonly measure the general hardness (GH). This is a measure of all chemically bivalent metal ions (primarily comprising calcium and magnesium). The level of GH is related to the geology of the water source areas. These ions and their given ratios are important for various life-stages of development as well as enzymatic and metabolic reactions. Extreme Ca:Mg ratios of less than 20:1 or greater than 8:1 were shown to negatively impact hatching, feeding, development, larval growth, and survival in the Rare Minnow, *Gobiocypris rarus* (Lou et al., 2016).

Scientists at the Stuttgart National Aquaculture Research Center (SNARC) in Arkansas, USA recently determined hardness to be a direct factor in the susceptibility of fish to a common bacterial disease that affects the skin and gills, *Flavobacterium columnare*, where removing excess calcium and magnesium ions from the water dramatically reduced the bacteria's ability to adhere to the gills (Straus et al., 2015). Given these findings, it is plausible to conclude that the Ca:Mg ratios of a given system play a role in determining susceptibility, or resistance, to any number of diseases that plague aquarium fish.

For marine tanks, GH is not measured. Instead, calcium and magnesium are individually measured because of the importance of maintaining calcium levels of 380-450 mg/L and magnesium levels of 1200-1300 mg/L, with a Ca:Mg ratio of ~0.3:1. Magnesium and calcium are essential for the construction of skeletons in fish, or shells of invertebrates. Additionally, magnesium helps to prevent excessive precipitation of calcium and bicarbonate, which lowers both the calcium level and causes a drop in carbonate hardness (KH).

Some questions arise. Is the measurement of GH sufficient to maintain optimal health in cichlids? Do we need to quantify the concentration of calcium and magnesium individually? Are proprietary products catering to the needs of cichlids from different biotomes?

**Background**

African cichlids common in the aquarium industry come from three major lakes in Africa; Lake Victoria, Lake Malawi, and Lake Tanganyika. The pH, GH, and ionised calcium and magnesium in these waters vary. The pH for Lakes Victoria and Malawi 7.8-8.4 (Use of the Seachem Malawi Buffer in our test resulted in pH 8.0). For Lake Tanganyika, a pH of 9.0-9.4 is considered optimal (Use of the Seachem Tanganyika Buffer resulted in pH 9.0-9.5).

The median mineral values given by Talling and Talling (1965):

- For Lake Victoria using the median values of calcium (10 mg/L) and magnesium (5 mg/L), the Ca:Mg ratio is 2.0.
- For Lake Malawi, using the median values of calcium (18.4 mg/L) and magnesium (6.8 mg/L), the Ca:Mg is 2.7.
- For Lake Tanganyika, using the median values of calcium (13.4 mg/L) and magnesium (41.3 mg/L), the Ca:Mg is 0.32.

A paper on sediment and pore water chemistry of Lake Malawi/Tanganyika by Branchu, P. et al. (2010) reported the following:

- For Lake Malawi, using the values of calcium (18.8 mg/L) and magnesium (7.3 mg/L), the Ca:Mg is 2.6.
- For Lake Tanganyika, using the values of calcium (10.9 mg/L) and magnesium (39.1 mg/L), the Ca:Mg is 0.28.

A third paper based on the Aquifer of Lake Malawi by Mapoma, Xie, Liu, et al. (2017) stated:

- For Lake Malawi, using the values of calcium (52.4 mg/L) and magnesium (11.7 mg/L), the Ca:Mg is 4.5.

**Multispecies aquarium with problems**

A range of species that are maintained in a large display aquarium, and the owner's experiences with the health of its inhabitants are tabulated in the following chart:

Species	Healthy/Sick	Lake of Origin
Haplochromides	Sick when get older	Victoria
<i>Haplochromis</i> sp.44 "Red Tail"		Victoria
<i>Pundamilia nyererei</i> (Flameback)	Sick - Get hollow belly	Victoria
<i>Haplochromis "Ptyochromis" sp.</i> (Hippopoint salmon)	Sick within 2 weeks of introduction. They are the worst affected in tank	Victoria
<i>Aulonocara</i> species (Peacock)	Healthy, especially small, except if low in pecking order	Malawi
Protomelius	Healthy	Malawi
<i>Protomelas taeniolatus</i> (Red empress)	Healthy	Malawi
<i>Copadichromis borleyi</i>	Healthy	Malawi
<i>Sciaenochromis</i> electric blue	Healthy	Malawi
<i>Pseudotropheus</i>	Healthy when young/small, but will slowly lose body condition	Malawi
<i>Pseudotropheus callainos</i> (cobalt zebra)	Sick when harassed, hollow belly	Malawi
<i>Altolamprologus calvus</i>	Healthy	Tanganyika
<i>Lamprologus kendali</i>	Healthy	Tanganyika
<i>Tropheus</i>	Healthy (but other people have problems with <i>Tropheus</i> bloat).	Tanganyika
<i>Julidochromis regani</i>	Healthy	Tanganyika
<i>Melanochromis</i>	Healthy, except those that get bullied (very aggressive)	Malawi
<i>Chromobotia macracanthus</i> (Clown loaches)	Healthy	Indonesia (pH between 5.0 and 8.0, and water hardness between 5 and 12 dH)
<i>Synodontis</i> catfishes	Healthy	Tanganyika
<i>Fossorochromis rostratus</i>	Healthy when young. As adults, get sick – difficult to put on condition (sand sifting, constant feeding)	Malawi
<i>Maylandia lombardoi</i>	Healthy	Malawi
<i>Otopharynx tetraspilus</i>	Healthy	Malawi

The water for this display tank is maintained with reconstituted Seachem's Cichlid Lake Salt, and the water parameters were:

pH 8.5, GH 200 mg/L, calcium 30 mg/L, magnesium 40 mg/L, Ca:Mg 0.75.

Seven months previously, water parameters were:

pH 8.0, GH?, calcium 60 mg/L, magnesium ≤40 mg/L, Ca:Mg 1.5.

Comparing these water quality results to those cited in the literature for the respective lakes suggest the calcium level in this tank is markedly elevated, and the magnesium level is in excess for Malawi and Victoria cichlids.

To test the constitution of Seachem's Cichlid Lake Salt, the powder was added to distilled water at the Lake Tanganyika dose rate (highest dose rate), and the water parameters were measured. The values for Lakes Malawi and Victoria were calculated proportionately:

For Lake Victoria, the calcium (11 mg/L) and magnesium (50 mg/L), giving a Ca:Mg of 0.233.

For Lake Malawi, the calcium (17 mg/L) and magnesium (75 mg/L), giving a Ca:Mg of 0.233.

For Lake Tanganyika, the calcium (35 mg/L) and magnesium (150 mg/L), giving a Ca:Mg of 0.233.



### Conclusions

This exercise illustrates that proprietary salt mixes do not contain calcium to magnesium ratios suitable for all the different lakes. Moreover, there is proportionately higher magnesium, which makes it unsuitable for replicating waters of lakes Malawi and Victoria.

Returning to our cichlid population in question, it seems the bulk of sick species originate from Lake Victoria. The water parameters show tank levels of magnesium (and to a lesser extent, calcium) much higher than their native waters. Magnesium has a diarrhetic effect. It is possible the in-tank Mg levels are too high for the Lake Victoria cichlids, leading to reduced gut-transit time, malabsorption, and fluid loss; and these may clinically present as "sunken belly syndrome." If this is true, then the commonly used aquarium remedy of adding more Epsom salts (magnesium sulfate) to help alleviate enteric issues in cichlids may actually exacerbate the condition. This finding should make aquarists reconsider whether it is the right course of action. Excessive calcium may result in mineral deposition in tissues, namely kidney, and may then interfere with proper renal function.

It is possible that the calcium and magnesium levels in the aquarium have been rising due to regular replenishment of water to counter evaporative losses, either with regular tap water, or with water with added salts. However, the minerals do not evaporate, so the levels may increase over time. It is suggested to replace the evaporated aquarium water with distilled/deionised water, and to reduce calcium (to 10 mg/L) and magnesium (to 5 mg/L) levels in the aquarium. This will serve to create an environment more supportive of the baseline community requirements. Those fish with higher calcium and magnesium requirements may acquire their additional needs via their diet.

### References:

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### Maintaining Healthy Oceans is Everyone's Business

by Dr. Devon Dublin  
 WAVMA's President-Elect

Plastics have been a part of the daily lives of humans since its introduction in the 20th Century. Shopping bags, drinking straws, food packages, disposable cups, toys and a host of other items have become quite common. Garbage disposal on the other hand has not always kept up with the use of plastics, and most countries did not have recycling plants, nor were they separating garbage to facilitate this aspect of waste disposal. Of course, with indiscriminate dumping and even inadvertently, plastics gets into the water ways and finds itself ultimately in the ocean. This has gone unnoticed for decades by most of us. As a result, the plastics that have been entering the oceans has reached an estimated 150 million metric tons. Apart from that, every year 8 million metric tons enter the oceans, adding to the existing figure.

The issue came to light when vessels observed large amounts of plastic swirling in the Pacific Ocean, now known as the great Pacific garbage patch. Before this patch brought the world to the realization of the plastic crisis, observations of the dangers of plastic were made by veterinarians and conservationists when dead sea animals such as turtles, seabirds, and mammals were being found with plastics in their stomach or entangling them. Just recently, some 80 pieces of plastic rubbish weighing eight kilograms were found in the stomach of a pilot whale that died in Thailand after a five-day effort to save its life.

It is against this background that we all need to make efforts to make the oceans healthy again. Many governments are passing legislations to ban plastics, NGOs such as Greenpeace and Ocean Conservancy are leading efforts to clean up the oceans of the plastics that are already there. As individuals, we can assist by curbing our use of plastics. The World Aquatic Veterinary Medical Association (WAVMA) supports endeavors that would see an improvement in the health of the Oceans.



Grey seal (*Halichoerus grypus*) dead from plastic stricture.

(© Marine Environmental Research).

Picture by Dr. Bianca Unger, ITAW - University of Veterinary Medicine of Hannover.

### **Aquarium de Paris offers haven for unwanted goldfish**

Paris (AFP)

Paris's biggest aquarium has created a refuge for goldfish, providing a second life for any unwanted pets who might otherwise find themselves flushed down the toilet. The Aquarium de Paris allows the city's residents to drop off their fish, with the numbers using the service swelling around the time of the long summer holidays. Instead of facing death in the city's sewerage system, the rejected goldfish find themselves given a full medical checkup involving antibiotics and anti-parasite treatments. After a month in quarantine, during which a minority succumb to the trauma caused by the change in location, they are then released into a giant tank where they go on display to the public.

"Some of them arrive very weak," said Celine Bezault, who cares for the fish at the giant aquarium complex which is located opposite the Eiffel Tower.

Since it was created two years ago, the goldfish rescue service has been used by around 50 people a month and the tank now contains about 600 specimens, mostly the classic golden-red version, as well as striped and black ones. Rather than spending all day banging into the glass of a small bowl, here the fish have space to swim and plenty of company, allowing them to socialise and move around in groups.

Some owners hand over their pets tearfully, motivated by concern for their fish, while others appear relieved to be rid of them and the routines of feeding and cleaning.

"It was in a small bowl and I think it'll be better here," a 32-year-old named Alexandre told an AFP reporter as he dropped off a friend's goldfish called Nemo before the holidays. "It's better than flushing it away."

Once in the bigger tank, some of the fish undergo a remarkable transformation. Being confined in a bowl stunts their growth, but the bigger space means some of them will expand to full adult size.

"They can reach up to 20-30 centimetres (8-12 inches)," Bezault said.

For Alexis Powilewicz, director of the Aquarium, the service is part of efforts to promote awareness about animal care. Goldfish are domesticated forms of wild carp originally found in east Asia and the practice of keeping them in bowls has existed for hundreds of years. It is thought to have originated in China. For goldfish owners, the aquarium advises that the tank should be at least 100 litres (20 gallons), should contain more than one fish, as well as a filtration system and decoration.



For those who dispose of their pets in ponds or rivers, scientific studies have found that some goldfish thrive afterwards -- but at a cost to the local ecosystem because the fish are an invasive, non-native species.

In 2015, officials in the western Canadian province of Alberta launched a "Don't Let It Loose" campaign, pleading with locals to stop releasing goldfish into the waterways.

The ethical disposal service available at the Aquarium de Paris is aimed at offering an alternative. Owners are also able to return afterwards to try to spot their former pets: quite a challenge in a tank of 600.

For Full article, go to:

<https://www.thenational.ae/lifestyle/aquarium-in-paris-offers-haven-for-unwanted-goldfish-1.761536>

*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 through 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!

**Bugs: They could be what's for dinner!**  
**Where some see a pest, others see a potential solution to a need for novel protein sources for your veterinary patients**

Jun 26, 2018

By Sarah Mouton Dowdy,  
Associate Content Specialist

Bugs may seem like a far cry from Sunday dinner, but keep in mind that much of the global human population regularly participates in entomophagy, or the consumption of insects. In fact, the Food and Agriculture Organization (FAO) of the United Nations estimates that insects are a part of the traditional diets of around 2 billion people. Plus, there are several potential benefits to replacing beef and chicken with insects like black soldier flies, mealworms and crickets.

According to a 2013 FAO report, insects are highly efficient at converting feed into body mass, they require far less water than cattle, they pose fewer animal welfare concerns and zoonotic disease risks (though more research is still needed in both areas), and their greenhouse gas emissions are relatively low. Add to this the fact that insects can deliver protein, fiber, fat and nutrients with fewer calories, and you can begin to see why bugs are garnering some serious attention.

Still, pet foods containing insects face many hurdles to becoming the norm in the United States. The current regulatory rubric assumes insects to be adulterants. In other words, insects are seen as food contaminants, not food. Moreover, studies remain limited on the digestibility and palatability of pet foods containing insects, though the studies that have been done demonstrated favorable results. But perhaps one of the biggest barriers is a psychological one: pet owners' perspectives on what pets should eat. Pet owners' own aversions to bugs could trump all the aforementioned potential benefits.

Excerpt from: <http://veterinarymedicine.dvm360.com/bugs-they-could-be-what-s-dinner?bid=2210227&eid=431016100>



*Insect-based fish food formulated by Nick Saint-Erne, DVM, CertAqV*

**Mixed Metazoan and Bacterial Infection of the Gas Bladder of the Lined Seahorse— A Case Report**

By PA Anderson &amp; BD Petty

*J. Aquatic Anim. Health*, 25 (1): 42-52.(2013).

Five wild-caught Lined Seahorses (*Hippocampus erectus*) from an aquarium system presented with altered buoyancy and distended upper trunks. Radiography of one specimen revealed a reduced air volume in the gas bladder. Pneumocystocentesis revealed a brown exudate of numerous leukocytes, parasite ova, and Gram positive and acid-fast-positive bacilli under wet mounts and stains.

Necropsies revealed enlarged, friable kidneys and distended gas bladders containing copious purulent exudate, necrotic tissue, and adult digeneans (*Dictysarca virens*). Bacterial isolates from exudate cultures grown on Lowenstein–Jensen medium were identified as *Gordonia* sp. and *Mycobacterium poriferae* by high-performance liquid chromatography and 16S ribosomal DNA sequencing.

Histopathology demonstrated a histiocytic response in kidney and gas bladder exudate, inflammation of the gas bladder wall, and infection of the gas bladder lumen with parasite ova and acid-fast-positive and Gomori's methenamine silver-positive bacilli.

Praziquantel is prescribed for digenean infections, but dissolves incompletely in seawater and is toxic to this host fish. Eradication of intermediate host vectors is a management option. Treatment of *Gordonia* infection has not been addressed in nonhuman animals, and there is no known effective treatment for *Mycobacterium* spp. infection in fishes.

This is the first case report of digenean infection of the gas bladder in a syngnathid, *Gordonia* sp. infection in a nonhuman animal, and *M. poriferae* infection in a fish.



*The *H. erectus* species can be found with a myriad of colors, from greys and blacks to reds, greens, and oranges. The lined seahorse lives in the Atlantic Ocean as far north as Canada and as far south as the Caribbean, Mexico, and Venezuela.*

Photo from:  
[https://en.wikipedia.org/wiki/Lined\\_seahorse](https://en.wikipedia.org/wiki/Lined_seahorse)



**Leafy Seadragons  
Saved by Veterinarian's  
Simple Prosthetic**  
By Katie Jones  
August 23, 2018  
Tampa, Florida



A veterinarian's invention has likely saved the lives of several delicate sea creatures at The Florida Aquarium. Three ailing leafy seadragons now wear buoyancy control devices designed by Dr. Ari Fustukjian. The leafy seadragons are native to Australia but have been at the aquarium since April. As soon as they started to grow, veterinarians and staff noticed troubling signs.

"To get down to the bottom and hunt for that food is really critical to their health, and as they were starting to grow from just a few centimeters to a little larger, we noticed they were having trouble," Associate Curator Eric Hovland said.

All three leafy seadragons had problems with their swim bladders. The condition forces them to swim constantly to stay off the bottom of the habitat, and it could have caused the seadragons to tire themselves to death, Fustukjian said. Fustukjian used a button and pieces of a wet suit to help them stay upright, likely saving their lives.

"The first time we put one of these devices on, that animal immediately went into normal posture. It looked relaxed and it started eating, and that is definitely very rewarding," Fustukjian said. Fustukjian has now made about a dozen of the devices during the past few months to help the growing marine creatures. Guests can see the leafy seadragons and their new accessories at [The Florida Aquarium](http://www.floridaaquarium.org).

Excerpt from:

<http://www.baynews9.com/fl/tampa/news/2018/08/23/rare-leafy-seadragons-saved-by-doctor-s-prosthetics>

Leafy seadragon image from Wikipedia  
[https://en.wikipedia.org/wiki/Leafy\\_seadragon](https://en.wikipedia.org/wiki/Leafy_seadragon)



**The Leafy Seadragon, *Phycodurus eques*,  
a Flagship Species with Low But Structured  
Genetic Variability**

By Stiller J 1, Wilson NG 1, Donnellan S 2,3,4, and Rouse GW 1

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The leafy seadragon (*Phycodurus eques*, Syngnathidae), is a charismatic endemic of Australia's temperate coast. The species exhibits remarkable camouflage in its kelp and seagrass habitat. These habitats have been retreating throughout the range of the species, leading to concerns about the persistence of leafy seadragons. Despite being a popular aquarium display and a flagship for coastal conservation, little is known about leafy seadragon biology.

We used 7 microsatellite markers and 2 mitochondrial DNA fragments to investigate the population structuring and genetic diversity of 71 individuals. Bayesian cluster analysis identified 2 main genetic partitions, one in Western Australia and the other in South Australia. Shallower, yet significant, differentiation of mitochondrial DNA ( $\phi$ ST) and microsatellites (FST, F' ST, D) was found on the smaller geographic scales in South Australia. Distinct groups were supported in Encounter Bay, on both shores of Gulf St Vincent, and in Spencer Gulf. Sample sizes were too small in the eastern Great Australian Bight and in the westernmost locality to address genetic differentiation in these regions.

Overall genetic diversity was moderate to low, but particularly low levels were found in the Western Australian cluster. This latter point needs confirmation at other sites in Western Australia. In South Australia, signatures of demographic changes were detected, which may have been caused by a population expansion due to post-glacial reflooding of the gulfs. The Western Australian and South Australian clusters appeared as demographically independent units. Conservation actions should focus on preserving genetic diversity at local scales and maintaining habitat connectivity.

*Journal of Heredity*. 2017 Mar 1;108(2):152-162.  
doi: 10.1093/jhered/esw075.

Link to website:

<https://www.ncbi.nlm.nih.gov/pubmed/28173190>

**The Seahorse Trust**

The Seahorse Trust was set up in 1999 as an umbrella organisation to preserve and conserve the natural world, especially the marine environment using Seahorses as our flagship species. We work in partnership through a Seahorse Alliance with many organisations and people from all over the world and it is this unique partnership that allows us to achieve so much in the conservation of seahorses and their environment.

Seahorses are a unique fish species that occupy the coastal areas of most of the world and it is these very areas that are most under threat, being vulnerable to human and natural interference. By working together we can make a difference to their future and the future of these fragile eco-systems.

Although we are a small charity, we are very effective and we make a difference in so many ways in education, conservation and lobbying for protected areas and to have marine and terrestrial species protected. See: <https://www.theseahorsetrust.org/>

**'Endangered' seahorses could become extinct**

Seahorses, which have existed for 13 million years, could be the creatures of the past in three decades unless a drastic action is taken. According to official figures, 64 million of the delicate creatures are taken from oceans annually for Chinese medicine and the curio trade, and conservationists are calling for a ban on shops in Britain selling the dried fish as holiday souvenirs, the *Mirror* reported.

There are 50-plus species of seahorses, and with seahorse fisheries claiming the numbers to have gone down by at least 50 percent in five years, this means the creatures could become extinct by 2045.

The Seahorse Trust has persuaded eBay to ban the sale of seahorses in the past year, and is now targeting shops in the UK. Original Article Link:

[http://zeenews.india.com/news/eco-news/endangered-seahorses-could-be-extinct-in-next-three-decades\\_1640158.html](http://zeenews.india.com/news/eco-news/endangered-seahorses-could-be-extinct-in-next-three-decades_1640158.html)

See also: <http://www.seahorsehawaii.org> and

<http://seahorse.com/news-media/endangered-seahorses-could-be-extinct-next-three-decades>

**Portable Digital Microscope** iolight

The only pocket-sized microscope that delivers 1 micron resolution

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**2019 AQUAVET® I & II & III Courses**

The College of Veterinary Medicine at Cornell University is pleased to announce the 2019 AQUAVET® I, II & III course offerings. They are aquatic veterinary medicine education programs that currently consist of two courses that will be presented at Roger Williams University in Bristol, RI in June 2019 and one on aquarium medicine held in three venues.

**AQUAVET® I: An Introduction to Aquatic Veterinary Medicine** is a 4-week course (26 May - 22 June 2019) intended primarily for veterinary students.

**AQUAVET® II: Comparative Pathology of Aquatic Animals** is a 2-week course (26 May - 8 June 2019) that is oriented toward the pathology of diseases of aquatic invertebrates and fish that are used in biomedical research, encountered in display aquaria and are of importance in commercial aquaculture.

**AQUAVET® Summer Research Fellow** (one offered) is an 8 week research program, usually studying fish disease at a lab at Cornell University. There is no tuition and this student will receive a stipend of \$3,800 after completing the 8 weeks.

**AQUAVET® III: Clinical Aspects of Captive Aquatic Animal Medicine** is a 5 week course (following AQUAVET® I – 23 June to 28 July 2019) and is limited to a small number of students. The venues include GA Aquarium, U of GA and Dolphinaris, Cancún, México.



Veterinary students can receive credits for the courses and graduate veterinarians can receive CE credits.

More detailed information and applications for admission (due by January 15, 2019) are available on the web site [www.aquavet.org](http://www.aquavet.org).

**2018 Humane Endings Symposium**

November 2-4, 2018  
 Westin O'Hare Hotel,  
 Rosemont, IL, USA

Experts on humane endings for animals (including all aquatic species) will come together to present cutting-edge research and practical experience in the application of methods of euthanasia, slaughter and depopulation. Attendees will learn how the AVMA formulates its guidance and contribute to the knowledge base and conversation that shapes it.

**Who Should Attend?**

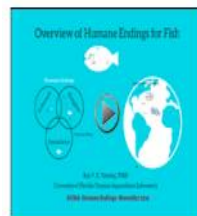
This is a must-attend event for anyone involved with end-of-life decision making for animals, including:

- Veterinarians who implement humane killing techniques
- Government employees, facility directors and accreditation representatives who are involved with regulation of these activities
- Producers of educational programs, standards or protocols in these areas of practice
- Representatives of animal-based industries and humane societies

If you have any additional questions or concerns, please contact [humaneendings@avma.org](mailto:humaneendings@avma.org).

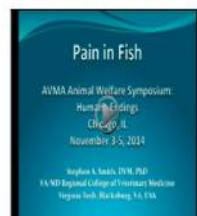
Examples of presentations given at the 2014 Humane Endings Symposium are available at:

<https://www.avma.org/Events/Symposiums/HumaneEndings/Pages/default.aspx>



**Overview of humane endings for fish**  
 Duration: 28:32  
 This presentation provides a framework for discussion of humane endings for fish, including current recommendations and practices, challenges, and future directions.

Roy Yanong



**Fish pain**  
 Duration: 29:19  
 The perception of pain in fish is controversial, but the preponderance of recent evidence supports that fish are anatomically, biochemically, molecularly, pharmacologically, and behaviorally similar to mammals. Thus, fish most likely have the potential to perceive pain and experience distress. Therefore, it is important to assess activities that may cause pain and discomfort in fish with the goal of minimizing aversive states for the fish.

Stephen Smith



*Your Singapore, the Tropical Garden City*

**43<sup>RD</sup> WORLD SMALL ANIMAL  
VETERINARY ASSOCIATION CONGRESS  
AND 9<sup>TH</sup> FASAVA CONGRESS**

25-28 September, 2018 | Singapore





**World Aquatic Veterinary Medical Association**

**Program**

**Congress and Wetlab Early-bird Registration Ends June 25, 2018**

**PRE-CONGRESS AQUATIC MEDICINE WETLAB/WORKSHOP**

**Monday, 24 September, 10:00** Location: Temasek Polytechnic  
**Instructors:** Dr. Richmond Loh, Dr. Julius Tepper & Dr. Nick Saint-Erne

**Learning Objectives:** This interactive wetlab will provide hands-on experiences for veterinarians, technicians, students and other support personnel involved in the care and handling of fish species, including a variety of handling, restraint, sample collection, and other techniques necessary for clinically evaluating the health of fish in practice. Restraint, medication administration, and other state-of-the-art techniques involving clinical procedures applicable to fish health and well-being will be demonstrated by instructors, then performed by participating veterinarians, veterinary technicians and veterinary students to help provide the clinical expertise and technical skills of the participant.

*Transport from/to Marina Bay Sands & Temasek Polytechnic will be provided*

**CONGRESS INTERACTIVE LECTURES**

ORNAMENTAL FISH & DISEASE		
Tuesday, September 25, 2018 Location: Marina Bay Sands Conference Centre, Auditorium 1		
Time	Speaker	Presentation
11:55-12:40	N. Saint-Erne	Supplies and Equipment to Practice Aquatic Veterinary Medicine
12:45-13:30	N. Saint-Erne	Water Quality Assessment in Aquatic Vet Medicine
14:30-15:15	J. Tepper	Clinical Aspects of Design and Function of Aquasystems
15:20-16:05	J. Tepper	Cutaneous Lesions in Koi
16:30-17:05	R. Loh	Anesthesia in Aquatic Vet Medicine
17:20-18:05	R. Loh	Therapeutics in Aquatic Vet Medicine
AQUATIC VETERINARY MEDICINE		
Friday, September 28, 2018 Location: Marina Bay Sands Conference Centre, Auditorium 5		
Time	Speaker	Presentation
08:30-09:15	A.D. Scarfe	International Efforts to Validate Day-1 Competency in Aquatic Veterinary Education

*Because WAVMA is a WSAVA Association Member, to obtain the lowest registration WAVMA Members can register as a "WSAVA Member"*

**For more information about the WSAVA Congress, to Register, and for Hotel Reservations:**

<https://wsava2018.com/>

April 18, 2018

NEW TRAINING COURSE LAUNCHING SEPTEMBER 2018

# The Health and Welfare of Atlantic Salmon

Salmon farming is a multi-billion dollar global industry, making significant contributions to the economies of the world's major salmon producing countries. It is vital that fish farm operatives who are responsible for these fish are trained in all the main aspects of health and welfare, to ensure that their fish are free from disease and suffering, to enhance quality and productivity, and to comply with legislation.

The Knowledge Services Division of Benchmark Animal Health has worked closely with Fish Vet Group to produce an exciting and interactive online course covering the Health and Welfare of Atlantic Salmon.



## The course includes

- Principles of fish welfare
- Feeds and feeding
- Transport
- The environment and fish welfare
- Health and veterinary health planning
- Management and husbandry practices
- Killing and flesh quality

## Features and benefits

- Online course divided into bite-sized modules so you can study at your own pace
- Study on any device with internet access
- Interactive exercises and on-farm videos to create interest and test knowledge
- Questions after each module to test your understanding
- Course certificate available after successful completion of all the modules
- Optional practical sessions covering sea lice counting, gill scoring etc. to help reinforce your learning

## Pricing and further details

Individual course access is £400 plus VAT.  
Please contact us for prices of multiple course access.  
[marketing@5mpublishing.com](mailto:marketing@5mpublishing.com)  
tel: +44(0) 1865 237733, [thefishsite.com/learn](http://thefishsite.com/learn)



The Fish Site



FishVet Group





### MEETINGS OF INTEREST TO AQUATIC VETERINARIANS

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



#### **3rd World Aquatic Veterinary Medical Association Conference, Annual General Meeting & Biosecurity Workshop**

November 8-12, 2018  
St. Kitts, USVI

The dates for the 2018 WAVMA Conference have been changed to November 8-12, 2018 to coincide with the West Indies Veterinary Conference. Consider attending or presenting at the 2018 WAVMA St. Kitts Conference ([2018-Conference.wavma.org](http://2018-Conference.wavma.org)).

For more meetings, see information at: <https://www.wavma.org/Aquatic-Veterinary-Educational-Meetings-Conferences-Symposia-Workshops>

#### **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>.

#### **Project Piaba**

Rio Negro, Amazonas, Brazil  
January 19 to February 1, 2019.

We're working on the itinerary which you'll find here: <http://projectpiaba.org/what-we-do-2/expeditions/>

It is a fun trip and also a great way to learn about a segment of the aquarium fish industry, visit fishing villages and see an amazing amount of wildlife. I'll be on the trip again doing animal health assessments and training locals to serve as extension resources for the fishers and transshippers. We may have some veterinary students as well, since the trip is available as an externship.

Here's a video shot on the trip in 2014 that Oregon Sea Grant produced about the fishery on the Rio Negro and the travels of these fish to Oregon, [https://www.youtube.com/watch?v=AqRmDFas\\_kg](https://www.youtube.com/watch?v=AqRmDFas_kg).

Here's some more information:

Costs: 2 weeks on the boat in Brazil approximately \$2,750, all included except alcohol or carbonated/bottled beverages and crew tip.

Brazilian tourist visa (\$100)

airfare \$1,200 - \$1,300 from most US cities

Any questions, feel free to send an email or call me or Scott Dowd:

Scott Dowd - [sdowd@projectpiaba.org](mailto:sdowd@projectpiaba.org) or (617) 973-5243.

Let us know if you are interested in joining the Expedition in January; a 50% deposit will hold a spot for you.

Hope to see you in Brazil.

Timothy J. Miller-Morgan, DVM, CertAqV  
Aquatic Animal Health Program, Oregon Sea Grant,  
College of Veterinary Medicine, Oregon State Univ.  
Assistant Professor, Department of Biomedical Sciences,  
College of Veterinary Medicine  
Instructor, Aquatic Animal Health Management,  
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Web sites:

<http://seagrant.oregonstate.edu>

<http://vetmed.oregonstate.edu/>

<http://www.oregoncoastcc.org/aquarium-science>

Blog: <http://blogs.oregonstate.edu/wetvet/>

Facebook: <https://www.facebook.com/aquaticanimalhealthprogram?ref=hl>



**ExoticsCon 2018 - Association of Avian Veterinarians, Association of Exotic Mammal Veterinarians, Association of Reptilian and Amphibian Veterinarians Joint Conference**  
September 22–27, 2018  
Atlanta, GA, USA  
For more information: <http://www.exoticscon.org>

**3rd World Aquatic Veterinary Medical Association Conference,**  
November 8-12, 2018  
St. Kitts, USVI

**Gill Health Symposium for Marine Fish**  
November 21 - 23, 2018  
Singapore  
Click for more information: [USIDNEY](#)

**ICARE 2019**  
April 28 – May 2, 2019  
London, Great Britain.  
For more information: <http://www.icare2019.eu>

**ExoticsCon 2019 - Association of Avian Veterinarians, Association of Exotic Mammal Veterinarians, Association of Reptilian and Amphibian Veterinarians, and AAZV**  
September 27–October 5, 2019  
St. Louis, MO, USA

For more meetings, see information at: <https://www.wavma.org/Aquatic-Veterinary-Educational-Meetings-Conferences-Symposia-Workshops>



Get The Fuller Picture From WAVMA WebCEPD Online Webinars

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Given by leading experts, WAVMA's real-time and recorded WebCEPD webinars are intended as educational programs on key aquatic veterinary issues and techniques to hone the knowledge and skills of aquatic veterinary students and practitioners.

<https://www.wavma.org/WebCEPD>

**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).

**43rd WSAVA Congress**  
September 25-28, 2018  
Singapore

Plan ahead for World Congress 2018 in Singapore, the Tropical Garden City!

Our Congress will be held at our famous Marina Bay Sands, where you may lay down by the infinity pool after an eventful day of lectures. So, come on down and indulge yourself, because we all deserve it!  
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Singapore 018956  
Website: <http://www.marinabaysands.com/>

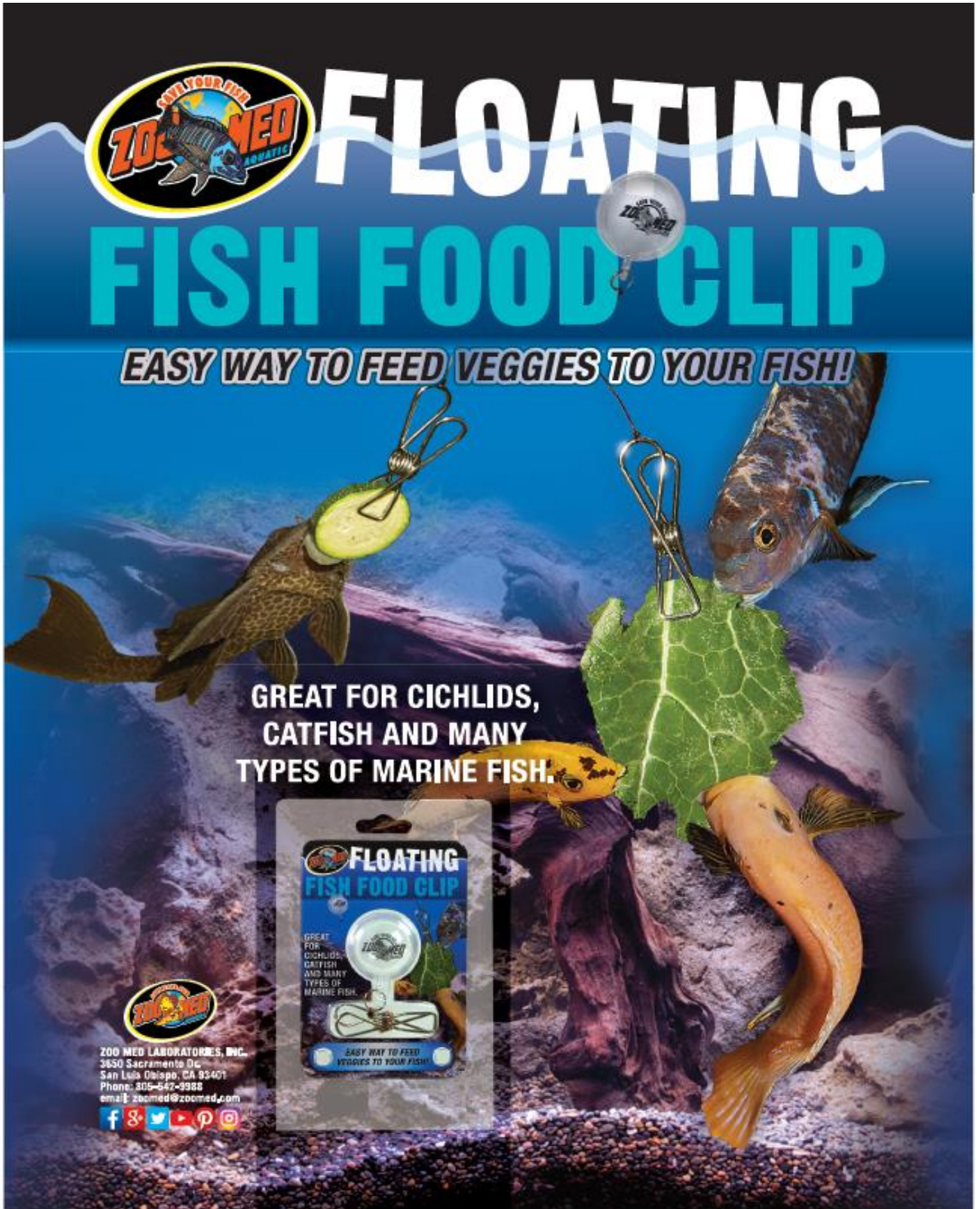
Conference Registration: <http://www.wsava2018.com/registration-hotels/registration#.Wjrl87enEz0>



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