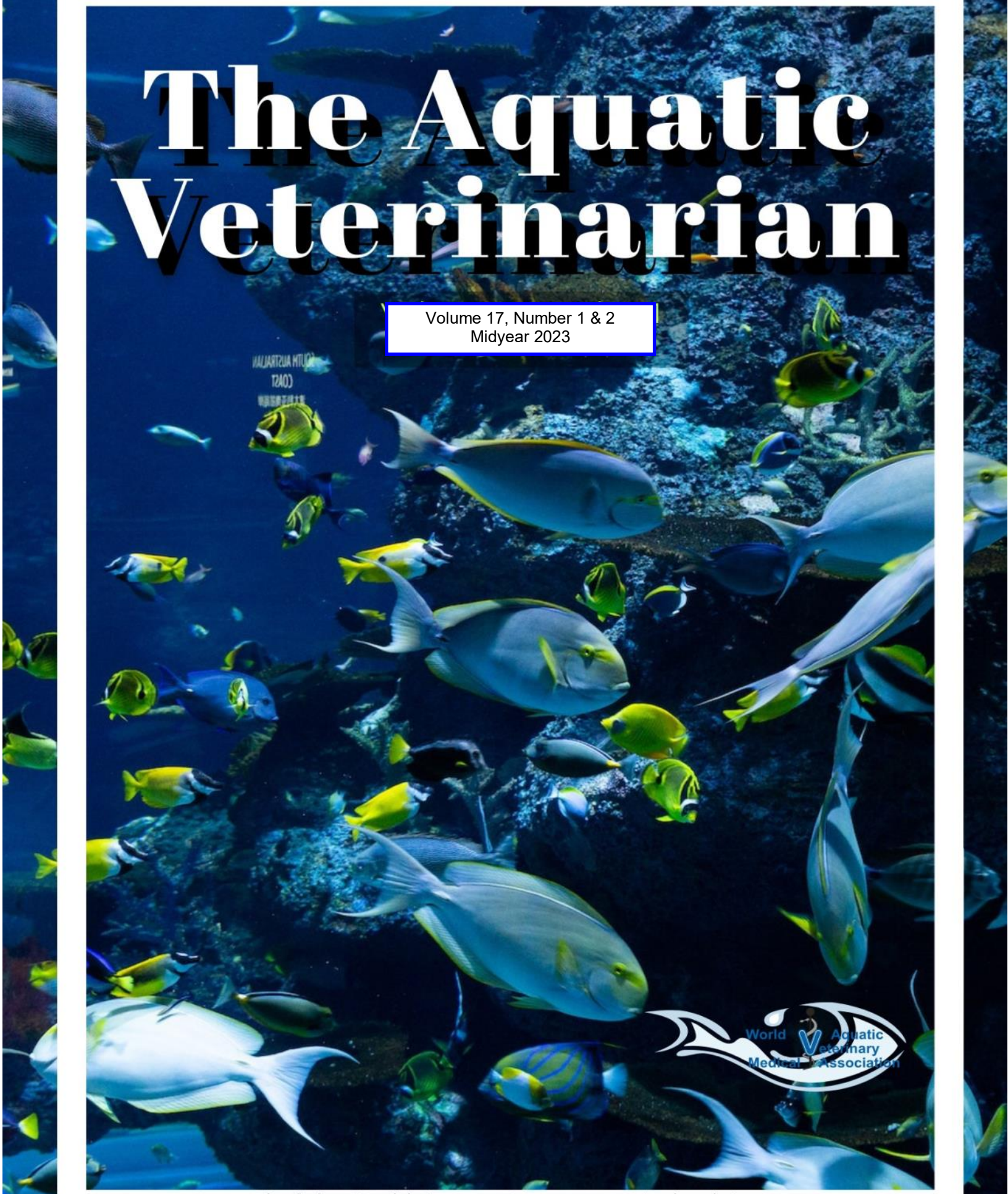
ISSN 2329-5562

The Aquatic Veterinarian

Volume 17, Number 1 & 2
Midyear 2023



World Aquatic Veterinary Medical Association

Journal of the World Aquatic Veterinary Medical Association

WHO ARE WE

MISSION

The Mission of the 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.

To fulfill this Mission, the World Aquatic Veterinary Medical Association has established the following:

Objectives

1. To serve aquatic veterinary medicine practitioners of many disciplines and backgrounds by developing programs to support and sustain members, and the aquatic species industries that they serve.
2. To identify, foster and strengthen professional interactions among aquatic medical practitioners and other organizations around the world.
3. To be an advocate for, develop guidance on, and promote the advancement of the science, ethics, and professional aspects of aquatic animal medicine within the veterinary profession and a wider audience.
4. To optimally position and advance the discipline of aquatic veterinary medicine, and support the practice of aquatic veterinary medicine in all countries.

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

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

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ISSN 2329-5562

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Stephen Reichley, Secretary	2018-2019
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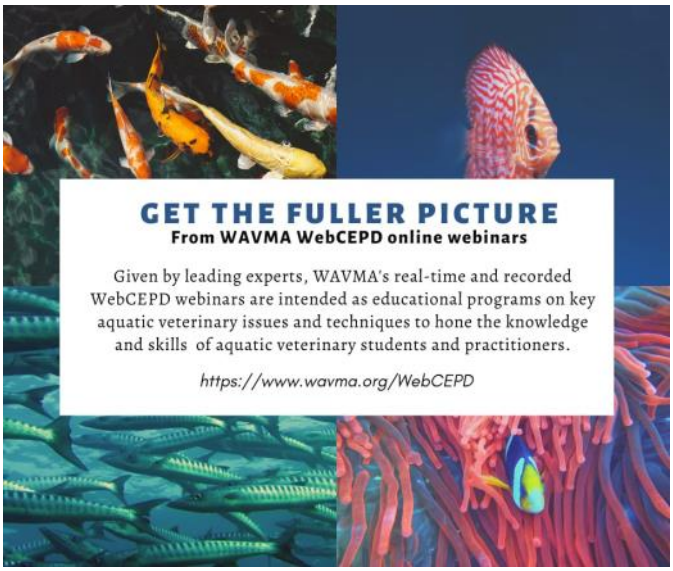
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Newly designed cover by Giorgia Maria Gottifredi

"I am thrilled to have had the opportunity to work on the redesign of The Aquatic Veterinarian. As someone who is passionate about fish, I have dedicated the past two years of my career to aquaculture, where I have gained invaluable experience and knowledge. I am now eager to take the next step in my journey by pursuing a degree in fish pathology. I'm excited to be a member of the WAVMA among all of those who play such a critical role in promoting the health and wellbeing of aquatic animals!"

- Giorgia Maria Gottifredi

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.

EDITORIALS

Editor's Note

Did you miss me? Or, should I say, did you miss an issue of *The Aquatic Veterinarian*? There was no issue published for the first quarter of 2023, as I was traveling most of the quarter in California, Arizona, Nevada, and Wisconsin, then in March I was on vacation in Central America for two weeks, followed by the Global Pet Show in Florida. And the first quarter was over without any free time.

After that, I spent two weeks learning how to breed marine ornamental fish at the University of Hawaii in Hilo in April, and have been still traveling for the past month, so I gave up on the first quarter issue and decided to combine it with the second quarter, for a midyear issue! I am finishing this issue in June, in time to get it out by the end of the second quarter, having just returned from lecturing at AQUAVET in Rhode Island last weekend, and traveling to Wisconsin and California again last week. I think I have spent more time away than at home this year! But things are settling down now, so the next two issues should be out on time. That is - if I have enough material submitted to make a good journal.

But we do have some good content contributed in this current issue: we have John L. Pitts Aquatic Education Award Reports from Greta Doden (page 19), Brian Anton (page 20), and a report about the activities of Maribel Escobedo (page 21). Our Colleague's Connection is a reprint of an article by Christopher Lopresto, VMD, CertAqV, titled, "Get Hooked on Fish Medicine," (pages 22-23). It is a light-hearted look at why we do what we do with the wet pets.

The Aquarium Report (pages 24-27) is about Acuario Mazatlán, Mexico, which I visited (twice now). This is a small aquarium that has nice exhibits of local Sea of Cortez fishes and aquatic animals native to Mexico. The Sea Museum there is also interesting.

We have several case reports and review articles: Investigation of extreme buoyancy disorder in public aquarium held freshwater moray eels (pages 28-29); In My Experience: Microscope Phone Mount, a handy thing to know submitted by Julius Tepper (page 30); Unusual Crustacean Mortality in the North-east of England in 2021 and 2022 (page 31) and another informative Grand Rounds Case (pages 32-33), followed by an update on World Aquaculture Data by Xiaowei Zhou (page 34).

The issues are only as good as the content that is sent in, so please submit your own case reports or other articles to include in the September 2023 issue. I can accept content until mid-September for that issue. Any offers to help in editing and formatting content are also appreciated! Especially take note of the new cover, designed by member Giorgia Gottifredi. Many thanks to her for the beautiful design!

Nick Saint-Erne, DVM, CertAqV
Executive Editor
TAVeditor@wavma.org

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.

The Aquatic Veterinarian

The Quarterly Magazine of the World Aquatic Veterinary Medical Association

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

Advertising Rates (per issue)

	Commercial	Non-Profit
Full page (~7" x 9")	$100	$50
1/2 page (~7" x 4.5") **or 1 column** (3.5" x 9")	$60	$30
1/4 page (~3.5 x 4.5")	$30	$15

WAVMA Members can place a free 1/8 page (business card size) advertisement in the TAV. Contact TAVeditor@wavma.org for information on advertising and payment options.

President's Report



I am glad to serve as President of the World Aquatic Veterinary Medical Association in 2023, welcoming all members and contributors! We are a community and inclusive. The theme of my 2023 presidency is to expand and involve everyone in this community who share in the same aims and values.

Professional services and research related to a broad range of aquatic animal species are needed worldwide. Aquatic veterinarians and para-veterinarians now play a key role toward the One Health approach. The sector is driven by the growth of aquaculture production, but there is also an increasing popularity of zoo attractions and ornamental pets, together with the exponential use of fish in biomedical research. Furthermore, veterinarians are needed to support wildlife species management, and to advise containment measures against the spread of emerging pathogens and of invasive aquatic species.

We continue supporting the education, certification, and promotion of this still highly under-represented category of veterinarians and para-veterinarians, when compared to those working with terrestrial animals. We offer the only certifications worldwide to aquatic veterinarians (CertAqV), and aquatic veterinary nurse and technicians (CertAqVNT).

We recently consolidated a prestigious WebCEPD program. We involve students as active activity development contributors, or through Student Chapters, and we offer training support through the Pitts Scholarship and list training opportunities. This year we opened new Executive Board positions to be more available in each continent, aiming at increasing local and international networks, establishing relations between WAVMA and other associations, thus, to attract new generations of veterinarians and para-veterinarian in our dynamic community.

Bart Gorgoglione
WAVMA President
President@wavma.org



Dr. Jessie Sanders and Dr. Bartolomeo Gorgoglione at the WAVMA booth at the Aquaculture America Convention.

February 23-26, 2023
New Orleans, Louisiana USA

Secretary's Report



Dear WAVMA members,

We have started this year 2023 under the leadership of President Dr. Bartolomeo Gorgoglione (USA), Immediate Past President Dr. Gillian Taylor (SA), and President-Elect Dr. Matthijs Metselaar (UK). This year we have a renewed and larger Executive Board (EB) fostering more regional representation in order to get a close view of needs in specific regions aiming to increase local and international networks and support our members in each region with relevant and opportune information. A warm welcome to:
Director for North America Dr. Jena Questen (USA), Director for Oceania Dr. Stephen Pyecroft (Australia), Director for Asia Dr. Win Surachetpong (Thailand), Director for Europe Simon Doherty (UK),
Director for Middle East Dr. Farah Gonul Aydin (Turkey), Director for Africa Dr. Nelly Isyagi (Kenya) and Director for Latin America and Caribbean Dr. Paola Barato (Colombia).

One of our successful programs has been for years the Aquatic Certification; this year the Credentialing Committee - led by Dr. Matthijs Metselaar - continues receiving more applications to the CertAqV Program, the process now became automatized and already had the first candidate assigned adjudicator via this new online system. Applications are welcome via https://www.wavma.org/CertAqV-Pgm. In the same context, the Certification for Aquatic Nurses and Technicians (CertAqVNT) was approved by the EB, whilst first candidates have been approved, many others are in the pipeline; this Certification is still under a manual process but soon will be automatized as the CertAqV actually is.

To give more support and enhance the relevance of WAVMA quarterly publication *The Aquatic Veterinarian* (TAV), a new Committee has been established: "Publication Committee" chaired by Dr. Nick Saint-Erne. This Committee´s focus is the edition and publication of TAV, in this sense, Dr. Saint Erne is conforming a new team to contribute to the tasks of this committee. As TAV belongs to the whole WAVMA community, therefore I invite everyone to contribute with clinical cases, experiences and reports to be reflected in this publication. For more information and contributions, email TAVeditor@wavma.org.

In order to optimize volunteers' time resources and enhance the Education and Students Committee (ESC) endeavor, a new subcommittee was arranged within ESC, the "Education Resources sub-committee" led by Dr. Jeff Griffioen; within other tasks this sub-committee has reunited and is responsible to overlook and administers the Students Chapters Mini Grant and Pitts Aquatic Veterinary Education Awards Program. Within the ESC, the WebCEPD Program continues its efforts organizing one webinar for each month of the year, interesting lectures/ videos are already on the website and many more to come, stay tuned!!

All the mentioned changes are within the context of an update of WAVMA website to make it more dynamic and boost more interaction among our WAVMA community. On the other hand, all these efforts have no sense if there is no feedback from WAVMA members, therefore I kindly invite everyone to sum interacting through WAVMA_Members-L@wavma.org, joining the current Committees, sending articles to TAV and to the e-news.

Members of the EB, from the President to Regional Directors, are actively contributing to represent WAVMA on a series of Congresses, Exhibitions and Meetings occurring this year. Briefly, President Dr. Bart Gorgoglione attended Aquaculture America this past February, while Dr. Nelly Isyagi attended Eastern Aquaculture Africa in Kenya, Dr. Win Surachetpong represented WAVMA at the WVA General Assembly in Taipei in April and Dr. Paola Barato attended the LACQUA WAS in Panama.

We have exciting news, WAVMA had an active participation in the recently announced Fish Practice Specialty that has been provisionally granted recognition by the American Veterinary Medical Association's (AVMA) American Board of Veterinary Specialties (ABVS); this was an effort of the ABVP - Fish Practice Organizing Committee which is made up of members from both the American Association of Fish Veterinarians (AAFV) and World Aquatic Veterinary Medical Association (WAVMA). This is a monumental achievement for the advancement of fish veterinary medicine!

WAVMA needs your contribution to keep going with our motto: One Profession, One Discipline, One Voice – Cohesive and Inclusive!

Claudia Venegas, MV, PhD, CertAqV
WAVMA Secretary
Puerto Varas, Chile
Secretary@wavma.org


ABVS HAS
GRANTED
PROVISIONAL RECOGNITION OF
FISH PRACTICE
AS A RECOGNIZED VETERINARY
SPECIALTY
WITHIN ABVP!
ABVP
AMERICAN BOARD OF VETERINARY PRACTITIONERS
JOIN THE FISH SPECIALTY
The credentialing applications are due by January 15, 2024 11:59 PM Central Time.
The ABVP - Fish Practice RVS will target veterinarians working in all sectors of fish medicine: pet/private practice, zoo and aquaria, commercial aquaculture, academia, research, natural resource and governmental agencies.
Credentials:
The ABVP online application to apply or re-apply.
https://app.prolydian.com/organizations/abvp
Specific questions can be directed to the ABVP - Fish Practice Regent, Dr. Johnny Shelley at john.shelley@noaa.gov.

New WAVMA Members - 1st and 2nd Quarters 2023

Members are the lifeblood of any organization!
Please welcome our new members:

Full Members

Allison Carter	United States
Brandon Wahler	United States
Bridget Walker	United States
Carlos Eduardo Smith Davila	Peru
Christine Trottier	United States
Deedee Moore	United States
Emanuele Lubian	Italy
Ginevra Brocca	Canada
Heindrich Snyman	Canada
Jessica Richardson	United States
Jorge Cuéllar-Anjel	Ecuador
Kitman Dyrting	Australia
Kristina Vuong	United States
Leslie Healis	United States
Luca Cappello	Italy
Luis Patricio Rivera Espinoza	Chile
Muriel Gomez Sanchez Orezzoli	Peru
Shawna Hawkins	United States
Tonya Clauss	United States
Adriana Mastrangelli	Brazil
Audrie Walkup	United States
Beni Halalludin	Indonesia
Dr Vishnu P Nair	India
Dwight Bowman	United States
Ezequiel Salas	Costa Rica
Faye Saunders	United Kingdom
Feroz A Shah	India
Ginevra Brocca	Canada
Jie Ma	United States
Kitman Dyrting	Australia
Mariana Figueiredo Fragoso	Portugal
Narendra Santika	Indonesia

New Graduate Full Members

Corrin Markey	United States
Madison Bober	Canada
Timothy Brunner	United States

Student Members

Abigail Hicks	Grenada
Adia Rumell	United States
Alyssa Palmer	United States
Alyssa Vogt	Grenada
Broderick Hadley-Flynn	United States
Céline Möckli	Germany
Charlotte Ashby	United Kingdom
Connor Bryant	Canada
Darby Gielewski	Canada
Emily Guy	United States
Emma Huggett	United Kingdom
Gemma McAfee	Grenada
Geshini Perera	Canada
Grace Hearth	United States
Grace Ritter	Saint Kitts and Nevis
Hannah Dadah	United States
Hayley Wuestenberg	United States
Isabelle Mays	Grenada
Jamie Slater	United States
Katie Rexius	United States

Student Members - continued

Kayla Mageau	Grenada
Kirsten Jaegersen	United States
Luis Davila	United States
Madelynn Sampson	United States
Man Pyo Lee	United States
Marlena Del Rio	United States
Mary Godfrey	United Kingdom
McKaylie Hernandez	United States
Pablo Morón-Elorza	Spain
Pamela Taylor	United States
Patrik Rollefson	United States
Sabrina Graham	United States
Samantha Doerr	United States
Shelley Lownds	Grenada
Sienna McDonald	United States
Spencer Ee Joon Tan	Australia
Stephanie Caviglia	United Kingdom
Victoria Koch	United Kingdom
WyLee Cooper	United States
Abhirup Ghosh	India
Antoine Sonia	France
Charlotte Ashby	United Kingdom
Chloé Thorbrogger	United States
Courtney Buser	United States
Daniel Mikulski	Cayman Islands
Darby Gielewski	Canada
Davida Johnson	United States
Derek Wong	Australia
Ember Lucier	United States
Emma-Jayne Murray	United Kingdom
Grace Hearth	United States
Isabelle Mays	Grenada
Jamie Slater	United States
Katie Rexius	United States
Leah Schumacher	United States
Madelyn Kuipers	United States
Madison Rawdon	United States
Mary Godfrey	United Kingdom
Pablo Morón-Elorza	Spain
Rachel Fost	United States
Samantha Amey-Gonzalez	United States
Sarah Carroll	United States
Savannah Dunn	United States
Stefanie Boothe	United States
Stephanie Caviglia	United Kingdom
Surina Birk	United States

Veterinary Technician/Nurse Members

Adina Valentine	United Kingdom
Mark Douglas	Canada
Misaye Yamaguchi	United States
Valerie Edwards	United States
Kathryn Buckner	United States
Lauren Valentine	United Kingdom
Lindy McMorran	United States
Shawn McMahon	United States
Sion Cahoon	Canada
Tara Klimek	United States

EXECUTIVE REPORTS

Executive Board Responsibilities

The WAVMA Executive Board consists of the President, Immediate-Past President, President-Elect, Secretary, Treasurer and Directors. The Executive Board will provide oversight and approve all fiscal and administrative activities of WAVMA and its committees, programs and services in accord with the Bylaws, and facilitates the development and implementation of WAVMA programs.

The President will: Schedule, draft agendas and preside over the Executive Board meetings; Monitor and facilitate implementation of all active WAVMA and Committee programs, services and other initiatives; serve on the Budget Committee; Provide an update of WAVMA activities for the association's quarterly publication; Work with the Meetings Committee to finalize and implement the WAVMA Annual General Meeting; Preside over the WAVMA Annual General Meeting.

The President-Elect will: Assume the President's responsibilities in the absence of the President; Serve as a member of the Budget Committee; Identify at least one new WAVMA program or initiative to implement during his/her 3-year tenure; Assist in facilitating and implementing active WAVMA programs and initiatives during his/her 3- year tenure;

The Immediate Past-President will: Assume the President's responsibilities in the absence of the President and President-Elect; Assist the President-Elect and other Board members in developing or implementing new or existing WAVMA initiatives and programs.

The Secretary will: Serve as the primary WAVMA point of contact for the public; Inform members of WAVMA programs & initiatives; Assist the developments and distribution of WAVMA official correspondence; Serve as Chair of the Communications Committee;

The Treasurer will: Maintain all WAVMA bank accounts and bookkeeping, receive all payments, and pay all approved expenses; Chair the Budget Committee and facilitate the development of an annual budget

Directors will: Represent individual WAVMA member's general interests in their geographical regions.



WebCEPD Program

Lectures given by leading experts, WAVMA's WebCEPD webinars are intended as educational programs on a variety of aquatic health issues and veterinary techniques, to hone the knowledge and skills of aquatic veterinarians and veterinary students.

To earn Continuing Education and Professional Development (CEPD) credit, you will need to complete a short Knowledge and Skills Assessment (KSA) to ensure you have met the learning objectives. On successful completion, you will receive a CEPD Certificate, which may be useful for licensure/registration to practice veterinary medicine and to earn credit towards becoming a WAVMA Certified Aquatic Veterinarian.

Recent Webinars include:



B-1070: Clinical Cases in Private Aquatic Animal Practice
Date: June 29, 2023
Presenter:
Jena Questen DVM, CertAqV

B-1069: From French Guiana to the French Quarter. The Evolution of Pathogenicity in *Mycobacterium ulcerans*
Date: June 16, 2023
Presenter: Dr Michael W. Sandel



Since 2013, WAVMA has produced nearly 100 Webinars that are available to watch on our website: https://www.wavma.org/WebCEPD.

You may be able to use these for continuing education credit for veterinary licensing, and you will also sure learn a lot!

COMMITTEE REPORTS

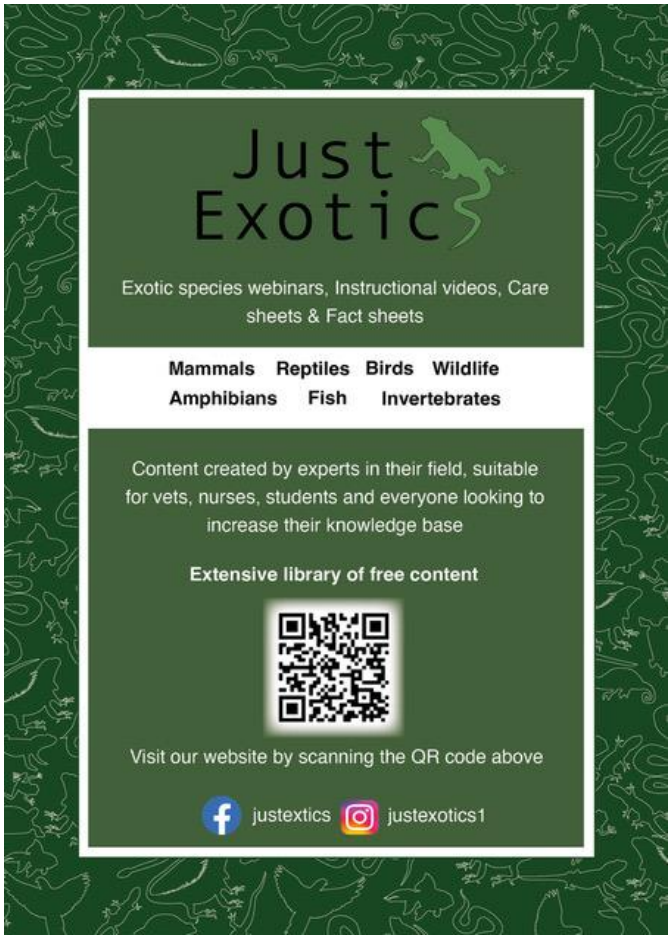
Join A WAVMA Committee

All of the great programs and features you get from WAVMA membership are provided by volunteers. We are always looking for more helpers, whether veterinarians, veterinary students or veterinary nurses, to join us on the committees. 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 10. Contact our Secretary or the committee chair for more information about the committee and the dates of the next meeting (also done via web conference). All are Welcome!

Join a WAVMA Committee today!

TO SUPPORT FUTURE STUDENT SCHOLARSHIPS,
PLEASE MAKE A DONATION TODAY
TO THE SCHOLARSHIP FUND!

WWW.WAVMA.ORG/SCHOLARSHIPS.



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 Secretary.

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: Wes Baumgartner, 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: Claudia Venegas, Secretary@wavma.org

Credentialing Committee

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

Chair: Matthijs Metselaar CertAqV-Admin@wavma.org

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, dvm246@aol.com

Membership Committee

This Committee oversees membership issues to optimally serve members and the organization.

Chair: Chris Walster, Administrators@WAVMA.org

Education & Student Committee

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

Chair: Bartolomeo Gorgoglione, BartGorg@msu.edu

COMMITTEE REPORTS

Fellows Advisory Council

A WAVMA Fellow is someone who has conferred on them the honorific: *WAVMA Distinguished Fellow*. The Fellows Advisory Council is composed of WAVMA Distinguished Fellows who are current WAVMA members and who wish to contribute to the development of WAVMA. The Chair of the Fellows Committee will be the Fellows Representative to the Executive Board.

The Fellows Nomination Subcommittee (FNS) is a subcommittee of FC and evaluates applications for the WAVMA Distinguished Fellow and forwards a recommendation for a WAVMA Distinguished Fellow to the EB. The 2022 Distinguished Fellow was announced at the Annual General Meeting in South Africa, the first week of December 2022.

Current Distinguished Fellows are:

Peter Merrill (2012)
Ronald Roberts (2012)
David Scarfe (2012)
Julius Tepper (2012)
Christopher Walster (2012)
Grace Karreman (2013)
Marian McLoughlin (2013)
Dusan Palic (2013)
Mohamed Faisal (2016)
Nicholas Saint-Erne (2017)
Richmond Loh (2018)
Laura Urdes (2019)
Devon Dublin (2020)
Gregory Lewbart (2021)
Matt Metselaar (2022)

Laura Urdes, PhD DVM CertAqV
Fellows Advisory Council Chair

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. Adjust the size on your screen so you can see both pages side by side.

Make sure that the first page is viewed by itself. 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.

Meeting Committee

Win Surachetpong (Asia Director) was the WAVMA representative at the General Assembly of the WVA congress (Taipei, Taiwan on 26th April 2023).

There is a sponsorship opportunity for Summer School of European Association of Zoo and Wildlife Veterinarians in August. The WAVMA EB pre-approved paying for flyer/insert in the event folder (€100 and one between Package A (€650) or B (€1800, including A + 1 h speaker slot). Simon Doherty (Europe Director), is to complete the negotiation with the event organizers, for free guest lecture, thus, to decide the type of sponsorship WAVMA will provide.

WAVMA may have a representative attend the 23rd EAFP International conference. This meeting, held 10-14 September 2023 in Aberdeen, Scotland, is a key international event in the aquatics field, normally attended by hundreds of scientists and associations from all over the world.

Julius M. Tepper, DVM, CertAqV
Meetings Committee Chair

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.

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

COMMITTEE REPORTS

Credentialing Committee

The WAVMA Aquatic Veterinarian Certification Program identifies the core competency or subject matter areas needed to practice aquatic veterinary medicine, and recognizes those veterinarians who have acquired the necessary knowledge, skills and experience (KSE) from a variety of sources, in the following 9 core subject matter areas:

- Aquatic Environment and Life Support Systems
- Taxonomy, Anatomy and Physiology
- Husbandry and Industries
- Pathobiology and Epidemiology of Aquatic Animal Diseases
- Diagnostics and Treatment of Aquatic Animal Diseases
- Clinical Veterinary Experience and Client Communications
- Public Health, Zoonosis and Seafood Safety
- Legislation, Regulations, and Policies
- Principles of Aquatic Animal Welfare

The Process

It is recommended that you initially speak with a mentor prior to applying, this is to ensure that you can complete the CertAqV process within the 12 months allowed. You can identify a mentor by going to the WAVMA Member Directory and click on the green CertAqV box at the bottom of the page. This will bring up a list of all potential mentors. Alternatively, you can email: administrators@wavma.org who will talk you through the process prior to you applying.

For CertAqV Program Description *Click here* to download, or go to WAVMA.org/CertAqV-Pgm.

Individuals who desire to participate in the WAVMA CertAqV Credentialing Program will first need to register and pay the US $250 administrative fee. When registering you will select a mentor to assist and guide you through the requirements. After you have registered, you will receive an e-mail on how to download a document to record where you have obtained sufficient KSEs (knowledge, skills and experience/education) in each of the 9 modules or subject areas. You have one year to complete these, once registered.

When your mentor is satisfied you have sufficient KSE credits, he/she will then request the WAVMA Credentialing Committee to evaluate these. Once the Committee and the WAVMA Executive Board have evaluated these and are satisfied you meet all requirements, you will be notified and mailed a certificate suitable for framing and display.

If you have questions about the Certification process, please send me an email.

Dr. Matthijs Metselaar DVM PhD CertAqV MRCVS
Credentialing Committee Chair
CertAqV-Admin@wavma.org

Certified Aquatic Veterinarians

Ali Anwar Ahmad	Singapore
Jessica Allen	USA
Sara Alves	USA
Chelsea Anderson	USA
June Ang	Singapore
Nimrod Arad	USA
Brenda Arras	USA
Farah Gonul Aydin	Turkey
Romualdo Balagapo	Phillipines
Sarah Balik	USA
Marcello Balzaratti	Italy
Jo Bannister	Australia
Madison Barnes	St. Kitts & Nevis
Michelle Barnett	USA
Christa Barrett	USA
Heather Barron	USA
Giana Bastos-Gomes	Hong Kong
Julia Bauer	Germany
Mariah Beck	USA
Trista Becker	USA
Jenice Bell	USA
Heather Bjornebo	USA
James Bogan	USA
Pierre-Marie Boitard	France
Serena Brenner	USA
Erika Brigante	St. Kitts & Nevis
Tessa Brown	USA
Faith Burgos	USA
Shraddha Cantara	United States
Christian Capobianco	United States
Todd Cecil	USA
Ri Chang	United States
Bryony Chetwynd-Glover	UK
Prakan Chiarahkhongman	Thailand
Dana Clark	USA
Annie Clift	USA
Dondrae Coble	USA
Michael Corcoran	USA
Emily Cornwell	USA
Galaxia Cortes-Hinojosa	Chile
David Craton	United States
Rebecca Crawford	St. Kitts & Nevis
Rubén López Crespo	Mexico
Charles Cummings	USA
Nadav Davidovich	Israel
Manuel De la Riva Fraga	Spain
Darren Docherty	UK
Simon Doherty	UK
Christina Dover	USA
Devon Dublin	Japan
Freeland Dunker	USA
Michael Dutton	USA
Jacqueline Elliott	USA
Ashley Emanuele	USA
Azureen Erdman	USA
Maribel Escobedo	Mexico
Antonella Fabrissin	Italy
Mohamed Faisal	USA
Erika First	USA
Lindsay Francis	USA
Ari Fustukjian	USA
Cherissa Garcia	United Arab Emirates
Erika Gibson	USA
Danielle Godard	USA
Christopher Good	USA
Bartolomeo Gorgoglione	USA
Krystan Grant	USA
John Griffioen	USA
Miguel Grilo	Portugal
Stephanie Grimmett	UK
Katharina Hagen-Frei	Switzerland
Alex Hall	USA
Katharine Haussman	USA

COMMITTEE REPORTS

Orachun Hayakijkosol	Australia
Eileen Henderson	USA
Jenny Herbert	United States
Chelsea Hester	USA
Nora Hickey	USA
Karlee Hirakis	Australia
Kelsey Hoag	USA
Emma Houck	USA
John Howe	USA
Aivee Huynh	Australia
Kerryn Illes	New Zealand
Adrien Izquierdo	USA
Leslie Jarrell	USA
Ericka Johnson	United States
Jimmy Johnson	USA
Kelsey Johnson	USA
Sharmie Johnson	USA
Kasper Jorgensen	Denmark
Brian Joseph	Canada
Hali Jungers	USA
Parinda Kamchum	Thailand
Kyle Kansman	USA
Fritz Karbe	Germany
Sherri Kasper	USA
Elizabeth Kaufman	Israel
Denyse Khor	Singapore
Amy Kizer	USA
Jessica Koppien-Fox	USA
Jack Kottwitz	USA
Laura Krogman	USA
Lana Krol	USA
Marie Kubiak	UK
Diya Lake	Mauritius
Lucinda (Wing Sze) Lam	Australia
Krista Ann Lee	USA
Veronica LePage	Canada
Elizabeth Leuchte Rising	USA
Sarah Lietzke	USA
Jan Linkenhoker	USA
Eric Littman	USA
Richard Lloyd	UK
Salina Locke	United States
Richmond Loh	Australia
Alfonso Lopez	Singapore
Ruben Arturo Lopez Crespo	Mexico
Jordi Lopez Ramon	Spain
Amber Lum	USA
Adolf Maas	USA
Raphael Malbrue	USA
Paul Manensis	Canada
David Marancik	Grenada
Victoria Maroun	USA
Laura Martinelli	USA
Robert Martinez	USA
Alexandra Mason	USA
Colin McDermott	USA
Alicia McLaughlin	USA
Celia Megdal	USA
Larissa Menke	USA
Matthijs Metselaar	UK
Sonja Miles	UK
Tim Miller-Morgan	USA
David Minich	United States
Haitham Mohammed	Egypt
Alissa Mones	USA
Danny Morick	Israel
Charlene Morotti	USA
Katrina Murray	United States
Kunda Ndashe	Zambia
Lucie Nedved	Australia
Ross Neethling	UK
Jenifer Nix	USA
Sally Nofs	USA
Ladislav Novotny	Czech

Massimo Orioles	Italy
Alec Ortiz Colosi	USA
Courtney Pace	United States
Dušan Palić	Germany
Brian Palmeiro	USA
Veronica Pardini	USA
Christine Parker-Graham	USA
Lily Parkinson	USA
Chris Payne	USA
Melanie Peel	USA
Ayanna Phillips	Trinidad & Tobago
Maximilian Polyak	United States
Ashley Powell	USA
Jena Questen	USA
Eva Quijano Cardé	USA
Janis Raines	USA
Atisara Rangsichol	Thailand
Zachary Ready	USA
Aimee Reed	USA
Stephen Reichley	USA
Nuno Ribeiro	Portugal
Julianne Richard	USA
Camille Richie	USA
Michelle Rivard	USA
Rifky Rizkiantino	Indonesia
Patinan Rookkachard	United Arab Emirates
Justin Rosenberg	United States
Komsin Sahatrakul	Singapore
Nick Saint-Erne	USA
Sonja Saksida	Canada
Jessie Sanders	USA
Sasha Saugh	South Africa
David Scarfe	USA
Neha Shah	India
Khalid Shahin	UK
Galit Sharon	Israel
John Shelley	USA
Chris Shirkey	USA
Constance Silbernagel	USA
Melissa Singletary	USA
Esteban Soto	USA
Brandon Spolander	South Africa
Elizabeth St. Germaine	USA
Brittany Stevens	USA
Chairat Sumgorthong	Thailand
Win Surachetpong	Thailand
Tanatporn Tantiveerakul	Thailand
Gillian Taylor	South Africa
Alissa Tepedino	USA
Julius Tepper	USA
Sharon Tiberio	USA
Miranda Torkelson	USA
Norrapat Towanabut	Thailand
Alexandra Troiano	USA
Laura Urdes	Romania
Julian Vaillard Cerdio	Mexico
Greta Van de Sompel	Belgium
Claudia Venegas	Chile
Jelena Vukcevic	Australia
Zachary Waddington	Canada
Sarah Wahltinez	USA
Chris Walster	UK
Scott Weber	USA
Marcus Webster	USA
Trista Welsh	USA
Michael Wenninger	USA
Peter Werkman*	Holland
Laura Whalen	USA
David Wilbur	USA
Sarah Wilson	USA
Howard Wong	Hong Kong
Sarah Wright	USA
Taylor Yaw	USA
Irene Yen	USA

Choosing a Mentor for the CertAqV or CertAqVNT

There are three possible ways of finding a mentor for your credentialing process, which are discussed below. In choosing a mentor it is recommended that you try and use someone you recognise/know, and is from the same country or region as you. This helps the mentor understand what KSE credits you may already have achieved, check that you are a registered vet, vet nurse or vet tech in your country (the mentor needs to confirm as well as you submitting evidence of registration), and assist in providing suitable opportunities to gain more KSE credits.

In the first instance please check the lists of CertAqV and CertAqVNT on the respective WAVMA website pages. These list all the CertAqV and CertAqVNT who currently comply with the certificate requirements (completed the certificate and are current WAVMA Members). Currently, all CertAqV can act as mentors for both CertAqV and CertAqVNT, whilst CertAqVNT can only act as mentors for CertAqVNT. If someone you know and believe to hold a certificate is not listed here, then the likeliest is that they are not up to date with their WAVMA membership. Check this first before contacting the Administrators. Unfortunately, WAVMA cannot list mentor contact details on these pages. To find them, if unknown to you, there are two possible ways:

Log in to your WAVMA membership. This will allow you to access the WAVMA Member directory listing contact details. You can search by name, or for CertAqV mentors, ticking the green CertAqV button at the bottom of the page will bring up all CertAqV in the directory. The Directory is "opt-in" so not all potential mentors are listed here (although it is recommended all mentors/members should be - there is a tick box towards the bottom of the "Contact Information" tab in your WAVMA profile).

Once you've paid for your certificate, a new tab will appear in your member profile "Certification Program." Clicking on the green "Add KSE credits and supporting documents" will open a new page. Here you can select your chosen mentor or pick a mentor. All available mentors are listed here, but if your chosen mentor is not, then ask them to make sure they have ticked the appropriate boxes in the Preferences tab of their WAVMA profile. These boxes only appear in the Preferences tab if you are a current CertAqV or CertAqVNT.

When you select a name here, an automated email will be sent to the prospective mentor asking them to confirm if they agree to act as a mentor. They can do this by going to their WAVMA profile where they will see a new tab "Mentoring". Here the mentor can accept or decline and if wished provide a reason why. You will receive an automated email showing if the mentor has accepted or declined. If the mentor accepts, then all documents you submit will be seen by them. The actual KSE Credit Record form will not appear to them, within the automated system, until you have reached the minimum required credits for all subject areas. It is recommended you download the example KSE Credit record form provided on the CertAqV and CertAqVNT pages. This will indicate what information you need to record as well as providing a potential template for your own record. The PDF format will convert to Word, if easier, for editing.

You can change mentor at any time, but you need a mentor to submit your documents to the Credentialing Committee for approval. Mentors are not obliged to accept a request to be a mentor. You are also encouraged to discuss the certificates with a potential mentor before applying. If you do not know a potential mentor, to discuss questions you may have regarding the certificate, then please feel free to contact the WAVMA Administrators.

Regards,

Chris Walster, BVMS MVPH CertAqV MRCVS
WAVMA Administrative Coordinator
Administrators@WAVMA.org



DIRECTOR'S REPORT

Upcoming Joint WAVMA/WAS Activities

Commercial aquaculture is expanding rapidly in Africa and now accounts for 20% of the continents fish supply. Producers are expanding and adopting more productive and intensive aquaculture production systems. This has stimulated the expansion of aquaculture value-chains and intra-regional trade in aquaculture goods and services. Africa's aquaculture sector has expanded before commensurate capacity for aquatic veterinary services, biosecurity and biosafety control for the sustainability of the sector could be adequately established.

Given its specific objectives, WAVMA entered a Memorandum of Understanding (MOU) with the African Chapter of the World Aquaculture Society in September, 2021 to advance aquatic veterinary medicine and aquatic animal health on the continent. The World Aquaculture Society (WAS) was founded in 1969 to bring together aquaculture value-chain stakeholders world-wide to share information and experiences. WAS, like WAVMA, is committed to excellence in science, technology, education, and information exchange for the sustainable development of aquaculture world-wide.

We can accomplish this by collaborating with like-minded global networks to disseminate information through events such as conferences, students' activities and publications. The objectives of the MOU between WAVMA and the WAS-African Chapter are to collaborate and partner in:

1. Organizing, running and contributing to technical sessions related to aquatic animal health and welfare, biosecurity control, public health and/or seafood safety, for World Aquaculture - African Chapter's continental and regional aquaculture conferences and/or events.
2. Organizing and running Aquatic Veterinary Continuing Education and Professional Development (CEPD) programs in collaboration with WAS – Africa.
3. Co-chairing the Aquatic Animal Health session, presenting and exhibiting the activities of WAVMA at the first Annual International Conference & Exposition of the African Chapter of the World Aquaculture Society (AFRAQ2021).
4. Chairing or co-chairing all sessions on aquatic animal health and welfare, biosecurity control. public health and/or seafood safety at subsequent Annual International Conferences & Expositions of the World Aquaculture Society – African Chapter.
5. Presenting and exhibiting the activities of WAVMA at all subsequent Annual International Conferences & Expositions of the World Aquaculture Society – African Chapter continental and regional aquaculture conferences and/or events of the WAS-AC.

Since the enforcements of the MOU, WAVMA has collaborated and co-organized aquatic animal health sessions at the following WAS-African Chapter events: Africa Aquaculture 2022, Alexandria Egypt and the First Eastern Africa Regional Aquaculture Conference 2021, Kampala Uganda. Likewise, the WAS—African Chapter supported WAVMA's recent Global Aquatic Health Conference that was held in Pretoria South Africa in December, 2022.

In line with this commitment, WAVMA members especially those working within Africa, are encouraged to promote, participate and/or support the organization of the Aquatic Health activities in planned WAS-African Chapter continental and regional events (e.g., join organizing committees of aquatic health events, attending the events, delivering presentations or identifying speakers including for farmers sessions, exhibiting your company's aquatic health products and assisting at the WAVMA booths, sponsoring sessions, supporting/mentoring veterinary students interested in aquatic veterinary medicine within the respective countries/regions, etc.).

The following are planned WAS-African Chapter Events where WAVMA will be involved:

1. The 6th edition of the Halieutis Fair, 1st to 5th February 2023, Agadir, Morocco. For more information: https://www.salonhalieutis.com/en
2. 2nd Eastern Africa Regional Aquaculture Conference and Exhibition, Bondo Kenya – 14th to 17th March, 2023. For more information: www.earac.org
3. 2nd West Africa Regional Aquaculture Conference and Exhibition, Abuja, Nigeria – 26th to 29th March, 2023. For more information: https://wasacwar.com/
4. Africa Aquaculture 2023, Lusaka, Zambia - 13th to 16th November, 2023 (combines the Southern Africa Aquaculture Regional Conference and the second continental Africa Aquaculture Conference).

For more information:
https://www.was.org/meeting/code/AFRAQ23

Nelly Isyagi
WAVMA Director for Africa



STUDENT COMMITTEE

WAVMA Student Chapters

To initiate a new Student Chapter, download the *WAVMA Student Chapter Guidelines*
A Spanish version of the Student Chapter Guidelines can be *downloaded from the WAVMA website.*

Examples of available Student Chapters programs:

- Assistance in organizing and promoting Chapter programs and activities.
- MiniGrants of up to $500 USD are available to assist official WAVMA Student Chapters with conducting activities intended to engage students in opportunities related to aquatic veterinary medicine. Download the Flyer here and the application form here.
- Access to recorded webinars and live web-based presentations from experts around the world.
- Low annual WAVMA Student Membership ($25)
- 50% Chapter member's dues may be available to support Chapter-organized activities. Get more information here and a Spanish version here.
- Reduced rate (50% off) WAVMA Full Membership the year after graduation.
- John L. Pitts Aquatic Veterinary Education Awards Program
- Access to the latest editions of WAVMA's quarterly journal, *The Aquatic Veterinarian*.
- Access to WAVMA member-only webpages.
- Aquatic veterinary externship and job listings.
- Participation in the WAVMA Certified Aquatic Veterinarian (CertAqV) Program.
- Access to WAVMA e-mail listservs, including Members-L, and Student-L.

A list of all current WAVMA Student Chapters is available on the website:
https://www.wavma.org/WAVMA-Student-Chapters

Consider joining the ***WAVMA Chapter Facebook Group*** to find out what's happening in other Chapters.

TO SUPPORT FUTURE STUDENT SCHOLARSHIPS, PLEASE MAKE A DONATION TODAY TO THE SCHOLARSHIP FUND! WWW.WAVMA.ORG/SCHOLARSHIPS.

WAVMA Student Chapters

University of Pretoria, Onderstepoort Faculty of Veterinary Science, South Africa (established 2017)

Murdoch University, School of Veterinary & Life Sciences, Australia (established 2014)

University of Sydney, School of Veterinary Science, Australia (established 2014)

Auburn University, College of Veterinary Medicine, USA (established 2013)

Colorado State University, College of Veterinary Medicine & Biomedical Sciences, USA (est. 2019)

Cornell University, College of Veterinary Medicine, USA (established 2019)

Michigan State University, College of veterinary Medicine, USA (established 2021)

Mississippi State University, College of Veterinary Medicine, USA (established 2014)

The Ohio State University, College of Veterinary Medicine, USA (established 2018)

Oregon State University, College of Veterinary Medicine, USA (established 2017)

Ross University, School of Veterinary Medicine, St. Kitts & Nevis, West Indies (established 2015)

St. George's University, School of Veterinary Medicine, Granada, West Indies (established 2018)

Tuskegee University, School of Veterinary Medicine, USA (established 2012)

University of California, Davis School of Veterinary Medicine, (Established 2020)

University of Georgia, College of Veterinary Medicine, USA (established 2015)

University of Illinois, College of Veterinary Medicine, USA (established 2018)

University of Pennsylvania, School of Veterinary Medicine, USA (established 2020)

Western University of Health Sciences, College of Veterinary Medicine, USA (established 2014)

University of Edinburgh, Royal (Dick) School of Veterinary Studies, Scotland UK (established 2020)

University of London, Royal Veterinary College, England UK (established 2021)

Ankara University, Faculty of Veterinary Medicine, Turkey (established 2022)

Makerere University College of Veterinary Medicine Animal Resources and Biosecurity (established 2022)

St. Matthew's University School of Veterinary Medicine West Bay, Cayman Islands (established 2022)

St. Matthews WAVMA Chapter Report

By Emeshe Xavier
WAVMA Student Chapter President
exavier@stmatthews.edu

The St. Matthews WAVMA student chapter had the amazing opportunity to join Cayman Kayaks on their electric boat tour to learn about and experience the bioluminescence on Grand Cayman. The dinoflagellates that inhabit Bio bay become trapped by the Northeast wind in the canal. There are about 1,000 single-celled organisms in two teaspoons of water.

During our evening trip, we were able to interact with the dinoflagellates by sitting with our legs dangling through the pool openings as well as swimming in the canal. The trip felt very surreal with all the glittering organisms surrounding us in the water.





The life cycle of the dinoflagellates is between 8-10 days but they begin to glow as soon as they spawn out of the mud from the bottom of the bay. At the end of the trip on our boat ride back we also were lucky enough to see a spotted eagle ray swim glowingly through the bay, as well as learn about and see a Cassiopeia jellyfish up close on the boat.





2023 John L. Pitts Aquatic Veterinary Education Awards Program

For Veterinary Students & Recent Graduates

This Program was established in 2010 to honor the contributions of **John Leland Pitts, DVM** (1941-2009) in advancing the discipline of aquatic veterinary medicine and his dedication to helping veterinary students and recent veterinary graduates navigate their way into highly rewarding careers in aquatic medicine.

The John L. Pitts Aquatic Veterinary Education Awards Program is pleased to offer financial support to veterinary students or recent graduates of recognized veterinary schools. The purpose of the awards are to provide an opportunity for recipients to explore a career in aquatic veterinary medicine. These activities or projects **must be completed between October 1, 2022, and February 1, 2024**. Current veterinary students and veterinarians who have graduated in the past 24 months are eligible for awards.

Applicants who are interested in aquatic medicine but have previously had limited ability or opportunity to get involved are **encouraged to apply.**

Awards (typically $250-$1,000) may be used towards offsetting personal costs for:

- Travel, accommodation, and/or registration at aquatic veterinary conferences, symposia and other continuing education and professional development (CEPD) meetings; including on-line CEPD
- Travel, accommodation, and other activities directly associated with externships or clinical experiences that expose individuals to aquatic veterinary medicine
- Equipment and supplies needed for aquatic veterinary research projects not funded by other sources



Individuals who receive an award must provide a written report after completing their activity for publication in ***The Aquatic Veterinarian*** and are encouraged to give a presentation about their experience to other veterinary students.

Applications

Applications will be accepted from veterinary students currently enrolled or recent graduates (within the past 24 months of the application deadline) of any veterinary school or college worldwide that awards a degree allowing the person to practice veterinary medicine. Incomplete applications and applications from previous recipients will not be considered. **Applications must be completed in English.**

Applications will open **January 09, 2023** and the application form and additional information will be available at http://www.wavma.org/scholarships



Applications for the 2023 Program will close on March 01, 2023

Recipients will be notified around May 1st, 2023

Questions? Please contact PittsEduAwards-Admin@wavma.org

December 2022

STUDENT REPORTS

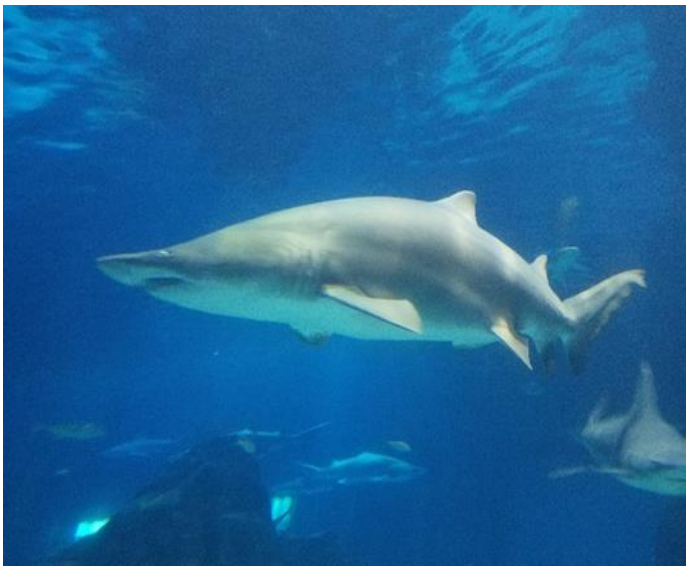
John L. Pitts Aquatic Education Award Report
By Greta Doden, DVM

My education in aquatic animal medicine was limited in veterinary school, so I welcome any opportunity to augment my knowledge. As a small animal rotating intern at a private referral hospital, domestic dogs and cats made up the vast majority of my caseload. However, I supplemented my clinical training with externships at the Milwaukee County Zoo, assisting in the treatment of various zoological species. The highlights of my aquatic animal experiences were learning skin scrape and gill clip biopsy techniques, and treating keratitis in a harbor seal. Since then, I have had a single aquatic patient as a zoological medicine specialty intern at Oklahoma State University – a goldfish with multifocal skin nodules and ocular abnormalities. I have also supplemented these clinical experiences with a research project during my internship at Oklahoma State University investigating vitamin and mineral concentrations in Elasmobranchii.

Background and Study Design

Elasmobranch species (sharks, rays, skates, and sawfish) have been documented to bioaccumulate minerals, which can affect individual, human, and ecosystem health. However, the medical literature regarding these species is limited. This study aimed to determine whether blood vitamin and mineral concentrations correlate with liver concentrations in captive Elasmobranchii. Venipuncture is a minimally-invasive sampling method that provides a wealth of information for veterinarians and researchers. Utilizing blood samples over liver biopsies to measure vitamin and liver levels would aid in the management of captive and free-ranging species, reducing potential anesthetic morbidity and mortality that may occur with collection of liver biopsies.





Perimortem blood samples and postmortem liver biopsies were collected from ill (and subsequently euthanized) or deceased animals. Twenty-seven animals of nine species were sampled, including cownose rays, Southern stingrays, fiddler ray, Atlantic stingray, epaulette shark, whitespotted bamboo shark, sandbar shark, silky shark, and bowmouth guitarfish. The analytes measured were vitamins A and E, arsenic, cadmium, cobalt, copper, iodine, iron, lead, manganese, mercury, molybdenum, selenium, thallium, and zinc. Statistical analysis showed a significant correlation between blood and liver samples of only two analytes, cobalt and molybdenum. Therefore, blood values do not appear to be an adequate predictor of liver concentrations for the remaining vitamins and minerals and, as in many species, liver biopsies may be necessary for diagnosis of toxicity or deficiency syndromes.

We plan to publish these results as a contribution to the medical literature regarding these amazing species. However, more research is needed, including references ranges for different Elasmobranch species, comparison of captive to free-ranging animals, and comparison of a feed analysis to blood or liver concentrations in these species.

I am grateful to have received the John L. Pitts Aquatic Education Award as it has allowed me to expand my knowledge and network in aquatic animal medicine. Although vitamin and mineral status is a tiny part of aquatic medicine as a whole, my understanding of anatomy and physiology in these species grew exponentially through participation in this project. As an aspiring zoo veterinarian, I hope to continue to influence aquatic medicine on the individual level with patients in my care, as well as on a broader scale through continued research with these incredible species.

STUDENT REPORTS

John L. Pitts Aquatic Education Award Report
By Brian Anton

Hello! My name is Brian Anton and I am a graduating 4th year dual degree DVM/MS student from the University of Wisconsin. I have always held a keen interest in aquatic species and as part of my fourth year education I participated in externships to gain knowledge and practical skills in this area. I was awarded the John L. Pitts education award in support of my participation in veterinary externships at the New England Aquarium and the Marine Biological Laboratory at Woods Hole.

I first traveled to the New England Aquarium where I was able to participate in the healthcare and management of a plethora of aquatic species ranging from African penguins to brine shrimp. Here I became familiar with modern diagnostics, anesthesia, surgical techniques, and medicine of many species. I was particularly fascinated by sonography of batoids, blood collection from harbor seals, and sedation of lungfish.

Outside of the veterinary department, keepers enthusiastically taught me about husbandry and enrichment. Staff chemists and engineers explained water quality control and systems management. I also visited NEAq's wildlife rehabilitation facility in Quincy, well known for the annual rehabilitation of hundreds of cold stunned marine turtles. Here I learned about triage protocols, animal quarantine procedures, and sustainable breeding practices of marine species.

Over the course of my externship I was able to participate in research as well. With the help of the staff veterinarians, I took part in a retrospective study investigating mycobacteriosis in Kemp's ridley turtles! My time at NEAq was invaluable in improving my technical skills and expanding my knowledge of aquatic species medicine. I thank the wonderful animal healthcare team for sharing their knowledge and passion.

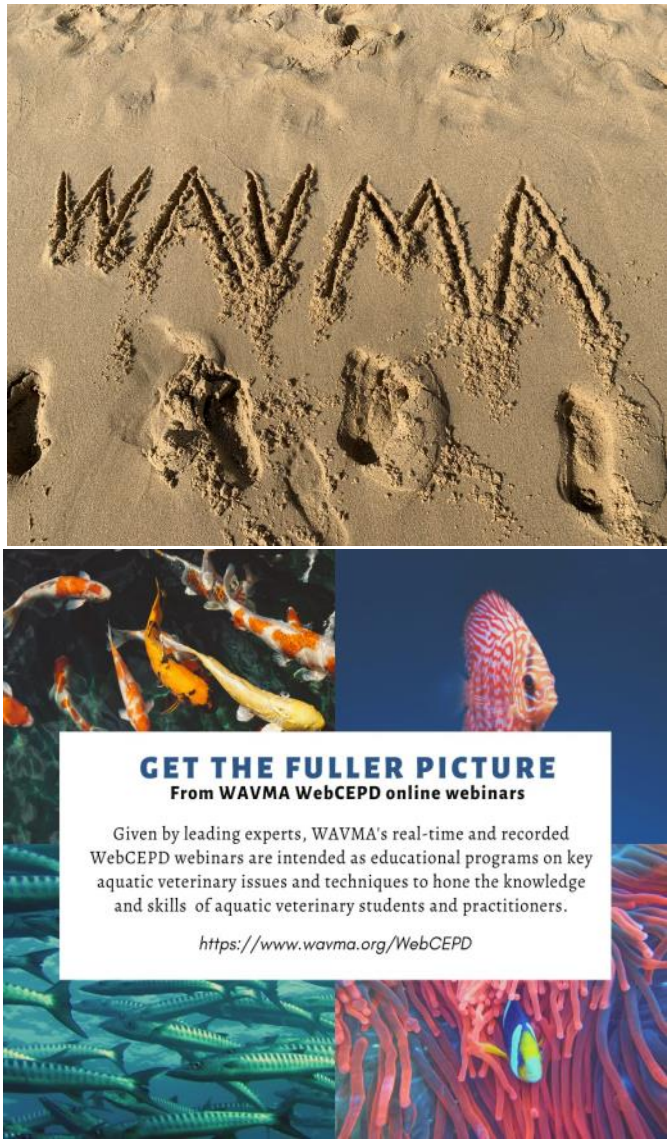
Next, I headed south to the Marine Biological Laboratory at Woods Hole, Massachusetts, where I was exposed to the care and use of aquatic species in veterinary research. Here I was able to delve into the nitty gritty - the embryology of skates and squid, sex determination and transgenics in *Xenopus*, and wasting disease of sea stars quickly occupied my mind.

At MBL, I continued to hone my clinical skills as well. I enjoyed performing sedated blood draws on catsharks, octopus, and cuttlefish. I was also able to participate in specimen collection where I learned about the life history and husbandry of many species. I was thrilled to meet many excellent researchers who were always enthusiastic to share their knowledge and projects with me. MBL is home to a diverse collection of scientists and has a long and fascinating history in the study of aquatic species. I thank the veterinary and animal care team for teaching me so much and for all the laughs. I especially would like to thank Nolan for always letting me wear his boots.

Moving forward I intend to continue to pursue aquatic animal medicine and research. There is so much more to explore in this area of veterinary medicine and I hope that through my career I can contribute to the advancement of our collective knowledge and aquatic species conservation.

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.



Biomonitoring of the Environment Using Sea Turtles

WAVMA Student Member, Maribel Escobedo has been involved for several years in developing biomonitoring programs using sea turtles as bioindicators, and experimental research using zebrafish, to understand toxicology implications for public health.

The website documenting the progress of this research, QR Biomonitoring, through a timeline and publications, also offers a 2-4 week externship for 4th-year veterinary students, graduate students, or graduated professionals in sea turtle conservation medicine and research. There is also information on other linked projects on the website.

The most recent paper, on which Maribel was the lead author, "Trophic behavior of inorganic elements in nesting sea turtles (*Chelonia mydas*, *Eretmochelys imbricata*, and *Caretta caretta*) in Quintana Roo: Biomagnification and biodilution effect in blood and scute tissues" is open access and can be downloaded at Science Direct. A previous paper "Incidence of 49 elements in the blood and scute tissues of nesting hawksbill turtles (*Eretmochelys imbricata*) in Holbox Island" is available from Science Direct (requires institutional access). However, current WAVMA members can obtain the full paper from WAVMA's Newsletter-Resources page. You will need to be logged in to your WAVMA membership to access this page, which will provide you with a free link to the full paper.

Both papers are well worth looking at, as is the website, and provide an interesting insight in to how human activities are affecting marine life and how we can monitor that impact. Below is the abstract of the earlier paper.

Abstract:

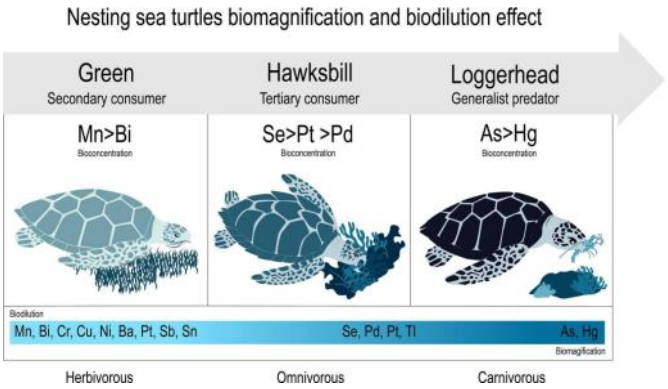
Due to progressive urban development along the Mexican Caribbean coastline, it is crucial to gauge the impact of anthropogenic contamination of marine ecosystems through biomonitoring procedures. In the current study, we quantified the concentration of 49 inorganic elements in the blood and scute tissues of clinically healthy nesting hawksbill sea turtles (*Eretmochelys imbricata*). The elements were classified into four groups: Group A: essential mineral elements with toxic potential; Group B: non-essential elements with high toxicity; Group C: toxic non-essential minority elements and Trace Elements (TE); and Group D: rare-earth elements (REE) and other TE.

Almost all the samples in both tissues showed perceptible levels of all the quantified elements. The only element identified with a correlation between blood and scute was arsenic (As), which could indicate a fast excretion through this type of keratinized tissue. The bio-accumulation of inorganic elements is a complex process, requiring the simultaneous examination of different tissues to evaluate the exposure. Our study reinforces the usefulness of scute tissue as a non-invasive sampling technique for the evaluation of persistent pollutants in marine turtles.



Scute sampling from nesting green turtle (*Chelonia mydas*) during the annual biomonitoring in Quintana Roo State, Mexico. Photograph by Alex Ze'evi.

Figure below from:
Trophic behavior of inorganic elements in nesting sea turtles (Chelonia mydas, Eretmochelys imbricata, and Caretta caretta) in Quintana Roo: Biomagnification and biodilution effect in blood and scute tissues.
By Maribel Escobedo Mondragon, Octavio Perez Luzardo, Luis Alberto Henríquez-Hernandez, Angel Rodríguez-Hernandez, Manuel Zumbado, J. Rene Rosiles Martínez, Fernando Gonzalez Farias, Gerardo Suzan, Carlos Gonzalez-Rebeles Islas.



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Get Hooked on Fish Medicine
By Christopher Lopresto, VMD, CertAqV

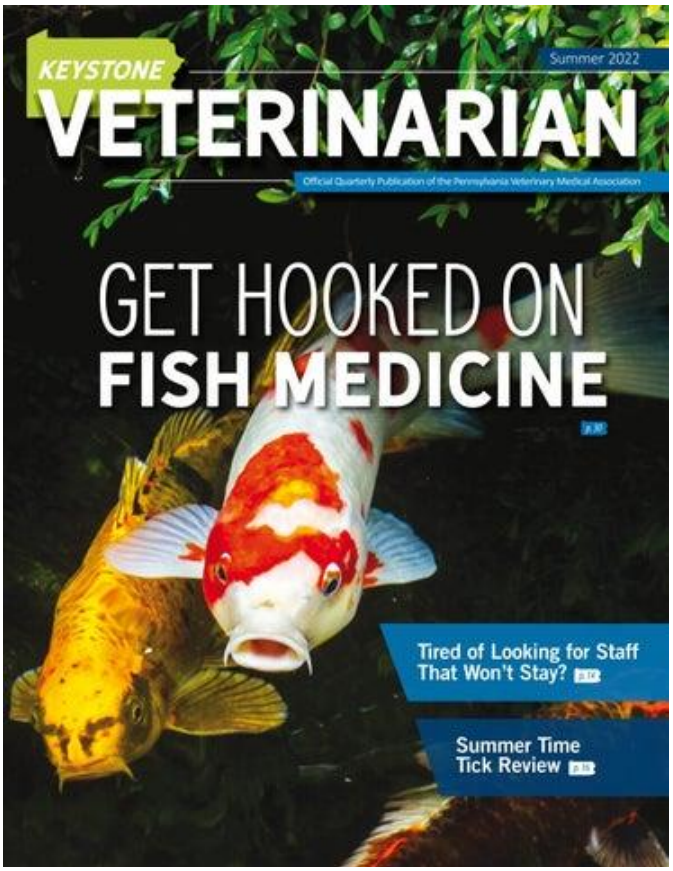
Aquatic animal medical practice is a unique endeavor with its own challenges and curiosities. For anyone interested in adding fish to their patient list, here's what you need to know.

Fish—why? Because some of us came up working in a pet store that sold fish and we "caught the bug." Maybe some of us like being unique and doing unique things that set us apart, making us feel, I don't know, unique. Or maybe some of us value life in all its forms, regardless of classification or category, and see an unmet need to care for creatures that too often suffer at the hands of human ignorance, vanity, and neglect. Sorry, too heavy?

Aquatic animal medical practice carries both small animal and large animal dynamics. Some fish come with names—often very unique, like Mac-n-Cheese, Jackie, or Badump—and are regarded as family members, connected by strong human-animal bonds. Some are prized, highly-valued individuals that folks have invested large sums of money in. It's routine for certain saltwater fish to sell for hundreds of dollars or more, and when it comes to koi, make that $1,000 or even $10,000 per fish, or more. Some other fish are simply a prize from the fair that didn't die, or one of the 30 fish that were in the pond when the people bought the house two years ago. So, as the veterinarian, you may be asked to do the best you can on a narrow budget for their daughter's betta; to figure out why a $20,000 koi died, and you better keep the other three that are left from also dying; or to perform "herd health" necropsies and diagnostics for a trout nursery. And all sorts of things in between.

A typical "general practice" fish case starts not when the problem starts, but when—or if—the fish keeper decides to call about it. This is likely a familiar theme for most veterinarians, albeit a bit more extreme when it comes to aquatic ectotherms; it's not uncommon for fish to be experiencing symptomatic disease for weeks to months—even years— before veterinary care is sought. And, no surprise, veterinary care is not commonly sought for most fish (I see many of you nodding your heads in agreement). The do-it-yourself atmosphere for fish healthcare is strong, including over-the-counter (OTC) access to antimicrobials that are prescription only in most other settings, such as oxytetracycline, minocycline, metronidazole, and praziquantel. And for folks who are serious about it, clove oil can be used as an at-home sedative to perform basic procedures like wound debridement, or also maybe some not-so-basic procedures.

There aren't all that many ways to be a sick fish. The symptoms tend to be nonspecific. Some of the most ubiquitous clinical signs are anorexia, lethargy, body swelling and distension, eroded or ragged fins, and respiratory rate changes (1). Adding to the confusion, some of these general symptoms are referred to by their own colloquial fish-trade terms, giving the impression that they are diseases unto themselves. Dropsy, for example, is the common term for coelomic distension, more specifically ascites, but dropsy is not its own disease; there are many [insert a number that's impressive but not absurd] potential underlying causes for coelomic distension and ascites in fish. Similarly, fin rot (referring to eroded, irregular, or traumatized fins) is often stated as a stand-alone condition, and there are even OTC medications that are specifically marketed to treat fin rot.



But, again, there is a bevy, a cornucopia, a bonanza of differentials for fin erosions and damage. It's a distinction we're all used to making—defining what is happening versus determining why it is happening. Some less vague clinical signs include skin ulcers (usually bacteria are involved) or stuff growing on the fish, which at least allows you to narrow down your list to stuff that grows on fish, like external microbial infections, parasite infestations, and epidermal tumors. Perhaps the most frustrating symptom, though, is the dreaded buoyancy disorder. You know, a fish stuck floating at the top or sunk to the bottom, constantly tilting to the side or upside-down—buoyancy disorder. Sure, it can focus you in on the swim bladder (2) as the affected structure, but rarely is it as simple as just a swim bladder problem. Even more specific clinical signs tend to be secondary to some other underlying primary cause.

The clinical evaluation of your fish patient doesn't necessarily start with the fish, but rather the water. Water quality is the single most important bit of husbandry when it comes to aquatic animal wellness and disease, so water quality testing (3) is where the evaluation starts. As for the patient, the same principles of physical examination that apply to familiar terrestrial vertebrates, such as dogs, also apply to fish.

Except, you know, there's that whole "underwater" thing. This means a large portion of the exam is visual, though some amount of palpation and handling can be done with more docile species like goldfish. Even so, a thorough examination—or any exam at all with pointy, bitey, or poisonous critters—requires sedation. Tricaine methanesulfonate (MS-222) is the drug of choice. It's a powder that you add to the water (along with baking soda as a buffer), but you'll also come across protocols for using propofol and alfaxalone as waterborne sedatives.

The basic, and essential, diagnostics for a typical fish case include skin scrapings and gill sampling. A microscope cover slip is used to scrape along the skin at a few areas, primarily to assess the mucous coat and screen for parasites. Gill sampling can also be done via scraping over the gill filaments but a biopsy is preferred. Take a small, sharp set of iris scissors, lift the operculum to expose the gill filaments, and (to paraphrase Mel Brooks) snip the tips! Those snipped tips are then looked at microscopically to assess architecture and screen for pathogens.

Seemingly, every other diagnostic in the context of day-to-day fish practice could be considered "advanced." Whether due to cost, availability, or feasibility, cases often proceed without the benefit of blood work, radiographs, or ultrasound. Bacterial culture and susceptibility testing from ulcers or wounds can be useful, but one must be particular with sample collection as aquarium water is not sterile; are you culturing the lesion or just environmental contamination? Computed tomography (CT) and magnetic resonance imaging might be ideal imaging modalities for fish, but you guessed it, not many clients elect to pursue these costly tests. And that's if there's even a place that will do it and someone available to read it—how much training do you think radiologists get on interpreting CT images from green terror cichlids?

One diagnostic that many aquatic practitioners must turn to is necropsy. Because antemortem diagnosis can be elusive and because it's often a group of fish that is affected by infectious disease or improper husbandry, figuring out what happened to the deceased can aid in diagnosis and treatment of the living, not an unfamiliar principle. Also, in some instances, mortality may be the first sign that there's a problem. Fish autolyze very quickly, though, so timing is paramount— and refrigerate, don't freeze.

When it comes to treatment, antiparasitics/antimicrobials and sedatives/analgesics are the most commonly used categories. The options for medicating a fish come in three: waterborne, oral, or injectable. Everyone feels comfortable tossing some stuff into the water, but prolonged immersions or bath treatments (as they're called) are often the most variable and least aggressive. That said, there are multiple pharmacokinetic studies supporting the use of, say, enrofloxacin as a waterborne medication in multiple species.

Oral medications can be administered directly—no, it's not ridiculous; folks can pill their koi and give a liquid to their goldfish with zero risk of aspiration, may I remind you. However, most oral medicating is done through medicated food, either by using a gelatin-based diet or by "top dressing" the existing diet.

Injections are, by far, the most direct, consistent, and aggressive means of administration, similar to other cold-blooded species. Referencing enrofloxacin again, injections can be administered every third day, which makes this approach kind of practical, albeit outside the comfort zone of every rational human being—no normal person has spent time considering: "What if I have to give needles to a fish?"

Being ectotherms, fish are slower to get sick and slower to get better. Some cases require weeks to months of recovery; however, many fish bounce back surprisingly quickly with appropriate treatment and husbandry corrections. And rarely are the efforts taken for granted. Most people are so appreciative and relieved that there's someone out there to provide care for their fish, that details and expectations over outcomes tend to slip into the background. People care about their fish and need help; what matters is that you're there to help. It may not be conventional, overly practical, or financially impressive, but practicing fish medicine is a decision anyone can feel good about—you just have to decide.

Author's Notes:

(1) Fish respire and, therefore, have a respiratory rate. It can be counted by watching the opercular movement—the operculum is the flap that covers the gills.

(2) Bony fish (not sharks and rays) have some version of a swim bladder, which is a blimp-looking hollow sack-like organ at the dorsal aspect of the coelom, and it inflates or deflates to adjust the fish's position in the water column (i.e., buoyancy).

(3) The most basic water quality testing should include pH, ammonia, nitrite, and nitrate. Temperature should be monitored continuously with a suitable thermometer.

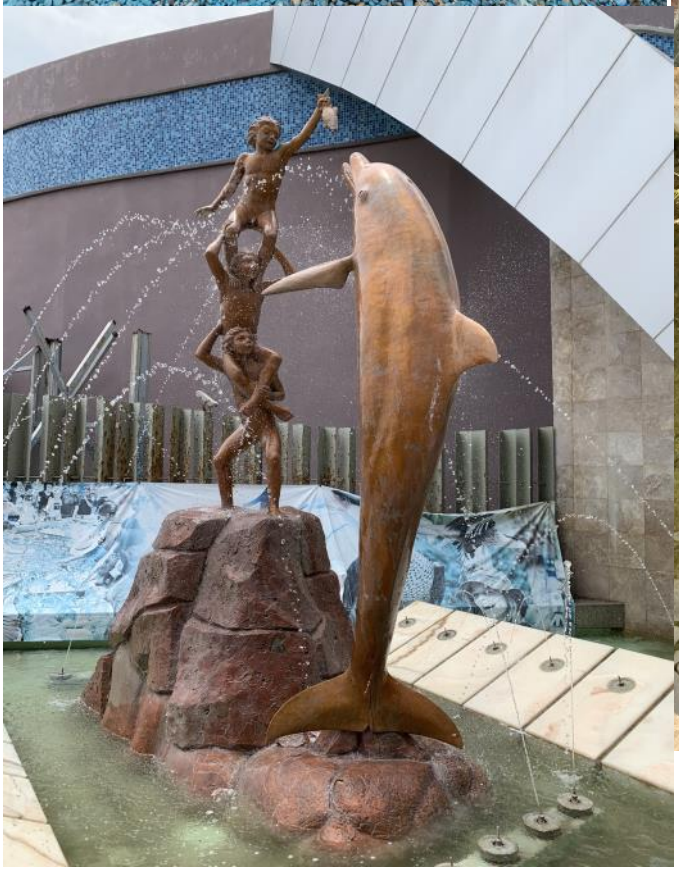
Christopher Lopresto, VMD, CertAqV, graduated in 2008 and completed a rotating small animal internship the following year. He worked in small animal general practice until 2020, maintaining a strong interest in exotics and wildlife, especially fish. He currently works as a certified aquatic veterinarian while completing a residency in veterinary dermatology.

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Photographs of the Acuario Mazatlán and Sea Museum on this page and the next are by Nick Saint-Erne.


Tortuga Golfina
Tortuga Caguama


Playa
Brujas
Dorada
Mar
Playa




EXCLUIDOR DE TORTUGAS
BARCO CAMARONERO







AQUARIUM REPORT

Acuario Mazatlán

The Mazatlán Aquarium is located 100 meters from the Avenida del Mar, on the Avenida de los Deportes. It was created at the initiative of the Government of the State of Sinaloa, whose governor in 1978, Mr. Alfonso G. fu Calderón, as part of the project "Forest City," planned a planetarium, an aquarium and a botanical garden, with the main objective of recreation for the population and the tourists. Construction began laying the foundation stone in November 1978, and the aquarium finally opened on September 13, 1980. The aquarium has an approximate area of one hectare, and exposes the public to a variety of marine and freshwater species on exhibition, in addition to the Sea Museum, the Auditorium and Botanical Garden.

The Mazatlán Aquarium has 34 saltwater fish tanks of different volumes in which marine species like seahorses, clownfish, surgeonfish, sea turtles and octopuses are exhibited. In the 17 freshwater tanks, visitors take a peek into the world of carnivorous piranhas, air breathing lungfish, and mudskippers- an amphibious fish that uses its fins to walk!



Educational Department

Starting in 1987, the sixth grade children of the northwestern region of Mexico have been invited to apply and consequently attend our ¨Conservation Camps" which cover the Sea Turtles and Birds of Sinaloa and the Gulf of California. The camps have the objective to asses and solve the environmental problems of the communities, so that through these values the communities may improve their environmental knowledge. We make sure to study the needs of the communities and instill in each child the imperative need to protect and conserve our flora and fauna.

The camps focus on providing activities, both cultural and recreational, that tie in the educational aspect. Different investigators and professors support and help plan our didactic approach. The Educational Department designs and implements each of its programs following the requirements of the Secretary of Education with an emphasis in sciences.

Sea Horse Repopulation

Mazatlán Aquarium has been an institution occupied by the protection of the marine environment and its inhabitants. It became an important pillar in the creation of conservation projects. More than two decades ago, a project started that focused on the protection of Seahorses, thanks to the concern of Mr. Víctor Flores, eminent diver of the institution, who observed in his expeditions the vulnerability of the species and the evidence of its declining habitat, as well as the decrease of its population.

Currently the Seahorse (*Hippocampus ingens*) Reproduction Program at the facilities of Acuario Mazatlán is in the charge of Mr. Víctor Flores, and Biologist Dayana Ruiz Velasco, who is responsible for the Live Food Laboratory. In the facilities of the Mazatlán Aquarium, the sea horse reproduction has a higher survival rate due to maintaining the optimum conditions with water quality, food and temperature, creating the appropriate conditions for reproduction and maintenance of the organisms, until they are grown to an optimum size for release (5 to 7 cm).

Sea Turtle Conservation Program

For over 23 years, the Mazatlán Aquarium has protected 6,289 nests and liberated over 384,000 hatchlings. The most common species in the beaches of Mazatlán is the Olive Ridley turtle (*Lepidochelys olivacea*) and it nests from June to November. Liberations of babies take place from August to December with schools, locals and tourists observing the release to help educate them about the sea turtles. Mazatlán Aquarium has increased the number of nests that have been protected and hopes that with our protection and education efforts this endangered species recovers.

Brown Pelican Protection Program

This program originated in 1992 and the aquarium annually attends to the care and rehabilitation of about 72 brown pelicans (*Paleacanus occidentals californianus*). They are usually hurt due to fish hooks, fractures and dehydration. Pelicans that recuperate are integrated back to the wildlife. It is estimated that about 40,000 reproductive pairs currently exist and 60% of those are in the Gulf of California. It is a marine bird that became endangered in 1970, but was removed from the endangered species list in 2009 due to recovered and expanded populations. While it is not now endangered, it still requires our protection.

Crocodile Lagoon

The Mazatlán Aquarium has six American crocodiles (*Crocodylus acutus*) on its grounds. Watch them either bask in the sun or show off their mighty jaws and teeth.





Frog Area

The Mazatlán Aquarium is the only Aquarium in Latin America with a dedicated frog area. Amphibians are a key facet of our environment since they are ecological indicators. They were the first vertebrates to adapt to semi-terrestrial life. Amphibians go through a compelling transformation during their development and at the aquarium you will be able to see the different stages. There are about 6,500 amphibian species and Mexico is the country with the fifth largest variety of amphibians in the world. A number of these amphibians can be found in the Mazatlán region, like salamanders and toads. In the 21 acuaterrariums you can see frogs and toads like the vibrant green tree frog and the powerful Mazatlán toad.

Sea Museum

The Aquarium would not be complete without a museum dedicated to our remarkable oceans. Here visitors can see skeletons of marine mammals, coral exhibitions, fishing methods, and learn about our conservation and protection programs. Rotating exhibitions of art and educational themes can periodically be seen here as well.

Sea Lion Show

Without a doubt, the star show of the Mazatlán Aquarium is that of Sea Lions (*Zaluphus californianus*). In this presentation of approximately thirty minutes you will know everything about this noble species and you will want to return, since with the help of their trainers the specimens manage to make the audience laugh and smile, with profuse applause. This exhibition began in December 1990 and currently this area has nine specimens of which six are females.

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Information from the website:
http://acuariomazatlan.com/









The above photos were taken by Nick Saint-Erne at the Acario Mazatlán.

CASE REPORT

Investigation of extreme buoyancy disorder in public aquarium held freshwater moray eels (*Gymnothorax polyuranodon*)

By Ben Rosenbloom, DVM, and Richmond Loh, Dip-ProjMgt, BSc, BVMS, MPhil (Pathology), MANZCVS (Aquatics & Pathobiology), CertAqV, WAVMA Fellow

Three large, presumably female, wild-caught freshwater moray eels (*Gymnothorax polyuranodon)* were housed in a public aquarium for upwards of five to six years. All three have developed what appears to be the same buoyancy disorder, with varying onset and slow progression, over the course of at least three to four years in captivity. The disorder is characterized by a slowly expanding, hyperbuoyant outpouching of skin on the right side of the eel, beginning several centimeters caudal to the opercular opening. All three specimens developed the disorder in the exact anatomical location (Figure 1).

Previously, the first specimen was sacrificed for necropsy. It was noticed to have lost its teeth, but there were no conclusive results. A second moray's disorder had progressed to the point where it was beginning to refuse food, was no longer fit for display, and was kept on its own in a hospital tank for a period.

Ultrasound was performed, strongly implying the outpouching structure was filled with gas, and yielding no other significant findings. The eel was sacrificed for post-mortem examination and histology. It was confirmed that the inflated structure was indeed filled with gas and a small amount of milky fluid (possibly surfactant or an exudate) and appeared to be a severely distended swim bladder. Being a physostomous gas bladder species, the blind-ended swim bladder's pneumatic duct was traceable back to the esophagus and was lightly vascularized. Histopathology confirmed the organ's identity.

This eel was markedly gravid, with roughly 540 grams of eggs filling much of the coelomic cavity of this 1800 g specimen (Fig 2). Accumulated egg mass could contribute to hypobuoyancy, and she may have gulped air to compensate. There were no other significant findings (including possessing intact teeth). Notably, *G. polyuranodon* does not possess the needle-like teeth typical of its saltwater relatives, instead having small, peg-like teeth on both the oral and pharyngeal jaw.

The gills, ovary, liver, kidney, stomach and intestines were examined by histology. It had mild to moderate multifocal acute renal tubular necrosis (Fig 3), suggestive of exposure to nephrotoxins, but the clinical significance of this concerning its hyperbuoyancy disorder is uncertain. There were no significant findings in other organs.

In the authors' experience with some other physostomous species, swim bladders are loosely attached in the coelom and, when overinflated, can become displaced. Eventually, the pressure causes



Figure 1. The swim bladder is enlarged and is floating upward through the stretched skin of the body wall. The first eel to succumb to the disorder was previously euthanized. The eel euthanized in this report had a significantly more severely distended swim bladder.

thinning of the coelomic wall, leading to further displacement outside the coelomic cavity. This and similar swim bladder herniation might be correctly described as an aerocystocele (Sirri *et al.,* 2016). In the case of this eel, there was nothing but skin covering the swim bladder.

The owner reported seeing these eels in the past having surfaced as they competed for food when hand fed at the water surface, potentially gulping air and over-inflating their swim bladders. In European eels (*Anguilla anguilla*), it has been noted that the pneumatic duct is functionally closed, and as such, the eels cannot gulp air (Pelster, 2021). In the common eel (*Anguilla vulgaris*) "the pneumatic duct acts as an organ of gas reabsorption in addition to being a direct route for gas release," (Steen, 1970). However, it is unclear which of these is true in *G. polyuranodon* or other moray species. Hyperbuoyancy reportedly occurred reasonably regularly in the past; however, the frequency has reduced after keeping them at lower stocking rates, deeper tanks, and changing feeding practice to feeding by pole, well below the water surface.

The recurrence may be due to previous stretch damage to the fibrous capsule, creating weakened wall integrity and allowing the swim bladder to over-stretch.



Figure 2.
The egg mass extended through the coelomic cavity.

We theorize four possible mechanisms for recurrence:
1. the swim bladder may need a feedback loop by sensing pressure, but the weakened swim bladder wall may not hold enough internal pressure to provide that feedback;
2. the swim bladder, in a weakened state, is unable to expel excess air;
3. the pneumatic duct connecting the swim bladder to the esophagus, when tightly stretched, becomes occluded and prevents expulsion of air; or
4. the pneumatic duct, when stretched and/or displaced, becomes dissociated with the vascular structure surrounding it, which may play a role in gas reabsorption into the bloodstream as it does in some *Anguilla* species (Pelster, 2021; Steen, 1970). This might inhibit the eel's ability to deflate its swim bladder.

The mechanisms that inform freshwater morays to deflate their swim bladders to maintain normal buoyancy remain unclear. In many species of fish, autonomic control of the swim bladder is stimulated by changes in hydrostatic pressure, stretch on the lining of the swim bladder, and even minor changes in depth brought about by attaching weights or floats to fish experimentally (Steen, 1970). Like other physostomes, *G. polyuranodon* may be able to expel gas from their mouths or vents, or may be limited to vascular absorption, like the European eel. It is unknown whether they have any conscious control over this process.

At the time of investigation, a third animal was affected, showing signs of developing the disorder, specifically a bulge on its right side. The findings from our investigation suggest several intervention methods should eels become hyperbuoyant:
- immediate deflation by aspiration with a needle and syringe to prevent the progression of the disease;
- strengthening the right coelomic wall by surgical scarification to encourage fibrosis; or
- surgical removal of the swim bladder altogether.

As this species is becoming more common in the private aquarium hobby, more reports of similar buoyancy disorders may develop in other captive-reared specimens. If so, this report will aid in preventing or treating hyperbuoyancy disorders in moray eels.

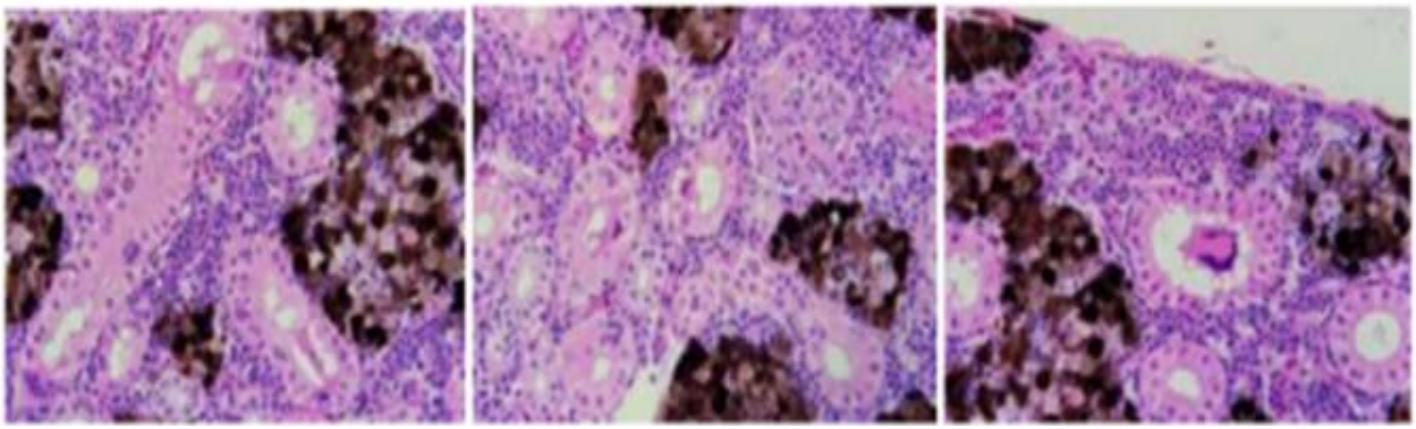
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ISSN 1546-5098, ISBN 9780123504043
https://doi.org/10.1016/S1546-5098(08)60135-1

Figure 3.
Kidney tubular epithelial cells multifocally exhibit the following changes: individual cells with hypereosinophilic shrunken angular cytoplasm and pyknotic nuclei (necrosis); epithelial cells lining tubules are occasionally multinucleated; and rafts of sloughed necrotic epithelium within tubule lumina.



CASE REPORT

In My Experience: Microscope Phone Mount
By Julius M. Tepper, DVM, CertAqV

Are you tired of squinting through a microscope with one eye closed? Would you like to show a client the results of a skin scrape or gill snip biopsy in real time? Wouldn't it be great to have digital photo files of these same procedures to include in your client records? If the answer to all of these is 'yes,' would you be prepared to spend about $20 to get it done?

I discovered a simple clamp designed to fit most eyepieces on microscopes or telescopes that allows you to mount your cell phone quickly and easily on site. Once mounted, you have a very high-resolution optical system that allows you to zoom in and record your results.





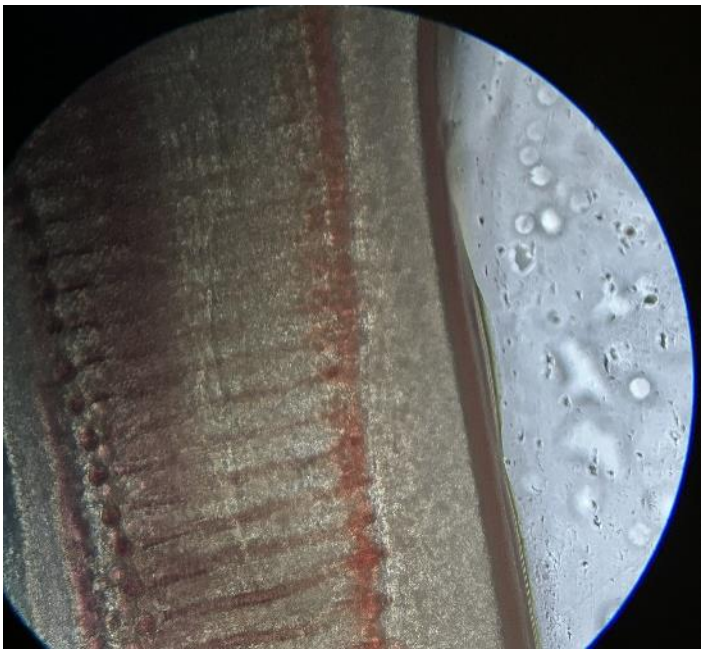
Where can I get one?

This clamp is sold online under several names. I bought mine on Amazon under the name Gosky Smartphone Adapter Mount. I got the Regular size (standard size) which fits most microscope eyepieces. There is a larger size for bigger eyepieces.

What's the setup like?

The setup was quick and easy. The base clamp attaches to the eyepiece with a screw mount. The smartphone then slides into the phone clamp, inverted to allow the camera lens to sit over the eyepiece. If you open your phone app to camera, then photo setting, you can slide the phone up and down until the camera lens is centered. Once in place, you can zoom easily and toggle to video if desired on the phone.

And the results...are spectacular!



Unusual Crustacean Mortality in the North-east of England in 2021 and 2022

Compiled by a panel of independent experts
convened by Defra's Chief Scientific Adviser
17 January 2023

An unusually large number of dead or dying crustaceans started to be found along the coast of the north-east of England from early October 2021. This unusual mortality continued through October and November 2021, and continued periodically through 2022 (although it is difficult to distinguish reporting bias due to increased awareness). Crustacean wash-ups were found along at least 70 km of coastline, and dead or dying crustaceans were also reported by fishers over a wide region.

Some of these crustaceans displayed a twitching behaviour not normally observed in beach wash-ups, or during fishing activity. This unusual twitching was particularly apparent during the initial period of mortality (October to November 2021) and again during May 2022, and was observed along at least 70 km of the coastline.

Initial unusual wash-ups were dominated by crabs. There have been reports of a number of other species found dead on beaches in the area, but it is unclear these are more frequent than normal occurrences, with the possible exception of a large number of octopuses on one occasion.

The cause of this unusual crustacean mortality event has been controversial, with two prevailing theories being considered most closely: a harmful algal bloom, and toxicity from pyridine released by local dredging activity.

The Crustacean Mortality Expert Panel (CMEP) was convened in December 2022 to provide an independent scientific assessment of all the possible causes of the mass crustacean mortality incident using all relevant available data. The panel considered possible causes (including but not limited to the two previously dominant theories) and grouped their consideration into four sections: disease pathology, harmful algal bloom, chemical toxicity, and dredging.

Each potential cause was assessed for likelihood, as defined by the Intergovernmental Panel of Climate Change (IPCC) likelihood scale. The panel considered whether the mortalities could be caused by disease or parasites. There are pathogens that are known to cause similar symptoms to those observed in the north-east of England, including the unusual twitching behaviour. Such pathogens have caused mortality events and declines in crustacean populations around the world. An amoebic crustacean disease, belonging to a similar group of parasites causing mortalities in the USA, has recently been found for the first time in UK waters in crabs on the south coast. No significant pathogens were identified in the north-east crabs, but full molecular screening was not conducted.

The panel considers it is about as likely as not, that a novel pathogen is the most likely cause of mortality (despite the lack of direct evidence of such a pathogen), because it would explain these key observations:

- Mortality over a sustained period and along at least 70 km of coastline;
- The unusual twitching observed by dying crabs in many locations. Algal bloom toxins and hypoxia are unlikely causative agents for the twitching observed.
- The dominant mortality of decapod crustaceans (including edible crabs, lobsters, common shore crabs and velvet swimming crabs, but not hermit crabs) rather than a wider range of species.

The impact of an algal bloom would also explain the wide distribution of observed deaths and cannot be ruled out as a causative factor particularly early in the incident. It is unlikely, however, that an agal bloom can explain the twitching nor the long duration of mortality particularly during winter months. Historical evidence from the UK and Ireland confirms the potential for harmful algal blooms to cause acute mortalities of marine benthic organisms, including crustaceans. Recorded events are primarily related to the dinoflagellate *Karenia mikimotoi.* There is evidence of an algal bloom in the region around the time of the initial crustacean mortality event in north-east of England but it is unlikely the bloom continued into late October of November, as temperatures cooled further.

The presence of a toxic substance could explain the twitching, but no source of sufficient amount of any toxic material could be identified, despite a range of relevant sediment and water measurements, and based on expert assessment of this and literature evidence. Although a range of chemicals, including pyridine, are known to be toxic to crustaceans, the wide geographical spread and long duration of the event would require sustained release of very large volumes of the chemical which is considered very unlikely from point sources or due to dredging as a cause for unusual crustacean death.

It is also possible that several of the stressors considered in this report operated together to degrade the marine environment and lead to the unusual mortality. No particular combination of factors was identified that might be particularly likely to cause the mortality events. This does not rule out some combination of factors as a possible cause for the mass mortality; it is well-known that multiple stressors can be deleterious to ecosystems or individual species.

GRAND ROUNDS CASE

Questions & Answers from the WAVMA Listserv
(WAVMA_Members-L@wavma.org)

Looking for advice to help a friend's aquatic store

Hi all,

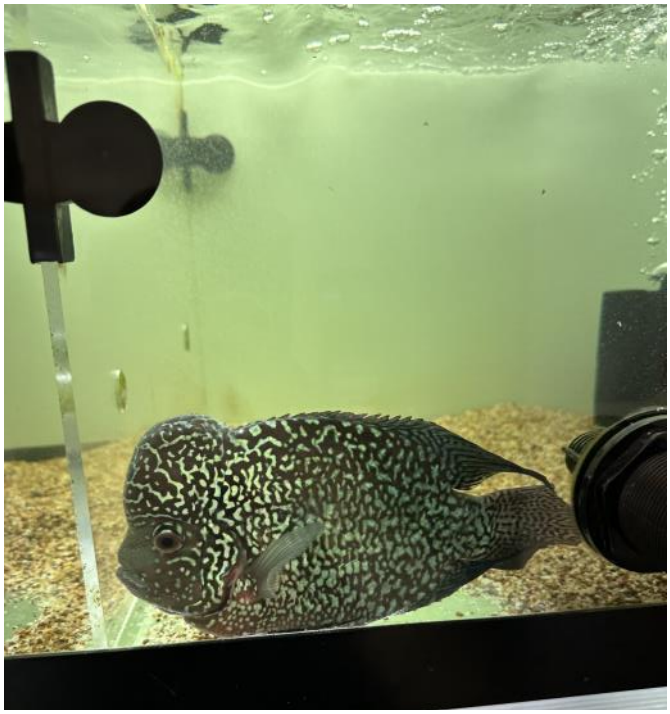
I have been involved with dogs and cats for a while now, with the goal of eventually integrating aquatics into my work. Although I haven't achieved that yet, I am a passionate long-term freshwater hobbyist, specializing in large, unusual, and harder-to-find fish species. Thankfully, I have had the opportunity to make many great friends within the hobby. Recently, one of my friends who owns a higher-end freshwater store reached out to me for some help. Since his store is bit of a drive away, I'm planning to visit him next week. In the meantime, I would greatly appreciate any suggestions and input you may have.

The store primarily focuses on freshwater fish, with a few brackish tanks. Each tank and pond has its own filtration system and is not connected to a centralized setup. The ponds are equipped with sumps, bio towers, or pond filters, while the tanks rely on air-driven sponge filters. Additionally, the owner has an automatic water change system that operates using an irrigation system. The tanks are well-maintained, with no presence of ammonia or nitrite. Nitrate is usually within the range of 10-20 ppm, pH is around 7.5, and the temperature is maintained at approximately 80 degrees Fahrenheit.

The issue my friend is facing is that the fish he brings into the store (whether through imports, wholesale purchases, or customer trade-ins) tend to deteriorate consistently after being in specific tanks for 24 hours. The affected fish exhibit symptoms such as lethargy, clamped fins, and a tendency to stay at the bottom of the tank. Some of them also develop a white slimy appearance, which is not ich (*Ichthyophthirius multifiliis*). The owner has been treating them with half-doses of nitrofurazone, and the fish typically recover. Alternatively, when he moves them to a different tank, they bounce back quickly with no medications.

I will attempt to attach some pictures of the sick fish, as well as an image of the same flowerhorn looking healthy after being transferred to another tank.

To the best of our knowledge, there is nothing in his system that could be leaching toxic metals into the water. The tanks are equipped with air-driven sponge filters and appear to have adequate water surface movement, indicating hopefully good oxygen levels. If the issue is truly bacterial, it's intriguing to observe how the fish respond positively to tank changes and no other treatments. Personally, I believe it would be beneficial for him to disinfect the tanks in question, along with their filters. He has spare filters that he can use as replacements.



Above: Flower horn cichlid appearing sick on arrival.

Below: Fish looking great after 24 hours in a new tank.



I kindly request you all to share any relevant experiences, thoughts, or suggestions that might help us resolve this issue. I joined this membership hoping to learn from all of you and, more importantly, to receive assistance in times of need.
Thank you for taking the time to read through this.
Best regards,

Michael Charney, DVM

GRAND ROUNDS CASE



Sick looking severum cichlid.

Dear Michael,

To me, it does not ring a bell for an infectious cause. Nitrofurazone treatment may help to decrease opportunistic bacteria that either came with the fish, or that are already in the aquarium.

At first glance, it looks (to me) as a water quality issue (possibly some irritant) combined with stress due to movement/changing environment.

You mentioned two things that I would investigate further after checking generalities (see below): "irrigation system for tank water change" and "specific tanks". Can you share more info on these? I think I saw a bulkhead in one of the photos? Assuming this is an exit point? E.g. does each tank have its own source, or schedule (if automated). Are hoses cleaned and disinfected on regular basis (or replaced). From where does this replacement water come?

Of course, "frontal" approach you would be advised to take when you get there (and in prep for the visit, the owner can do some things) would involve a) check water quality with a "good" kit simultaneously in all tanks for several days during such episodes, and b) collect as much as you can from sick fish - gill/skin biopsy, fecal swab, and check under microscope for anything suspicious.

Checking alkalinity, hardness, sulfites, H2S, and chlorine all come to mind, but not knowing the water source (well, pond, municipal, ozonated, chlorinated/chloraminated, iron-rich) it is only a guesswork at this point. Maybe pH swings in ponds if used as external replacement source, or algal toxins or H2S from biofilms in irrigation systems are involved.

Hope this helps the thinking,

Dušan Palić, D.V.M., MVSc, Ph.D., Dipl. ECAAH
Professor and Chair of Fish Diseases and Fisheries Biology
Faculty of Veterinary Medicine, Ludwig-Maximilians University Munich
Kaulbachstraße 37
80539 München
Deutschland
Email: d.palic@lmu.de

I'm fully in agreement with Dusan, this looks to be more of an environmental issue than infectious. To me what you're describing is potentially poor transport preparation by supplier, which in itself might not be too bad, but then compounded by a local environment issue which may be hard to track down.

If there is any correlation between tanks and suppliers, then I'd try and check their preparation for transport protocols. Otherwise, I'd work through what Dusan has suggested but I would add checking for any vibrations/sound levels, difference in lighting at the specific tanks.

Finding a potential environmental issue is key. I agree with Dusan that the antibiotic is simply controlling a secondary opportunistic bacterial infection.

Regards,
Chris Walster BVMS MVPH CertAqV MRCVS

Thank you all for the replies. It does fit along with my line of thought as well. Here is some of the additional info Dusan requested:
"irrigation system for tank water change" and "specific tanks"

He uses a water sprinkler controller (the one that controls the underground sprinklers for your home) to run his automated water changes. All the piping and connection from the controller are PVC. Each tank is drilled with a bulkhead for tank draining. The tanks are not filled through the bulkheads. There is a pvc run above the tanks that feeds into each one individually. Water from one tank never touches another. There just seems to be certain tanks in the store that have this issue. He has municipal water that runs through a large carbon filter before entering any of the tanks. His county treats the water with chlorine and not chloramine. I do not know if or how he disinfects tubing used for routine maintenance.

Please let me know if you have any further questions.

Michael Charney, DVM

Dear Michael,

Thank you for sharing and welcome to the fish world. What would be your friend's acclimatization protocol? Meaning what is the process he does after the fish arrives?

If the problem is there no matter where the fish come from and it happens only 24 hours after arrival, better assess husbandry protocols. Does your friend do the acclimatization itself always?

Cheers,

Elena

LITERATURE REVIEW

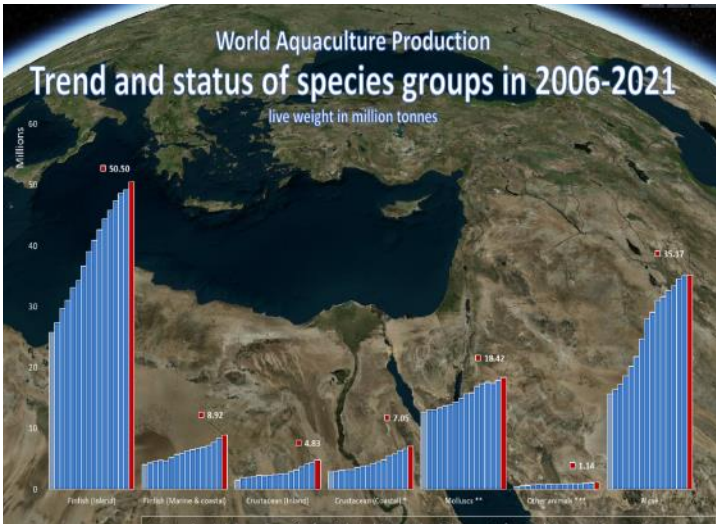
World Aquaculture Data

By Xiaowei Zhou
email: xiaowei.zhou@fao.org
xiaowei.zhou@fao.org
Fisheries and Aquaculture Division
Food and Agriculture Organization (FAO)
April 2023

World aquaculture production in 2021 reached 126 million tonnes in live weight, up by 2.7% over 2020. Total aquaculture production in 2021 was comprised of 90.9 million tonnes (mt) of aquatic animals, 35.2 mt of algae and 1.9 mt of shells and pearls. The estimated farm gate value of global aquaculture was USD $296.5 billion, an increase by 17.9 billion from 2020.

Farming of aquatic animals, e.g., fish, crustaceans and molluscs, is the most important sub-sector in world aquaculture, both in quantity and value terms. The global output of 90.9 million tonnes of farmed aquatic animals in 2021 was another all time high record. This represents an annual growth by 3.7% in 2021 from 87.6 million tonnes in 2020.

Aquaculture productions worldwide from 1950-2021 are recorded by FAO under 710 species or groups, reflecting the great diversity of species farmed across the world. Detailed data are publicly accessible and could be consulted at:
www.fao.org/fishery/en/statistics.





World Aquaculture Production Quantity and Value

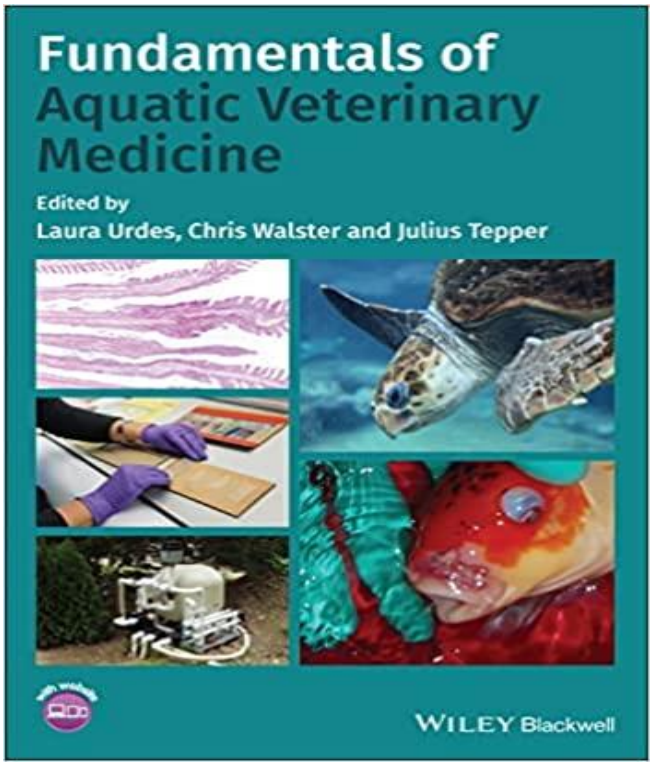
weight in thousand tonnes

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Quantity (thousand tonnes)												
Fishes, crustaceans and molluscs, etc.	57 759.1	59 809.1	63 502.1	66 935.8	70 519.3	72 893.5	76 521.6	79 566.5	82 463.9	85 219.2	87 630.5	90 861.8
Seaweeds and microalgae	20 174.3	21 768.4	24 667.7	27 993.6	29 067.5	31 073.5	31 645.6	32 608.4	33 433.3	34 587.3	35 079.6	35 171.6
Ornamental shells and pearls	63.3	53.5	22.2	33.5	48.2	41.0	54.2	65.7	27.3	2.4	1.8	1.9
Total aquaculture	**77 997**	**81 631**	**88 192**	**94 963**	**99 635**	**104 008**	**108 221**	**112 241**	**115 925**	**119 809**	**122 712**	**126 035**
Value (USD billion)												
Fishes, crustaceans and molluscs, etc.	1 311.9	1 548.5	1 699.1	1 920.6	2 109.2	2 069.1	2 239.0	2 389.3	2 492.9	2 591.7	2 632.7	2 808.9
Seaweeds and microalgae	88.6	90.6	107.8	114.4	112.7	104.7	114.4	123.0	134.5	147.3	151.6	154.5
Ornamental shells and pearls	2.4	2.5	2.3	2.4	2.7	2.4	2.6	2.9	2.6	1.9	1.4	1.4
Total aquaculture	**140**	**164**	**181**	**204**	**222**	**218**	**236**	**252**	**263**	**274**	**279**	**296**

Note: Quantities are in live weight for Fishes, crustaceans and molluscs, etc., and Seaweeds and microalgae.
Quantities are in product weight for Ornamental shells and pearls.

© Food and Agriculture Organization (FAO), 2023
For inquiry and comments, contact:
Xiaowei Zhou : xiaowei.zhou@fao.org

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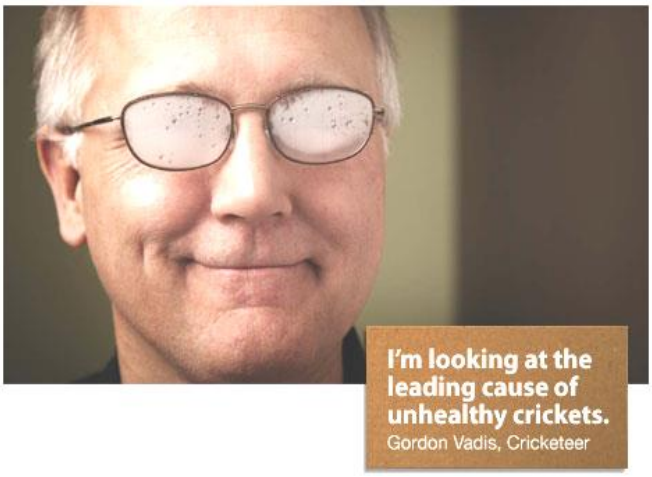


Fundamentals of Aquatic Veterinary Medicine covers the competencies necessary to assure the highest quality of aquatic veterinary services. This book provides systematic, practical guidance on the treatment of aquatic mammals, amphibians, fish, and invertebrates in veterinary practice.

Covering the nine core areas of the WAVMA Certified Aquatic Veterinarian (CertAqV) Program, this comprehensive clinical reference covers taxonomy, anatomy and physiology of aquatic species, water quality and life support systems, diagnostics, treatment, and prevention of aquatic diseases, and more. Designed to help readers acquire and demonstrate the necessary knowledge, skills, and experience to be competent in aquatic veterinary medicine, this authoritative guide:

- Focuses on "Day One" competencies outlined by the World Organization for Animal Health (OIE)
- Covers pathobiology and epidemiology of aquatic diseases, public health, zoonotic diseases, and seafood safety
- Provides up-to-date information on relevant legislation, regulations, and policies.

Fundamentals of Aquatic Veterinary Medicine is a must-have reference and review guide for veterinary students and practitioners interested in practicing aquatic veterinary medicine, as well as for aquatic veterinarians looking to become WAVMA certified or wanting to acquire OIE "Day One" competency.



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AQUATIC VETERINARY CE & PD

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.

World Aquatic Veterinary Medical Association

48th WSAVA World Congress - 2023
Lisbon, Portugal
https://wsava-congress.org/

49th WSAVA World Congress - 2024
Shanghai, China



AQUAVET® I and II - 2023

AQUAVET® *is historically sponsored by the University of Pennsylvania (co-founder Dr. Donald Abt, 1936-2022) and Cornell University (co-founder Charles Rickard, D.V.M., M.S., Ph.D., 1922-1993).*

Courses are held at Roger Williams University, RI.

AQUAVET® Course Information:
AQUAVET® I - Introduction to Aquatic Veterinary Medicine; 4 week course
28 May to 24 June 2023
AQUAVET® II - Comparative Pathology of Aquatic Animals; 2 week course
28 May to 10 June 2023
AQUAVET® Summer fellowship; Duration: 8 weeks

Location: Roger Williams University - Bristol, RI
Classrooms and labs; Library
Tuition covers course work, housing and most meals
Housing – suites with kitchen and 2 bedrooms
4 students per suite
Meals – cafeteria meal plan:
Breakfast, lunch, dinner

Tuition for AQUAVET I Students = $2,750
Less $200 from anonymous donor = $2,550
Includes: Tuition, room and board (almost all meals) for 4 weeks

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To apply, go to:
https://www.vet.cornell.edu/education/other-educational-opportunities/aquavet/aquavet-application-procedures-information

Applications for admission are due by January 15, 2023. The application is available on our website. You will receive an e-mail acknowledging receipt of your completed application and supporting materials.
Further information about any aspect of AQUAVET® may be obtained by contacting:

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email: aquavetmail@gmail.com
www.aquavet.info

21ST INTERNATIONAL CONFERENCE ON DISEASES OF FISH AND SHELLFISH
Aberdeen, UK
11th-14th September 2023

We are happy to announce the 21st International Conference on Diseases of Fish and Shellfish, which will be held at the P&J Live Aberdeen TECA, in beautiful Scotland. The EAFP welcomes abstract submissions for oral and poster presentations. During submission, apart from the usual themes we encourage new session topics to be announced in the section 'others'. These will be established should there be enough interest.

Please ensure that you have read the submission guidelines before submitting your abstract through the online portal. You will be required to set up an account and provide basic contact details in order to use the submission portal. Ensuring you complete all fields, the instructions in the system will guide you through the process. The deadline for abstract submissions is **10:00 BST on Monday 24 April 2023.**

More information will become available on the conference website in due course, including invited speakers and conference fees which will however lie in the usual range for the event.
https://eafp.org/21st-eafp-conference-aberdeen-2023/

What is the EAZWV Student Summer School?
21st to the 25th of August 2023
ARTIS Amsterdam Royal Zoo, Netherlands,
https://www.artis.nl/en/

The EAZWV Student Summer School is a five-day educational event organized by the EAZWV's Student Section biannually. The student section comprises of undergraduate and graduate veterinarians and veterinary students working in on towards a career in the fields of zoological or wildlife medicine or research.

The 2023 Summer School will be organized on the theme of Aquatic Animal Medicine in collaboration with the ARTIS Zoo in Amsterdam. The intensive 5-day event will include a scientific program with lectures and workshops from leading professionals in the field as well as networking opportunities during evening social events.

EAZWV Sponsorship contact:
Martyna Grabska,
EAZWV Student Education Officer,
The European Association of Zoo and Wildlife Veterinarians
students@eazwv.org

ACUARIO MICHIN

The next International Aquarium Congress in 2024 will take place at Michin Aquarium, Guadalajara, Mexico!



WAVMA Resources for CertAqV and CertAqVN/T
www.wavma.org/WebCEPD
Resource: one hour Webinars on various topics
Cost: Available for free to WAVMA Members.
KSE Credit: Stated for each webinar. To gain the CEPD certificate you need to complete a short quiz.
Evidence: Submission of Certificate with KSE record.
www.wavma.org/video-library
Resource: Video recordings deemed of good quality but not part of WebCEPD
Cost: Free to WAVMA members
KSE Credit: Variable,
Comments: One of WAVMA's primary aims is to promote aquatic veterinary medicine. There are other resources WAVMA provides such as The Aquatic veterinarian, member listservs, e-news and blog.

Aquadocs
www.aquadocspodcast.com
Resource: Various discussion topics
Cost: Free
KSE Credit: Dependent on time and topic
Evidence: None. Discuss with mentor
Comments: Lots of information on various topics

Ornamental Aquatic trade Association
https://ornamentalfish.org
Resource: information regarding ornamental fish including several free publications (care sheets) and links to other resources.
Cost: Free except for training modules
Comments: useful information regarding ornamental fish as well as **legisla**tion (UK and EU).



The Aquarium Vet is delighted to be hosting the fourth **E-lasmo Conference** the week commencing Monday June 5th., 2023. This is the only conference in the world, that is solely dedicated to elasmobranchs in human care in aquariums and zoos. The E-lasmo Conference 2022 will be held virtually over four days with four hours of presentations each day.

One of the sessions will be solely devoted to Elasmobranch Training and Conditioning. Other topics will include Husbandry, Diseases and Parasites, Life Support Systems, Conservation and Reproduction. At this stage we are calling for abstracts on any topic related to elasmobranchs in human care - your research, your experiences, your animals, your successes and even your failures. Various presentation lengths are available, ranging from 10 minutes up to 30 minutes for more detailed talks.

All presenters receive free registration to the entire E-lasmo Conference 2023. If you are interested in presenting at the E-lasmo Conference 2023, please contact us at rob@theaquariumvet.com

The entire E-lasmo Conference 2023 will be recorded and available afterwards to all attendees (in case you miss a session). For attendees, an early bird registration discount will be available until the end of March 2023. To register for The Aquarium Vet E-lasmo Conference 2023, please go to:
https://www.theaquariumvet.com/store/





The Purdue University Medicine of Aquatics, Amphibians & Reptiles Symposium is *IN PERSON* this year. Join us for our 4th biennial symposium that will provide veterinary professionals and students the opportunity to develop the skillsets for treating aquatic, amphibian, and reptilian patients by learning from experts in these fields.

If you have any questions please contact:

PVMlifelonglearning@purdue.edu

AQUATIC VETERINARY CE & PD



World Aquatic Veterinary Medical Association

WebCEPD Program

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