The Aquatic Veterinarian

Journal of the World Aquatic Veterinary Medical Association



An Australian Fly River Turtle from the Los Angeles Zoo

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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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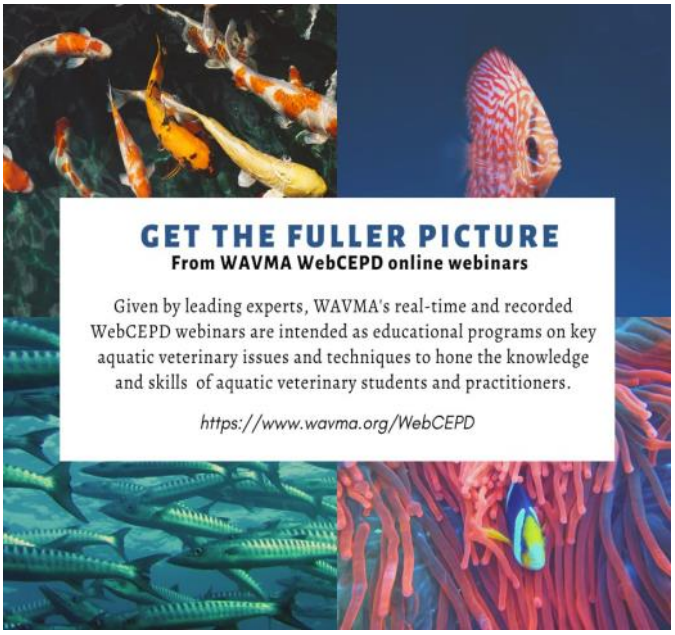
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Cover photo:
Australian Fly River Turtle from the
Los Angeles Zoo. See article on pages 24-25.

Photograph by Nick Saint-Erne.





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.

EDITORIAL

Editor's Note

While Autumn has arrived in the rest of the Northern Hemisphere, as I write this in Phoenix, Arizona, it is still over 104°F (40°C), and has been that way since mid-May! But it's a dry heat (so is an oven!). I don't mind the typical hot, dry summer here in the Sonoran Desert, but by mid-September it usually starts to cool off and even get a chill at night. Not this year…

Hopefully the weather where you are is doing better, but in the Southeast USA hurricanes are causing severe problems right now. I received notice that the Clearwater Aquarium was flooded and animals were being moved out to other facilities. I wonder how the many Florida fish farms are doing?

More food for thought, in this issue our Administrator, Chris Walster, discusses some interesting statistics on WAVMA Membership over the past few years (page 7). Also, see information about the WAVMA Annual General Meeting in the President's Report (page 5) and the Meetings Committee report (page 13).

The Pitts Aquatic Veterinary Education Award helps fund students in their aquatic learning events, and we have reports from students who have received this award on pages 16-18 in this issue.

On a sad note, we report the death of one of our founding members and our second WAVMA President, Dr. Ronald Roberts (page 20-21). Aquatic Veterinary Medicine, and WAVMA, have been greatly enhanced by Dr. Roberts' contributions.

A new online space (like Facebook or LinkedIn) for the aquaculture community, the Aquaculture Information Exchange (AIE), is discussed on pages 22-23. It looks like an interesting and helpful addition to communication among aquaculture professionals.

Finally, I had an opportunity to visit the Los Angeles Zoo while out working at a wholesale fish facility in California recently. See my report on pages 24-25.

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



Hanging out with the flamingos at the L.A. Zoo!

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.

EXECUTIVE REPORTS

President's Report

WAVMA Annual General Meeting &
Election for the 2025 Board Members

We are excited to announce that the 2024 WAVMA Annual General Meeting (AGM) will take place on 13th December, coinciding with the TAVA meeting in Bangkok, Thailand. This year's AGM will also see the results of the election of the 2025 WAVMA Board Members, who will play a crucial role in shaping the future of aquatic veterinary medicine.

As a member-driven organization, your participation in this process is crucial. The election of the Board is not just a formality—it's a chance to have a say in the leadership that will continue to elevate WAVMA's mission of advancing aquatic veterinary medicine worldwide. Whether you are a longstanding member or newly joined, your vote matters!

Why Should You Get Involved?

Shape the Future: The Board members play a pivotal role in driving WAVMA's initiatives, partnerships, and educational opportunities.

Community Representation: By voting, you help ensure the Board represents the diverse interests of our global community.

Leadership Renewal: Fresh ideas and perspectives are essential for growth. The election gives us a chance to bring in new voices while retaining the valuable experience of continuing members.

Nominations Now Open for the 2025 Board Members!

We encourage all members to submit nominations for the 2025 WAVMA Board. Self-nomination is encouraged, so if you are passionate about aquatic veterinary medicine and ready to contribute to our organization's leadership, don't hesitate to step forward!

How to Nominate: Email your nominations to Administrator@wavma.org

Nomination Deadline: Nominations open on 11th October 2024 and close on 31st of October

Nomination Forms: Forms can be found on the WAVMA website or by emailing the WAVMA Administrator at Administrator@wavma.org.

Election Process:

As usual, the election will be conducted online, allowing all members to participate globally.

Voting Opens: 1st November 2024.

Voting Closes: 29th November 2024.

Members will receive instructions via members-L email on how to vote online. Be sure to cast your vote to have your say in the future of WAVMA.



Important Dates:

AGM Date: 13th December 2024 (during the TAVA Meeting) further details to be posted online

Nominations Open: ASAP and closes 31st of October

Voting Opens: 1st November 2024

Election Closes: 29th November 2024

Further details about the AGM will be available on our website and via the Members-L email list. Please make sure you're signed up to receive these updates—check your member profile on the WAVMA website!

Your involvement is key to WAVMA's continued success. Let's come together to ensure a strong and forward-looking leadership for 2025!

Thank you for your continued support and commitment.

Warm regards,

Matthijs Metselaar DVM PhD Dipl ECAAH
CertAqV, MIFM, MRCVS
WAVMA President for 2024
www.aquaticvets.com
President@wavma.org

EXECUTIVE REPORTS

Secretary's Report

Dear WAVMA Members,

Cannot believe we are already in the last quarter of the year!!! As always for WAVMA this year has been a very dynamic one. Our Director for Latin America and Caribbean, Dr. Paola Barato, in cooperation with Dr. Esteban Soto from UC Davis have been very active and organizing a series of workshops and training in freshwater fish medicine in the region; starting in March in Costa Rica, early September in Brazil. Next ones (Sanidad y bioseguridad en produccin de tilapia) will be soon in Colombia (September 30, October 1-2). In Mexico on November 21 and 22, registration here.

Dr. Barato is also attending various conferences in the region on behalf of WAVMA, among this WAS LACQUA 2024 to be held in Colombia on September 24-27, positioning our organization at the highest level. **Thank you, Dr. Paola Barato, for your commitment to WAVMA advancement.**

WAVMA keeps moving!...

Our very active ESC Students Support subcommittee has launched a new issue of their own newsletter. Periodically, but at least once per year, the Education and Student Committee Student Subcommittee produces a Newsletter focusing on the benefits students can get from joining WAVMA. Access the Newsletter here.

As the year continues, we continue to see more members successfully completing the Aquatic Certification and Renewals, both for the Certificate of Aquatic Veterinarian (CertAqV) and for the Certificate of Aquatic Nurse/Technician (CertAqVNT), enlarging the pool of colleagues and mentors/adjudicators to strengthen the program. We continue receiving more applications, the process now is 100% online which is allowing to shorten the adjudication period. Applications for CertAqV are welcome via:
https://www.wavma.org/CertAqV-Pgm
and for CertAqVNT at:
https://www.wavma.org/CertAqVNT-Pgm.
We encourage the applicants to check the application online for comments on the details and submit additional information requested in the last stage of revision by our Executive Board.

As mentioned in a previous TAV issue, a new partnership between WAVMA and WVEPAH (World Veterinary Education in Production Animal) is moving forward to start the new Professional Certificate in Animal Health: Aquaculture Production. The course residential part will start soon in October, (7-11) in Padova, Italy, where our own WAVMA President, Dr Matt Metselaar and WAVMA Past President Dr. Bart Gorgoglione will be among the instructors… so be ready to check WVEPAH webpage

Attention!! For WAVMA CertAqV members a special fee has been agreed!



The WAVMA webinars have become a rockstar within WAVMA!!, now having more than 100 excellent lectures dealing with different topics within the aquatic veterinary medicine, this has become an excellent repository for everyone interesting in the discipline! We continue organizing interesting lectures with lead experts in their field. Stay tuned, every month!! Check here for more information:
https://www.wavma.org/WebCEPD.

We continue to work to keep the WAVMA website updated, thanks to our Administrator, Dr Chris Walster, with all the news and updates to WAVMA programs. We are also present on different social networks, so please have a look on our Facebook page, Instagram and in LinkedIn. These are great places to ask your aquatic questions, share stories or pictures and jobs, and talk to other colleagues involved in aquatic animal health. Don't hesitate to use our members or Students-L listserv! I also encourage you to submit articles dealing with Clinical Cases, and Book Reviews to *The Aquatic Veterinarian journal,* or short news stories for the WAVMA e-News!

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

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

EXECUTIVE REPORTS

Membership Report

Current WAVMA membership as of September 2024 is 561 members, which splits into Full members 313, Students 203, New Grads 17, Vet Tech/Nurses 23, Affiliates 4, Allied Vet Organizations 1. Members are from 53 countries. This compares with 640 at roughly this time last year, a decline of 79 members or 12.3%. If one were just to look at full members, then one could argue that they are relatively stable (between 300-350 veterinarians) for the past few years. In 2022, membership was around 732, which split roughly 50:50 full member and student members, with 5 Associate members. That means WAVMA has lost a third of members in the past two years. Although there are no easily accessible “records” available, WAVMA peaked at around 800-850 members around 2020.

Since the start of “open" membership (2007), WAVMA has attracted 4500 total memberships, of which 1439 never renewed (32%) after one year. There are fewer than 10 of the original members left. Records would indicate there were at least 70 original founding members. Admittedly some of these founding members do rejoin intermittently, presumably based on their interest/involvement in aquatics.

The only positive is the increase from around 4 -5 VetTech/Nurse members to 23; this is all due to the CertAqVNT (since that is the only change in “services" for them). Since 2023, 11 people have been awarded CertAqVNT and there are 8 people in progress.

Since 2020, 250 veterinarians have been awarded the CertAqV, while 31 are currently in progress, and 10 renewals are in progress. It is a requirement to be a WAVMA member to use the certificate honorific and be listed on the WAVMA website.

Further food for thought from the membership spreadsheet: 344 members receive Members-L emails, 36 members receive Members-L digest emails, which totals to 380 members receive Members-L emails, ~58% of current members. Only 184 members receive the Student-L emails. Combining all listservs means we are still only reaching <60% of members.

This is concerning as the listservs are the primary means of informing members of WAVMA information. It’s impossible to know if the other 40% get their information via TAV, WAVMA website, the Blog page, or social media. If any member has comments regarding WASVMA membership, please email directly to me so we can address any issues.
Thank you.

Regards,

Chris Walster
WAVMA Administrator
Administrators@WAVMA.org

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.



EXECUTIVE REPORTS

WAVMA's Certification Programs

WAVMA's CertAqV and CertAqVNT programs are globally recognised as demonstrating your competence in aquatic veterinary medicine. This is amply demonstrated by current discussions with various awarding bodies whereby the certificates can count towards completion of their requirements. This in turn means that WAVMA needs to ensure that the certificates standards are upheld.

The Executive Board is the final reviewer of applications and whilst the running of the certificates is under the purview of the Credentialing Committee, the Executive Board can and does provide feedback. One common theme is whether a candidate has provided sufficient evidence to confirm they have carried out the listed learning/experience. Whilst it is relatively easy to provide a copy of a CEPD certificate or letter of experience from an employer linked (and relevant) to the claimed KSE, it is not always possible. As such the Certificates rely on an element of trust. Not providing sufficient evidence of completing a KSE will likely delay the awarding of a certificate or require the applicant to provide further proof, but could also be detrimental to the reputation of the applicant and their mentor, as well as WAVMA. It is up to all involved in the certification process to ensure standards are maintained.

There are several actions within the certification process which help ensure the standard is kept maintained:

Following the requirements of the certificate. These are described in the CertAqV Handbook and the CertAqVNT Handbook, with a summary of the KSE categories and their KSE values at the top of the online KSE Record Form. Failure to follow these requirements is an "automatic fail," even if the applicant is otherwise excellent.

An applicant should ensure that the description of the activity is relevant and contains sufficient information for a reviewer to accurately appraise the activity which might be unknown to them (e.g., an externship or local course). This might include an attached CEPD certificate, active link to a course or book description. But perhaps most importantly the description should accurately describe the activity and what was undertaken.

Whilst there is no requirement to provide proof of completion, an applicant is providing a professional attestation that they have completed the activity. Where possible it is better to add proof which ensures less chance of rejection or requests for additional information (that should be responded to promptly).

Ensure a resume or CV, any additional supporting material (e.g., employer letter, degree certificate), are attached before submitting the KSE documentation to the mentor.

Mentors should review the KSE form and the CV to ensure it has been completed correctly and demonstrates the required knowledge. The mentor is confirming they agree the activity has been completed, is suitable, and worth the claimed KSE. This is a professional attestation.

Mentors should check the box "I confirm that, to the best of my knowledge, the applicant has provided a valid vet degree," before submitting the application for review. This can be found at the bottom of the KSE page. It can be done by CertAqV-Admin at a later date (e.g., based on the CV) but the mentor is best placed to confirm it, and failure of the mentor to check this box might delay awarding certification.

The mentor should add any additional comments. These are not comments like "excellent candidate," as this is not the mentor's role, but any comments that might help in determining the validity and value of the claimed KSE or the experience of the candidate. Mentors then submit the application for review.

The review process involves at least 14 independent reviewers with a requirement that at least 10 of them approve. They will have varying opinions, hence why it is important to accurately describe an activity and provide any proof of completion where you can. The more accurate and fuller (although concise) the information provided, the lesser chance of it being mis-interpreted.

If you have any questions regarding the certification process, please read all the information provided on the certificate pages. These include amongst others, a summary of the process, the requirements, example KSE forms, and "How to use the automated system". If having read this, you still have questions, please feel free to contact either:
Certaqv-admin@wavma.org
or administrators@wavma.org.

Regards,

Chris Walster BVMS MVPH CertAqV MRCVS
WAVMA Administrative Coordinator



EXECUTIVE REPORTS

WebCEPD Program

Since 2013, WAVMA has produced over 172 Webinars that are available to watch on our website: https://www.wavma.org/WebCEPD, and conference recordings on the Video page: https://www.wavma.org/video-library. You may be able to use these for continuing education credit for veterinary licensing, and you will also sure learn a lot!

Lectures are given by leading experts, and 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.

WAVMA WebCEPDs

B-1086: Genetic Improvement and Disease Resistance: Applications in Aquatic Veterinary Medicine

Date: October 16, 2024
Time: 02:00 PM UTC
Presenter: Dr. Liane Bassini
Credits: 1.0 hour

Register here now:
https://register.gotowebinar.com/register/5402098981584926552



WAVMA's Member Programs and Services

Find a Fish Vet Directory - a directory for the public to find aquatic veterinarians

Member Directory - a members-only tool to locate other members and for vet students to locate mentors

The Aquatic Veterinarian - a quarterly publication with news, peer-reviewed contributions, clinical cases, jobs, meetings and more

Certified Aquatic Veterinarian (CertAqV) Program - a program identifying and certifying veterinarians with competency in core subject matter necessary for practicing aquatic veterinary medicine

WebCEPD Program - live and recorded webinars, courses, and presentations;; many are available for CEPD credit

John L. Pitts Aquatic Veterinary Education Awards Program - an international program that provides financial support for veterinary students and new graduates to increase their experience in aquatic veterinary medicine

Employment Opportunities - a list of available aquatic veterinary jobs, available to members only

Image Library - a collection of images useful for presentations, diagnostic interpretations, and more

Video Library - a collection of videos to help members and others understand aquatic veterinary techniques and issues

WAVMA Student Chapters - WAVMA chapters formed by veterinary students and faculty mentors at veterinary schools and colleges around the world

Members-L - (WAVMA_Members-L@.wavma.org). A members-only listserv for discussions on any topic of interest. To post to it, you must be a current member and ticked the appropriate box in your Member Profile Preferences tab.

Students-L - (WAVMA_Student-L@wavma.org). A discussion listserv for WAVMA student members. you must be a current member and ticked the approrpiate box in your Member Profile Preferences tab.

Leadership Roles - All members (including students) have the opportunity, and are encouraged, to serve on any WAVMA Committee. All full members may also be nominated for a position on the Executive Board. If you are interested in more information, please contact the WAVMA President.

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 nine 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 acknowledgement and a new tab will appear in your WAVMA profile “Certification Program”. Here you can record your KSE’s by clicking on the green Add KSE button. 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, or refer to the website: How to use the automated CertAqV, CertAqVNT system.

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

Certified Aquatic Veterinarians

Samah Abdelrazek	United States
Ali Anwar Ahmad	Singapore
Jessica Allen	United States
Sara Alves	United States
Chelsea Anderson	United States
June Ang	Singapore
Farah Gonul Aydin	Turkey
Romualdo Balagapo	Philippines
Benjamin Balducchi	Canada
Sarah Balik	United States
Marcello Balzaretti	Italy
Madison Barnes	United States
Christa Barrett	United States
Heather Barron	United States
Julia Bauer	Germany
Trista Becker	United States
Jenice Bell	United States
Heather Bjornebo	United States
James Bogan	United States
Pierre-Marie Boitard	France
Rachel Brown	United Kingdom
Faith Burgos	United States
Shraddha Cantara	United States
Christian Capobianco	United States
Todd Cecil	United States
Ri Chang	United States
Bryony Chetwynd-Glover	United Kingdom
Prakan Chiarahkhongman	Thailand
Annie Clift	United States
Mike Corcoran	United States
Emily Cornwell	United States
David Craton	United States
Rebecca Crawford	United States
Hannah Dadah	United States
Manuel De la Riva Fraga	Spain
Zarah Deutsch	United States
Darren Docherty	United Kingdom
Simon Doherty	United Kingdom
Christina Dover	United States
Devon Dublin	Japan
Freeland Dunker	United States
Michael Dutton	United States
Ashley Emanuele	United States
Maribel Escobedo	Mexico
Antonella Fabrissin	Italy
Mohamed Faisal	United States
Erika First	United States
Julie Fithian	United States
Ari Fustukjian	United States
Danielle Godard	United States
Giana Gomes	Singapore
Emmanuel Gonzalez Rueda	Mexico
Bartolomeo Gorgoglione	United States
Krystan Grant	United States
Michelle Greenfield	United States
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Jenny Herbert	United States
Chelsea Hester	United States
Kelsey Hoag	United States
Adrien Izquierdo	United States

COMMITTEE REPORTS

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Sharmie Johnson	United States
Jimmy Johnson	United States
Brian Joseph	United States
Hali Jungers	United States
Kyle Kansman	United States
Elizabeth Kaufman	Israel
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Denyse Khor	Singapore
Amy Kizer	United States
Victoria Koch	United Kingdom
Jack Kottwitz	United States
Lana Krol	United States
Marie Kubiak	United Kingdom
Diya Lake	Mauritius
Lucinda (Wing Sze) Lam	Australia
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Richmond Loh	Australia
Alfonso Lopez	Singapore
Rubén Arturo López Crespo	Mexico
Jordi Lopez-Ramon	Spain
Amber Lum	United States
Adolf Maas	United States
Raphael Malbrue	United States
Paul Manesis	Canada
David Marancik	Grenada
Victoria Maroun	United States
Laura Martinelli	United States
Robert Martinez	United States
John Mastrobuono	United States
Colin McDermott	Hong Kong
Alicia McLaughlin	United States
Margaret McTighe	United States
Larissa Menke	United States
Matthijs Metselaar	United Kingdom
Sonya Miles	United Kingdom
Timothy Miller-Morgan	United States
David Minich	United States
Haitham Mohammed	United States
Katrina Murray	United States
Kunda Ndashe	Zambia
Lucie Nedved	Australia
Jenifer Nix	United States
Ladislav Novotny	Czech Republic
Massimo Orioles	Italy
Alec Ortiz Colosi	USA
Courtney Pace	United States
Dušan Palić	Germany
Veronica Pardini	USA
Christine Parker-Graham	USA
Lily Parkinson	USA
Chris Payne	USA
Melanie Peel	USA
Sarah Pellett	United Kingdom
Ayanna Phillips Savage	United States
Maximilian Polyak	United States
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
Lucy Robson	United Kingdom
Patinan Rookkachard	United Arab Emirates
Justin Rosenberg	United States
Benjamin Rosenbloom	Saint Kitts and Nevis
Daniel Ruvolo	United States
Komsin Sahatrakul	United Arab Emirates
Nick Saint-Erne	USA
Sonja Saksida	Canada
Maria Eugenia Sancho Santos	United States
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 Martinez	USA
Brandon Spolander	South Africa
Heather Srch-Thaden	United States
Elizabeth St. Germaine	USA
Brittany Stevens	USA
Chairat Sumgorthong	Thailand
Win Surachetpong	Thailand
Spencer Ee Joon Tan	Australia
Tanatporn Tantiveerakul	Thailand
Gillian Taylor	South Africa
Alissa Tepedino	USA
Julius Tepper	USA
Sharon Tiberio	USA
Miranda Torkelson	USA
Norrapat Towanabut	Thailand
Aubrey Traina	United States
Alexandra Troiano	USA
Kaitlyn Upton	United States
Laura Urdes	Romania
Julian Vaillard Cerdio	Mexico
Greta Van de Sompel	Belgium
Claudia Venegas Morales	Chile
Pedro Viadanna	United States
Jelena Vukcevic	Australia
Zachary Waddington	New Zealand
Sarah Wahltinez	USA
Bridget Walker	United States
Chris Walster	UK
Lindsey Waxman	United States
Scott Weber	USA
Marcus Webster	USA
Trista Welsh	USA
Michael Wenninger	USA
Laura Whalen	USA
David Wilbur	USA
Sarah Wilson	USA
Howard Wong	Hong Kong
Sarah Wright	USA
Taylor Yaw	USA
Irene Yen	USA

COMMITTEE REPORTS

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.

Communications Committee
This Committee manages the communications among members and others involved with aquatic veterinary medicine. It oversees the e-News, Facebook, Twitter, LinkedIn and other social media accounts.
Chair: Claudia Venegas, Secretary@wavma.org

Credentialing Committee
This Committee oversees and administers the Cert-AqV Program for credentialing aquatic veterinary practitioners, and evaluates aquatic veterinary educational programs useful to members.
Chair: Matthijs Metselaar CertAqV-Admin@wavma.org

Education & Students Committee
This Committee facilitates networking between student members and helps development of educational programs and services. It is composed of three subcommittees: WebCEPD, Education Resources, and Student Support.
Chair: Bartolomeo Gorgoglione, BartGorg@msu.edu

Meetings Committee
This Committee oversees and coordinates logistics for WAVMA-organized or sponsored aquatic veterinary educational meetings, including the Annual General Meeting.
Chair: Julius Tepper, cypcarpio@aol.com

Membership Committee
This Committee oversees membership issues to optimally serve members and the organization. It oversees the listservs and membership lists.
Chair: Chris Walster, Administrators@WAVMA.org

Publications Committee
This committee oversees the publication of WAVMA's quarterly journal, *The Aquatic Veterinarian*, and other occasional publications.
Chair: Nick Saint-Erne, TAVeditor@WAVMA.org

A variety of items (mugs, t-shirts, hoodies, bags) are available for purchase at WAVMA's Store.

Items in the Zazzle store can be purchased in a variety of sizes, colors, and can even be customized to include your name, clinic name, or to include WAVMA Student Chapter information. For help with customization, please contact the WAVMA Administrator.

https://www.zazzle.com/store/wavma788

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

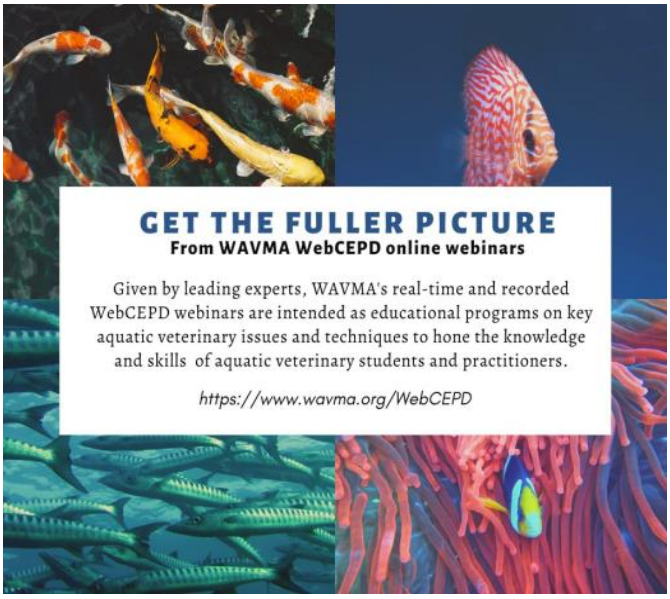
Meetings Committee

The WAVMA Annual General Meeting will be held in conjunction with the Thai Aquatic Veterinary Association meeting in Bangkok, Thailand, on December 13, 2024. More information will be sent to members by email soon.

The Meetings Committee will continue the initiative, begun earlier in 2024, to better publicize the programs and benefits of WAVMA membership. Based on a new directive from the Executive Board, funding has been approved for meeting attendance expenses to be used by members who are willing to provide short presentations at meetings they are already planning to attend. If you are interested in participating in this program, please contact me as soon as possible. As of this writing, we have begun coordinating members with targeted meetings.

Julius M. Tepper, DVM, CertAqV
Meetings Committee Chair
dvm2468@gmail.com

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



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.

WAVMA 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)
Stephen Reichley (2023)

The 2024 Distinguished Fellow award will be announced at the 2024 WAVMA Annual General Meeting, held in conjunction with the Thailand Aquatic Veterinary Association meeting in Bangkok, Thailand. on 13th December.

Hope to see you all there!

Laura Urdes, PhD DVM CertAqV
Fellows Advisory Council Chair



COMMITTEE REPORTS

WAVMA Student Chapter Guidelines

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.



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)

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

University of Florida, College of Veterinary Medicine USA (Established 2013)

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)

University of Bristol, Bristol Veterinary School, England (established 2023)

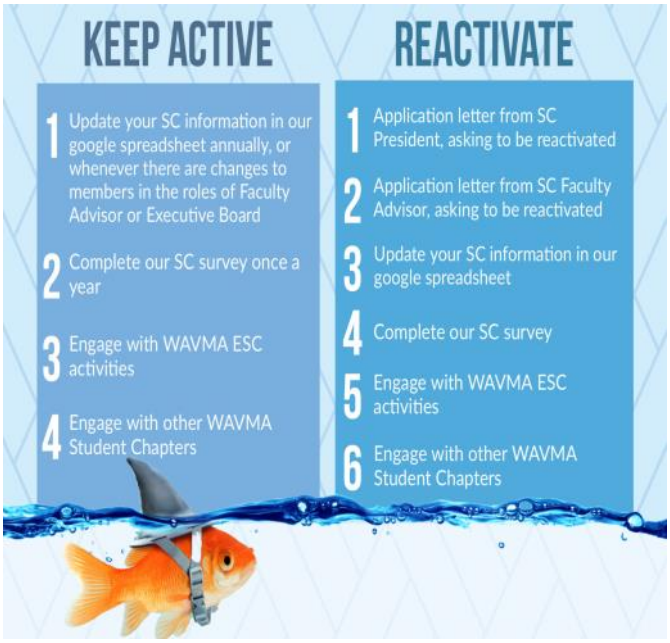
University of Calgary, Canada (established 2023)

COMMITTEE REPORTS

Education and Students Committee

Greetings Student Chapters!

As we finish our third quarter of the year, we want to ensure that we're keeping you updated with all WAVMA ESC activities. One key way to stay connected is by participating in WAVMA activities, keeping active or reactivating your Student Chapter. We value your involvement and look forward to seeing all Student Chapters end the year with valuable learning in Aquatic Medicine!



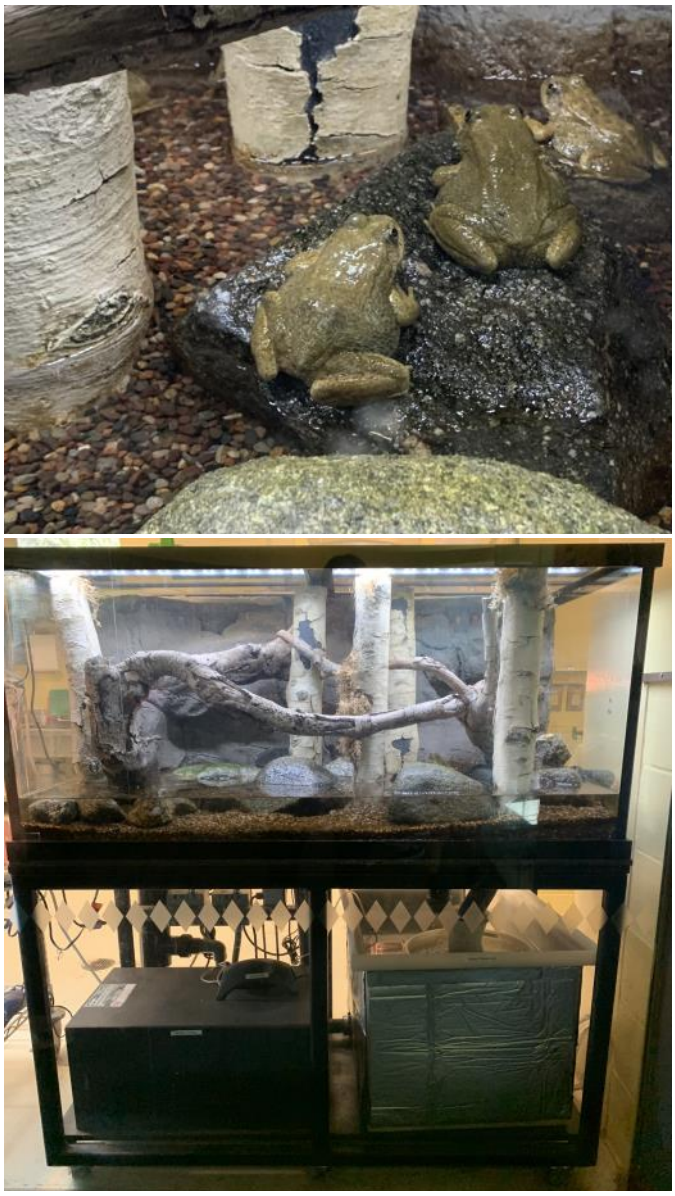
We invite all our Student Chapters to share their exciting activities during 2024 with the WAVMA community! If your Chapter has had memorable experiences or successful events that you'd like to showcase in this newsletter, please contact our WAVMA ESC - Student Support Subcommittee to feature them in our next number. We look forward to hearing from you!

For any question regarding how to keep active or reactivate a Student Chapter, please contact our WAVMA ESC - Student Support Subcommittee.
If you are interested in being part of this or other ESC - Subcommittee, please contact our WAVMA ESC Vice Chair **Rachel Feeney** at rzf3@msstate.edu

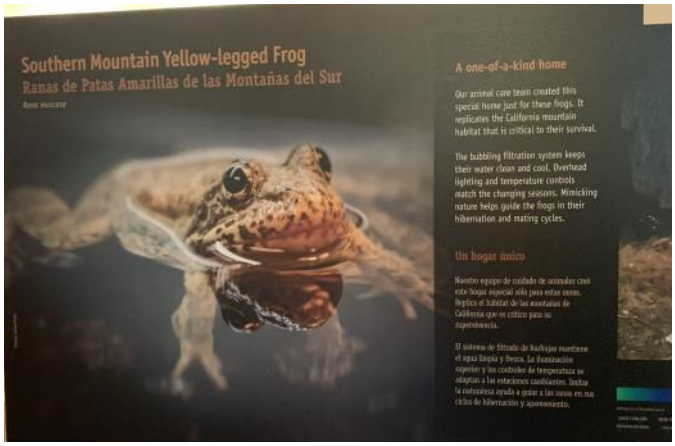
Bartolomeo Gorgoglione, DVM, MSc, PhD, CertAqV
Chair of WAVMA Education and Students Committee

Robert Martinez, DVM CertAqV
Education Resources Subcommittee Leader

Maribel Escobedo Mondragón,
Student Support Subcommittee Leader



Habitat for the endangered Southern Mountain Yellow-Legged Frog at the LA Zoo (see pages 24-25).



STUDENT REPORTS

John L. Pitts Aquatic Education Award Report
By **Natasha Serrano**
DVM Candidate, Class of 2026

Hello everyone! My name is Natasha Serrano and I am a third-year veterinary student at North Carolina State University College of Veterinary Medicine. Growing up on the island of Guam, I have always been interested in marine life. When I was given the opportunity to conduct research on the Pacific Halibut, I jumped at the opportunity. The John L. Pitts Aquatic Veterinary Education Award enabled me to present my research findings at the 2024 International Association for Aquatic Animal Medicine (IAAAM) conference in Galway, Ireland.

The Pacific Halibut (*Hippoglossus stenolepis*) is a pivotal species on the continental shelf of the United States and Canada, spanning the northern Pacific Ocean and Bering Sea. Its significance extends both commercially and ecologically, yet comprehensive baseline physiological data is lacking for this species. This study aims to fill this gap, providing insights into the health parameters essential for effective conservation and management strategies for this species.

In response to overfishing threats, management strategies have been pivotal for preventing population declines similar to those experienced by its Atlantic relative, the Near Threatened Atlantic Halibut (*Hippoglossus hippoglossus*). The Pacific Halibut is currently managed through the International Pacific Halibut Commission (IPHC) which sets catch limits and other regulations based on scientific assessments to ensure sustainable harvest levels. The data collected from this project will aid in informing conservation strategies, habitat protection measures, and sustainable fishery practices.

Building upon a preliminary study presented at the 2020 IAAAM conference, this research expands to include a total of 52 Pacific halibut specimens collected across Alaska's Kenai Peninsula. Field surveys gathered morphometric measurements and blood parameters, including white blood cell counts, hemoglobin concentration, and hematocrit levels, offering a comprehensive assessment of individual health. Biochemistry values from plasma samples, reported during my presentation, further enriched this dataset. Analyzing these parameters and establishing reference intervals, using the American Society for Veterinary Clinical Pathology (ASVCP) guidelines and MedCalc statistical software, will aid in identifying potential health issues or environmental stressors impacting fishery management decisions.



Dr. Greg Lewbart and Natasha Serrano at the IAAAM Conference.

I am grateful to WAVMA for selecting me to receive the 2024 John L. Pitts Aquatic Veterinary Education Award, which supported my travel to Ireland and presentation at the 2024 IAAAM Conference. This conference not only marked my first time presenting a research project but also my first experience at a veterinary conference. It provided an amazing opportunity to immerse myself in the aquatic field, learn about current research advancements, and network with veterinarians and fellow veterinary students passionate about aquatic medicine.

Looking ahead, I aim to publish my research sometime in the near future. Sharing these findings with the broader scientific community will contribute to ongoing efforts in understanding and conserving the Pacific Halibut populations.



STUDENT REPORTS

John L. Pitts Aquatic Education Award Report
By Katie Broikos

Hi everyone! My name is Katie Broikos and I am a rising third-year veterinary student at Cornell University College of Veterinary Medicine. I am grateful to have been selected as a 2024 John L. Pitts Scholar. The John L. Pitts Aquatic Veterinary Education Program has allowed me to pursue my interest in aquatic veterinary medicine and attend AQUAVET® I this summer. AQUAVET® I, Introduction to Aquatic Veterinary Medicine, is a four-week course filled with various lectures, labs, and field trips focused on marine animal medicine. The program has faculty from around the country who teach and advise students on this ever-expanding area of veterinary medicine. AQUAVET® I not only opened me to the science behind this emerging specialty of aquatic medicine but also introduced me to amazing people who I hope to work alongside.

A large portion of AQUAVET® I was lectures. In the classroom, we discussed topics ranging from Important Diseases of Marine Invertebrates to Marine Mammal Clinical Techniques. The lectures were engaging and very applicable. The talks connected to the material I had learned in undergraduate and veterinary school. Water quality, pharmacology, and diagnostics emphasized the importance of understanding chemistry. Whereas, conservation efforts for a multitude of aquatic species brought about why ecology, genetics, and microbiology are useful to study. With a great variety of topics and interactive faculty, I found myself continually excited to learn.



We also spent time in the lab. The lab was where we applied what we had learned from lectures. We performed dissections, diagnostic tests, water quality tests, and fish surgery. My favorite lab was the invertebrate lab. The first part of the lab was designed to reiterate the anatomy and taxonomy of the invertebrate phyla. We dissected squids, horseshoe crabs, and bivalves such as clams and mussels. Afterward, the class went to the shore of Mount Hope Bay during low tide to collect rocky intertidal invertebrates. Next, we studied our varied collection, and following the observation and examination of the animals we released them back into the bay. The lab revealed the intricacies and importance of the overlooked group that comprises the invertebrates.

Towards the end of the four-week course, we started going on field trips. Our class was able to go on behind-the-scenes tours at the Mystic Aquarium, the New England Aquarium, and the Marine Biological Laboratory. At Mystic Aquarium we were able to interact with the veterinary staff and animal trainers. Quality husbandry and animal training were emphasized as important aspects of the animals' healthcare. At the New England Aquarium, we walked around the facilities and were able to observe the tanks from behind the exhibits. We learned about various species' habitat requirements and new initiatives. At the Marine Biological Laboratory, we got detailed descriptions of all the resident animals and what research they were involved in.

The AQUAVET® I group was also able to visit the Long Island Aquarium and Riverhead Foundation for Marine Research and Preservation. During our time at the Long Island Aquarium, we fragmented corals, performed physical examinations on African penguins, and toured the aquarium's water filtration systems. At the Riverhead Foundation for Marine Research and Preservation, we performed pre-release examinations and blood draws on the foundation's ready-to-release seals. It was an impressive feat to see the wild pinnipeds restrained and handled. Lastly, we were able to do a marine mammal necropsy at the Woods Hole Oceanographic Institution. It was a great way to see comparative anatomy up close and perform necropsies with trained professionals.



I am extremely thankful for my experiences at AQUAVET® I and to the John L. Pitts Award for allowing it to happen. I am excited to see where my journey into aquatic veterinary medicine will take me.

STUDENT REPORTS

John L. Pitts Aquatic Education Award Report
By Whitney Smith

I am extremely grateful to have been selected for the John L. Pitts Aquatic Education Award as it allowed me to attend AQUAVET® this summer. I am a DVM/MPH student at the University of Minnesota and am interested in aquatic medicine and free-ranging wildlife population health. AQUAVET® provided a comprehensive background into the world of aquatic medicine which has allowed me to feel more prepared pursuing aquatic medicine externships and opportunities. I could not have attended AQUAVET® without the Pitts Award and I am thankful that WAVMA continues to provide opportunities to support students interested in aquatic medicine.

I attended AQUAVET® I, the first part of a two-part course held at Roger Williams University in Bristol, Rhode Island. AQUAVET® I covers a wide range of topics including water quality, in addition to more clinical lectures covering aquatic invertebrates, fish, amphibians, reptiles, sea turtles, aquatic birds, and marine mammals. Wet labs and field trips complement the lectures, allowing student the opportunity to put their new theoretical knowledge into practice.

Labs included topics such as fish diagnostics and techniques which allowed us to practice foundational skills such as performing and evaluating skin scrapes and gill biopsies. The water quality lab reinforced the importance of proper water testing, and microscope labs including fish hematology, pathology, and histopathology built upon skills learned in the general veterinary school curriculum. My personal favorite lab was the fish surgery lab. While I had already completed my third year spay and neuter lab, I had never seen a fish surgery and was very interested in seeing the different anesthesia techniques put into action.

In addition to the lectures and labs, we went on field trips to multiple aquariums, research, and rescue facilities including Mystic Aquarium, New England Aquarium, Woods Hole Oceanographic Institution, and Riverhead Foundation for Marine Research and Preservation. These field trips gave us behind the scenes insight into the daily activities of aquatic veterinarians in various settings. We performed physical exams on African penguins and harbor seals, completed necropsies on marine mammals, and learned about the research and conservation efforts at various aquariums.

This combination of lectures, labs, and field trips at AQUAVET® I solidified my interest in a career that combines aquatic medicine and free-ranging population health. I am very thankful for the John L. Pitts Award and the aquatic veterinary opportunities it has allowed me to pursue, and I will continue to work hard to make a positive impact and contribute to the health and welfare of aquatic animals and their environment.



Fish Surgery Lab, L-R:
Students: S. Ramirez, W. Smith, and K. Broikos.
Doctor: G. Groocock, DVM, PhD.

2024 AQUAVET® I Class,
Woods Hole, MA



AQUACULTURE REPORTS

GLOBAL AQUACULTURE FAO REPORT

Excerpted from an article in *Fish Farmers Magazine*, July 2024; pages 42-43.
www.fishfarmermagazine.com



World fisheries and aquaculture production has hit a new high, with aquaculture production of aquatic animals surpassing capture fisheries for the first time in human history, according to a new report published by the Food and Agriculture Organisation of the United Nations (FAO). The 2024 edition of *The State of World Fisheries and Aquaculture (SOFIA)* shows that global fisheries and aquaculture production in 2022 surged to 223.2 million tonnes, a 4.4% increase from the year 2020. Production comprised 185.4 million tonnes of aquatic animals and 37.8 million tonnes of algae (seaweed).

In 2022, aquaculture surpassed capture fisheries as the main producer of aquatic animals for human consumption. Global aquaculture production reached an unprecedented 130.9 million tonnes, of which 94.4 million tonnes are aquatic animals, and algae was 36.5 million tonnes, while global capture fisheries only produced 92.3 million tonnes. Aquaculture growth indicates its capacity to further contribute to meeting the rising global demand for aquatic foods, but future expansion and intensification must prioritise sustainability and benefit regions and communities most in need.

At present, a small number of countries dominate aquaculture. Ten of them – China, Indonesia, India, Vietnam, Bangladesh, the Philippines, Republic of Korea, Norway, Egypt, and Chile – produced over 89.8% of the total, with China alone producing 36%. Aquatic animal production by region: Asia (70%), Europe (9%), Latin America and the Caribbean (9%), Africa (7%), North America (3%) and Oceania (1%). But many low-income countries in Africa and Asia are not using their full potential. Targeted policies, technology transfer, capacity building and responsible investment are crucial to boost sustainable aquaculture where it is most needed, especially in Africa.

The global consumption of aquatic foods rises again, and record production of aquatic foods underlines the sector's potential in tackling food insecurity and malnutrition. That's why FAO advocates Blue Transformation to meet the overall requirements of better production, better nutrition, a better environment, and a better life, leaving no one behind.

Global consumption of aquatic animal foods reached 162.5 million tonnes in 2021. This figure has increased at nearly twice the rate of the world population since 1961, with global per capita annual consumption rising from 9.1 kg in 1961 to 20.7 kg in 2022. Of total aquatic animal production, 89% was used for direct human consumption, and fisheries and aquaculture play a critical role in maintaining global food security. The rest was destined for indirect or non-food uses, mainly fishmeal and fish oil production.

Aquatic foods provide high-quality proteins – 15% of animal proteins and 6% of total proteins worldwide – and key nutrients including omega -3 fatty acids, minerals, and vitamins. In 2021, they contributed at least 20% of the per capita protein supply from all animal sources to 3.2 billion people.

Most capture fisheries production comes from sustainable stocks. Global capture fisheries production has remained stable since the late 1980s. In 2022, the sector produced 92.3 million tonnes, comprising 11.3 million tonnes from inland and 81 million tonnes from marine capture. Despite the growth in aquaculture, capture fisheries remain an essential source of aquatic animal production. The proportion of marine stocks fished within biologically sustainable levels, however, decreased to 62.3% in 2021, 2.3% lower than in 2019. When weighted by production level, an estimated 76.9% of the 2021 landings from stocks monitored by FAO were from biologically sustainable stocks.

These numbers demonstrate the role that effective fisheries management can play in facilitating stock recovery and increased catches, highlighting the urgent need to replicate successful policies to reverse the current declining trend.

SOFIA also contains FAO's outlook for fisheries and aquaculture, which projects increases in world production and apparent consumption for the period up to 2032. Aquatic animal production is expected to increase by 10% by 2032 to reach 205 million tonnes. Aquaculture expansion and capture fisheries recovery will account for this rise. SOFIA projects that consumption will increase by 12% to supply on average 21.3 kg per capita in 2032. Rising incomes and urbanisation, improvements in postharvest practices and distribution, and dietary trends are expected to drive most of this increase. However, per capita apparent consumption in Africa will continue to decrease, the report says, as production projections may not keep up with population growth. This is especially alarming for sub-Saharan Africa where many countries are dependent on aquatic foods to meet their nutritional needs, particularly animal proteins and micronutrients.

In addition to nutrition and food security, fisheries and aquaculture are an important source of livelihoods. According to the latest data, an estimated 61.8 million people were employed in the primary sector of fisheries and aquaculture in 2022, down from 62.8 million in 2020. Women made up 24% of the overall workforce but 62% in the processing subsector.

COLLEAGUE'S CONNECTION

Obituary
Professor Ronald John Roberts, CCT, FRCVS, FRCPath, FRSE,
(1941-3rd August 2024)

A teacher, veterinary pathologist, author, editor and mentor to many young vets and fish health professionals, Dr. Roberts was a talented veterinarian who drove veterinary science into aquaculture and vice versa. He created the world-renowned Institute of Aquaculture at the University of Stirling, and inspired countless vets into the aquatic world.

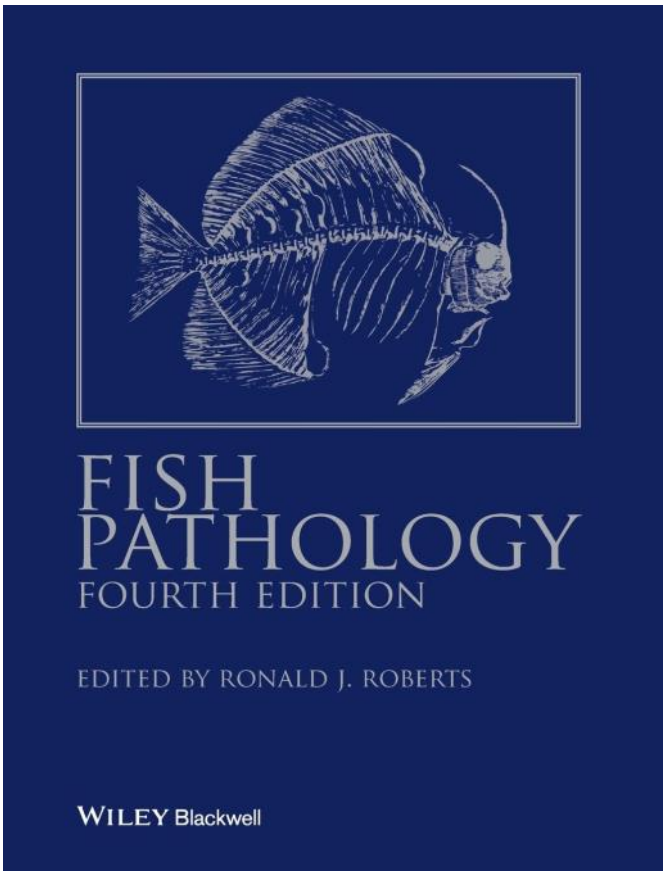
Ronald John Roberts was born in Liverpool, England, in 1941 at the height of the 'blitz', in an underground shelter below the rubble of a maternity hospital. His father was a Customs Officer, and after the war, the family moved to Campbeltown, Argyll, Scotland. He attended Campbeltown Grammar School and then the University of Glasgow Veterinary School, from which he graduated in 1964. In the same year, he married Helen Macgregor, a local school teacher.

After a short time in veterinary practice, he secured a post in the Department of Veterinary Pathology at the University of Glasgow and also completed a PhD degree. His time as a junior pathologist coincided with a severe outbreak of a skin disease in wild salmon, now known as ulcerative dermal necrosis (UDN). Ron was given responsibility for reporting the large numbers of cases which were submitted to the department for investigation and definitive diagnosis. As a result of this work, he became inundated with post-mortem material from the embryonic trout, salmon and turbot farming industries which were developing at that time in Scotland. He began the studies of inflammation, wound healing, cellular immunity and melanomacrophage function which have become a cornerstone of modern fish pathology.

In 1971 his work, and the rapidly growing aquaculture scene, led the Nuffield Foundation to fund a Research Unit at the University of Stirling: the Aquatic Pathobiology Unit. With this funding was established the world's first Master's degree course in Aquatic Vet-



COLLEAGUE'S CONNECTION



erinary Studies, which continues to this day. In 1978, Nuffield funding ended and the unit was converted to a self-supporting university institute, the Institute of Aquaculture. In the same year, the first edition of his seminal text *Fish Pathology* was published, which is now in its fourth edition. Also in the same year, *Journal of Fish Diseases*, the first scientific journal in English devoted entirely to fish and shellfish diseases, was launched under Ron's editorship, and to top off that year, he was elected a fellow of the Royal Society of Edinburgh at the early age of 37.

Much of the work of the Institute of Aquaculture at this time was funded by the UK Overseas Development Administration, as well as from the FAO and The World Bank, and it was on one such project that he was dragooned into leading a large UN Mission, extending over five years, to investigate a serious condition afflicting rice field fishes in Asia, which was alleged to be caused by the use of the fertilizers and pesticides. The matter was of great concern to national governments and major chemical companies, with an urgent need to identify the cause of the condition and advise as to how it might be managed. Roberts established an international team working out of Bangkok which collected disease material in the field from an area stretching from Australia and Papua New Guinea to Pakistan. The final conclusion was that the single necessary primary pathogen was a recent mutant *Aphanomyces* fungus, which was named *Aphanomyces invadans*. The disease, Epizootic Ulcerative Syndrome (EUS) remains a notifiable disease to the World Organisation of Animal Health (WOAH) and the success of this project led to Ron being appointed Commander of the Most Noble Order of the Crown by His Majesty King Bhumibol of Thailand. I

n 1996, Ron Roberts retired as Institute Director but continued his work in other ways. His two major commitments, were to the University of Idaho, where he was invited to take up a Distinguished Visiting Professorship, and as a Director of Landcatch, a commercial salmon farming company in Scotland. He was awarded the Dalrymple Champneys Cup and Medal by the British Veterinary Association (1990) and the Buckland Medal of the Buckland Foundation (1985) as well as the Fellowship of the Royal College of Veterinary Surgeons and was a founding member of the European College of Aquatic Animal Health (ECAAH).

Despite later health challenges Ron was active in Campbeltown where Helen and he continued to rear their sheep and he published the book *A Sense of Place: Kintyre's Remarkable Diaspora* in 2023, with biographies of people from Argyll who have made international impacts.

Ron Roberts's energy, enthusiasm, world vision, ambition, drive and intelligence has created a global legacy of vets, researchers, fish health professionals and aquaculturists that were inspired and guided into the aquatic world. He was a trailblazer in the application of veterinary science to aquatic animal health and had a major impact on the science and art in the sphere, as well as the many lives globally.

Our sympathy goes to Helen and his sons Gavin and Calum Roberts and grandchildren whom he loved so dearly.

Hamish Rodger
Kinvara, Ireland



COLLEAGUE'S CONNECTION

Connect to the Aquaculture Industry: Virginia Sea Grant launches the USDA and NOAA-supported Aquaculture Information Exchange Community

By Joe Caterine
Virginia Sea Grant
jwcatarine@vaseagrant.org
July 22, 2024



Imagine an online space (like Facebook or LinkedIn) for the aquaculture community, where every interaction is meaningful and tailored to your professional interests. That's the goal of the Aquaculture Information Exchange (AIE), an innovative social networking platform reshaping how aquaculture professionals across the United States and beyond connect, communicate, and collaborate.

I'm Joe Caterine, the community manager of the AIE, and I'm excited to share how our website is becoming the online home of the U.S. aquaculture sector. Launched last October, with funding from a NOAA/USDA grant and developed by Virginia Sea Grant, the AIE has quickly grown to over 1,300 members, creating a vibrant, diverse, and thriving online community.

The AIE is more than just a website; it is a dynamic meeting place where growers, hatchery operators, students, researchers, government personnel, nonprofit staff, environmental consultants, educators, and more come together to tackle common challenges, share resources, and build ties. One of the most inspiring things about the AIE is its budding culture of collaborative problem-solving. When a member posted an image of a mystery protist they found in an oyster gill, an expert on our site offered help identifying it. When a new farmer sought guidance on insurance options, seasoned veterans stepped in with guidance. Another member looking for technology recommendations for fieldwork found practical solutions from peers. It is this cross-sector cooperation that makes the AIE such an exciting platform.

What sets the AIE apart is its focus on aquaculture-specific content without the distractions found on other social networks. As you scroll through our activity feed, you'll find industry announcements, educational videos on recirculating aquaculture systems, discussions on innovative approaches to aquaculture education, and more. One member aptly described it as "like LinkedIn but without the noise."

The AIE provides numerous opportunities for professional growth and community engagement. Whether you work with sea urchins or are looking to improve your social media skills, there are dedicated groups and resources to support you. And if you can't find what you're looking for, it's easy to start your own group.

Beyond group interactions, other features offer opportunities for career advancement. Our job board is filled with aquaculture openings across the country, making it easier than ever to take the next step in your professional journey. Likewise, our event calendar is stacked with webinars and conferences that can be your gateway to new parts of the industry.

The AIE's impact extends beyond just professional networking. It also plays a vital role in fostering a sense of community and mutual support among the aquaculture sector at large. Following the Aquaculture America conference in San Antonio, Texas this year, members posted photos in a discussion thread and shared their favorite parts about the conference, such as the Women in Aquaculture session, the workforce development panel, and the NOAA Science Innovations showcase. It's our hope that conversations which begin at conferences continue on the Exchange.

Another notable feature of the AIE is its commitment to education and continuous learning. We recently started offering online courses designed to keep our members up-to-date with the latest industry trends and best practices. In the future, we plan to offer actual professional certifications that members can qualify for through completing modules on our website.

In our "State Marine Aquaculture Policy Dashboard Walkthrough" course, National Sea Grant Law Center Director Stephanie Otts walks users through how to explore that online tool which offers interactive and visual representations of marine aquaculture policy data collected for all 23 coastal states. She explains how to apply dynamic filters to look at multiple policy attributes across all states, taking a deep dive into specific categories of aquaculture policies, and learning about a specific state's policies.

In addition to educational resources, the AIE also hosts regular virtual networking events, allowing members to connect with fellow aquaculturists from

COLLEAGUE'S CONNECTION

across the country. These events provide a platform for members to share their experiences, exchange ideas, and forge new professional relationships. Whether you're new to aquaculture, a long-time farmer, or work in an adjacent industry, all are welcome!

We kicked off this year with a Virtual Meet-and-Greet event in January, where over 100 members joined over two sessions. Since then, members have given presentations about seafood tracing, the social dimensions of aquaculture, and seaweed marketing, with more fascinating lectures around the corner.

One of the standout advantages of the AIE compared to other social networking sites is our responsiveness to user needs. When AIE members requested instant messaging, we upgraded our plugin to allow for real-time communication. When there was a call for a way to leave feedback on any page, we added a feedback button to ensure we could continually improve based on user suggestions. In response to user requests for a way to propose their own online courses, we are developing a system that allows members to submit and manage their educational content. This adaptability ensures that the AIE evolves in ways that directly benefit the aquaculture community.

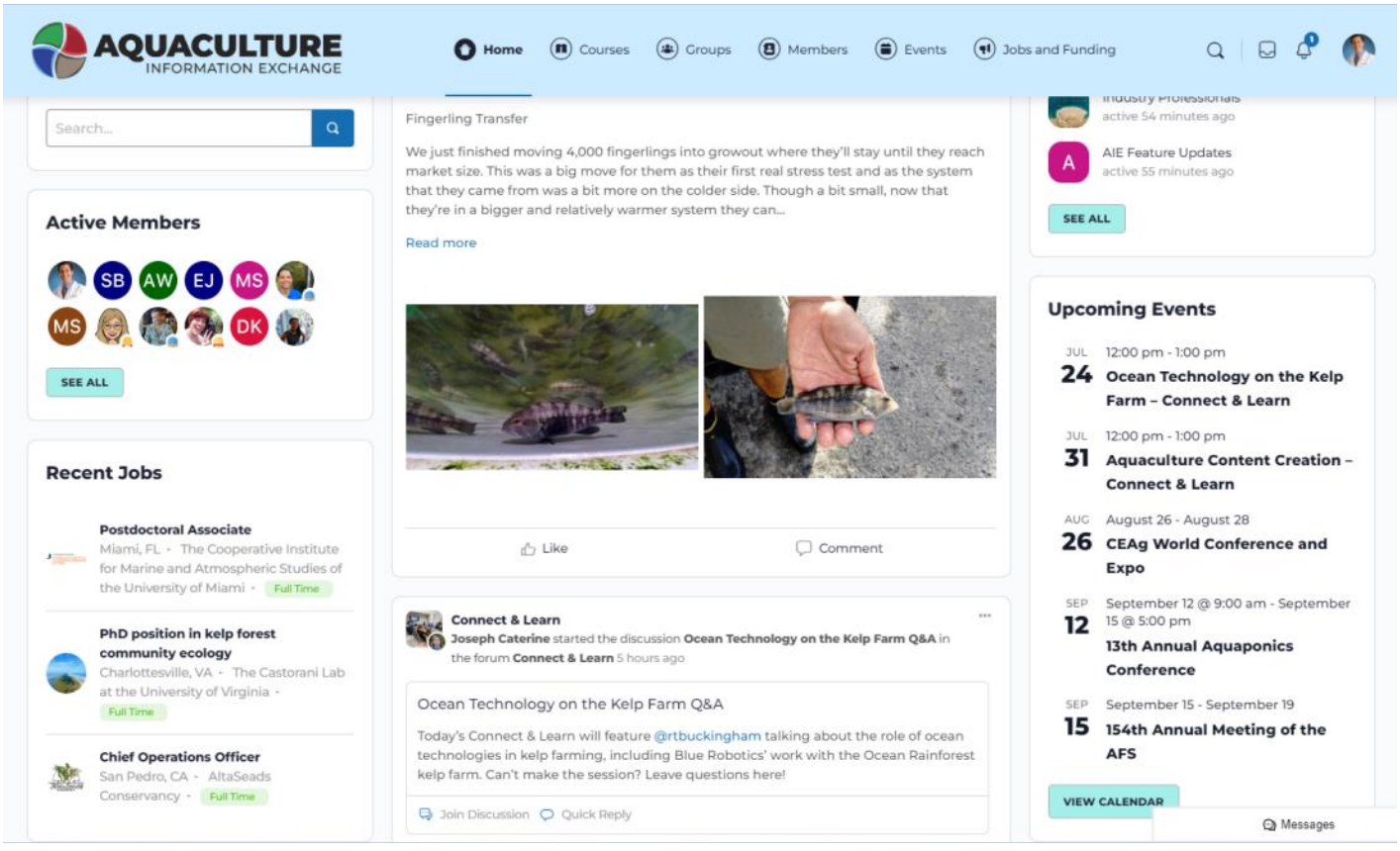
The AIE is committed to promoting inclusivity and diversity within the aquaculture industry. We believe that a diverse community is a stronger community, and we strive to create an environment where all members feel welcome and valued. We've spotlighted groups like *Women of the Water* and *Minorities in Aquaculture* in line with these values. We are working to make our website accessible for everyone, regardless of their level of technical expertise or physical abilities.

By joining the Aquaculture Information Exchange, you are stepping into a vibrant community where your voice matters, your challenges are addressed collaboratively, and your professional growth is supported by tailored resources and continuous learning opportunities. Together, we are not just participants in an industry but pioneers shaping the future of aquaculture through innovation, mutual support, and responsive development.

Joe Catarine is the digital experience and community manager who is running the Aquaculture Information Exchange through the Virginia Sea Grant. (jwcatarine@vaseagrant.org)

Article first appeared in *AquaCulture North America* magazine:
https://www.aquaculturenorthamerica.com/growing-together-online/?oly_enc_id=3569F2023834H2X

Below is a screenshot from the website:
https://aquainfoexchange.org/



AQUARIUM REPORT

A Visit to the Los Angeles Zoo
By Nick Saint-Erne, DVM, CertAqV

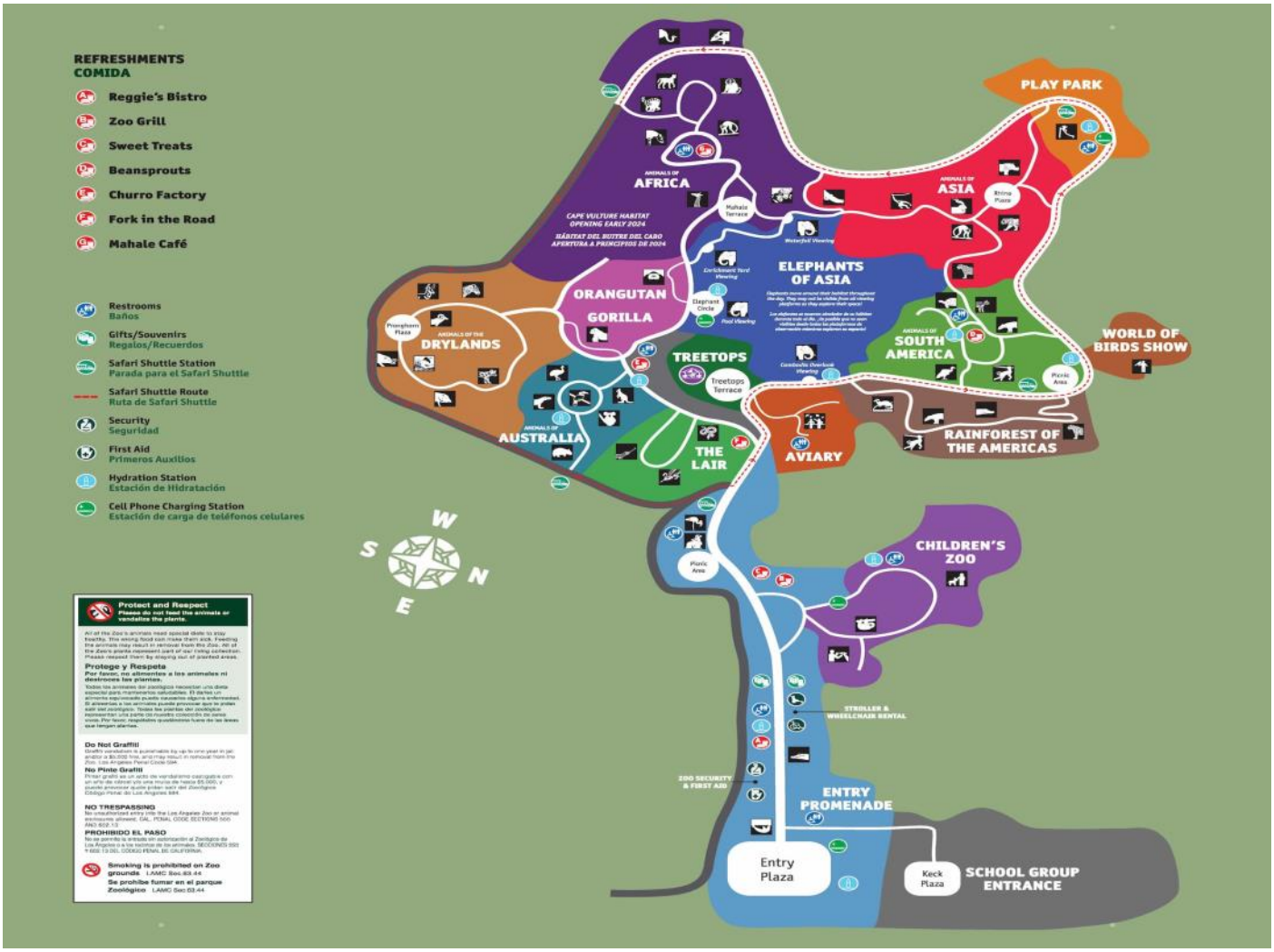
Located in Griffith Park, the popular Los Angeles Zoo and Botanical Gardens occupy an area of 133 acres (54 hectares). With over one million visitors a year, the zoo and gardens are home to over a thousand of species of flora and fauna from around the world, including more than 1,700 mammals, birds, amphibians, reptiles, fish and invertebrates, representing more than 270 different species, of which more than 60 are endangered.

The massive space is neatly divided into different zones for convenience. Although all of them are worth visiting, The Lair, which opened in 2012, houses some of the rarest and most endangered reptiles and amphibians. The zoo hosts some of the best events in the city (see map below).

Greater Los Angeles Zoo Association
5333 Zoo Drive, Los Angeles, CA 90027
(323) 644-4200
lazoo.org



Photo of entrance to the L.A. Zoo
By Nick Saint-Erne



AQUARIUM REPORT

The L.A. Zoo opened in its present location on November 28, 1966. In 1998, the zoo opened Chimpanzees of the Mahale Mountains, followed by Red Ape Rain Forest in 2000, the Komodo Dragon Exhibit, the Winnick Family Children Zoo in 2001, the Entry Plaza, Children's Discovery Center and Sea Lion Cliffs (now Sea Life Cliffs) in 2005, Campo Gorilla Reserve in November 2007, Elephants of Asia in the winter of 2010, and the LAIR (Living Amphibians, Invertebrates, and Reptiles) in 2012. In 2002, the zoo became a certified botanical garden, and the official name of the institution was changed to the Los Angeles Zoo and Botanical Gardens. Throughout the zoo grounds, there are 15 different collections of plants, highlighting over 800 different species, with a total of over 7,400 individual plants.

The Los Angeles Zoo has been successful in its breeding program of the rare California condor, helping to grow the number of condors in the world from a low of 22 in the 1980s to over 430 today. It is one of the few zoos worldwide to have the mountain tapir, and is the only zoo outside of Peru and Brazil to house the red uakari. It was one of the first zoos to successfully breed echidnas, and gave birth to the first Coquerel's sifaka outside of Madagascar, the sifaka's native homeland. They also breed the rare Komodo Dragon.

The city of Los Angeles owns the zoo, its land and facilities, and the animals. Animal care, grounds maintenance, construction, education, public information, and administrative staff are city employees. The Greater Los Angeles Zoo Association (GLAZA) was created in 1963 and is a nonprofit corporation created to support the Los Angeles Zoo in its mission to nurture wildlife and enrich the human experience. GLAZA's primary responsibility is to seek and provide financial support for the zoo's programs and capital projects. GLAZA also provides support through membership, organizing special events and travel programs, producing publications, coordinating one of the largest zoo volunteer programs in the country, administering the contract for visitor services concessions within the zoo, and supporting community relations, and public relations.



A couple of American Alligators lounging in the sun. One of the alligators was first spotted in a local lake in 2005, but it wasn't until 2007 that it was captured and brought to the zoo!





The L.A. Zoo has hatched over 53 Komodo Dragons in their highly successful breeding program.



Critically endangered Iranian harlequin newts.



The ever-popular red belly piranhas are exhibited in the South American rainforest exhibit.

All photos on this page by Nick Saint-Erne.

CASE REPORTS

Treatment of gills atrophy in an Axolotl

Emanuele Lubian *DVM, PhD, EM, GPCert(ExAP)*
E-mail: emanuele.lubian@hotmail.com

In June 2023, a specimen of axolotl (*Ambystoma mexicanum*) was brought to the hospital for a clinical examination due to an alteration in buoyancy that had occurred in last few days. The owner reported that the animal was unable to eat, leaving the uneaten food on the bottom of the tank. There was no visible improvement of the clinical signs in the following week, so the owner decided to ask for a professional opinion.

The axolotl was kept alone in a approximately 90 L aquarium, decorated with live plants. The owner checked some of the environmental parameters only once when he installed the aquarium, and few weeks later. At the time of the examination the owner was monitoring only the water temperature, which was around 27°C. The owner reported what he done in the attempt to decrease the water temperature: adding cold water, installing an aquarium fan out of the water and freezer blocks placed inside the filtration system out of the aquarium. Despite all of these, the temperature was still around 27°C (the goal of the owner was to reach 24°C). In that period of the year environmental temperature in our country was about 33-35°C. Water temperatures were about 20°C in the winter; but in summer it was very hard in some days to get the water temperature down below 27°C.

The water used for the aquarium was tap water left in a tank for 24h to dechlorinate with air contact (occasionally the owner used a bio-conditioning product). He used external filtration system (cleaned approximately every 3 months), and a partial change of water was carried out every 30-45 days. The animal was fed with thawed *Chironomus* larvae initially, but currently with pellets for axolotls.

During the clinical examination the animal was alert and responsive, able to stay at the bottom of the transport container and go to surface when stimulated. Significant dilatation of the abdomen and mild generalized muscular atrophy was noted. The oral cavity was normal. The gills appeared with severe atrophy. No further alterations were observed during the clinical examination.

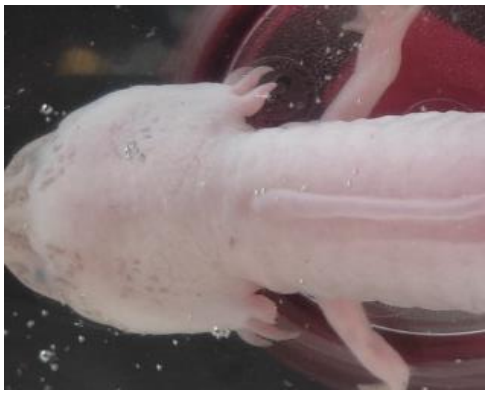
The owner agreed to have the patient hospitalized to carry out further diagnostic investigations. The animal was housed in a 8 litre plastic aquarium with an oxygenator inside, the water temperature was maintained around 18-20°C by a refrigerator.

First of all, an x-ray with contrast medium was performed, without any remarkable findings. A cytological investigation on the gills was performed for a quick visualization: the cells appeared normal and no pathogens were identified. This has been followed by a histological examination of the gills, with the sample sent to an external laboratory. The histological examination result was: “epithelium is intact and regular. Edema and scattered heterophilic infiltrate are observed; morphological diagnosis: edema and mild subacute inflammation, consider a mild subacute inflammatory condition with possible bacterial etiology”.

Waiting for the histological response, during the hospitalization period the animal started swimming well and eating worms and mealworms. Considering the improved condition of the animal and the result of the histological examination, the final diagnosis was a bacterial infection secondary to unsuitable environmental conditions. For this reason, the initial treatment didn’t involve the use of antibiotics (the animal was healing and the antibiotic sensitivity test would have taken several days), but just the correction of the environmental conditions.

The patient has been discharged with some guide lines for the owner to correct the environmental condition: use a refrigerator or put the aquarium in a cool cellar, especially during summer, considering that the optimum environmental temperature for axolotls is 16-18°C and should never exceed 24°C. The ideal water pH is 7.4-7.6 (this was the same as the tap water used by the owner); the use of an oxygenator has been recommended to help the animal to breathe as consequence of gills atrophy; furthermore the owner has been advised to leave the water to stand for 24 hours before adding it to the tank, and to supplement the diet with live prey (earthworms, mealworms).

Once back home, three months later the animal was healthy and the gills were completely grown back. This clinical case shows the importance of right management to control aquatic animal diseases.





The pictures show the axolotl during the first clinical examination with no gill lamellae, and after being hospitalized with some regrowth of gill lamellae.

CASE REPORTS

Treatment of Aeromonas infection Koi carp
Emanuele Lubian *DVM, PhD, EM, GPCert(ExAP)*

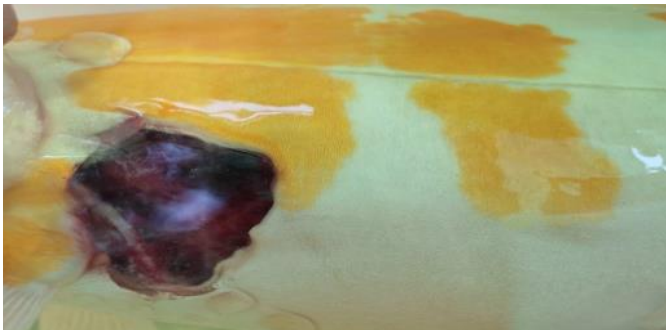
In early July 2023, a private owner of koi carps (*Cyprinus rubrofuscus*) contacted me following the loss of some fish in his pond. He reported that the animals started to die two weeks before, all characterized by the same prodromic clinical signs: skin hyperemia and following ulceration with, in the advanced stage, exposure of the muscular layers. These lesions were involving mainly the side of the body.

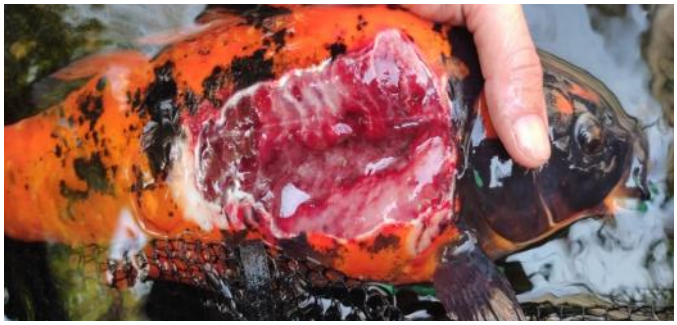
I made a house-call to the garden where the pond is located to examine the fish and evaluate the water condition. The pond was about 6000 liters with about 20 koi carp inside (both adults and young), there were also some goldfish (*Carassius auratus*) and some western mosquitofish (*Gambusia affinis*) – this species is often used for mosquito control in ponds. I performed a water analysis with a dipstick test kit, reporting the following values: Nitrate >250 mg/L, Nitrite 5 mg/L, Cl_2 0 mg/L, GH 0 mg/L, KH 0 mg/L, pH 7.3.

The filtration system included mechanical, chemical, and microbiological filtration systems with a water pump that pushes about 3000 L/hour. Water changes were performed once a week of about 1/5 of the total pond volume. Near the pond there was a plant (common hazel: *Corylus avellana*) which had leaves that fell into the pond. To avoid contact with the latter and because the fish, especially in the last few days, were jumping out of the pond, the owner put a plastic net about 30 cm on one side of the pond.

Five koi have been reported by the owner with the following signs: one of them had a deep ulceration with severe tissues lost with the exposure of muscular layers (about half of the lateral body length), another one showed the same lesions but in a smaller area (about 2 cm on the lateral part of the body), the others had hyperemic spot lesions spread on both sides of the body. The owner started, under suggestion of the breeder who sold him the animals, a therapy with enrofloxacin intramuscular (IM) at the dose of 5 mg/kg every 3 days. Further investigation, such as microbiological examinations, has been agreed by the owner.

The day after my visit, the koi with the most severe lesions passed away and the body was brought to my practice for the postmortem examination, which confirmed a severe ulcerative and suppurative dermatitis, confirmed by the histological examination.







The two pictures above show the koi with the worst clinical signs; the second photo is of its post mortem examination. (NB, the picture shows an hand without gloves because these are pictures sent me by the owner before my clinical examination.)

No further lesions have been assessed on the other analyzed organs. Microbiological analysis identified *Aeromonas* sp. (in particular *A. bestiarum* compatibility 90%), with resistance for fluoroquinolones and beta lactams, but sensible for aminoglycosides (both gentamicin and amikacin).

Treatment with amikacin injections was started at the dose of 5 mg/kg IM q24h for 7 days. All the unhealthy fish were treated. Further recommendation was a thorough cleaning of the pond, followed by a complete change of the pond water, to increase the water changes for the first period (1/5 every two days), and increase the filtration system (bigger and with a pump with greater capacity). Furthermore, I suggest to decrease the number of fish or increase the volume of the pond.

After seven days of therapy the affected fish were completely healthy without any cutaneous sign, except a few lesions that were still healing. In the next week after starting treatment, two other fish showed the clinical signs and were treated using the same protocol. None of the other fish showed any clinical signs. At the follow up visit two months later, the owner didn't report any further cases. During this period the water has been analyzed once every week or two and the values reported after two months were: Nitrate 10 mg/L, Nitrite 0 mg/L, Cl2 0 mg/L, GH 0 mg/L, KH 0 mg/L, pH 7.

WAVMA SPONSOR

Esox Biologics *Detect* Diagnostics





Are you faced with the common dilemma where histology indicates pathology, but the causative agent cannot be identified? Do your current diagnostic tools provide targeted detection with little insight?

By omitting total microbiomes, the true cause of disease is ignored. The consequences of these failings lead to misdiagnosis and ineffective treatments.

Our Detect platform is the world's most powerful pathogen detection tool available to aquatic veterinarians. Utilising metagenomics, we can identify every organism within a single sample, without amplification and without bias. Add Detect to your diagnostic toolbox and gain insights into:

Novel pathogens
Secondary infection
Cross-clade interactions

But that's not all – we can also distinguish between benign and pathogenic strains, identify antimicrobial resistance markers, and uncover novel pathogens, allowing you to make informed treatment decisions.

Our platform has two applications: Detect for livestock and Detect for the environment. Choose Detect Livestock for a single use application designed to help identify causative agents of presenting pathologies, or choose Detect Environment for a longitudinal surveillance package that monitors pathogen abundance within the environment, providing unique proactive insights before disease manifests.

With prices starting at just £125, Detect offers unparalleled value, delivering comprehensive pathogen insights that are easy to interpret and accessible from your mobile device. Contact us today and elevate your diagnostic accuracy.

Detect. Predict. Prevent.

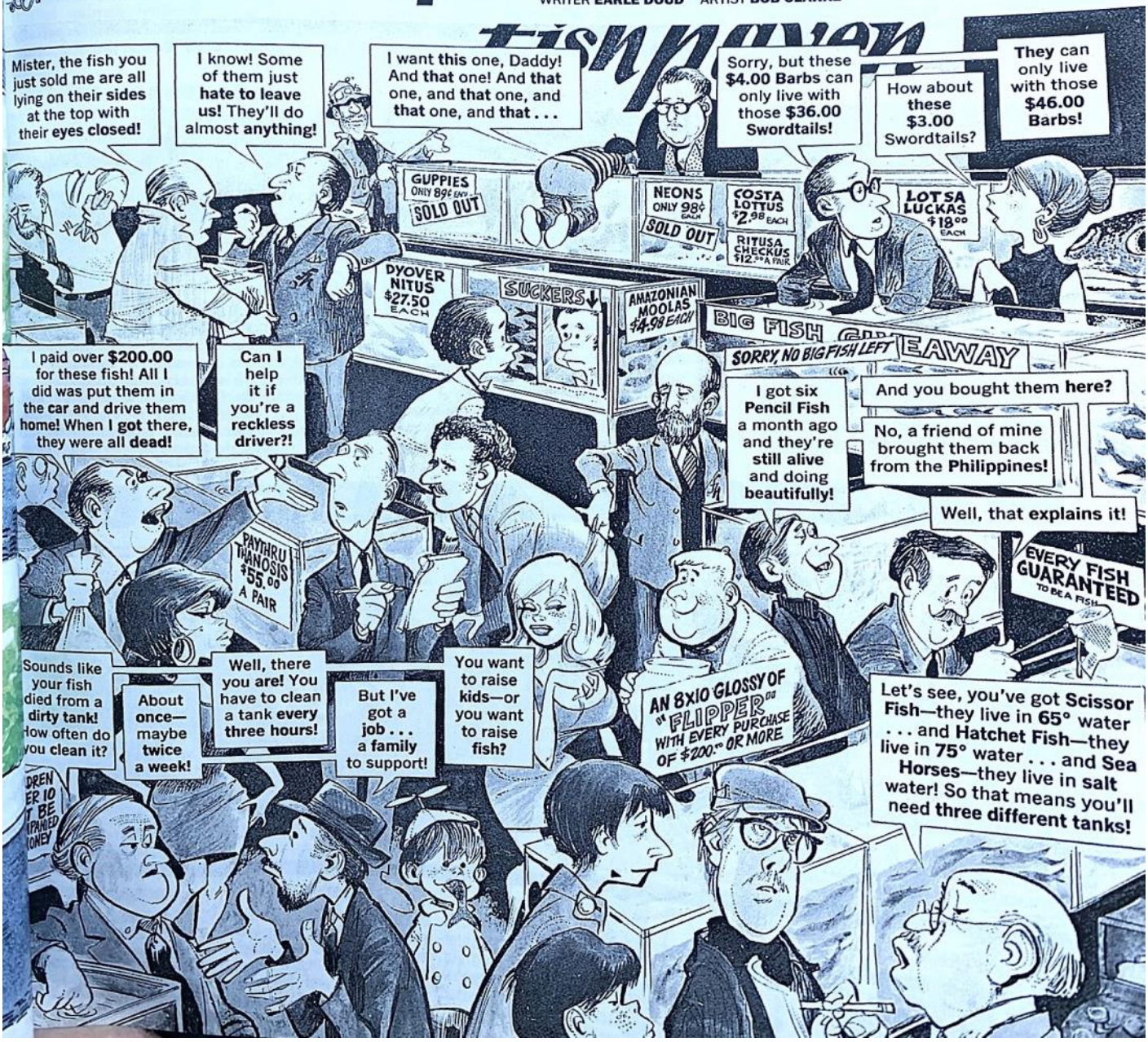


TANKS A MILLION DEPT.

One of the fastest growing hobbies today (that we're free to talk about in a family magazine) is the collecting, breeding and raising of Tropical Fish. From their purchase to their demise (often the same day), Tropical Fish are decorative, quiet, easy to feed, relaxing to watch, and an utter bore. And yet, despite the fact that they do nothing but swim around (or float on the top), Tropical Fish has become a multi-million dollar industry. So to save you from becoming a hopeless addict . . . if you haven't already become one . . . we now present . . .

A MAD LOOK AT Tropical Fish

WRITER **EARLE DOUD** ARTIST **BOB CLARKE**



LITERATURE REVIEW

The Complex Lives of British Freshwater Fish
By Mark Everard
CRC Press, Boca Raton, FL. 2020.

Book Review by Nick Saint-Erne, DVM, CertAqV

This interesting book is about the natural history of all the freshwater fishes found in the British Isles. It contains 14 chapters and 6 appendices, plus an index in its *xiv* plus 355 pages. The author is an avid nature watcher, angler, scientist, and keeper of pet fish. I found this book useful as an aquatic veterinarian, since it is helpful to know how fish live in the wild and understand their natural behaviors.

In the first chapter the author defines "fish" as an artificial category of animals covering a wide array of aquatic creatures that share some similar attributes, such as living in water, breathing with gills and having fins. The recreational and food values of fish set them apart from the rest of nature in the eyes of the public and policy makers. They are the most important animal protein source that is still captured from the wild.

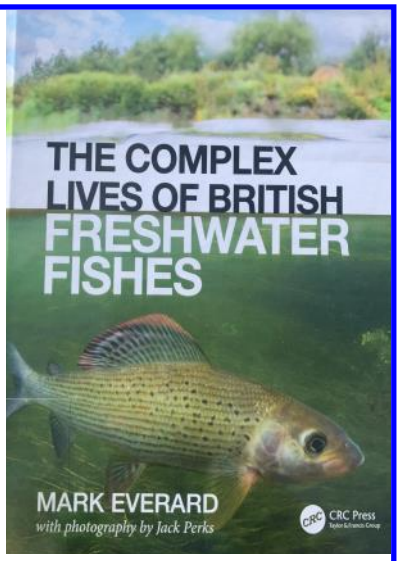
In Chapter 2, he lists how fish are also important as farmed food sources. The most farmed aquaculture species globally are the silver carp (*Hypophthalmichthys molitrix*), followed by the grass carp (*Cteno-pharyngodon idella*) that are produced in China. In Vietnam, it is the Tra catfish (*Pangasianodon hypophthalmus*) and the Basa catfish (*Pangasius bocourti*) that are the most produced fish. In Britain it is salmon raised in sea cages, then brown trout (*Salmo trutta*), native to the UK. Rainbow trout (*Oncorhyncus mykiss*), originally native to the USA, are also commercially raised in the UK.

Common carp (*Cyprinus carpio*) have been bred in ponds in China for at least 2400 years, and spread westward into Europe during the Roman Empire. In the early Middle Ages, stew ponds became common at estates and monasteries in Great Britain. By the 11th Century, pike, eels, and bream were being raised in ponds. Common carp were imported to Britain by the 14th Century as food for monks.

Dame Juliana Berners, an English noblewoman and Prioress of the Sopwell Nunnery (1460-1500) wrote the earliest English book on fishing, in 1496: *A Treatyse of Fysshynge with an Angle*. This predates the famous *The Compleat Angler* (1653) by Izaac Walton by over 150 years.

An interesting definition given in this book is the differentiation between 'Shoal' - fish swimming together in a distinctly structured formation with fish swimming equal distances apart and responding as a group; and 'School' - fish staying together in a loosely formed group. This is a valid distinction in how fish swim in groups and we should try to use this.

In Chapter 4—Knowing Your Way Round a Fish, he explains, "Fish benefit from life in a buoyant medium by a reduced need for a strong skeletal system to support their own weight."



Freshwater is nearly 800 times denser than air. Pressure waves move through water nearly five times as fast as through the air, due to higher density of the water. Fish can detect pressure waves in the water with their inner ears, gas bladders (using Weber's ossicles to transmit vibrations from the bladder to the inner ear in some species of fishes), and lateral line organ. The lateral line organ detects low-frequency sounds, surface waves, water currents, and alterations in pressure, which allow orientation, shoaling behavior, and predator or prey detection, even in low light.

Chapter 5 describes all the families of fish found in Great Brittain: Cyprinidae, the carps and minnows; Salmonidae, salmon and trout; Esocidae, pikes; Percidae, perch; Gasterosteidae, sticklebacks and tubesnouts; Cottidae, sculpins; Nemaceilidae and Cobitidae, loaches; Anguillidae, eels; Petromyzontidae, lampreys; Clupeidae, herring, shad, sardine and menhaden; Acipenseridae, sturgeon; Lotidae, burbot; Siluridae and Ictaluridae, catfishes; Centrachidae, sunfish.

Chapter 6 discusses the various ecosystems in which fish live. Chapter 7 discusses the lives of anadromous fishes—those living as adults at sea but returning to freshwater to breed; and catadromous fishes—living in freshwater as adults, but returning to the sea to spawn. Chapter 8 is the feeding behaviors of the different fish species, including filter-feeding, parasitism, predation (carnivores or piscivores), omnivores, and herbivores.

Chapter 9 discusses unusual fish species, such as the largest British fish, the sturgeon (*Acipenser sturio*), which can grow over 10 feet long and weigh 460 pounds; and mentions a goldfish in Devon, England that lived for 43 years in an aquarium. Chapter 10 is all about the European eel. It mentions that the Romans kept eels as pets in pond and they placed ear rings as ornaments on the fish through their gill plates.

Chapters 11 and later discuss conservation of native fish species. The author lists these threats to the survival of native fishes: poor water quality, decreased water quantity, habitat degradation, introduced invasive species, and threats from aquaculture. As aquatic veterinarians, we understand water quality and these other threats to the environment, and need to work together to protect native fish species, as well as the aquacultured ones we normally treat.

GRAND ROUNDS CASE

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

Metronidazole Dosages

Hello, WAVMA,

I am wondering if anyone has experience with medicated metronidazole bath treatments for Discus for antiprotozoal? Dosage? Time?
Thank you in advanced!

-**Meg**

Hi Meg,

What are you using as your base drug form for metronidazole? If you are crushing tablets or using powder it can be a difficult drug to keep in suspension depending on water temperature and water parameters. You can basically end up with a film on the bottom of the aquarium and a questionable concentration in the water, even with water agitation.

The IV formulations are basically limited to 500 mg/100 ml, or 5 mg/ml. That limits water bath dosing methods and can get expensive.

Metronidazole also may have endocrine signaling/pituitary hormone suppressive effects in fish (and who knows what other species) based on zebrafish research. That makes me cautious about water contamination and use in any facility where there may be breeding. We really need more information on those effects in other species. I tend to only dose metronidazole orally because of all of that.

Jack Kottwitz DVM, PhD, CertAqV
Noah's Ark
Locust Grove, GA

Hi Jack, and Meg,

I use bulk metronidazole powder (available from Fishman Chemicals, https://fishchemical.com/). I find it dissolves fairly well. It can be measured on the Hach spectrophotometer (see reference below) indicating good dissolution. I can't speak to any long term side effects regarding breeding, but I have not seen any acute side effects.

D. Harry Webb, Cynthia Marrero, Helen Ellis, Lea Merriwether & Alistair D. M. Dove (2013) A Simple Reagent-Free Spectrophotometric Assay for Monitoring Metronidazole Therapy in Aquarium Water, *Journal of Aquatic Animal Health*, 25:3, 165-170, DOI: 10.1080/08997659.2013.788583

Michael Hyatt, DVM
Wildlife Conservation Society's New York Aquarium
Brooklyn, NY

Hello,

I was told that high doses (in general 6 ppm would be advised) would be counterproductive, or at least I would think that it damages the kidneys? Or is this another myth that you must be aware for toxicity? I have had clients using it at 25 ppm (mg/L) without problems.

Best regards,
Tim Barbé

Metronidazole has been recommended for treatment of flagellated protozoa, specifically *Hexamita* and *Spironucleus* in discus, angelfish and other cichlid species. Traditional dosage is 4-25 mg/L added to the water in a quarantine aquarium.

As an alternative to Metronidazole baths, as Jack Kottwitz mentioned, it is better dosed orally rather than just adding it into the water. Medicated food can be custom made with a Veterinary Feed Directive prescription in the USA. The dose is 12 mg Metronidazole/gram of food. Feed daily for 5 days.

Medicated food can be made by using small fish food pellets and adding in the white of eggs until the food is lightly moistened. Use powdered metronidazole or crush the tablets and add to the food, mixing thoroughly. Let the food dry in a warm oven or for a short time in the microwave, just long enough until the food is dry. Store in a sealed container in the refrigerator until used.

Previously there was a Metronidazole medicated flake food available from the Florida Tropical Fish Farms Co-op Store: https://www.ftffacoop.com/. However, I do not see it on their current website.

Another source for aquatic medications is B.L. Mitchell Aquaculture Supplies (in Leland, Mississippi, (662) 332-1951). That is where I get many fish medications. An online search found Metronidazole for pets available on Amazon, Chewy and Petco websites.



Nick Saint-Erne, DVM CertAqV

Photograph: Seachem brand of Metronidazole powder.

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American Association of Fish Veterinarians

Seattle, Washington, USA

October 17-21, 2024



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.

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.



Aquaculture Conferences & Exhibitions

AQUACULTURE AFRICA 2024 – AFRAQ24
Hammamet, Tunisia – November 19-22, 2024

Tunisia is the second biggest aquaculture producer country in North Africa region, after Egypt, and is looking forward to expanding the sector owing to the competitive advantages on its blue economy domain.
www.WAS.org
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XI International Symposium on Fish Parasites
Fish Health, Parasites and Biodiversity Conservation
Mérida, Mexico – 20 January to January 24, 2025

AQUACULTURE AMERICA 2025
New Orleans, Louisiana USA
March 6-10, 2025
www.was.org

WORLD AQUACULTURE 2025 CHINA
Qingdao, China
April 24-27, 2025
www.was.org

WORLD AQUACULTURE SAFARI 2025
Entebbe, Uganda
June 23-26, 2025
www.was.org

AQUACULTURE EUROPE 2025
Valencia, Spain
September 22-25, 2025
www.aquaeas.org

LACQUA 2025
Puerto Varas, Chile
October 6-9, 2025
www.was.org

American Association of Fish Veterinarians
12th Annual Conference
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https://fishvets.org/aafv-conference/

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AQUACULTURE 2025 –
New Orleans, USA – March 6-10, 2025

Every three years, the Triennial is held somewhere in the United States. In 2025, the Triennial returns to sunny New Orleans – one of America's favourite cities. The Triennial is the largest aquaculture conference and tradeshow with nearly 4,000 attendees from over 90 countries. The Triennial combines the annual meetings of the National Shellfisheries Association, Fish Culture Section of the American Fisheries Society, World Aquaculture Society, and the National Aquaculture Association. In addition to the annual meetings of the main sponsors, look what else is happening at AQUACULTURE 2025 with the annual Meeting of USAS, the U.S. Chapter of World Aquaculture Society and the Aquaculture Suppliers Association, the annual Meeting of the U.S. Trout Farmers Association, the special sessions organized by Aquacultural Engineering Society and International Association of Aquaculture Economics and Management and many other meetings of working groups, government agencies and related aquaculture activities. Click for Brochure and abstract.

AFRAQ24: AQUATIC ANIMAL AND ECOSYSTEM HEALTH SESSION
November 19 - 22, 2024
Hammamet, Tunisia

THEME: Aquaculture biosecurity and biosafety control for climate-smart aquaculture development in Africa: The merits of regional collaboration for sustainability

The opportunity for the growth and of development African aquaculture as a sustainable food-system is immense. However, threats for the sectors sustainable development arising from demographic changes, environmental degradation and climate-change are real and growing. The anticipated impacts of climate change for the supply and quality of Africa's water resources amidst environmental degradation and population growth include El-Nino oscillations and increased frequencies and intensities of precipitation, storms, droughts with consequent flooding, rise in water levels of water bodies, siltation, pollution, turbidity, water temperatures, and falls dissolved oxygen.
These are environmental stressors whose consequences for aquatic animal health and welfare, aquatic biodiversity, food-safety and public health are quite well known.

Within this context, the spatial distribution and potential impacts of the mentioned environmental stressors across the continent's water basins and catchments are a threat for the sectors sustainable development. This is because the aquaculture production technologies used on the continent rely on the inherent availability and quality of water as a natural resource. Most aquaculture producers and traders do not have the capacity to invest in closed aquaculture systems and so farm native species using open or semi-open aquaculture production systems. The growing concerns over mass mortality incidents, aquatic animal disease, occupation health and food-safety concerns come as no surprise.

As natural resource goods, the sustainable supply of good quality water, feed ingredients, feedstuffs, seed and health of stock can only be assured from healthy aquatic ecosystems. Africa has therefore opted to address its aquatic biosecurity and biosafety concerns from the perspective of the water-basins and catchment as the primary ecological epidemiological unit through a continental Aquatic Animal Health Strategy. Bearing in mind the multiplicity of factors influencing the sustainable management of water resources for productive uses such as fisheries and aquaculture, the need for regional and multisectoral collaboration remains paramount.

https://www.was.org/meeting/code/AFRAQ24

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