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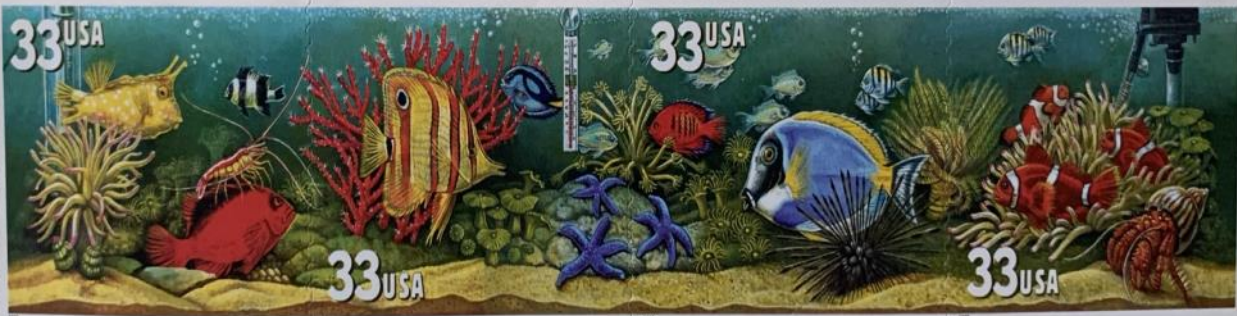
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Volume 14, Number 4
Fourth Quarter, 2020

AQUARIUM FISH

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WHO ARE WE

MISSION

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

OBJECTIVES

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

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

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

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Editorial 4
 Editor’s Note 4
 Advertising Rates 4

Executive Reports 5-8
 President’s Report 5
 Secretary’s Report 6
 Treasurer’s Report 7
 WAVMA Elections 8
 WAVMA 2020 Annual General Meeting ... 10-11
 Executive Board Responsibilities 12

Privileges & Benefits of WAVMA Membership 9

Committee Reports 9-16
 Obituary: John Bernard Gratzek, DVM, PhD ... 9
 Join a WAVMA Committee 12
 WAVMA Committees 12
 Fellows Advisory Council 13
 Meetings Committee 13
 Credentialing Committee 14
 Certified Aquatic Veterinarians 15
 Summarizing an important year for the Education and Students Committee 16-17
 Murdoch Student Chapter Event Report 18-19
 Education & Student Committee..... 21
 New Website and Dues Payment Update..... 22
 Canada’s farmed salmonids Code of Practice. 22

Instructions for Authors and Contributors 23

Colleague’s Connection 24-25
 Fish Philately: Dr. Nick Saint-Erne..... 24-25

Centerfold 26-27
 Fish Postage Stamps from Around the World,
 Photographs by Nick Saint-Erne, DVM, CertAqV

Case Reports 28-31
 Chronic lymphocytic dermatitis in a koi fish
 (*Cyprinus rubrofuscus*)..... 28-31

Grand Rounds Case 32-33
 Flipper Find Forensic Identification 32
 Koi Blood Cell Deformity 33

Aquatic Veterinary Abstracts: *Francisella* ...34-35
 Outbreak of francisellosis in cultured neon jewel
 cichlids from Morelos, Mexico 34
Francisella infections in fish and shellfish 34
 Multiple-locus, variable number of tandem repeat
 analysis (MLVA) of the fish-pathogen *Francisella*
noatunensis 35
 Characterization and Vaccine Potential of Mem-
 brane Vesicles Produced by *Francisella noatunensis*
 subsp. *orientalis* in an Adult Zebrafish Model ... 35

Aquatic Veterinary CE & PD 36-39
 2021 John L. Pitts Aquatic Veterinary Education
 Awards Program 36
 The Atlantic Salmon Conservation Foundation
 Webinars 37
 20th International Conference on Diseases of Fish
 and Shellfish 38
 2021 AQUAVET I & II & III Courses 38
 WAVMA’s WebCEPD Program 39
 Freshwater Mussel Conservation 39

Index of 2020 Articles 40-43

Sponsors
 WAVMA Shop 14
 The Bug Company 20
 ZooMed Laboratories 44

Cover Photo:

Postage Stamps from USA released in 1999 featuring Aquarium Life. At that time, it only cost 33 cents to mail a first class letter domestically.

See article about collecting Fish postage stamps on pages 24-27.



Get The Fuller Picture From WAVMA WebCEPD Online Webinars

WAVMA's WebCEPD Program - Webinars for Global Aquatic Veterinary Education

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

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

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>.

Editor’s Note

The year has ended and we are still in the midst of the COVID-19 outbreak. What a crazy year—but the end is in sight: COVID vaccines are being administered to healthcare workers, those in nursing homes, the elderly and teachers currently. Veterinarians are also on the priority list, and so we should be able to register for our vaccinations soon.

Despite the paucity of in-person meetings held in 2020, there was a plethora of virtual online meetings. WAVMA held our Annual General Meeting and Conference online and it was a great success (see pages 10-11). Congratulations to the Executive Board, the Meetings Committee and the Education and Student Committee members who put together that event.

In this issue you will find summaries of the years’ activities by our Officers and Committee Chairs, so read those updates if you want to see all the great work WAVMA members did this past year, despite the pandemic. It was a productive year for WAVMA.

And for those veterinarians who have interests outside of just keeping aquariums for a hobby, (such as growing Bonsai as seen in our last issue) see the article about stamp collecting—specifically Fish Philately—on pages 24-27. You can connect your passion for Aquatic Veterinary Medicine with many other things!

Dr. Alicia McLaughlin has written a Case Report about a koi with chronic dermatitis (pages 28-31) and there are interesting reports in the Grand Round Cases on pages 32-33. Let us know your thoughts.

Francisella infections are being found more often in aquatic medicine, so review the abstracts from papers presented on this emerging pathogen in the Literature Review section on pages 34-35.

Lastly, I am very sad to see the report of the passing of Dr. John Gratzek, DVM, PhD, formerly of the University of Georgia College of Veterinary Medicine. He was a stalwart supporter of Aquatic Veterinary Medicine and many veterinarians owe their interest in fish medicine to him. Rest in Peace.

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

*Stamp Photos by Nick Saint-Erne, DVM
from my personal stamp collection.*



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
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President's Report

Dear Colleagues,

2020 was an exciting year for WAVMA, with some having said we accomplished more this year than since the inception of the organization. Mainly it was the launch of a new website with it's many moving parts, that our hard-working members Drs. Stephen Reichley and Chris Walster devoted 10 hours a week or more on, despite the personal hardships of the pandemic, working with the developer to address and fix all the kinks. From changing how we conduct the elections, to changing how we do membership renewals, to automating the membership due-date tracking correctly, and making sure all members are listed accurately, the details were enormous, and I am so grateful they were able to work through them all and present us a fantastic new website to head into the years ahead! If you haven't had a chance to check it out, now is the time: www.wavma.org!

With the addition of Dr. Bart Gorgoglione as the chair of the Education & Student Committee, we had record breaking webinar attendance, and are well on our way to our common goal of being THE go-to space for all things about aquatic veterinary medicine, for students as well as seasoned practitioners.

We will miss Dr. Dave Scarfe and Dr. Nick Saint-Erne, two of the original founders of WAVMA, who next year will no longer be on the Executive Board. On behalf of all WAVMA members we offer you gratitude for all of your years of service to the organization, we will miss you much and wish you the best! Our current board is now composed of more newer members to the organization, and a balanced board representing the various aspects of aquatic medicine, so, we will have our work cut out for us to follow in some big footsteps and get up to speed quickly, yet the diversity will be a real asset to the future of WAVMA. Welcome new 2021 Executive Board members!

Our Annual General Meeting was also a challenge this year, as making the pivot from an in-person meeting to an on-line event definitely had many of us outside our comfort zones trying to make sure we could anticipate and address problems before the event (recording, hosting, tracking attendance, internet connection issues, etc.). Dr. Julius Tepper organized a great event and it ended up being a resounding success, with some of our highest attendance records. Despite all the problems it caused, the pandemic also pushed us to bring out our best selves during this time, and the success of our AGM this year is testament to how often when one door closes, another opens, and with even better results.

I am very proud of all of the members of WAVMA this year. I have said it before, it says a lot about the integrity and compassion of the members of our unique organization, to continue to prioritize the advancement of aquatic veterinary medicine, knowing how important that is, and not wavering even under some of the worst global conditions.

Thank you to all of the current Executive Board, and to all of you, for doing your part to help this organization grow and spread the word. Therefore I ask that if you do not currently repost our social media post, please do that going forward, and share our educational opportunities with

colleagues, so that we may continue to champion for the fishes, and each other.

It has been an honor to be your president in 2020, now on to an even better 2021! Blessings to you and your family,

Jena Questen, DVM, CertAqV
 2020 WAVMA President
President@WAVMA.org



Secretary's Report

The year 2020 has certainly given us all a number of things none of us could have foreseen. As we come to a close of 2020 and my term as Secretary, it's time to reflect back and to look forward to hopes of important future activities that might bring WAVMA to greater heights.

Unquestionably, despite where you live, COVID-19 has created a situation that made 2020 a year unlike any before. Student's educational programs have been disrupted; many veterinarians struggled to maintain their practices and some have lost their jobs. By now most of us know a colleague or other person who has succumbed to the pandemic. But with effective COVID-19 vaccines now being deployed, we see a light at the end of this dark tunnel.

However, as we move into a new (and hopefully better) year, we wish you moments of peace amid the difficulties, and joyful connections with family and friends during the festive season, even if they can't be in person.

Despite the impacts of COVID-19, the Executive Board and Committees have worked tirelessly around the disruptions and have taken the opportunity to accomplish many important things that may move WAVMA into a new era. With cancellation, postponement or moving to virtual meetings, a number of conferences WAVMA usually organizes aquatic veterinary sessions for, the Board decided to take advantage of the funds normally used to support these sessions to completely revise the WAVMA website. The "look" of the website has become more contemporary and a number of administrative actions will continue to be automated during 2021.

Together we have grown and accomplished so much, and I know that we couldn't have done it without a large number of volunteers from our members. Thank you for your loyalty and your dedication. With the Board encouraging committees to take ownership of many programs, we hope that a new membership program will be refined and improved. Those that may be considered in 2021 include:

- Clarifying the CertAqV requirements for becoming certified as competent in aquatic veterinary medicine;

- Revitalizing the WebCEPD program with an increased number of webinars from leading experts around the world;
- Soliciting more contributions to support more applicants for Pitt's Education Awards to help students and new vets get involved with aquatic veterinary medicine;
- Considering making additional funds available to support Student Chapters organize special events at veterinary schools to encourage more vet students to consider a career in aquatic veterinary medicine;
- Possibly providing discounted membership to veterinarians in economically depressed countries and retired members who have been members for at least 10 years.



We have come a long way since 2006 when we started discussing how to create an organization that would cater to those involved or interested in aquatic veterinary medicine. For those of us "older generation" who have been ready to step in and assist with numerous programs in the last 15 years, it is time for us to "pay-forward" and support and help younger generation leaders to infuse new ideas. With the increasing number of veterinarians volunteering to serve on committees and being elected as Board members (along with Directors now representing members in American, Asia-Pacific, African-Middle

Eastern, and European countries), anticipate new, more contemporary membership programs in the coming years.

We hope everyone will enjoy safe and wonderful year-end celebrations, and we wish you a peaceful and prosperous 2021! As always, we encourage members to volunteer for any committee and provide feedback to the Board on any issues you feel the Board should consider.

A. David Scarfe PhD, DVM, MRSSAf, CertAqV
WAVMA Secretary
Secretary@wavma.org

Treasurer's Report

WAVMA is in great financial shape at the end of 2020. We spent quite a bit of money this year revamping our website, WAVMA.org, and it looks great. Offsetting that extra expense was a huge savings from not having attended many conferences this year with the WAVMA booth and lectures, because of the shut down due to the COVID pandemic. While we missed the opportunity for more WAVMA exposure and attracting new members, we saved more money than we ended up spending on the website. The Budget for 2021 will allow WAVMA to attend future conferences to promote Aquatic Veterinary Medicine.

New Members—Fourth Quarter 2020

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

Veterinarians

Jamie Arredondo
Chairat Sumgorthong
Snježana Zrnčić
Jill Spangenberg
Veronica Pardini
Ericka Johnson
Katharine Horzmann
Theresa VonAlmen
Aimee Berliner

Veterinarian—New Graduate

Benjamin Jakobek
Melissa Witherell
Waseem Nazar
Safa Be Brahim
Christina Lyn
Yağmur Yıldırım

Vet Student Members (enrolled in Vet Curriculum)

Linnea-Serine Aune Gernerup
Andrew Lathan
Chloe Priestland
Emily Rue
Zenia Sherman
HUSSEIN HALEMEH
Theano Andriopoulou
Vivian Lee
William Mahendran
Mindy Yeong
Suzanne Testing
CeCe Roberts
Julia Troncoso
Sophia Giattina
Nate Wichman
Gabi Bröcker
Maural Sowlat
Irosh Bandara
Meritxell Royo Becana

Vet Student Members - continued

Elizabeth Price
Carla Ivette Rivera Pérez
Louise Welch
Suneet Chana
Hannah Reynolds
Cody Munson
Raina D'Orazio
Tiera McAdam
Samantha Davern
Ollie Landauer
Jessica Yamauchi
Christie Li
Stella Maris Albarenque
Micha Tarpley
Edsel Wun Quan Yong
Caroline Loftus
Brittney Waranius
Raluca Gearap
Kenna Doeden
Suzy Kwon
eleni fotopoulou
Perrine Keiser
Timothy Kennedy
Pamela Betancourt
Sam Deadmond
Christopher Payne
Agnes Galej
Anna Heineke
Akshaya Chandrashekar
Stella Maris Albarenque
Fransisca Risny Oktavia
Annemiek Wisse
Lee Gedelian
Nicole Gorete Coutinho

Affiliate Members (Non-veterinarian)

Larry Pryor

Welcome to WAVMA!

Nick Saint-Erne, DVM CertAqV

WAVMA Treasurer
Treasurer@WAVMA.org



2021 WAVMA Executive Board



President
Dr. Stephen Reichley
(USA)



President-Elect
Dr. Gillian Taylor
(South Africa)



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(USA)



Secretary
Dr. Morag Clinton
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(USA)

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(Uganda)



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Dr. Claudia Venegas
(Chile)



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(UK)

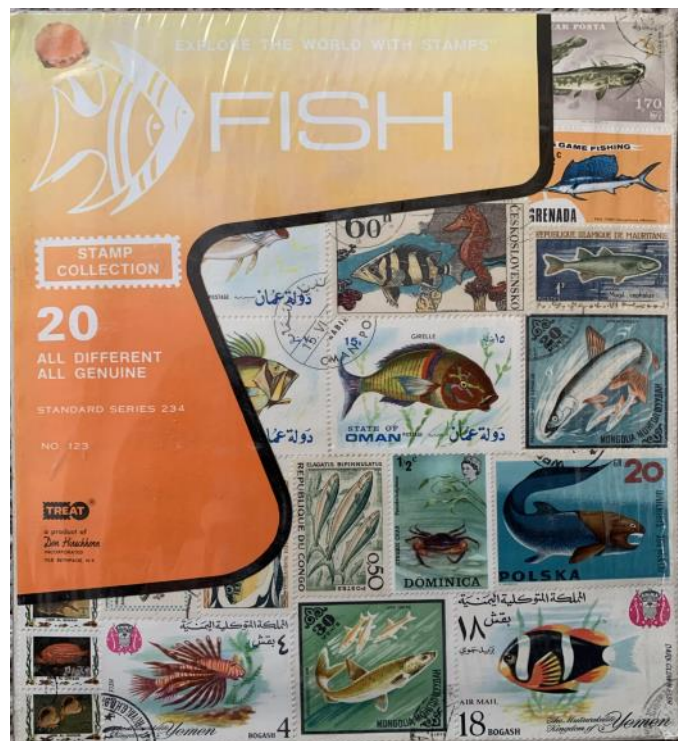
We are very pleased to announce the members of the 2021 WAVMA Executive Board! Thank you to all our members who voted in the elections and welcome to the new 2021 Executive Board members:

President—Stephen Reichley
President-Elect—Gillian Taylor
Past-President—Jena Questen
Secretary—Morag Clinton
Treasurer—Wes Baumgartner

Directors-at-Large:
Africa and Middle East—Ajangale Isyagi
Americas—Claudia Venegas
Asia-Pacific Islands—Stephen Pycroft
Europe—Matt Metselaar

We look forward to working together to continue to advance aquatic veterinary medicine and supporting our membership.

Stephen Reichley, DVM, PhD, CertAqV
WAVMA President-Elect
President-Elect@wavma.org



PRIVILEGES & BENEFITS OF WAVMA MEMBERSHIP

Aquatic Veterinary e-Learning

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

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

Obituary: John Bernard Gratzek, DVM, PhD

For those WAVMA members who knew, and were taught or mentored by Dr. Gratzek, a giant in ornamental fish medicine, we are sorry to report that he passed away at the age of 89. John Bernard Gratzek was born on 23 January 1931 during the Great Depression. He died 22 November 2020 during the Great COVID Pandemic. In between he lived a full life.

Jack, as he was called, was born in St. Paul, Minnesota, and lived near Lake Phalen. He was one of five children, and remained close to his surviving sisters until their deaths. He attended Catholic schools through college, then returned to St. Paul to begin Vet School at the University of Minnesota. Here he met his future wife, Kathleen Mullin from Minneapolis on a double date (initially not with each other). They married in 1957.

Minnesota natives Jack and Kathleen moved to Madison, WI for his PhD and to start a family. He began his veterinary career in Ames, Iowa and then moved to Athens, Georgia in 1966, where he was professor and head of medical microbiology at the UGA College of Veterinary Medicine. He remained there until retirement in 1994. His field of expertise was aquatic medicine. It was important to Jack for veterinarians to be educated in fish health throughout the world and much of his career was dedicated to this goal, writing extensive publications.

In his retirement he traveled, fulfilled his dream to become a pilot. He dug and maintained a giant koi pond, became an avid gardener, and enjoyed his growing family. Jack had a forceful personality with an elfish sense of humor; he could make you laugh with his eyes. Later in life he showed his gentle side, especially to his adoring grandchildren.

During retirement, Jack and Kathy travelled extensively. They visited Asia, Australia, Europe, Africa and the Americas. They often travelled with friends and family. Jack took solo trips with his grandsons, taking one to Poland, and another on a tour of European Battlefields. Jack and Kathy toured Poland with a Chicago based Polka band. They rode camels in Egypt to see the pyramids; took a boat down the Amazon; climbed volcanoes in Guatemala and experienced biblical wonders in Israel and Palestine. Jack suffered his first stroke while in Sweden, touring beautiful Stockholm.

He is survived by his wife Kathleen of Athens; his children, Tom Gratzek (Elizabeth) of Greensboro NC, Ann Njaka (Chima) of San Jose CA; Jean Colville (David) of Marietta GA, and Jim Gratzek (Megan) of Edina MN. He has seven grandchildren: John Gratzek, Alex Gratzek, Katie Colville, Paige Colville, Taylor Njaka, Chloe Gratzek, Kara Gratzek. A Celebration of his Life (with open-bar, at Jack's request) will be held after COVID restrictions are reduced.

**TO SUPPORT FUTURE STUDENT
 SCHOLARSHIPS, PLEASE MAKE
 A DONATION TODAY
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Advances in Diagnostics And Treatment Of Ornamental Fishes
November 7, 2020



Gregory A. Lewbart M.S., V.M.D.,
Dipl. ACZM, ECZM (ZHM)
greg_lewbart@ncsu.edu



The slide features a background image of a colorful koi fish. It contains the title of the presentation, the date, the WAVMA logo, the speaker's name and credentials, his email address, and the NC State Veterinary Medicine logo.

WAVMA 2020 ANNUAL GENERAL MEETING AND VIRTUAL CONFERENCE
7 November 2020





The Ohio State University College of Veterinary Medicine

Ohio State University WAVMA Student Chapter

Raphael A. Malbrue, DVM, MS, CertAqV
Charlene Morotti & Cheryl Theile

The WAVMA Annual General Meeting was held virtually this year, under the leadership of President Jena Questen. In addition to the AGM, there was a full day of presentations, including Keynote talks by Dr. Meritxell Diez-Padrisa on “Current advances in diagnostics and treatments of farmed fish,” and Dr. Gregory Lewbart on “Current advances in diagnostics and treatments of ornamental fish.” Members Elizabeth St. Germaine, Laura Krogman, and Sarah Wright discussed their experiences on internships supported by the WAVMA John Pitts Aquatic Education Award funding. Students from The Ohio State University discussed activities of their WAVMA Student Chapter. Dr. Stephanie Plön gave a presentation on “What whales and dolphins can tell us about the health of our oceans.”

This shows the amazing work that WAVMA members do and was a great success thanks to the computer wizardry behind the scenes.



Join A WAVMA Committee

All of the great programs and features you get from WAVMA membership are provided by volunteers. We are always looking for more helpers, whether veterinarians, veterinary students or veterinary nurses, to join us on the committees. If you are not interested in running for office, but would like to provide your input and guide the future of WAVMA, join one of our committees (no previous experience necessary!). See a list of our committees on page 12. Contact our Secretary or the committee chair for more information about the committee and the dates of the next meeting (also done via web conference). All are Welcome!

Join a WAVMA Committee today!

Executive Board Responsibilities

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

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

WAVMA Committees

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

Budget and Finance Committee

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

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

Chair: Nick Saint-Erne, Treasurer@wavma.org

Communications Committee

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

Chair: David Scarfe, 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

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 individual members and the organization. Chris Walster, chris.walster@onlinevets.co.uk

Education & Student Committee

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

Chair: Bartolomeo Gorgoglione, BartGorg@msu.edu

Fellows Advisory Council

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

Our WAVMA Distinguished Fellows are:

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

During the past months, a series of recommendations were provided to the Executive Board members for due consideration and review. These recommendations address emerging (global) trends, which require among other actions, a revision of current by-laws, last adopted by the vote of members in 2017. With this in mind, the Fellows Advisory Council has assembled a by-laws review working group.

Among the matters of general membership interest to be considered by the Fellows is the addition of new membership categories to the existing ones, i.e., retired members and members from countries with political and socio-economic difficulties. The WAVMA Fellows are cordially invited to join this working group.

I would also like to remind everyone that the call for nominations for WAVMA Fellows is ongoing until 30 April 2021. To read more about this call and how to apply, please click here:

<http://www.wavma.org/wavma-fellows>.

Please contact Laura with questions or suggestions, at laurau_2005@yahoo.com.

Happy Holidays to everyone!

Laura Urdes, DVM PgDip PhD CertAqV
Fellows Advisory Council Chair
laurau_2005@yahoo.com.

Meetings Committee

Due to the COVID-19 pandemic, the meeting schedule for 2021 continues to be in a holding pattern. The WSAVA conference, which has been postponed until March 2021, is still scheduled to take place, however, it has been changed to a virtual conference. This affords the WAVMA membership a chance to attend the scheduled lectures in the program organized by us. If you wish to participate, visit the conference website at: <https://wsava2020.com/>. The lecture series is scheduled for **Monday, March 22, 2021** and will feature talks by 4 WAVMA members. The program can be found by clicking on the program link at the site.

Due to these changes, we will be holding our KoiPrax3 as a virtual event hosted by WAVMA as part of our continuing education series. Please note the time and date changes below.

The Koi Practitioners Working Group is pleased to announce its third annual session (KoiPrax3), which will take place **Sunday, April 18, 2021. This will be a virtual event, starting at 12 PM UTC**. Check your local time zone for the start time in your area. KoiPrax 3: "Koi Ulcer Disease and *Aeromonas* species: Current Clinical Presentations, Diagnostic Resources and Treatments" This meeting will feature speakers that are at the forefront of research on bacterial diseases of koi. Our honored keynote speaker will be Verena Jung-Schroers.

Verena Jung-Schroers is a specialized veterinarian in fish diseases working at the Fish Disease Research Unit of the University of Veterinary Medicine in Hannover, Germany. She is the leader of the ECAAH (European College of Aquatic Animal Health) approved training centre of the Fish Disease Research Unit in Hannover. Verena Jung-Schroers is involved in many research projects of different topics, like microflora and bacteriology, welfare of aquatic animals, and fish and shrimp and virology.

Fees: WAVMA members: free of charge – registration required, Non-WAVMA members: \$100. For more information, please contact me.

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



Credentialing Committee

In the last six years we've made great progress in refining this Certification Program, and have moved more than 130 people through the review/approval process. Arguably, it is one of WAVMA's best and most successful programs, and has helped a lot of people gain recognition for their knowledge.

A number of circumstances require me to pass the Chair of the Credentialing Committee, and responsibilities for managing the Certification Program, to someone else. Matthijs Metselaar (a former Executive Board member) has offered to do this. I will work with Matt to explain the myriad of things that need to be done behind the scenes, to make sure he is comfortable with keeping things running smoothly. I will make sure that everything I've been managing is up to date before handing things over on October 1. I will also continue to serve on the Credentialing Committee and I'll be available to help whoever manages the Program in the future. Best wishes to Matt and the Committee.

David Scarfe,
dscarfe@ameritech.net



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>

Certification Program

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

1. Aquatic Environment and Life Support Systems
2. Taxonomy, Anatomy and Physiology
3. Husbandry and Industries
4. Pathobiology and Epidemiology of Aquatic Animal Diseases
5. Diagnostics and Treatment of Aquatic Animal Diseases
6. Clinical Veterinary Experience and Client Communications
7. Public Health, Zoonotics and Seafood Safety
8. Legislation, Regulations, and Policies
9. Principles of Aquatic Animal Welfare

For CertAqV Program Description [Click here](#) to download, or go to WAVMA.org/CertAqV-Pgm.

Individuals who desire to participate in the WAVMA CertAqV Credentialing Program will first need to register and pay the US\$250 administrative fee. When registering you will select a mentor to assist and guide you through the requirements. After you have registered, you will receive an e-mail on how to download a document to record where you have obtained sufficient KSEs (knowledge, skills and experience/education) in each of the 9 modules or subject areas. You have up to 2 years to complete these.

When your mentor is satisfied you have sufficient KSE credits, he/she will 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.

Congratulations to the following Veterinarians who have qualified recently to become Certified AqV:

Rubén López Crespo
Brandon Spolander
Jordi Lopez Ramon
Julianne Richard
Lucie Nedved
Danielle Godard
Laura Rasche

There are an additional 55 members in the process of becoming Certified Aquatic Veterinarians.

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

Certified Aquatic Veterinarians

Jessica Allen	USA
June Ang	Singapore
Nimrod Arad	USA
Farah Gonul Aydin	Turkey
Sarah Balik	USA
Madison Barnes	St. Kitts & Nevis
Christa Barrett	USA
Heather Barron	USA
Giana Bastos-Gomes	Hong Kong
Mariah Beck	USA
Jenice Bell	USA
Heather Bjornebo	USA
James Bogan	USA
Pierre-Marie Boitard	France
Serena Brenner	USA
Erika Brigante	St. Kitts & Nevis
Todd Cecil	USA
Bryony Chetwynd-Glover	UK
Dondrae Coble	USA
Michael Corcoran	USA
Emily Cornwell	USA
Rebecca Crawford	St. Kitts & Nevis
Charles Cummings	USA
Nadav Davidovich	Israel
Darren Docherty	UK
Simon Doherty	UK
Devon Dublin	Japan
Jacqueline Elliott	USA
Ashley Emanuele	USA
Azureen Erdman	USA
Antonella Fabrissin	Italy
Mohamed Faisal	USA
Erika First	USA
Ari Fustukjian	USA
Christopher Good	USA
Bartolomeo Gorgoglione	USA
Krystan Grant	USA
Miguel Grilo	Portugal
Stephanie Grimmett	UK
Katharina Hagen-Frei	Switzerland
Katharine Haussman	USA
Orachun Hayakijkosol	Australia
Eileen Henderson	USA
Chelsea Hester	USA
Nora Hickey	USA
John Howe	USA
Kerryn Illes	New Zealand
Leslie Jarrell	USA
Jimmy Johnson	USA
Sharmie Johnson	USA
Kasper Jorgensen	Denmark
Brian Joseph	Canada
Parinda Kamchum	Thailand
Fritz Karbe	Germany
Sherri Kasper	USA
Elizabeth Kaufman	Israel
Denyse Khor	Singapore
Amy Kizer	USA
Jessica Koppien-Fox	USA
Jack Kottwitz	USA
Elizabeth Leuchte	UK
Jan Linkenhoker	USA
Eric Littman	USA

Richard Lloyd	UK
Richmond Loh	Australia
Adolf Maas	USA
Raphael Malbrue	USA
David Marancik	Grenada
Victoria Maroun	St. Kitts & Nevis
Robert Martinez	USA
Alexandra Mason	USA
Colin McDermott	USA
Matthijs Metselaar	UK
Sonja Miles	UK
Tim Miller-Morgan	USA
Haitham Mohammed	Egypt
Alissa Mones	USA
Danny Morick	Israel
Ross Neethling	UK
Sally Nofs	USA
Massimo Oriols	Italy
Dušan Palić	Germany
Brian Palmeiro	USA
Christine Parker-Graham	USA
Lily Parkinson	USA
Ayanna Phillips	Trinidad & Tobago
Jena Questen	USA
Eva Quijano Cardé	USA
Atisara Rangsichol	Thailand
Zachary Ready	USA
Aimee Reed	USA
Stephen Reichley	USA
Nuno Ribeiro	Portugal
Patinan Rookkachard	Thailand
Komsin Sahatrakul	Singapore
Nick Saint-Erne	USA
Jessie Sanders	USA
Sasha Saugh	South Africa
David Scarfe	USA
Khalid Shahin	UK
Galit Sharon	Israel
John Shelley	USA
Chris Shirkey	USA
Constance Silbernagel	USA
Melissa Singletary	USA
Esteban Soto	USA
Brittany Stevens	USA
Win Surachetpong	Thailand
Gillian Taylor	South Africa
Julius Tepper	USA
Sharon Tiberio	USA
Norrapat Towanabut	Thailand
Laura Urdes	Romania
Greta Van de Sompel	Belgium
Claudia Venegas	Chile
Zachary Waddington	Canada
Sarah Wahlstrom	USA
Chris Walster	UK
Scott Weber	USA
Marcus Webster	USA
Trista Welsh	USA
Michael Wenninger	USA
Peter Werkman*	Holland
David Wilbur	USA
Howard Wong	Hong Kong
Sarah Wright	USA
Taylor Yaw	USA
Irene Yen	St. Kitts & Nevis

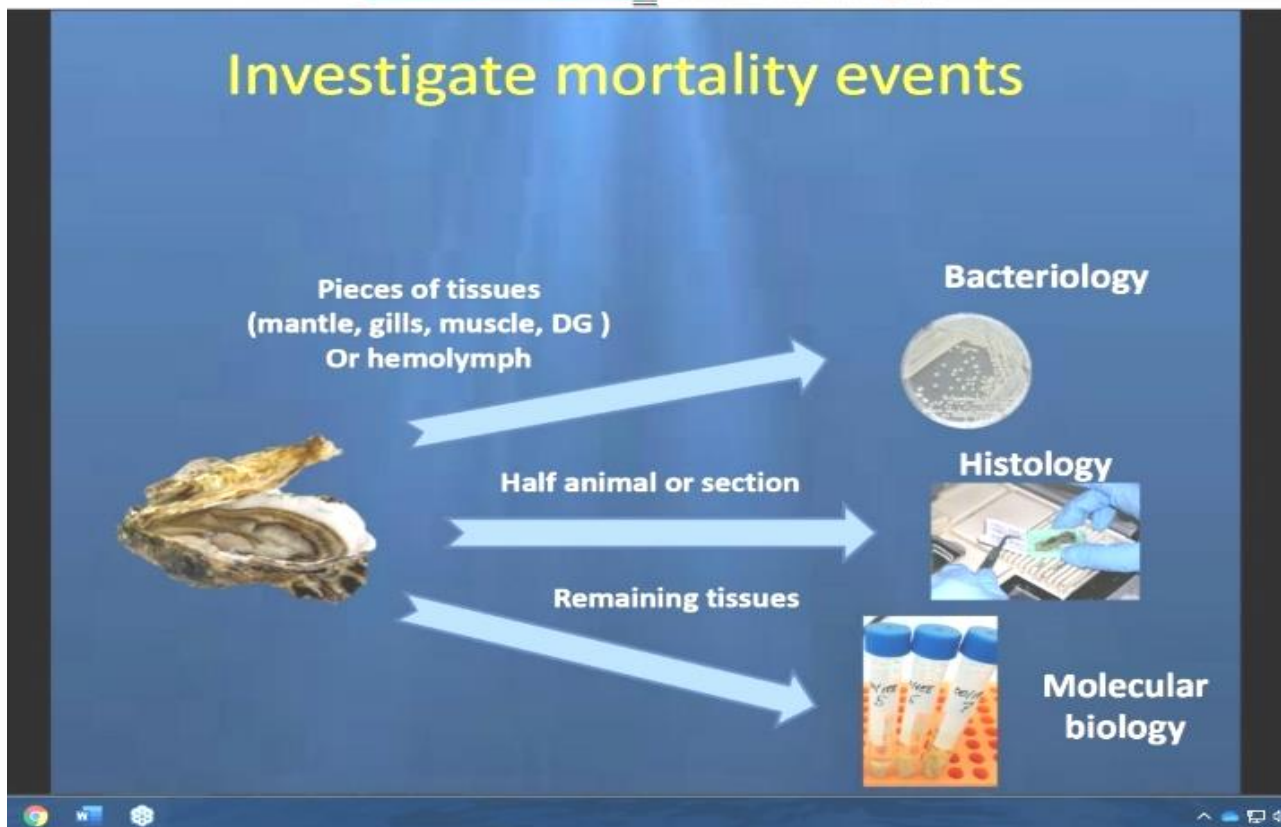
Summarizing an important year for the Education and Students Committee

We have been actively promoting aquatic veterinary education despite the difficulties linked to the ongoing COVID pandemic. Indeed, ESC had to be drastically reshaped to have subcommittees with active contributors, thus, despite mostly based on personal initiatives, we are proud of the accomplishments during this particularly challenging year.

In 2020, we welcomed three new WAVMA Student Chapters. Two were established in the US, including at University of California-Davis School of Veterinary Medicine, and at the University of Pennsylvania School of Veterinary Medicine. The first European WAVMA Student Chapter was instead established at the Royal (Dick) School of Veterinary Medicine in Edinburgh, Scotland. The COVID pandemic situation blocked the establishment of at least two further new Student Chapters, so we hope they could complete their application during next year. ESC provided the leaflet "WAVMA Student Chapter Guidelines" in English and Spanish languages, with more translations in preparation. This leaflet, together with




the Student Chapter Bylaws Template, which can be requested to the ESC Chair, offer invaluable resources to help students around the world to establish their own WAVMA Student Chapter.

In 2020 we finally managed to restart the WebCEPD program, offering five new webinars given by eminent scientists in the field. These webinars were very successful, each attracting several hundreds of people, between registrants and live attendees. These included an elegant description of the functional morphology of fish integument (by Dr. Diane Elliott in June), and a two-credit webinar on diseases and pathogens of marine fish species (by Dr. Snjezana Zrncic, Dr. Anna Toffan in July), the latter given in collaboration with the European Association of Fish Pathologists. For the first time WAVMA hosted a webinar on shellfish, focusing on marine mollusk diseases (by Dr. Isabelle Arzul in October). Two further webinars were delivered in concomitance with the virtual WAVMA 2020 AGM, focusing on updates on farmed fish treatments (by Meritxell Diez-Padrisa), and on diagnostics methods for ornamental fish (by Prof. Gregory A. Lewbart). All these new webinars will remain available through the website and allow receiving CE



The screenshot shows a Zoom meeting interface. At the top, two video thumbnails are visible: Maribel Escobedo on the left and Eva Marie Quijano Cardé on the right. Below them is a presentation slide with the following content:

FIRST EXPERIENCE

<h3>1. CONSERVATION & PROTECTION</h3> <ul style="list-style-type: none"> • Working closely with biologist. • Assist in endangered species recovery plan. 	<h3>2. RESEARCH</h3> <ul style="list-style-type: none"> • Assist in field work • Learn new technical skills 	<h3>3. WILDLIFE MEDICINE & REHABILITATION</h3> <ul style="list-style-type: none"> • Stranding network: sea turtles and marine mammals. 
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credits after correctly replying to a short KSA questionnaire. The WAVMA ESC would like to thank the speakers who helped provide these great educational webinars, and all people who attended! The webinar schedule for 2021 is being finalized, with excellent international speakers (including with Dr. Paola Barato and Dr. Johanna Baily), but we do also invite WAVMA members to propose themselves to deliver a WebCEPD by forwarding the application form to the ESC Chair. WebCEPD speakers get free WAVMA membership for one year and, starting from 2021, also an *honorarium* will be corresponded.

The Students and Resources Subcommittee worked this year to revise the webpage with externship opportunities for veterinary students, also revising WAVMA social media, both aimed to effectively provide information and resources to students seeking to improve their aquatic veterinary education. The highest-attended ESC event in 2020 was the newly-introduced Student Panel “A Sea of Student Opportunities in Aquatic Animal Medicine” held on 19th November 2020 via GoToWebinar. This event featured three panelists (Sarah Wright, Maribel Escobedo Mondragón, and Jaclyn Wilson) who shared their view and practical experience during externship that enriched their education on aquatic animal medicine. The initiative achieved 531 registrants, with 228 people

attending it live, and generating over 10 new memberships. The recording will remain available for WAVMA members only through the website.

Finally, despite this having been a challenging year for everyone, the WAVMA ESC is proud to have provided a wide variety of experiences and guidance for veterinary students and aquatic veterinarians all over the world. Thanks to the new WAVMA Membership Reward program, top ESC contributors are named to be rewarded with free membership, which for 2021 will be granted to: Dr Bartolomeo Gorgoglione (ESC Chair and WebCEPD organizer), David Minich (ESC Vice Chair), Eva Quijano (Leader of the Students and Resources ESC Subcommittee and Student Panel organizer), Prof. Dave Scarfe and Dr. Chris Walster, having been persistent key contributors. We are planning recurrent and new activities for 2021, also with the support of a consistent monetary budget. We do invite WAVMA members to participate to our upcoming meeting on 23rd January 2021, volunteering to contribute to the development of new ESC activities.

**Dr Bartolomeo Gorgoglione,
David Minich,
Eva Marie Quijano Cardé**

**World Aquatic Veterinary Medical Association
Murdoch Student Chapter Event Report for 2020**
By Tony Smith, President WAVMA Student Chapter

As 2020 winds down, the Murdoch Veterinary Student Association's special interest group: the WAVMA Murdoch Student Chapter, is thankful to look back on the events that we were able to be a part of.

In September, in collaboration with another Murdoch University special interest group (Murdoch Association for Companion Exotics), we were able to host The Fish Vet's Dr Richmond Loh for a lecture on fish anesthesia and surgery. We were happy to have fish featured as part of a lecture series that also included reptiles and birds. Dr Loh outlined some of the basics when it comes to fish anesthesia including pre-anaesthetic considerations, anaesthetic agents, analgesia, and some common surgical procedures.



Later that month, we were able to host our second event, a tour of the Department of Primary Industries and Regional Development's Marine Fish Hatchery facility in Fremantle, Western Australia. It was a tour given by researcher Dr Lindsey Woolley, who led our group throughout the facility, describing the research being conducted and the process of breeding yellowtail kingfish and barramundi. The facility provides commercial quantities of kingfish to an offshore farm in Geraldton and barramundi to a farm in Derby, W.A.



The facility houses four tanks of yellowtail kingfish broodstock, and several grow-out tanks. They also conduct research on aquaculture specific to yellowtail kingfish and barramundi.



Our final event of the year was an evening of presentations on sea turtles in October. We welcomed Murdoch University PhD candidate Dr Erina Young, as well as Dr Paul Whittock, a researcher with the environmental consultancy group Pendoley Environmental. Dr Young presented her research on developing Flat-back turtle reference intervals for a variety of biometrics and laboratory markers. Additionally, she spoke about some of the causes implicated in sea turtle stranding in W.A., as well as mass casualty events. She also provided some valuable information regarding ways to help conserve sea turtles, and ways to appropriately look after stranded sea turtles.

Dr Paul Whittock detailed his work on sea turtles as the general manager of Pendoley Environmental. He provided a summary on the sea turtle lifecycle, detailing some of the events and aspects of sea turtle behaviour that precipitate much of his approach as a researcher. Dr Whittock also spoke about some of the methods that he uses to track hatchling sea turtles, to



investigate the impact of industrial infrastructure on sea turtle nesting, and to monitor fluctuations in numbers of several large sea turtle populations.

Each of our events was well-attended with an enthusiastic and motivated group of veterinary, marine biology, and animal science students from Murdoch University. We recognise that we have been incredibly fortunate to have held these events despite the COVID pandemic, and look forward to what the future has in store for the WAVMA Murdoch Student Chapter.

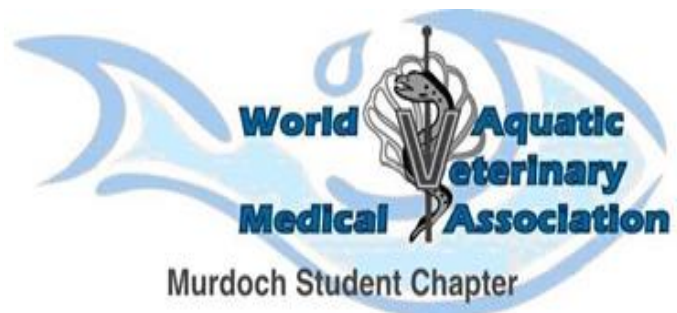
We would like to thank the out-going committee:

- President - Tony Smith
- Vice president - Spencer Tan
- Secretary - Chloe Ting
- Treasurer - Hanna Wang
- General comm - Megan Chu and Justin Tan

And welcome the 2021 committee:

- President - Spencer Tan
- Vice President - Megan Chu
- Secretary - Ben Lim
- Treasurer - Ishita Manimaran
- General Committee - Dayini Latif, Iris Li and Kesia Lim

We would also like to express our gratitude to our sponsors:



To initiate a new Student Chapter, download the [WAVMA Student Chapter Guidelines](#)

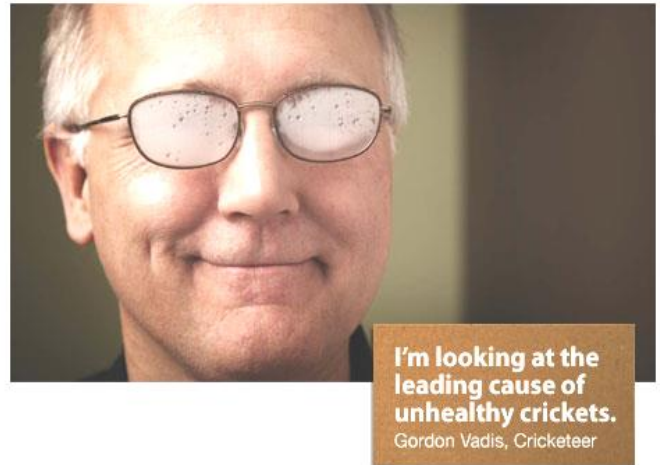
A Spanish version of the Student Chapter Guidelines can be [downloaded from the WAVMA website](#).

PROGRAMS AVAILABLE TO STUDENT CHAPTERS:

- Assistance in organizing and promoting Chapter programs and activities.
- 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.
- Reduced rate (50% off) WAVMA Full Membership the year after graduation.
- John L. Pitts Aquatic Veterinary Education Awards Program
- Access to WAVMA member-only programs.
- Aquatic veterinary externship and job listings.
- WAVMA promotional flyers, brochures and other materials for distribution to other students.
- Free or discounted registration for WAVMA meetings, conferences or educational webinars.
- Participation in the WAVMA Certified Aquatic Veterinarian (CertAqV) Credentialing 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.



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Education & Student Committee

The ESC held a Student Panel: "A Sea of Student Opportunities in Aquatic Animal Medicine" on 19 November 2020 via GoToWebinar. There were 531 registrants, 228 attended it live, ~10 new memberships, ~10 non-member requests to watch it for free. The recording will remain available for WAVMA members only.

ESC Core meeting was held on 8th December 2020, from h 15:00 to 17:30 UTC. Attended by BG, Dave Scarfe (DS), Chris Walster (CW), and Eva Quijano (EQ). Discussion points:

To contact former ESC members with personal emails asking to confirm their participation for 2021. Reaching WAVMA members to recruit new ESC members for 2021, and to identify new leaders. CW/DS/BG discussed a reward program for active committee contributors through the year, including by screening meeting reports and emails checking for active participants, then recommending free WAVMA membership for the following year. WAVMA needs to establish criteria for the membership reward program, and for granting membership discounts to members from developing countries.

Priority to complete the new leaflet "Keeping active WAVMA Student Chapters", including adding instructions to claim 50% membership rebate (as recently defined by CW).

To complete 2021 updates for the leaflet "Guidelines for WAVMA Student Chapters", also adding about the membership reward program, and completed French and Turkish translations.

Student Chapters webpage to be maintained and constantly updated. Needed a recurring (3 times/year) automated email system to be implemented through the WAVMA website; to reach Student Chapters, including their board members and Academic Advisors; periodically reminding them to provide board and activity updates/renew memberships/claim 50% rebate (once a year). CW to discuss costs with Gary.

Upcoming ESC activities:

To schedule new WebCEPD webinars, monthly in 2021. All webinars' contents to be reviewed one week before streaming, to avoid inadequate contents (e.g. commercial contents). Free 1-year WAVMA full membership and *honorarium* to speakers (\$50-200, based on contribution type).

Establishing further collaborations by partnering with other associations worldwide: to increase attendance; to increase WAVMA visibility attracting new memberships; to attract more vets to the aquatic medicine; to attract specialized/greater contributions; to share eventual additional costs; offering WebCEPD brand and WAVMA's well established webinar system; offering permanent webpage hosting; offering free access to members of the collaborating association.



Webinars will remain free of charge for WAVMA members, including for watching and to get the CE certificate. Non-members fee to be reduced to \$15 (from \$25), including for watching and to get the CE certificate. Easier payment option to be implemented through WAVMA website, e.g., PayPal; CW to discuss costs with Gary.

Sending emails to solicit contributions from WAVMA members, mentioning membership reward program and *honorarium* to speakers. ESC Core members will retain the right to decide on speaker suitability, and to define the schedule.

To schedule more Student Panels, twice in 2021, EQ and subcommittee to propose dates/coordinate events, attracting more contributions from outside the US education system.

Define conditions for small grant allocation to Student Chapters.

The ESC Committee will be rearranged, based on available contributors attending the upcoming committee meeting on 23rd January 2021 at h 14:00 UTC (<https://www.gotomeet.me/WAVMA/wavma-esc>).

All are invited to join the ESC Committee. For more information, please send me an email.

Dr. Bartolomeo Gorgoglione

Chair of Education & Student Committee

BartGorg@msu.edu

New Website and Dues Payment Update

I am very excited to present the new WAVMA website, which is now live. This has been a work in progress for close to a year. Our WAVMA Administrator Chris Walster and President-Elect Stephen Reichley have been working tirelessly to implement this project, with feedback from the Executive Board. I would like to thank Chris and Stephen for all their efforts, as well as NetBusiness, who has supported WAVMA IT needs for many years and does a tremendous job.

We are unable to transfer your password to the new website. Please take a moment to use the "Lost Password" feature to set up your password on the new website: <https://www.wavma.org/members/reset-password>

Be sure to use the email address you listed as your Primary Email for WAVMA for this process.

In addition to many behind the scenes technological changes not readily observable yet important to ensure everything runs smoothly, you will notice many page changes. The new contemporary layout is easier to navigate and displays better on mobile devices.

This new website, and underlying system, has also made new programs possible and strengthened existing programs. One new feature is the Find a Fish Vet Directory <http://www.wavma.org/find-a-fish-vet>. This is a feature for public visitors to the webpage to quickly and easily find fish veterinarians and a great opportunity for our members to increase their presence and branding. We also updated the Members Directory <http://www.wavma.org/directory/search>, which is only open to WAVMA members to help us locate colleagues from around the world. Please take a moment to go to your member profile <http://www.wavma.org/members/login> and give us permission to include you in these two directories!

Another important change with this new website is the change to the WAVMA membership year. To help make this a smooth transition for all members, and to ensure members receive maximum benefit, your renewal dates will be the following:

If you paid your dues between 1 October 2019 and 31 December 2019 your next renewal deadline will remain as 1 January 2021. After that, your subsequent renewal deadline will be 12 months from your last renewal payment.

If you paid your dues during 2020, or future renewals, your next renewal deadline will be 12 months from your last dues payment.

Please pass along any concerns or questions to the WAVMA Administrators at:

Administrators@wavma.org

Jena Questen
WAVMA President
President@wavma.org

Canada's farmed salmonids Code of Practice

The National Farm Animal Care Council (NFACC) and the Canadian Aquaculture Industry Alliance (CAIA) are pleased to announce the launch of the public comment period for the draft Code of Practice for the Care and Handling of Farmed Salmonids. The draft Code and the public comment system are now accessible at: www.nfacc.ca/codes-of-practice/farmed-salmonids.

The Code Development Committee will consider the submitted comments after the close of the comment period, and the final farmed salmonids Code of Practice will be released in the fall of 2021.

Codes of Practice for the care and handling of farm animals are the result of a unique consensus-based, multi-stakeholder approach used across various agricultural sectors, which brings together all relevant stakeholders with an interest in animal care standards. A Scientific Committee report developed by scientists familiar with fish welfare, summarizing research conclusions on priority welfare topics can be found online alongside the draft Code. This peer-reviewed report aided the discussions of the Code Development Committee as it prepared the draft Code of Practice.

"The Code Development Committee has worked hard for nearly two years developing the draft Code. The public comment period is a key step that will allow us to check our work with a broader representative group," said Dr. Barry Milligan, a veterinarian who has held senior roles in both salmonid production and fish health, and who also serves as the Chair of the Code Development Committee. "Welfare is an integral component of fish health and one that is increasingly being looked at both from the industry and from the public perspective," he added.

"We're very proud to be developing the first Code of Practice for farmed salmonids in Canada," noted Arlen Taylor, Code Development Committee member and owner of a business that operates five rainbow trout hatcheries in Ontario. "This Code will be a valuable resource for large and small farms alike. As a living document, it will allow us all to improve our practices while continuing to innovate for the future betterment of animal care."

The Code's development is led by a 14-person Code Development Committee that includes participants from across Canada including producers, animal welfare and enforcement representatives, researchers, veterinarians, and government representatives. More information on the Code development process is available at www.nfacc.ca/codes-of-practice.

Canadian Aquaculture Industry Alliance (CAIA) is the national association that speaks for Canada's seafood farmers, representing their interests in Ottawa and internationally. CAIA members generate over \$6 billion in economic activity, \$2.45 billion in GDP, and employ over 25,000 Canadians delivering a healthy, growing and sustainable seafood farming sector in Canada. For more information visit: www.aquaculture.ca.

Instructions for Authors and Contributors

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

Colleague's Connection

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

Peer-Reviewed Articles

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

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

Clinical Cases

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

Book Reviews

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

Publication Abstracts

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

News and Views

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

Legislative & Regulatory Issues

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

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

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

Jobs, Internships, Externships or Residencies

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

Advertising

See advertising rates on page 4.

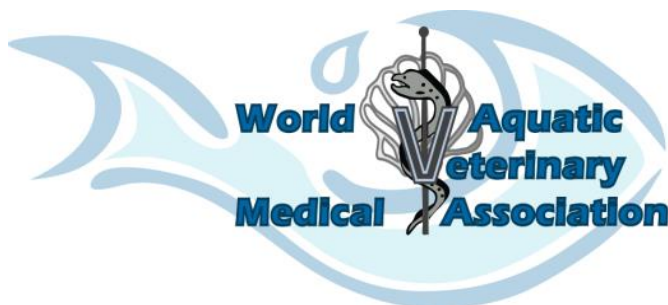
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- Issue 1 – February 15 (published in March)
- Issue 2 – May 15 (published in June)
- Issue 3 – August 15 (published in September)
- Issue 4 – November 15 (published in December)

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Fishy Philately: Collecting Fish Stamps
 By Nick Saint-Erne, DVM, CertAqV

Stamp collecting used to be a serious hobby for millions of people. You hardly hear anything about stamp collecting any more, or hobbies in general!

I started keep stamps when I received a Stamp Album for Christmas one year, even before I started keeping aquarium fish, which I started at age 9 with a 5-gallon aquarium of guppies. During the late 1960s in an article from *Tropical Fish Hobbyist* magazine, I remember reading that aquarium keeping was the third most popular hobby, after photography and stamp collecting.

At that time, the photography hobby not only included taking photographs with a film camera, but then developing the film in your home photo lab. Stamp collecting was fairly easy since everyone received mail daily as it was the main form of communication, and most businesses would receive international mail, which allowed stamp collectors (philatelists) to find international stamps locally. This was the time before internet and computer games and social media, so most people had some form of hobby that they devoted serious study to in their spare time.

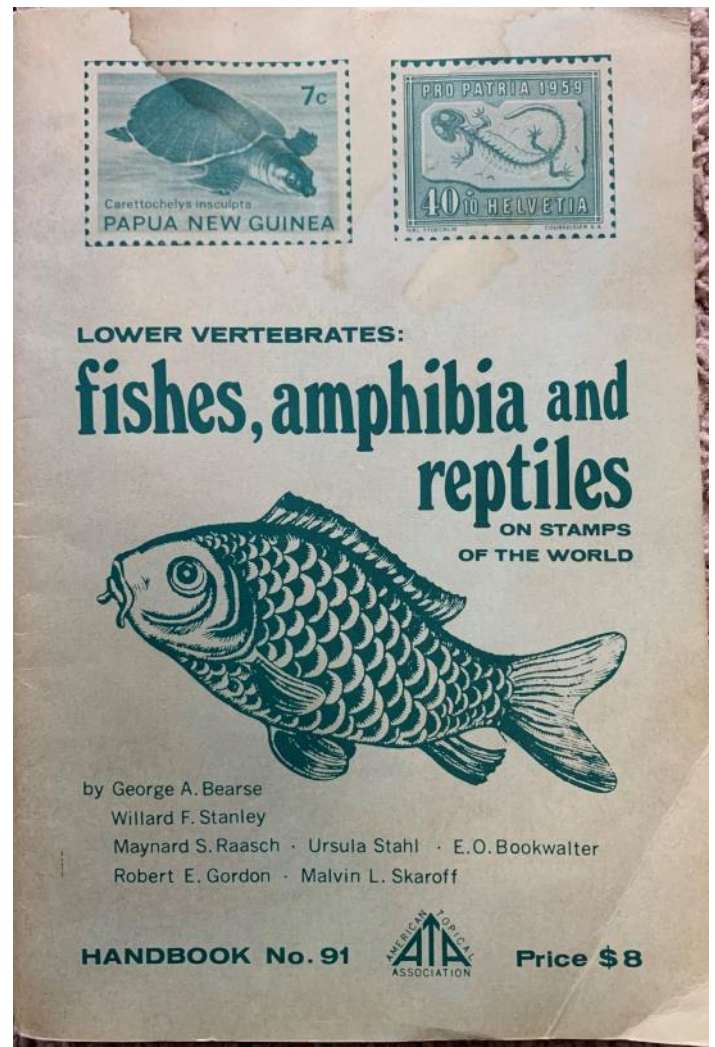
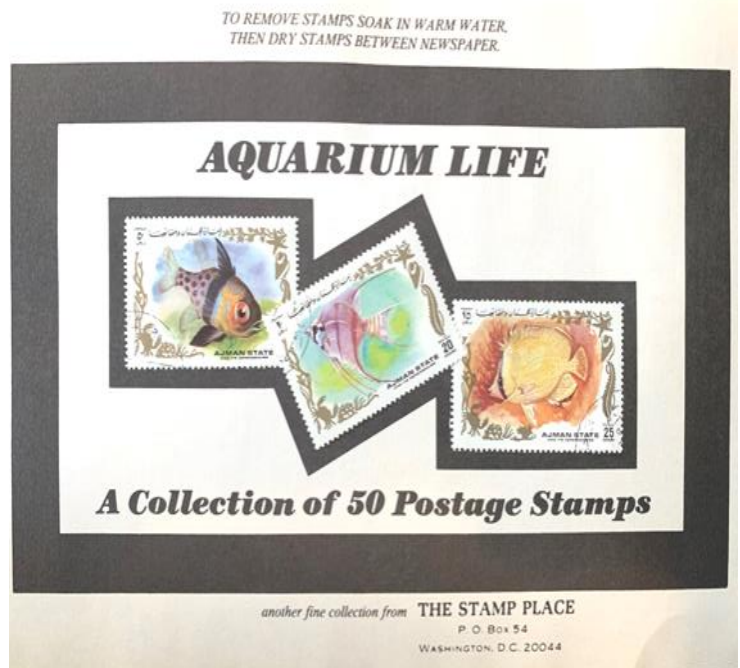
In an article by Mildred Jailer in *The New York Times* on April 8, 1973, she wrote that Fish Keeping was the Second Largest Hobby:

"There are 20 million fish hobbyists in the country," said George L. Mood of Fair Lawn, president of the North Jersey Aquarium Society, who has 150 tanks of his own. "Right now, it's the second largest hobby, next to stamp collecting. It has topped photography and coin collecting. If you have one goldfish or over 100 tanks, you're considered a fish hobbyist.

"And it's a relaxing hobby. You stay right in your own home and work with them. And you don't have to take fish for a walk."

Some years after starting to keep tropical fish—which was an all consuming hobby for me growing up—I decided to collect stamps that were specific to fish as a way of combining my previous hobby of stamp collecting with my new one of aquarium keeping. While not active in philately for many years now (since college) I still have all of my stamps and thought WAVMA members would be interested in seeing some fish stamps from around the world.

For those interested in learning more about stamp collecting, see the American Topical Society website: <https://americantopical.org/>. This is a group of collectors who specialize in a specific theme (topical) for the type of stamps they collect. The book pictured in the next column (ATA Handbook No. 91) is my copy of the 1977 edition of a listing of the fishes, amphibia and reptiles on stamps of the world. Now this information can be obtained online (for a fee), but there is some thing about still having a book to read to learn more about your favorite (non-computerized) hobby.





Above: WONDERS OF THE SEA STAMP SHEET
USA 29 Cents 1994



Left:
1962 stamps from the Soviet Union (USSR/CCCP)
Betta fish on South Moluccas 1953 stamp
Republic of Rwanda fish stamp 1973



Below: 1979 US Postal Service issue honoring Veteri-
nary Medicine with a postage paid envelope. I bought
many of these and used them for writing home while
away at University and in Veterinary School!





**Chronic lymphocytic dermatitis in a koi fish
 (*Cyprinus rubrofuscus*)**

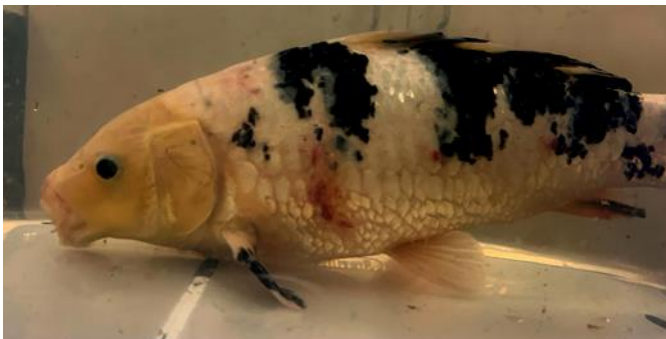
Alicia McLaughlin, DVM

A 10-year-old female koi (*Cyprinus rubrofuscus*) weighing 1.57 kg presented for a recheck examination. She had been previously seen by another clinician 1 month prior after she became stuck in a tank filter and developed several wounds on her body. At that visit, she underwent a diagnostic workup including gill and fin biopsies and cytology, skin scrape cytology, a CBC, and a culture of the skin wounds. The CBC results were supportive of sepsis, and the bacterial culture grew a mixture of bacterial organisms (*Aeromonas sobria* and *Shewanella putrefaciens*) that were sensitive to multiple antibiotics, including ceftazidime. No parasites were seen on microscopic evaluation of the skin scrape, gill biopsy, or fin biopsy. The patient was prescribed a course of ceftazidime 20 mg/kg IM each 72 hours (q72h) and had been receiving injections of this medication as directed. The last dose of ceftazidime had been administered the night before the current presentation.

The owner noted that the wounds had not entirely healed with antibiotic administration, and in fact the patient was developing new sores on her back and side within the last week. The patient was more energetic than she was immediately after the traumatic event, and had been eating normally.

The fish was housed in a large outdoor pond with two other koi, both of which were younger than the patient, clinically normal, and introduced into the pond last year. The pond had a box filtration system rated for a much larger pond. The filter box was vacuumed out once every 1-2 weeks to remove physical debris. Water quality testing had been performed using a strip test kit on a weekly basis, with ammonia/nitrite/nitrate levels consistently reading at zero. The owner had recently added baking soda to the pond to increase water alkalinity. The pH had consistently measured at 7.0. The owner had recently removed some of the decorative rocks in the pond to prevent the patient from rubbing her wounds against them. The diet was Hikari high protein pellets offered three times per day.

On physical examination, the patient's body condition was slightly heavy and her mentation and position within the water column were normal. There was an ulcerative lesion on the left side, approximately 2 cm x 4 cm diameter, that was slightly proliferative at the margins. There were two other mildly proliferative lesions located caudal to the primary lesion, in addition to another ulcerated lesion on the patient's rostrum. Bruising and discoloration was seen on the patient's dorsum in the epaxial muscle region, possibly due to antibiotic injection administrations. The caudal fin was slightly ragged with marked vasculitis (see attached figures). No ectoparasites were noted on gross exam. The remainder of the exam findings were normal.



Based on these findings, the patient was diagnosed with persistent, progressive ulcerative and proliferative skin lesions and vasculitis (likely secondary to ongoing sepsis). Possible causes for these symptoms included a resistant bacterial infection (despite the previous culture results), an underlying viral disease that may have been introduced along with the new fish in the past year, a water quality issue or an unidentified parasite infestation (considered less likely since the other fish were apparently unaffected and recent cytology exams were negative for parasites), or a disorder of the immune system or skin preventing a normal response to antibiotic therapy.

After discussing the exam findings and possible causes for the patient's symptoms with the owner, biopsy and histopathology of the skin lesions were recommended as the best next diagnostic step. Koi Herpesvirus PCR was also recommended. The owner approved and the patient was sedated with MS-222 to effect for the biopsy sample collection. Recovery from anesthesia was fast and uneventful. A course of meloxicam at 0.2 mg/kg IM q24h for 5 days was prescribed to help reduce postoperative discomfort and inflammation associated with the lesions. The antibiotic therapy was switched to amikacin based on the previous culture results, at a dose of 5 mg/kg q24h for 3 days, then q48h for 10 doses. The owner was also instructed to apply dilute betadine to the skin wounds while handling the patient for the injection administration.

The owners were told to add aquarium salt to the pond at a rate of 1-2 pounds per 100 gallons of water (= 0.1-0.2% salinity) to provide a better environment for the patient's skin healing. They were also told to switch to using a drop-testing water quality kit instead of strip test kit and to keep track of test results.

While waiting for the histopathology results, the owners reported that they saw a marked improvement in the fish's condition immediately after the new medications were started. However, the symptoms relapsed once the meloxicam was stopped.

The biopsy results are as follows:

HISTOLOGIC DIAGNOSIS:

Lymphocytic dermatitis, subacute to chronic, multifocal, moderate with osteoclastic scale resorption and focal superficial necrosis with Oomycete-type hyphae.

HISTOLOGIC DESCRIPTION:

Submitted are two whole fixed scales with minimal attached soft tissue that measure approximately 1.5 cm in length and 1 cm in width. The scales are briefly decalcified and examined in bisections. Within each section, the attached soft tissue is composed of epidermis and superficial dermis. The epidermis is multifocally and markedly hyperplastic with multiple regions of erosion. Large numbers of lymphocytes with fewer plasma cells and macrophages and occasional eosinophilic granular cells infiltrate the hyperplastic epidermis

and expand the underlying dermis. There is focally-extensive scale resorption with prominent osteoclasts and Howship lacunae along the scale margin. A GMS stain demonstrates small numbers of superficial thin-walled hyphae (Oomycete type) within a small focus of epidermal necrosis. Fite acid-fast and BH gram stains are negative for microorganisms.

COMMENTS:

The histologic lesions are not typical of koi herpesvirus or carp pox infection and confirmatory PCR was negative for koi herpesvirus. Although a small number of Oomycete-type (i.e., water mold/*Saprolegnia*) hyphae were identified these organisms were present only superficially and are interpreted as a secondary infection (although this does not rule out the possibility that the water molds could contribute to lesion persistence). Inciting cause was not evident in the sections examined. Differentials include residual inflammation and tissue repair following systemic bacterial infection, a hypersensitivity reaction or other unrecognized infection. Some aspects of the lesions are reminiscent of strawberry skin disease of salmonid fish putatively associated with a rickettsia-like organism. Rickettsial PCR will be performed on DNA extracted for the koi herpesvirus PCR and charged to a research budget (no additional charge to you or your client).

Koi Herpes PCR test: **NEGATIVE**

Rickettsial PCR test: **NEGATIVE**

After discussing the test results with the pathologist, the following differentials and possible causes for the patient's symptoms were considered:

1) A resistant bacterial infection could be present. This could either be an unknown rickettsia organism (a false negative rickettsial PCR is possible) or another unidentified pathogen.

2) An autoimmune type disease could be present, leading to secondary bacterial and fungal organisms. This would potentially explain why the patient was the only fish in the pond to show signs of illness.

3) there could be another currently unidentified underlying disease process that could be suppressing the patient's immune response (for example, Mycobacteriosis, internal organ disease, or neoplasia).

Recommendations for further testing included performing another biopsy of the skin lesions to see if a more definitive diagnosis could be obtained, since the secondary infections made full interpretation of the lesion challenging; diagnostic imaging (radiographs, ultrasound, and/or CT); a serum chemistry screen to check for other internal organ disorders; and another CBC to evaluate progression of the sepsis/immune system health following the antibiotic and anti-inflammatory courses.

While the owners decided whether or not they were willing to pursue additional diagnostic testing, a course of oxytetracycline (60 mg/kg IM q7days) was prescribed to treat a possible underlying rickettsia disease. Steroids were reserved as a last option; although they could potentially be curative if an autoimmune disorder was the main issue, they could also interfere with wound healing and could lead to immunosuppression, which would be risky in a septic patient. Since tetracycline-class antibiotics can have immunomodulatory effects, this may have also proven beneficial to the patient. Unfortunately, because oxytetracycline was not included in the sensitivity panel previously evaluated, there was a possibility that the secondary infections would not be sensitive to this medication. Amikacin and meloxicam treatment was continued at the same time as the oxytetracycline treatment.

The day after the fish received the first dose of the oxytetracycline injection, the owner reported a possible injection site reaction with purulent discharge oozing from the site. A recheck was recommended, and the patient was brought into the hospital the following afternoon.

The owner reported that the patient had mildly improved in her symptoms that morning. On examination, an abscess/localized reaction was noted surrounding the site of oxytetracycline injection in the epaxial muscle adjacent to the cranial edge of dorsal fin. Subcutaneous hemorrhage and swelling was present, and a serous fluid was oozing between the scales. Many red and mildly proliferative and ulcerated lesions were present in the skin on both the left and right sides of the patient. The patient's gills were slightly pale and the patient was lethargic compared to the previous exam.

The patient was diagnosed with an oxytetracycline injection site reaction, persistent ulcerative/proliferative skin lesions, probable anemia, and persistent sepsis. A neoplastic or autoimmune disorder both remained differentials for the cause of the symptoms.

The owners were apprised of the exam findings and agreed to perform bloodwork and re-biopsy the lesions, but declined any diagnostic imaging. The patient was again sedated with MS-222 to effect and blood was collected from the ventral tail vein. A newer scale lesion was biopsied. During the biopsy process, an additional lesion that extended to the level of the coelomic membrane on the left side was identified. The liver was visible through this ulceration, although the coelomic membrane was not punctured. This new finding negatively impacted the patient's prognosis, and after discussing the findings with the owners, humane euthanasia was chosen to prevent further suffering. The patient was again sedated with MS-222 prior to administering Euthasol via the ventral tail vein. Loss of heartbeat was confirmed via doppler before a necropsy was performed to try to obtain a definitive diagnosis for the cause of the patient's symptoms.

In addition to the previously identified skin lesions, there was some mild hemorrhage within the kidneys. No other gross lesions were noted on necropsy. Tissue samples (skin, eye, pharynx, kidney, gills, liver, hepatopancreas, intestines, and spleen) were saved for histopathological evaluation. Histopathology results are shown below.

HISTOLOGIC DIAGNOSES:

1. Dermatitis, lymphocytic, multifocal, chronic, moderate with scale resorption
2. Lymphocytic infiltration of the choroidal rete mirabile, periocular skeletal muscle and conjunctiva, and pharynx

HISTOLOGIC DESCRIPTION:

Seven tissues from a koi fish are submitted in one container and are evaluated in three slides. Grocott's methenamine silver, giemsa, and Gimenez stains are performed on block 1.

Skin: Diffusely infiltrating the *stratum basale* are low to abundant numbers of uniformly sized, small lymphocytes. Multifocally, lymphocytes obscure the basement membrane and extend into the *stratum compactum* to the scale pocket. Multifocally, scales are fragmented and invaded by mononuclear cells (scale resorption). No infectious agents are observed in with special stains.

Eye: The ocular conjunctival epithelium is diffusely infiltrated by abundant small lymphocytes. Lymphocytes multifocally extend into the subepithelial stroma and periocular adipose tissue and loosely center around blood vessels. The choroidal rete mirabile is mildly expanded by small clusters of lymphocytes.

Pharynx: The pharyngeal epithelium is diffusely infiltrated by abundant lymphocytes.

Kidney: Diffusely the parenchyma is hypereosinophilic with lack of distinct cellular and nuclear morphology and blood vessels filled by basophilic wispy to granular material (euthanasia artifact).

Tissues examined and considered free of significant histologic lesions aside from postmortem artifact include the gills, liver, hepatopancreas, intestines, spleen, and kidney.

PATHOLOGIST'S COMMENTS:

The main histologic findings are multisystemic infiltrates of lymphocytes, particularly in the skin. The dermal lesions are similar to the previous submission (WADDL 2020-8525). The top differentials in this case include neoplasia, such as lymphoma, or an immune-mediated disorder. The literature on lymphoma/leukemia in fish is sparse. The epitheliotropism and perivascular location of the lymphocytes fits lymphoma/leukemia. In fish, oncogenic viruses are reported, although there is no evidence of an agent in this case. Alternatively, in other species, the lymphocytic epidermal inflammation overlaps with immune-mediated con-

ditions in other vertebrates. Diagnostic criteria have not been established for fish.

Discussion

Induced autoimmune disorders have been diagnosed in fish (salmonid gonad autoimmunity, Secombes/Laird/Priede 1987; salmonid vaccine induced systemic autoimmunity, Koppang/Bjerkas/Haugervoll et al. 2008; whitefish gonad autoimmunity, Bittner/Cossins/Segner et al. 2011; zebrafish gonadal autoimmunity, Presslauer/Nagasawa/Dahle et al. 2014) but are uncommon. Autoimmune disorders are complicated to manage in other species, and usually the treatment involves steroids or other immunomodulating agents. Other proposed treatments include stem cell therapy and gene therapy (Hawsawi et al. 2018; Shu et al. 2015). Interestingly, fish oil has been identified as a treatment for autoimmune disorders in other species due to the anti-inflammatory properties of Omega-3 fatty acids (Wu/Chiang/Chang et al. 2000; Kelley/Ferretti/Izui et al. 1985; Jolly/Muthukumar/Avula et al. 2001; Walton/Snaith/Lochniskar et al. 1991).

Lymphoma has been identified in a flower horn cichlid (Lin et al. 2008), and a conger eel (Lombardini/Hard/Harshbarger 2013). Lymphomas associated with retroviruses have been diagnosed in muskellunge, northern pike, brook trout, coho salmon, madai, and seahorses (Lombardini/Hard/Harshbarger 2013; Kieser/Kent/Groff 1991). Leukemia has been diagnosed in Chinook Salmon and a brown bullhead catfish (Lombardini/Hard/Harshbarger 2013). Oncogenic viruses have been documented to cause lymphoma/leukemia in fish (Coffee/Casey/Bowser 2013) but there was no indication on histopathology of a viral agent contributing to the pathology in this case.

This patient's symptoms were caused by a lymphocytic dermatitis that was secondary to either an autoimmune skin disorder or lymphoma. If the owner had not chosen to euthanize, and a diagnosis had been obtained via the second skin biopsy, it would have been appropriate to re-culture the lesions and start steroids despite the risk of non-healing wounds. However, the clinician personally feels that the owner made the right choice to euthanize.

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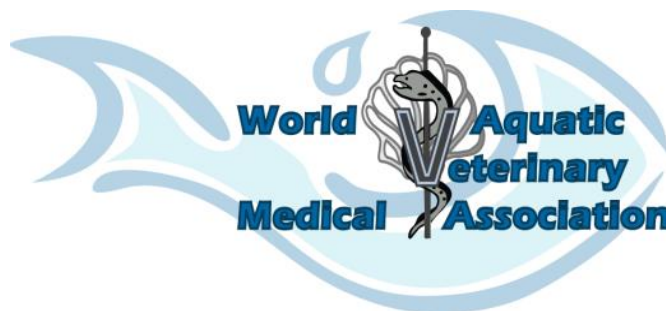
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Questions & Answers from the WAVMA Listserv
[WAVMA Members-L@wavma.org](mailto:WAVMA_Members-L@wavma.org)

Flipper Find Forensic Identification

Hello wonderful fish vets,

I am hoping for some forensic help in identifying this spine-like structure, which I found inside an abscess on the flipper of an Australian fur seal. There was a severe cellulitis reaction, with this structure embedded within the subcutaneous tissues. On close inspection, the structure appears mostly clear, glassy, with a central channel, tapering to a very sharp point at one end, and broken at the thicker end.

I am wondering if this could be a spine from one of the Scorpaenidae species, another piece of fish anatomy, or something else entirely?

I have attached some photos of the structure, with 40x and 100x microscope magnifications.

Thanks in advance for any suggestions!

Kind regards,

Dr. Chris Cheng
 BVSc, MMarAntSc, MVSc (Microbiology), MANZCVS
 (Medicine of Zoo Animals)
 Veterinarian
 Melbourne Zoo and Healesville Sanctuary
 (Zoos Victoria)
 Melbourne, Victoria, Australia
Loctahedron@gmail.com, CCheng@zoo.org.au



G'day, Chris.

Indeed, this appears to be a fin spine of the family Scorpaenidae. The genus *Scorpaena* is highly likely, considering the habits and habitat of the southern fur seal. If you want species-level precision, send the sample my way and I'll barcode it for you. Here is an informative paper with an illustration of the apparatus: <https://www.jstor.org/stable/pdf/3223876.pdf>

Cheers,

Michael W. Sandel, PhD
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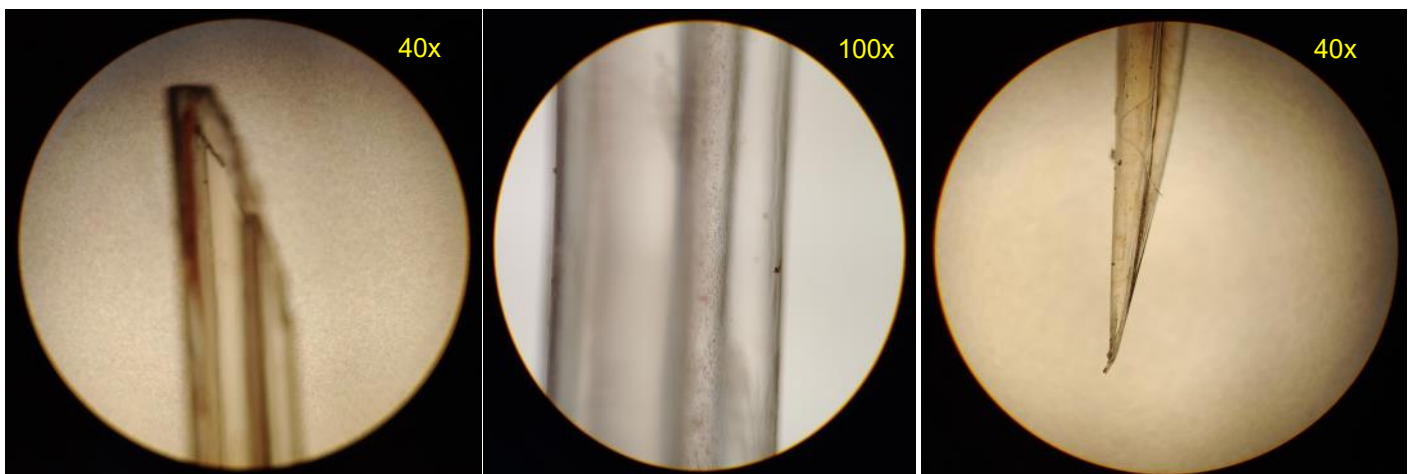
THE VENOM APPARATUS OF THE CALIFORNIA SCORPIONFISH, *SCORPAENA GUTTATA* GIRARD¹

BRUCE W. HALSTEAD, MYRNA J. CHITWOOD and F. RENE MODGLIN
*College of Medical Evangelists
 Loma Linda, California*

The piscine family Scorpaenidae contains a large number of venomous species. *Scorpaena guttata* Girard is representative of the more noxious members of its genus. The California scorpionfish, which is also known as the bullhead or sculpin, ranges from central California south into the Gulf of California. This scorpionfish is commonly taken by hook and line, or set lines, in the bays and along the shore throughout its range. Despite its venomous properties, the sculpin is generally conceded to be an excellent food fish, and in 1946 it ranked seventh in number caught among California ocean fishes (Roedel, 1948).

The sculpin is generally reddish above, mottled with reddish brown, olive, gray or purple, with a bright pink below. Scattered over the body are blotches and spots of brown or olive. The ventral fins are pinkish, whereas the other fins are marked with brown. Typical of many scorpaenids, these sculpins are somewhat fearless, and may frequently be observed resting on a sandy bottom or amongst a cluster of kelp. They are not easily frightened, apparently aware of their ability to inflict an extremely painful wound.

Photos of fish fin spine found in flipper of seal:



Koi Blood Cell Deformity

This past summer (June 2020) a large karashigoi (90 cm, 6 years old) got an infection of some lateral scales on its side. The owner treated with marbofloxacin injections, but it didn't get better. Then I was called and we treated with cefquinome injections with good results. 10 days later the fish was okay, but had a scar of about 6 cm. The fish was always very friendly and hungry. As most of such fish, they eat a lot and the owner spoils them with more and more food.

Recently (September), all of a sudden, the fish stopped eating and got very apathic/lethargic laying on the bottom of the pond, not swimming much. Examination: microscopy of skin, gill, faeces negative. No swelling, normal color, normal reactions; nothing special to see (other fish are normal, water quality is fine).

Treated with gentamycin, vitamins, meloxicam. No improvement. One week later I did an echo: not much abnormal to see, kind of a swelling before the anus but no pathological structures. Again some injections: butomidol, vitamins, gentamycin. Fish is taking some food (sinking) seldomly, if you drop it in front of him, but he is not asking for food, stays on the floor and swims from time to time around the pond. Every time the fish is bowled he tends to bleed from the gills (stress reaction, normal for many large fish). Later on, the fish is not really getting better nor worse.

As of October, the fish is swimming on its side on the bottom of the pond; eyes don't respond normally (they should try to stay horizontal but are as lateral as the fish). The fish is still responding to the net and to manipulation, but maybe overreacting and difficult to sedate. Again, the fish is bleeding from the gills. Blood is taken and this is very anemic (waterlike).

See the bloodwork done by Vetscan2 and some pictures of the blood cytology. HCT is very low (5!), many white blood cells are seen (buffy coat, cytology) and the red blood cells are deformed (because of the anemia?).

I would love to hear your opinion about this. What could have caused the fish to get so sick?

Thanks for sharing your ideas.

Best regards,

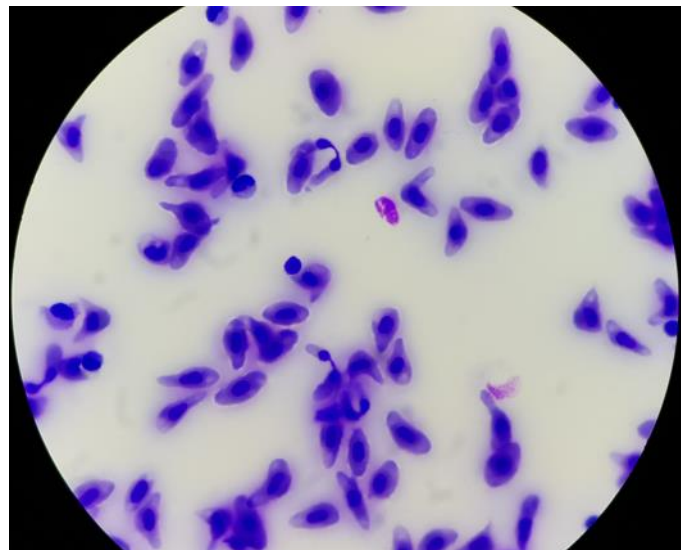
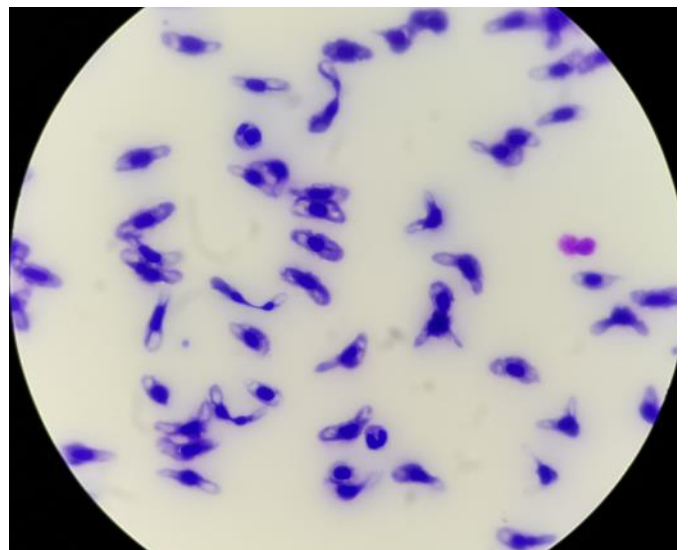
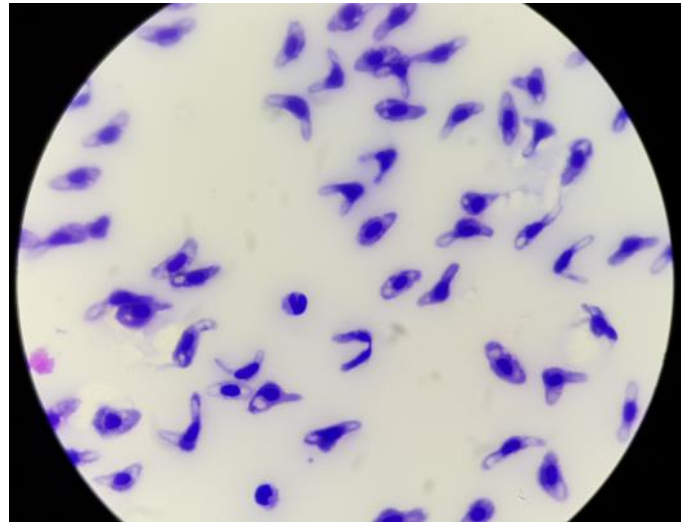
Tim Barbe

tim.barbe@skynet.be

Serologisch bloedonderzoek bij Koi, metingen en referenties

Patiënt : Karashigoi 90cm MF Watertemp : 14°C Date : 20/10/20

Parameter	Eenheid	Meting	Ref NK tripathi	Ref NS Erne	Ref B Palmero
Hemolyse index		0			
HCT		5			
Kidney & gill					
BUN	Mg/dl	4/3	2.2 - 2.7	5 - 15	
Creatinine*	Mg/dl	<0.2	0.1 - 0.2	0.2 - 0.5	
BUN/CREAT		20/15		10 - 20	0 - 5
Uric Acid*	Mg/dl	0.1	0.032	1 - 2.5	
Muscle					
AST = SGOT	IU/L	96	71 - 98	100 - 300	
CK	IU/L	7.41	4.32 - 7.39	4.5	
LDH			138 - 277		
Liver & Bile					
ALT = SGPT	IU/L	16	28 - 35	20 - 50	9 - 98
Tot Bil*	Mg/dl	0.5/0.6	0.04 - 0.1	0.1 - 0.3	0 - 4.4
ALP (bot)	IU/L	13/19	9 - 13	10 - 20	4 - 55
GGT*	IU/L	2	0.01 - 0.43	1 - 3	
Bile acids (BA)	µmol/L	0	8 - 11		
ICT		0			
Pancr					
Amylase**	IU/L	47		25 - 50	
Vet		0			
LIP index		0			
Cholesterol		122			



Photomicrographs of Koi blood cytology

Abstracts from Scientific Literature—*Francisella*:**Outbreak of francisellosis (*Francisella noatunensis* subsp. *orientalis*) in cultured neon jewel cichlids *Hemichromis bimaculatus* from Morelos, Mexico**

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ABSTRACT

Francisellosis is a disease caused by different species of the bacterial genus *Francisella* and has been diagnosed in a wide variety of animals, including fish. Francisellosis in fish is characterized by the development of non-specific clinical signs as well as the presence of numerous granulomas in several organs (mainly spleen and kidney). Ten neon jewel cichlids *Hemichromis bimaculatus* were submitted for diagnosis from a farm located in Morelos, Mexico. Gross examination, wet preparations, cytology, histopathology and PCR were performed.

Affected fish showed lethargy, erratic swimming, imbalance and gasping. At the postmortem examination, multiple granulomas were observed in the kidney and spleen. Microscopically, granulomatous inflammation was observed in several organs. Species-specific PCR assay using DNA from the affected tissues of *H. bimaculatus* as a template demonstrated the presence of *F. noatunensis* subsp. *orientalis* (*Fno*) by amplifying a hypothetical protein gene of the *Fno* species. The end diagnosis of francisellosis is important for Mexican ornamental aquaculture, since it is necessary to implement measures for treatment, prevention, control and diagnosis. This is the first report of francisellosis in the neon jewel cichlid.

KEY WORDS: *Francisella noatunensis* subsp. *orientalis* · Francisellosis · *Hemichromis bimaculatus* ·

<https://www.int-res.com/abstracts/dao/v137/n2/p125-130/>

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***Francisella* infections in fish and shellfish**

T H Birkbeck, S W Feist, D W Verner-Jeffreys

J Fish Dis. 2011 Mar;34(3):173-87.

PMID: 21306585

DOI: 10.1111/j.1365-2761.2010.01226.x

Abstract

A series of recent reports have implicated bacteria from the family Francisellaceae as the cause of disease in farmed and wild fish and shellfish species such as Atlantic cod, *Gadus morhua* L., tilapia, *Oreochromis* spp., Atlantic salmon, *Salmo salar* L., three-line grunt, *Parapristipoma trilineatum* (Thunberg), ornamental cichlid species, hybrid striped bass *Morone chrysops* x *M. saxatilis* and, recently, a shellfish species, the giant abalone, *Haliotis gigantea* Gmelin. The range of taxa affected will very probably rise as it is likely that there has been considerable under-reporting to date of these disease agents.

In common with other *Francisella* species, their isolation and culture require specialized solid and liquid media containing cysteine and a source of iron. This has likely restricted earlier efforts to identify them correctly as the cause of disease in aquatic animals. The most information to date relates to disease in cod, caused by *F. noatunensis* and tilapia, caused by *F. noatunensis* subsp. *orientalis* (also termed *F. asiatica*), both causing granulomatous inflammatory reactions. Mortalities in both species can be high and, as the disease can likely be transferred via live fish movements, they pose a significant threat to tilapia and cod aquaculture operations. Although the fish-pathogenic *Francisella* species are classified in the same genus as the human pathogens *F. tularensis*, causative agent of tularemia, and *F. philomiragia*, the risk to humans from the fish and shellfish pathogenic *Francisella* species is considered very low.



Multiple-locus, variable number of tandem repeat analysis (MLVA) of the fish-pathogen *Francisella noatunensis*

Øyvind J Brevik, Karl F Ottem, Are Nylund

BMC Vet Res. 2011 Jan 24;7:5.
 PMID: 21261955 PMCID: PMC3037875
 DOI: 10.1186/1746-6148-7-5

Abstract

Background: Since *Francisella noatunensis* was first isolated from cultured Atlantic cod in 2004, it has emerged as a global fish pathogen causing disease in both warm and cold water species. Outbreaks of francisellosis occur in several important cultured fish species making a correct management of this disease a matter of major importance. Currently there are no vaccines or treatments available. A strain typing system for use in studies of *F. noatunensis* epizootics would be an important tool for disease management. However, the high genetic similarity within the *Francisella* spp. makes strain typing difficult, but such typing of the related human pathogen *Francisella tularensis* has been performed successfully by targeting loci with higher genetic variation than the traditional signature sequences. These loci are known as Variable Numbers of Tandem Repeat (VNTR). The aim of this study is to identify possible useful VNTRs in the genome of *F. noatunensis*.

Results: Seven polymorphic VNTR loci were identified in the preliminary genome sequence of *F. noatunensis* ssp. *noatunensis* GM2212 isolate. These VNTR-loci were sequenced in *F. noatunensis* isolates collected from Atlantic cod (*Gadus morhua*) from Norway (n = 21), Three-line grunt (*Parapristipoma trilineatum*) from Japan (n = 1), Tilapia (*Oreochromis* spp.) from Indonesia (n = 3) and Atlantic salmon (*Salmo salar*) from Chile (n = 1). The Norwegian isolates presented in this study show both nine allelic profiles and clades, and that the majority of the farmed isolates belong in two clades only, while the allelic profiles from wild cod are unique.

Conclusions: VNTRs can be used to separate isolates belonging to both subspecies of *F. noatunensis*. Low allelic diversity in *F. noatunensis* isolates from outbreaks in cod culture compared to isolates wild cod, indicate that transmission of these isolates may be a result of human activity. The sequence based MLVA system presented in this study should provide a good starting point for further development of a genotyping system that can be used in studies of epizootics and disease management of francisellosis.

Characterization and Vaccine Potential of Membrane Vesicles Produced by *Francisella noatunensis* subsp. *orientalis* in an Adult Zebrafish Model

Leidy Lagos, Julia I Tandberg, Urska Repnik, Preben Boysen, Erik Ropstad, Deepa Varkey, Ian T Paulsen, Hanne C Winther-Larsen

Clin Vaccine Immunol. 2017 May 5;24(5):e00557-16.
 PMID: 28331079 PMCID: PMC5424235
 DOI: 10.1128/CVI.00557-16

Abstract

Vaccine development against extracellular bacteria has been important for the sustainability of the aquaculture industry. In contrast, infections with intracellular pathogens remain largely an unresolved problem. *Francisella noatunensis* subsp. *orientalis* is a Gram-negative, facultative intracellular bacterium that causes the disease francisellosis in fish. Francisellosis is commonly characterized as a chronic granulomatous disease with high morbidity and can result in high mortality depending on the host. In this study, we explored the potential of bacterial membrane vesicles (MVs) as a vaccine agent against *F. noatunensis* subsp. *orientalis*.

Bacterial MVs are spherical structures naturally released from the membrane of bacteria and are often enriched with selected bacterial components such as toxins and signaling molecules. MVs were isolated from broth-cultured *F. noatunensis* subsp. *orientalis* in the present work, and proteomic analysis by mass spectrometry revealed that MVs contained a variety of immunogenic factors, including the intracellular growth proteins IgIC and IgIB, known to be part of a *Francisella* pathogenicity island (FPI), as well as outer membrane protein OmpA, chaperonin GroEL, and chaperone ClpB. By using flow cytometry and electron microscopy, we observed that *F. noatunensis* subsp. *orientalis* mainly infects myelomonocytic cells, both in vivo and in vitro. Immunization with MVs isolated from *F. noatunensis* subsp. *orientalis* protects zebrafish from subsequent challenge with a lethal dose of *F. noatunensis* subsp. *Orientalis*.

To determine if MVs induce a typical acute inflammatory response, mRNA expression levels were assessed by quantitative real-time PCR. Expression of *tfa*, *il1b*, and *ifng*, as well as *mhcii*, *mpeg1.1*, and *ighm*, was upregulated, thus confirming the immunogenic properties of *F. noatunensis* subsp. *orientalis*-derived MVs.

Keywords: *Francisella noatunensis* subsp. *orientalis*; MVs; fish pathogens; francisellosis; immune response; immunization; immunology; membrane vesicles; vaccine; zebrafish.

2021 John L. Pitts Aquatic Veterinary Education Awards Program

For Veterinary Students & Recent Graduates

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

The John L. Pitts Aquatic Veterinary Education Awards Program is pleased to offer financial support to veterinary students or recent graduates of recognized veterinary schools, allowing recipients to explore a career in aquatic veterinary medicine through a variety of aquatic veterinary educational activities. These activities or projects **must be completed between November 1, 2020 and March 31, 2022**. Awards are intended to assist veterinary students and veterinarians who have graduated in the past 24 months to become involved in aquatic veterinary medicine.

Awards (generally between \$250 and \$1,000) may be used towards offsetting personal costs for:

Travel, accommodation, and/or registration at aquatic veterinary conferences, symposia and other continuing education and professional development (CEPD) meetings; including on-line aquatic CEPD

Travel, accommodation, and other activities directly associated with externships that expose individuals to aquatic veterinary medicine

Equipment and supplies needed for aquatic veterinary research projects not funded by other sources

All individuals who receive an award must provide a written report after completing their activity for publication in ***The Aquatic Veterinarian***, a quarterly publication of the World Aquatic Veterinary Medical Association (WAVMA), and are encouraged to give a presentation about their experience to other veterinary students.

Applications

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

An application form and additional information is available at <http://www.wavma.org/scholarships>.

Applications for the 2021 Program close on April 1, 2021.

Recipients will be notified by May 15.

For any questions, please contact PittsEduAwards-Admin@wavma.org.





**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.

Many Veterinary Conferences being held in 2021 have been canceled or postponed. Please check websites to ensure conferences are still being held before making travel plans.

Future WSAVA Conferences:

45th WSAVA World Congress [Virtual]

Dates: 21-24 March 2021

Held Virtually online

[Visit the website here](#)

46th WSAVA World Congress

Dates: 13-16 November 2021

Hyderabad, India

[Visit the website here](#)

47th WSAVA World Congress

Dates: 29-31 October 2022

Lima, Peru

See: [WSAVA](#)

The 2016 WAVMA Virtual Conference Presentations

The presentations (18 webinars) from the 2016 WAVMA Virtual Conference were recorded but due to various issues have never been placed on the WAVMA website to date. They will form part of over 140 webinar recordings which are available to members now that the new website is up and running.

CEPD credit was available if you watched the original webinars live and will be available when they go to watch them on the WAVMA website.

Chris Walster
Website Administrator

The Atlantic Salmon Conservation Foundation is proud to announce our upcoming series of webinars. To register, please follow the link below each webinar title. Participation in the series is free and audio access is available through your computer.

La Fondation pour la conservation du saumon atlantique est fière d'annoncer notre prochaine série de webinaires. Pour vous inscrire, suivez le lien sous chaque titre. La participation à cette série de Webinaires est gratuite et l'accès audio est disponible grâce à votre ordinateur.

**2021 ASCF Webinar Schedule
Horaire des webinaires de FCSA 2021**

Please note: Presentations will be in either English (EN) or French (FR), but where possible, the question and answer period will be bilingual.

Veillez noter que les webinaires seront en anglais (EN) ou en français (FR), mais dans la mesure du possible la période de question et réponse sera bilingue.

6 Jan (EN) – Sam Andrews (UNB) – A review of Atlantic Salmon smolt consumption by Striped Bass
<https://attendee.gotowebinar.com/register/3765430808606893584>

22 Jan (FR) – Marie-Camille St-Amour (OBVNEBSL) & Rébecca Gagnon (OBVMR) – Projet de partenariat avec le Club quad Avignon Ouest pour la caractérisation des ponceaux à potentiel faunique
<https://attendee.gotowebinar.com/register/8864928355146819343>

3 Feb (EN) - Karelle Gilbert (UL) & Sylvian Jutras (UL) - Water and forest road networks in Quebec: issues and solutions
<https://attendee.gotowebinar.com/register/3345762613468739343>

17 Feb (FR) - André St-Hilaire (INRS) – La caractérisation et la sensibilité thermique des rivières à saumon
<https://attendee.gotowebinar.com/register/2353160899308784908>

3 Mar (EN) - Ben Whalen (KWRC) – Riparian Restoration Tool Box: A how to manual for watershed practitioners
<https://attendee.gotowebinar.com/register/7279197292405329167>

**20th INTERNATIONAL CONFERENCE ON
 DISEASES OF FISH AND SHELLFISH**

Aberdeen, UK

29th August - 2nd September 2021

Depending on the status of the COVID-19 epidemiological situation for the appointed period, the 20th International Conference on Diseases of Fish and Shellfish (<https://www.delegate-reg.co.uk/eafp-2021/>) is currently planned to be held in-person at Aberdeen's newest events and exhibition space, TECA. Scientific and technical sessions consisting of poster presentations, invited talks, keynotes, oral presentations, workshops and an EAFP General Assembly will take place during the Conference. Planned social events such as, the Welcome Cocktail, Civic Reception and the traditional Conference Banquet, will be held in accordance with required epidemiological 'social distancing' measures in place.

In order to ensure that appropriate topics are covered, including emerging areas, we are very interested in hearing any suggestions for potential topics for scientific sessions and workshops at the conference. EAFP members and non-members are encouraged to submit proposals. More information will be available on the EAFP website and a 2nd announcement will provide more updates.

We look forward to seeing you at the 20th International Conference on Diseases of Fish and Shellfish organised by the EAFP. Feel free to contact our Meetings Secretary if you have any questions or need additional information, see below for contact information.

Ivona Mladineo,
 EAFP Meeting Secretary,
 e-mail: ivona.mladineo@paru.cas.cz
 or eafp@kc-jones.co.uk

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

2021 AQUAVET® I & II & III Courses

The College of Veterinary Medicine at Cornell University is pleased to announce the 2021 AQUAVET® I, II & III course offerings. They are aquatic veterinary medicine education programs that currently consist of two courses that will be presented at Roger Williams University in Bristol, RI in June 2021 and one on Aquarium Medicine held in three venues.

AQUAVET® I:

An Introduction to Aquatic Veterinary Medicine is a 4-week course (30 May - 26 June 2021) intended primarily for veterinary students.

AQUAVET® II:

Comparative Pathology of Aquatic Animals is a 2-week course (30 May - 12 June 2021) that is oriented toward the pathology of diseases of aquatic invertebrates and fish that are used in biomedical research, encountered in display aquaria and are of importance in commercial aquaculture.

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

AQUAVET® III:

Clinical Aspects of Captive Aquatic Animal Medicine is a 5-week course (following AQUAVET® I - 27 June to 1 August 2021) and is limited to a small number of students. The venues include GA Aquarium, U of GA and Dolphinaris, Cancún, México.

Veterinary students can receive credits for the courses and graduate veterinarians can receive CE credits. More detailed information and applications for admission (due by January 15, 2021) are available on the web site www.aquavet.org.



WAVMA's WebCEPD Program -
 Webinars for Global Aquatic Veterinary Education

Given by leading experts, WAVMA's real-time and recorded WebCEPD webinars are intended as educational programs on key aquatic veterinary issues and techniques to hone the knowledge and skills of aquatic veterinary students and practitioners. Currently, there are 44 recorded videos available to watch on the WAVMA.org website.

Earning CEPD Credit for Recorded Webinars

Recorded webinars can be viewed at no charge. However, to earn veterinary continuing education & professional development (CEPD) credit, you will need to complete a short knowledge & skills assessment (KSA) or quiz to ensure you have met the learning objectives. On successful completion you will receive a CEPD certificate (useful for re-licensure/registration to practice veterinary medicine, and credit towards becoming a WAVMA Certified Aquatic Veterinarian). Accessing the KSA and receiving a CEPD will cost US\$5.00 for WAVMA Student Members, \$15.00 for all other WAVMA Members, and \$25.00 for those who are not WAVMA members - click on "more info" for the recording and for KSA/CEPD information.

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

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>.



The New Year is right around the corner and I wanted to let everyone know about the Freshwater Mussel Conservation Webinars we already have scheduled for 2021! Below is a list of upcoming webinars. Go to nctc.fws.gov/topic/online-training/webinars/freshwater-mussel-conservation.html and register for any or all of them. You can also watch recordings of all previous webinars in the series.

January 12th (2PM Eastern):
 Infectious threats to freshwater mussels: how worried should we be? Presented by Dr. Tony Goldberg and Jordan Richard.

February 23rd (2PM Eastern):
 The Current State of Freshwater Mussel Propagation: New Advancements and Tricks of the Trade. Presented by Rachel Mair, Rachael Hoch, Nathan Eckert, and Chris Eads.

April 6th (2PM Eastern):
 The fascinating story of the Glochidium: evolution, anatomy, physiology, and ecology. Presented by Dr. Michael Hoggarth.

Thanks,
 Matthew Patterson
 Fish and Wildlife Biologist/Course Leader
 National Conservation Training Center
 U.S. Fish and Wildlife Service
 698 Conservation Way
 Shepherdstown, WV 25443
 304-620-3820



The Aquatic Veterinarian 2020 Index

[Key = Volume (Issue) Page Number]

Compiled Table of Contents for

The Aquatic Veterinarian—Volume 14

WAVMA News

Who We Are ... 14(1) 2; 14(2) 2; 14(3) 2; 14(4) 2
 Editorial Staff ... 14(1) 2; 14(2) 2; 14(3) 2; 14(4) 2
 WAVMA Executive Board ... 14(1) 2; 14(2) 2; 14(3) 2;
 14(4) 2
 Table of Contents ... 14(1) 3; 14(2) 3; 14(3) 3; 14(4) 3
 Editorials ... 14(1) 4; 14(2) 4; 14(3) 4; 14(4) 4
 Advertising Rates ... 14(1) 4; 14(2) 4; 14(3) 4; 14(4) 4
 Executive Board Reports ... 14(1) 5-7; 14(2) 5-10; 14
 (3) 5-9; 14(4) 5-8
 President's Report ... 14(1) 5; 14(2) 5; 14(3) 5; 14(4) 5
 Secretary's Report ... 14(1) 6; 14(2) 6; 14(3) 6; 14(4) 6
 Treasurer's Report ... 14(1) 7; 14(2) 7; 14(3) 7; 14(4) 7
 New Members ... 14(1) 7; 14(2) 7; 14(3) 7; 14(4) 7
 Committee Reports ... 14(1) 8-12; 14(2) 11-18; 14(3)
 10-16; 14(4) 9-16
 Privileges & Benefits of WAVMA Membership ... 14(1)
 8; 14(2) 11; 14(3) 10; 14(4) 9
 WAVMA Committees ... 14(1) 8; 14(2) 11; 14(3) 10; 14
 (4) 12
 Credentialing Committee ... 14(1) 9; 14(2) 12-13; 14(3)
 12; 14(4) 14
 Certified Aquatic Veterinarians ... 14(1) 9; 14(2) 13; 14
 (3) 13; 14(4) 15
 Meetings Committee ... 14(1) 10; 14(2) 14; 14(3) 11;
 14(4) 13
 Membership Committee: Exciting Changes Around
 the Corner ... 14(2) 15
 WAVMA Member Receives 2020 Veterinarian of the
 Year Award ... 14(3) 12
 New Advantages For WAVMA Members ... 14(2) 17;
 14(3) 15
 Education & Student Committee ... 14(1) 11; 14 (2)
 16; 14(3) 15; 14(4) 21
 First Joint Webinar Collaboration Between WAVMA
 and EAFP: 'Main Infectious Diseases of Marine Fish'
 ... 14(3) 14
 Fellows Advisory Council ... 14(1) 10; 14(2) 14; 14(3)
 8; 14(3) 11; 14(4) 13
 Executive Board Responsibilities ... 14(1) 10; 14(2)
 14; 14(3) 8; 14(4) 12

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

WAVMA Veterinary School Chapters ... 14(1) 11
 Obituary: John Bernard Gratzek, DVM, PhD .. 14(4) 9
 Summarizing an important year for the Education and
 Students Committee ... 14(4) 16-17
 New Website and Dues Payment Update ... 14(4) 22
 Fish Veterinary Society Liaison Report ... 14(1) 11
 WAVMA Annual General Meeting ... 14(3) 9; 14(4) 10-
 11
 WAVMA Elections ... 14(2) 8; 14(3) 8; 14(4) 8
 Meet the Regional Directors ... 14(2) 8-10
 Join A WAVMA Committee ... 14(1) 12; 14(2) 15; 14
 (3) 8; 14(4) 12
 Author's Instructions ... 14(1) 13; 14(2) 19; 14(3) 17;
 14(4) 23

Student Chapter Reports

Aquatic Animal Internships / Externships ... 14(1) 11
 New Student Chapter—UC-Davis ... 14(1) 12
 New Student Chapter—Edinburgh ... 14(2) 18
 New Student Chapter—PennVet ... 14(3) 16
 Pitts Aquatic Veterinary Education Award Program ...
 14(2) 17; 14(4) 36
 Murdoch Student Chapter Event Report ... 14(4) 18-19

**Colleague's Connection ... 14(1) 14-17; 14(2) 20-21;
 14(3) 18-21; 14(4) 24-25**

The Less Traditional Pathway of an Aquatic Veterinari-
 an, By Dr. Azureen Erdman ... 14(1) 14-17
 Meet: Dr. Terra MacDonald ... 14(2) 20-21
 Meet: Dr. Julius Tepper ... 14(3) 18-21
 Fish Philately: Dr. Nick Saint-Erne ... 14(4) 24-25

Featured Aquarium ... 14(1) 18-23

Arizona-Sonora Desert Museum ... 14(1) 18-23

**Centerfold ... 14(1) 22-23; 14(2) 22-23; 14(3) 22-23;
 14(4) 26-27**

Gila Topminnows at the ASDM ... 14(1) 22-23
 Albino Alligator at the Wildlife World Zoo ... 14(2) 22-
 23
 Dr. Julius Tepper's Koi Pond ... 14(3) 22-23
 Fish Philately: Fish Postage Stamps from Around the
 World ... 14(4) 26-27

**Grand Round Cases ... 14(1) 36-37; 14(2) 40-41; 14
 (3) 36-37; 14(4) 32-33**

Koi with Skin Lesions ... 14(1) 36-37
 Fish Parasites ... 14(2) 40-41
 The Aquarium Vet E-Workshop – Parasite ID and their
 Management ... 14(2) 41
 Websites with illustrated guides to fish parasites ... 14
 (2) 41
 Stuck on You: Aquatic Glue ... 14(3) 36
 Scale Protrusion in a Koi ... 14(3) 36
 Koi Scales ... 14(3) 37
 Flipper Find Forensic Identification ... 14(4) 32
 Koi Blood Cell Deformity ... 14(4) 33

Clinical Case Reports ... 14(1) 24-34; 14(2) 24-39; 14(3) 30-35; 14(4) 28-31

Dystrophic Calcification in the Feet of a Colorado River Toad (*Incilius alvarius*) By Sharmie Johnson ... 14(1) 24-27

Partial Hysterectomy Following Cesarean Section In a Blacktip Reef Shark (*Carcharhinus melanopterus*) By Sharmie Johnson... 14(1) 28-34

Cholangiocarcinoma and papillary mesothelioma in an albino American alligator (*A. mississippiensis*) By Sharmie Johnson ... 14(2) 24-33

Mycobacteriosis in a betta fish (*Betta splendens*) diagnosed after treatment with enrofloxacin

By Jenifer L. Nix, BVSc ... 14(2) 34-39

Histopathology and Polymerase Chain Reaction Diagnosis for Lung Phaeohiphomycosis in a Free Ranging Hawksbill Sea Turtle (*E. imbricata*) ... 14(3) 30-33

The Presence of *Ichthyophthirius multifiliis* in Koi (*Cyprinus rubrofuscus*) ... 14(3) 34-35

Chronic Lymphocytic Dermatitis in a Koi Fish (*Cyprinus rubrofuscus*) by Alicia McLaughlin, DVM ... 14(4) 28-31

Research Reports 14(3) 24-29

Hematologic and Plasma Biochemical Values in Nesting Hawksbill Sea Turtles (*Eretmochelys imbricata*) on Holbox Island, Mexico ... 14(3) 24-29

Literature Review

Aquatic Veterinary Abstracts ... 14(1) 38; 14(2) 42-43; 14(3) 38; 14(4) 34-35

Frogs, the Present of the Future Protein Source ... 14(1) 38

Defining and Monitoring Atlantic Salmon "Health" ... 14(1) 38

Current Practices and Challenges for the Control Of Sea Lice on Salmon Farms ... 14(1) 38

Fish Farms at Sea: The Ground Truth from Google Earth ... 14(1) 38

Fish Parasites... 14(2) 42-43

Guide to the Identification of Fish Protozoan and Metazoan Parasites in Stained Tissue Sections ... 14(2) 42

Parasitology and Necropsy of Fish ... 14(2) 42

Parasites of Juvenile Brook Trout (*Salvelinus fontinalis*) from Hunt Creek, Michigan, USA ... 14(2) 42

Helminth Parasites of South American Fishes: Current Status and Characterization as a Model for Studies of Biodiversity ... 14(2) 42

Use of praziquantel to control platyhelminth parasites of fish ... 14(2) 43

Helminth Communities of Four Commercially Important Fish Species From Chetumal Bay, Mexico ... 14(2) 43

Koi Genetics ... 14(3) 38

The complete mitochondrial genome of the Oujiang color carp ... 14(3) 38

The complete mitochondrial genome of the Japanese ornamental koi carp and its implication for the history of koi ... 14(3) 38

Complete mitochondrial genomes of domesticated and wild common carp ... 14(3) 38

The structural basis for enhanced silver reflectance in Koi fish scale and skin ... 14(3) 38

Francisella ... 14(4) 34-35

Outbreak of francisellosis in cultured neon jewel cichlids from Morelos, Mexico ... 14(4) 34

Francisella infections in fish and shellfish ... 14(4) 34

Multiple-locus, variable number of tandem repeat analysis (MLVA) of the fish-pathogen *Francisella noatunensis* ... 14(4) 35

Characterization and Vaccine Potential of Membrane Vesicles Produced by *Francisella noatunensis* subsp. *orientalis* in an Adult Zebrafish Model ... 14(4) 35

Legislation & Regulations ... 14(1) 39

COVID-19 Information ... 14(1) 39

FDA Temporarily Relaxes Veterinary Telemedicine to Meet Animal Health Needs ... 14(1) 39

Canada's farmed salmonids Code of Practice... 14(4) 22

Aquatic Veterinary CE & PD ... 14(1) 41-43; 14(3) 45-47; 14(3) 39-43; 14(4) 36-39

The Health and Welfare of Atlantic Salmon ... 14(1) 41;

The Atlantic Salmon Conservation Foundation ... 14(2) 45; 14(3) 45; 14(3) 41; 14(4) 37

Meetings of Interest to Aquatic Veterinarians ... 14(1) 42-43; 14(2) 46-47; 14(3) 42-43; 14(4) 37-39

2020 Aquatic Animal Welfare (Virtual) Conference ... 14(3) 39-40

2021 AQUAVET® I & II & III Courses ... 14(3) 40; 14(4) 38

WAVMA 2020 Conference and AGM ... 14(3) 42

International Conference on Diseases of Fish and Shellfish ... 14(4) 38

Freshwater Mussel Conservation ... 14(4) 39

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

Send your article (<1,000 words) with pictures to
TAEditor@wavma.org.

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

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 The Fish Vet Group ... 14(1) 41
 ZooMed Laboratories ... 14(1) 44; 14(2) 48; 14(3) 44; 14(4) 44
 The Aquarium Vet ... 14(3) 15

Index for 2020 Issues ... 14(4) 40-43**The Aquatic Veterinarian Comprehensive Index:**

Compiled Articles from *Aquatic Vet News* (AVN) and *The Aquatic Veterinarian* (TAV)
 [Key = Volume (Issue) Page Number]

Featured Public Aquariums

Vancouver Aquarium, Canada - AVN 2(4) 21
 New York Aquarium, New York - TAV 7(1) 33
 Waikiki Aquarium, Hawaii - TAV 7(2) 12
 Melbourne Aquarium, Australia - TAV 8(1) 32
 Mote Marine Lab and Aquarium - TAV 8(4) 20-21
 The Georgia Aquarium, Atlanta, GA - TAV 9(1) 22-26
 The Shedd Aquarium, Chicago, Illinois - TAV 9(2) 29-30
 Monterey Bay Aquarium, California - TAV 9(3) 28-30
 OdySea Aquarium, Phoenix, Arizona - TAV 10(4) 32-35
 S.E.A. Aquarium, Singapore - TAV 10(4) 40-43; 12(4) 26-29
 National Aquarium, Baltimore, Maryland - 11(2) 17
 A Visit to River Safari—Singapore - 12(1) 20-21
 New England Aquarium — Boston, Massachusetts, USA - 12(2) 23
 Dallas North Aquarium, Dallas, Texas - 13(1) 18-21
 Florida Aquarium, Tampa, Florida—13(2) 20-23
 South Carolina Aquarium, Charleston, South Carolina—13(3) 20-23
 Wildlife World Zoo and Aquarium, Litchfield Park, Arizona— 13(4) 22-25
 Arizona-Sonora Desert Museum, Tucson, Arizona - 14(1) 18-23

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WAVMA Annual General Meeting Reports

Washington, DC, USA - July 18, 2007; AVN 1(1):1-2
 Vancouver, BC, Canada - July 27, 2008; AVN 2(3):1-6
 Seattle, WA, USA - July 14, 2009; AVN 3(3): 6-7
 Athens, Greece - July 14, 2010; AVN 4(3): 26-27
 St. Louis, MO, USA - July 18, 2011;
 San Diego, CA, USA - August 6, 2012; AVN 6(3): 5
 Prague, Czech Republic - September 18, 2013; TAV 7(3): 7, 10-11
 Denver, CO, USA - July 24, 2014; TAV 8(3): 4-6
 Istanbul, Turkey - September 15, 2015; TAV 9(4): 12-15
 San Antonio, Texas USA - August 6, 2016; TAV 10(3):12-13
 Targu Mures, Romania—September 13, 2017; 11(3) 14-15
 St. Kitts, BWI—November 10, 2018; 12(4) 12-15
 Toronto, Canada—July 15, 2019; 13(2) 7 and 16
 Virtual AGM—November 7, 2020; 14(4) 10-11

Index to WAVMA Member Profiles in the Colleagues' Connection and Student Committee Reports

AVN = *Aquatic Vet News* (2007-2012)
 TAV = *The Aquatic Veterinarian* (2013-2017)
 SC = Student Committee Report
 Key = Volume(Issue) Page number
 Listed in alphabetical order by last name

Kurt Arden - TAV 9(3) 20 SC
 Barry Baker - AVN 6(1) 6 SC
 Kendra Baker - TAV 9(2) 18 SC
 Meg Baker - TAV 10(1) 14 SC
 Elizabeth Bamberger - TAV 8(4) 19
 Wes Baumgartner - TAV 8(3) 17
 Brandon Boren - AVN 5(2) 6 SC
 Shane Boylan - TAV 13(3) 16-19
 Lydia Brown - TAV 8(2) 18; TAV 8(3) 18
 Alyssa M. Capuano - TAV 12(3) 22 SC
 Julie M. Cavin - TAV 11(1) 16
 Bryony Chetwynd-Glover - TAV 13(3) 24-27 SC
 Hui Nee Chin - TAV 8(4) 18 SC
 Leigh Clayton - TAV 11(2) 16
 Lori Corriveau - AVN 3(1) 7
 Brett De Poister - AVN 6(3) 6 SC
 Emily Denstedt - AVN 6(2) 6 SC
 Jessica Dewar - TAV 8(2) 16 SC
 Kyle Donnelly - TAV 7(3) 12 SC
 Devon Dublin - AVN 4(2) 9; AVN 4(3) 11; TAV 8(3) 16; TAV 11(3) 12
 Azureen Erdman - TAV 14(1) 14-17
 Mohamed Faisal - TAV 9(4) 24
 Susan Fogelson - TAV 8(3) 14 SC
 Ari Fustukjian - TAV 13(2) 18-23
 Ian Gardner - AVN 5(3) 13
 Joe Gaydos - TAV 10(4): 21
 John Griffioen - 10(3) 15 SC
 Chad Harris - TAV 8(3) 18; TAV 9(4) 25
 Leighanne Hawkins - TAV 13(4) 19

- Ashley Heard-Ganir – TAV 9(4): 20 SC
 Nora Hickey – TAV 8(1) 16-17 SC; TAV 9(4) 21 SC
 Rob Hildreth – AVN 2(3): 29
 Nicole E. Himebaugh—TAV 12(3) 20 SC
 Elizabeth Hodges – TAV 8(3) 14-15
 John Howe – AVN 6(2) 10; TAV 13(2) 17
 Sara Huckabone – TAV 8(2) 15 SC
 Sharmie Johnson– TAV 13(4) 20-21
 Colin Johnston – AVN 3(3) 11
 Timothy Jones – AVN 5(1) 9 SC
 Kirstin Kamps – AVN 4(4) 6, SC; AVN 5(1) 7 SC;
 Myron Kebus – AVN 2(4) 14-15; TAV 7(4) 12-13
 David Kestenman – AVN 5(1) 18-19
 Sangwha Kim – TAV 10(2) 18 SC
 Ashley Kirby – TAV 9(3) 18 SC
 Sarah Knowles – TAV 9(3) 23 SC
 Manuel Kunzel - TAV 12(3) 18-19 SC
 Austin Leedy – TAV 8(1) 10-12
 Shelby L. Loos – TAV 9(4) 18-19 SC
 Veronique LePage – AVN 5(1) 8 SC
 Barbara Linnehan – TAV 8(4) 16 SC
 Noelle Litra – TAV 9(2) 19 SC
 Eric Littman – TAV 9(1) 16 SC
 Richmond Loh – TAV 7(3) 14-17; TAV 10(2): 23-25
 Terra MacDonald – TAV 14(2) 18-19
 Doug Mader – TAV 10(3) 18-19
 Sarah McConnachie -12(2) 18-19 SC
 Christina McKenzie - 10(3) 16-17 SC
 Peter Merrill – AVN 5(2) 12-15; TAV 10(2) 19
 Tim Miller-Morgan – AVN 2(3) 29; AVN 2(4) 13-14;
 AVN 4(4) 11
 Timothy Mullican – TAV 9(1) 22-26
 Jenny Munhofen – TAV 8(2) 14 SC
 Michael Murray – TAV 9(3) 28-30
 Ross Neethling – TAV 9(3) 21 SC
 Nicole Nietlisbach - TAV 12(1) 16-19 SC
 Brian Palmeiro – AVN 3(2) 8
 Samara Parker – AVN 5(3) 5 SC
 Anna Penacchi – TAV 10(2) 17 SC
 Kaylee Perry – TAV 9(3) 22 SC
 John Pitts – AVN 3(4) 1; AVN 4(1) 7; TAV 10(2) 13
 Caryn Poll – TAV 7(3) 9 CR
 Jena Questen – AVN 3(1) 1; TAV 8(1) 14-15; TAV 11(3)
 12
 Stephen Reichley – AVN 6(3) 10; TAV 8(2) 12 SC; TAV
 11(3) 12
 Julianne Richard – TAV 9(4) 22-23 SC
 Christine Richey – TAV 9(3) 22 SC
 Helen Roberts – AVN 2(4) 14; AVN 6(1): 10-11; TAV 12
 (3) 15
 Ronald Roberts – AVN 5(4) 12-13; TAV 12(1) 14-15
 Abe Robinson – TAV 8(4) 20-21
 Hamish Rodger –TAV 11(1) 16
 Jenna D. Roseman – TAV 9(2) 21 SC
 Nick Saint-Erne – TAV 7(1) 12-13; TAV 7(2) 12; TAV 8
 (3) 16; TAV 11(3) 12; TAV 14(4) 24-25
 Elizabeth St. Germaine –TAV 13(3) 28-29 SC
 Jessie Sanders – TAV 10(1) 15-17
 Maya Sawyers – TAV 7(4) 11 SC
- A. David Scarfe – TAV 10(2) 20-22
 Karissa Sciacca – TAV 8(2) 16 SC
 Najim Sekh – TAV 9(2) 20 SC
 Sunita Shrestha —TAV 13(4) 16 SC
 Wesley Siniard – TAV 8(3) 12 SC
 Justin Stillwell – TAV 9(1) 17 SC
 Megan Strobel – TAV 10(2) 16 SC
 Helen Roberts Sweeney - TAV 12(3) 15
 Julius Tepper – AVN 5(3) 12-13; TAV 14(3) 18-21
 Sharon Tiberio – TAV 8(3) 17
 Laura-Daniela Urdes – TAV 7(4) 14-15; TAV 8(3) 18;
 TAV 12(2)14
 Jonas Vaitkus – AVN 5(1) 10-11 SC
 Bill Van Bonn – TAV 9(2) 29
 Vasile Vulpe - TAV 11(4) 14-15
 Zac Waddington – TAV 8(4) 17 SC
 Chris Walster – TAV 7(2) 10-12
 Holly Ward — TAV 13(4) 14 SC
 Scott Weber – AVN 3(4) 9; AVN 6(4) 10-13;
 Tatiana Weisbrod - TAV 11(1) 14-15 SC
 Peter Werkman – TAV 9(3) 26-27; TAV 10(4) 20
 Sophie Whoriskey – AVN 5(4) 5 SC
 Jen Wilson-Cohen – TAV 8(3) 13 SC
 Hillary A. Wolfe – TAV 9(2) 18 SC
 Courtney Wright (WDFW) - TAV 12(2) 20-21 SC
 Courtney Wright (IDFG) -TAV 12(2) 22-23 SC
 Sarah Wright - TAV 12(1) 19-20 SC; TAV 13(4) 15 SC
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