

The



quatic

eterinarian



Review of the Red Lionfish, *Pterois volitans*
By Sharon Tiberio, DVM, CertAqV
(Photo by [Jens Petersen](#))
See related article on page 20.

Volume 8, Number 3
Third Quarter, 2014



THE AQUATIC VETERINARIAN

Volume 8, Number 3

Formerly *Aquatic Vet News*

Third Quarter 2014

WORLD AQUATIC VETERINARY MEDICAL ASSOCIATION

WHO ARE WE

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.

The purpose of the World Aquatic Veterinary Medical Association is:

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

The ideas presented in this publication express the views and opinions of the authors, may not reflect the view of WAVMA, and should not be implied as WAVMA recommendations or endorsements unless explicitly stated. Information related to the practice of veterinary medicine should only be used within an established valid Veterinarian-Patient-Client Relationship.



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THE AQUATIC VETERINARIAN

Volume 8, Number 3

CONTENTS

Third Quarter 2014

WAVMA News:

Editorials	4
Executive Board Reports	5
Committee Reports	8
2014 WAVMA/AVMA/AVMF Aquatic Scholarship Recipient Reports	12
Wesley Siniard	12
Jen Wilson-Cohen	13
Susan Fogelson	14
Elizabeth Hodges	14
Colleague's Connection: 2015 Officer/Director Nominees	16

Instructions to Authors

Research Articles and Review Papers:

Review of the Red Lionfish, <i>Pterois volitans</i> : Sharon Tiberio	20
Quantification of the Antibacterial Agents in Aquaculture: Samuel Nute	24

Grand Round Cases :

Collation of discussions from the WAVMA Listserv	29
IM Injections in Sharks	29
Ban the Sale of Teddy Bear Tanks	29

Clinical Cases:

Advanced Diagnostics in a Diamond Tetra: Matthijs Mettselaar	30
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Literature Review:

Aquatic Veterinary Abstracts	32
Use of veterinary medicines, feed additives and probiotics in four major internationally traded aquaculture species farmed in Asia	32
Probabilistic risk assessment of veterinary medicines applied to four major aquaculture species produced in Asia	32
<i>Herpetological Conservation and Biology</i>	33
Use Of GPS Loggers To Enhance Radio-Tracking Studies Of Semi-Aquatic Freshwater Turtles	33
Book Review: <i>Introduction to the Commercial Fisheries of the United States and Canada</i>	34
Know your Sea Cucumbers	35

News and Views:

Sea creatures add branch to tree of life: New species that do not fit in any known group	36
Smarter than you think: Fish can remember where they were fed 12 days later	36
Koi Herpesvirus (KHV) disease confirmed in UK koi carp (<i>Cyprinus carpio</i>)	37
Hawaiian Monk Seal Hospital Officially Opens	37
Scientists study 'talking' aquatic turtles in Brazilian Amazon	38
Asian Bacterium causing US catfish deaths	39
The 2014 Edition of the "Blue Book" 2014 is now online	40
Avian Flu in Harbor Seals Could Infect People	40
Benefits of treating Salmon Sequentially with SLICE and Hydrogen Peroxide	41
Noteworthy Websites	41

Legislative & Regulatory Issues:

Aquaculture considered key to feeding the world in 2030	42
China plans giant fish-farming ship at Nansha	42
Public Comment Period Opens for Draft Shrimp Standard for the ASEAN Region	43
Four years after oil spill disaster, the Gulf of Mexico seafood industry is still depressed	43

Aquatic Veterinary CE&PD:

Meetings of Interest to Aquatic Veterinarians	44
Internships, Externships and Residencies	50

Job Opportunities

Sponsors

THE AQUATIC VETERINARIAN

Volume 8, Number 3

EDITORIALS

Third Quarter 2014

Editor's Note

This is the biggest issue of *The Aquatic Veterinarian* yet, and we are really pleased with the contributions from our members. Please keep sending in your Case Reports and Research Articles, news items, or any thing else of interest to aquatic veterinarians. Be sure to review the Nominees for our 2015 Officers and vote online. And remember, vote early and vote often.

The WAVMA Annual General Meeting held during the AVMA Convention in Denver, Colorado was a huge success. The meeting location arranged by Dr Tepper was outstanding, the food superb, and the entertainment magical. But the best part was the fellowship and the bonding of the Aquatic Veterinarians. Both old friends and newly made ones had a great time at the meeting, during the Aquatic lectures and at the evening adventures. The photos represent only a sample of the exciting events. AquaVets Assemble!

Nick Saint-Erne, DVM, CertAqV
Executive Editor



THE AQUATIC VETERINARIAN

Volume 8, Number 3

EXECUTIVE REPORTS

Third Quarter 2014

President's Report

Dear WAVMA Members,

Just a month ago, I had the privilege to meet many of our members at the AVMA Convention in Denver. It was certainly "fantastic" to meet all the people I've been conversing with over the "net" and also "catch" them in a social setting.

I learnt that many of us have developed a significant part of our know-how through self-education. And many are so grateful that the WAVMA is now around. The List-serv questions and responses are amazing and everyone learns by sharing their ideas. We have our WebCEPD Program on its way to delivering live and recorded webinars. I can't stress enough what an asset each and every one of our members are in terms of their knowledge and experiences. This is becoming more and more evident as we receive more and more applications for the CertAqV Program.

In case you're not aware of the Certified Aquatic Veterinarian Program, it is a peer-reviewed process of recognising your prior knowledge, skills and experiences in Aquatic Veterinary Medicine. When you satisfy all the requirements, the WAVMA will proudly present you with the CertAqV post-nominals. I have to say that the committee who put this together did a marvelous job.

One of the encouraging things that I've been told frequently is how our organisation is so supportive. I cannot think of any global organisations that looks after every individual member's needs like the one we have. And as we can see from this year's executive board nominees, there are so many willing to help our organisation succeed.

What else has been happening behind the scenes? We have been working on our website, and something that our proud members may like to know about is our shopping page. To see it on our website, go to <<http://www.wavma.org/Shop>>. We're planning to fill this page with more great stuff. If you have ideas you'd like to contribute, please let us know.

That's all from me for now. Enjoy reading our members' contributions in another great edition of *The Aquatic Veterinarian*.

Yours sincerely,

Dr Richmond Loh
WAVMA President



Dr Richmond Loh

DipProjMgt, BSc, BVMS, MPhil (Pathology), MANZCVS (Aquatics & Pathobiology), CertAqV, CMAVA, NATA Signatory.

Certified Aquatic Veterinarian

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President [WAVMA](#)

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Skype: thefishvet

THE AQUATIC VETERINARIAN

Volume 8, Number 3

EXECUTIVE REPORTS

Third Quarter 2014

Secretary's Report

On July 28th, 2014 our Annual General Meeting was held in Denver, Colorado USA at the American Veterinary Medical Association Convention. It was a nice reunion of colleagues drawn together for a common cause. The opportunity presented itself for WAVMA's future plans to be discussed and the framing of a roadmap for 2016. I am thankful to Dr. Tepper, the Chair of the Meetings Committee, for again organizing a smoothly run AGM.

We have gone past the halfway mark in this year and I daresay that we have accomplished quite a bit. Nevertheless, there is a lot more to be done and it requires the input of everyone. The president started off his tenure with his own self-styled vision of moving WAVMA forward and making it more visible and heard. One important way of accomplishing this is by collaborating with sister organizations.

The World Veterinary Association (WVA) will be holding its meeting in Singapore in November this year and WAVMA will make an appearance there. An aquatics stream has been included in the Federation of Asian Veterinary Associations (FAVA) Conference and WAVMA is partnering with them in this endeavor, led by our President Dr. Loh. The Asian region is very important when it comes to aquatics, aquaculture and fisheries and it is indeed a nice opportunity that we have been afforded to run an aquatic session at the World Small Animal Veterinary Medical Association (WSAVA) Congress in Bangkok next year.

There are other openings as well that are giving us the much needed ventilation of issues in aquatic medicine. One of these is the Clinician's Brief newsletter, which has been focusing mainly on dogs and cats, agreeing to actually publish articles on pet fish. These opportunities are rare and very important for our cause, but because only a few veterinarians are integrally involved in this aspect of the profession, there is a need for all of us to play our little part to make these endeavors successful.

There has been an overwhelming increase in WAVMA student members, which is a promising phenomenon because it provides for a new crop of future veterinarians that may be able to take up the mantle that we currently are carrying. Several WAVMA student chapters have already been established in veterinary schools and others are



in the making. As a result, it is envisioned that a vibrant student committee could be established that can highlight the needs and views of our student members. I am personally interested in this becoming a reality.

Finally and importantly, the call for 2016 office bearers has been made and I would like to appeal to our members to be more involved and consider stepping forward as candidates for positions on the board or as members of a committee. Let's work together to continue the good work that has been started. Do enjoy the summer while it lasts.

Devon Dublin, DMVZ, MSc. CertAqV
WAVMA Secretary

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THE AQUATIC VETERINARIAN

EXECUTIVE REPORTS

Treasurer's Report

WAVMA 2014 Income & Expenses - To 8/31/2014	
Income	
Veterinarian Memberships	8,900.00
Student Memberships	3,025.00
New Graduate Memberships	300.00
Other Memberships- AVO	850.00
CertAqVet application fees	2,500.00
Donations / Sponsorship	1,000.00
Total income:	16,575.00
Expenses	
Total Meetings expenses:	4,911.15
Total admin. expenses:	3,015.56
Total services:	6,281.76
Total expenses:	14,208.47
Income less expenses:	2,366.53

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Credentialing Committee

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

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

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

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

The WAVMA Certified Aquatic Veterinarian (CertAqV) program has now certified twenty-one aquatic veterinarians. Please welcome our latest Certified Aquatic Veterinarians:

Dr Aimee Reed, DVM, CertAqV
Dr Jena Questen, DVM, CertAqV

There are an additional ten WAVMA members currently in the process of being certified.

THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

Membership Committee

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

New Members (July 6 – September 1, 2014)

Full Member (Veterinarian)

Lisa Abbo (USA)
Patricia Latas (USA)
Komsin Sahatrakul (Singapore)
Melissa Singletary (USA)
Tim Tristan (USA)

Student Members

Thomas Bellamy (Australia)
Joshua Bool (Australia)
Greer Brander-McCaffrey (USA)
Amanda Bridges (USA)
Theresa Bruno (USA)
Jacob Bryan (USA)
Arthur Chau (Australia)
Zackarias Gardenfors (St. Kitts & Nevis)
Mario Guarracino (UK)
Elizabeth Hodges (Canada)
Aivee Huynh (Australia)
Ashley Keeley (USA)
Jonathon Keener (USA)
Jamie Nelson (USA)
Chelsea O'Toole (USA)
Karissa Sciacca (USA)
Hannah Shing (Australia)
Cyrus So (Australia)
Brittany Szafran (USA)
Hayley Thompson (USA)
Hanh-Uyen Vo (USA)
Adam Wagner (USA)
Jen Wilson-Cohen (USA)
Irene Yen (St. Kitts & Nevis)
Hannah Zillmer (USA)

Meetings Committee Report

The World Small Animal Veterinary Association convention, of which WAVMA is a member organization, will take place in Cape Town, S. Africa from Sept. 16-19, 2014.

The Asian Fisheries Society will host the Diseases of Aquatic Animals 9, aimed at improving aquaculture in the region, in Ho Chi Minh City, Vietnam from Nov. 24-28, 2014. Immediately after, the Singapore Veterinary Association will host the Federation of Asian Veterinary Associations (FAVA) conference, to take place in Singapore from Nov. 28-30, 2014. President Richmond Loh will be attending and speaking at this conference. Although we were not able to arrange an organized program here, our goals and opportunities for Asian-based aquatic veterinarians will be well represented by Richmond.

Julius Tepper, DVM, CertAqV

Meetings Committee Chair

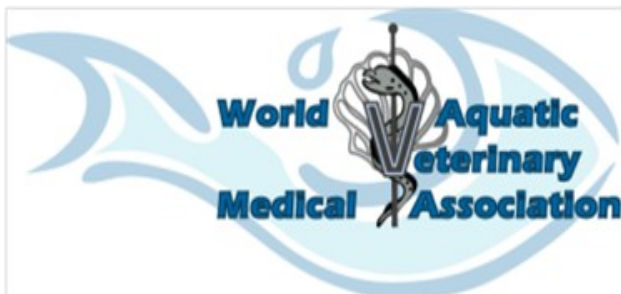
cypcarpio@aol.com

Annual General Meeting

Denver, Colorado

7-29-2014

The WAVMA Annual General Meeting was held in conjunction with the AVMA Convention in Denver. In addition to the AGM dinner, WAVMA also had a booth in the exhibit hall and sponsored three days of lectures and a wet-lab at the Aquarium.



THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

2014 WebCEPD Program

This year, we are re-launching the Aquatic Vet WebCEPD Program by embracing the internet as a means of more equitably sharing benefits among a global network of our members. After testing several systems over the past year for delivering educational webinars to members, the WAVMA Executive Board settled on one that is simple and automatically sends reminders to those that register. While these WebCEPD webinars will be delivered by members in different time zones around the world, recording will be available through the WAVMA website.

Importantly, these webinars are planned to provide continuing education and professional development (CEPD) credit to those that require a certain amount of CEPD every year to be re-licensed or re-registered to practice veterinary medicine. Additionally, instructors at veterinary schools might like their students to participate in webinars as part of a course, or veterinary students may be able to seek recognition from their veterinary school to have participation credited towards their veterinary degree. Furthermore, many of the webinars may be suitable for credit towards the WAVMA Aquatic Veterinary Certification Program (CertAqV) that recognizes veterinarians with "Day-1" competency in aquatic veterinary medicine.

As part of the requirement of receiving CEPD credit, participants will need to satisfactorily complete an on-line knowledge and skills assessment (KSA) after watching each WebCEPD session. These short KSAs (or quizzes) will ensure that each participant fulfils the learning objectives that will be identified at the beginning of each WebCEPD session. While we hope to allow everyone to participate in all WebCEPD webinars at no cost; however, to offset some of the costs for the webinar and the KSA systems that WAVMA has to pay commercial vendors for, there may be a nominal fee for people to complete the KSA and receive a CEPD certificate.

Additional information on this program and specific dates and times for the tentative webinars will be distributed through WAVMA Members-L and be on the WAVMA website.

If you are interested in presenting, or have ideas about potential topics you would like to see covered in future WebCEPD webinars, please email WebCEPD-Admin@wavma.org.

**Webinar B-1005 - WAVMA WebCEPD:
Diseases of barramundi (Asian seabass) -
developing good disease management
strategies
Oct 13, 2014**

Speaker: Dr Susan Gibson-Kueh, BVSc, MSc
(Aquatic Vet. Studies), PhD (Fish Pathology).

Register now!

[https://attendee.gotowebinar.com/
register/6483172817892681217](https://attendee.gotowebinar.com/register/6483172817892681217)

Time: Oct 13, 2014 9:00 PM AWST

(check your local time here:

<http://tinyurl.com/ou3vaz6>)

Suitable for veterinarians and other technical personnel at all levels in the production chain who manage fish health, this webinar will cover significant diseases commonly encountered in the barramundi culture, and the principles behind sound disease investigations. It will establish some baseline information for understanding of the dynamics behind disease occurrence on a farm that is necessary for implementing fish disease management plans.

Specific learning objectives include:

1. Understanding the general principles and techniques behind sound fish disease investigations;
2. Becoming familiar with common and significant diseases of barramundi; and,
3. Understanding how a disease affects the fish, and how this translates to successful disease management program.

NOTE: this webinar will be recorded. If you register for the live webinar and are unable to attend, you will be sent a link to view the webinar at a later time.

Want CEPD credit?

Registration is required. After viewing the webinar and a successfully completing a brief KSA (knowledge & skills assessment) veterinarians, veterinary students and veterinary technicians/nurses can earn up to 1.5 hrs of CEPD credit. Details will be sent to all who register.

Register now for this free live WAVMA WebCEPD webinar: [https://attendee.gotowebinar.com/
register/6483172817892681217](https://attendee.gotowebinar.com/register/6483172817892681217)

THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

Communications Committee Report

The Communications Committee's primary role is to assist in the development and maintenance of the WAVMA website, the quarterly newsletter (the former *Aquatic Vet News*, currently, *The Aquatic Veterinarian*), the List-serves and other communication means of members. Additionally, the committee advises and recommends actions to the Executive Board on communication issues.

The committee, consisting of the following members: Andrei Bordeianu (vice-chair), Devon Dublin, Nick Saint-Erne, David Scarfe, Laura Urdes (chair) and Chris Walster, is open to enrolment of Full and Student Members, at any time.

Since January 2014 onwards, the Committee has focused on a number of small projects, such as updating and refining the WAVMA website and webpages, improving members' communication through the Members-List, the email system and other readily available electronic means of communication and dissemination of information (e.g. the WAVMA@Work Blog, Facebook, Twitter, LinkedIn, Novice etc.), developing and diversifying the currently available membership facilities and programmes. This year, the PayPal account was added to the Registration and Online Membership Renewal webpages, as an on-line payment option for members.

Among the subject matters of a real interest to the Communications Committee this year has been the dissemination of information about WAVMA current activities and programmes to both the WAVMA members and the general public. In accomplishing this task, the Committee is currently searching for more effective means of generating the type of information to be disseminated to the public. Clarifications on the procedure and policies of using e-News, social media and blog pages, as well as who to manage them are among the debated issues by the Committee.

Another project of interest to the Committee is the development of an improved and updated version of the WAVMA brochure, which we plan to make available for use by the end of the year 2014.

Additionally, an electronic "Welcome Package" for new WAVMA members and members who re-

new their membership, to supply documents useful to members, is under development. The "Package" will consist of documents such as: a "Member's Handbook" of information about current WAVMA programmes available to members; the member's user name and password; the payment receipt, and a message from the president. In prospective, we will develop a "Welcome Packet" to be sent by post to all WAVMA members.

A document listing useful books, journals and other learning resources, is available for the use of members on the website. **Members are invited to contribute further reading resources, by sending the info to [Website Administrators](#).**

Similar to the existing WAVMA webpages "Video Library" and "Members-only/Public Image Library", the [WAVMA Aquatic Veterinary Videos](#), was set up with the aim of posting aquatic veterinary videos promoting the profession of aquatic veterinary medicine to veterinarians and the general audience. **Members are invited to contribute original aquatic veterinary videos/photos to the webpages and the YouTube Channel, by contacting the [Website Administrators](#).**

To ensure an optimal and efficient use by WAVMA of WordPress (for WAVMA@Work blogs), Facebook, LinkedIn, Twitter and YouTube, the members who are familiar with these communications tools, are warmly invited to join the Committee communications projects. Also as a measure to ensure a successful accomplishment of the projects into the near future, we are considering re-establishing the Student Committee, so that student members who have the necessary skills, knowledge and aptitude to set up some of these communications channels can voluntarily offer their help and work closely with the Committee members. **Rewards for the volunteers are envisaged and are currently under the considerations of the Committee and the Executive Board.**

Laura-Daniela Urdes DVM PgDip PhD CertAqV
Communications Committee Chair
laurau_2005@yahoo.com

THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

Student Committee Report

Current WAVMA Student Chapters:

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

Faculty Advisors - Drs. Lian Yeap & Richmond Loh. **Chapter contact** – [click here](#)

Auburn University, College of Veterinary Medicine (established 2013)

Faculty Advisor - Dr. Ray Wilhite

Chapter Contact - [click here](#)

St. George's University, School of Veterinary Medicine (in development)

Tuskegee University, School of Veterinary Medicine (established 2012)

Faculty Advisor - Dr. Kenneth Newkirk

Chapter Contact - TBA

University of Florida, College of Veterinary Medicine (established 2013)

Faculty Advisor - Dr. Tom Waltzek

Chapter Contact - TBA

University of Illinois, College of Veterinary Medicine (in development)

University of Prince Edward Island, Atlantic Veterinary College (in development)

University of Tennessee, College of Veterinary Medicine (established 2012)

Faculty Advisors - Dr. Michael Jones & Dr. Debra Miller **Chapter Contact** - [click here](#)

View the Chapter's [Facebook](#) page

University of Wisconsin, College of Veterinary Medicine (in development)

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

Faculty Advisor - Dr. Suzana Tkalcic

Chapter Contact - [click here](#)

University of Nottingham, School of Veterinary Medicine & Science (in development)

For information or assistance, please contact the [WAVMA Chapter Coordinator](#)

To initiate a new Student Chapter see the "Guidance for Forming a New Student Chapter" ([click here](#) to download PDF).

Help Give Veterinary Students & New Veterinarians the Opportunity to Experience Aquatic Veterinary Medicine.

Support the Aquatic Veterinary Scholarship Program with a Tax-Deductible Charitable Donation.

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Go to:

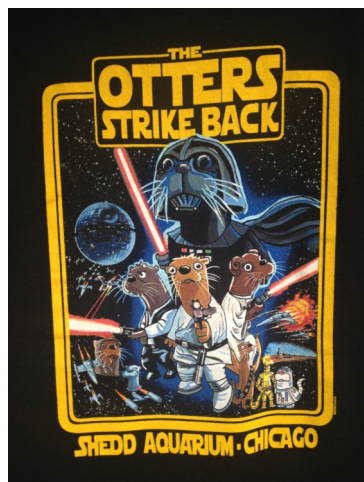
www.AVMF.org and then click on

DONATE ONLINE

<http://www.avmf.org/donate/>



American Veterinary Medical Foundation



T-shirt front in gift shop at the Shedd Aquarium, Chicago. Photo by Nick Saint-Erne

THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

SCHOLARSHIP COMMITTEE:

2014 WAVMA/AVMF/AVMA Aquatic Veterinary Educational Grant Recipient Reports

In 2014, \$20,000 was awarded in small grants to 22 veterinary students or new graduates to enable them to pursue a variety of educational activities. Each recipient is required to provide a report of their activity as a possible inspiration for others.

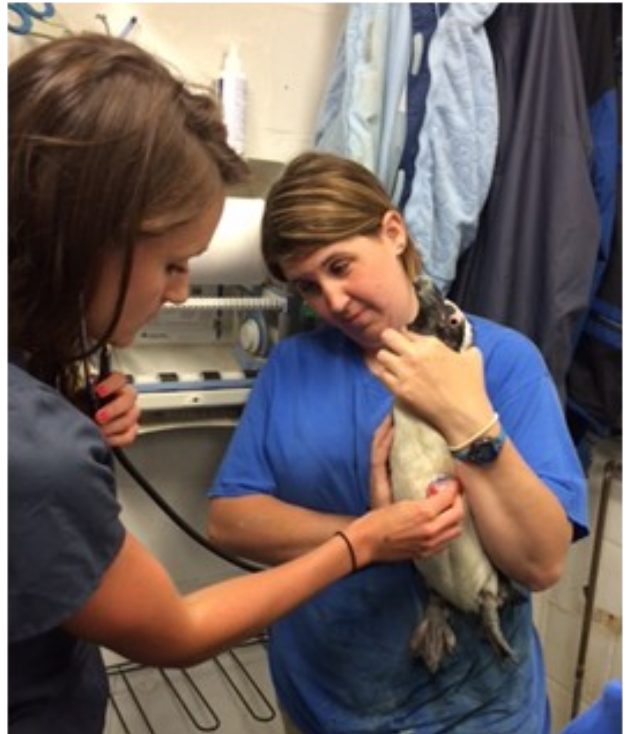
~~~~~  
**Wesley Siniard** – University of Tennessee, College of Veterinary Medicine, Class of 2016

I am one of the extremely appreciative recipients of the 2014 WAVMA Aquatic Education Grant Award. I used this grant to offset the cost of the AQUAVET I program (May 25-June 21, 2014) which I just recently completed this past month. This program was one that was extremely beneficial for my aspirations and goals in pursuing a career in the field of aquatic animal medicine and I am very grateful to have been a participant.

AQUAVET I embraced every aspect of aquatic animal medicine as well as management practices and regulations that are associated with these animals. In addition to lectures on these topics, I had the experience of participating in many different wet-labs, discussions, seminars, and field trips as well. I feel like I learned more in the four weeks at AQUAVET I than I ever could have imagined.

In addition to gaining a plethora of knowledge about this area of medicine, I also got the opportunity to meet and network with professionals from all different areas within this field. One of the greatest aspects of AQUAVET I is that many different lecturers are brought in to lecture and teach the students. This really gives the students a chance to learn from experts having different experiences in the varying aspects of aquatic medicine. It also gives students the chance to hear different professional's perspectives on what is presently occurring in this area of medicine and the best way to go about getting involved in this field.

Another reason why this grant is so beneficial to me is that I will also be participating in the MarVet Grand Cayman course this July, which I am funding myself as well. I am very excited about this program and am certain that it will also strengthen my knowledge in this amazing area of veterinary medicine. Once again, I am extremely thankful for this award and will use the knowledge gained from these courses in my path to pursuing a career in aquatic medicine.



Assisting with penguin & sea turtle clinical exams



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

**Jen Wilson-Cohen** – Washington State University, College of Veterinary Medicine, Class of 2016

Thank you very much for awarding me an Aquatic Education Grant. The grant is allowing me to participate in two amazing – and very different – externships during the summer of 2014.

The first externship was at Gulf World Marine Park in Panama City Beach, FL, where I worked with Dr. Lydia Staggs on the resident animals at the park. In addition, I was also able to participate in the turtle stranding team helping to rehabilitate endangered sea turtles. I was even able to release one back into the ocean this summer, which was an amazing feeling! One of my favorite parts of working at Gulf World was getting to design and run Vet Camp, a day camp for kids where they spend the day learning about different aspects of veterinary medicine. I am very passionate about educating the public about what being a veterinarian means, especially being a vet in such a unique setting. It's always fun to watch the campers' excitement as they learn about all the amazing activities we do on a day-to-day basis.



The second externship is at Hatfield Marine Science Center in Newport, OR, with Dr. Tim Miller-Morgan. There I am learning about fish and aquatic invertebrate medicine and husbandry. We are actively working on researching sea star wasting syndrome and are regularly treating the sea stars at the facility. I have gotten lots of hands-on experience with fish and invertebrate handling and medicine; I've even learned how to perform trance immobilization on sharks! Hatfield is a unique facility because their visitor center is a research center where they use recording devices to study how people learn – or choose not to learn – information.



It's very interesting seeing how the ways in which data is presented can influence a person's desire to find out more about a subject.

Overall, I am having an amazing summer, and it wouldn't be possible without the funds I received from WAVMA, AVMF, and AVMA. Thank you very much; I am so excited to see what else I can do to promote the profession and educate the public.





# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

Third Quarter 2014

## 2014 WAVMA/AVMA/AVMF Aquatic Scholarship Recipient Reports

**Susan Fogelson DVM, MS –**  
Aquatic Animal Anatomic Pathology Resident/  
PhD Student,  
University of Georgia,  
College of Veterinary Medicine

Thanks to the generosity of the World Aquatic Veterinary Medical Association, I had the unique opportunity to participate at the CL Davis Marine Species Histopathology Workshop and concurrent International Association of Aquatic Animal Medicine (IAAAM) meeting in Queensland, Australia.

The CL Davis Workshop was part of a one day, yearly meeting consisting of a key-note speaker and several case presentations characterizing marine animal diseases. This year I presented “Dolphin surprise: A case of disseminated histoplasmosis in a common dolphin” as well as “Select diseases of Syngnathids”. During this meeting there was ample interaction between speakers and attendees to create an open dialogue with aquatic animal pathologists from all over the world.

Discussions during this session encompassed everything from zoonosis to epidemiology of several aquatic animal diseases. The IAAAM annual conference was a great forum where veterinarians, veterinary technicians, biologists, nutritionists, aquatic animal researchers and graduate students came together to discuss a multitude of topics that concern aquatic animals such as clinical medicine, behavior, therapeutics, epidemiology, pathology, and nutrition. At IAAAM, I presented preliminary data from my PhD research, which included an investigation into the genetic variation of *Mycobacterium chelonae* induced disease in weedy seadragons, leafy seadragons, seahorses, and pipefish with special focus on the pathologic lesions and immunologic response to infection.

Participation in these meetings was of great value as it provided a way to continue my education in aquatic animal medicine, propagate collaborative research between aquatic animal professionals, and disseminate my research to a wide audience in aquatic animal health. This experience would not have been possible without the WAVMA Aquatic Veterinary Education Grant.

**Elizabeth Hodges –**  
University of Calgary,  
Faculty of Veterinary Medicine, Class of 2016

I am writing this while settling back in at home, which is somewhat difficult, after having had such a fantastic time participating in AQUAVET® 1. Being someone with ecosystem based interests, the species-spanning aspect of the program was what first attracted me to it. The desire to learn more about the animals that swim was well satisfied through a variety of lectures, labs, and field trips. It caught me by surprise however, that it was the diversity of perspectives passing through Bristol, RI that really kept me hooked. The faculty, brought in from near and far, would yo-yo between different backgrounds, knowledge, experiences, and views providing unmatched exposure for all of us who were being introduced to such a vast field. This diversity was similarly reflected in the students, who I quickly started calling friends.



*Using the microscope during the rocky intertidal invertebrate lab (I am facing the camera in the lab coat) – Roger Williams University, Bristol, RI  
(Photo credit: Melchior de Bruin)*

Being from western Canada, the territory was novel to me, and I am grateful for the help with the program and travel costs. The opportunity to see so many different aquatic facilities along the northeastern American coast was really amazing – especially when paired with the chance to tour behind the tanks with their staff and to get our hands on some of their animals. I was able to learn more about how our profession operates in my nation’s neighbour. Lastly, the area where I live does not boast many aquatic opportunities so I was eager for the chance to supplement the standard veterinary curriculum before graduation.



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COMMITTEE REPORTS

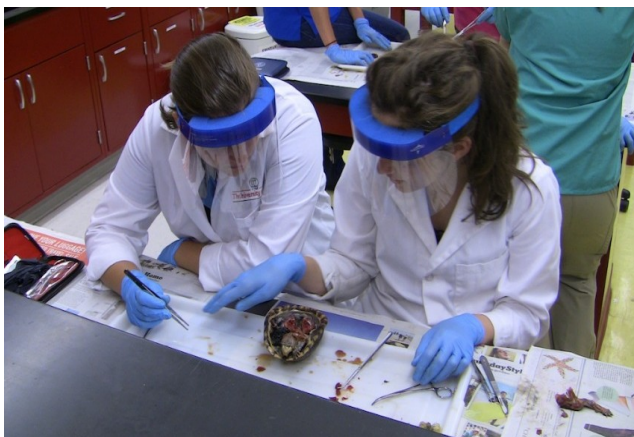
Third Quarter 2014

I am pleased to still be working with zebrafish in a vision and prion disease research laboratory for the remainder of the summer. The job has already enabled me to begin applying what I learnt at AQUAVET® 1 in a new context.

Thank you ever so much to all those involved. I'm most appreciative to have attended AQUAVET® 1 with grant funding from WAVMA.



*Physical examination and immunization of a penguin – Long Island Aquarium, Riverhead, NY  
(Photo credit: Rebecca Fellman)*



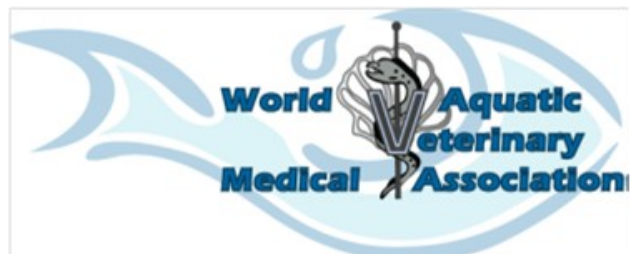
*Tortoise necropsy lab (I am on the right) -  
Roger Williams University, Bristol, RI  
(Photo credit: Dr. Donald Stremme)*



*Fish anaesthesia and surgery lab –  
Roger Williams University, Bristol, RI  
(Photo credit: Melchior de Bruin)*

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



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COLLEAGUE'S CONNECTION

Third Quarter 2014

## 2015 Officer/Directors Nominees

To Cast your Vote, go to:

<http://www.wavma.org/elections>

Polls open until October 10!

### President-Elect

(1 nominee for 1 position)

#### Nicholas Saint-Erne

(United States) – BS (Fisheries Biology, Kansas State University), DVM (Kansas State University), WAVMA CertAqV.

#### Membership:

WAVMA, AVMA, ARAV



#### Aquatic Veterinary Experience:

Dr. Saint-Erne worked in private clinical veterinary practice for 15 years, treating small animals, exotic pets, zoo animals, and aquatic species. Working extensively with pet stores, he had the opportunity to join PetSmart in 1999, North America's largest chain of pet stores, as their Quality Assurance veterinarian. PetSmart has over 1300 retail pet stores in the USA, Canada and Puerto Rico.

In this position at PetSmart he has been in charge of the health care of the pets sold in all of the stores, and creating training material for store associates and pet care guides for customers. In this capacity he audits all of the fish farms and other breeding facilities where the pets sold at PetSmart are produced, and oversees the health care of the fish in six PetSmart Fish Distribution Centers around the U.S.

#### Vision and plans as an Executive Board Member:

Dr. Saint-Erne has been active in WAVMA since it was founded, being on the Communications Committee and Credentialing Committee, serving on the Executive Board, acting as Treasurer and as Editor of *The Aquatic Veterinarian* journal. At this point he would like to step up to serve as President-Elect, assisting 2015 President Chris Walster, and follow as President in 2016. The World Aquatic Veterinary Medical Association has been instrumental in moving forward the Aquatic Veterinary Medicine profession, and it would be an honor to continue serving this association on the Executive Board as President-Elect and future President.

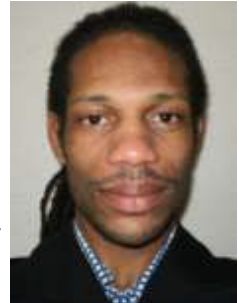
### Secretary

(1 nominee for 1 position)

#### Devon Dublin (Japan/Guyana)

– DMV&Z (summa cum laude, Agrarian University of Havana, Cuba), MSc (Marine Life Sciences, Hokkaido University, Japan), currently pursuing a PhD (Environmental Science Development, Hokkaido University, Japan), WAVMA CertAqV.

**Membership:** 1) Guyana Veterinary Association; 2) Guyana Forum for Youth in Agriculture; 3) Founding Member of the Centre for Leaders in Agriculture; 4) World Aquatic Veterinary Medical Association; 5) Fish Veterinary Society; 6) Japanese Society of Fisheries Science. June 2012 to present.



**Aquatic Veterinary Experience:** 1) Artificial Insemination Technician (Ministry of Agriculture, Guyana, 1997-1998); 2) Veterinary Laboratory Technician (Caribbean Community Secretariat, Guyana, 1998-2001); 3) Veterinary Officer (Ministry of Agriculture, Guyana, 2007-2011); 4) Research Assistant (Center for Sustainability Science, Hokkaido University, Japan, 2012- present).

#### Vision and plans as an Executive Board Member:

I am committed to the work of WAVMA and believe that my tenure as a Director-at-Large as well as Secretary over the last year has served to provide valuable experience and confidence in continuing to function on the board. WAVMA has come a long way and I am happy to be a part of a pool of professionals that are committed to the advancement of Aquatic Veterinary Medicine. I am dedicated to the principles of the organization and do believe that WAVMA is extremely relevant in being a worldwide advocate and representative of the field of Aquatic veterinary medicine. If elected, I would like to focus my attention mainly on our relationships with organizations we are a part of or affiliated to advance the interests of WAVMA, seek out more opportunities for WAVMA members and promote aquatic veterinary medicine in general.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COLLEAGUE'S CONNECTION

Third Quarter 2014

## Treasurer

(2 nominees for 1 position)

**Sharon Tiberio (USA)** – BS (Microbiology, University of Florida), DVM (University of Florida); USDA/APHIS National Veterinary Accreditation Program (Category II – all species); WAVMA CertAqV.  
**Membership:** WAVMA, AAFV, AVMA, FVMA



**Aquatic Veterinary Experience:** My aquatic veterinary medical education encompassed training in anatomy, physiology, pathology and treatment of aquatic invertebrates, fish, sea turtles, cetaceans, and marine mammals. Areas of study included aquatic wildlife conservation, governmental issues / regulatory guidelines, aquaculture and pet fish practice.

**Vision and plans as an Executive Board Member:** Having owned and successfully operated a small animal hospital as a solo practitioner, I would bring strong business skills to the position of WAVMA treasurer. I believe my experience as a business owner would be a valuable contribution. As I transition and expand my career to aquatic veterinary medicine I look forward to becoming involved with the aquatic community. I have previously and presently serve as treasurer for a non-veterinary, non-profit organization. In addition to responsibilities traditionally associated with being a treasurer, I participated in creation of by-laws, researched officers' liability insurance policies, maintained membership records and liaised with various city officials and governmental agencies. I wish to support WAVMA through active participation, and hope to foster more friendships and professional liaisons with my new colleagues as WAVMA continues to grow.

## Treasurer

(2 nominees for 1 position)

**Wes Baumgartner (USA)** – DVM (University of Illinois), PhD (Louisiana State University), Diplomate American College Veterinary Pathologists.  
**Membership:** ACVP, AVMA, AFS-FHS, WAVMA



**Aquatic Veterinary Experience:** I have been involved in the diagnosis and treatment of warmwater aquaculture species, particularly catfish, for the last 10 years. I began as an intern at the National Warmwater Aquaculture center in Stoneville MS, USA where I was trained in diagnostic techniques, therapeutic advice, and had experience in research trials. I then transferred to Louisiana State University for anatomic pathology training and PhD study in enteric septicemia of catfish. In that time I was heavily involved in the aquatic diagnostic lab, investigating cases in a wide variety of fish as well as crustaceans. Since 2011, I have been working as a diagnostic pathologist at Mississippi State University in the veterinary college. In addition to my domestic animal caseload I am on duty in the aquatic disease lab 13 weeks out of the year. I also participate in aquatic animal disease and biology research.

**Vision and plans as an Executive Board Member:** Here at MSU I have two facets of my job that I think lend themselves to the betterment of the aquatic community and WAVMA. Mississippi State University has recently made a serious commitment as a university to international outreach. In that regard the vet school has partnered with the Food and Agricultural Organization of the United Nations to recognize the Global Center for Aquatic Food Security here at MSU. I'm proud to be able to participate in this endeavor as we work internationally on aquatic health issues. I am interested in promoting international veterinary work and the WAVMA through this avenue, not only in terms of identifying new colleagues, but in making other governmental entities aware of what WAVMA can offer in terms of expertise and collaboration. Secondly, as I am involved in mentoring the student WAVMA chapter here at MSU, I see the WAVMA in terms of what it can offer students to prepare them in practice. I am interested in expanding the materials offered for self-study and aids in clinical practice.





# THE AQUATIC VETERINARIAN

Volume 8, Number 3

COLLEAGUE'S CONNECTION

Third Quarter 2014

## Director-at-Large

(3 nominees for 3 positions)

**Lydia Brown** (United Kingdom) – BVSc (University of Liverpool), MRCVS/FRCVS, PhD (Aquatic Veterinary Studies, Stirling University).

**Membership:** Royal College of Veterinary Surgeons, Fish Veterinary Society, European Association of Fish Pathologists; WAVMA.

**Aquatic Veterinary Experience:** A career in aquatic veterinary studies encompassing contract research (fish toxicology), working for a feed company as technical adviser, European Technical Manager for a veterinary pharmaceutical company licensing an aryl fluoroquinolone for aquaculture use, performing residue and pharmacokinetic studies for antibiotics and anaesthetic agents for fish. Editor of Aquaculture for Veterinarians. Past President of the Royal College of Veterinary Surgeons, Past President of the Fish Veterinary Society.

### Vision and plans as an Executive Board Member:

I am currently a Director at Large for WAVMA and am chairman of the Membership Committee. I am interested in working with others to develop an International Aquatic Veterinary Dialogue whereby fish vets in other organisations can attend an e-platform to share knowledge and experience. Also I am helping WAVMA develop a database looking at Antibiotic usage in aquaculture in various countries throughout the world.

**Chad Harris (USA)** – BS (McMurry University), DVM (Ross University).

**Membership:** AVMA, Texas VMA, Capital Area VMA, WAVMA

**Aquatic Veterinary Experience:** I work in general practice and see small animals, exotic pets, and aquatic animals (mostly koi and aquarium fish).

### Vision and plans as an Executive Board Member:

If elected to the executive board, I plan to work in coordination with my colleagues and committees to make decisions that will help WAVMA to grow in a positive and progressive direction. I also plan to use the position to help myself grow as an aquatic veterinarian through education and building professional relationships.



**Laura Urdes (Romania)** – DMV (University of Agricultural Sciences & Veterinary Medicine, Bucharest, Romania), PhD (Veterinary Medicine), Postgraduate Diploma (Livestock Health & Production, University of London), WAVMA CertAqV.

**Membership:** WAVMA (Chair of the Communications Committee), EAFF, General Association of Veterinarians of Romania (AGMVR).

**Aquatic Veterinary Experience:** WAVMA Certified Aquatic Veterinarian; Traineeship at Shedd Aquarium in Chicago, IL; Didactic and scientific research on Fish Pathology/Epidemiology of Diseases since 2006; Invited guest at the Norwegian School of Veterinary Science, with the presentation "Expanding Aquatic Veterinary Medical Education in Europe, to Meet Current and Future Needs of Aquatic Animal Industries"; Attended WAVMA webinars (WebCEPD); Panel member, FVE "Caring for health and welfare of fish" conference; Invited speaker "European and Non-European Seafood Safety Programmes," 31st World Veterinary Congress, Prague.

### Vision and plans as an Executive Board Member:

As a WAVMA member, I have learned about the great potential that WAVMA has in supporting the development of the aquatic veterinary medicine discipline worldwide, through its international members, and through the various programmes. As Vice-chair and later as Chair of the Communications Committee, I have seen the commitment of a wonderful team, putting all its efforts into serving WAVMA. My vision is for WAVMA to become the hub for the aquatic veterinary profession, by the achievement of more visibility within regions where activities involving aquatic animals take place, and by diversifying the actual benefits for its members. During my tenure as an Executive Board Member, I am planning to carry on assisting WAVMA on promoting and advocating for the field of aquatic veterinary medicine, so that the study and practice of aquatic veterinary medicine to become familiar notions for veterinary schools and veterinary practitioners worldwide. I also plan to act as liaison between the Board and the committee that I am chairing, to help at enhancing the organisation's wide visibility through social media and, together with other WAVMA colleagues, to act as a mentor for veterinarians and veterinary students willing to pursue a career in the field of aquatic veterinary medicine. Nonetheless, I plan on participating at the decision making process and all other activities assigned to the Board, in a highly effective and dynamic manner. I also intend to protect and respect, through all my actions, the interests of WAVMA and of its members.



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AUTHOR'S INSTRUCTIONS

Third Quarter 2014

## Instructions for Authors and Contributors

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

### Colleague's Connection

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

### Peer-Reviewed Articles

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

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

### Clinical Cases

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

### Book Reviews

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

### Publication Abstracts

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

### News

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

## Legislative & Regulatory Issues

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

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

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

## Jobs, Internships, Externships or Residencies

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

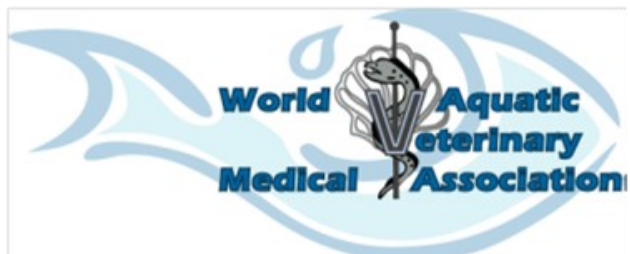
## Please send articles, clinical reports, or news items to the editor by the following submission dates:

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

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

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

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



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

## Review of the Red Lionfish, *Pterois volitans*

By Sharon Tiberio, DVM, CertAqV

The red lionfish, *Pterois volitans*, a flamboyant tropical fish commonly kept in saltwater aquariums, is an invasive species that was retrieved for the first time in the Atlantic Ocean off the coast of South Florida in 1985.<sup>(1)</sup> Native to the Indo-Pacific Ocean, its natural warm water distribution covers a vast expanse extending from southern Asia, including Japan and South Korea, south to Oceania, east to French Polynesia, and west to the east coast of Africa, and then north up into the Red Sea.



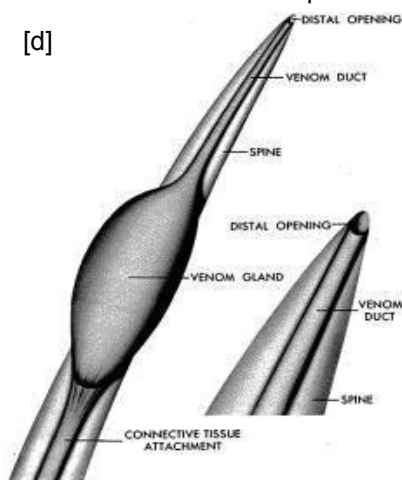
The first documented release into the Atlantic Ocean occurred in Biscayne Bay, Florida in 1992 as a result of damage to a beachside aquarium during Hurricane Andrew.<sup>(2)</sup> In 2000, two independent sightings were documented in the waters off North Carolina.<sup>(3)</sup> In 2002, lionfish were captured off the northeast coast of Florida and submitted to the Florida Fish and Wildlife Conservation Commission and Wildlife Research Institute, where the species identity was confirmed.<sup>(4)</sup> Reproducing populations of *P. volitans* have since been observed in the Atlantic Ocean from North Carolina to the Florida Keys, as well as in the Gulf of Mexico and the Caribbean Sea stretching from Mexico to Venezuela, and off the coasts of several Caribbean islands.

Intentional and unintentional release of aquarium specimens is thought to be the means by which lionfish have invaded, however the Gulfstream current is considered instrumental in dispersal of egg masses and larvae. The theory of invasion originating from ship ballasts discharging water containing entrapped lionfish has fallen out of favor.<sup>(5)</sup>



Native lionfish dwell in coral reefs and lagoons, however non-indigenous lionfish also inhabit mangroves, seagrass beds, and estuaries. Lionfish are adaptable and can survive in both brackish and marine environments. They are tolerant of variations in salinity and can withstand brief exposure to salinity as low as 1ppt<sup>(6)</sup>. During the day, the lionfish resides in reef crevices and caves in a concealed fashion. Native lionfish will venture into depths of over 1000 feet to hunt at night, whereas invasive lionfish in Caribbean waters are most active during dusk and dawn.<sup>(7)</sup> An aggressive carnivorous species, *Pterois volitans* feeds on crab, shrimp, fish, juvenile spiny lobsters and even other lionfish.

A member of the scorpionfish family, native *P. volitans* averages 13 inches in length and weigh 2 pounds, however invasive lionfish are already exceeding these averages. Wild lionfish can live 15 years. Dorsolaterally compressed, the body of this impressive fish has brown, maroon or red vertical stripes alternating with white, while the dorsal, caudal and anal fins are spotted. Fleshy "tentacles"



protrude from above the eyes and below the mouth, possibly serving as camouflage. Lionfish possess venomous dorsal, pelvic and anal fin spines that function in defense as well as in capturing prey.



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

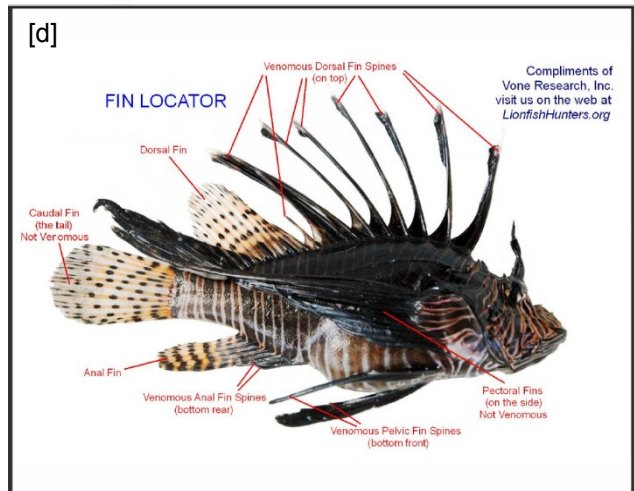
The palmate structure and motion of the pectoral fins enable lionfish to corral their prey after which they briskly swallow it whole. Interestingly, it has been found that a lionfish is able to consume a fish two thirds of its own length.<sup>(8)</sup>

Lionfish are not harmless to humans. The venom is composed of acetylcholine and a neurotoxin. A localized reaction at the site of envenomation typically results in intense, protracted pain which can culminate in blistering. Systemic reactions can include, but are not limited to, headache, nausea, seizures, paralysis, cardiopulmonary complications, blood pressure changes and loss of consciousness.<sup>(9)</sup>

The Devil Firefish (*Pterois miles*) is similar in appearance to the red lionfish, but has fewer dorsal and anal fin rays. It is indigenous to the Indian Ocean and the Red Sea, and via the Suez Canal has invaded the Mediterranean Sea. In the Atlantic Ocean, 93% of *Pterois* species are represented by *P. volitans* haplotypes, whereas 7% are *P. miles* haplotypes, both displaying low genetic diversity.<sup>(10)</sup> Mitochondrial DNA studies of the two fish have been inconclusive; it is still undetermined as to whether the red lionfish and devil firefish are truly two distinct species or merely two distinct populations of the same species.<sup>(11)</sup>

*Pterois volitans* reproduction is external and sexual maturity is reached by two years of age. Spawning may occur numerous times yearly. Lionfish are solitary in nature, however during the reproductive season their behavior changes. Males exhibit assertive, ostentatious displays and will congregate with 2-7 females. Females release two egg clusters in a pelagic environment, with each cluster containing 2000-15,000 eggs encased in a mucus layer that traps sperm. This gelatinous layer

disintegrates, fertilization occurs, and embryos develop within 12 hours. Hatching of larvae follows in the next 24 hours and within two to three days the larvae actively begin swimming and feeding on zooplankton. This larval stage is estimated to per-



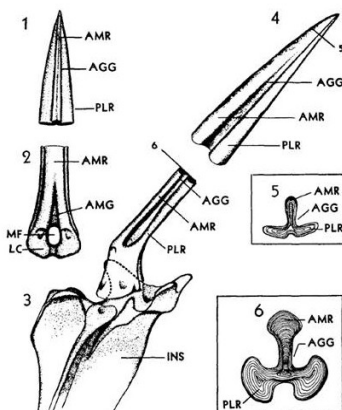
sist for 25-40 days, after which metamorphosis occurs. Although water currents favor dispersal of these stages, adult site fidelity patterns are unknown and may impact control measure options and effectiveness.<sup>(12)</sup>

In their indigenous habitat, factors such as disease, competition and predation affect population balance; the dynamics and long term effects of lionfish invasion have not yet been determined. Concerns include competition with commercially fished species such as grouper and snapper that dwell at the same trophic level, ingestion of herbivorous species which play a vital role in controlling seaweed and algal overgrowth in the coral reef environment, decrease in native fish populations as well as the economically important spiny lobster due to predation, and the fact that *P. volitans* has no natural enemies in non-native waters.

A 2007 Bahamian study revealed that recruitment of native coral reef fishes was reduced by 79% in reefs inhabited by lionfish compared to those which were not, and several indigenous species were found in the stomachs of lionfish. In 2012, another study was conducted in the Bahamas which documented a 65% decrease in lionfish prey biomass encompassing 42 species over a two year time frame.<sup>(13)</sup>

*P. volitans* is not listed as a threatened or endangered species by the IUCN. Research is underway and attempts at control are being instituted due to the lionfish's adaptability to new prey, range of thermal and salinity tolerance, and prolific reproductive potential. In the United States, the Reef Environmental Education Foundation, United States Geological Survey, National Oceanic and Atmospheric Administration, and Florida Fish and

[e] ANATOMY OF VENOM APPARATUS, ZEBRAFISH 321



Drawing of a typical dorsal spine of *Pterois volitans*. Apps. X 20.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014



Wildlife Conservation Commission are working to address the lionfish invasion, as well as the professional and recreational dive community.<sup>(14)</sup>

As it is a popular food fish in Asia with the flavor and texture being likened to hog snapper and grouper, fishing lionfish for human consumption is a potential population control measure. In the waters off Florida, lionfish harvesting is encouraged both commercially and privately; although licensure is required under certain circumstances, there are no restrictions on harvest size or bag number. Fish markets and restaurants in Florida have begun offering lionfish entrees.

Another proposal has been to recover, maintain and condition indigenous species such as large groupers or sharks to prey on lionfish eggs,

larvae, and juveniles.<sup>(15)</sup> Manual culling in high priority reefs has been suggested as well.

Whether inadvertent or intentional, human behavior and choices have impacted the balance of ecosystems through introduction of an invasive species. The research illustrates how the release of a non-native species can over a few decades have unanticipated repercussions. Public education is essential in combating ignorance of, or indifference to, the issue of lionfish invasion.

## CITATIONS

(1) National Oceanic and Atmospheric Administration website:

<http://oceanservice.noaa.gov/education/stories/lionfish/factsheet.html>

(2) Florida Museum of Natural History website:

<http://www.flmnh.ufl.edu/fish/gallery/descript/redlionfish/rionfish.html>

(3) Whitfield, P., Gardner, T., Vives, S., Gilligan, M., Courtenay, W., Ray, G., Hare, J. (2002).

Biological invasion of the Indo-Pacific lionfish *Pterois volitans* along the Atlantic coast of North America. *Marine Ecology Progress Series* (235) 289-297.

(4) Smithsonian Marine Station at Fort Pierce website:

[http://www.sms.si.edu/irlspec/pterois\\_volitans.htm](http://www.sms.si.edu/irlspec/pterois_volitans.htm)

***"If you can't beat 'em, eat 'em!"***



I've done my part to help save the reef:

(Left is a photo by the author of a Lionfish served at S.A.L.T., a restaurant in Islamorada, Florida; Right is after dinner, 8-30-14)



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

(5) National Oceanic and Atmospheric Administration website

<http://coris.noaa.gov/exchanges/lionfish/>

(6) Jud, ZR, Nichols, PK, Layman, CA. Environ Biol Fish, DOI 10.1007/s10641-014-0242-y

(7) Green, S, Akins, J, Cote, I (2011). Foraging behavior and prey consumption in the Indo-Pacific lionfish on Bahamian coral reefs. *Marine Ecology Progress Series* (433) 159-167.

(8) Safe Spear LLC website

<http://www.safespear.com/v.php?pg=59>

(9) Florida Museum of Natural History website

<http://www.flmnh.ufl.edu/fish/gallery/descript/redlionfish/rlionfish.html>

(10) Hamner, R., Freshwater, D., Whitfield, P. (2007). Mitochondrial cytochrome b analysis reveals two invasive lionfish species with strong founder effects in western Atlantic. *Journal of Fish Biology* (71) 214-222.

(11) Retrieved from the United States Geological Survey Non-indigenous Aquatic Species website:

<http://nas.er.usgs.gov>

(12) Morris, JA, et al. Biology and Ecology of the Invasive Lionfishes, *Pterois miles* and *Pterois volitans*, 61<sup>st</sup> Gulf and Caribbean Fisheries Institute

[http://www.ccfhr.noaa.gov/docs/morrisetal\\_2009.pdf](http://www.ccfhr.noaa.gov/docs/morrisetal_2009.pdf)

(13) United States Geological Survey Non-indigenous Aquatic Species website:

<http://nas.er.usgs.gov>

(14) Florida Fish and Wildlife Conservation Commission website

<http://www.myfwc.com/fishing/saltwater/recreational/lionfish/>

(15) National Oceanic and Atmospheric Administration website

<http://coris.noaa.gov/exchanges/lionfish/>

[ f ]



## IMAGE SOURCES

[a] The Reef Monitoring website

<http://www.reefmonitoring.org/lionfish.html>

[b] The National Geographic website

<http://animals.nationalgeographic.com/animals/fish/lionfish/>

[c] The Okeanos Aquascaping website

<http://www.okeanosgroup.com/blog/uncategorized/rawr-the-lionfish/>

[d] The Lionfish Hunter's website

<http://www.lionfishhunters.org/lionfish.html>

[e] Halstead, B. W., Chitwood, M. J. and Modglin, F. R. (1955), The anatomy of the venom apparatus of the zebrafish, *Pterois volitans* (Linnaeus). *Anat. Rec.*, 122: 317-333. doi: 10.1002/ar.1091220304

<http://onlinelibrary.wiley.com/doi/10.1002/ar.1091220304/abstract>

[ f ] Red Lionfish from Wikipedia;

photo by [Jens Petersen](#).

<http://en.wikipedia.org/wiki/Pterois>





# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

## Quantification of Antibacterial Agents in Aquaculture

By **Samuel Nute**

PHARMAQ Scholar, Summer 2014.

(currently studying at Bishop Wordsworth Grammar School, Salisbury, UK)

There has been some concern expressed about the use of antibiotics in aquaculture around the world. There does not appear to be a central reference that provides published data on antibiotic usage on farmed fish species from reliable sources on an international basis. This information is necessary because of potential concerns over development of antibiotic resistant strains of pathogens in farmed fish, as well as in other species, including humans. I was given access to reliable data sources and spent several days collating the information as outlined below.

The spreadsheet which was developed quantifies the amount of antibacterial agents reported as being used in aquaculture for several countries in order to gain insight into exactly how much antibacterial agent each fish receives, expressed as Kilogram of antibiotic per Tonne of fish. The spreadsheet is simply constructed so that it is possible for other people in the future with additional precise data to change and correct the information with ease. It is also simple enough to add other countries when their data sources are made available. All of the data listed on the spreadsheet charts can be located in industry and government websites found on the internet using Google and other search engines.

The spreadsheet contains a column for the years, a row for countries and another row for mass of antibiotics (Kg), mass of fish (Tonnes) and a ratio of the two. This means that the data per year and country may be compared easily. Due to the vast ranges of data size for mass of antibiotics, I have chosen to use kilograms as opposed to tonnes because this means that the spreadsheet is able to use more precise numbers and furthermore this makes the final ratio a more normal number (given to four decimal places). Finally I used tonnes for the mass of fish because this unit is how most production figures are expressed. The production figures are based on 'fish' which is a composite figure for all farmed fish species per country.

Furthermore some countries only give figures

as tonnes (e.g. UK) and so I have had to multiply the number by 1000 to give Kg antibiotics. Chile, on the other hand gave more precision in their data. There needs to be a standard set for how precise the results should be; in my opinion three significant figures is probably sufficient to allow enough detail whilst still being easy to handle.

The data shows wide ranges in production tonnage and the ratio of Kg of antibiotics to tonnes of fish has made for some interesting ratios. For example, I can infer that it would be almost impossible for the US to feed fish as much as their own weight in antibiotics, because even the highest ratio currently on the table is still less than 1 kg of antibiotics per 1 tonne of fish, with most salmon weighing from 3 to 4 kg. In any event it seems that most salmon consumed in the US are in fact imported from other countries, principally Chile.

The data has been extremely difficult to find and I have spent many hours looking through seemingly endless websites and pdfs only to come across one or two usable figures, for example this is all that I was able to find for the USA in two hours of searching:

The filling out of the spreadsheet could be im-

| USA  |                               |                |                            |
|------|-------------------------------|----------------|----------------------------|
| Year | Total Mass of Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics /Tonne Fish |
| 1995 |                               | 253420         |                            |
| 1996 |                               |                |                            |
| 1997 |                               |                |                            |
| 1998 |                               |                |                            |
| 1999 |                               | 399160         |                            |
| 2000 |                               | 333352         |                            |
| 2001 |                               |                |                            |
| 2002 |                               |                |                            |
| 2003 |                               |                |                            |
| 2004 |                               | 341064         |                            |
| 2005 |                               |                |                            |
| 2006 |                               |                |                            |
| 2007 |                               |                |                            |
| 2008 |                               |                |                            |
| 2009 |                               |                |                            |
| 2010 |                               |                |                            |
| 2011 | 63492                         | 166000         | 0.3825                     |

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

proved if governments put all of the amounts of fish and antibiotics sold into a table in the public domain which could be easily accessed by anyone for further study.

Trying to collect data using the web is simple, yet complicated by the fact that not everything is accurate. Finding official sources is difficult, especially when looking at US sources because it is hard to tell if a source is 100% correct to start with, but later in the article it might also reveal that the data is only for one state, or excludes other, larger aquaculture producing states, despite the table being labelled *US fish production*. There is some national US data, but it is all in pdfs and only targets individual years. From what I have read whilst doing this project, the US federal government only takes a 'consensus' of sold fish every five years, and has no idea about the amount of antibiotics in the fish, which appears strange. The data is presented as consumption of antibiotics by farmed fish, and generally species of fish are not defined.

If governments allowed all data to be published openly on an annual basis, it would make it easy to determine how much antibiotics are being used and would firstly prevent inaccurate conjecture and also would allow the government to monitor and regulate the use of antibiotics. On the other hand it might also show that the government doesn't need to change anything if the antibiotic was judiciously used.

However, these figures are only half the story. In some countries there is concern that unlicensed antibiotics might be used. If this is the case, it is unlikely that quantification of the problem will be published anywhere. Countries that import farmed fish have a stringent testing system in place to check that fish sold for human consumption do not contain antibiotic residues and this provides reassurance to the general public.

I would like to suggest that this work is carried on into the future and that others could add to this spreadsheet with moderation by a designated person who would check for accuracy. The data could then be made available for reference to interested governments, industry and people.

## References and Acknowledgements:

Thanks to the following members of the World Aquatic Veterinary Medical Association (WAVMA) for assisting me by giving links: Hugh Mitchell, Rae Knight; and to Dr. Lydia Brown for some of the information that gave me a good base to build upon:

Canada (BC):

<http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/health-sante-eng.html>  
(Fish Health Management page)

Chile:

[http://sernapesca.cl/index.php?option=com\\_content&view=article&id=75:informes&catid=31:acuicultura&Itemid=205](http://sernapesca.cl/index.php?option=com_content&view=article&id=75:informes&catid=31:acuicultura&Itemid=205)

UK:

<http://www.vmd.defra.gov.uk/pdf/VARSS.pdf>

Norway:

<http://phys.org/news/2014-03-medicines-norwegian-fish-farming.html>  
<http://www.fao.org/fishery/facp/NOR/en>

Ireland:

[http://www.mwg.utvinternet.comiss\\_ma\\_ireland.html#fin](http://www.mwg.utvinternet.comiss_ma_ireland.html#fin)

<http://oar.marine.ie/bitstream/10793/859/1/Veterinary%20treatments%20and%20other%20substances%20used%20in%20finfish%20aquaculture%20in%20>

And from my own research:

Norway:

<http://www.fao.org/fishery/facp/NOR/en>

Canada:

<http://www.dfo-mpo.gc.ca/stats/aqua/aqua-produ-eng.htm>

Iran:

[http://www.fao.org/fishery/countrysector/naso\\_iran/en](http://www.fao.org/fishery/countrysector/naso_iran/en)

USA:

USDA Assessing infectious disease emergence potential in the US Aquaculture Industry. Phase 1. US Aquaculture Industry Profile. July 2007 and other pdfs

Also big thanks to Dr. Ben North and Dr. Lydia Brown for supporting me during this project.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

## Quantification of Antibacterial Agents in Aquaculture—Charts

By Samuel Nute,  
PHARMAQ Scholar Summer 2014.  
(currently studying at Bishop Wordsworth  
Grammar School, Salisbury, UK)

### CANADA (B.C.)

| Year | Total Mass of Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics /Tonne Fish |
|------|-------------------------------|----------------|----------------------------|
| 1995 | 12                            | 27             | 0.4500                     |
| 1996 | 10                            | 28             | 0.3500                     |
| 1997 | 19                            | 37             | 0.5200                     |
| 1998 | 16                            | 42             | 0.3900                     |
| 1999 | 13                            | 49             | 0.2600                     |
| 2000 | 17                            | 50             | 0.3400                     |
| 2001 | 13                            | 70             | 0.1800                     |
| 2002 | 19                            | 85             | 0.2200                     |
| 2003 | 27                            | 75             | 0.3600                     |
| 2004 | 14                            | 62             | 0.2200                     |
| 2005 | 7                             | 71             | 0.0950                     |
| 2006 | 8                             | 78             | 0.1000                     |
| 2007 | 6                             | 79             | 0.0750                     |
| 2008 | 6                             | 81             | 0.0700                     |
| 2009 | 6                             | 76             | 0.0800                     |
| 2010 | 2                             | 83             | 0.0300                     |
| 2011 | 4                             | 74             | 0.0500                     |

Source: <http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/health-sante-eng.html>

### CHILE

| Year | Total Mass of Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics / Tonne Fish |
|------|-------------------------------|----------------|-----------------------------|
| 1995 |                               |                |                             |
| 1996 |                               |                |                             |
| 1997 |                               |                |                             |
| 1998 |                               |                |                             |
| 1999 |                               |                |                             |
| 2000 |                               |                |                             |
| 2001 |                               |                |                             |
| 2002 |                               |                |                             |
| 2003 |                               |                |                             |
| 2004 |                               |                |                             |
| 2005 | 239170                        | 614435         | 0.3893                      |
| 2006 | 343810                        | 647302         | 0.5311                      |
| 2007 | 385630                        | 511200         | 0.7544                      |
| 2008 | 325620                        | 561600         | 0.5798                      |
| 2009 | 184470                        | 278400         | 0.6626                      |
| 2010 | 143170                        | 307200         | 0.4660                      |
| 2011 | 206800                        | 469200         | 0.4408                      |
| 2012 | 337990                        | 618000         | 0.5469                      |
| 2013 | 450700                        | 624000         | 0.7223                      |

Source: [http://sernapesca.cl/index.php?option=com\\_content&view=article&id=75:informes&catid=31:acucultura&Itemid=205](http://sernapesca.cl/index.php?option=com_content&view=article&id=75:informes&catid=31:acucultura&Itemid=205)



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

## NORWAY

| Year | Total Mass of Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics / Tonne Fish |
|------|-------------------------------|----------------|-----------------------------|
| 1995 | 280000                        |                |                             |
| 1996 | 300000                        |                |                             |
| 1997 | 370000                        |                |                             |
| 1998 | 405000                        |                |                             |
| 1999 | 460000                        |                |                             |
| 2000 | 480000                        |                |                             |
| 2001 | 500000                        |                |                             |
| 2002 | 540000                        |                |                             |
| 2003 | 590000                        |                |                             |
| 2004 | 1159                          | 610000         | 0.0019                      |
| 2005 | 1215                          | 650000         | 0.0019                      |
| 2006 | 1478                          | 700000         | 0.0021                      |
| 2007 | 648                           | 820000         | 0.0008                      |
| 2008 | 941                           | 825000         | 0.0011                      |
| 2009 | 1313                          | 950000         | 0.0014                      |
| 2010 | 662                           | 1050000        | 0.0006                      |
| 2011 | 544                           | 1120000        | 0.0005                      |
| 2012 | 1591                          |                |                             |
| 2013 | 972                           |                |                             |
| 2014 |                               |                |                             |
| 2015 |                               |                |                             |
| 2016 |                               |                |                             |
| 2017 |                               |                |                             |
| 2018 |                               |                |                             |
| 2019 |                               |                |                             |
| 2020 |                               |                |                             |

Source: <http://www.fao.org/fishery/facp/NOR/en>  
<http://phys.org/news/2014-03-medicines-norwegian-fish-farming.html>

## UK

| Year | Total Mass of Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics /Tonne Fish |
|------|-------------------------------|----------------|----------------------------|
| 1995 |                               |                |                            |
| 1996 |                               |                |                            |
| 1997 |                               |                |                            |
| 1998 |                               |                |                            |
| 1999 |                               |                |                            |
| 2000 |                               |                |                            |
| 2001 |                               |                |                            |
| 2002 |                               |                |                            |
| 2003 |                               |                |                            |
| 2004 |                               |                |                            |
| 2005 |                               |                |                            |
| 2006 |                               |                |                            |
| 2007 |                               |                |                            |
| 2008 | 1000                          | 142000         | 0.0070                     |
| 2009 | 3000                          | 157000         | 0.0191                     |
| 2010 | 1000                          | 169000         | 0.0059                     |
| 2011 | 2000                          | 172000         | 0.0116                     |
| 2012 | 2000                          | 172000         | 0.0116                     |
| 2013 |                               |                |                            |
| 2014 |                               |                |                            |
| 2015 |                               |                |                            |
| 2016 |                               |                |                            |

Source: <http://www.vmd.defra.gov.uk/pdf/VARSS.pdf>



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

REVIEW PAPERS

Third Quarter 2014

## Quantification of Antibacterial Agents in Aquaculture—Charts

By Samuel Nute,  
CONTINUED

### IRELAND

| Year | Total Mass of<br>Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics /<br>Tonne Fish |
|------|----------------------------------|----------------|--------------------------------|
| 1995 | 12296                            |                |                                |
| 1996 | 14745                            |                |                                |
| 1997 | 16442                            |                |                                |
| 1998 | 16780                            |                |                                |
| 1999 | 20340                            |                |                                |
| 2000 | 20137                            |                |                                |
| 2001 | 25092                            |                |                                |
| 2002 | 24511                            |                |                                |
| 2003 | 17838                            |                |                                |
| 2004 | 293                              | 15263          | 0.0192                         |
| 2005 | 119                              | 15384          | 0.0077                         |
| 2006 | 1271                             |                |                                |
| 2007 |                                  |                |                                |
| 2008 |                                  |                |                                |
| 2009 | 12000                            |                |                                |
| 2010 | 16000                            |                |                                |
| 2011 | 12100                            |                |                                |
| 2012 | 12500                            |                |                                |
| 2013 |                                  |                |                                |
| 2014 | 16000                            |                |                                |
| 2015 |                                  |                |                                |
| 2016 |                                  |                |                                |
| 2017 |                                  |                |                                |
| 2018 |                                  |                |                                |
| 2019 |                                  |                |                                |
| 2020 |                                  |                |                                |

Source:

[http://www.mwg.utvinternet.com/iss\\_ma\\_ireland.html#fin](http://www.mwg.utvinternet.com/iss_ma_ireland.html#fin)  
<http://oar.marine.ie/bitstream/10793/859/1/Veterinary%20treatments%20and%20other%20substances%20used%20in%20finfish%20aquaculture%20in%20ireland%20Final%5b1%5d.pdf>

### IRAN

| Year | Total Mass of<br>Antibiotics(Kg) | Tonnes of Fish | Kg Antibiotics /<br>Tonne Fish |
|------|----------------------------------|----------------|--------------------------------|
| 1995 |                                  |                |                                |
| 1996 |                                  |                |                                |
| 1997 | 34780                            |                |                                |
| 1998 | 38763                            |                |                                |
| 1999 | 36000                            |                |                                |
| 2000 | 25490                            |                |                                |
| 2001 | 25785                            |                |                                |
| 2002 | 13010                            |                |                                |
| 2003 | 18461                            |                |                                |
| 2004 | 20230                            |                |                                |
| 2005 | 22179                            |                |                                |
| 2006 | 24970                            |                |                                |
| 2007 | 34888                            |                |                                |
| 2008 | 28622                            |                |                                |
| 2009 | 27503                            |                |                                |
| 2010 |                                  |                |                                |
| 2011 |                                  |                |                                |
| 2012 |                                  |                |                                |
| 2013 |                                  |                |                                |
| 2014 |                                  |                |                                |
| 2015 |                                  |                |                                |
| 2016 |                                  |                |                                |
| 2017 |                                  |                |                                |
| 2018 |                                  |                |                                |
| 2019 |                                  |                |                                |
| 2020 |                                  |                |                                |

Source: • [http://www.fao.org/fishery/countrysector/naso\\_iran/en](http://www.fao.org/fishery/countrysector/naso_iran/en)

Source: • [http://www.fao.org/fishery/countrysector/naso\\_iran/en](http://www.fao.org/fishery/countrysector/naso_iran/en)

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

GRAND ROUNDS CASES

Third Quarter 2014

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

## IM Injection in Sharks

I was teaching the final year vet students today and I think one of the students might have taught me/us a thing by accident. If you've injected sharks before, you may notice the meds oozing back out from your point of entry. At the SeaVet course, Dr Walsh suggested applying bone wax to the area to form a temporary seal. This is rather expensive stuff. One of the kids in class didn't quite hear me clearly and asked if I said, "Board wax," as in surf board wax.

Has anyone tried this before? Will it work?

### Dr Richmond Loh

W: <http://www.thefishvet.com.au>  
E: [thefishvet@gmail.com](mailto:thefishvet@gmail.com)

It works well. Bee's wax might be more "sterile" than other types of wax, but if I still surfer I'd try board wax. Most elasmobranchs seem to be very resistant to infection.

Cyanoacrylate (Super Glue), used in cutaneous closure without stress, will work too. It solidifies very rapidly, even on wet tissue and underwater.

**A. David Scarfe** PhD, DVM, MRSSAf  
[dscarfe@avma.org](mailto:dscarfe@avma.org)

Same "problem" with koi, when you inject vitamins you often see it returning at the injection site. As vitamins are pretty easy to see you may be sure that it happens also with colorless antibiotics etc. A trick I learned is to smear some fish mucus on it (with shark not an option unfortunately). There is one thing that should be helpful, I can't remember the name right now, but it is used for human mouth ulcers and is also useful for closing fish ulcers. What works best for koi injections is a longer fine needle like a 21G x 1" (0,5x25 mm).

### Tim Barbe

[tim.barbe@skynet.be](mailto:tim.barbe@skynet.be)

Orabase cream is the human mouth ulcer paste. I agree on finding it very handy stuff for fish treatments!

**Richard Lloyd** BVSc MSc (Aquatic pathobiol)  
MRCVS  
[richlloyd@gmail.com](mailto:richlloyd@gmail.com)

Have you tried Vaseline?

**Dr Lydia A Brown** MBE FRCVS  
[drydiabrown@gmail.com](mailto:drydiabrown@gmail.com)

Great ideas. I have found that the Curafil wound dressing is a good applicant after injection to prevent back spill. Have also used sterile honey wound dressing.

**Todd R. Cecil**, DVM, DABVP-Avian  
[waavs@aol.com](mailto:waavs@aol.com)

## Ban the Sale of Teddy Bear Tanks

Any comments on the sale of small fish bowls in stuffed toys?

<http://www.thepetitionsite.com/135/537/268/ban-the-sale-of-teddy-tanks/?z00m=21392659&redirectID=1445305826>

### Pat Latas

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

Just one word – appalling.

### Rob Jones

"The Aquarium Vet"

[www.theaquariumvet.com.au](http://www.theaquariumvet.com.au)





# THE AQUATIC VETERINARIAN

Volume 8, Number 3

CLINICAL CASES

Third Quarter 2014

## Advanced Diagnostics in a Diamond Tetra *Moenkhausia pittieri*

By Matthijs Metselaar DVM PhD MRCVS MIFM,  
Veterinary Surgeon, Fish Vet Group

### Disease history

During my vet degree training, I was already active as a fish health professional when I was called to examine a 200 litre, planted community aquarium with several different species of fish. There was a low mortality being reported, where only 1 to 2 fish died per week over a period of several months. Only 2 fish in the tank showed symptoms at the time of the visit. The affected fish sank when it stopped swimming. This fish was cachexic and also struggled to keep its equilibrium. Similar symptoms were seen in the other fish that had died.



*The diamond tetra is a small fresh-water fish of the family Characidae. It is found in Lake Valencia in Venezuela.*

### Work up

As the symptoms indicated an issue with the swimbladder it was decided to start with an X-ray, as we were taught at vet school that air shows up best on an X-ray. In order for us to take the X-ray it was necessary to anaesthetise the fish. Although there were several drugs to use, I opted for 2-Phenoxy ethanol as I had a lot of experience with this, as I was working a lot with koi at the time. Every species does, as I found out, respond differently and despite my previous experience, the anaesthesia was too deep. In order to recover the fish I applied the mouth-to-tap method, which is very useful in this situation. The fish was held in a stream of slow running water to eliminate the excess 2-Phenoxy ethanol. All was well for the fish and his buddy that served as a reference as I had no anatomic knowledge of this species.

### X-ray

The X-ray shows the affected fish (top) and the reference fish (bottom). You can clearly see that the swim bladder of the affected fish is different from his healthy counterpart. If you look closely you can still make out the contours of the



***Mouth-to-tap method to resuscitate the patient. Chlorine toxicity is a concern with tap water.***

swimbladder. It is filled with a radio dense material, which could be a process or fluid. For the more observant there is also some air present and as it is in the middle of the swimbladder, or more accurate, at the highest point; the differential diagnosis had to be that the swimbladder was filled with a fluid. As mentioned before, air shows up well on X-ray, but a fluid is best analysed by ultrasound.

### Ultrasound

Below you can see the affected fish in a bag. In order to use ultra sound you need to remove the air between the scanner and the patient. As fish swim in water this was easily achieved by placing the patient in a small water filled bag. The fish was fully awake at this point. The ultrasound confirmed that there was fluid in the swim bladder of the affected fish. An ultrasound guided biopsy of the fluid failed



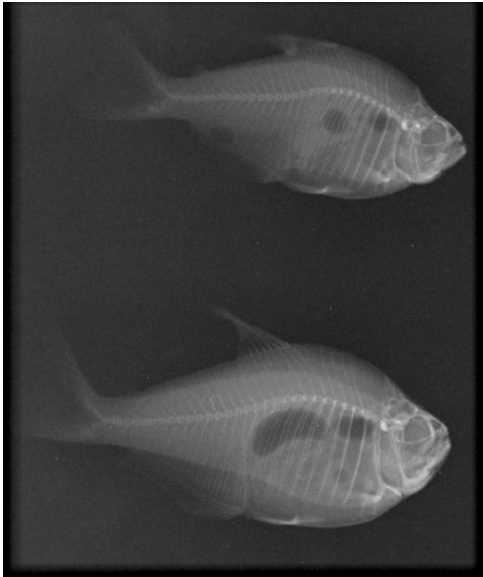
as the fish was too small. Some fluid was aspirated blind and heat fixed and stained this for rapid analysis.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

CLINICAL CASES

Third Quarter 2014



## Cytology

The fluid was heat fixed on a slide and stained. This showed small rods that were acid fast on Ziehl-Neelsen stains.

## Bacteriology

The fluid was also cultured on specific culture media. This also showed small rods, acid fast on Ziehl-Neelsen.

## Histology

The histology showed multiple granulomas throughout abdominal organs. ZN stains showed presence of very high numbers of acid fast rods.

## Diagnosis

The signs above and histology were all presumptive for mycobacteriosis. As the pathogen was isolated, the presumptive diagnosis could be confirmed. At that time molecular techniques weren't as advanced as today, so no further differentiation to species level was made. In practice this is also less relevant as it doesn't often affect the therapy plan. The client was advised to depopulate the aquarium.

## The Bill

This particular visit was done pro bono as the diagnostics were provided by the client, however I did calculate the total cost of the visit:

|               |            |
|---------------|------------|
| X-ray:        | £ 60.00    |
| Ultrasound:   | £ 60.00    |
| Bacteriology: | £ 20.00    |
| Histology:    | £ 20.00    |
| Vet visit:    | £ 100.00 + |
| Total cost    | £ 260.00   |

The replacement value of the fish was £2.49. I often use this case when I teach at vet schools. At

this point I always ask the students to raise their hand if they think this is too much to pay for a fish. So far the vast majority have raised their hands, until I explain where the aquarium was situated.

We all know that Mycobacterium is a potential zoonosis. This particular aquarium was located in the cafeteria...the cafeteria of a hospital...in the OR of that hospital. Needless to say most students can then agree that spending a bit more money made sense. The amount of money that should be spent should never be a reflexion of the replacement value of a patient. It highlights the balance between the costs and the benefits of advanced diagnostics in minor species.

## Treatment

No treatment was advised to this particular client. The advice was to depopulate the aquarium and relocate it. Mycobacteriosis is, however, a very common problem in ornamental and other fish, but the literature does not really describe any therapies. In human medicine it is advised to use multiple drugs to treat the bacterium. Some people have tried 10mg/litre enrofloxacin and 15mg/litre doxycycline hyclate, added to the treatment tank. The water is changed every day (50-66%). The antibiotic should be replaced on a daily basis. The total treatment should continue for at least 5-7 days.

Success of the therapy is hard to measure and if the fish are big enough it is recommended to use long-acting injectable formulations, as these would spare the biofilter. The choice of antibiotics should, where possible, be based on sensitivity tests for optimum success.

Any other suggestions of treatment are of course welcome, but often cure is not possible. Most of my advice is for eradication. All fish should be culled and the aquarium deep cleaned with a mycobacteriumcide (Virasure, Lysol or 50-70% ethyl alcohol) for at least 30 minutes, including all equipment that is used.

As the above option is often too extreme for hobbyists, the focus then shifts to controlling the outbreak. Mycobacterium is most often seen in older animals. Removing affected old animals is very effective and is a good option in these cases. We should, as veterinarians, also be responsible to educate people about the potential zoonotic risks without causing panic. Simple explanation of the symptoms with instructions to see a doctor if present, and mention the possibility of this should be a minimum.

## AQUATIC VETERINARY ABSTRACTS

Compiled by A. David Scarfe

### Use of veterinary medicines, feed additives and probiotics in four major internationally traded aquaculture species farmed in Asia

Rico A, et al (2013). *Aquaculture*, 412–413: 231–243.

#### Abstract

Antimicrobials, parasiticides, feed additives and probiotics are used in Asian aquaculture to improve the health status of the cultured organisms and to prevent or treat disease outbreaks. Detailed information on the use of such chemicals in Asian aquaculture is limited, but of crucial importance for the evaluation of their potential human health and environmental risks.

This study reports the outcomes of a survey on the use of chemical and biological products in 252 grow-out aquaculture farms and 56 farm supply shops in four countries in Asia. The survey was conducted between 2011 and 2012, and included nine aquaculture farm groups: Penaeid shrimp farms in Bangladesh, China, Thailand and Vietnam; Macrobrachium prawn farms, and farms producing both Penaeid shrimps and Macrobrachium prawns in Bangladesh; tilapia farms in China and Thailand; and Pangasius catfish farms in Vietnam.

Results were analysed with regard to the frequencies of use of active ingredients and chemical classes, reported dosages, and calculated applied mass relative to production. A range of farm management and farm characteristics were used as independent variables to explain observed chemical use patterns reported by farmers within each group. Sixty different veterinary medicinal ingredients were recorded (26 antibiotics, 19 disinfectants, and 15 parasiticides). The use of antibiotic treatments was found to be significantly higher in the Vietnamese Pangasius farms. However, total quantities of antibiotics, relative to production, applied by the Pangasius farmers were comparable or even lower than those reported for other animal production commodities. Semi-intensive and intensive shrimp farms in China, Thailand and Vietnam showed a decrease in the use of antibiotic treatments. These farm groups utilised the largest amount of chemicals relative to production, with feed additives and plant extracts, probiotics, and disinfectants, being the most used chemical classes, mainly for disease

prevention. The surveyed farmers generally did not exceed recommended dosages of veterinary medicines, and nationally or internationally banned compounds were not used (with one exception) by the surveyed farmers, nor by the surveyed chemical sellers.

Factors underlying the observed differences in chemical use patterns differed widely amongst farm groups, and geographical location was found to be the only factor influencing chemical ingredient application patterns in the majority of the studied farm groups.

### Probabilistic risk assessment of veterinary medicines applied to four major aquaculture species produced in Asia

Rico A & PJ Van den Brink (2014). *Science of the Total Environment*, 468-469:630-641.

#### Abstract

Aquaculture production constitutes one of the main sources of pollution with veterinary medicines into the environment. About 90% of the global aquaculture production is produced in Asia and the potential environmental risks associated with the use of veterinary medicines in Asian aquaculture have not yet been properly evaluated. In this study we performed a probabilistic risk assessment for eight different aquaculture production scenarios in Asia by combining up-to-date information on the use of veterinary medicines and aquaculture production characteristics.

The ERAAQUA model was used to perform mass balances of veterinary medicinal treatments applied to aquaculture ponds and to characterize risks for primary producers, invertebrates, and fish potentially exposed to chemical residues through aquaculture effluents. The mass balance calculations showed that, on average, about 25% of the applied drug mass to aquaculture ponds is released into the environment, although this percentage varies with the chemical's properties, the mode of application, the cultured species density, and the water exchange rates in the aquaculture pond scenario.

In general, the highest potential environmental risks were calculated for parasitic treatments, followed by disinfection and antibiotic treatments. Pangasius catfish production in Vietnam, followed by shrimp production in China, constitute possible hot-spots for environmental pollution due to the intensity of the aquaculture production and considerable discharge of toxic chemical residues into surrounding aquatic ecosystems. A risk-based



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

LITERATURE REVIEW

Third Quarter 2014

ranking of compounds is provided for each of the evaluated scenarios, which offers crucial information for conducting further chemical and biological field and laboratory monitoring research. In addition, we discuss general knowledge gaps and research priorities for performing refined risk assessments of aquaculture medicines in the near future.

## **Herpetological Conservation and Biology**

[www.herpconbio.org/](http://www.herpconbio.org/)

New Issue Announcement

Volume 9, Issue 1 July 2014

The Editorial Staff at Herpetological Conservation and Biology is pleased to announce the release of the latest issue, Volume 9(1). This issue contains a HerpSpective on the environmental importance of amphibians, as well as 19 exciting research articles. We hope you all enjoy the latest issue and its content. Please take a moment to enjoy all of the great photos that correspond to their respective manuscripts and contributors in our photo gallery online. Also, please take a moment to join our mailing list or our growing community on Facebook. Signing up will ensure you receive the latest news and updates about Herpetological Conservation and Biology!

All of our publications are open-access and freely available to anyone interested, and continue to enjoy wide readership. The Governing Board extends its thanks to authors and readers alike, and appreciates their patience and understanding for the timing of this issue. Our success is only made possible by your continued support.

### **Rob Lovich, PhD.**

Communications Editor

*Herpetological Conservation and Biology*

[rlovich@herpconbio.org](mailto:rlovich@herpconbio.org)



## **USE OF GPS LOGGERS TO ENHANCE RADIO-TRACKING STUDIES OF SEMI-AQUATIC FRESHWATER TURTLES**

Published: 13 July 2014.

By ROBERT J. CHRISTENSEN AND PATRICIA CHOW-FRASER

*Department of Biology, McMaster University, 1280 Main St. West, Hamilton, Ontario L8S 4L8, Canada, e-mail: [bobchristensen@gmail.com](mailto:bobchristensen@gmail.com)*

*Abstract.*—Ecologists have spent many hours manually tracking the movements of animals in their habitat to determine their home range, and to ascertain their use of critical habitat and wildlife corridors. This is costly, logistically burdensome, and can disturb the animal from its natural patterns of behavior. The introduction of Global Positioning System (GPS) logging devices has greatly reduced the labor involved for tracking large mammals and migratory birds since the devices automatically acquire locational fixes at regular intervals throughout the day. For freshwater turtles, however, GPS logging devices may not be suitable because of their inability to obtain locational fixes when submerged in water, but when on land, they have the advantage of collecting a sufficiently large number of locational fixes to resolve short-term sojourns and fine-scale movements that are not possible with conventional telemetry approaches. In this paper, we used a combination of conventional radio-tracking plus GPS loggers to study the movements of several Blanding's Turtles (three females in 2011; two males and two females in 2012). We predicted that the GPS loggers in combination with conventional telemetry would provide additional information that would transform our understanding of how the turtles used their habitat. With this enhanced tracking, we were able to: (1) arrive at a more complete mapping of habitat used by the Blanding's Turtles; (2) identify novel areas of critical habitat that were not discovered during the process of radio-tracking; (3) determine movement corridors between critical habitat locations; and (4) uncover fine scale patterns of movement within wetland habitat. We discuss the advantages and disadvantages of GPS logging technology, and provide an approach to maximize effectiveness for tracking freshwater turtles.

Original article on web at:

[http://www.herpconbio.org/Volume\\_9/Issue\\_1/Christensen\\_Chow-Fraser\\_2014.pdf](http://www.herpconbio.org/Volume_9/Issue_1/Christensen_Chow-Fraser_2014.pdf)

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

LITERATURE REVIEW

Third Quarter 2014

## Book Review

By Nick Saint-Erne, DVM, CertAqV

### ***Introduction to the Commercial Fisheries of the United States and Canada***

Illustrated 2012 Edition

By R. W. A. Rodger and W. M. von Zahren

Illustrated by Minji Kim and Sherri Spurrell

Canadian Marine Publications,

Halifax, Nova Scotia, Canada

[cmp@cmpPublications.com](mailto:cmp@cmpPublications.com)

This hardbound book of over 400 pages is a concise guide to the common marine and freshwater fish and invertebrates of commercial (i.e. edible) significance in the waters of North America. The book covers 147 different species that represent 500 similar species that compose almost all of the commercially harvested aquatic animals. A representative species is illustrated with a line drawing that references the general external appearance of species within the group.

The common names and the market names for each fish are compatible with the "Seafood List", Fish Base and SeaLifeBase. The scientific names have been referenced with the recent *Integrated Taxonomic Information System* (ITIS). The species are listed in alphabetical order by their Market Name, and divided into the categories of Marine Finfishes, Freshwater Finfishes, and Shellfishes.

The book contains the following three sections, in addition to the Preface and Acknowledgements:

PART 1 – Introduction and Overview

PART 2 – Fishes and Shellfishes

PART 3 – Bibliography, References, Glossary, Index

The Introduction of the book gives a historical perspective of the fisheries including:

- Overfishing Issues
- Anthropogenic Stressors on Fish Biomass
- Key Management Issues
- The Impact of Aquaculture
- Social-Economic Impact of the Fisheries

One important point this book emphasizes in the Introduction is that many aquatic habitats are overfished and the annual catch that has been about 90 Million tonnes of fish per year is not sustainable at that level without additional stewardship and better fisheries management plans.

An example of overfishing given in the text is the depletion of the Newfoundland Atlantic cod fishery in 1992, where 18,000 jobs were lost due to the lack of fish. A moratorium on cod fishing on the Eastern

Scotia Shelf was declared in 1993, after 500 years of exploitation of the fishery.

Other threats to wild fisheries include water pollution from factories, sewage, agricultural runoff, oil spills, heavy metals, trash and floating debris; and introduction of invasive species, especially predatory fish like the lionfish (*Pterois volitans*), or hitch hikers

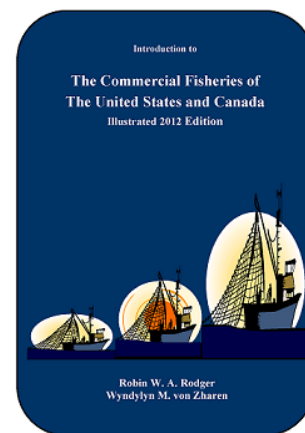
in bilge and ballast water. Global climate change is another factor affecting fisheries, as water temperatures change and fish are redistributed to new areas that have changed climates.

Despite the grim prognosis for commercial wild fisheries, the book offers some suggestions for national and international policies to protect fish populations. An example cited in the book of a NGO that is working to improve sustainable fisheries is the Marine Stewardship Council (MSC), which certifies fishing management practices that will ensure the fisheries are sustainable.

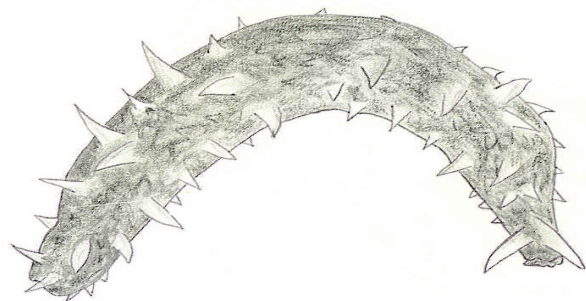
Section Five of Part 1 covers Aquaculture, which is listed as increasing production at an annual rate of 5-6%. The countries that produce the most fish and shellfish through aquaculture are China (62% of total world aquaculture production), India, Vietnam, Indonesia, Thailand and Bangladesh, ordered in rank of production. Carp species are 39% of the total world fish production by volume, while the White Leg Shrimp is the single most valuable species cultivated, followed by Atlantic salmon, grass carp and then silver carp. Aquaculture is not without its potential problems, however, and these are discussed in the book as well.

Section Seven has a good, concise overview of the fishing equipment used in commercial fish capture, which is helpful information to know when one intends to catch fish.

The main portion of the book (pages 78-375) is Part 2, which covers the general descriptions of the species with commercial value; an example of which is the sea cucumber information on the page following this. The physical description information, including sizes and longevity, would be very useful to veterinarians who work with these fish species in aquaculture or display aquariums.



## Know Your Sea Cucumbers



The **sea cucumber** is a marine invertebrate or “echinoderm” (spiny-skinned) animal that moves sluggishly over the sea floor in search of food. It is a close relative of the sea urchin and the sea star. At least 1,100 species have been identified worldwide. The **California stichopus** (class Holothuroidea [sea cucumbers], family Stichopodidae) has a peculiar feature: during October and November, many stop eating, and upon examination out of water, are found to contain no internal organs. It was once thought that these organs were simply expelled, but it has since been discovered that they atrophy. Fortunately, the organs replicate themselves in six to eight weeks.

A common Atlantic species is the Atlantic sea cucumber, *Cucumaria frondosa*; however, individual sea cucumber species are so difficult to distinguish they are often just referred to by a genus name such as *Parastichopus* spp., *Holothuria* spp. or *Cucumaria* spp.

The California stichopus can be found throughout the near-shore waters of the Pacific coast, from extreme low tide levels to depths of over 300 feet. They live on all types of bottoms, from muddy sand to bedrock, although they avoid areas where waves are high. In water less than 60 feet deep, SCUBA divers gather them in large mesh bags to be hauled to the surface, where a boat waits to take them ashore. US landings of all sea cucumbers totaled 651 tonnes in 2008, valued at \$2.9 million. All of the landings were on the West Coast, divided between California and Washington. The Canadian catch in 2008 was 4,516 tonnes, valued at \$4 million. About two-thirds of the Canadian catch and value was on the West Coast as well.

Farming and ranching of sea cucumbers are common in Asia, especially China and Japan, and are under active research effort in North America. Since sea cucumbers thrive on waste material produced by other organisms, it is believed they

should both thrive in, and benefit, the trophic environment surrounding other maricultured species, including finfish.

The higher valued product from sea cucumber is the whole gutted and dried body wall, called “trepan” or “beche de mer.” It is used in soups in parts of eastern Asia and is also considered a herbal tonic (“ginseng of the sea”) for blood, kidney and intestine dysfunctions. Pharmaceutical uses in China include treating fatigue, impotence, constipation and frequent urination. There is also a strong and growing market for the five muscle strips located just inside the surface of the body wall. The muscle strips are delicious when fried quickly in butter, and as more North American consumers become familiar with this delicacy, the market is expected to grow. Other products include raw sea cucumber (served marinated in Japan), dried sea cucumber gonads (which can be priced up to \$50.00/lb. in Japan), and salted, fermented intestines (which can be priced up to \$30.00/lb. in Japan). However, quality is paramount and some sea cucumber species are preferred over others, especially for trepan.

The California stichopus spawns from April to August. Fertilization takes place when the male and female, adopting a cobra like posture with their front ends elevated off the sea floor, release sperm and eggs into the water. The larvae spend 65-125 days floating as plankton before settling to the bottom, where they become juvenile sea cucumbers. These juveniles hide much of the time among the seaweed, under rocks and in crevices. It takes four to six years for young sea cucumbers to reach their adult size of two pounds. Lifespan is 12-14 years.

Moving slowly along the sea bottom, sea cucumbers look for the micro-organisms associated with sediment particles. They leave trails of nutrient materials behind them much as common earthworms do. In fact, overfishing of sea cucumbers is reported as causing hardening of the sea floor, eliminating habitat for other benthic organisms.

Adult sea cucumbers have few natural predators beside some species of sea stars. An encounter with a sea star can invoke a violent, arching, back-and-forth escape response — about the only time a sea cucumber moves rapidly.

For additional information please see website: [http://www.CMPpublications.com/na\\_fisheries](http://www.CMPpublications.com/na_fisheries)

Excerpt from **An Introduction to the Commercial Fisheries of the United States and Canada.**



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

NEWS AND VIEWS

Third Quarter 2014

## Sea creatures add branch to tree of life: New species that do not fit in any known group

Nicole Skinner  
04 September 2014

Scientists have identified two mushroom-shaped marine animals that do not fit in any of the known categories of the tree of life and could be related to groups thought to be extinct for 500 million years. Jean Just, a zoologist at the Natural History Museum of Denmark in Copenhagen, discovered 18 odd-looking invertebrate specimens while sorting through materials he had collected in the Tasman Sea in 1986. On that expedition, he was exploring the continental slope off the southeastern coast of Australia using a sled that drags over the bottom of the ocean floor and collects animals that live there.

In the study, which appears in *PLOS ONE*<sup>1</sup>, the researchers report 14 specimens, collected at depths of 400 and 1,000 metres, that could not be classified into any major groups, or phyla. The researchers classified the organisms under a new genus, *Dendrogramma* — a reference to dendrograms, the tree diagrams used in biology to illustrate evolutionary relationships between organisms. The two species names, *enigmatica* and *discoides*, allude to their mysterious character and disc shape, respectively.

Under a microscope the samples showed morphological similarities to two existing groups, jellyfish and comb jellies. This suggests that they may be related to one of these groups, although at the moment they cannot be classified as either.

The researchers also found similarities between *Dendrogramma* and a small group of 'medusoids', or jellyfish-like creatures, that lived 600 million years ago during the Ediacaran period.

### References

Just, J., Kristensen, R. M. & Olesen, J. *PLoS ONE* **9**, e102976 (2014).

<http://www.nature.com/news/sea-creatures-add-branch-to-tree-of-life-1.15833>



*Dendrogramma enigmatica* is neither jellyfish nor comb jelly.  
Photo by Jørgen Olesen

## Smarter than you think: Fish can remember where they were fed 12 days later

July 1, 2014

Source: Society for Experimental Biology



African Cichlid (*Labidochromis caeruleus*).

Photo Credit: Erica Ingraham

It is popularly believed that fish have a memory span of only 30 seconds. Canadian scientists, however, have demonstrated that this is far from true -- in fact, fish can remember context and associations up to twelve days later. The researchers studied African Cichlids (*Labidochromis caeruleus*), a popular aquarium species. These fish demonstrate many complex behaviours, including aggression, causing the scientists to predict that they could be capable of advanced memory tasks. Each fish was trained to enter a particular zone of the aquarium to receive a food reward, with each training session lasting twenty minutes. After three training days, the fish were given a twelve day rest period.

The fish were then reintroduced into their training arena and their movements recorded with motion-tracking software. It was found that the cichlids showed a distinct preference for the area associated with the food reward, suggesting that they recalled the previous training experiences. Furthermore, the fish were able to reverse this association after further training sessions where the food reward was associated with a different stimulus.

For fish living in the wild, ability to associate locations with food could be vital for survival. "Fish that remember where food is located have an evolutionary advantage over those that do not" said lead scientist Dr Trevor Hamilton.

This research was presented at the Society for Experimental Biology Annual Meeting, July 2014 held at Manchester University, UK.

The above story is based on materials provided by [Society for Experimental Biology](http://www.sciencedaily.com/releases/2014/07/140701193253.htm).

For complete article, go to:  
ScienceDaily, 1 July 2014.

[www.sciencedaily.com/releases/2014/07/140701193253.htm](http://www.sciencedaily.com/releases/2014/07/140701193253.htm)

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

NEWS AND VIEWS

Third Quarter 2014

## Koi Herpesvirus (KHV) disease confirmed in UK koi carp (*Cyprinus carpio*)

August 13, 2014

An outbreak of KHV disease has been confirmed at Baden Hall Fishery, Eccleshall, Stafford, Staffordshire. The site is now subject to statutory controls to prevent or limit the spread of the disease.

The Fish Health Inspectorate (FHI) at Cefas, acting on behalf of Defra has issued a confirmed designation prohibiting the movement of fish to, from and within the fishery complex. Fishery equipment disinfection and movement control measures are also now in place and anglers must ensure that they comply with all biosecurity measures within the designated area.

The fishery owner voluntarily closed the affected water in advance of official controls and reported the problem for further investigation. KHV has no implications for human health. It is nonetheless, a serious viral disease of fish, and is notifiable in the United Kingdom. KHV affects all varieties of common and ornamental carp (*Cyprinus carpio*) including koi and carp hybrids and can result in high rates of fish mortalities.

Clinical signs of KHV disease may include white or necrotic patches on the gills, rough patches on the skin, sloughing mucous and sunken eyes. These signs usually appear when water temperatures are between 16 and 28 degrees centigrade. Anyone noting deaths in carp or carp hybrids, with signs of disease similar to those above, or have suspicion of notifiable disease in any aquatic animal, should immediately contact the FHI. Anyone who imports, keeps, fishes for, or retails carp (common and ornamental) and carp hybrids should take precautions to prevent the spread of KHV.

For more information see <http://tinyurl.com/omhual>, or contact the Fish Health Inspectorate ([Emailfhi@cefas.co.uk](mailto:Emailfhi@cefas.co.uk) or tel (UK): 01305 206700).



## Hawaiian monk seal hospital officially opens

Hawaii News - Honolulu Star-Advertiser

[StarAdvertiser.com](http://StarAdvertiser.com)

KAILUA-KONA, Hawaii

By Associated Press

Sep 04, 2014



A new emergency room for endangered Hawaiian monk seals has officially opened on the Big Island of Hawaii. The Marine Mammal Center held a blessing and grand opening celebration for its Hawaiian monk seal hospital on Wednesday. The \$3.2 million facility in Kailua-Kona is named Ke Kai Ola.

The hospital received its first patients in July when scientists brought in four malnourished seals they picked up during a research trip to the Northwestern Hawaiian Islands. Veterinarians and trained volunteers nursed the seals back to health. The seals headed back to the Northwestern Hawaiian Islands on Sunday.

There are only about 1,100 Hawaiian monk seals remaining, and their population is declining about 3 to 4 percent per year.

[http://www.staradvertiser.com/news/breaking/20140904\\_Hawaiian\\_monk\\_seal\\_hospital\\_officially\\_opens.html](http://www.staradvertiser.com/news/breaking/20140904_Hawaiian_monk_seal_hospital_officially_opens.html)



## Scientists study 'talking' aquatic turtles in Brazilian Amazon

Credit: C. Ferrara/Wildlife Conservation Society  
August 14th, 2014 in Biology / Ecology. Phys.org

Turtles are well known for their longevity and protective shells, but it turns out these reptiles use sound to stick together and care for young, according to the Wildlife Conservation Society and other organizations. Scientists working in the Brazilian Amazon have found that Giant South American river turtles actually use several different kinds of vocal communication to coordinate their social behaviors, including one used by female turtles to call to their newly hatched offspring in what is the first instance of recorded parental care in turtles.

"These distinctive sounds made by turtles give us unique insights into their behavior, although we don't know what the sounds mean," said Dr. Camila Ferrara, Aquatic Turtle Specialist for the WCS Brazil Program. "The social behaviors of these reptiles are much more complex than previously thought."

To listen go to: <http://phys.org/news/2014-08-scientists-turtles-brazilian-amazon.html>

Some behaviors of the Giant South American river turtle have been well known for some time, including the tendency to aggregate in huge numbers during the nesting season. However, the mechanisms used by turtles to coordinate their activities have yet to be explained. This study focused on the sounds made by the turtles as a possible means of facilitating social behavior.

Working on the Rio Trombetas between 2009 and 2011, the research team captured 270 individual sounds made during 220 hours of recording made with both microphones and hydrophones when the turtles were swimming through the river. The scientists then conducted spectrographic analyses on the repertoire, which they subdivided into six different types of vocalization made by turtles during the nesting season, which begins as the reptiles leave the seasonally flooded forest for nesting beaches along river banks. The scientists also sought to correlate vocalizations with specific behaviors.

Sounds made by the turtles while migrating through the river or basking tended to be low frequency sounds, possibly to facilitate contact between turtles over longer distances. Vocalizations made during nesting tended to be higher frequency sounds, possibly because higher fre-

quency sounds travel better in shallow water and in the air. The highest diversity of sounds are used by females about to nest; the researchers theorize that the animals use these sounds to decide on a specific nesting site and to synchronize their movements (the turtles leave the water in a single-file procession).

The hatchling turtles themselves make sounds before they hatch and continue to do so as they clamber out of the nest chamber on the river beach. The sounds, the authors speculate, may stimulate group hatching. The females, in turn, vocalize in response to the nestling calls, perhaps guiding the nestlings into the water. These interactions—the first recorded instance of parental care in turtles—were featured in a 2012 study appearing in the *Journal of Comparative Psychology*. Using sonic transmitters, the team also discovered that the hatchlings remain together and migrate with adult females for more than two months.

The Giant South American river turtle is the largest of the side-necked turtle family and grows up to 80 centimeters (nearly three feet) in length. The species is only found in the Amazon River basin and is now threatened by unregulated consumption of the turtles' meat and eggs.

"Groundbreaking studies such as this one can help us better understand the complex relationships between both individual animals and their environment," said Dr. Julie Kunen, Executive Director of WCS's Latin America and the Caribbean Program. "Protecting the still sizable populations of Giant South American river turtles will also enable us to conserve the behavioral richness of these reptiles for future study."

Research on the Giant South American river turtles is part of a new long-term WCS conservation program called Amazon Waters, an initiative focusing on the conservation of aquatic ecosystems and species.

The Wildlife Conservation Society works to save turtles and tortoises around the world. In 2012, WCS launched an organization-wide program to revive some of the most endangered turtle and tortoise species. Efforts include breeding programs at WCS's zoos in New York, head start programs abroad, and working with governments and communities to save species on the brink of extinction.

For more information, see: *Herpetologica*, [www.bioone.org/doi/full/10.1653/0000-0000-00000000-00000000](http://www.bioone.org/doi/full/10.1653/0000-0000-00000000-00000000)

Provided by Wildlife Conservation Society



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

NEWS AND VIEWS

Third Quarter 2014

## Asian Bacterium causing US catfish deaths

Provided by [American Society for Microbiology](#)  
Jun 03, 2014

A bacterium causing an epidemic among catfish farms in the southeastern United States is closely related to organisms found in diseased grass carp in China, according to researchers at Auburn University in Alabama and three other institutions. The study, published this week in *mBio*®, the online open-access journal of the American Society for Microbiology, suggests that the virulent U.S. fish epidemic emerged from an Asian source.

Since 2009, catfish farming in Alabama, Mississippi and Arkansas has been seriously impacted by an emerging strain of *Aeromonas hydrophila*, which causes septicemia in catfish. A serious infection that can cause death in as little as 12 hours, *Aeromonas* septicemia's clinical signs include skin lesions and blood loss. Normally *A. hydrophila*, which can be found in both fresh and brackish water, only affects fish that are stressed or injured. But the newer strain has affected even apparently healthy fish with no obvious signs of duress, says senior study author Mark Liles, PhD, an associate professor in the Department of Biological Sciences at Auburn. When initial tests of the diseased fish showed *A. hydrophila* was responsible, says Liles, scientists "didn't believe it at first, because the signs didn't match the more typical opportunistic infections in stressed fish that we associate with *A. hydrophila*." To date, disease outbreaks have been responsible for an estimated loss of more than \$12 million in catfish aquaculture operations in the southeastern United States, he says.

Liles and colleagues studied the molecular epidemiology of the epidemic-causing *A. hydrophila* to try to trace its evolution. They compared samples of the bacteria to 264 known *Aeromonas* strains in an international database. Only one virulent strain came close to matching the one sampled from Alabama: ZC1, isolated from a diseased grass carp in China's Guangdong Province. ZC1 was isolated from fish that had experienced an epidemic outbreak atypical of *Aeromonas* infections. Researchers also identified a less aggressive related *A. hydrophila* strain called S04-690, taken in 2004 from a diseased catfish in a commercial aquaculture pond in Mississippi. That strain caused a serious *Aeromonas septicemia* outbreak that killed thousands of catfish but did not result in an epidemic on neighboring farms.

Next, the scientists evaluated the evolutionary relationships of additional Chinese carp bacteria samples from epidemics in the Hubei Province in China. This revealed that all of the Chinese carp bacteria samples, including ZC1, group together with the recent U.S. epidemic samples of bacteria in catfish, suggesting that a common ancestor is responsible for the virulent *A. hydrophila* strains causing fish disease in both China and the United States. S04-690, from the Mississippi fish, also was found to be in the same group, related to both the U.S. catfish and Asian carp bacteria. However, it was genetically distinct from the other two strains. By contrast, *A. hydrophila* strains that do not cause epidemics are more heterogeneous.

Additional experiments found that isolated bacteria from diseased catfish in America and diseased carp in China shared alternate forms of 10 key 'housekeeping' genes required for basic cellular function.

It's not clear how the bacterium was introduced in America, Liles says. It could be from importing Asian carp to America for aquatic weed control, or from transporting ornamental fish or contaminated processed seafood products from Asia. The spread of disease among farms also is not fully understood but could result from birds that move from pond to pond eating catfish, or from harvesting equipment that may be insufficiently sanitized between uses.

Liles and other researchers are investigating means to control the spread of illness, including developing vaccines against the bacteria, and using medicated feed and/or probiotics. Meanwhile, he says, U.S. farmed catfish are safe to eat and pose no disease threat to humans due to strict standards regarding harvesting and processing of sick animals.

Explore further: [Catfish industry embraces USDA pond management research](#)

Journal reference: [mBio](#)

Photo Credit: David Nance



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

NEWS AND VIEWS

Third Quarter 2014

## The 2014 Edition of the "Blue Book" 2014 (Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens) is now online and open access

The American Fisheries Society's Fish Health Section Executive Committee recently approved an online / open access format of the Blue Book, with intent to provide others access to information on the detection and diagnosis of aquatic animal diseases.

The primary purpose of the Blue Book is to provide standardized diagnostic laboratory assay protocols for aquatic animal diseases. Standardized procedures and protocols will allow more informed decisions when evaluating whether animals are free of important disease causing agents, that is important in intrastate, interstate or international movement of aquatic animals, certifying disease freedom in an aquaculture operation, and other important regulatory issues.

New or updated in the 2014 edition are parts of the diagnostic section (motile aeromonas septicemia, weisselosis, general procedures for electron microscopy, viral erythrocytic necrosis and Infection with hematodinium) and inspection section (myxobolus cerebralis, a virology position statement and a parasitology position statement).

To access the online version of the Blue Book, go to:

<http://afs-fhs.org/bluebook/bluebook-index.php>.

For questions or queries please contact one of the following member of the Blue Book technical standards committee:

Keven Snekvik, Chair ([ksnek@vetmed.wsu.edu](mailto:ksnek@vetmed.wsu.edu))

Nick Phelps ([phelp083@umn.edu](mailto:phelp083@umn.edu))

Maureen Purcell, ([mpurcell@usgs.gov](mailto:mpurcell@usgs.gov))

## Avian Flu In Harbor Seals Could Infect People

By Mary Elizabeth Dallas



Photo: U.S. Fish and Wildlife Service

(HealthDay News) –

The avian flu that killed 160 harbor seals in New England in 2011 could be spread through respiratory drops and therefore poses a potential threat to humans. Researchers at St. Jude Children's Research Hospital have discovered natural mutations to the avian H3N8 seal virus that might allow it to travel through the air in droplets. Current seasonal flu vaccines wouldn't help in such a scenario, the study's authors added.

"The transmissibility of the seal H3N8 virus coupled with the apparent lack of immunity makes this strain a concern," the researchers wrote in the study, which was published in a recent issue of *Nature Communications*.

Deadly cases of avian H5N1 and H7N9 flu have been confirmed around the world. Mutations in a specific protein allowed the H5N1 virus to spread through respiratory droplets. The researchers isolated the H3N8 virus and found it could grow and infect human lung cells. They also found the virus spread among ferrets through respiratory droplets.

"This study highlights a gain-of-function experiment that occurred in nature and shows us there are avian flu viruses out there beyond H5N1 and H7N9 that could pose a threat to humans," explained the study's corresponding author, Stacey Schultz-Cherry in a hospital news release.

"Avian H3N8 viruses are established in horses and dogs. This study raises a red flag about the threat this strain poses to humans exposed to animals infected with the virus," she said. Avian H3N8 may have also triggered a human flu pandemic in the 1880s. This research highlights the need to monitor flu viruses in wild and domesticated animals to better understand risks to people and the genetic changes that allow a virus to spread through respiratory droplets.

SOURCE: St. Jude Children's Research Hospital, news release, Sept. 4, 2014.



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

NEWS AND VIEWS

Third Quarter 2014

## Benefits of Treating Salmon Sequentially with SLICE® and Hydrogen Peroxide

Presented at the 10th International Sea Lice Conference (31 August to 5 September in Portland, Maine, USA), Merck Animal Health discussed the benefits of treating salmon with SLICE® (emamectin benzoate) followed by hydrogen peroxide, to reduce sea lice infestations and re-infection in sea lice populations that have demonstrated resistance to emamectin benzoate.

The MSD study found that a sequential treatment approach provided effective clearance of existing sea lice infections and subsequently reduced resettlement of an emamectin benzoate-resistant sea lice strain, more effectively than treatment with hydrogen peroxide alone.

“Sequential treatment with SLICE and hydrogen peroxide has been adopted by a number of veterinarians and producers to improve sea lice control, particularly in sea lice populations that have shown resistance to the treatments,” said Dafydd Morris, MSD Animal Health. “We are pleased to present this important research to help producers optimise their sequential treatment approach, thereby improving the effectiveness of their control strategy and reducing re-infection.”

In the study, mixed-sex Atlantic salmon were challenged with infective sea lice copepodids from a population that is resistant to emamectin benzoate. After four weeks, the fish were randomly allocated to 28 identical treatment tanks. On Day 36, the fish were challenged with a second cohort of sea lice copepodids to ensure a mixed-stage sea lice population on the fish.

The 28 treatment tanks were randomly assigned to 14 treatment groups, with ten groups receiving treatment with SLICE from days zero to six. Nine of these groups were also treated with hydrogen peroxide at nominal concentrations of 600, 1000, or 1400 ppm, administered at either three, seven, or 12 days after the end of the SLICE treatment.

The other four groups did not receive a SLICE treatment. Of these, three groups received hydrogen peroxide treatments at 1400 ppm and one received no treatments. The study found that efficacy against sea lice infection was greater when hydrogen peroxide was administered seven or 12 days after SLICE in a concentration of 1000 or 1400 ppm. For more information on Merck's SLICE® Sustainability Project, go to:

<http://tinyurl.com/knj584b>.

## Noteworthy Websites

### European Food Safety Authority – Fish Welfare

<http://www.efsa.europa.eu/en/topics/topic/fishwelfare.htm>

### United States Department of Agriculture, Information Resources on Fish Welfare

<http://www.nal.usda.gov/awic/pubs/Fishwelfare/fishwelfare.htm>

### Animal Welfare Institute—Fish Farming

<https://awionline.org/content/fish-farming>

### Project Piaba

<http://projectpiaba.org/>

### APPA Pet Ownership Survey

[http://www.americanpetproducts.org/press\\_industrytrends.asp](http://www.americanpetproducts.org/press_industrytrends.asp)

### AVMA Pet Ownership Survey

<https://www.avma.org/KB/Resources/Statistics/Pages/Market-research-statistics-US-pet-ownership.aspx>

### Freshwater Fish Specialists Group

<http://www.iucnffsg.org/about-ffsg-2/>

### The Fish Vet Group

<http://fishvetgroup.com/>

### Singapore Aquarama 2015

<http://ubm-asia.msgfocus.com/q/17LW3CCjNGYALiHMFafCXt/wv>

### American Fisheries Society-Fish Health Section

<http://afs-fhs.org/>

### Manual of Diagnostic Tests for Aquatic Animals

[OIE Aquatic Manual](#)

### Aquatic Animal Health Code

[OIE Aquatic Code](#)

[National Aquatic Animal Health Plan - Canada](#)

[National Aquatic Animal Health Plan - USA](#)

[USDA-APHIS Aquaculture Information](#)

[AADAP Aquatic Animal Drug Program](#)

[NCRAC State fish health regulations page](#)



# THE AQUATIC VETERINARIAN

Volume 8, Number 3 **LEGISLATIVE & REGULATORY ISSUES** Third Quarter 2014

## **Aquaculture considered key to feeding the world in 2030**

Vigo, Spain

During the International Scientific Symposium for Innovation in Marine and Food Industry the director of the Economy and Fisheries Policy of the United Nations Food and Agriculture Organization (FAO), Lahsen Adabouch, stated the development of the aquaculture industry and an increased use of resources are two key elements given the higher global demand for seafood.

According to a study carried out by the FAO, the World Bank and several scientific institutions, in 2030 aquaculture will provide nearly 66% of the global fish consumption, compared to the 51% it currently represents. Adabouch also noted that 29 % of fishing grounds worldwide are overexploited, so the sector faces huge losses amounting to USD 50,000 million. "Asia encompasses 91 per cent of global aquaculture production [China alone accounts for 61 per cent] so the scope for growth of the industry in other parts of the world is large"

Other future challenges include a boost of offshore aquaculture and improvement of feed quality. According to the investigation, about 1,300 million tonnes per year are thrown away because of consumers' fault or due to deficiencies during storage. Therefore, it is important to "harmonize" and simplify ecolabelling in order to avoid misleading consumers.

During the opening ceremony, the Spanish Secretary of Science, Technology and Innovation, María Luisa Poncela, emphasized the "strength" of the Spanish food sector and the development of the associated technological research. However, she admitted that one of its "major weaknesses" is a "high fragmentation" in the productive sector, with "many very small businesses."

To the President of Xunta de Galicia, Alberto Núñez Feijoo, the future strategy should combine growth with job creation and the boost of environmentally friendly sustainable industry; and make a "clear commitment" for aquaculture. According to Núñez Feijoo, it is necessary for countries' administrations to commit to practices that regulate and require food producers' and processors' guarantees. Meanwhile, the president of the National Association of Manufacturers of Canned Fish and Shellfish (ANFACO-CECOPECA), Jesus Alonso Escurís, recognized that the achievement of "traceability" is the biggest challenge to ensure food security.

## **China plans giant fish-farming ship at Nansha**

Web Editor: Si Huan

Ecns.cn

Plans for the construction of China's first factory fish-farming ship at the Nansha islands are underway, the China Science Daily has reported. The converted oil tanker could weigh as much as 200,000 tons, and will function as a multi-purpose mobile offshore production base, according to Lei Jilin, a researcher at the Yellow Sea Fisheries Research Institute. Lei said the initial plan is to deploy the factory ship at Mischief Reef, one of China's major fishing bases in the southernmost area.

"In addition to defending the reef, it will contribute to fish processing and storage, and function as an anchorage to provide supplies and services to deep sea fishing vessels," Lei added.

Lei said that if the ship runs well, they will deploy more to other islands, adding that marine fisheries and ocean-going fishing are just as significant as offshore oil and other resources.

An increasing number of fishermen have settled in the area to breed aquatic products. Li said government support can help develop deep-sea fisheries and uphold sovereignty over marine territories.

Website:

<http://www.ecns.cn/cns-wire/2014/09-24/135964.shtml>

| Top 10 species grown in China in 2005 |                       |
|---------------------------------------|-----------------------|
| Species                               | Tonnes <sup>[2]</sup> |
| <a href="#">Japanese kelp</a>         | 4 314 000             |
| <a href="#">Grass carp</a>            | 3 857 000             |
| <a href="#">Pacific cupped oyster</a> | 3 826 000             |
| <a href="#">Silver carp</a>           | 3 525 000             |
| <a href="#">Japanese carpet shell</a> | 2 857 000             |
| <a href="#">Common carp</a>           | 2 475 000             |
| <a href="#">Wakame</a>                | 2 395 000             |
| <a href="#">Bighead carp</a>          | 2 182 000             |
| <a href="#">Crucian carp</a>          | 2 083 000             |
| <a href="#">Yesso scallop</a>         | 1 036 000             |

[http://en.wikipedia.org/wiki/Aquaculture\\_in\\_China](http://en.wikipedia.org/wiki/Aquaculture_in_China)

# THE AQUATIC VETERINARIAN

Volume 8, Number 3 **LEGISLATIVE & REGULATORY ISSUES** Third Quarter 2014

## **60-Day Public Comment Period Opens for Draft Shrimp Standard for the ASEAN Region**

Jakarta, Indonesia

A first draft Shrimp Standard for the Association of Southeast Asian Nations (ASEAN) region is now available for public comment through October 10, 2014. A steering committee of 14 industry and non-government stakeholders designed the draft standard to be a workable tool for the shrimp industry in ASEAN to improve the sustainability, environmental and social performance of farming, especially at the small-scale, and receive recognition in key export markets. The steering committee welcomes comments on the draft standard from farmers, experts and other stakeholders engaged in the shrimp aquaculture industry.

The draft standard complements existing national good aquaculture practices and aims to align with internationally accepted environmental and social standards, including the Monterey Bay Aquarium's Seafood Watch® Program sustainability assessment criteria and the Aquaculture Stewardship Council standards.

With the formation of an ASEAN Economic Community in 2015, the region will become one of the 10 largest global economies and a major player in the global seafood industry. The creation of a single market will present an opportunity for the industry and other interested stakeholders to work collaboratively across the ASEAN region to improve sustainability of shrimp farming and promote responsible aquaculture practices in a way that continues to support food security and safeguards the livelihoods of small-scale shrimp farmers.

The public comment process is open to all individuals, organizations and entities interested in providing inputs and feedback on the draft standard, in line with international guidelines for creating environmental and social standards defined by the ISEAL Alliance. The steering committee will use this feedback to revise the draft standard that will be piloted or field tested with farmers in several ASEAN countries. The steering committee plans to finalize the Shrimp Standard for the ASEAN Region by early 2015.

To review the draft shrimp standard and provide input, please download the (i) Public Comment Feedback Form and (ii) the Draft Shrimp Standard for ASEAN from:

<https://www.dropbox.com/sh/17xiy6swfinw4aa/AADYivk6Fntfu6iCOJx8Zneza>

The Steering Committee includes: FAIRAGRO (Thailand); Indonesian Fishery Product Processing & Marketing Association (Indonesia); International Collaborating Center for Aquaculture & Fisheries Sustainability (Vietnam); Kasetsart University (Thailand); Network of Aquaculture Centers Asia Pacific (Regional); Tambuyog Development Center (Philippines); Socskargen Federation of Fishing & Allied Industries (Philippines); Surya University (Indonesia); Thai Union Frozen Products (Thailand); Thai Farmers Council (Thailand); Vietnam Association of Seafood Exporters & Producers (Vietnam); Wetlands International (Indonesia); Monterey Bay Aquarium Seafood Watch® (USA); Chicken of the Sea (USA). The development of the Shrimp Standard for the ASEAN region is being carried out with the support of the United States Agency for International Development (USAID).

Please send all comments by October 10, 2014 to [shrimp.steeringcommittee@gmail.com](mailto:shrimp.steeringcommittee@gmail.com).

## **Four years after oil spill disaster, the Gulf of Mexico seafood industry is still depressed**

The Louisiana fishermen say the oyster population in the Gulf of Mexico has yet to rebound and continues to suffer lower birth rates and higher mortality rates than before the 2010 spill. As a result of the disaster, Oyster production in Louisiana, which typically accounts for one third of all oyster production nationwide, dropped by half in 2010. Experts are still probing potential problems with crabs and shrimps as well.

US Federal judge Carl Barbier ruled that oil giant BP acted with "gross negligence" during the 2010 Deepwater Horizon disaster. The ruling, part of a civil suit case involving the federal government and five US states bordering the Gulf of Mexico, could potentially quadruple the fines the company faces under the Clean Water Act. Under the federal Clean Water Act, "simple" negligence carries a maximum penalty of \$1,100 per barrel; gross negligence carries a \$4,300 per barrel maximum fine. Using the official government estimate of 4.2 million barrels of spilled oil, the BP could be liable for up to \$18 billion in penalties.

The Deepwater Horizon disaster, which began in April 2010 with an explosion aboard the rig and continued throughout the summer, is considered the worst environmental disaster in American history.

<http://www.presstv.ir/detail/2014/09/15/378779/fishing-nets-still-empty-in-louisiana/>

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014



## MEETINGS OF INTEREST TO AQUATIC VETERINARIANS

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

## PLAN AHEAD FOR THESE GREAT MEETINGS!

WAVMA members will be presenting full days of Aquatic Veterinary Medicine lectures at the 2015 WSAVA Congress in Bangkok, Thailand. Plan ahead to attend this meeting.



**WSAVA**  
Global Veterinary Community

The Great African Vet Adventure

**39<sup>th</sup> World Small Animal Veterinary Association Congress**

Cape Town, South Africa  
16-19 September, 2014

**WSAVA 2014**  
16-19 September 2014  
Cape Town, South Africa

**39th WSAVA Congress**  
Cape Town, South Africa  
September 16-19, 2014

<http://www2.kenes.com/wsava/Pages/Home.aspx>

**40th WSAVA Congress**  
Bangkok, Thailand  
May 15-18, 2015

<http://www.wsava2015.com/congress-information/about-wsava>

The Always Amazing Thai Experience

**40<sup>th</sup> WORLD SMALL ANIMAL VETERINARY ASSOCIATION CONGRESS**

Bangkok, Thailand | 15-18 May, 2015

**WSAVA CONGRESS 2015**  
15-18 May  
Bangkok, Thailand



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014

## **Animal Welfare Symposium 2014: Humane Endings - In Search of Best Practices for the Euthanasia, Humane Slaughter and Depopulation of Animals November 3-5, 2014,**

The Westin O'Hare, Rosemont, Illinois, USA

This symposium will take a comprehensive look at existing best practices for euthanasia, humane slaughter and depopulation across animal species, while exploring research and innovation in the name of continuous improvement. A by-invitation half-day workshop focused on international harmonization of recommendations will follow the 2.5-day event.

A few of the aquatic animal welfare presentation & posters on the program:

- \* Overview of humane endings for fish - Roy Yanong
- \* Pain in fish - Stephen Smith
- \* Fish slaughter - Hugh Mitchell
- \* Fish depopulation - Kathy Hartman
- \* What's new in fish euthanasia - Daniel Weary
- \* Aquatic invertebrates - Michael Murray
- \* Assisting IACUCs with humane endings for fish - Stephen Smith
- \* Correlating physiological and behavioral studies of stressful events in animals - Craig Johnson
- \* Challenges in research and the field for fish and aquatic wildlife species - Craig Harms
- The alligator industry—advances in animal welfare from egg to slaughter - Javier Nevarez
- 

Reserve your seat today! Registration for the symposium is now open according to the following schedule:

| Registration | Opens          | Closes   |
|--------------|----------------|----------|
| Regular      | 9/16/14        | 10/16/14 |
| Vet: \$325   | Student: \$165 |          |
| Late         | 10/16/14       | 10/26/14 |
| Vet: \$350   | Student: \$175 |          |
| Onsite       | 11/2/14        | 11/5/14  |
| Vet: \$375   | Student: \$195 |          |

Registration will be accepted on a space-available basis.

For more information, to see the full tentative agenda, to register or for hotel reservations go to <https://www.avma.org/Events/Symposiums/Pages/2014-Humane-Endings-Symposium.aspx>.

## **18th Federation of Asian Veterinary Associations Congress**

**28 Nov - 3 Dec, 2014**

Marina Bay Sands, Singapore.

The Aquatics component of the FAVA kicks off with Fish Medicine on Saturday 29 Nov., continues with a series of lectures on Aquaculture on Sunday 30 Nov. and finishes off with a full-day wet-lab covering "Practical Veterinary Aspects of Fish Veterinary Medicine" on Monday 1 Dec.

For more information, see <http://fava2014.com/congress-information/>

## **9<sup>th</sup> Symposium on Diseases in Asian Aquaculture (DAA9)**

**November 24-28, 2014**

Ho Chi Minh City, Vietnam

The Fish Health Section of the Asian Fisheries Society was founded in May 1989 with the goal to improve regional knowledge on fish health management and to support sustainable aquaculture development in Asia Pacific. FHS strives to promote interaction by bringing together fish health researchers to share their knowledge and experience. The FHS is credited with holding triennial symposia on "Diseases in Asian Aquaculture" (DAA) where members and aquatic animal health professionals meet to discuss broad issues and specific topics related to aquatic animal health. FHS has conducted earlier symposia in Bali, Indonesia (1990); Phuket, Thailand (1993); Bangkok, Thailand (1996); Cebu, The Philippines (1999); Gold Coast, Australia (2002); Colombo, Sri Lanka (2005); Taipei, Taiwan (2008) and Mangalore, India (2011). Each of these symposia brought together more than 300 aquatic animal health scientists, students, government researchers and industry personnel from over 30 countries to discuss issues pertaining to aquatic animal disease, their diagnosis, prevention and control. In keeping with the tradition of previous DAA symposia, DAA9 in Vietnam is going to be a unique experience that you don't want to miss. For more information on DAA9 and FHS, go to <http://www.fhs-afs.net>.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014

**Association of Reptilian and Amphibian Veterinarians/Association of Exotic Mammal Veterinarians/American Association of Zoological Veterinarians Concurrent Annual Conferences  
October 18-24, 2014**

Walt Disney World/Orlando, Florida, USA

Just a reminder that the 2014 Conference Registration is now open [on-line](#). If you have not yet done so, please register now to ensure that you are able to get into the lab/workshop of your choice. Simply go to the [ARAV website](#) to register on-line or download the registration form if you wish to register by mail.

Please note that our room block at Disney's Coronado Springs Resort has filled and we are now booking at Disney's Caribbean Beach Resort (same conference room rates). The Caribbean is a short 1-1/2 miles from the Coronado and a shuttle will be provided between the two properties. Reservations at the Caribbean Beach Resort can be made by calling Disney's reservation line at 407-939-4686 and let them know that you are attending the AAZV/ARAV/AEMV conference to get the conference room rate. Thanks and we hope to see you in October. If you have any questions, please do not hesitate to contact me.

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E-mail: [ARAVETS@aol.com](mailto:ARAVETS@aol.com)



**ABVP Announcement!**  
**October 30-November 2, 2014**  
Nashville, Tennessee

For all of you interested in becoming boarded in Reptile and Amphibian medicine come visit the 19th Annual ABVP Symposium in Nashville, Tennessee October 30-November 2, 2014. Find out more information at [www.abvp.com](http://www.abvp.com).



European Committee  
of the Association  
of Avian  
Veterinarians



Association  
of Exotic Mammal  
Veterinarians



Association  
of Reptilian and  
Amphibian  
Veterinarians



European  
College of  
Zoological Medicine

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014



## International Conference on Avian herpetological and Exotic mammal medicine

### International Conference on Avian, Herpetological and Exotic Mammal Medicine (ICARE)

April 18 - 23, 2015  
Paris, France

After a very successful and exciting "1st International Conference on Avian, Herpetological and Exotic Mammal Medicine" (1st ICARE) in Wiesbaden, Germany in 2013, all participating organisations have decided that this important veterinary symposia should continue every two years touring through Europe.

We are proud that the European Committee of the Association of Avian Veterinarians (EAAV), the Association of Exotic Mammal Veterinarians (AEMV), the Association of Reptilian and Amphibian Veterinarians (ARAV) and the European College of Zoological Medicine (ECZM) have decided that the 2nd International Conference on Avian, Herpetological and Exotic Mammal Medicine (2nd ICARE) will be held in 2015 in Paris, France (April 18 - 23, 2015). All organizations (EAAV, AEMV, ARAV, ECZM) are participating in a newly formed ICARE Steering Committee to select suitable locations and support the local organising committees for future conferences.

In preparation of the 3rd upcoming ICARE in 2017 the ICARE Steering Committee seeks proposals! If interested in organising ICARE 2017 please send your proposal before 31.03.2014 via email to [Dominik.fischer@vetmed.uni-giessen.de](mailto:Dominik.fischer@vetmed.uni-giessen.de).

On behalf of the ICARE Steering Committee,  
Dominik Fisch

#### The Organizing Committee

Norin CHAI  
Minh HUYNH  
Charly PIGNON  
Lionel SCHILLIGER

### Commemorative Symposium on Reptiles and Amphibians

Birkbeck College, London,  
Saturday 24th January, 2015

A half-day Symposium on the health, welfare and pathology of reptiles and amphibians will be held at Birkbeck College, University of London, 43 Gordon Square, London WC1H 0PD, on Saturday 24th January 2015. The meeting is organised in conjunction with the British Herpetological Society (BHS) supported by the British Chelonia Group (BCG). The Symposium will last from 1.00 pm (13.00) until 6.00 pm (18.00). Admission is free.

The Symposium marks the 120<sup>th</sup> anniversary of the birth of Dr Edward Elkan, pioneer of lower vertebrate pathology. His research and writings on diseases and pathology contributed much to the health and welfare of reptiles and amphibians and influenced a generation of veterinary surgeons, zoologists and herpetologists. The Symposium will mark the end of the series of Elkan Memorial Lectures instigated after Edward Elkan's death in 1983. However his Reference Collection of Lower Vertebrate Pathology, part of which will be on display at the Symposium, remains available for study by scientists and students - a long-term legacy of this great man.

The full programme for this Symposium will be published later in the year. In the meantime, expressions of interest, including offers to present a paper, should be addressed to:  
Professor John E Cooper, FRCVS  
Co-ordinator, Edward Elkan Memorial Lectures  
[ngagi2@gmail.com](mailto:ngagi2@gmail.com)



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014



28 - 31 MAY 2015  
Suntec, Singapore -

Aquarama is the leading biennial international ornamental fish, aquatic plants, invertebrates and accessories trade exhibition in the world ([www.aquarama.com.sg](http://www.aquarama.com.sg)). Throughout its history stretching back to 1989, it has attracted exhibitors, trade and public visitors from all corners of the globe. The 14th edition – scheduled to run from 28-31 May 2015 in its traditional home of Singapore, will be no different – with one important exception. In addition to its usual complement of visitors from the international ornamental aquatic industry and the general public (numbering in the many thousands), it has always attracted a small number of visitors from the public aquarium world, as well as some exhibitors who supply both the ornamental and public aquarium sectors.

This is now set to change dramatically with the organisers (UBM Media (Singapore) Pte Ltd) and a specially convened public aquarium committee launching a programme of sub-events aimed specifically at public aquarium personnel. This committee, consisting of Scott Dowd (Senior Aquarist at the New England Aquarium, Boston, USA), Ramón Barbosa (Senior Curator at the S.E.A. Aquarium in Sentosa, Singapore) and Rob Jones ('The Aquarium Vet' and veterinarian at the SEA LIFE Melbourne Aquarium, Australia) and co-ordinated by Aquarama Consultant, John Dawes, who is devising a programme of activities tailored fairly and squarely to the needs of the public aquarium industry, as well as the fostering of closer links between the home aquarium industry and public aquaria.

Up to now, these links have only been modest. However, if developed to their full potential, this would undoubtedly benefit both industries. For instance, there are several livestock suppliers within the ornamental sector that already service public aquaria, but the room for expansion and improvement is considerable but, as yet, largely unexplored. The same applies to manufacturers and suppliers of equipment, foods, treatments, services, etc.

In order to address these issues, Aquarama is dedicating over 50% of its available seminar and meeting time slots to a number of activities aimed at bringing both industries closer together than ever before.

**Round Table Discussion:** Chaired by Aquarama Consultant, John Dawes, this will consist of a panel of invited experts, comprising the three above-mentioned committee members, government representatives, ornamental aquatic industry leaders, plus livestock suppliers. Under the theme: **Engage, Influence and Collaborate: Maximising the Synergies of the Public and Home Aquarium Industries**, attendance will be free and open to all Aquarama trade and public aquarium visitors and exhibitors, and will consist of a minimum of 1½ hours of intense debate, action and Q&A's.

**Seminar:** This half-day programme of presentations from leading figures from the public aquarium world will feature topics of exclusive relevance to the industry, such as: **Artificial Reproduction Techniques in Sharks and Rays, Prolonged Transportation and Captive Husbandry of Manta Rays; The Initiative to Promote Conservation and Sustainable Management of Home Aquarium Fishes, led by the IUCN Species Survival Commission/Wetlands International Freshwater Fish Specialist Group (FFSG) and the Global Zoo and Aquarium Community; Initiative to Promote Socially and Environmentally Beneficial Home Fishkeeping**, plus several other topics which are currently being finalised.

**Strategic Development Meeting:** This in-depth session will discuss the IUCN's FFSG/public aquaria initiative set up to explore ways in which both industries can help drive environmental and socio-economic benefits, e.g. by identifying and promoting opportunities for sustainable management of wild populations of aquarium fishes that support livelihoods for communities living in regions of biological importance, thus fostering a powerful drive for conservation of these species as well as the habitats where they are found – achieved via well-informed consumer choices within the home aquarium industry. The team to explore this new, ambitious, and important initiative (under the chairmanship of committee member, Scott Dowd) will create a win-win-win scenario where the hobby gets an infusion of energy from zoos and public

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

AQUATIC VETERINARY CE & PD

Third Quarter 2014

aquaria (which will showcase fish identified by IUCN's FFSG as key species), thus promoting fish-keeping; zoos and aquaria will get a new instrument to achieve their goals of in-situ environmental protectionism; rural communities can receive sustainable economic returns for stewarding aquatic resources and watersheds, and the ornamental industry becomes a main actor in facilitating ethical supplies and helping alleviate poverty. This important meeting will last for a full afternoon (approximately four hours).

Too often, meetings of great importance such as this take place at international conferences. Important conclusions are reached by very well qualified specialists. Unfortunately though, those findings and discussed action plans fade away shortly after the meeting. In order to guarantee lasting outcomes from our Strategic Planning Meeting, we have retained the services of The Facilitators Network Singapore with trained experts to help us run the most efficient meeting, capture all information and produce a working document which will serve as a road map that will enable us to follow through and accomplish the goals we agree upon at Aquarama 2015.

It is hoped that bringing public aquaria into Aquarama will benefit all parties, especially when added to the organiser's efforts to attract exhibitors who supply public aquaria but are currently unaware of the trade benefits and possibilities that Aquarama undoubtedly offers.

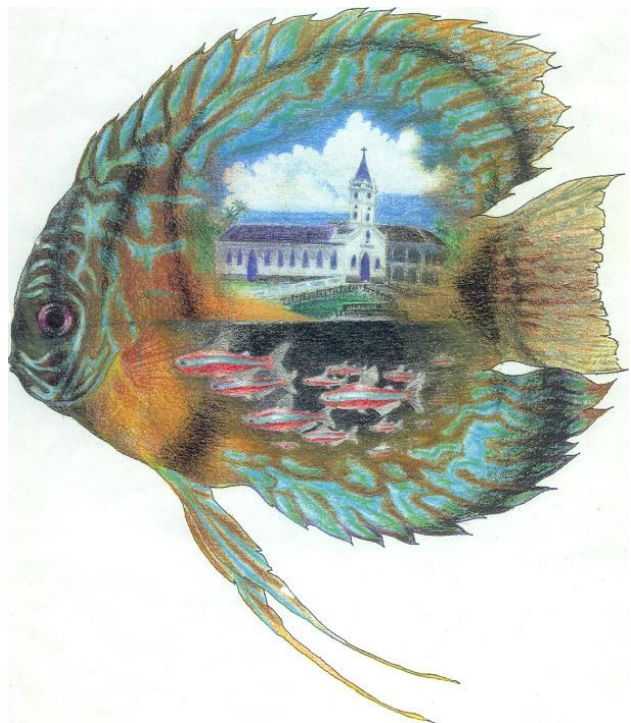
It is also hoped that by attracting visitors and exhibitors from public aquaria, these will gain an invaluable insight into an industry which they may be aware of, but know little about. These visitors will, for example, be able to witness at first hand a staggering array of fish, aquatic plants, invertebrates and equipment which they may never have come across before. They will also, of course, be able to source supplies of equipment, services and livestock for their own establishments, be able to attend the free ornamental aquatic trade and public seminars which form a traditional part of Aquarama, join the highly popular fish farm tour and marvel at the more than 1,400 entries in the general fish competition, as well as the specialised crystal bee shrimp, betta, marine aquarium, marine nano cube, freshwater planted aquarium, freshwater nano, and dragon fish (Asian arowana/bonytongue) competitions, which have helped make Aquarama the 'best ornamental aquatic exhibition' on the planet.

In the words of Jennifer Lee, event manager for Aquarama: "The ornamental aquatic sector has always supplied fish, plants and invertebrates to the home aquarium hobbyist, on the one hand, and public aquaria on the other. It could be said to lie in the middle, with the two sectors at either end of the spectrum. It is our aim to bring both ends much closer together than they've ever been before and establish our event as a 'must attend' fixture in the calendar of all stakeholders."

For further information on Aquarama, please visit [www.aquarama.com.sg](http://www.aquarama.com.sg).



Illustrated Cardinal Tetra  
Credit: Sally Landry



# THE AQUATIC VETERINARIAN

Volume 8, Number 3 **INTERNSHIPS, EXTERNSHIPS & RESIDENCIES** Third Quarter 2014

## **SeaWorld (3-4 weeks)**

SeaWorld offers externships at each of its 3 locations. There is one common application where you rank each park. Externs get to work with the wild birds that are brought for rehabilitation, even surgery! You are required to give a small presentation to the veterinary staff on the last week of your rotation. Housing is not provided, but there are lots of hotels in the area, including an extended stay hotel with a small kitchenette for around \$50/night.

## **The Marine Mammal Center (3-4 weeks)**

Located in Sausalito, CA, the Marine Mammal Center is in the front-running for marine mammal rehabilitation and research. It is very seasonal, with more animals in the spring and summer. You will work with the veterinary staff 3-4 days per week, and then on crew, doing basic husbandry and feeding once or twice a week. Housing is provided with the veterinary intern and any other externs at one of the old fort houses nearby. It is highly recommended that you get a car for driving around. It is a beautiful area with lots of beach coast and hiking.

## **Mystic Aquarium**

Mystic Aquarium in Mystic, CT, right near the coastal Rhode Island border, houses a large collection of marine mammals, fish and invertebrates. You work primarily with the veterinary intern, shadowing and assisting on procedures. You will also get very proficient in taking and processing analog radiographs. A presentation is required during this externship. No housing is provided, but you may want to ask if they know of anyone working at the aquarium who can provide you with a room for the time you are there. This is another rotation where you'll want a car to check out all the beaches nearby.

## **Georgia Aquarium**

Georgia Aquarium is one of the newest aquariums in the US. It has a new procedure suite and one of the most outstanding tanks in the world. Housing is not provided. You may not need a car since the aquarium is located in downtown Atlanta, GA.

## **Navy Marine Mammal Program (4 weeks)**

The US Navy trains marine mammals to perform tasks underwater that cannot be performed by humans. This is a high priority for those interested in marine mammal medicine. This program is based in San Diego, CA and is highly competitive.

## **Vancouver Aquarium (2-4 weeks)**

Located in Stanley Park of Vancouver, Canada, Vancouver Aquarium takes externs to work with their collection of mammals, birds, amphibians, reptiles and fish. A literature review project is required. Housing is not provided but they provide a guide on their website. Make sure your passport is up to date!

## **Georgia Sea Turtle Center (2-6 weeks)**

The Georgia Sea Turtle Center is located on Jekyll Island along the southern coast of Georgia. They rehabilitate both sea turtles and native land turtles at their center. If turtles are your interest, this is one of the best facilities to participate in the latest research and rehabilitation techniques. A research project is required for non-4th year students that is financed by funding through your school. Housing available based on seasonality. A car is recommended.

## **National Aquarium**

### **Baltimore, MD (6-8 weeks)**

National Aquarium is located in Baltimore, MD and houses a large collection of fish, mammals, amphibians/reptiles and birds. This rotation gives hands-on experience with fish, birds, reptiles and amphibians. There is some work with mammals and other critters, but it is largely observational. Applications are accepted year round. A small presentation is required. No housing is available but there are lots of hotels in the area.

## **New England Aquarium**

### **Boston, MA (6-8 weeks)**

Located in Boston, MA, the New England Aquarium hosts a large collection of fish, birds, marine mammals and turtles. Their chief veterinarian, Dr. Charles Innis, is one of the most knowledgeable about cold stun in turtles and has made a significant contribution to researching their rehabilitation. Externs are required to prepare a case report and research paper with presentations for both. No housing is available, but there are lots of options nearby.



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

JOB OPPORTUNITIES

Third Quarter 2014

**Aquatic Veterinary Pathologist**  
**Fish Vet Group Limited,**  
**Portland, Maine, USA**  
**August 13, 2014**



The role the veterinarian will mainly consist of histopathological examination of the material submitted as part of the assessment of fish (or other aquatic animal) health and disease status. Histological preparation will take place at our own laboratory in Portland. The work will include direct reports, oral and written to a fish health manager, client, or attending veterinarian.

#### Key Responsibilities:

- Perform necropsies on aquatic animals submitted to the diagnostic laboratory for disease investigations.
- Perform the microscopic evaluation and interpretation of tissue sections from aquatic animals submitted to the diagnostic laboratory.
- Author comprehensive pathology narrative reports of gross and microscopic findings, while meeting report deadlines
- Communicate the significance of pathologic findings to the veterinary team and clients.
- Ability to provide scientific guidance and feedback to histology technicians to correct artifacts and prevent reoccurrence of technical problems, and to ensure accuracy and compliance with protocols and SOP's.
- In collaboration with management, participate in projects to develop new or improved services or technologies.
- Participate in histopathology consultations and peer reviews with other pathologists within the company.
- Attend continuing education seminars and give presentations.
- Other duties as assigned.

#### Skills, Knowledge, Qualifications & Experience:

- Specialty pathology training working with aquatic animal species
- Doctoral degree in veterinary medicine from an AVMA-accredited institution and eligibility to practice in Maine and/or ability to become licensed upon joining. This is not a requirement however would be an advantage.
- Board certification in anatomic pathology by the American College of Veterinary Patholo-

gists or eligibility to sit for the ACVP board examination would be an advantage.

Good communications skills, written & oral  
Good problem solving skills and able to use own initiative

High level of attention to detail

The ability to work well in a motivated and dedicated team.

Interested veterinarians should send their CV and cover letter detailing their previous experience and suitability for the role, to [anna.winton@bmkholdings.com](mailto:anna.winton@bmkholdings.com), quoting job reference "FVG/3."

#### About the Company:

Established in the UK in 1995 to provide veterinary health services for fish farming operations around the coast of Scotland, the Fish Vet Group Limited has expanded to become the world's largest dedicated aquaculture health provider with a footprint on three continents and a global team of over 50 veterinary surgeons, diagnosticians, biologists and environmental scientists. Benchmark Holdings Plc (FVG holding company) is an ethical and progressive group of companies working in the field of sustainable food production with particular emphases on aquaculture technology, animal health, sustainable science in food production and technical publishing to the global farming and food production industries. The company established and uses the principle of the 3Es (bringing together Ethics, Environment, with Economics within all business activity), it combines expert knowledge, scientific research and evaluation and practical methodology to help drive change and progress. Benchmark operates internationally with offices in the USA, Brazil, China, Thailand, Norway, Ireland and in the UK it has operations/offices in Sheffield, Oxford, Braintree, Manchester, Edinburgh, Ardtoe, and Inverness. The Benchmark group currently employs circa 200 people and is growing at an annual rate of circa 35%. Benchmark Holdings plc is an AIM listed company on the London Stock Exchange. The Fish Vet Group Limited team in Portland, Maine provides veterinary consultation, diagnostic laboratory, fish health inspection and specialized training services to the aquaculture industry of North America. Their core expertise includes veterinary science, disease diagnosis, production optimization and strategic risk mitigation.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

JOB OPPORTUNITIES

Third Quarter 2014

## **Associate Veterinarian Position Available – Georgia Aquarium, Atlanta, USA September 16, 2014**

The Georgia Aquarium is seeking applicants for an associate veterinarian. This individual will report directly to the Director of Animal Health. Compensation for this position includes a competitive salary and full benefits, including support of continuing education.

The successful candidate will have the following qualifications:

- DVM or VMD degree from an AVMA accredited college or is ECFVG certified
- A Georgia veterinary license or the ability to obtain one within 3 months
- Minimum of 3 years of experience with full time practice in aquatic animal medicine; ACZM diplomat status preferred
- Strong leadership skills; previous experience supervising/mentoring staff, volunteers and/or students preferred
- Willingness to participate in gross and clinical pathology procedures
- Willingness to participate in scientific studies and clinical projects
- Above average ability to organize, manage time and set priorities while meeting deadlines
- Effective problem analysis and resolution skills and the ability to be flexible and shift priorities to meet needs
- Ability to maintain a high level of professionalism, integrity and confidentiality
- Superior verbal and written communication skill

To see more information about this position go to <http://tinyurl.com/nash39x>.

The following application materials should be submitted electronically to Tonya Clauss ([tclauss@georgiaaquarium.org](mailto:tclauss@georgiaaquarium.org)) by 15 October 2014:

- a curriculum vitae or resume
- a letter of intent reflecting the applicant's goals in the area of aquatic animal medicine
- 3 letters of recommendation, two of which should be written by veterinarians

## **Applications open for the International Veterinary In-Residence Program, the Marine Mammal Center (Sausalito, CA, USA)**

The Marine Mammal Center International Veterinary In-Residence (IVIR) training program provides marine mammal veterinarians across the globe an opportunity to gain experience in marine mammal medicine and rehabilitation. It is expected that successful applicants will return to their pre-existing programs prepared to implement training programs of their own.

This position requires a DVM degree or equivalent. Preference will be given to veterinarians that are currently employed with a marine mammal rehabilitation program or non-profit equivalent. This is an unpaid position. Airfare to San Francisco, CA, as well as shared housing at the TMMC Guest House located within the Marin Headlands, will be provided as part of the program. The house is shared during the busy season with other students, researchers, externs and the veterinary intern. This position is available during the busy season for three months at a time, either from March-May, May-July or July-September.

The Marine Mammal Center veterinary staff includes full and part time veterinarians, three veterinary technicians, a medical technologist and research staff. Goals of the program include assisting the veterinary medical staff in providing medical management of a large number of stranded marine mammals (mostly pinnipeds); performing post mortem examinations, sample collection for various research projects, and record keeping. Collaborative research is highly valued at TMMC, and development of a research project, either clinical or using retrospective necropsy data, is highly encouraged.

Qualified applicants should submit the following materials via e-mail to [vetsciadmin@tmmc.org](mailto:vetsciadmin@tmmc.org), with "2015 International Veterinary In-Residence Program" in the subject line, or mailed to Dr. Claire Simeone, Conservation Medicine Veterinarian, The Marine Mammal Center, 2000 Bunker Road, Fort Cronkhite Sausalito, CA 94965-2619, USA.

A cover letter/statement outlining the applicant's goals and interests in the area of aquatic animal medicine.

Three letters of recommendation from individuals familiar with the applicant's academic and/or clinical performance.

# THE AQUATIC VETERINARIAN

Volume 8, Number 3

JOB OPPORTUNITIES

Third Quarter 2014

A current curriculum vitae, limited to 4 pages.

Selection of preferred dates (applicants will only be selected during the busy season (March-September), but slight flexibility in scheduling will be accommodated on a case-by-case basis.

Applications are due by Friday, November 28th, 2014. Selection of applicants will be made by the first week in January 2015.

For more information about the Marine Mammal Center visit [www.marinemammalcenter.org](http://www.marinemammalcenter.org).

## 2015 HSA Animal Welfare Research Training (PhD) Scholarship Available

The Humane Slaughter Association is recognised internationally for promoting scientific advances towards improving the welfare of food animals worldwide (e.g. mammals, birds, fish, etc.) during their transport, marketing, slaughter or killing. As part of its endeavours to encourage high quality science that is likely to lead to substantial advances in animal welfare in these areas, the HSA is awarding a Animal Welfare Research Training Scholarship to enable a promising veterinary graduate to undertake a three-year program of research leading to a PhD degree.

The award will be for a maximum of £110,000.

The HSA wishes to encourage research in the areas listed below, but also welcomes other projects aimed at improving the well-being of animals that are farmed for food, during their transport, marketing, slaughter or killing for disease control and other welfare reasons.

These include:

- development of improved or novel methods of stunning animals
- refinements in electrical stunning of turkeys, ducks and geese
- improvements in fasting, handling, transport and slaughter procedures for fish
- refinement of existing, or development of novel, methods of assessing states of consciousness, enabling correlations of neurological activity with animal behavior and physiology
- refinements to electrical stunning methods, to improve both animal welfare and meat quality.

Applications are invited from veterinary students that will graduate shortly, or veterinarians who have graduated recently, particularly if the university has a UFAW/HSA University 'LINK' person (see [www.ufaw.org.uk/links-news-events.php](http://www.ufaw.org.uk/links-news-events.php) for more information, or to enquire about becoming a LINK person for your university).

Applications for this award will be a two-stage process. Initially, supervisors are required to submit a brief concept note by Wednesday 19 November, 2014. The concept note application form is available to download from [www.hsa.org.uk](http://www.hsa.org.uk), or on request from: [info@hsa.org.uk](mailto:info@hsa.org.uk).

Following assessment of these concept notes, selected applicants will be invited (in mid-December 2014) to submit a more detailed proposal prepared jointly by the supervisor and the PhD candidate. These completed detailed proposals must be submitted to the HSA by Friday 23 January 2015.

Humane Slaughter Association,  
The Old School, Brewhouse Hill,  
Wheathampstead, Hertfordshire AL4 8AN,  
UK. Tel: +44(0)1582 831919;  
Fax: +44(0)1582 831414.  
Registered in England, Charity No. 209563.

For a HSA document on humane transport and slaughter of food fish, go to:

<http://www.hsa.org.uk/downloads/related-items/harvesting-of-fish.pdf>

And other documents are available to download from this HAS site:

<http://www.hsa.org.uk/publications/printed-publications>



**Humane Slaughter Association**



# THE AQUATIC VETERINARIAN

Volume 8, Number 3

WAVMA SPONSORS

Third Quarter 2014



## FishVet Group

TOTAL AQUACULTURE HEALTH

**Established in 1995 to provide veterinary health services for fish farming operations around the coast of Scotland, we have since grown into the world's largest dedicated aquaculture health provider with a footprint on three continents.**

Core to our growth and success is our Total Aquaculture Health offering. This holistic approach to the prevention, diagnosis and treatment of disease in aquaculture, combined with our extensive clinical experience, allows us to provide strategic health management advice – from farm through to boardroom level.

Our global team is made up of leading veterinary surgeons who work alongside a multi-disciplinary unit of diagnosticians, biologists and environmental scientists to provide on-farm clinical services.

Our world-class lab network provides histopathology, bacteriology, virology and qPCR/PCR diagnostic services.

In addition to our aquatic health services, our operations in Scotland, Ireland, Norway, Thailand and the US also offer a comprehensive range of training, environmental and advisory services across all areas of aquatic animal production.

Find out more about our products and services email: [enquiries.na@fishvetgroup.com](mailto:enquiries.na@fishvetgroup.com)

#### Our Locations:

22 Carsegate Road, Inverness,  
Scotland IV3 8EX

350 Commercial Street, Portland,  
Maine, United States

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Oranmore, Co. Galway, Ireland

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10210 Thailand



[WWW.FISHVETGROUP.COM](http://WWW.FISHVETGROUP.COM)