



Aquatic Vet News

World Aquatic Veterinary Medical Association

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WAVMA-Certified Aquatic Veterinary General Practitioner (Cert-AqVGP) Program

WAVMA is developing a Program that recognizes and certifies veterinarians that have core competencies in aquatic veterinary medicine as "WAVMA-Certified Aquatic Veterinary General Practitioners". Before implementing this Program the WAVMA Practitioner Credentialing Committee seeks comments from WAVMA members.

The Committee is developing this Program by: 1) identifying the core competencies needed by a veterinarian to practice aquatic veterinary medicine; 2) identifying and evaluating existing education programs suitable for core competencies; and 3) evaluating the credentials of applicants.

Many academic veterinary curricula lack a focus on aquatic veterinary medicine. For many clients, aquatic animal industries, governments and the public, simply having a veterinary degree and being licensed or registered by a national or state/provincial veterinary body (e.g. RCVS, State/Provincial Boards of Veterinary Medical Examiners, etc.) to legally practice veterinary medicine, are insufficient for recognizing aquatic veterinary competency.

Currently there are a variety of opportunities for veterinary students and veterinarians to obtain the appropriate education, knowledge, skills and experience to competently practice aquatic veterinary medicine. However, no program currently exists to identify the core competency areas needed to practice aquatic veterinary medicine, or recognize those practicing veterinarians that have the core, or "day-one" education, knowledge, skills and experience in aquatic veterinary medicine.

Specifically we seek comments on the WAVMA Cert-AqVGP Program's intent to:

1. Identify the core or basic veterinary knowledge, skills and experience (KSEs), above and beyond a veterinary degree, needed for veterinarians to practice clinical aquatic veterinary medicine and surgery;
2. Develop a Cert-AqVGP credentialing system that will recognize aquatic veterinarians based on assessment of the applicant's knowledge, skills and experience in aquatic veterinary medicine (KSAs).

Please send your comments or suggestions about the Cert-AqVGP Program to: WAVMA_Cred_Cmte@mailhost.wavma.org.

Table of Contents

<u>Front Page News</u>	1
<u>Editor's Note</u>	2
<u>Executive Reports</u>	3
<u>WAVMA Committees</u>	5
<u>Listserv Letters</u>	12
<u>Literature Review</u>	14
<u>Colleague's Connection</u>	18
<u>Clinical Reports</u>	20
<u>Emerging Issues</u>	22
<u>Legislative & Regulatory Issues</u>	24
<u>Aquatic Veterinary CE & PD</u>	26
<u>Aquatic Veterinary Opportunities</u>	31
<u>Membership Application</u>	33
<u>Contact Corner</u>	34
<u>Executive Board and Committee Chairs</u>	34

Click on topic to skip to that page



Aquatic Vet News

World Aquatic Veterinary Medical Association

Editor's Note

It is the beginning of a new year and now all our memberships to professional organizations require renewal. It can take a large chunk of change to pay the dues to each organization, especially all at the same time, but it is important to look at the benefits one derives from membership to these professional organizations, such as the World Aquatic Veterinary Medical Association. You will read in the President's Report and in the Secretary's Report, as well as elsewhere in this issue, about many of the benefits from belonging to WAVMA. To put this in perspective, I am copying an article that was originally published in the first issue of the American Fisheries Society's newsletter *Fisheries* (Vol 1, No 1, Jan-Feb 1976, p 29). It is a very interesting point of view. I also did a little research and updated their list to add the dues now payable in 2011 for each of the organizations. As you will see, WAVMA membership is still a great deal!

"Concern about increasing membership costs has been expressed by a number of members. In light of expanding demands on everyone's dollar, this concern is not surprising nor is it illogical. In order to view AFS dues in better perspective, we have made the following comparison with other natural-resource oriented societies and associations. In reviewing this list please bear in mind that no two organizations offer the same services and thus a direct dollar comparison may be quite misleading. It is quite common, however, for additional charges to be levied for subscriptions to ancillary publications."

Organization	Dues:	2011 1976	2011 Full	2011 Student
American Fisheries Society	\$20	80	20	20
Am Soc Ichthy & Herpetologists	\$15	100	45	45
Am Soc Limnology & Ocean	\$20	215	40	40
National Rifle Association	\$10	35	15	15
Soil Conservation Society	\$15	80	25	25
American Geophysical Union	\$20	20	7	7
Marine Technology Society	\$20	75	25	25
Am Water Resources Assoc	\$21	165	30	30
Society of Range Management	\$23	70	25	25
Am Inst of Biological Science	\$25	110	65	65
Wildlife Society	\$26	69	35	35
American Geographical Society	\$30	65	65	65
Society of American Foresters	\$40	133	35	35
Soc of Landscape Architects	\$100	322	50	50
AVERAGE:	\$28	110	35	35
WAVMA		100	25	25

Articles Index

<u>WAVMA Cert-AVGP Program</u>	1
<u>Oceans Explorer's Symposium</u>	6
<u>Shark With Eye Injury</u>	12
<u>Case of the Crooked Koi</u>	12
<u>Fish Reproduction Clinical Abstracts</u>	14
<u>Motivation for Becoming Aquatic Vet</u>	18
<u>A Case of Low DO</u>	20
<u>New Aquatic Health Facility</u>	22
<u>Disease Advisory Status of IMN</u>	22
<u>Resistance of Salmon to Sea Lice</u>	22
<u>Virus Causing CMS Identified</u>	22
<u>Aquariumania Podcasts</u>	23
<u>New Canadian Aquatic Regulations</u>	24
<u>CFIA Amends Regulations</u>	24
<u>USDA / FSIS Catfish Regulations</u>	24
<u>USDA Catfish Study</u>	25

Click on topic to skip to that page

Nick Saint-Erne, DVM
 Aquatic Vet News Editor
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Executive Reports

President's Report

I am taking this opportunity to present the membership with the 2010 WAVMA Annual Report, which will be our way of summarizing all that has happened during the past 12 months. This document will serve to help meet our requirements as a 501(c)(3) not-for-profit organization under U.S. IRS rules. It is also a way to address the full membership and demonstrate how we as an organization have advanced toward the goals we have espoused.

Executive Board Meetings: there were 11 Executive Board meetings held by conference calls during 2010, as well as countless separate discussions and strategy meetings.

Professional Meetings: there were six meetings that WAVMA participated in this past year: a) Aquaculture America in San Diego, b) the SAVMA Symposium (March 11-13, Madison, WI USA), c) IAAAM (May 8-13, Vancouver, Canada), d) WAVMA Annual Conference (July 12-14, Athens, Greece and CEPD Cruise Greek Islands), e) AVMA Convention (July 31-Aug 3, Atlanta, GA), and f) International Symposium on Aquatic Animal Health (Sept, Tampa, FL).

WAVMA Brochure: the cover of our promotional brochure was redesigned to reflect a more modern look featuring our new logo. Available as a digital file on our website, we were also able to have printed copies at the meetings throughout the year.

Strategic Collaborations: Several collaborative efforts were advanced through various stages of completion in 2010. Amongst these were: a) joint meetings between members of the online Veterinary Information Network and WAVMA members to explore further cooperation with VIN in developing an aquatic veterinary section to the VIN website, which could be accessed by WAVMA members, b) WAVMA/AVMA Aquatic Veterinary Promotion and Outreach: a completed agreement enabled WAVMA to streamline movement of our educational and promotional booth, at greatly reduced cost, to meeting venues. It also opened the door to additional cooperative ventures between our group and the AVMA.

WAVMA Merchandising: We continue to have both polo shirts and self-stick logo decals available for sale to the membership.

WAVMA Scholarship Committee: The committee formed, conducted several meetings, was funded and then awarded several scholarships to vet students at our AGM in Greece.

WAVMA Aquatic GP Certification Program: The Executive Board is working on a program for certifying veterinarians with advanced knowledge and training in Aquatic Veterinary Medicine to allow recognition of their expertise.

WAVMA Administrative Policies & Procedures Manual: As an guide to incoming and future members of the Executive Board, a manual was begun which outlined the responsibilities and procedures to follow, including time-lines.

WAVMA Student Committee: We are excited to have had an active Student Committee form in 2010, and look forward to their assistance in WAVMA activities.

WAVMA Facebook Page: Keeping up with the times, our Student Committee had developed a Facebook page on the internet. Be sure to sign in and "Friend" us.

WAVMA Application for Membership in WSAVA: We were pleased to respond positively to the invitation to become a member organization of the World Small Animal Veterinary Association. The application process is proceeding.

New Website: Development continued with several beta version being tested. The new website will be active in early 2011.

New Technologies: Besides Skype for online meetings, WAVMA began using Go-to-Meeting and Dropbox as tools to more quickly and efficiently conduct the business of running our association.

WAVMA Budget and Finance Committee: The committee developed and presented the 2010 budget and the draft of the 2011 budget of our Association to the Executive Board. The Annual General Meeting Treasurer's report was also prepared and presented during the 2010 WAVMA AGM.

WAVMA Membership: At the beginning of 2010, the membership consisted of a total of 71 members (58 full members, 12 student members, 1 Allied Organization). As of the close of the year, this number had increased to 126 members (73 full members, 28 student members, 24 affiliated members, 1 Allied Organization). We expect it to continue to grow this year, as well.

Julius Tepper, DVM

2011 WAVMA President

cypcarpio@aol.com

2010 Secretary's Annual Report

2010 was a good year for WAVMA. We gained many new members, had a very successful annual conference in Athens, Greece, established a very active Student Committee, added a presence on FaceBook, made provisions for student scholarships, had excellent information exchange through the members listserv (over 60 topics), responded to several consultations including one initiated by the Canadian Department of Fisheries and Ocean, as well as the development of further projects of benefit to WAVMA members, such as the initiation of collaboration with the AVMA Aquatic Veterinary Medicine Committee (AqVMC). Collaboration with the AVMA AqVMC will benefit both organisations by decreasing the cost of exhibiting at veterinary meetings through shared costs, and by helping to further develop the AquaVetMed.info website, with further initiatives in the pipeline.

Secretary's Report

With luck, by the time you read this report, the new WAVMA website will be public (or at least a large chunk of it). The site is divided in to seven areas, some parts of which will be public and others that will be members-only. Two key website areas are Membership and Educational Opportunities. The Membership area will allow members to update their details, pay dues and access other areas of the website through a password log-in. The Educational Opportunities area provides some of the most important membership benefits, such as access to WAVMA presentations, webinars and hopefully later on in the year, the certificate of aquatic veterinary general practitioner (Cert-AVGP) that is under development.

How good these resources will be is dependent on who contributes to them and, as ever, please consider providing content that you feel will be of benefit to other members. Remember that one of WAVMA's key purposes is to provide a forum for the dissemination of knowledge and discussion between aquatic veterinarians and students around the world so clinical observations and appeals for further information are as valid as that peer reviewed, statistically robust paper you want an easy route to publish to a key audience. I have discovered over the past three years that the gain far outweighs any pain in contributing.

A constant issue is where to find the funds to allow WAVMA to develop into the type of association it would like to be. It is clear that dues alone cannot provide sufficient income unless we have several thousand members and whilst sponsorship is very welcome, there are few companies to ask. It is unfair to keep tapping into the limited streams of sponsorship available for aquatic veterinary organisations, as this may affect national or

regional groups, which is not WAVMA's intent.

WAVMA's aim is to work synergistically with these groups to promote aquatic veterinary medicine and the By-laws were designed to allow WAVMA to operate as an international umbrella organisation for national or regional groupings acting as "chapters". To date, we have somewhat failed to achieve an independent income stream and support for other veterinary organisations (except through consultations), but potentially the website could address both issues by developing income streams, providing a resource that other groups would like to access and providing some reward to those who contribute.

An example would be how Webinars could work – providing a specific target for sponsorship (e.g., a vaccine presentation sponsored by a vaccine company), an archive of cutting edge information available to WAVMA members and other interested parties, and through charging non-members for access, potentially an income stream and financial reward for the presenter of the webinar. All food for thought!

Chris Walster BVMS MYPH MRCVS

WAVMA Secretary

chris.walster@onlinevets.co.uk

WAVMA New Members

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

Full Members:

John Copland
Julie Cavin
Jena Questen
John McArdle
Elizabeth Lawrence
Dawn Buhrow

Student Members:

Stephen Richley
Danielle Lipson
Keiko Hirokawa
Alice Bugman
Trista Welsh
Hillary Braverman
Robert Martinez
Sophie Whoriskey

2010 Treasurer's Annual Report

Dr Dušan Palić continued treasurer's responsibilities during 2010, after being re-elected elected as Treasurer of the Association in 2009 and continues to keep accounts of the organization in order. Dr Nicholas Saint-Erne will be taking over as a 2011 Treasurer.

Overall finances:

American Bank and Greater Iowa Credit Union accounts (Savings and Checking account) remained in effect in 2010. As of Dec 31st, 2010, WAVMA accounts had combined funds in the amount of US\$ 10,071.98.

Total expenses for the past year were \$12,870.56 with major expense categories being the annual general meeting costs, accountant, bank and legal fees, and web site maintenance.

Budget development:

The Treasurer of the association and two WAVMA members (Dr Fotini Athanasopoulou and Dr Julius Tepfer) currently staff the Budget and Finance Committee. The Treasurer presented the 2011 budget for Executive Board approval and the discussion is ongoing.

Administrative submissions:

The Law Firm continues to assist the WAVMA in filing appropriate forms with the Internal Revenue Service to request Tax Exempt 503c(6) status. The Accounting Company has been consulted in 2009 tax year preparation and the 2009 tax application was submitted to the IRS. The 2010 Tax year preparation is ongoing.

Complete documentation is available for review upon request from the Executive Board.

Best Regards,

Dušan Palić, DVM
2010 WAVMA Treasurer
dulep@iastate.edu

Nick Saint-Erne, DVM
2011 Treasurer
Saint-Erne@Q.com

WAVMA Committee Reports

Communications Committee

Committee Members:

Devon Dublin, Krystan Grant, Kirstin Kamps, Nick Saint-Erne, David Scarfe, Chris Walster, Peter Werkman

Website:

New areas (e.g., Member Database, WAVMA e-News, Web CEPD, Publications & Abstract Database, Podcasts/Webcasts, Picture Library) are under construction. Content is currently being added to the member-only and public pages on the new website.

New member database with automated member dues reminder/payment systems needs to be tested with the Treasurer (as administrator); the new system will allow members will be able to access their profile and update their contact and other data.

Listserves:

Members-L is working well and generating good discussion. The Student-L is not being actively used, yet.

Facebook:

Facebook is public and is a good tool to promote aquatic vet med and encourage new membership. The WAVMA Facebook now has ~190 "friends."

We are developing a new message system to encourage WAVMA members and others to contribute information to the Facebook page.

Vet School Communications:

We are developing a list of vet school contacts to which we can send the Newsletter.

Newsletter:

Volume 5 (1) was unfortunately delayed due to computer crashing. A new hard drive was installed and back-up data retrieved – a little late but fully functional.

Please join the Communications Committee members to help with any of the above activities – Students are Welcome too!

Nick Saint-Erne, DVM 2010 Chair
Saint-Erne@Q.com

David Scarfe, DVM 2011 Chair
dscarfe@ameritech.net

Meetings Committee Annual Report

2010 has been a very progressive year for the Meetings Committee. Given the increasing cost and difficulty for our organization, as well as our members, to physically meet in varied venues, we still saw several great meetings take place. We had members in attendance in March 2010 at the

SAVMA meeting at the School of Veterinary Medicine, University of Wisconsin-Madison. In May, at the International Association for Aquatic Animal Medicine meeting in Vancouver, British Columbia, Canada, we co-sponsored a terrific full day Fish Health Wet Lab, instructed by our members and well-attended by students and vets from the U.S., Europe and Asia. This was followed up the next day with a roundtable discussion of current aquatic veterinary issues. A catered meal provided additional incentive for about 25 attendees to be there and participate in a lively discussion.

Our own conference and Annual General Meeting was organized and held in Athens, Greece, in July, followed by a CEPD cruise around the Greek Islands. It was a wonderful experience both scientifically and personally, having had the opportunity to meet many of the current Executive Board and general members for the first time. July also saw our presence at the American Veterinary Medical Association Convention with several of our members participating in continuing education sessions and staffing our booth.

The WAVMA booth was also exhibited at the 6th International Symposium on Aquatic Animal Health in Tampa, Florida in September. Thanks to the collaborative agreement between WAVMA and the AVMA AqVMC, both organizations will continue to benefit greatly by decreasing the cost of shipping and displaying educational booths at veterinary meetings.

In keeping with our desire to present our organization as a truly international one, we will also be present at the World Veterinary Association's WORLD VETERINARY CONGRESS 2011, to be held in Cape Town, South Africa from October 10-14. The theme "CARING FOR ANIMALS: HEALTHY COMMUNITIES" lends itself to fulfilling a global need and sets the scene for a varied, stimulating, multi-session scientific and professional program, catering to the diverse needs of a multi-disciplined veterinary profession.

From my planning point-of-view, I would be most interested in hearing from you, the membership. Feel free to contact me, about WAVMA participation in Veterinary meetings.

J. M. Tepper, DVM
Meetings Committee Chair
cypcarpio@aol.com

Ocean Explorers Symposium 2011

I was fortunate to represent WAVMA on January 29th at the University of Pennsylvania's Ocean Explorers Symposium. The symposium was held at the School of Veterinary Medicine and focused on threats to the biodiversity of aquatic ecosystems. It was a great day filled with exciting and informative lectures and discussions.

The first lecture was given by Janey Whaley, DVM of NOAA National Marine Fisheries Service; the lecture focused on marine mammal threats and emphasized the various roles a veterinarian can play in these important issues.

Dr. Judith Pederson from MIT Sea Grant College discussed ecological interactions between marine invaders and native species. Erica Miller, DVM from Tri-State Bird Rescue detailed the various veterinary contributions to the Deepwater Horizon oil spill. Dr. Tom Simms from the University of Delaware reviewed the Chesapeake Bay and the innovative watershed management used to improve its health.

The final lecture by Dr. David Gallo from Woods Hole Oceanographic Institute was a very interesting presentation on deep ocean exploration. Given that 70% of the earth is covered with ocean and 50% of the oxygen we breathe is derived from it, ocean conservation is a very important topic. This was a great symposium for WAVMA to sponsor, with an intriguing combination of aquatic medicine, ecology, biodiversity and conservation.

Brian Palmeiro, VMD, Diplomate ACVD
Lehigh Valley Veterinary Dermatology & Fish Hospital
www.lehighvetderm.com
www.pettishdoctor.com

WAVMA is now on Facebook!



Assisted by the WAVMA Student Committee, WAVMA and aquatic veterinary medicine is being actively promoted on Facebook.

Become a WAVMA "friend" and feel free to post information useful for other veterinarians, veterinary students, and inform the public about what aquatic veterinarians do.

Simply go to www.facebook.com and search for "WAVMA"

Student Committee

With the beginning of 2011 came some big changes and additions to our services that we're offering veterinary students. The most notable change is that we have decreased the WAVMA student membership fees to \$25 a year. This decision came to make membership more affordable to students and to encourage students to join earlier on in their education rather than only in their senior year. In addition to the services we currently offer students, members in good standing during their graduation year will receive a 50% discount on membership the year after graduation. Please feel free to share this news with any students you know who may be considering joining WAVMA.

Our newest addition to student services is the trial period of a formal mentorship program. We want to work towards matching up students and practicing veterinarians with similar interests to help facilitate professional growth for our students. Currently we are looking for volunteers for both veterinarian mentors and student mentees for a 6 month program. Please see our ad on page 9 for more information.

The Student Committee also continues to support WAVMA's Facebook page. If anyone has announcements or upcoming conferences they would like to see added to the page, please send us an email with the details and we will take care of it for you.

Additionally we have welcomed another member to our committee. Samara Parker is a student at Atlantic Veterinary College in Canada and we are very happy to have her join us.

Remember that this space is reserved for us. Feel free to send us information on any topic that you consider interesting or important. It could be summer courses, training programs, current research, and case studies; in short, anything.

Also you can simply send us a biography and a photo and we can feature you in the "Meet the Students" section. The student committee will accept submissions for each newsletter by February 5, May 5, August 5 and November 5th. Contact us at:

WAVMA_Student_Cmte@mailhost.wavma.org.

Kirstin Kamps

Student Committee Chair

Meet the Students



Kirstin Kamps outside California Senator Boxer's office after a meeting during her AVMA Government Relations Division Externship

Kirstin Kamps is the current chair of WAVMA's Student Committee. She received her Bachelor's of Science degree in Marine Biology from the University of California Santa Cruz. After school she worked doing lobster settlement research in Maine, kelp forest ecology research with the Channel Islands National Park and conducted recreational fishery surveys in San Diego, CA.

She made the decision to apply for veterinary school after coming to the conclusion that commercial fishing could not continue to supply the growing international market demand for seafood.

While in veterinary school at Western University of Health Sciences in Southern California, she has spent her spare time attending courses and conferences seeking additional training in aquatic veterinary medicine. With graduation rapidly approaching in May 2011, she is applying for jobs in a variety of fields, including laboratory animal medicine and post-doctoral research positions, with the hopes that she will be able to continue in the field of aquatic medicine.

Scholarship Committee Reports

The following 3 reports are from veterinary students who have received a 2010 John L. Pitts Veterinary Student-Recent Graduate Scholarship:

Véronique LePage (DVM, 2010)
University of Guelph, Canada

This year, the John L. Pitts Veterinary Student-Recent Graduate Scholarship Award has allowed me to travel to Vancouver, Canada for the International Association for Aquatic Animal Medicine conference in order to present my work on the investigation of bilateral myopathy in Syngnathids. Attendance at aquatic animal health conferences such as the World Aquatic Veterinary Medical Association, International Association of Aquatic Animal Medicine, Eastern Fish Health Workshop, and others, allows veterinarians to sharpen their knowledge, promote oneself as a professional with interest in aquatic animal medicine, and meet a variety of people who are well established in this industry.



For me, such an experience has helped to create opportunities that I never thought possible. Through meeting professionals at these conferences, I acquired veterinary rotations at the Georgia Aquarium, Vancouver Aquarium and the Georgia Sea Turtle Center. I also had the opportunity to talk to veterinarians with different careers in aquatic animal medicine and have since considered the many options available to me, such as an aquatic animal residency, internships, and job opportunities across the globe.

I participate in this program as 4th year veterinary student and I am also completing a Masters Degree in Comparative Pathology at the Ontario Veterinary College in Canada. To date, my research project has allowed me to discuss with others and investigate many interesting problems observed in Syngnathids across aquaria internationally. Some of these issues include a suspect nutritional myopathy and an erosive to ulcerative bacterial dermatitis.

My ultimate career goal is to acquire employment in the area of aquatic animal medicine and contribute to conservation medicine. To accomplish this requires a great deal of dedication, motivation, exposure and great mentors.

Syngnathidae is the family of fish which includes seahorses, seadragons and pipefish. Wild Syngnathid populations are on a decline from over-fishing; increasing human populations fuel Syngnathid demands for aquaria, curios and traditional medicine. Captive rearing of seahorses has been practiced for decades and husbandry has since greatly improved, yet they still provide a serious challenge for aquarists. This is partly due to a scarcity in the number of peer-reviewed scientific papers on the biology, ecology and pathology of seahorses, seadragons and pipefish when compared to many other aquarium or aquaculture species.

As for many exotic species of fish, closing the life cycle can be very difficult and fish in captivity are often riddled with disease. In my diagnostic research, I chose to conduct a ten year retrospective study of Syngnathid diseases observed at the Toronto Zoo. The major findings include: dermatitis, bilateral myopathy, mycobacteriosis, gas bubble disease, cryptosporidiosis and neoplasia.

I would highly recommend applying for this scholarship if you have an interest in aquatic veterinary medicine. I would also like to thank everyone within the WAVMA association, the Pitts family and all of the other donors for creating these opportunities, opening so many doors for students like myself.

Timothy Jones (DVM Candidate 2012)
Cornell University, Ithaca, New York

During the months of June and July, 2010, I spent six weeks pursuing an externship at the University of Florida's Tropical Aquaculture Laboratory (TAL), working under Dr. Roy Yanong, an extension veterinarian with the TAL and Associate Professor at the University of Florida. I was primarily looking to this experience as an opportunity to see a large number of cases so that I might gain practical skills in the diagnosis and treatment of fish. I was fortunate in obtaining this externship because Florida boasts a large industry in both the culturing and importation of (primarily) freshwater fishes for the aquarium trade.

The experience far outstripped my expectations, as the lab received a relatively constant case load throughout my stay, while I also had the opportunity to visit (and even work at) many farms in the area, and attend a few courses at which Dr. Yanong was lecturing. This meant that I was not only exposed to many cases, allowing me to hone my skills at necropsies, external and internal parasite identification, and bacteriology, but I was also afforded the chance to meet people who were working in all aspects of the field, including other veterinarians, fish culturists and farmers.

I also had the opportunity to meet researchers, including Dr. Jeff Hill, who studies non-native species and their impacts upon the ecology of Florida. Some of the visits I made included 5-D Tropical Fish Farm, Oceans, Reefs & Aquariums, the Mote Aquaculture Laboratory, and the Tampa International Airport to aid a USDA veterinarian inspecting incoming shipments of fish. These visits allowed me to see many different fresh and salt water life support systems and gain an appreciation for environmental and husbandry problems that may plague holding facilities.

An externship at the TAL would not only benefit a student or veterinarian interested in aquaculture. The experience I gained at the TAL would be applicable to all manner of aquatic animal health settings such as aquaculture, private fish practice, public aquaria, or at research institutions. The training I received in accurate history taking, parasite identification, performing systematic necropsies, and other essential skills will be invaluable to me in any field involving aquatic animals. Opportunities such as these only continue to cement my desire to integrate aquatic animals into my career as I move towards graduating in the next two years.

I am deeply grateful to the committee for selecting me as a recipient of this scholarship and would like to extend a special thanks to Dr. Roy Yanong, Debbie Pouder, Dr. Jeff Hill, and Dr. Nicole Stacy, all of the University of Florida. In addition, I would also like to thank Dr. Kathleen Hartman (USDA-APHIS) and Dr. Genevieve Dumonceaux of the Florida Aquarium.

WAVMA Mentoring Program

Purpose: To provide an opportunity for student members to be guided and advised by full members of the organization in their pursuit of a career as an Aquatic Veterinarian.

Duration: minimum of 6 months Mentorship



Are you interested in being a Mentor?

Would you like to apply to be a mentee?

Do you wish to receive additional information?

Contact us at:

WAVMA_Student_Cmte@mailhost.wavma.org

Jonas Vaitkus (DVM Class of 2013)
Virginia-Maryland Regional College of Vet Medicine

I received the WAVMA student scholarship award before entering my second year of veterinary school. I am tracking small animal, but have a deep interest in exotics and aquatics. Throughout my first year of school, I wondered how it would be possible to find practical veterinary opportunities to work and expose myself to those branches of the veterinary field. Thankfully, I found a poster advertising an aquatic medicine course located at the LSU campus called AQUAMED. I applied immediately, and later was informed that I had been selected as one of the course participants.

AQUAMED took place over a month's time and covered a vast amount of material including water quality, biopsy and necropsy procedures, bacteriology, virology, anatomy, parasitology, marine mammal anatomy and medicine, alligator anatomy and medicine, and shrimp aquaculture.

The very first topic we covered was water quality, and we set up our own 10 gallon aquariums with goldfish so that we could manage the nitrogen cycle for the month. Every morning we would test for several parameters and make adjustments as needed. We also gained experience with several species of parasites, including Ich and treated accordingly. A typical day started with water quality measurements around 8 am, followed by lectures from 9 until 2 pm, at which time we then went into the lab.

Typically, we had one to two field trips per week as well. Some of our destinations included the Audubon Aquarium of the Americas in New Orleans, a catfish processing plant, a tilapia farm, and two koi farms. It was an unbelievable experience for me, since I was able to get a behind the scenes look at the aquarium, as well as learn many of the concepts of aquaculture. I also gained hands on experience with animals that I might never have been able to examine, otherwise.

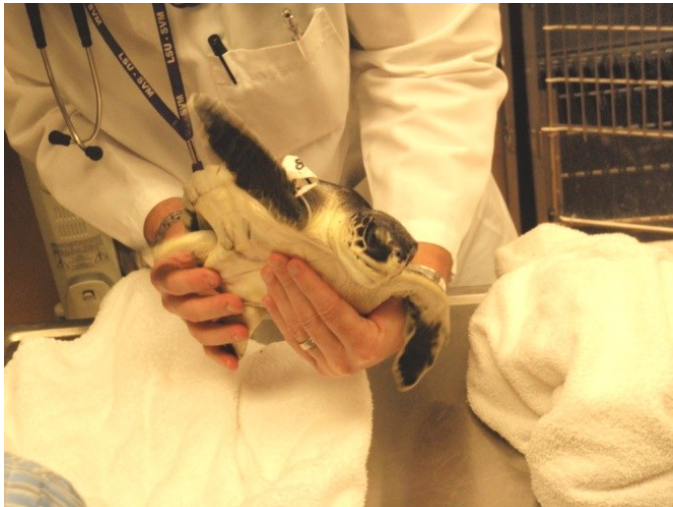
The timing of the course was very interesting, since we were in the Gulf during the height of the oil spill and saw firsthand some of the destruction stemming from it. Many of us took the opportunity to volunteer and help some of the various oiled-animal rescue centers. We also watched hurricane Alex sweep towards us and cut our trip to the LUMCON facility short.



Though our days felt very long at times, one of the highlights of each day was going into the lab to practice procedures and get our hands on specimens. We had a week's worth of bacteriology in which we cultured and isolated four separate organisms and then used various bacteriological tests and media to identify those organisms. Since bacteriology is a second year class at VMRCVM, it was very beneficial to receive an overview to prepare for my upcoming semester. We confirmed the identities of our bacterial unknowns using the API20E test kit. Other labs included anatomy of fish, marine mammals and alligators, PCR gel electrophoresis, case studies, as well as fish venipuncture and anesthesia.



Many times as a student, I find that I am biased as to what species I wish we could learn about and often lament about learning about those which I have less interest in. This course was a month-long delve into many different species that peaked my curiosity. Having the opportunity to wrangle and hold a live alligator literally was a personal highlight. I have learned where to draw blood from fish and alligators. I have been exposed to MS 222 dosing and how to sedate a fish before performing a physical exam. The list of things I have learned goes on and on.



I would truly recommend this course to any student or doctor who has even the slightest bit of curiosity about aquatics. I want to thank Dr. Thune and Dr. Hawk of the LSU SVM for accepting me into the program and for how they conducted it. I also want to thank WAVMA for their financial support through the Pitts Scholarship, and for welcoming me into the world of aquatic medicine. I hope you have enjoyed hearing about my experiences. I know that it was a once in a lifetime opportunity for me and I am very glad I to have taken part.

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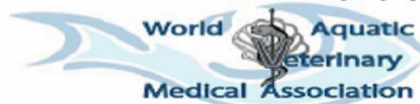


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ListServ Letters

The following case summaries were compiled from our WAVMA member listserv discussions. Complete cases are encouraged to be submitted as a case report for publication in the AVN; however many discussions offer information worthy of sharing (again) and archiving in the newsletter.

Shark With Eye Injury

A 3 m female grey nurse shark (*Carcharias taurus*) from a public aquarium presented with an eye lesion. She sustained a traumatic injury to both eyes, however the left eye was more severely affected. She has been residing in this same aquarium for the last 25+ years. The tank is 4m deep and holds 3 million litres. There have been no changes in the aquascaping, water flow/pumps, etc for many years. Other fish in the tank include 5 other grey nurse sharks, a couple of turtles, some smaller reef sharks, snapper, etc.

Initial clinical signs included corneal opacity which progressed to redness. One week later (Fig. 1), Oxytetracycline (PO) and Meloxicam (PO) were started. Her condition improved (became more active and eating better); however, a second traumatic event was suspected



Fig. 1.
Left eye
one
week
after
initial
clinical
signs.

to have occurred one month after initial presentation (Fig. 2). During this examination, it was suspected that the shark was blind as she was not reacting to light and bumping into objects while swimming. She is normally a placid fish, but never handled. And she continued to eat well and maintain steady buoyancy control while preferring to hang at mid-water level.

The lesion is described as buphthalmia and hyphaema with corneal lens opacity and periorbital swelling. Although there is likely a traumatic component, it is difficult to ascertain whether or not the vision problems were prior to the trauma. Some differential diagnoses and/or etiologies considered in this case included cataract, luxated lens, hypersaturation, parasites, changes in Ozone or UV, or by-products of disinfection.

Fig. 2.
Left eye
one
month
after
initial
clinical
signs.



In the interim, it was decided to assist the shark in adjusting to her lack of vision by using clickers at a dedicated station for feedings, place air stones at the base of fixed objects, and supply dripping or flowing water at the surface above obstacles. It is likely that, after being in the same exhibit for over 25 years, she will be able to negotiate objects in the tank; however motion and/or auditory cues may help her during the transition of vision loss.

Special thanks to Drs. **Richmond Loh**, **Ed Latson**, and **Donald Stemme** for their contributions to this case.

Case of the Crooked Koi

An 18-inch (total length when straight) koi presented with a crooked back. It was housed in a 100-gallon tank with three tank-mates for 13 years. When the four koi were introduced to the tank they were 15-16 inches total length. The tank was in a basement and water temperature ranged from 55-68 F (13-20 C). All of the koi appeared to have below average body condition. Nine months prior to presentation they had been switched to Hikari koi pellets, and for the previous three years they were on Purina AquaMax.

For thirteen years the fish had an unremarkable existence from a disease stand-point. There have been no new fish introductions. Six weeks prior to presentation the owner noted spinal curvature in one of the four koi. Three weeks later spinal curvature was noted in two more of the tank-mates, leaving only one of four that appeared unaffected. The spinal curvature progressively worsened and, two days prior to presentation, one of the most severely affected koi died. Figure 1 shows the most severely affected of the remaining fish.

Differential diagnoses included:

Vitamin C deficiency can result in spinal fractures, but perhaps in the indoor environment, Vitamin D deficiency could result in low calcium in the bones, making them soft.

Vitamin E deficiency, selenium, or rancid fats from improper storage, shipping or handling of food.

Not having natural growth of algae and bugs that would occur in an outdoor pond would make the basement denizens dependent on all the nutrients in a commercial food. Normally in a case like that, it is recommended using multiple types of food and alternating to ensure complete nutrition.

Electric shock (lightning strike not likely in the basement) from a short circuit in a pump or light fixture may cause muscle contraction resulting in spinal trauma, but this seems less likely in this case.

There are some reports of organophosphate toxicity causing seizures affecting the spine, but unless the water was recently treated with Trichlorfon that is also not likely.

Physical trauma from handling (or dropping) or jumping could cause spinal fractures or compression, but unless the fish were recently caught it is not likely to occur in multiple fish at one time.

Possible neurologic injury causing the dorsal muscles to contract, a progressive contracture, resulting in the deformity.



Fig. 1.
Koi with a crooked back. This is the most severely affected fish of those remaining.

There was no history of physical trauma and electric shock was unlikely in this case. A nutritional etiology was most considered. Unfortunately, the fish died. A necropsy was performed (Figure 2). The koi may have been dead in the tank for up to six hours. The scales were slightly raised, otherwise there were no significant skin lesions. The day before there was a note of slight hemorrhage on the skin, but upon necropsy there was no evidence of hemorrhage.

The muscles on the left side were filleted. The cranial half of the epaxial muscle was below average in condition, but the caudal half was even more under conditioned. Strikingly, all of the muscle tissue was very trans-



Fig. 2.
Necropsy of koi with crooked back.

lucent, clear fluid escaped from the muscle as it was cut and the muscle tissue had the appearance and consistency of gelatin that is allowed to warm to room temperature (an unrefrigerated runny aspic).

The vertebral column was palpated and, as it appeared, there seemed to be a gradual curvature - no abrupt malpositioning or breaks of adjacent vertebrae. The appearance of the vertebrae was striking in that less than 20% of the bony tissue had the normal opaque appearance expected, instead the vast majority of the vertebral bony tissue was remarkably translucent. The density of the bone tissue appeared to be very low, and probing with a forceps tips felt more like cartilage than bone. There was no evidence of masses.

Internally there was no fat and there were extensive adhesions throughout the coelomic cavity. The koi was female. The internal organs were smaller and darker than normal for a koi of its length, otherwise no significant lesions were noted.

Further investigation regarding the diet revealed that the owners purchased the Hikari feed 16 months prior to the onset of signs. The opened feed was stored in a dark, cool location and lasted two years. The original Vitamin C, ascorbic acid, had a short shelf life (maximum 6 months), and was extremely labile when exposed to air or heat or light.

Most commercial fish foods today use L-Ascorbyl 2-polyphosphate, which is more stable, can be heated in a food extruder, and will last 2 years in a sealed bag, but up to a year once the bag is opened. A 2-year-old bag of food is likely vitamin C deficient. Anecdotally, vitamin C has been administered at 50-100 mg/kg IM q72h to the remaining fish. Clients should be advised to buy food that their fish will consume within 4-6 weeks. An opened bag, even with a seal, would likely become deficient in vitamin C if stored for too long.

Special thanks to Drs. **Myron Kebus, Nick Saint-Erne, Renate Reimschuessel, Helen Roberts, Chris Walster,** and **Jim Brackett** for their contributions to this case.

Literature Reviews / Abstracts

Fish Reproduction Clinical Abstracts

Contributed by A. David Scarfe *PhD, DVM, MRSSAf*

Ovarian aromatase and estrogens: A pivotal role for gonadal sex differentiation and sex change in fish.

Guiguen Y, A Fostier, F Piferrer, C-F Chang. (2010)
Gen. & Comp. Endol., 165 (3):352-366.

Abstract

The present review focuses on the roles of estrogens and aromatase (*Cyp19a1a*), the enzyme needed for their synthesis, in fish gonadal sex differentiation. We extend the already well accepted hypothesis of an implication of estrogens and *Cyp19a1a* in ovarian differentiation to a broader hypothesis that would place estrogens and *Cyp19a1a* in a pivotal position to control not only ovarian, but also testicular differentiation, in both gonochoristic and hermaphrodite fish species.

This working hypothesis states that *Cyp19a1a* up-regulation is needed not only for triggering but also for maintaining ovarian differentiation and that *Cyp19a1a* down-regulation is the only necessary step for inducing a testicular differentiation pathway. When considering arguments for and against, most of the information available for fish supports this hypothesis since either suppression of *Cyp19a1a* gene expression, inhibition of *Cyp19a1a* enzymatic activity, or blockage of estrogen receptivity are invariably associated with masculinization. This is also consistent with reports on normal gonadal differentiation, and steroid-modulated masculinization with either androgens, aromatase inhibitors or estrogen receptor antagonists, temperature-induced masculinization and protogynous sex change in hermaphrodite species.

Concerning the regulation of fish *Cyp19a1a* during gonadal differentiation, the transcription factor *foxl2* has been characterized as an ovarian specific upstream regulator of a *Cyp19a1a* promoter that would co-activate *Cyp19a1a* expression, along with some additional partners such as *nr5a1* (*sf1*) or cAMP. In contrast, upstream factors potentially down-regulating *Cyp19a1a* during testicular differentiation are still hypothetical, such as the *dmt1* gene, but their definitive characterization as testicular repressors of *Cyp19a1a* would strongly strengthen the hypothesis that early testicular differentiation would need active repression of *Cyp19a1a* expression.

Oogenesis in teleosts: How fish eggs are formed.

E Lubzens, Young G, Bobe J & Cerdà J. (2010).
Gen. & Comp. Endol., 165 (3):367-389

Abstract

One of the major objectives of the aquaculture industry is the production of a large number of viable eggs with high survival. Major achievements have been made in recent years in improving protocols for higher efficiency

of egg production and viability of progeny. Main gaps remain, however, in understanding the dynamic processes associated with oogenesis, the formation of an egg, from the time that germ cells turn into oogonia, until the release of ova during spawning in teleosts.

Recent studies on primordial germ-cells, yolk protein precursors and their processing within the developing oocyte, the deposition of vitamins in eggs, structure and function of egg envelopes and oocyte maturation processes, further reveal the complexity of oogenesis. Moreover, numerous circulating endocrine and locally-acting paracrine and autocrine factors regulate the various stages of oocyte development and maturation.

Though it is clear that the major regulators during vitellogenesis and oocyte maturation are the pituitary gonadotropins (LH and FSH) and sex steroids, the picture emerging from recent studies is of complex hormonal cross-talk at all stages between the developing oocyte and its surrounding follicle layers to ensure coordination of the various processes that are involved in the production of a fertilizable egg.

In this review we aim at highlighting recent advances on teleost fish oocyte differentiation, maturation and ovulation, including those involved in the degeneration and reabsorption of ovarian follicles (atresia). The role of blood-borne and local ovarian factors in the regulation of the key steps of development reveal new aspects associated with egg formation.

Spermatogenesis in fish.

Schulz RW, LR de França, J-J Lareyre, F LeGac, H Chiarini-Garcia, RH Nobrega & T Miura. (2010)
Gen. & Comp. Endol., 165 (3):390-411.

Abstract

Spermatogenesis is a developmental process during which a small number of diploid spermatogonial stem cells produce a large number of highly differentiated spermatozoa carrying a haploid, recombined genome. We characterize morphologically the different germ cell stages with particular attention for the spermatogonial generations, including the stem cells and their specific capacity to colonise a recipient's testis after transplantation.

We propose a nomenclature for fish germ cells to improve the comparability among different teleost fish but also to higher vertebrates. Survival and development of germ cells depends on their continuous and close contact to Sertoli cells, and we review their multiple roles in the cystic mode of spermatogenesis seen in fish. We then discuss gene expression patterns associated with testis maturation.

The endocrine system of vertebrates has evolved as master control system over spermatogenesis. In fish, both pituitary gonadotropins LH and FSH stimulate gonadal sex steroid hormone production directly by activating Leydig cells. Information is reviewed on the effects of progestin, androgens, and estrogens on global testicular gene ex-

pression patterns (microarray analysis), and on the molecular mechanisms by which steroids regulate specific candidate genes (identified by subtractive hybridization approaches) during early stages of testis maturation. Moreover, progestin and androgen effects on spermiation and milt hydration are discussed. Sex steroids mainly act via receptors expressed by Sertoli cells. One type of response is that Sertoli cells change growth factor expression, which subsequently modulates germ cell proliferation/differentiation via mechanisms yet to be characterized. Finally, we review data on germ cell autonomous processes, mainly derived from loss-of-function mutant fish lines, before identifying a number of focus areas for future research activities.

Perspectives on fish gonadotropins and their receptors.

B. Levavi-Sivan, J. Bogerd, E.L. Mañanós, A. Gómez, J.J. Lareyre. (2010)

Gen. & Comp. Endol., 165 (3):412-437.

Abstract

Teleosts lack a hypophyseal portal system and hence neurohormones are carried by nerve fibers from the preoptic region to the pituitary. The various cell types in the teleost pituitary are organized in discrete domains. Fish possess two gonadotropins (GtH) similar to FSH and LH in other vertebrates; they are heterodimeric hormones that consist of a common α subunit non-covalently associated with a hormone-specific β subunit. In recent years the availability of molecular cloning techniques allowed the isolation of the genes coding for the GtH subunits in 56 fish species representing at least 14 teleost orders.

Advanced molecular engineering provides the technology to produce recombinant GtHs from isolated cDNAs. Various expression systems have been used for the production of recombinant proteins. Recombinant fish GtHs were produced for carp, seabream, channel and African catfish, goldfish, eel, tilapia, zebrafish, Manchurian trout and Orange-spotted grouper.

The hypothalamus in fishes exerts its regulation on the release of the GtHs via several neurohormones such as GnRH, dopamine, GABA, PACAP, IGF-I, norepinephrine, NPY, kisspeptin, leptin and ghrelin. In addition, gonadal steroids and peptides exert their effects on the gonadotropins either directly or via the hypothalamus. All these are discussed in detail in this review.

In mammals, the biological activities of FSH and LH are directed to different gonadal target cells through the cell-specific expression of the FSH receptor (FSHR) and LH receptor (LHR), respectively, and the interaction between each gonadotropin-receptor couple is highly selective. In contrast, the bioactivity of fish gonadotropins seems to be less specific as a result of promiscuous hormone-receptor interactions, while FSHR expression in Leydig cells explains the strong steroidogenic activity of FSH in certain fish species.

Neuroendocrinology of reproduction in teleost fish.

Yonathan Zohar, José Antonio Muñoz-Cueto, Abigail Elizur, Olivier Kah. (2010)

Gen. & Comp. Endol., 165 (3):438-455.

Abstract

This review aims at synthesizing the most relevant information regarding the neuroendocrine circuits controlling reproduction, mainly gonadotropin release, in teleost fish. In teleosts, the pituitary receives a more or less direct innervation by neurons sending projections to the vicinity of the pituitary gonadotrophs. Among the neurotransmitters and neuropeptides released by these nerve endings are gonadotrophin-releasing hormones (GnRH) and dopamine, acting as stimulatory and inhibitory factors (in many but not all fish) on the liberation of LH and to a lesser extent that of FSH. The activity of the corresponding neurons depends on a complex interplay between external and internal factors that will ultimately influence the triggering of puberty and sexual maturation. Among these factors are sex steroids and other peripheral hormones and growth factors, but little is known regarding their targets.

However, very recently a new actor has entered the field of reproductive physiology. *KiSS1*, first known as a tumor suppressor called metastin, and its receptor *GPR54*, are now central to the regulation of GnRH, and consequently LH and FSH secretion in mammals. The *KiSS* system is notably viewed as instrumental in integrating both environmental cues and metabolic signals and passing this information onto the reproductive axis. In fish, there are two *KiSS* genes, *KiSS1* and *KiSS2*, expressed in neurons of the preoptic area and mediobasal hypothalamus. Pioneer studies indicate that *KiSS* and *GPR54* expression seem to be activated at puberty. Although precise information as to the physiological effects of *KiSS1* in fish, notably on GnRH neurons and gonadotropin release, is still limited, *KiSS* neurons may emerge as the "gatekeeper" of puberty and reproduction in fish as in mammals.

Endocrine control of sexual behavior in teleost fish.

Arimune Munakata, Makito Kobayashi. (2010)

Gen. & Comp. Endol., 165 (3):456-468.

Abstract

Sexual behavior is one of the most profound events during the life cycle of animals that reproduce sexually. After completion of gonadal development that is mediated by various hormones, oviparous teleosts perform a suite of behaviors, often termed as spawning behavior. This is particularly important for teleosts that have their gametes fertilized externally as the behavior patterns ensures the close proximity of both sexes for gamete release, fusion and ultimately the production of offspring. As in other vertebrates, sexual behavior of fish is also under the control of hormones. Testicular androgen is a requirement for male sexual behavior to occur in most fish species that

have been studied. Unlike tetrapods, however, ovarian estrogen does not appear to be essential for the occurrence of female sexual behavior for fish that have their gametes fertilized externally. Prostaglandins produced in the ovary after ovulation act as a trigger in some teleosts to induce female sexual behavior. Potentiating effects of gonadotropin-releasing hormone in the brain on sexual behavior are reported in some species.

Under endocrine regulation, male and female fish exhibit gender-typical behavior during spawning, but in some fish species there is also some plasticity in their sexual behavior. Sex changing fish can perform both male-typical and female-typical sexual behaviors during their lifetime and this sexual plasticity can also be observed in non-sex changing fish when undergoing hormonal treatment. Although the neuroanatomical basis is not clear in fish, results of field and laboratory observations suggest that some teleosts possess a sexually bipotential brain which can regulate two types of behaviors unlike most other vertebrates which have a discrete sex differentiation of their brain and can only perform gender-typical sexual behavior.

Current knowledge on the melatonin system in teleost fish.

J. Falcón, H. Migaud, J.A. Muñoz-Cueto, M. Carrillo.
Gen. & Comp. Endol., 165 (3):469-482.

Abstract

Melatonin is a much conserved feature in vertebrates that plays a central role in the entrainment of daily and annual physiological rhythms. Investigations aiming at understanding how melatonin mediates the effects of photoperiod on crucial functions and behaviors have been very active in the last decades, particularly in mammals.

In fish a clear-cut picture is still missing. Here we review the available data on (i) the sites of melatonin production in fish, (ii) the mechanisms that control its daily and annual rhythms of production and (iii) the characterization of its different receptor subtypes, their location and regulation.

The *in vivo* and *in vitro* data on melatonin effects on crucial neuroendocrine regulations, including reproduction, growth, feeding and behavioral responses, are also reviewed. Finally we discuss how manipulation of the photic cues impact on fish circannual clock and annual cycle of reproduction, and how this can be used for aquaculture purposes.

Control of puberty in farmed fish.

Geir Lasse Taranger, Manuel Carrillo, Rüdiger W. Schulz, Pascal Fontaine, Silvia Zanuy, Alicia Felip, Finn-Arne Weltzien, Sylvie Dufour, Ørjan Karlsten, Birgitta Norberg, Eva Andersson, Tom Hansen. (2010)
Gen. & Comp. Endol., 165 (3):483-515.

Abstract

Puberty comprises the transition from an immature juvenile to a mature adult state of the reproductive system, i.e. the individual becomes capable of reproducing sexually for the first time, which implies functional competence of the brain–pituitary–gonad (BPG) axis. Early puberty is a major problem in many farmed fish species due to negative effects on growth performance, flesh composition, external appearance, behaviour, health, welfare and survival, as well as possible genetic impact on wild populations. Late puberty can also be a problem for broodstock management in some species, while some species completely fail to enter puberty under farming conditions. Age and size at puberty varies between and within species and strains, and are modulated by genetic and environmental factors.

Puberty onset is controlled by activation of the BPG axis, and a range of internal and external factors are hypothesised to stimulate and/or modulate this activation such as growth, adiposity, feed intake, photoperiod, temperature and social factors. For example, there is a positive correlation between rapid growth and early puberty in fish. Age at puberty can be controlled by selective breeding or control of photoperiod, feeding or temperature. Monosex stocks can exploit sex dimorphic growth patterns and sterility can be achieved by triploidisation.

However, all these techniques have limitations under commercial farming conditions. Further knowledge is needed on both basic and applied aspects of puberty control to refine existing methods and to develop new methods that are efficient in terms of production and acceptable in terms of fish welfare and sustainability.

Broodstock management and hormonal manipulations of fish reproduction.

Constantinos C. Mylonas, Alexis Fostier, Silvia Zanuy.
Gen. & Comp. Endol., 165 (3):516-534.

Abstract

Control of reproductive function in captivity is essential for the sustainability of commercial aquaculture production, and in many fishes it can be achieved by manipulating photoperiod, water temperature or spawning substrate. The fish reproductive cycle is separated in the growth (gametogenesis) and maturation phase (oocyte maturation and spermiation), both controlled by the reproductive hormones of the brain, pituitary and gonad.

Although the growth phase of reproductive development is concluded in captivity in most fishes—the major exemption being the freshwater eel (*Anguilla* spp.), oocyte maturation (OM) and ovulation in females, and spermiation in males may require exogenous hormonal therapies. In some fishes, these hormonal manipulations are used only as a management tool to enhance the efficiency of egg production and facilitate hatchery operations, but in others exogenous hormones are the only way to produce fertilized eggs reliably.

Hormonal manipulations of reproductive function in cultured fishes have focused on the use of either exogenous luteinizing hormone (LH) preparations that act directly at the level of the gonad, or synthetic agonists of gonadotropin-releasing hormone (GnRH α) that act at the level of the pituitary to induce release of the endogenous LH stores, which, in turn act at the level of the gonad to induce steroidogenesis and the process of OM and spermiation. After hormonal induction of maturation, broodstock should spawn spontaneously in their rearing enclosures, however, the natural breeding behavior followed by spontaneous spawning may be lost in aquaculture conditions. Therefore, for many species it is also necessary to employ artificial gamete collection and fertilization. Finally, a common question in regards to hormonal therapies is their effect on gamete quality, compared to naturally maturing or spawning broodfish.

The main factors that may have significant consequences on gamete quality—mainly on eggs—and should be considered when choosing a spawning induction procedure include (a) the developmental stage of the gonads at the time the hormonal therapy is applied, (b) the type of hormonal therapy, (c) the possible stress induced by the manipulation necessary for the hormone administration and (d) in the case of artificial insemination, the latency period between hormonal stimulation and stripping for *in vitro* fertilization.

Egg and sperm quality in fish.

Julien Bobe, Catherine Labbé. (2010)
Gen. & Comp. Endol., 165 (3):535-548.

Abstract

Fish egg quality can be defined as the ability of the egg to be fertilized and subsequently develop into a normal embryo. Similarly, sperm quality can be defined as its ability to successfully fertilize an egg and subsequently allow the development of a normal embryo. In the wild or under aquaculture conditions, the quality of fish gametes can be highly variable and is under the influence of a significant number of external factors or broodstock management practices. For these reasons, the topic of gamete quality has received increasing attention.

Despite the significant efforts made towards a better understanding of the factors involved in the control of gamete quality, the picture is far from being complete and the control of gamete quality remains an issue in the aquaculture industry. Some of the factors responsible for the observed variability of gamete quality remain largely unknown or poorly understood. In addition very little is known about the cellular and molecular mechanisms involved in the control of egg and sperm quality.

In the present review, the molecular and cellular characteristics of fish gametes are presented with a special interest for the mechanisms that could participate in the regulation of gamete quality. Then, after defining egg and sperm quality, and how can it can be accurately esti-

mated or predicted, we provide an overview of the main factors that can impact gamete quality in teleosts.

Stress and fish reproduction: The roles of allostasis and hormesis.

Carl B. Schreck. (2010)
Gen. & Comp. Endol., 165 (3):549-556.

Abstract

This paper is a review of the effects of stress on reproduction in fishes. I hope to further the development of the concepts of *allostasis* and *hormesis* as relevant to understanding reproduction in general and in fish in particular.

The main contentions I derive in this review are the following: Stressors affect fish reproduction in a variety of ways depending on the nature and severity of the stressor. The effects are transduced through a hormonal cascade initiated by perception of the stressor and involving the hypothalamus–pituitary–interrenal axis, the catecholamines, and also cytokines. Mounting a stress response and resisting a stressor is an energetically costly process, including costs associated with *allostasis*, attempting to reset homeostatic norms. Responses in emergency situations (e.g., being chased by a predator or a net) can be different from those where fish can cope (e.g., being in a more crowded environment) with a stressor, but both situations involve energy re-budgeting. Emergency responses happen in concert with the onset of energy limitations (e.g., the fish may not eat), while coping with allostatic overload can happen in a more energy-rich environment (e.g., the fish can continue to eat). Low levels of stress may have a positive effect on reproductive processes while greater stress has negative effects on fish reproduction.

The concept of *hormesis* is a useful way to think about the effect of stressors on fish reproduction since responses can be nonmonotonal, often biphasic.

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Colleague's Connection

Motivations for Becoming an Aquatic Veterinarian

By **David Kestenman, DVM**

I was invited to write an article for Aquatic Vet News about what motivated me to get involved with aquatic veterinary medicine and what issues are now priorities. As an avid SCUBA (Self-contained, underwater breathing apparatus) diver for the past 45 years, my heart and passion have always been fueled from the ocean reefs. At the age of six, I was fortunate that a family friend took me diving. We owned a boat and dove almost weekly on the reefs of south Florida and the Bahamas. So the desire to preserve and enjoy the reefs has always been dear to my heart.

When I chose a profession at the age of 18, oceanography was high on my list. However, when attending Woods Hole Oceanographic Institute and the University of Rhode Island, professors discouraged me due to the poor job market. They told me that PhDs were bagging groceries for lack of jobs. The Jacques Cousteau era had spawned too many hopefuls; much like the book *All Creatures Great and Small* had led to a glut of veterinary school applications. Though I've had a great professional life as a large animal and later companion animal veterinarian, I've often regretted that decision.

During the 1960s, there were no organizations for recreational diving. For those who remember the show "Sea Hunt" with Lloyd Bridges, the equipment was somewhat primitive. You had to be a strong swimmer and there were no diving charts for calculating safe bottom time. Diving was an adventure of the very few. Even today, diving is an exclusive club for the adventurous.

At the time, diving was glorious. Coral heads broke above the surface at low tide and it was not unusual for a reef to be 40 feet in height, adorned with multicolored fire coral, sponges and sea fans. There were virtually no areas of dull green or dead coral. It was not uncommon for me to see octopi on every dive, as well as lobsters within limitless alcoves. Fish ranged from tiny, up to 400 pound groupers. Sharks were a regular feature of delight. Schools of small silver fish at times enveloped me much like a stack of leaves during fall in New England. To sum it up, it was paradise.

Fish and lobster were easy to catch on spear and gig and I must confess, I was guilty of being a hunter. Back then, there never seemed to be a decline in sea life. Seafood was cheap at restaurants. When the television show "Flipper" hit the air, many more people were intrigued with SCUBA diving and ocean life. The 1970s brought on an era of recreational diving and national organizations advertised and grew. A plethora of diving shops and diving resorts opened. Even then, with all the fishing, spear- ing and giggering; sea life abounded.



In the 1980s and 1990s, I took a bit of a hiatus from diving as I focused on the rigors of college, veterinary school, internship and residency. I worked for a few practices before I started my own. It wasn't until the turn of the new millennium that life presented me the time to get back in touch with diving. I couldn't wait to take a diving trip, but upon my first outing, I was soon dumbfounded; after just two decades it was paradise lost.

Where were all the fish, where was the coral, where were the turtles and sharks? I had heard about the decline in reef quality due to bleaching, pollution and hunting pressure. However, I had no idea how bad things had gotten. It's one thing to hear about it on T.V. or in a magazine; it's very different to see and feel it firsthand.

At first I was heartbroken and disappointed. Then I was angry. I chased the dream of my youth, to experience the intrigue and beauty of the reefs, from Florida down the chain of the Caribbean islands all the way to Tobago. It was gone, all gone with the exception of Dominica (not the Dominican Republic), the least developed of the islands.

The reefs I saw were a dull green. Small bits of live coral were sparsely littered amongst a landscape of dead rock. Fish were small, and in reduced numbers. I was lucky to see a turtle or a ray on any given dive. I didn't see one coral head reach the surface and rarely saw the tentacles of a lobster poke out from under a rock. Too much particulate matter in the water made it difficult for the sun to penetrate the water and everything had taken on a dull lifeless look. The devastation of bleached coral was evident. I'd see a nurse shark here and there, but cool ones you see tattooed on human arms and backs are a rare commodity.

While the scene I describe is most prevalent, with some diligence and luck, I was able to find pockets of beauty here and there. Divers certified in the past twenty years don't have a clue as to what they have missed (not counting Pacific diving). They think that what they are

seeing is normal or only a bit degraded. Thus, they might not have the sense of urgency to get involved with reef preservation.

In my exploration of the Caribbean I came away with the following observations. Tourism has placed enormous pressure on sea life to feed sun seekers. Organized diving has been successful at creating a dive destination tourist industry with one positive goal being to find more people who will connect to the reefs and help save them. However, it is a double edged sword. All these tourists need to be fed. It is not uncommon for hotels and all inclusive resorts to flood serving trays with conch, lobster and fish. The local population of Caribbean islands is also increasing. This places the price and resources of the sea out of reach for many native islanders already living in poverty. I have not seen this issue discussed anywhere, as if the tourists are untouchable due to their contribution to local economies. People do not realize that there is no 'trickle down' to the local people, much like the U. S. economy now. The pressure on the reefs is unsustainable.

While I have seen somewhat growing efforts of the tourist industry to go green, it centers more on lessening the carbon footprint visible to a land lubber's eye. For example, using fans rather than air conditioners, and using solar or wind for energy. However, there is little effort toward protecting reefs and fish populations.

Some will argue that divers are now told not to touch coral or pick up shells. Boats are getting away from using anchors that damage coral. Spear fishing or lobster hunting is now banned or limited in many places. However, these measures are having little effect. According to ocean scientists, the prognosis for reef life is collapse within 20-30 years. Think of the impact on local and coastal people who depend on fish for food.

Yet, developed countries are still demanding fish and invertebrates to adorn our tables at unsustainable levels. We are developing land that was once mangroves, the nursery of most reef fish, at an alarming rate greater than deforesting rain forests. Poaching is rampant. Run off pollution continues to plunder all living things. Sharks are being hunted towards extinction for fins. Many governments play lip service to preserving reefs and deep sea populations of tuna.

Let me highlight related issues on my trip to Jamaica this past January. It's a beautiful island with a very poor population, but well known for sun, beaches and waterfalls. Jamaican newspapers openly discuss their political and daily challenges, and there are plenty. Thus imagine my surprise to read about the "invasive" species of Lion Fish and how they are decimating reef fish. A spiny fish, they are toxic to touch and have no natural enemies. Fortunately Jamaica acknowledges this threat. A two page color spread was published on the Lion Fish and the problems they are causing. The article described in detail how to clean the fish without being stung. It listed recipes,

and encouraged people to hunt them, eat them and place them on restaurant menus.

There was also much to do about Honduran fishing boats coming into Jamaican waters. It appears that Honduran reefs have run out of fish. Jamaica is undertaking measures to enforce its sea border and determine whether to shoot, seize and imprison the Hondurans. Could this be the beginning of end?

I spent one day SCUBA diving and saw my first Lion Fish. I found no fish over six inches long. I didn't see any parrot fish, which are instrumental in making sand for shoreline beaches. Nor did I see fish cleaning stations. There were no sharks, no turtles and no rays. These creatures are running out of food. I'm now convinced that if I want to see the reefs of old, I'd better high tail it over to the Pacific side of things, before it's too late.

I sold my practice several years ago and have been exploring ways to fill up this new stage of life. I only needed a look to my past and the love of the ocean. Reading on all things aquatic, I've begun to take courses to increase my understanding and knowledge about reef life and aquaculture. At this time, I have developed an interest in how to advance our ability to farm freshwater and seafood without harming the environment. My desire is to get into the thick of things to preserving our aquatic heritage.

Watching new veterinary students and new graduates being encouraged to pursue the field of aquatic medicine and aquaculture is refreshing. There are now plenty of educational opportunities for graduate veterinarians. Our waters are crying out for help, and recruiting gifted and dedicated people to the effort is essential. What better group of professionals than veterinarians to assist in this venture. We need you!

David Kestenman, DVM
Bloomington, Indiana USA
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Clinical Reports

A Case of Low DO

By Dr Richmond Loh

Clinical history:

Several large koi (*Cyprinus carpio*) fish were dying on a daily basis for the last 2 weeks. Bodies usually found first thing in the morning. The current owner inherited the ponds when he moved into the house 4.5 years ago.



Dense water lily growth (fig. 1).



Oil scum on the surface of water (fig. 2).

There used to be water running through the ponds, but since the drought, there hasn't been any. One pond receives a small amount of water through an underground spring. During periods of light rain, oil from roads wash into the pond.



Small fish remain, but do not come to feed and when visible, are usually lethargic and gasping at surface (fig. 3).

Water quality parameters:

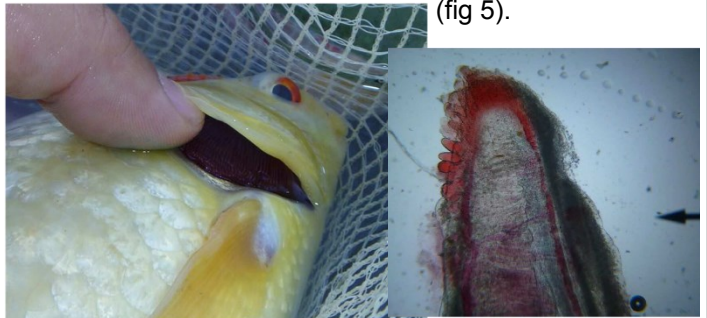
Pond Volume (L) 90,000

Time 6:45am

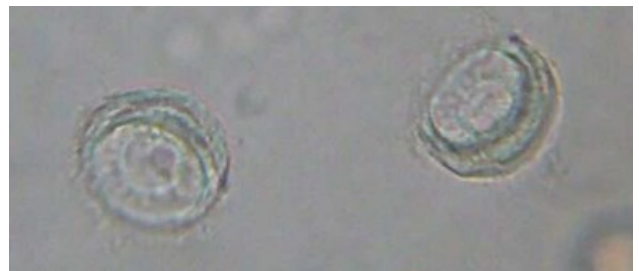
	<u>Pond water</u>	<u>Optimal range for koi</u>
Temperature (oC)	19.8-20.0	18-25
Ammonia (ppm)	0	<0.5
Nitrite (ppm)	0	<0.5
Nitrate (ppm)	0	<50
pH	6.0	6.5-7.5
KH - Alkalinity (ppm)	40	40-70
GH (ppm)	80	150
Dissolved CO2 (ppm)	77 (derived)	<12
Dissolved oxygen (ppm)	2-3	8
Salinity (ppt)	0	0-5

Clinical examination:

Examined fish is lethargic, gasping at surface, weak. Dark, congested gills visually (fig 4) and microscopically (fig 5).



Some excess mucus and ciliated protozoal parasites (Trichodina) on the gills (fig 6).



Diagnosis:

Hypoxia (low dissolved oxygen).
Carbon dioxide toxicosis (high carbon dioxide).
Trichodiniasis.

Comments:

There is an excessive amount of plants in this pond. There is a common misunderstanding that plants produce oxygen for fish all the time. This is only true if the plants receive sunlight for photosynthesis. Plants actually remove oxygen and produce carbon dioxide during the night through respiration. The build-up of organic wastes also increases the biological oxygen demand of the system, to the detriment of the fish. In addition, due to oily film on the surface and limited water movement, oxygen is unable to diffuse into the water efficiently. It is common that the larger fishes tend to be the worst affected in such cases. The pond is in urgent need of cleaning.

In terms of the DO & CO₂, the test water was collected from the surface near the edge and the sun had already been up for at least an hour. So, maybe the DO could have been lower and the CO₂ could have been higher prior to sunrise. I believe this case is due to a combination of low DO, high CO₂ and probably other noxious gases (H₂S) from anaerobic breakdown of matter at the bottom of the earthen pond that have been trapped under the oily film at the surface.

It pays to wake up very early in the morning to visit the client. I've had other similar cases of excessive planting, but couldn't fully convince the client because I didn't have the test results to back it up due to the time of the day (afternoon or evening, DO is higher). I could only explain the theory behind the issue. One way of getting around this is to ask them to set up 3 buckets of pond water a few hours before you visit - one without water weeds, the second with water weeds placed in a sunny position, and the third with water weeds with a cover over to prevent sunlight entering. Then testing these water samples will show the client how plants and sun affect the water oxygen and carbon dioxide levels.

The Trichodina parasites seen in the gills are considered to be pathogenic secondary to poor water quality. Once the environmental conditions are rectified, these should no longer be a problem.

Plan of action:

1. Collect remaining fish into clean, aerated, shaded container of water.
2. Remove plants and clean pond bottom.
3. Re-fill ponds and maintain a balanced eco-system with regular (2-3 times/yr vacuum of the bottom).
4. Install a small plant filter pond before the water inlet to allow for plants to "clean" the incoming water.
5. Re-introduce fish.
6. Treat for Trichodina, as needed.

In other countries, KHV should be on the differentials list. We have no confirmed KHV cases that have occurred in Australia (although, we probably don't test for it enough). The virus is held for experimental purposes at the Australian Animal Health Laboratories for the prospect of controlling feral populations of carp. In states like Western Australia and New South Wales, koi are not considered noxious. However, koi carp are considered noxious in the states like Tasmania, Victoria and Queensland. This may be because carp is assumed to compete with other introduced species such as the rainbow trout, salmon and redfin, much to the disfavour of angling voters.

There is rumour, however, that koi enthusiasts may be illegally importing koi (labelled as goldfish with their barbels cut off to disguise them) into Australia. Even if these koi have KHV-free certificates, they may in fact be carriers. We ought to do more testing and be vigilant with cleaning & disinfecting our equipment between client visits.

Dr **Richmond Loh**, BSc, BVMS, MACVSc (Aquatics & Pathobiology), MPhil (Vet Pathology), DipPM, CCAS, CMAVA

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Famous movie aquarist Deuce Bigalow (Rob Schneider) with the real world fish doctor Richmond Loh (on right).

Emerging Issues

New Aquatic Health Facility for Coast of Bays

Newfoundland & Labrador, Canada—Another major piece of the evolving aquaculture picture in the Coast of Bays is currently under construction in St. Alban's, as that community will be home to the Centre for Aquaculture Health and Development (CAHD) which is scheduled to be in operation by April 2011. The centre will be one of the most modern facilities of its kind in the world when completed and is based on models found in Norway, New Brunswick and the United States.

The facility will provide at least 10 full-time jobs when in operation - jobs that will include four veterinarians, an animal health technologist, aquaculture technicians, animal health technologists, lab technicians and lab technologists. Dr. Daryl Whelan is the Provincial Aquaculture Veterinarian with the provincial department of Fisheries and Aquaculture (DFA) and is the Director of the Aquatic Animal Health Division with the department.

Dr. Whelan said that the centre will be very important for the aquaculture industry in the Coast of Bays. He said, "The staff that will work at the CAHD, and the many visiting professionals, will not be interested in abstract research or development. We want to do applied work that benefits the bottom line of producers and that maintains the health of the fish. By having this facility in place we will be able to do that applied work right here in St. Alban's." See <http://tinyurl.com/23fsqc6> for information.

Disease Advisory: Infectious Myonecrosis (IMN) Status and Threat

December 23, 2010 - Infectious myonecrosis (IMN) is a viral disease caused by infectious myonecrosis virus (IMNV). It affects Pacific white shrimp *Penaeus vannamei*, tiger shrimp *P. monodon* and blue shrimp *P. stylirostris*. IMN is associated with heavy losses in farmed shrimp of 40-70%. Originally reported from Brazil, outbreaks were reported in East Java, Situbondo District in Indonesia in May 2006. In 2009 several other provinces were affected.

With the current spread of the disease there is a high threat of the disease spreading to neighbouring shrimp-producing countries. Suspected outbreaks should immediately be reported to the authorities.

More information on Infectious Myonecrosis (IMN) is available at <http://tinyurl.com/24hd3rt>.

Study to analyze the natural resistance of salmon to sea lice

December 09, 2010—CHILE - A group of Chilean scientists have developed a method to identify specimens of salmon which are genetically more resistant to sea lice (*Caligus rogercresseyi*). The project is led by researchers

from the School of Marine Sciences of the Institute of Biology, which is part of the Pontificia Catholic University of Chile (PUCV) and the University of Concepción. It also has the support of the Technological Institute of Salmon, the company Aquainnovo and financing from Innova Corfo (the Corporation for the Promotion of Production).

As explained by the study's director, José Gallardo, with the developed system they can recognize which species of salmon are naturally more resistant to infections of sea lice, even when exposed to the parasite. "This involves determining the conditions and appropriate life stages of both the fish and the *Caligus*, for testing and to obtain a more robust response," he said. The goal is to produce genetically improved species and enhance their immune response.

The final results of the investigation, which will involve the development of around 15,000 tests which will be available within six months. So far, there was a protocol that would make these a "test of defiance" for salmon. At present, methods to combat these diseases generate an environmental impact, as is the case of medication through food, or high costing vaccinations. Moreover, "the parasite also becomes resistant to these drugs," said the specialist. It is therefore considered that a new method will help to reduce the large expenditure that companies have each year to combat the parasite, in addition to genetic improvements in this area.

See <http://tinyurl.com/23I2jxs> for the full story.

Virus causing cardiomyopathy syndrome (CMS) of Atlantic salmon identified

Norway—Pharmaq and the Norwegian School of Veterinary Science have identified the virus causing CMS of salmon. Through this discovery, more tools will become available that will make it possible to control the disease and limit the spread and the impact of the disease. Pharmaq will explore the possibilities for developing a vaccine against CMS, a disease which currently results in significant losses for the aquaculture industry.

Cardiomyopathy syndrome of Atlantic salmon was first recorded in the mid 1980s in Norway. Economic losses are high since primarily fish at slaughter size die. The virus was discovered through a close research collaboration between Pharmaq with project manager Marit Rode, and Professor Øystein Evensen and his research group at the Norwegian School of Veterinary Science.

"We have identified a new and until now unknown virus of fish and part of the genome show resemblance with viruses of the family Totiviridae," says Øyvind Haugland, and he continues: "The fact that such a virus has not been described in fish before is by itself interesting, but also challenging scientifically. A related virus has earlier been identified as the cause of myonecrosis of white shrimp, but no virus of this family has been isolated from a vertebrate species before."

See <http://tinyurl.com/6hqxqba> for the full story.

Aquariumania Podcasts (Pet Life Radio) – Tropical Fish as Pets

March 12, 2011

Keeping fish as pets has been a tradition going back to ancient Egypt and China. Today, many more different, beautiful and fascinating kinds of fish and other aquatic animals can thrive in your home if you learn the dos and don'ts and get the right equipment. Aquariums and ponds are living, breathing aquatic works of art that can be as simple or as complex as your imagination and skills allow.

In these fun pet podcasts, hosted by **Roy Yanong** VMD, you'll learn all about aquarium fish and other aquatic animals, the aquarium industry, and the science and art that surround this fascinating hobby! Aquariumania Podcasts include a number of interviews with aquatic veterinarians and others involving a number of topics important to aquatic veterinary medicine. So dive in--the water is fine!

Current Podcasts:

- Episode 24 - If Electric Fish Could Talk, What Would They Say? Ask the Gymnocom!
- Episode 23 - Keeping Fish and Other Aquatics Healthy!
- Episode 22 - The Good, the Bad, and the Not-So-Ugly Truths about Aquarium Bacteria
- Episode 21 - Scrubbers, Sumps and Such: An Introduction to Coral Reef Systems
- Episode 20 - Aquarium Fish Sex: How Craig Watson's Obsession Helps Stimulate Florida's Ornamental Fish Industry
- Episode 19 - Fish Logistics: Moving Fish and Aquaria, Fish Care When You're Away, and Power Outages
- Episode 18 - Sea Life at Home: Getting Started with Marine Aquaria
- Episode 17 - Baseball, Hot Dogs, and Coral Reefs at the New Marlins' Stadium
- Episode 16 - Would Your Water Pass the Test? The Shedd Aquarium's Allen LaPointe Explains How to Avoid Water Woes
- Episode 15 - Killifish: Small, Secret Gems of the Aquarium World
- Episode 14 - Have a Sick Fish? Veterinarian Dr. Helen Roberts Helps Heal Wet Pet Woes!
- Episode 13 - Through Hell's Aquarium—and Back—with Best-Selling Author Steve Alten!
- Episode 12 - How Cardinal Tetras are Saving the Rainforest: Project Piaba
- Episode 11 - Keeping Aquarium Fish Where They Belong: Non-Native Species Concerns in the Industry
- Episode 10 - North American Native Fishes: Aquatic Pets from Your Own Back Yard
- Episode 9 - Old World Cichlids
- Episode 8 - New World Cichlids

Episode 7 - How Aquarium Societies Can Help You Avoid Common Fish Keeping Mistakes

Episode 6 - The Straubs: Pioneers of Florida's Tropical Fish Industry

Episode 5 - Angelfish, Neon Tetras. . . and Electric Eels: "Shockingly" Fun Collecting Trips in the Amazon

Episode 4 - The Science and Art of Koi and Goldfish

Episode 3 - Clowns and Corals: ORA's Ornamental Marine Hatchery

Episode 2 - A Glo-ing Review of Fluorescent Glo-Fish

Episode 1 - Introduction (Dr. Roy Yanong welcomes everyone to his new show and talks all about aquarium fish and other aquatic animals, the aquarium industry, and the science and art that surround this fascinating hobby!)

To access these podcasts go to: www.markiac.addr.com/PET_LIFE_RADIO/aquariumania.html.



Dr. **Roy Yanong**—Pet Life Radio Host

Has This Happened to You?

A man goes to the veterinarian with his goldfish. "I think it's got epilepsy" he tells the vet. The vet takes a look and says "It seems normal to me." The man says, "You haven't taken it out of the bowl yet!"

Legislative and Regulatory Issues

New Canadian Aquatic Animals Import Control Regulations – Effective December 2012

Canadian Food Safety Inspection Service
Ottawa, December 22, 2010

The Canadian Food Inspection Agency (CFIA) published new regulatory changes in the Canada Gazette, Part II, which changes their *Health of Animals Regulations* and *Reportable Diseases Regulations*. These changes will result in new import controls for aquatic animals, which will include an import permit issued from CFIA, and a zoosanitary certificate issued in the country of origin. This effort is focused on preventing the introduction, and/or spread within Canada, of certain animal diseases. The Agency has published the regulated lists of aquatic species (finfish, mollusc, and crustaceans) and aquatic animal diseases. The regulation can be read at: <http://www.gazette.gc.ca/rp-pr/p2/2010/2010-12-22/html/sor-dors296-eng.html>.

The regulation will come into effect December 10, 2012. Once these regulations are effective the listed finfish, mollusks, and crustacean species, including live and dead animals for specific end uses, will require aquatic animal import permits issued by CFIA, and zoosanitary certification (i.e., a health certificate issued by a veterinarian and endorsed by the appropriate Competent Animal Health Authority) from all exporting countries including the US. However, the specific conditions of the import permit and language of the health requirements are still being developed by CFIA.

CFIA Amends Regulations for Reportable Aquatic Animal Diseases

Canadian Food Safety Inspection Service
Ottawa, January 5, 2011

Canada has further strengthened its ability to protect aquatic animal health and ensure the aquatic animal industry remains strong. New regulations require all suspected or confirmed cases of serious aquatic animal diseases to be reported to the Canadian Food Inspection Agency (CFIA).

The CFIA has amended the Reportable Diseases Regulations to include 20 diseases that pose serious risks to aquatic animal health, international trade, and the economy. "These amendments underscore the Government of Canada's commitment to protecting our thriving aquaculture industry, which provides consumers around the world with top-quality seafood," said Agriculture Minister Gerry Ritz. "Canada is now better positioned to act quickly when serious aquatic animal diseases are detected."

"Fishers and seafood processors are a vital part of communities across Canada," said Fisheries and Oceans

Minister Gail Shea. "Protecting Canada's aquatic resources remains a top priority for this Government, and I'm pleased with the cooperation among all parties to implement these important regulatory changes."

These amendments complement the recent changes to the Health of Animals Regulations, which enabled the CFIA to implement the National Aquatic Animal Health Program. This science-based program helps protect finfish, molluscs and crustaceans from aquatic diseases. The new measures ensure Canada meets the standards set by the World Organisation for Animal Health (OIE) for preventing disease spreading from the trade of live animals or high-risk products. These regulatory amendments were the result of extensive consultations with the federal, provincial and territorial governments, industry and stakeholders.

For additional information on the amendments, visit <http://tinyurl.com/26s2aa5>. More information on the National Aquatic Animal Health Program and the reportable aquatic animal diseases is available on the CFIA website at <http://tinyurl.com/2wm5q8>.

[This action now clearly places regulatory activities concerning aquatic animal health and diseases under the auspices of the Health of Animals Act and CFIA.]

USDA/FSIS Proposed New Catfish Inspection Regulations

Washington DC, February 23, 2011

The U.S. Department Agriculture (USDA) has announced a proposed rule requiring inspection of catfish and catfish products by USDA's Food Safety and Inspection Service (FSIS). USDA is proposing these regulations to implement provisions as required by the Food, Conservation and Energy Act of 2008, also known as the 2008 Farm Bill.

The 2008 Farm Bill amended the Federal Meat Inspection Act making catfish an amenable species under the Act, thereby requiring that all catfish undergo inspection by FSIS. In addition, the Secretary must take into account the conditions under which catfish are raised and transported to processing establishments as part of the new inspection program.

The 2008 Farm Bill requires the Secretary of Agriculture to define the term "catfish" for this new inspection program. The proposed rule provides two options for the definition of catfish and seeks public comment on the issue. One option is the current labeling definition in the 2002 Farm Bill, which includes all species in the family Ictaluridae. The other option is to define catfish as all species in the order Siluriformes, including the three families typically found in human food channels, including Ictaluridae, Pangasiidae, and Clariidae.

The proposed rule describes the new requirements that will apply to catfish produced in or imported to the United States. Among these requirements is that prod-

ucts labeled as "catfish" must bear either the FSIS mark of inspection or a mark of inspection from the country from which it was exported.

The proposed rule also describes how FSIS will inspect U.S. catfish farms as well as transportation from farms to processing establishments, as required under the 2008 Farm Bill. In this regard, FSIS will focus on factors affecting the safety of the product being produced, such as water quality and feed.

The proposed rule anticipates a transition period during which domestic and international operations will come into compliance with the catfish inspection program. Once the catfish inspection program rules are issued in final form, FSIS will follow-up by announcing the implementation dates for key provisions in the rule.

Comments must be received on or before June 24, 2011, and may be submitted per the following: through the Federal e-Rulemaking Portal at www.regulations.gov; by mail to the U.S. Department of Agriculture, FSIS Docket Clerk, Room 2-2127, George Washington Carver Center, 5601 Sunnyside Ave., Mail-stop 5272, Beltsville, MD 20705; or by e-mail to fsis.regulationscomments@fsis.usda.gov. All comments must identify FSIS and docket number FSIS-2008-0031. Comments will be available for viewing on the FSIS website at [www.fsis.usda.gov/regulations & policies/proposed_rules/index.asp](http://www.fsis.usda.gov/regulations_and_policies/proposed_rules/index.asp). In addition to a public comment period, FSIS intends to hold public meetings on the proposed rule, which will be announced at a later date.

USDA Releases First Report from Catfish Study

Friday, February 11, 2011

The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) has released the first report from its Catfish 2010 study. The descriptive report, Part I: Reference of Catfish Health and Production Practices in the United States, 2009, was produced by APHIS's National Animal Health Monitoring System (NAHMS).

Catfish 2010 is NAHMS' third national study of the U.S. catfish industry. The study was designed to provide participants, industry and animal health officials with information on the nation's catfish operations that will serve as a basis for education and research. Four states participated in the study. These states accounted for 53.5 percent of U.S. catfish operations, 91.5 percent of total national catfish sales, and 91.3 percent of the water surface acres to be used for catfish production from January 1 through June 30, 2010.

The full report is available at:
http://www.aphis.usda.gov/animal_health/nahms/aquaculture/index.shtml

Hungary and UK become zones free of Spring Viraemia of Carp

December 7, 2010—Following presentation of evidence by Hungary and UK that their territories are free of the fish disease spring viraemia of carp (SVC), the European Commission passed a decision declaring these countries free of the disease. This allows these countries to restrict imports of carp from zones in which the disease remains endemic.

See Official Journal of the European Union, L: 322/47, Amending Annexes I and II to Decision 2010/221/EU as regards approved national measures by Hungary and the United Kingdom for spring viraemia of carp at: <http://tinyurl.com/2bvbj5x>.

Ornamental Fish Keeping Brochure

The BVA Animal Welfare Foundation (BVA AWF) has launched a new leaflet on ornamental fish keeping. It aims to provide most of the information needed before purchasing your first fish, deciding which fish will suit you best and gives crucial advice in order to keep your fish healthy.

For more information, go to: FishVetSociety.org.uk to [Download the leaflet](#).



Aquatic Veterinary CEPD

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

12th Aquaculture Insurance & Risk Management Conference

March 31-April 1, 2011

Carlton Hotel & Spa
Kinsale, County Cork, Republic of Ireland

The aquaculture insurance industry is very interested in how aquatic veterinarians can help reduce the risks from disease outbreaks. Consider attending and interact with world leaders that deal with disease and other risks to aquaculture, and find out how the veterinary profession and insurance industry supports aquaculture industries.

For more information and full details about the Conference visit: <http://aquaculture-conference-2011.aquacultureinsurance.com/>.

Additional information about aquaculture insurance is at <http://www.aquacultureinsurance.com>.

Special Species (Zoo & Wildlife) Symposium

April 15-17, 2011

Cornell University, College of Veterinary Medicine
Ithaca, New York, USA.

This is an annual symposium that alternates between Cornell University College of Veterinary Medicine (Zoo and Wildlife Society) and the University of Pennsylvania, School of Veterinary Medicine (Special Species/Exotic Animal Club).

The Symposium is open to veterinarians and veterinary students. Registration costs \$60 to attend lectures only, and \$80 to attend both lectures and wet-labs/tours. Wet-labs and tours are only open to veterinary students due to space limitations.

The program will feature Dr. Michael Noonan lecturing on "The Behavior and Welfare of Killer Whales in Captivity" and Dr Paul Bowser on "Fish Disease Diagnostic Cases: Expect the Unexpected."

For more information see <http://www.vet.cornell.edu/students/ZAWS/Welcome.html>.

12th Fish Immunology Workshop

April 17-21, 2011

Wageningen University,
Wageningen, The Netherlands

The objective of the workshop is to provide partici-

pants with advanced knowledge, both theoretical and practical, on the immune system of fish and shellfish. The latest insights in the evolution of the immune system and related issues such as (experimental) animal welfare will be presented. Focused on academic and aquaculture industry researchers and graduate students (reduced registration fee). The 2011 workshop includes two afternoons with a choice between hands-on practical application or updates on recent molecular advances in microarray analysis and gene synteny.

For more information see www.cbi.wur.nl/UK/fish_workshop

42nd IAAAM Conference

May 7-11, 2011

Mirage Hotel, Las Vegas (<http://www.mirage.com>)

This year the Mirage is both our hotel and conference host, so all conference events will be happening in one location! The IAAAM Board is looking forward to seeing everyone in Las Vegas. See website for more information: IAAAM.org

AMERICAN ACADEMY OF VETERINARY PHARMACOLOGY & THERAPEUTICS SYMPOSIUM

MAY 22-25, 2011

University of Wisconsin-Madison,
Lowell Center Conference and Lodging Facility

Aquatic Drugs Session (May 22) presentations include: Approved Drugs and Unmet Needs in the US; Unique Aquatic Drug Pharmacology and Pharmacokinetics - their use in drug approval; Aquatic Animal Drug Approval Partnership - an unique approach and research protocols for approving aquatic drugs; Advances in Minor Use, Minor Species Drug Approval and Regulations; Availability, Environmental, Resistance, and Other Issues Facing Aquatic Drug applications (Panel Discussion).

For more information on abstract submission, registration and the full program see <http://aavpt.org/17thBiennial.shtml>.

2011 AQUAVET® Program

May 29 - June 24, 2011

Presented by the School of Veterinary Medicine
University of Pennsylvania, and the College of
Veterinary Medicine Cornell University

The courses will be presented according to the following schedule:

AQUAVET® I

CLASSES: Sunday 29 May - Friday 24 June 2011

AQUAVET® II

CLASSES: Sunday 29 May - Friday 10 June 2011

Course fees for the 2011 AQUAVET® Program are as follows:

AQUAVET® I (4-week course): \$1850 for full time veterinary students. \$3250 for veterinarians
 AQUAVET® II (2-week course): \$1150 for full time veterinary students. \$1750 for veterinarians
 These fees included course fee, room and board.
<http://www.vet.cornell.edu/AquaVet/proginfo.html>

**SeaVet Clinical Training in Aquatic Animal Health
 June 6-15, 2011**

University of Florida,
 Gainesville, FL, USA

SeaVet Clinical Training is an intensive one-week course designed to teach veterinary medical students and veterinarians through didactic lecture, case-based problem-solving and practical experience.

Important: This course is being offered exclusively for Veterinary Students and Licensed Veterinarians. Registration for this two-credit graduate and professional class through the University of Florida (granted to UF veterinary students) will begin in mid-to-late January 2011. Tentative Agenda, Training Sites, Course Faculty, Field Trips, General Class Information, Registration and Questions are online.

For more information see website: www.conference.ifas.ufl.edu/ame/seavet or contact Dr. Mike Walsh, Program Organizer, University of Florida, College of Veterinary Medicine, PO Box 100136, Gainesville, FL 32610-0136. Phone: 352-294-4948 Fax: 352-392-8289; Email: walshm@ufl.edu.

**Shrimp Pathology Short Course
 June 6-17, 2011**

University of Arizona,
 Tucson, Arizona, USA.

This year marks our 23rd annual intensive short course. "Shrimp Pathology Short Course: Disease Diagnosis and Control in Marine Shrimp Culture", is taught by Dr. Donald Lightner and his colleagues from the Aquaculture Pathology Laboratory at the University of Arizona.

This intensive course consists of comprehensive lectures and practical laboratory training that is focused on current methods used to diagnose, prevent, and treat the principal diseases of cultured penaeid shrimp. This program also provides an excellent opportunity for participants to meet and interact with others involved in shrimp disease research and management.

For more information see <http://microvet.arizona.edu/research/aquapath/index.htm> or contact Dr. Donald V. Lightner, dvl@email.arizona.edu, Rita Redman (course coordinator), ritar@email.arizona.edu, Fax: (520)621-4899; Tel: US +1 520-621-4438; or aquapath@ag.arizona.edu.

8th International Conference on Molluscan Shellfish Safety (ICMSS 2011)

June 12-17, 2011

University of Prince Edward Island,
 Charlottetown, Prince Edward Island, Canada

Experts from around the world will discuss the latest scientific advances and their impact on molluscan shellfish safety. For more information see www.gov.pe.ca/icmss2011.

**52nd ANNUAL WESTERN FISH DISEASE WORKSHOP
 June 14-16, 2011**

American Fisheries Society, Fish Health Section
 Vancouver Convention Center,
 Nanaimo, British Columbia, Canada

A continuing education session on day 1 will be followed by 2 days of plenary session. Set aside those dates now in your calendar to come to Vancouver Island. Abstract should be sent to Simon.Jones@dfo-mpo.gc.ca by April 29, 2011.

Two downtown Nanaimo hotels are offering conference rates (reservation deadline, May 1) – Best Western Dorchester (\$109/night; www.dorchesternanaimo.com, 800-661-2449;) and Coast Bastion Inn (\$129-\$189/night; http://www.coasthotels.com/hotels/canada/bc/nanaimo/coast_bastion/overview, 800-663-1144) - mention AFS "Western Fish Disease Workshop" for reservations.

For more information available at: <http://www.fisheries.org/units/fhs/index.php>.

**1st Australasian Scientific Conference
 On Aquatic Animal Health**

July 5-8, 2011

Pullman Reef Hotel
 Cairns, Queensland, Australia

The Australian Fisheries Research Development Corporation, Aquatic Animal Health Subprogram (<http://tinyurl.com/2cbmn6g>) is pleased to announce the First Australasian Scientific Conference on Aquatic Animal Health to be held in Cairns, Queensland, Australia (<http://tinyurl.com/2coroyc>) - gateway to the Great Barrier Reef and Daintree rainforest.

The conference provides a forum for presentation of diagnostic, research, management and policy issues encompassing all areas of aquatic animal health and bio-security. Previously, AAHS has organized national scientific conferences (in 2003, 2005, 2007 and 2009) featuring presentations on aquatic animal health research in Australia and an international aquatic animal health expert as the keynote presenter.

For more information (registration fee will be Aus \$330) and accommodation details please contact Joanne Slater, FRDC Aquatic Animal Health Subprogram

Coordinator (email: joanne.slater@csiro.au) with an expression of interest indicating whether you plan to attend and/or make a presentation (please indicate topic).

**Salmon Disease Workshop
July 11-22, 2011**

University of Oregon,
Corvallis, OR, USA

This workshop is designed for professionals working in the fish health field and will emphasize recent advances and developments in our understanding of salmonid diseases. The workshop is limited to 20 participants on a first come, first served basis.

General Topics: Viral Diseases, Cell Culture & Viral Diagnosis; Bacterial Diseases; Parasitic Diseases; Disease in Net Pen Culture; Issues in intensive trout culture; Immunology and stress; Molecular Diagnostics; Disease Control and Treatment; Histology & Histopathology; Pharmacology.

Cost of the workshop is \$950 plus housing (if desired). For more information and to register please contact Dr. Jerri Bartholomew (541-737-1856; bartholj@science.oregonstate.edu). A website for more information and with links to registration will be posted in the near future.

**International Aquaculture Biosecurity
Conference & Workshop
August 14-17, 2011**

Organized by the International Aquatic Veterinary Biosecurity Consortium (WAVMA is a member),
Trondheim, Norway

To be held in conjunction with AQUA NOR 2011 as a two-day conference and two-day applied, training workshop. Internationally recognized keynote speakers, contributed posters and talks on aquaculture biosecurity that involve practical approaches for the prevention, control, and eradication of disease. The goal of this conference and workshop is to provide expert opinions and tools for implementing internationally acceptable, standardized, practical, economic, and effective biosecurity plans and programs in any type of aquaculture production facility. A call for posters and short talks is forthcoming on the website. For more information see www.cfsph.iastate.edu/IICAB/meetings/iabc2011.php.

**Health and Colony Management of Laboratory Fish
August 15-19, 2011**

Mount Desert Island Biological Laboratory
Bar Harbor, Maine, USA

Topics to be discussed will include general system design and water quality management, anatomy and histology of fish, infectious and non-infectious diseases common to all fish, specific diseases of importance to laboratory-maintained zebrafish, and general fish diseases and disease management strategies. The course will consist of lecture, laboratory exercises, with an opportunity to discuss unusual and/or unsolved diagnostic case experiences from their laboratories as problem-solving exercises. The course should be particularly valuable to technical staff, graduate students, postdoctoral fellows, junior faculty and investigators needing skills to monitor the health of a colony of aquatic organisms.

Applications are being accepted for this 1-week educational opportunity for individuals with maintenance, management or research responsibilities in which fish are used as laboratory animals – Deadline June 15, 2011. For more information see www.mdibl.org/courses/Health_and_Colony_Management_of_Laboratory_Fish/182/

**AQUA NOR 2011
August 16-19, 2011**

Trondheim Spektrum, Norway.

The AQUA NOR trade shows are held biennially in Trondheim, and have attracted 15,000-20,000 visitors from more than 50 nations, and 300 exhibitors representing more than 600 manufacturers and suppliers from all over the world. Exhibitors present current developments in the fields of aquaculture technology, fish feed, fish health, quality assurance, training, funding, fish farmer networks, grading, equipment, storage, processing, packaging, environmental protection and distribution.

AQUA NOR also provides a Forum, organized by the European Aquaculture Society in cooperation with the Nor-Fishing Foundation, SINTEF and CREATE, for science, industry, consumers and policy makers to review developments in the aquaculture sector and to discuss the key issues that affect those developments.

The Forum will have three sessions (each 2 hours long) where presentation of the issues and discussion of the solutions will be the priority and will address one of the critical constraints to the development of aquaculture in Europe – access to sites with high water quality to ensure high quality aquaculture products. By up-scaling production systems an increase in productivity can be obtained for any specific site; but this must be compliant with legislation, with regard to fish welfare, with regard to husbandry and especially with regard to the environmental impacts of increased production systems.

For more information see www.nor-fishing.no.

15TH INTERNATIONAL CONFERENCE ON DISEASES OF FISH AND SHELLFISH

SEPTEMBER 12-16, 2011

Annual Meeting of the European Association of Fish Pathologists, Radisson Blu Resort in Split, Croatia

This is a large conference and is a great forum for exchange of information with other fish health scientists from throughout the world.

From Monday September 12 through Thursday September 15 there will a full scientific program of keynotes, oral presentations, dedicated poster sessions, workshops and roundtables. An EAFP plenary session is also scheduled. The deadline for presentation abstracts is April 8, 2011, and the deadline for early registration rates is May 13, 2011.

An additional histopathology workshop dealing with lymphoid organs, musculoskeletal system and nervous system will be held in conjunction with the EAFP meeting on September 17, 2011, after the close of the main scientific conference. Workshop space is limited to 30 participants. Preference is given to EAFP members who can contribute a case presentation on one of the workshop topics. If you wish to attend please contact Dr. David Bruno (david.bruno@scotland.gsi.gov.uk) before you register and pay your conference fee so he can reserve you a place. The cost will be 35-40 Euros which will go towards the cost of a CD.

For further information about the scientific and social programs, abstract submission, registration, optional workshops and study visits, and the stunning conference venue on the Adriatic Sea, please visit the conference website at <http://eafp.org/second-announcement/>.

Aquaculture Europe 2011 **October 18-21, 2011**

Annual Meeting of the European Aquaculture Society, hosted by The Federation of Greek Maricultures and the Hellenic Centre for Marine Research – Rhodes, Greece.

With a theme of “Mediterranean Aquaculture 2020,” this meeting will be the most innovative event of European aquaculture to date, bringing together research institutions, academia and the industry. Sessions will address vital questions affecting the development of Mediterranean aquaculture over the next decade, with reviews of the importance of aquaculture in EU food production; the sustainability of aquaculture feeds and the implementation of selective breeding strategies in aquaculture.

A review of current EU-funded research programmes will highlight their relevance to the current and future production practices. Aquaculture Europe 2011 will establish benchmarks for future research that will lead to a clear foresight of the development dynamics of Mediterranean aquaculture 2020. The conference will include an inter-

national trade show, a Farmer’s Day, a student workshop and will provide a platform to showcase European initiatives in aquaculture. Call for papers deadline April 15, 2011. Sessions include: Sustainable feeds and feeding management; Reproduction and breeding; Hatchery production; Health management; Welfare management; Novel technologies; New species for aquaculture production (including ornamentals); Aquaculture engineering and technology; Tuna farming; Zebrafish; Aquaculture and the consumer; Escapees; Energy efficiency in aquaculture production; Aquaculture governance, policy and socio-economics; Aquaculture planning; Organic aquaculture; Diverse freshwater aquaculture systems; Alternative aquaculture; Mollusc aquaculture; and an EU Forum. For more information see: www.easonline.org.

8TH SYMPOSIUM ON DISEASES IN ASIAN AQUACULTURE **NOVEMBER 21-25, 2011**

Fish Health Section of the Asian Fisheries Society, the College of Fisheries, Mangalore, India & Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar, India.

With the Theme “Fish health for food security” the conference will deliberate on the following tentative issues: Global aquaculture – Past, present and future; Public health and trade impacts; Environmental approaches to disease management; Epidemiology of fin-fish diseases; Epidemiology of crustacean shellfish diseases; Epidemiology of molluscan shellfish diseases; Emerging issues and approaches in aquatic animal health management; Biosecurity and aquaculture; Diagnostic development – conventional to molecular; Immunological approaches to disease management; Genomics, proteomics and bioinformatics; Pathogen risk analysis and risk assessment; and Alternatives to antimicrobials. For more information see: www.daa8.org/index.html.

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Aquatic Veterinary Opportunities

MARINE HARVEST (SCOTLAND) LTD

We currently have a vacancy for a Health Specialist at our Freshwater Salmon site at Loch Lochy. The successful applicant will be required to be pro-active in all fish health matters on site and to take appropriate corrective action in the face of any health challenges with the objective of maximizing welfare, survival and performance.

The main duties will include the following:

- To provide advice, support and training to farm staff on best practice with regard to the health and welfare of the fish.
- To supervise the use of medicines and support the development of new medicines and health initiatives.
- To provide a monitoring and diagnostic service to the site for rapid detection of health challenges.
- To collate data on fish health and produce regular reports for the Lochs Area Manager and Freshwater Health Manager.
- To support the Freshwater Health Manager in wider projects and visits to other sites.

Candidates should be able to demonstrate a high degree of commitment to the job, be able to work independently as well as being a strong team player, be computer literate, and have previous experience of working in a similar role or have fish health qualifications.

If you are interested in applying for this post, please submit a CV with a supporting letter to: Vicky Ferguson, Human Resources Manager, Marine Harvest (Scotland) Ltd., Business Resource Centre, Blar Mhor Industrial Estate, Fort William, PH33 7PT, UK. For an informal enquiry please email vicky.ferguson@marineharvest.com.

NEW ENGLAND AQUARIUM, AMERICAN LOBSTER AQUACULTURE INTERN (SUMMER 2011)

New England Aquarium, Boston, Massachusetts (USA) is now accepting applications for an American Lobster Aquaculture Intern for the summer 2011. At the New England Aquarium, larval and juvenile lobsters are raised in a small hatchery and then used in experiments, which have focused on growth, nutrition, and disease.

Incumbents must have a desire to learn how to care for hundreds of juvenile lobsters in a small research setting. Daily tasks include observing, recording data, and feeding all lobsters in the research collection, collecting and counting newly hatched larvae, changing filters, and cleaning tanks.

To learn more about how to apply, visit:

http://www.neaq.org/get_involved/volunteering_and_internships/internships/applying_for_an_internship.php.

GEORGIA AQUARIUM VETERINARY STUDENT PRECEPTORSHIP/EXTERNSHIP PROGRAM

The Georgia Aquarium provides veterinary students the unique opportunity to gain experience in the field of aquatic animal medicine at one of the largest aquariums in the world.

Preceptorships/externships lasting a minimum of 4 weeks and a maximum of 8 weeks are available. Preference will be given to 3rd and 4th year students but all may apply. Preceptorships are not available November 20 - January 10 or July 1- July 31.

Work hours are typically 7:30 – 4:30, but subject to change based on the medical needs of the collection. Students should expect to work some weekend days. Low cost housing may be available but should not be counted on. Students should provide their own transportation to and from the aquarium. A current tetanus vaccination and health insurance are required.

Students will spend time working in the commissary, the water quality and diagnostic laboratory, necropsy, quarantine and with clinical cases. Individuals are expected to produce a written case report with an associated PowerPoint presentation during the last week of the preceptorship and will also complete a research or special project. There is an assigned reading list intended to broaden the student's knowledge base in aquatic animal husbandry and clinical care. There are 5 veterinarians on staff, 3 of which are full time clinical positions. Through a partnership with the University of Georgia, College of Veterinary Medicine we have an established aquatic veterinary pathology program as well as a growing clinical partnership with the zoological medicine service. .

Applications will be evaluated twice annually. Applications for an externship between January 11 and July 1 are due by March 1 of the preceding year. Applications for an externship between August 1 and Nov 20 are due by November 1 of the preceding year. For example, one wishing to do an externship from March 15 to April 15, 2013 should submit a complete application no later than March 1, 2012. It is the student's responsibility to check that their application packet is complete as incomplete applications will not be considered.,

For more information, contact: Dr. Tonya Clauss, DVM, MS (tclauss@georgiaaquarium.org) or Dr. Aimee Berliner, DVM (aberliner@georgiaaquarium.org); Attn: Vet Extern Program, Veterinary Services, Georgia Aquarium, 225 Baker Street, Atlanta, Georgia 30313. Electronic submissions are encouraged.

Combined Residency/MS Training in Anatomic Aquatic Animal Pathology.

Washington State University is offering an anatomic pathology residency/MS training position with an emphasis in Aquatic Animal Pathology. This rigorous three-year program combines anatomic pathology residency training in a fully accredited diagnostic laboratory (http://www.vetmed.wsu.edu/depts_waddl/) with training in biomedical research leading to a MS degree (<http://www.vetmed.wsu.edu/depts-vmp/graduate/AnatomicPath.aspx>).

Veterinarians completing training are eligible for American College of Veterinary Pathologists (ACVP) certification. The ten-year ACVP board pass rate for WSU trainees is greater than 93%. Training occurs under the guidance of 7 ACVP and one ACLAM board-certified pathologists.

The MS graduate training position will focus on a research project involving rainbow trout, salmon or other significant fresh water or marine fish species native to the Pacific Northwest and important to aquaculture production. The selected graduate student will study under the Ed McLeary Distinguished Professor in Aquatic Animal Health and his collaborators. Projects will be hypothesis directed with an emphasis on infectious disease and/or immunology at the host pathogen interface.

The starting stipend is \$35,436/yr, with tuition support and medical benefits. The position would begin in the summer of 2011. Applicants must possess a DVM or equivalent degree. Applications should include veterinary college transcripts, curriculum vitae, a statement of professional goals, and names of three references. Send applications to: James Stanton, Department of Veterinary Microbiology and Pathology, Washington State University, PO Box 647040, Pullman, WA 99164-7040; phone (509)335-3725; e-mail jstanton@vetmed.wsu.edu.

AQUATIC VETERINARY GRADUATE COLUMNARIS RESEARCH (PHD DEGREE)

Are you interested in captivating scientific research in the area of fish disease? The Faculty of Veterinary Medicine, Department of Morphology, Ghent University has an opening for a PhD research position involving the pathogenesis of columnaris disease in catfish and rainbow trout.

The Department of Morphology is in search for a Master in Biotechnology, Biomedical Sciences, Bio-engineering, Biology or Veterinarian for the execution and follow-up of an innovative and intriguing research project on the way that the bacterium *Flavobacterium columnare* causes disease in catfish and rainbow trout. This concerns a research project with a fixed term of up to four years which includes varying research (in vitro research, research with organ perfusion models and experimental infections in fish) within a multidisciplinary team of researchers in the area of aquatic veterinary medicine.

Research will include and involve chemotaxis, adhesion, biofilm formation, quorum sensing, apoptosis and antimicrobial resistance; the ultimate goal is to develop efficient and environmentally friendly measures to combat columnaris disease.

If you are interested in this ground-breaking research, have any questions about this program or the research, or want to apply, please contact Prof/Dr A. Decostere (annemie.decostere@ugent.be). Applicants should send a CV, along with a cover letter explaining their motivation.

CERC POST-DOCTORAL RESEARCH SCIENTIST POSITIONS IN AQUATIC EPIDEMIOLOGY

The Atlantic Veterinary College (AVC) at the University of Prince Edward Island (UPEI) is seeking highly-qualified applicants for up to 4 post-doctoral research scientist positions in aquatic epidemiology. Positions will range from 2 to 5 years depending on the individuals' qualifications and experience.

The goal of the CERC program is to make UPEI and Canada the global leader in applied aquatic epidemiology research (with an ecosystem health focus). The successful applicants will join a multi-disciplinary team of epidemiologists, statisticians, finfish, crustacean and mollusc clinicians, ecosystem health and regulatory veterinary medicine specialists whose work focuses on holistic approaches to assist the Canadian and international aquaculture industries improve the productivity, sustainability and health of farmed fish stocks.

A veterinary degree, expertise in epidemiology, and strong quantitative skills will be considered assets, as will experience with fish diseases and aquaculture. However, strong candidates with other relevant backgrounds are encouraged to apply. Individuals must be self-motivated and able to work both independently and as an effective partner in the growing UPEI CERC team.

Salary and benefits will be commensurate with qualifications and experience of the individual. Interested applicants are encouraged to contact either Dr. Ian Gardner (phone: 530-752-6992; e-mail: iagardner@upe.ca) or Dr. Ian Dohoo (phone: 902-566-0640; e-mail: dohoo@upe.ca) for further information about the positions.

Interested candidates should submit their curriculum vitae, a statement of interest and the names and contact information of two referees. Review of applications will begin on April 1, 2011 and the positions will remain open until filled.

Applications should be sent to: Leanne Newson, Administrative Project Manager, Centre for Veterinary Epidemiological Research, Department of Health Management, Atlantic Veterinary College, University of Prince Edward Island, Charlottetown, PEI C1A4P3 Canada (cver@upe.ca; ph: +1 (902) 6205049, fax: +1 (902) 620-5053).

World Aquatic Veterinary Medical Association

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2011 MEMBERSHIP FORM

New Application or Renewal (check one)

Use this Form for mailing with cheque, or credit card payment information

(Membership Application and Renewals, and on-line credit card payments can also be done through www.WAVMA.org)

Please complete all mandatory fields marked with*, as accurately as possible.

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Please Check One Membership Category below and complete all the information required for that category

Full Member (a graduate of a Nationally recognized veterinary school that awards a Doctor of Veterinary Medicine, or equivalent, degree) – US\$100

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Student Member (currently enrolled in a Nationally recognized veterinary school that awards a Doctor of Veterinary Medicine or equivalent degree, or a graduate veterinarian enrolled in a post-graduate degree program, internship or residency) – US\$25

*Primary Veterinary Degree (to be, or already, awarded e.g. DVM; VMD; BVMS; DEDV; Dr. vet. med.; MVZ, etc) _____

*Year _____; University _____; City _____; Country _____

Veterinary Technician/Nurse Member (must be working under the supervision of a veterinarian) – US\$50

*Name of supervising veterinarian _____; Phone _____; e-mail _____

Affiliate Member (para-veterinary professional (non-veterinarian) graduate of a nationally recognised university or institution of higher education who supports the Mission and Objectives of the Association) – US\$100

*Degree _____; *Year _____; *University _____; *City _____; *Country _____

Allied Veterinary Organization Member (legally formed organization or society whose members are predominantly veterinarians) – US\$500

*Current total number of members _____; *Number (or %) of members that are veterinarians _____;

*Estimated number (or %) of members involved with aquatic veterinary medicine (any species or disciplines) _____

Membership Annual Dues Payment Options

(New members joining in November/December will be considered paid through December 31 of the following year)

Check One Payment Option: Please send me an Invoice , accept enclosed cheque # _____, or charge the credit card below for the total amount of US\$ _____

Please return this form to:

Dr. Nick Saint-Erme (Treasurer)
3845 W. Calle Lejos
Glendale, AZ 85310
e-Mail: Saint-Erme@Q.com

Please charge my:

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Card Security Code _____ Signature _____

All membership applications or renewals will receive an e-mail confirmation once processed.

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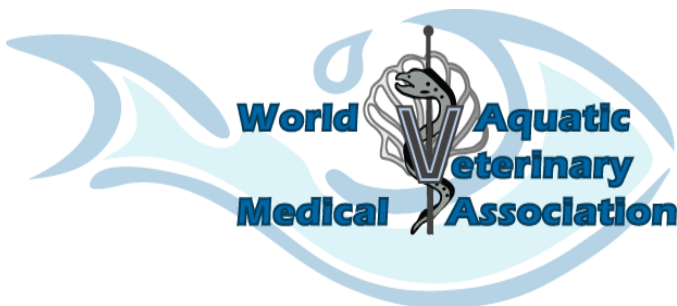
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One Profession; One Discipline; One Voice—Cohesive & Inclusive!

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.

Aquatic Vet News

Instructions for Authors and Contributors

Do you want to make an impact and a contribution to aquatic veterinary medicine? If so, consider becoming a regular or periodic contributor to the quarterly *Aquatic Vet News*.

Help make the *Aquatic Vet News* the source for pertinent and important news. If you would like to be an Associate Editor or have material published in AVN, contact Nick Saint-Erne (Saint-Erne@Q.com).

We particularly invite contributions for (and Associate Editors to assist with) the following regular columns:

Aquatic Vet Q&A

Short description of a problem and solution to an issue – if you don't have the solution, ask the questions and let readers submit solutions for the next issue.

Clinical Cases

Clear description of a distinct clinical case or situation and how those were resolved.

Book Reviews

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

Legislative & Regulatory Issues

Description of legislation or regulations with information on how to access further details.

Externships, Internships & Residencies

Description with specific contact information for veterinary student externships and post-graduate internships or residencies at private practices, institutions, universities or organizations.

Meetings & CEPD Opportunities

Description of upcoming aquatic veterinary educational meetings noting the meeting title, dates, location, and contact person or website.

Jobs Available

Description of available full or part-time employment for aquatic veterinarians.