



# FISH HEALTH NEWSLETTER

American Fisheries Society/Fish Health Section

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## **President's Report:**

August 2006

My term as President is fast coming to an end and I am very proud to have served for what seems like a very short one-year term. Our section is one, I can assure you, that the parent society is very proud of and supports wholeheartedly. There are issues that we continue to struggle with, concerning the changing landscape of the fish health profession, but we have to push on and do the things that we have always done well. The Bluebook is an extremely valuable resource that Fish Health labs and Veterinary Diagnostic labs are finding indispensable in conducting diagnostic tests, certifications and inspections. Our various forms of communication are constantly being improved and I applaud the efforts of our editors of the Newsletter (Lora Petrie-Hanson), Listserve (Jerri Bartholomew), and website (Ben LaFrentz) for the excellent job they do. The Journal of Aquatic Animal Health continues to publish high quality articles that are of interest to fish health scientists worldwide. All in all I would say our section is in very good shape. Membership continues to be a concern, however, and I appreciate the efforts of everyone for spreading the word concerning the benefits of section membership. Our web site now includes a "Student Info" page that is designed to provide students with information on the benefits of student membership in the Fish Health Section. We also have a new poster that should be displayed at meetings and new brochures made available to interested parties. Student recruitment is also a goal of the parent society so we are in line with their desires for increasing membership.

### **Support for the National Coordinator for Aquaculture New Animal Drugs**

Financial support was provided to the National Coordinator for Aquaculture New Animal Drug Applications. This program, headed by Roz Schnick, has the goal of improving the availability of drugs approved by the U.S. Food and Drug Administration for use on aquatic species.

## International Symposium on Aquatic Animal Health

The 5<sup>th</sup> International Symposium on Aquatic Animal Health (ISAAH) is being held September 2-6, 2006 at the Marriott, San Francisco, California. I would like to take this opportunity to thank the Program Committee chairs, Vicki Blazer and Pete Taylor along with the program committee, Diane Elliott, Andy Goodwin, and Sue Marcquenski for their hard work in putting together a very strong group of plenary speakers and special sessions. I would also like to thank Ron Hedrick and Bev Dixon for local arrangements and fundraising in California and Ron Thune for fundraising efforts. The details of the program are on the website. If you recall from previous meetings the range of topics can be very wide and can encompass all areas of aquatic animal health. The annual meeting of the Fish Health Section is combined with the ISAAH in 2006. The EXCOM meeting will be held at 2:00 PM on Saturday, September 2 in room Pacific A and the Annual Business Meeting will be held on Tuesday, September 5 at 5:15 PM in Yerba Buena 5 followed by the awards ceremony.

Best Wishes to all for a productive 2006 and I look forward to seeing everyone in San Francisco!

John Hawke  
President FHS

### **Meetings and Workshops:**

#### **5<sup>th</sup> International Symposium on Aquatic Animal Health**

The 5<sup>th</sup> ISAAH will be held on September 2-6, 2006 in San Francisco, California USA. The symposium program will emphasize the multidisciplinary nature of aquatic animal health. You are invited to contribute and share experiences and expertise from around the world. The program includes 12 plenary lectures, more than 200 oral presentations, and up to 150 posters. Plenary lectures by outstanding speakers of international stature will address topics of broad interest. Oral presentations (15 minutes) will run as 3 concurrent sessions. Posters will be presented over a 3-day period and will include in-session activities.

Specific information about the symposium (including the program overview, presentation topics, online registration, travel information, call for papers, tentative symposium schedule, and online abstract submission) can be found at the symposium website: [http://www.fisheries.org/fhs/isaah\\_2006.htm](http://www.fisheries.org/fhs/isaah_2006.htm). New information regarding the program has recently been updated. Please visit this website for the latest news and announcements as they will be updated periodically.

#### **60<sup>th</sup> Annual Southeastern Association of Fish and Wildlife Agencies Conference**

The Virginia Department of Game and Inland Fisheries (VDGIF) invites you to the 60<sup>th</sup> Annual Southeastern Association of Fish and Wildlife Agencies Conference at the Marriott and Sheraton Norfolk Waterside Hotels, Virginia, November 5-8, 2006. Reservation and hotel information will become available online at <http://seafwa2006.org/>.

The fisheries session will include: 1) Oral presentations of peer-reviewed manuscripts to be published in the Southeastern Proceedings; 2) Oral presentations of unpublished studies (limited to space available on the program); and 3) Posters. Manuscripts on marine, estuarine, and freshwater fisheries topics, including but not limited to, management, research, and culture are encouraged. Case histories are particularly encouraged. Poster abstract submissions must be submitted to Jeff Trollinger, VDGIF, 4010 West Broad Street, Richmond, VA 23230; (804)367-8747, [Jeff.Trollinger@dgif.virginia.gov](mailto:Jeff.Trollinger@dgif.virginia.gov). Poster size cannot exceed 4' x 8'. Students: Indicate if you wish to be considered for best student poster award.

Our conference theme, Wildlife Management in the Next New World, was designed to focus the spotlight on the many struggles that natural resources managers have trying to balance conflicting demands on wildlife resources. Today, people and wildlife struggle to live in harmony. In keeping with this theme we would like to extend a special invitation for papers, posters, and workshops that discuss fishery management issues in relation to increasing demand on aquatic resources.

The deadline for submitting manuscripts is April 28, 2006. Manuscripts must follow SEAFWA instructions to authors guidelines, available in past issues of the annual proceedings, at the Virginia SEAFWA 2006 website (<http://seafwa2006.org/>), or by contacting the Fisheries Associate Editor (Dr. John Galvez) or Fisheries Program Chair (Dan Michaelson). Please submit four hard copies of your manuscript to the Fisheries Associate Editor. Submissions must include the title, author(s) names, work address and telephone number, and e-mail address of the contact author.

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### **SHORT COURSE: HEALTH MANAGEMENT OF LABORATORY FISH 2006**

The short course Health Management of Laboratory Fish will be held September 18 - 22, 2006 at the seaside Mount Desert Island Biological Laboratory near Bar Harbor, Maine. The course is still accepting registrations.

Health Management of Laboratory Fish is a hands-on, techniques-driven, short course to help technical staff, graduate students, postdoctoral fellows, junior faculty and investigators monitor the health of a colony of aquatic organisms, primarily zebrafish.

Topics covered include:

Fish Disease: identification, treatment & management  
General training: anatomy, histology and necropsy techniques  
Core management: water quality, facility considerations  
Species covered: Zebrafish, also Fundulus, Medaka, Elasmobranchs

Faculty include:

Paul Bowser, PhD  
Professor of Aquatic Animal Medicine  
Cornell University College of Veterinary Medicine

Mike Kent, PhD  
Director, Center for Fish Disease Research  
Professor, Dept. of Microbiology  
Oregon State University

Jan Spitsbergen, DVM, PhD  
Diplomate American College of Veterinary Pathologists  
Center for Fish Disease Research and  
Marine/Freshwater Biomedical Sciences Center  
Oregon State University

Tuition: \$2,000 (includes on-campus housing and all meals); \$1800 (on campus-housing not included); Course fellowships up to \$800 are available for technicians, students, postdoctoral fellows and junior faculty to help defray the cost of tuition. If you would like to be considered for a course fellowship, please indicate your need and rationale in the 'rationale' section of the preregistration. Further questions about eligibility should be directed to Mike McKernan, Director of Education and Conferences ([mmckernan@mdibl.org](mailto:mmckernan@mdibl.org)).

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## **FISH AND CHELONIAN DIAGNOSTIC ENDOSCOPY**

SAT 2ND & SUN 3RD DECEMBER 2006

ATHENS, GEORGIA

This 15 hour continuing education course is designed to teach the theory and practical applications of diagnostic endoscopy in fish (including koi and catfish) and aquatic chelonians.

Whether you are a private practitioner, zoo/aquarium/wildlife veterinarian, or researcher this course will train you to perform minimally-invasive endoscopic procedures including biopsy techniques in fish and turtles. The course will include PowerPoint video lectures and practical instruction in gastro-intestinal, respiratory, and coelomic endoscopy. Special emphasis will be placed upon equipment selection, animal preparation, endoscopic identification of tissues and organs, and the collection of biological samples for disease diagnosis and research purposes.

In addition, there will over 8 hours of practical wet-lab time to practice and develop endoscopy skills in anesthetized (non-recovery) farmed koi, catfish and red-eared sliders (terrapins). All procedures approved by the UGA Institutional Animal Care and Use Committee.

Refreshments, lunch, certificate of training, and full color printed course notes containing all tutorial materials will be provided. Limited to 16 veterinarians. \$750 for veterinarians, \$150 for accompanying technicians.

Register on-line at <http://www.georgiacenter.uga.edu/conferences/2006/Dec/02/fish.phtml>

For registration details contact  
Sandi Kilgo at Tel 1-706-542-1451, Email: [skilgo@vet.uga.edu](mailto:skilgo@vet.uga.edu)  
[www.gactr.uga.edu/conferences](http://www.gactr.uga.edu/conferences)

## **Announcements:**

### **News from the Aquatic Veterinary Medicine Committee**

-New FDA approval for oxytetracycline use in lobster feeds: The Food and Drug Administration (FDA) is amending the animal drug regulations to reflect approval of a supplemental new animal drug application (NADA) filed by Phibro Animal Health. The supplemental NADA provides for the approval of the dihydrate salt of oxytetracycline in their Type A medicated article used in aquaculture feed, a change of oxytetracycline concentration in the Type A medicated article, and the addition of an indication for control of gaffkemia in lobsters.

-The Minor Use and Minor Species (MUMS) Animal Health Act of 2004 (<http://www.fda.gov/cvm/minortoc.htm#Laws> ) amended the Federal Food, Drug, and Cosmetic Act to authorize the Food and Drug Administration (FDA) to establish new regulatory procedures intended to make more drugs legally available to veterinarians and animal owners for the treatment of minor animal species and uncommon diseases in major animal species. FDA is issuing proposed regulations to implement Section 572 of the Act entitled "Index of Legally Marketed Unapproved New Animal Drugs for Minor Species" ("the Index".) These regulations propose administrative procedures and criteria for index listing a new animal drug for use in a minor species. Such indexing provides a basis for legally marketing an unapproved new animal drug intended for use in a minor species. Minor species are all animals other than the major species (cattle, horses, swine, chickens, turkeys, dogs, and cats), for example, sheep, goats, honey bees, zoo animals, ornamental fish, parrots, ferrets, and guinea pigs. However, the "Index" is limited to nonfood-producing minor species with a limited exception for some early life stages of food animals, such as fish eggs.

### -APHIS Emerging Disease Notice

Viral hemorrhagic septicemia (VHS) has historically been considered to be the most serious viral disease of salmonids reared in freshwater environments in Europe. More recently, VHS has been associated with marine finfish species, and most recently has become an emerging disease of freshwater fish in the Great Lakes region of the United States and Canada. VHS was first detected in the Great Lakes region in the Bay of Quinte , Lake Ontario , in 2005, and was subsequently detected in an archived 2003 sample from Lake St. Clair . VHS virus also was detected in Lake St. Clair in 2005 and in Lake Ontario , Lake Erie , Lake St. Clair and the St. Lawrence River in 2006 in a variety of fish species. Prior to 2003, isolations of VHS virus were limited in North America to saltwater finfish from the Atlantic and Pacific Oceans, including Chinook and Coho salmon, Pacific herring, Atlantic herring and cod. Since 2005, the list of species

known to be affected by VHS has risen to more than 40, including a number of ecologically and recreationally important fish.

This Emerging Disease Notice describes the current status of viral hemorrhagic septicemia in the U.S, focusing on the 2005 and 2006 outbreaks in the Great Lakes area. This notice also quantifies trade and production statistics for relevant fisheries products and aquaculture resources and provides a qualitative assessment of potential risks and impacts of this disease in the event that it affects aquaculture fish species.

-First Report of Koi herpesvirus in Texas. G. M. Southard and L.T. Fries

Koi herpesvirus (KHV) was detected in a common carp, *Cyprinus carpio*, collected from a fish kill during May 2006 at Twin Buttes Reservoir near San Angelo, Texas. Also known as carp nephritis and gill necrosis virus (CNGV), KHV is highly contagious, infects both common carp and ornamental koi carp, and can result in high mortality rates.

### **New Aquaculture Titles Now Published:**

#### **Systemic Pathology of Fish:**

#### **A Text and Atlas of Normal Tissues in Teleosts and their Responses in Disease**

*edited by*

**Hugh W. Ferguson** *BVM&S, PhD, DipACVP, MRCVS, FRCPath.*

**Professor and Chair of Diagnostic Pathology and Microbiology, Institute of Aquaculture, University of Stirling, Scotland.**

The much anticipated *second edition* of this highly acclaimed book is now available. It has been expanded to 368 pages and almost 700 figures, including light, scanning and transmission electron micrographs. It retains the *hardback* specialty-bound format of the first edition, but it is now in *full colour* on high quality non-reflective paper (silk, 130 gsm), with integrated text and figures, and it has a larger page size of 195 x 273mm in order to make best use of the illustrations, some of which are half or full page. Numerous high quality images of fish have been used to separate and introduce the chapters, in order to enhance readability and overall appearance. As before, the book is not intended to be simply a list of aetiologies found in various species under differing environments. Instead, the systemic approach to understanding disease has been maintained, with chapters on all organ systems, and descriptions on how involved tissues respond to a variety of insults. With the addition of an extra chapter on pathophysiology, there are now 14 chapters overall, each with selected references, plus an index. There has been no compromise on quality in the production of this book, and a serious attempt has been made to blend aesthetics with scientific rigour and ease of use.

The list of contributing authors has also been expanded, and includes:

*Ellen Bjerkås, Øystein Evensen, Hugh W. Ferguson, Salvatore Frasca Jr, Erling Olaf Koppang, John F. Leatherland, John S. Lumsden, Daniel Martineau, Edward J. Noga, Trygve T. Poppe, Mark Powell, Renate Reimschuessel, David J. Speare and Jimmy Turnbull.*

It is published by **Scotian Press**, a new publishing company dedicated to the production of high quality textbooks for the veterinary and scientific community. The price is **£125.00** or **£140.00** for a single copy, depending on the delivery method chosen (*Business Post* or *DHL* courier delivery included in the price). Reduced prices are available to

professional societies and to universities who order multiple copies for their own distribution (contact [admin@scotianpress.com](mailto:admin@scotianpress.com)).

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For a direct look at some sample pages, try <http://www.scotianpress.com/pamphlet/index.html>

### **The Fisheries of North America – Illustrated**

-Information covers 99% (by volume) of North America's commercial/farmed, marine/freshwater, fish/shellfish; as well as many recreational species.

-100 illustrations, 180 tables; includes biological, economic and US and Canadian landing's information (5 years).

-Correct market and scientific nomenclature is highlighted. The preferred common and market names in The Seafood List are referenced to ITIS and FishBase scientific and common names.

-Pre-publication reviews by 26 fish biologists and fish experts from all parts of North America.

-Now in use at more than 100 North American universities and colleges.

-Presently under examination for course adoption at the University of Alaska, UPEI and the NS Dept. of Education.

-Look for upcoming reviews by the American Fisheries Society and the American Library Association.

-New Distributors - Steven Simpson Books (can also be obtained from Blackwell's, YBP, Coutts and others, or - Save Time and Money by ordering on-line).

-For order information, table of contents, index and page samples, see website below:

[ [http://www.marketresearchassociates.com/The\\_Fisheries\\_of\\_North\\_America\\_Description.htm](http://www.marketresearchassociates.com/The_Fisheries_of_North_America_Description.htm) ][http://www.marketresearchassociates.com/The\\_Fisheries\\_of\\_North\\_America\\_Description.htm](http://www.marketresearchassociates.com/The_Fisheries_of_North_America_Description.htm).

## CLSI Releases New Aquatic Veterinary Microbiology Guidelines

*A Global Approach to Improve Quality and Efficiency  
in Aquatic Animal Disease Diagnostic Laboratories*

*Karen Kelty, MBA  
Marketing Manager*

*Clinical and Laboratory Standards Institute*

One of the greatest challenges in the aquaculture world is health maintenance and the control of disease outbreaks. Fish farmers throughout history have tried a range of compounds to treat fish ailments, including salt, asphalt, and brandy.

The last century saw major progress in the isolation and identification of the microorganisms that cause disease in aquatic animals. Concurrent to the advances to diagnose diseases in aquatic species, scientists were developing more effective means of fighting them with the production of antimicrobial substances. While there are currently over 70 known aquatic bacterial pathogens, there are numerous instances where isolated organisms from the aquatic environment remain either partially or completely unidentified.

Susceptibility testing of aquatic bacteria is used when there is a concern that the organism may possess resistance mechanisms against commonly used antimicrobial agents. To adequately assess the effect of antimicrobial use on the aquatic environmental bacteria, it is imperative that standardized methods are developed and that protocols are updated as more data become available.<sup>1,2</sup>

In June 2006, the Clinical and Laboratory Standards Institute (CLSI) released the latest approved-level guidelines for performing susceptibility testing on bacteria isolated from aquatic animals: *Methods for Antimicrobial Disk Susceptibility Testing of Bacteria Isolated From Aquatic Animals; Approved Guideline (M42-A)* and *Methods for Broth Dilution Susceptibility Testing of Bacteria Isolated From Aquatic Animals; Approved Guideline (M49-A)*.

“These documents satisfy a long-time need for standardized susceptibility testing methods in aquaculture. They provide a central core set of testing methods for the aquatic animal medicine field,” says Ron Miller, MS, U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine.

Two commonly used drug susceptibility testing methods exist. In the first type, bacteria are isolated, added to an agar plate, a paper disk saturated with the drug is added to the agar surface, and the inoculated plate is incubated. The distance to which the bacteria are inhibited from growth around the disk corresponds to their level of sensitivity to the drug.

The second type of drug susceptibility testing, the dilution technique, involves bacteria being exposed to varying concentrations of a drug. In broth microdilution tests, the drug is diluted in wells in a microtiter plate. The bacteria are then added to the wells, incubated, and allowed to grow. The lowest drug concentration for which there is no bacterial growth in the wells corresponds to that isolate’s minimal inhibitory concentration (MIC). An MIC can be used to predict the effectiveness of therapy, but should not be used without also considering additional information, including the host-drug interaction and the bacterial pathogen.

The disk diffusion method is the most commonly used laboratory technique for susceptibility testing. It is simple, cost-effective, and easy to perform. However, dilution testing is becoming increasingly popular, since an MIC provides additional information to the clinician regarding the concentration of antimicrobial agents needed to inhibit or eliminate the infectious organism.



CLSI document M42-A provides veterinary microbiologists with the most up-to-date techniques for disk diffusion susceptibility testing of aquatic species isolates. M49-A provides methods for determining MICs of aquatic bacteria by broth micro- and macrodilution.

Both M42-A and M49-A include quality control and quality assurance parameters for both fastidious and nonfastidious aquatic bacterial pathogens; tables outlining antimicrobial agents used in global aquaculture; methods for preparing stock solutions and dilutions of antimicrobial agents; protocols for data comparison between laboratories; and nonfastidious aquatic bacterial pathogen testing.<sup>1,2</sup>

The development process for the guidelines began in 1998 during the *Workshop on MIC Methodologies in Aquaculture*, held in Weymouth, England. Since the workshop, two separate and coordinated multilaboratory studies were initiated to develop the standard methods for susceptibility testing in aquatic animals, taking into account such criteria as incubation conditions and identifying quality control (QC) limits for potential QC strains. As noted on the Department of Microbiology, National University of Ireland, Galway website, “There is a real and very exciting possibility that the final outcome will be methods of truly international acceptability.”

Peter Smith, PhD, from the National University of Ireland, Galway, calls the new CLSI documents “a first essential step in an international effort to develop programs enabling scientists the world over to monitor the spread of antibiotic resistance among aquatic bacteria.”

Smith, who participated in the development of the guidelines, says the extensive collaboration has resulted in “a standard, universal language in which we can investigate the epidemiology of resistance and discuss therapies for the aquatic environment.”

Renate Reimschuessel, PhD, VMD, U.S. Food and Drug Administration (FDA) Center for Veterinary Medicine, explains “The (CLSI) standards themselves provide methods that can be applied globally and have been awaited by the fish medicine community for decades.” These documents include the best thinking of global scientists in the field and their recommendations for conducting susceptibility testing in organisms that prefer or require conditions such as lower temperatures, semisolid media, or supplemented media. Ultimately, these new guidelines allow aquatic animal disease diagnostic laboratories around the world to provide consistent and reliable testing methods, greater accuracy in interpreting results, and the ability to compare quality test data and results among laboratories.

## References

Clinical and Laboratory Standards Institute (CLSI). *Methods for Antimicrobial Disk Susceptibility Testing of Bacteria Isolated From Aquatic Animals; Approved Guideline*. CLSI document M42-A (ISBN 1-56238-611-5).

Clinical and Laboratory Standards Institute (CLSI). *Methods for Broth Dilution Susceptibility Testing of Bacteria Isolated From Aquatic Animals; Approved Guideline*. CLSI document M49-A (ISBN 1-56238-612-3).

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## The use of a portion of the DNA polymerase gene to characterize large DNA viruses

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Many viral pathogens of aquatic animals are poorly characterized. Often a suspect virus agent is reported and described based on the presence of virus like particles in electron micrographs. If a suspected new virus could be cultured, morphology, physical characteristics, growth characteristics and antigenic nature were determined. Usually, because of limited time and money, this characterization is limited to viruses that are associated with an important disease. A large percentage of viruses are either unculturable, difficult to culture, or are not associated with a disease of enough importance to justify in-depth characterization or development of reliable serological reagents. Even with culturable viruses, confirmative diagnosis is often not done because of a lack of diagnostic antibodies or PCR assays. Therefore, the development of broad spectrum diagnostic methods that obviate culture are needed as well as methods to bypass the cumbersome traditional methods of characterizing culturable viruses.

In a recent report we describe the development and application of a method for characterizing large DNA viruses and adenoviruses (Hanson et al. 2006)(available on-line at <http://www.virologyj.com/content/3/1/28>). The method is based on a combination of selective DNA extraction (the packaged virus genome is DNase resistant), the use of degenerate PCR primers to target conserved regions of the DNA polymerase gene, cloning the PCR product and sequencing it. We demonstrated the utility of this assay for case isolates of fish herpesviruses, ranaviruses and lymphocystis viruses. Also, the method was applied to case isolates of fowl adenoviridae and avian poxvirus (with modification). This method worked well on cell culture isolates and tissue extracts. The assay had an added advantage in that the DNA polymerase is the subject of several evolution studies (Braithwaite and Ito 1993; Ito and Braithwaite 1991; Villarreal and DeFilippis 2000) providing a readily available database of virus and bacteriophage sequences. Searching the GenBank nr database for related sequences is simply a matter of performing a BLAST (Altschul et al. 1990). I have found that BLASTn is a rapid search for closely related viruses, and translating the sequence and applying the amino acid sequence to BLASTx provides a rapid analysis of approximate relationships to other viruses. Not only does the method allow identification or approximate grouping of the viral agent, but also this process provides sequence data of sufficient size for developing species specific primers for diagnostic PCR.

By targeting a common region of the genome the fish health community can build on the publicly available database by simply submitting the sequences to GenBank. This methodology has been recently applied in several papers addressing fish herpesviruses in disease etiology, and taxonomic placement (Goodwin et al. 2006; Kelley et al. 2005; Waltzek et al. 2005). The method has resulted in new GenBank files for 13 different large DNA viruses in fish. Slight modifications of the method (different primer sequences) would allow this method to be effectively applied to large DNA viruses of crustaceans and mollusks.

### References

- Altschul, S. F., W. Gish, W. Miller, E. W. Myers, and D. J. Lipman. 1990. Basic local alignment search tool. *Journal of Molecular Biology* 215(3):403-10.
- Braithwaite, D. K., and J. Ito. 1993. Compilation, alignment, and phylogenetic relationships of DNA polymerases. *Nucleic Acids Research (Online)* 21(4):787-802.
- Goodwin, A. E., L. Khoo, S. E. Lapatra, C. Bonar, D. W. Key, M. Garner, M. V. Lee, and L. Hanson. 2006. Goldfish Hematopoietic Necrosis Herpesvirus (Cyprinid herpesvirus 2) in the USA: Molecular Confirmation of Isolates from Diseased Fish. *Journal of Aquatic Animal Health* 18:11-18.

- Hanson, L. A., M. R. Rudis, M. Vasquez-Lee, and R. D. Montgomery. 2006. A broadly applicable method to characterize large DNA viruses and adenoviruses based on the DNA polymerase gene. *Virology Journal* 3(1):28.
- Ito, J., and D. K. Braithwaite. 1991. Compilation and alignment of DNA polymerase sequences. *Nucleic Acids Research (Online)* 19(15):4045-57.
- Kelley, G. O., T. B. Waltzek, T. S. McDowell, S. C. Yun, S. E. Lapatra, and R. P. Hedrick. 2005. Genetic relationships among herpes-like viruses isolated from sturgeon. *Journal of Aquatic Animal Health* 17:297-303.
- Villarreal, L. P., and V. R. DeFilippis. 2000. A hypothesis for DNA viruses as the origin of eukaryotic replication proteins. *Journal of Virology* 74(15):7079-84.
- Waltzek, T. B., G. O. Kelley, D. M. Stone, K. Way, L. Hanson, H. Fukuda, I. Hirono, T. Aoki, A. J. Davison, and R. P. Hedrick. 2005. Koi herpesvirus represents a third cyprinid herpesvirus (CyHV-3) in the family Herpesviridae. *Journal of General Virology* 86(Pt 6):1659-67.

## **Fish Health Newsletter – Editorial Policy**

The *Fish Health Newsletter* is an electronic publication of the Fish Health Section of the American Fisheries Society and is available for downloading in Adobe pdf file format. Submissions on any topic of interest to fish health specialists and preliminary case reports are encouraged with the understanding the material is not peer-reviewed. Abstracts submitted to the *Journal of Aquatic Animal Health* are also encouraged. Submissions must be formatted in Microsoft Word, WordPerfect, or Rich Text Format, and can be sent by electronic mail or via 3.5” floppy disk to the editor’s address below. **Graphics files should be sent separately in jpeg format.**

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