Fish Health Newsletter

Fish Health Section/American Fisheries Society

January 2000 **Volume 28, Issue 1**

PRESIDENT'S REPORT

HAPPY NEW YEAR/ MERRY MILLENNIUM

The beginning of the new year will mark some changes, updating, and new endeavors for the Fish Health Section. As described in the December 1999 volume of the *Journal of Aquatic Animal Health*, our co-editors Ron Hedrick and Steve Kaattari plan to introduce a new format presenting a "feature" article by an invited author in each journal issue. The newsletter editors are planning to include reprints of these articles in selected issues of the newsletter. We hope that you enjoyed getting a reprint in the October newsletter, and we look forward in continuing to provide timely reprints as a feature of the newsletter.

The FHS with the help of staff assistance and funding from the Whirling Disease Foundation will facilitate and review a set of recommended methodologies for WD research. A Whirling Disease Research Standardization Committee, established at the last meeting (Feb.1999), is developing a set of research protocols for whirling disease studies which the FHS will publish in print form and on our website. Hopefully, the Whirling Disease document will be the beginning of a series of "Technical Papers" published by the FHS.

Plans are well underway for this year's annual conference in Pensacola, Florida, organized by President-elect Mike Kent and Jack Fournie. Mark your calendars for what promises to be an event featuring great science, great friends, warm sand, and cold beer! The Fourth International Symposium on Aquatic Animal Health is planned for 2002 in New Orleans. Ron Thune at Louisiana State University, has graciously agreed to organize this important international conference on behalf of the FHS.

The members of the FHS Executive Committee have had several discussions on the updating of the Blue Book. Bill Klontz and Ron Goede were selected to review and prepare guidelines especially for Fish Inspectors. Portions of the fourth edition are in the process of being updated, and will be available in the

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In this issue:

OBSERVATION OF GLUGEA PIMEPHALES IN WYOMING

D. J. Money, K. Bardsley, and M. Stuart. Wyoming Game and Fish Department Laboratory, Laramie, WY.
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In August of 1999, University of Wyoming toxicological researchers observed a sharp decline in spawning activity of their captive fathead minnow population and a coinciding chronic low-level mortality in adult males duing the summer of 1999. Facility records indicated that the suspect fish had been developed from two commercial and one wild stock. Laboratory investigation into the cause of the loss suggested that the sick adult females showed classic clinical signs of an internal microsporidian infection (abdominal distention with large xenomas). Similar observations of microsporidiasis by Glugea have been noted previously in both wild (Mitchum 1995) and propagated fathead minnows (Morrison et al. 1985).

Interestingly, many of the surviving adults examined from this group of fish showed no apparent gross signs of the parasite, but did display subtle areas of hemorrhage near the vent with an accompanying emaciated appearance. Juvenile fish in this study appeared normal and expressed no obvious clinical signs of disease.

Dissection and microscopic examination of the morbid females revealed 3 to 5 large white xenomas (up to 3 mm in diameter) occurring in the gonadal and mesenteric region. Also two forms of xenomas, both a rigid calcified and a more elastic “balloon – like” structures, were identified. Xenomas appeared to be free floating within the organ tissue mass without any apparent physical attachment to body tissues. Necropsies of the adult males from this population revealed no signs of disease or spores. Xenomas were composed of circular patterned clusters (32 spores or less) or compressed packets of spores (1,000 or more spores).

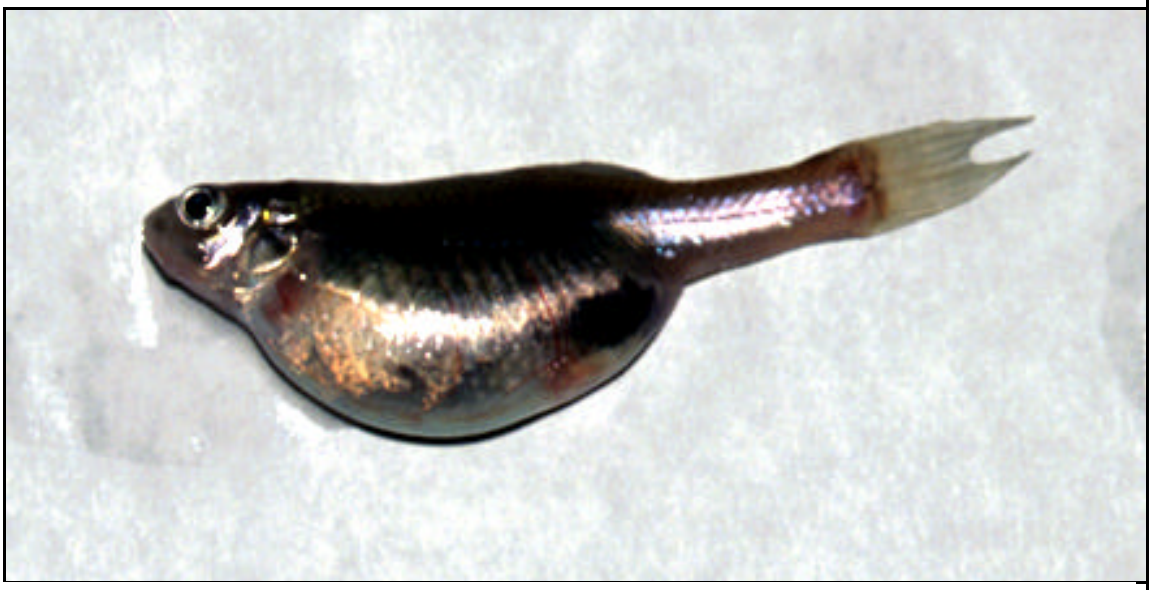

Figure 1. Mature female fathead minnow showing abdominal distention resulting from xenomas of *Glugea pimephales*.

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Fresh spores ranged from smaller forms (2.5 um x 2.5um x 5.0 um) to larger forms (2.5 x 3.0 um x 8.8 um). Both ovate and piriform (pear-shaped) shapes were dispersed throughout the xenomas. No “free” spores were found in body tissues or fluids during the preliminary examination.

Initially it was suspected that the bacteria Cytophaga sp. caused the hemorrhagic areas observed near the vent on surviving fish. However, the associated emaciation observed in this case is not likely to be due solely to a bacterial infection. A more probable mechanism would be the resulting increase in internal pressure caused by the bursting of spore filled xenomas within ascitic fluid which could in turn force a rupture in the integument of the rectum.

Following the discovery of the parasite, the rearing facility was depopulated and decontaminated with chlorine (5,000 ppm).

References:

- Mitchum, D.L. 1995. Parasites of Fishes in Wyoming. Wyoming Game and Fish Department. p. 31.
- Morrison, C., G.L. Hoffman, and V. Sprague. 1985. Glugea pimephales Fantham, Porter and Richardson, 1941, n. comb. (Microsporidia, Glugeidae) in the fathead minnow, Pimephales promelas. Can. J. Zool. 63: 380-391.

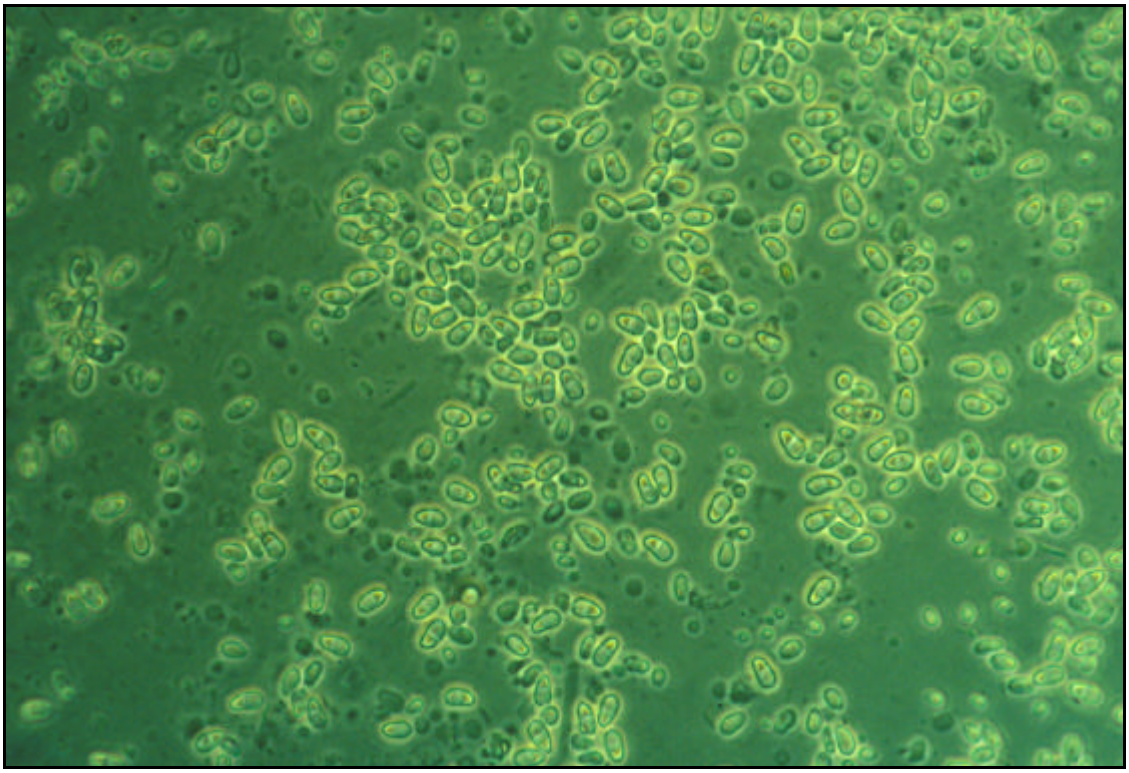

Figure 2. Squash preparation of *Glugea* xenoma showing ovate and piriform spore types. Phase contrast.

Editorial:

Moving Forward

Ronald P. Hedrick and Stephen A. Kaattari

Journal of Aquatic Animal Health

Introduction We are very enthusiastic about the future direction for the *Journal of Aquatic Animal Health* as it moves forward into the 21st century. The Society's new Executive Director, Dr. Gus Rassam, has strongly affirmed his support for the JAAH and has expressed a commitment to have the journal grow in stature and size within the next few years. Our enthusiasm is bolstered by several tangible and noteworthy developments.

The journal is back on schedule and now has the fastest turnaround (i.e., the time from submission of a paper to publication) of all the American Fisheries Society journals. The mean turnaround for papers published in this issue is less than a year.

We have begun recruiting cutting-edge research papers and review articles to be featured as lead papers in future issues of the journal. Readers will see the fruits of this effort early next year.

Of importance to many of our authors, the journal's page charges are being phased out over the next 3 years. If existing page-charge requirements are a problem for you now, be aware that page-charge waivers are available to all members of the American Fisheries Society who have insufficient grant or institutional funds to cover these charges. Limited funds should not be a deterrent to publishing in the *Journal of Aquatic Animal Health* or any other AFS journal.

As you probably know, the *Journal of Aquatic Animal Health* and the three other AFS journals are now available on the Web (http://afs.allenpress.com). This means much broader exposure for your JAAH publications through a common searching and browsing mechanism used by people outside the traditional fields of aquatic animal health.

Representing the Editorial Board and the journal's editorial staff, we are excited about the plans to transform the JAAH into the premier aquatic animal health journal and to promote it as a forum for the exchange of the latest developments in the fish, shellfish, and aquatic animal health sciences. We encourage all of you, and especially members of the AFS Fish Health Section, to make the *Journal of Aquatic Animal Health* your first choice for publication of research papers, review articles, and short communications.

Journal of Aquatic Animal Health 11:311–311, 1999

CHANGE OF ADDRESS

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John Schachte has a new email address associated with connection to the NYSDEC network. His new address is: jhschach@gw.dec.state.ny.us

WORKING GROUP ON AQUACULTURE

The introductory meeting of the Working Group on Aquaculture (WGA) will take place on January 11, 2000 in conjunction with the meeting of the Subcommittee on Veterinary Antimicrobial Susceptibility Testing, in Orlando, FL.

The working group, headed by Tom Bell (US Fish and Wildlife Service, Div. of Fish Hatcheries, Arlington, VA) is a 10 member panel of international scientists representing various interests within the aquaculture community. The members are: Jeff Watts (VAST Representative), Clyde Thornsberry (VAST Representative), Beverly Dixon (California State University, Hayward, CA), Gilles Olivier (Department of Fisheries and Oceans, New Brunswick, Canada), John Hawke (Louisiana State University, Baton Rouge, LA), Tom Baldwin (Washington State University, Pullman, WA), Emmett Shotts (Leetown Fish Disease Laboratory, Kearneysville, WV), Peter Smith (National University of Ireland, Galway, Ireland), Takashi Aoki (Tokyo University of Fisheries, Tokyo, Japan), and Jeremy Carson (Dept. of Primary Industries, Water and Environment, Tasmania, Australia.

The objective of the Aquaculture Working Group is to produce the National Committee on Clinical Laboratory Standards (NCCLS) Document M42, tentatively entitled: "Performance Standards for Anti-microbial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Aquatic Animals.

*(**President's Report** - Continued from page 1)*

not too distant future. We are also discussing a new category of certification designed for veterinarians.

One last note, as some of you already know I received a Fulbright Lecture Award and will be leaving at the end of January for Poland. I will be teaching a Fish Health Management course from February through June at the University of Agriculture and Technology in Olsztyn, Poland. Seems a little ironic that I will be teaching a fish disease course in Poland, the homeland of our mentor, Dr. Snieszko. To maintain continuity in the newsletter, Chris Wilson, our formatting editor, has agreed to perform my duties as text editor. Please send your April and July newsletter contributions to Chris via e-mail at cwilson@sisna.com. I will maintain my local e-mail address and also have an e-mail address in Poland, so please feel free to contact me or visit.

The new year promises to be a busy and exciting time for the FHS, new ideas, new adventures and new discoveries! With your continuing support the FHS will remain a leader in the international fish health community.

Happy New Year and Best Wishes for a Happy, Healthy, and Prosperous 2000! From Poland "*Szczesliwego Nowego Roku i Wszystkiego Najlepszego*".

Beverly Dixon, President

UPCOMING MEETINGS

25TH ANNUAL EASTERN FISH HEALTH WORKSHOP APRIL 10-14, 2000

In the year 2000, the Eastern Fish Health Workshop ushers in a new millennium while celebrating its 25th Anniversary. The National Fish Health Research Laboratory (Kearneysville, WV) is especially proud to host this gala celebration at The John Carver Inn, in Plymouth, Massachusetts. Registration will begin on Monday, 10 April from 5:00 - 7:00 p.m., followed by three full day sessions, 11, 12, and 13 April.
PLEASE NOTE: Not only will there be a complete session on the final day (Thursday,13 April) but that evening will also feature our special Anniversary Banquet with professional entertainment (included in the registration package). Therefore, we encourage you to please make your departure plans for Friday, 14 April.

Sessions will include oral presentations of research studies and clinical reports as well as workshops on current trends in warmwater aquaculture and coral reef diseases. Lodging accommodations must be made with The John Carver Inn at (508) 746-7100 or (800) 274-1620. Check-in time is 3 p.m. and check-out time is 11:00 a.m. The Inn has graciously honored our room rate of two years ago at $60.00 + 9.7% room tax/night for either single or double occupancy. Identify your affiliation with the Eastern Fish Health Workshop to secure reservations at these prices before 1 March 2000. You can visit the Inn at http:\\media3.com/johncarverinn and take a step back in history to review the birth of America and explore the attractions of this New England seaport at http:\\bestreadguide.com\plymouth\index.html. A $105.00 registration fee (U.S. currency equivalent) includes workshop proceedings, refreshments/breaks, continental breakfasts and luncheons on each day of the proceedings, a catered get-acquainted reception on Tuesday evening, and the 25th Anniversary Banquet on Thursday night. Please make checks payable to the "Eastern Fish Health Workshop c/o Rocco Cipriano" and return payment with your completed registration form by 15 March 2000. Contracts for food services necessitate a late registration fee of $120.00 after this date.For additional information, contact: Dr. Rocco C. Cipriano,National Fish Health Research Laboratory, Kearneysville, WV 25430

Mark your Year 2000 Calendars!

The **41st Western Fish Disease Workshop** will be hosted by Washington Department of Fish and Wildlife at the Inn at Gig Harbor, Gig Harbor, Washington on **June 28 and 29, 2000**. On **June 27,** an AFS/FHS **continuing education class** will held at the same location. A call for papers and more information will be forthcoming. For more information contact Steve Roberts at 509-255-5907 or robersdr@dfw.wa.gov.

THE AFS/FISH HEALTH SECTION 2000 ANNUAL MEETING

will be hosted by Jack Fournie (U.S. EPA) and Vicki Blazer (USGS). The meeting will be held at the Hampton Inn, Pensacola Beach Florida on **September 6-8, 2000**. A continuing education seminar on oyster diseases is being planned in conjunction with the meeting.

A call for papers and details concerning the meeting schedule and registration will be provided in the April newsletter or on the Fish Health Section web page. For more information contact Jack Fournie at fournie.john@epa.gov or 850-934-9272.

CALL FOR FISH HEALTH SECTION AWARDS

S.F. Snieszko Distinguished Service Award - the highest award of the FHS. Dr. S.F. Snieszko stands as one of the most prominent figures in the establishment of the modern fish health sciences in the U.S.A. and internationally. This award is presented to individuals to honor their outstanding accomplishments in the field of fish health. This is a career achievement award. The nomination must be made by a current member of the FHS to the awards committee. The nomination should consist of a current curriculum vitae of the nominee, a letter of nomination and six letters of recommendation that support the nominee=s dedication and contributions to research, teaching and/or service in fish health. **Nominations will be accepted until June 1, 2000.** Also see enclosed flyer about this year's winner.

Special Achievement Award - award for a significant accomplishment in the field of fish health. This award is presented to a FHS member who has in the past year made a significant accomplishment in basic or applied fish health. The achievement must meet a high standard of science as determined by peer review. Candidates for this award must be nominated by a current FHS member. The letter of nomination should state the accomplishment, its importance to the science of fish health, and the implications of the accomplishment (regional, national or international). Copies of articles and other supporting documents should be submitted with the nomination. The nomination may be submitted any time within one year of the accomplishment to the awards committee.

Send nominations to: Dr. John Fryer, FHS Awards Committee, Dept. of Microbiology, 220 Nash, Oregon State University, Corvallis, OR 97331-3804.

Applications for **S.F. Snieszko Student Travel Award** are being **accepted until April 1, 2000**. This travel award was established to help students attend and present a paper at the FHS annual meeting. Applicants must be AFH/FHS members. Submit a letter of application (including a statement of reason travel support is needed), a curriculum vitae, three letters of recommendation, an itemized budget (travel, meals, lodging and registration) and a copy of the abstract of the paper to be presented. Funds are limited and the award will be based on quality of abstract, importance of the findings, academic and professional achievement and financial need. Send applications to Dr. John Fryer, FHS Awards Committee, 220 Nash, Oregon State University, Corvallis, OR 97331-3804.

FHS Student Paper Award - an award will be presented to a student whose paper is being presented at the National Meeting to be held in Pensacola, FL. Selection will be made by 3 judged (to be appointed prior to the meeting) based on (a) scientific content, (b) scientific merit of the research, (c) originality and (d) quality of presentation. Please note on your application if you wish to have you paper judged.

MINUTES FROM EX-COM MEETING

A mid-year meeting of the Executive Committee was held in Corvallis, OR Dec. 13-14, 1999. Attending were President Beverly Dixon, Past-president Scott LaPatra, President-Elect Mike Kent and Vice-President Jerri Bartholomew. Under old business, it was reported that copies of the new FHS brochure, produced by Pete Taylor, were ready for distribution and that the traveling display is being developed. Also available are brochures on the JAAH and affiliate membership forms. Anyone who will be attending meetings and willing to distribute this information please contact the secretary, Ana Baya at 301-935-6074, or ambaya@wam.umd.edu.

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Plans for the 2002 International Symposium in New Orleans are underway, with Ron Thune as the meeting=s coordinator. The ambitious efforts of the previous symposium organizers, Sarah Poynton and Andrew Kane, resulted in a symposium fund that will be maintained for to provide start-up funds for the international symposia series. Plans for the national 2000 meeting are well underway, with Jack Fourney hosting in Pensacoloa, Florida. The proximity of this meeting to a varied aquaculture and ornamental fish industry should result in a scientific agenda with a broad range of interests represented. A tiered registration fee will be tried this year to encourage section membership. Potential sites for the 2001 annual meeting of the FHS were also discussed.

There was considerable discussion on maintaining relationships with other agencies with interests in aquatic animal health, including the USAHA, the AVMA, the IAAAM and the WAS. Suggestions for ways that the FHS could benefit members with veterinary and diagnostic backgrounds included a new certification status, revival of roundtable discussions and continuing education courses with a point system and methods for documentation.

Blue Book revisions were discussed and a series of options formulated for discussion and vote. A new committee, consisting of Bill Klontz and Ron Goede was selected at the annual meeting in June to begin developing an outline. The primary concern about the present format is that it doesn=t meet the needs for inspection and certification and these will be addressed in the revision. It is expected that a plan will be adopted and the revisions underway before the next annual meeting.

A lack of response in recent years to calls for nominations for awards in the FHS section has also been of concern. The section has two awards for service and a student travel award, and this year an award will be given for the best student paper presented.

Under new business, Bev Dixon summarized the discussion at the AFS Governing Board meeting (Charlotte, NC) on issues of the JAAH. Although the parent society has addressed concerns over page charges and delays in publication, there are still issues relating to the appropriateness of certain citations. It was decided that an action item be presented at the March 2000 mid-year AFS Governing Board meeting. The present AFS policy does allow citation of non-peer reviewed articles and the JAAH would like the flexibility to cite this information, as approved by the JAAH editors. Under the direction of the editors, JAAH has initiated a feature article series that will appear in its next issue.

Progress on the Whirling Disease Foundation (WDF) Technical Procedure Leaflet was presented with plans for how this type of publication will be formatted, reviewed, published and distributed. This guide represents a new area of involvement for the section and offers the potential for collaborations with other associations. An ad-hoc committee of Bill Klontz, Ron Goede and Richard Cooper has been established to review the document. Jerri Bartholomew is serving as liaison between the WDF and the FHS in the development of this important document.

A policy on passage of resolutions was discussed and it was decided that the AFS standing policy could be adapted for the section=s needs. Other topics of new business included development of an expense account policy and continuance of a mid-term meeting schedule for the executive committee.

Respectfully submitted, Jerri Bartholomew, Acting as Secretary.

QUALITY ASSURANCE IN FISH DISEASE DIAGNOSIS MINUTES OF THE E.A.F.P. WORKSHOP AT RHODES, GREECE

SUMMARY

A workshop on Quality Assurance in Fish Disease Diagnosis was held during the 9th International Conference of the European Association of Fish Pathologists (EAFP) in Rhodes, Greece, on Tuesday 20th September 1999. In this workshop, a working document on how to standardize work, and how to gain accreditation (ISO 9001, EN 45001, USDA) of diagnostic testing was presented. The working document was published in the E.A.F.P. Bulletin of December 1999, and now available on the website of the E.A.F.P.. The workshop was chaired by Eva-Maria Bernoth with about 60 people in attendance. Following the oral presentations, the QA for fish diagnostic laboratories was discussed with the audience.

Selected minutes of the workshop follow, for further information please visit the E.A.F. P. website.

ORAL PRESENTATIONS OF THIS WORKSHOP:

- **ISO and Sterlab in Practice at a Fish Diagnostic Lab**
  Olga L.M. Haenen
- **Practical Aspects of Setting up an Interlaboratory Quality assurance program for fish diagnostic laboratories**
  David Groman
- **Standardization and Quality Control in Aquaculture Diagnostics**
  D.J. Alderman (OIE representative)
- **AFS/FHS and USDA Perspective: QA and Laboratory Accreditation of Fish Diagnostic Laboratories in North America**
  Scott LaPatra, Alex Thiermann, and Nathalie Bruneau

AFS/FHS AND USDA PERSPECTIVE: QA AND LABORATORY ACCREDITATION OF FISH DIAGNOSTIC LABORATORIES IN NORTH AMERICA

Scott LaPatra1 (FHS/AFS representative), Alex Thiermann2 (USDA representative) and Nathalie Bruneau3

Clear Springs Foods, Research Dept., P.O. Box 712, BUHL, ID 83316 USA
US Department of Agriculture, Animal and Plant Health Inspection Service, International Services, 40 Boulevard Du Regen B3, 1000 BRUSSELS, Belgium
Department of Fisheries and Oceans Canada, Aquaculture and Oceans Science Branch, National Fish Disease Registry.

Dr. LaPatra began the session on quality assurance (QA) and laboratory accreditation by providing background information on the Fish Health Section (FHS) of the American Fisheries Society (AFS). The FHS was the first AFS Section established in 1972 and is composed of representatives from the natural resource agencies, the research sector, and commercial aquaculture. The objectives of the Section are to safeguard the health of fish through education and communication along with

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developing and applying effective fish health protection practices. The FHS has a certification program that recognizes aquatic animal health professionals as certified fish health inspectors and/or fish pathologists. In 1994 the fourth edition of the Blue Book was published entitled "Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens". The Section has also been actively involved in developing criteria for validation of new diagnostic methods, quality assurance programs and laboratory accreditation. A QA/QC Committee has been established and given the charge of developing a program for fish diagnostic laboratories. A manual is being developed with recommended standard operating procedures (SOP) governing QA/QC in five areas including lab samples, fish health inspections, bacteriology, virology, serology and parasitology. The goals of these guidelines are to provide for inter-laboratory continuity and peer review of laboratory operations. The AFS/FHS Blue Book will be updated with the SOPs that will be consistent with the ISO 9001 guidelines.

The FHS/AFS has also been working with other organizations on laboratory accreditation including the American Association of Veterinary Laboratory Diagnosticians (AAVLD). The AAVLD has an Aquaculture Committee that is developing a proposal on how to include aquatic animal pathogen assays/sections in accreditation reviews. This is also being reviewed by the U.S. Animal Health Association Aquaculture Committee. The proposed aquatic section summary form consists of:

Description of the unique aspects of the lab section

- **$** List of major services
- **$** List of personnel and qualifications
- **$** Description of SOPs and QA programs
- **$** Description of facilities and equipment
- **$** Methods for biohazard containment
- **$** Training programs and continuing education
- **$** Activities to expand / improve

A number of other important topics were brought up during a Special Session held at the 3rd International Symposium on Aquatic Animal Health (Baltimore, MD, 1998) that also need to be considered including:

- **$** Before any new diagnostic test is applied it must be evaluated for practicality, value, reliability and reproducibility.
- **$** Criteria for developing and evaluating a new test differ on depending on if the test will be used for diagnostics or for inspection/certification purposes.
- **$** New assays must be benchmarked against known "Gold Standards".
- **$** Reference laboratories need to be identified and funded to develop proficiency testing programs.

In summary, QA/QC and laboratory accreditation are becoming increasingly important in the aquatic animal health field. This includes developing criteria for testing new methods against established benchmarks along with generating funds for developing reference laboratories and collections. Additionally we must strive to harmonize international standards and promote coordination between organizations such as the Office International des Epizooties, Asian Fisheries Society, Japanese Society of Fish Pathology, EAFP and FHS/AFS in order to attain that goal.

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Dr. Alex Thierman presented the
USDA/APHIS CERTIFICATION PROGRAM
APHIS is primary the Federal Agency responsible for
$ Preventing introduction into the US foreign of agricultural pests and diseases
$ Controlling and eradicating introduced agricultural pests and diseases
$ Preventing wildlife damage to agriculture
APHIS has a voluntary certification program, including:
$ Health certification for export
$ Laboratory approval for export
$ Regulation of biologics
$ Representation on the Office International des Epizooties
$ Negotiation of zoosanitary regulations

The MILESTONES, reached until now are:
US Memorandum 567.1 of August 6, 1997
It includes health certification procedures to:
$ Review importing countries on health requirements
$ Visit sites on farm and evaluate them
$ Collect samples and get insight into lab results
$ Endorse health certificates
VS Memorandum 567.2 of May 21, 1998
$ It contains Laboratory Approval Procedures:
$ The laboratory protocol requires:
$ Facilities and equipment/personnel
$ Federal, state, university or private
$ Standardized testing, i.e. according to O.I.E. Code and Manual and AFS Blue Book
$ Systematic reporting each week or 48 h
$ Sample collection by an accredited veterinarian
$ QA plan (private labs)
$ Laboratory inspections:
Three tier review the process
$ annual proficiency tests
$ biennial inspections
$ laboratory removal if things are not o.k.
Current status:
Laboratory Approvals: 5 Regions/States have laboratories approved by APHIS to perform diagnostic work for aquatic animal health certification
Exports: VS endorsed health certificates for over 3.8 million live fish exported to approximately 47 foreign countries during 1997.
Exports: VS endorsed health certificates for over 500 million salmonid eggs since August 1999, up from 6.4 million in December 1994.

In Summary, The Federal, State, University or Private lab is eligible for the approval of laboratory procedures. Laboratory protocols are required, and laboratory inspections need to be performed. Next steps are to revise VS 567.2 to get approval in line with approval of OIE reference labs and add additional QA components. Furthermore, it is necessary to extend approvals beyond regions. The QA components of the National Aquaculture Program are a voluntary certification program, for aquatic animal health certification and with laboratory approval procedures and an animal health reporting system.

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Deadline for next issue:
March 31, 2000

Fish Health Newsletter - Editorial Policy

The *Fish Health Newsletter* is a quarterly publication of the Fish Health Section of the American Fisheries Society. Submissions on any topic of interest to fish health specialists and preliminary case reports are encouraged with the understanding that material is not peer reviewed. Abstracts submitted to the *Journal of Aquatic Animal Health* are also encouraged. Articles should not exceed two newsletter pages and should not have more than five references. Submissions *must* be formatted in Microsoft Word, WordPerfect 6.x (preferred) or other major Windows word processors, and can be sent by electronic mail or via 3.5" floppy disk to the content editor's address below:

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