Fish Health Newsletter

Fish Health Section/American Fisheries Society

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PRESIDENT'S REPORT

Following the annual meeting in Victoria, there has been a flurry of activity on several issues of importance to the Section, and I'd like to take this opportunity to update the membership at this time.

Inspection manual

As many of you are aware, a collaborative effort between the FHS and the USFWS was initiated with the goal of producing a "USFWS/AFS-FHS National Fish Health Inspection Procedures" manual. At our annual meeting in Victoria, members of the FHS and USFWS met and developed a plan for reviewing and revising the existing document so that it would meet the needs of the USFWS and also become the new regulatory portion of the Blue Book. The committees, chaired by Joy Evered, Patricia Barbash and Linda Chittum, have done a great deal of work in the last few months to insure that specific procedures are identified for certifications for intra and interstate movements of fish and import/export inspections – thanks so much for your efforts.

Blue Book

Revision of the inspection chapter of the Blue Book will necessitate updating of certain pathogen sections. As with the sections released in July, we will continue to make new chapters available on the website. We recognize that there are some difficulties, especially in citation, posed by this electronic format. However, this is the most feasible means of distributing new information in a timely manner and will allow more frequent additions and revisions. The Technical Standards committee will continue to insure that new chapters undergo appropriate review.

Journal of Aquatic Animal Health

At the AFS governing board meeting in Phoenix in August, there was considerable discussion about the status of the two junior AFS journals – North American Journal of Fisheries Management (NAJA) and the Journal of Aquatic Animal Health (JAAH). The issue was the continued reduction of page charge for these journals and the fiscal feasibility of this for AFS. In the end, it was moved to rescind the prior decisions to eliminate JAAH and NAJA page charges and the associated journal endowment and, in lieu of this, maintain current page charges ($37.50) for the JAAH and NAJA journals for one year, set aside $125,000 in the AFS budget to be expended over 5 years beginning in FY 2003 and allocated equally to the two journals with the goal of increasing the scientific prestige and visibility of these journals. Furthermore, the

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incoming president of the AFS will appoint a committee of appropriate section members, editorial board members, POC members and general members to formulate plans to implement this goal.

At this time it is unclear what effect this will have on the JAAH, but I am optimistic because it offers a new opportunity for directing the journal in a direction that we choose.

Newsletter

At the Victoria meeting, the membership voted to support elimination of the hard copy of the newsletter in favor of the electronic format that has currently been available on the web. This transition will take place with the January issue. At that time, we will also say goodbye to Chris Wilson and Ray Brunson as newsletter co-editors and welcome Lora Petri-Hanson as a new co-editor. Bev Dixon will continue to serve as formatting co-editor, and Chris will be devoting more of his time to the website and to duties as our new Vice-President. Our sincere thanks to you, Chris and Ray for all the hard work.

AFS

Throughout discussions on the JAAH, I was impressed by the interest on the part of the AFS governing board in understanding FHS issues and involving us more in issues of the parent society. An offshoot of these discussions was a request for involvement in a symposium proposed by the Fish Culture Section on “Propagated Organisms in and for Aquatic Resource Management”. This provides an opportunity to collaborate on a topic of importance and interest to both sections and if anyone is interested in becoming involved in the planning stages (target meeting date 2003), please contact me.

By now I have, I believe, worked out some of my communication bugs and hope that I will be able to provide you with timely information on these and other topics. As I have said, my periodic emails and the website are a resource for you, so please continue to send announcements of meetings, jobs, website links and any items of interest or topics on which you would like discussion.

Jerri Bartholomew, President

A Parting Shot From the Editor

After all these many years, its (past) time for me to step down and turn the newsletter over to the capable hands of Lora Hanson, who will continue to be assisted by Bev Dixon. I’d like to thank my co-editors Bev Dixon and Ray Brunson (who was ably assisted by Shirley Stroh) for their help in making the production of this newsletter much less of an ordeal. I’d also like to thank all those who volunteered (more or less willingly) to write articles to make the newsletter something worth reading.

This is also the last edition of the newsletter which will be published in hardcopy; in the future it will only be available on our website (www.fisheries.org/fhs) for online reading or printing in your office if desired. This should speed up the turnover time as well as saving the Section a lot of money in printing and mailing costs. I encourage everyone to continue to make submissions, especially of the quick and dirty types of data. This is the kind of stuff that makes the newsletter interesting. See you around the website.

Chris Wilson

SMELT ROTAVIRUS RECOVERED FROM COMMERCIALLY DISTRIBUTED FRESH WATER RAINBOW SMELT

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"*If you are going to ask a rhetorical question, be prepared for the answers.*" *Ron Goede*

"*Curiosity killed the cat.*" *Anonymous*

Whole frozen fresh water rainbow smelts (*Osmerus mordax*) were purchased from a supermarket in Brush, Colorado, USA. The smelts were labeled for human consumption and distributed by a company in Wheatley, Ontario, Canada. After thawing at room temperature for ~1 hour, kidney, spleen and gill arch samples were pooled in groups of four fish in tubes in Hank's Basic Saline Solution with Gentamycin sulfate. The samples were then shipped on ice from the state lab in Colorado to the Washington State University lab for virus testing. Syncitial CPE was observed in CHSE-214 cells after incubating approximately two weeks at 15^{o}C. These observations and resistance to chloroform suggest that this virus is likely in the reovirus group.

Small, non-enveloped, icosohedral viruses with multiple segments of double-stranded DNA have been widely reported from a variety of fishes (Dopazo et al 1992). Virtually all are considered orphan viruses for which no pathology or effects can be demonstrated. Moore *et al* (1988) reported a picorna-like virus in rainbow smelt. Marshall *et al* (1990) characterized a smelt virus isolate as a rotavirus (11 segments of double-stranded DNA). It is possible that the isolate reported here is that same rotavirus previously described.

This finding has no apparent clinical significance. However, it points out another potential vector of certain fish pathogens. For the most part, the fish health community knows little of the survivability of pathogens in frozen products. LaPatra et al (2001) recently demonstrated that there is minimal danger of spreading IHN virus in frozen trout that have been eviscerated. We suggest that there is need for additional work of this nature.

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ANEMIA IN FALL CHINOOK SALMON: EVIDENCE FOR A VIRAL ETIOLOGY

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We observed anemia in Nisqually River/McAllister Creek stock yearling fall chinook salmon while they were being reared at Christmas Creek Hatchery (Snohomish River watershed, WA) during the winter of 1997-98 and again during the winter of 1998-99. In addition to hematocrit values as low as 12%, the condition was associated with grossly enlarged spleens and the presence of numerous erythroblasts in the peripheral blood (Fig. 1). Aside from higher than normal losses immediately following transport of the fish back to the Nisqually River watershed, mortality remained normal during the occurrences of the disease. In 1998-99, the anemia was first observed in December and remained present in the population when the fish were released in April. Based on the observation of pale gills in a representative sample, the prevalence in the population reached >25% in the weeks following the stress of transfer. Although mortality was normal at the time of release, we suspect that the anemia may have adversely affected transition to seawater and long-term survival.

A number of disease conditions, both infectious and non-infectious, can produce anemia in salmonids. Initially, plasmacytoid leukemia (Kent et al. 1990), which also produces anemia in chinook salmon, was suspected because of the abnormal presence of blast cells in the peripheral blood. However, in the disease we observed, the blasts cells appeared to be primarily of erythroid lineage and in most instances, unlike plasmacytoid leukemia, we did not observe blast cells in non-hematopoeitic tissues. No pathogens were detected by standard bacterial and viral assays or by histopathology. We are uncertain of the ability of our virus assay system to detect the virus associated with infectious salmon anemia (ISA), but the clinical signs exhibited in the disease reported here were not consistent with ISA (Evensen et al. 1991). Furthermore, examination of stained blood smears showed no evidence of erythrocytic inclusion body syndrome (Leek 1987) or viral erythrocytic necrosis (Evelyn and Traxler 1978). We believe this is a previously undescribed disease, although there have been numerous instances of reports of unexplained anemia in various salmonid species in which investigations were inconclusive.

Possible candidates for the etiology of this condition included a toxin, a nutritional deficiency or an infectious agent. In order to determine if an infectious agent was responsible for the disease, we injected homogenate of kidney and spleen tissue from affected fish into yearling fall chinook salmon that had been reared in the laboratory on pathogen-free water. We also injected fish with tissue homogenate that had been passed through a 0.65µm filter. After four weeks at 10°C, we observed clinical signs of the disease in samples of both fish that had been injected with kidney and spleen homogenate, and fish that were injected with the tissue homogenate filtrate. Control fish injected with similar tissue preparations from laboratory fish did not exhibit clinical signs. At eight weeks post-injection, five fish, which had been injected with the unfiltered tissue homogenate from diseased fish, had a mean hematocrit value of 20.4% with one fish as low as 16%, as compared with 58.1% in controls. Spleens were

also grossly enlarged; the mean value for spleen weight/body weight was 1.26% for four fish from this same group as compared with 0.33% for control fish.

In a subsequent experiment, naive laboratory-reared yearling fall chinook were injected with filtered (0.65µm) kidney and spleen tissue from either diseased hatchery fish (McAllister group) or diseased lab fish from the first experiment at the Western Fisheries Research Center (WFRC group). In both groups, the experimental fish exhibited clinical signs of the disease while control fish did not. In this experiment, spleen enlargement reached a peak at nine weeks post-injection at which time mean spleen weight/body weight for representative fish was 1.31% for the WFRC group and 1.12% for the McAllister group. At the same sampling period, the mean spleen weight/body weight for control fish was 0.20%. Thus, the spleens of the diseased fish were approximately 6X larger than normal. Mean hematocrits reached a low point at 12 weeks when hematocrit values were 35% and 38% respectively for the WFRC and McAllister groups. Mean hematocrit for the control fish sampled was 53% at that time period. Although the severity of the clinical signs in the lab-challenged fish decreased with time and there appeared to be a trend toward recovery, spleen size and hematocrits had still not completely returned to normal when last sampled at 22 weeks post injection.

Because we were able to transmit the disease in serial passage through two groups of laboratory fish, the possibility of the disease being produced by a toxin has been virtually ruled out. Furthermore, because most bacterial agents would be excluded by passage through a 0.65µm filter, the results of our laboratory transmission studies suggest that the causative agent of the disease is a virus. So far, attempts to visualize and identify a virus by electron microscopy have been unsuccessful. Other parts of our study, aimed at characterizing the pathological changes associated with the putative disease agent through histological and hematological analyses will be reported separately.

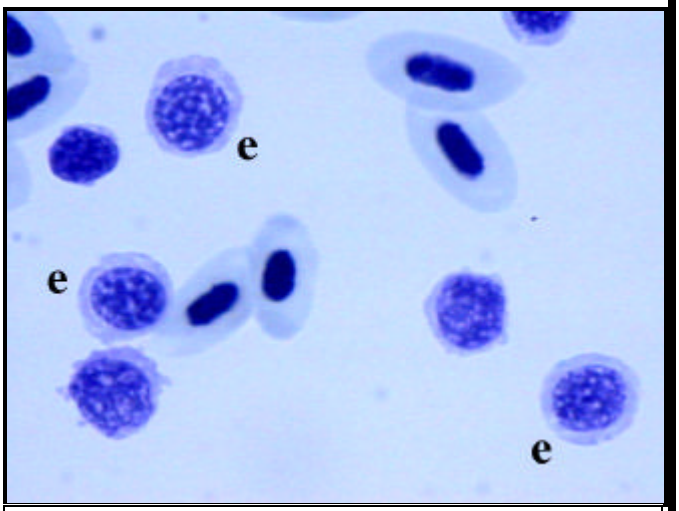

Fig. 1 – Pinacyanol chloride stained peripheral blood smears showing erythroblasts (e). (400X)

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Evensen, Ø., K. E. Thorud and Y.A. Olsen. 1991. A morphological study of the gross and light microscopic lesions of infectious anemia in Atlantic salmon (Salmo salar). Research in Veterinary Science 51:215-222.

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Leek, S.L., 1987. Viral erythrocytic inclusion body syndrome (EIBS) occurring in juvenile spring chinook salmon (Oncorhynchus tshawytscha) reared in fresh water. Can. J. Fish. Aquat. Sci. 37:148-154.

Progress of the Federal-State Aquaculture Drug Approval Partnership Project

by Rosalie A. Schnick, (RozSchnick@aol.com)
William H. Gingerich, Bill R. Griffin, and David Erdahl

The International Association of Fish and Wildlife Agencies Project (IAFWA Project) entitled "Federal-State Aquaculture Drug Approval Partnership Project" has now completed seven years and is in its eighth and final year. New Animal Drug Application (NADA) submissions to the Center for Veterinary Medicine (CVM) to support original or supplemental approvals for IAFWA Project drugs are the result of efforts by the Upper Midwest Environmental Sciences Center (UMESC), Harry K. Dupree Stuttgart National Aquaculture Research Center (HKD-SNARC), U.S. Fish and Wildlife Service (FWS) Bozeman National Investigational New Animal Drug (INAD) Office (NIO), other public agencies such as state natural resources agencies, the private aquaculture sector, sponsors, and the National Coordinator for Aquaculture NADAs.

PROJECT SUCCESSES

Successes for the IAFWA Project are the (1) identification and retention of committed sponsors for all IAFWA Project drugs, (2) identification of alternate drugs and sponsors to replace sarafloxacin and benzocaine, (3) identification of data requirements for each drug, (4) execution of studies according to acceptable protocols, (5) submissions of technical sections to CVM by its partners mentioned above, and (6) acceptance of these technical section submissions by CVM that should lead to new or supplemental NADA approvals. Currently, all eight IAFWA Project drugs have pharmaceutical or chemical company sponsors, in contrast to only three when the IAFWA Project began in 1994. Another positive sign that pharmaceutical companies are becoming more interested in developing their products for aquaculture occurred in August 2001 at the FWS's INAD annual workshop where nine sponsors or potential sponsors participated and discussed possible projects. Prior to this meeting, no sponsor even appeared at this meeting even though some were invited.

A first major and tangible success was the broad supplemental NADA approval in 1998 for formalin to control certain fungi on the eggs of all fish and certain external protozoa and monogenetic trematodes on all fish. Other broad approvals are expected for hydrogen peroxide and oxytetracycline (OTC). Limited approvals are expected for chloramine-T, copper sulfate, and florfenicol.

YEAR 7 HIGHLIGHTS

AQUI-S™

An INAD was established for AQUI-S™ at the Bozeman INAD Office after the sponsor made the decision to renew its efforts to gain approval for its original anesthetic formulation.

The sponsor, AQUI-S New Zealand LTD., reversed a business decision to reformulate their product. The product to be developed in the United States is the same formulation that the company has approved as a fish anesthetic in several countries.

Chloramine-T

All holders of chloramine-T INADs were sent notices in March 2001 that CVM has concerns for the possible carcinogenicity of p-TSA, the marker residue of chloramine-T

and will not renew slaughter authorizations (including release of fish) after a certain point (depends upon the date of INAD renewal). This policy will continue until CVM receives new information from the sponsor that addresses CVM's mammalian safety concerns for p-TSA. The sponsor is actively engaged in responding to concerns raised by CVM regarding these concerns.

Copper Sulfate
CVM is requiring no tolerances, regulatory methods, or withdrawal times for fish treated with copper sulfate.

Crop Grouping
Drs William Gingerich, William Hayton, and Guy Stehly presented a morning-long seminar at the Office of Research, Center for Veterinary Medicine, U.S. Food and Drug Administration, Laurel, Maryland on August 30, 2000 to review the results of efforts to date on crop grouping studies conducted by UMESC.

Florfenicol
A Cooperative Research and Development Agreement (CRADA) between Schering-Plough Animal Health and USGS was signed on April 10, 2001. The in-life phase of a target animal safety study for florfenicol in channel catfish has been completed under that CRADA.

Funding was made available to UMESC and FWS for efficacy data generation on florfenicol under the Multi-State Conservation Grant Program on November 1, 2000.

Hydrogen Peroxide
CVM accepted pivotal efficacy data for treatment of salmonid eggs to control mortalities associated with saprolegniasis and data to control mortality associated with bacterial gill disease (BGD) on all salmonids.

CVM is requiring no tolerances, regulatory methods, or withdrawal times for fish and their eggs treated with hydrogen peroxide.

UMESC has continued to expand its coordination and collaboration to develop additional efficacy data to support the use of hydrogen peroxide by initiating three compassionate INADs. Participation in the three INAD protocols has increased immensely over the past year from 24 INAD cooperators in 2000 to 115 in 2001.

Oxytetracycline
CVM accepted (1) pivotal efficacy data to control mortality resulting from coldwater disease in coho salmon and systemic columnaris disease in steelhead trout, (2) human food safety data for juvenile northern pike and walleye and established a zero withdrawal time in these species, and (4) human food safety data for juvenile coho salmon and will allow OTC to be used on all juvenile salmonids at any culture temperature with a three-day withdrawal time.

DRUG STATUS
Certain label claims are nearing completion:
1. Chloramine-T--mortality from bacterial gill disease on salmonids reared in freshwater
2. Copper sulfate--*Ichthyophthirius* on catfish in earthen ponds
3. Florfenicol -- mortality from furunculosis in salmonids (submitted by the sponsor)

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EDUCATIONAL OPPORTUNITIES

Aqua-Immunology Post-Doc Position Available

The successful applicant will perform in vitro and in vivo laboratory research in the field of finfish and shellfish immunology. Specifically the candidate will be conducting studies on the structure and function of trout immunoglobulin, and on pathobiology of oyster disease. The candidate should be experienced in a variety of immunotechniques, including monoclonal antibody production, ELISA, immunoblotting, in vitro culture of lymphocytes, as well as standard biochemical methodologies. Although not essential, experience in molecular techniques including PCR, DNA sequencing, and in situ hybridization would be a distinct advantage.

The candidate will be expected to meet all necessary grant requirements, plan and execute novel research and have experience in peer-reviewed publication.

The salary range will be $36,000 - $43,000 per annum depending upon the level of experience. Screening of applications will be begin October 25 and continue until a candidate is chosen, it is preferred that the candidate begin the appointment in November, 2001.

Please forward a CV, letter of interest, and have three letters of recommendation forwarded to:

Dr. Stephen Kaattari,
Dept. of Environmental Sciences,
Virginia Institute of Marine Science,
College of William and Mary,
Gloucester Point, VA 23062
Tel. (804) 684-7362
FAX (804) 684-7186
Email: kaattari@vims.ed

Summertime Veterinary Internship

A summertime internship is available at the Marine Biological Laboratory for a veterinary student who has preferable finished the 3rd year of training, or is a graduate of veterinary school.

The Marine Biological Laboratory (MBL) is a nonprofit, private, research institution. The MBL provides a stimulating environment for principal investigators from around the country to both conduct research on aquatic species collected from the local waters, and to exchange ideas. Highly specialized courses teaching the newest research techniques, available at a post doctorate level, are conducted each summer (see the MBL web page at: www.mbl.edu). Additionally, the community of Woods Hole is a vibrant, intellectually lively, and beautiful summer seaside location.

The internship dates are flexible but in general span a 8 to 10 week period from June 1st to August 15th. This is a full time (40 hour/week) position. Board (except for Sundays), housing on the MBL Woods Hole campus and a stipend of $2200 will be provided. Deadline for application is Dec. 15, 2001

Questions can be directed to Dr. Roxanna Smolowtiz, MBL Veterinarian (508-289-7400; rsmol@mbl.edu).

Applications should be submitted to the Human Resources Office at the MBL
Marine Biological Laboratory,
7 MBL St.,
Woods Hole, MA 02543,
Ph: 508-289-7422

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4. Florfenicol - - mortality from enteric septicemia in channel catfish (to be submitted by sponsor)
5. Formalin--mortality from saprolegniasis on all fish
6. Hydrogen peroxide--mortality from saprolegniasis on all fish eggs
7. Hydrogen peroxide--mortality from saprolegniasis on all fish
8. Hydrogen peroxide--mortality from bacterial gill disease on salmonids reared in freshwater
9. Oxytetracycline--mortality from systemic columnaris disease in all salmonids
10. Oxytetracycline--mortality from systemic coldwater disease in all salmonids
11. Oxytetracycline--otolith marking of all fish by immersion (submitted by the National Research Support Project Number 7)

All the technical sections (except efficacy) for which the IAFWA Project is responsible will be submitted by 2002 to allow for broader label claims when efficacy data are generated beyond 2002 for chloramine-T, formalin, hydrogen peroxide, and oxytetracycline. The sponsor of florfenicol is completing the technical sections on florfenicol for salmonids and catfish but the Drug Approval Working Group decided not to allow IAFWA Project funds to be expended to extend the label claims to cool and scaled warm water fish. Amendments to broaden initial or existing aquaculture drug approvals will be possible after pivotal and supporting efficacy data are generated and accepted to substantiate label claims beyond those mentioned above. At the present time, adequate efficacy data exist mainly for salmonids but are lacking for cool water and warm water fish. This lack of efficacy data jeopardizes the addition of these species to label claims in original or amended NADAs.

New INADs are now in place at NIO to develop efficacy data on florfenicol and AQUI-S™, and CRADAs are also in place with the sponsors for AQUI-S™, copper sulfate, chloramine-T and florfenicol. In the latter half of 2000, new sponsors replaced the original sponsors for chloramine-T (Axcentive bv for Akzo Nobel Chemicals, Inc.) and oxytetracycline (Philbro Animal Health for Pfizer Inc.).

CONTRACTUALLY LIMITED FACULTY APPOINTMENT VETERINARY SPECIALIST, AQUACULTURE

The Department of Pathobiology, Ontario Veterinary College, University Of Guelph, announces the immediate availability of a contractually limited faculty appointment at the Assistant Professor level in Veterinary Aquaculture.

The deadline for applications is September 20, 2001 or until a suitable candidate is found. Please send a complete curriculum vitae and the contact information for three references to:

Dr. Patricia E. Shewen, Chair
Department of Pathobiology
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Guelph, Ontario N1G 2W1
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DISTRIBUTION OF LARGEMOUTH BASS VIRUS MAY BE EXPANDING IN MISSISSIPPI

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2Mississippi Department of Wildlife, Fisheries and Parks

Largemouth Bass Virus (LMBV) has been implicated in causing substantial losses of largemouth bass (LMB) in several waters in Mississippi. LMBV is an iridovirus in the ranavirus group that was first reported as the causative agent of high mortality in adult LMB in the Santee-Cooper Reservoir in South Carolina (Plumb et al. 1996). In 1998 LMBV related mortality was found in Mississippi in Sardis Reservoir (Hanson et al. 2001) and in 1999 LMBV associated mortality was documented in wild LMB populations in Tunica Cutoff and Lake Ferguson as well as waters in Texas and Louisiana. These new outbreaks suggested that LMBV was spreading or conditions had recently become optimal for LMBV induced disease. Because this virus was associated with high numbers of losses of LMB in important LMB fishing lakes and fishing tournaments are a major activity in this region, critical information is needed to determine if events that lead to the disease outbreak or the spread of the pathogen can be controlled.

In spring 1999 we surveyed 11 major fisheries of Mississippi for LMBV. We surveyed the same lakes in spring of 2000 to determine if the prevalence of the virus was changing. Additionally in the fall of 1999 our survey included young of the year LMB from Lake Ferguson which had LMBV related losses that year and compared the results to Sardis Reservoir which had the LMBV losses the year before. This was done to determine if young of the year were acquiring the virus at the same rate as the adults. Also, the data would indicate if LMBV was being transmitted to young LMB the year after the LMBV associated losses in Sardis Reservoir. Additional LMB populations evaluated for LMBV included those of Aberdeen Lake, Lamar Bruce Lake, Flower Lake, Tunica Cutoff, fall evaluations of Enid Lake, Lake Whittington and Tunica Cuttoff and a winter evaluation of Bolivar County Lake. Although preliminary in nature, our results suggest that LMBV is spreading in Mississippi waters and that once a population is infected, the virus will be efficiently passed on to subsequent generations.

Methods:
The prevalence of LMBV in juvenile (young of year) and adult LMB from Lake Ferguson and Sardis Reservoir was determined by sampling a minimum of 30 juvenile and 30 adult LMB in November of 1999 and evaluating the fish for LMBV by cell culture. We evaluated the prevalence of LMBV in LMB populations of Sardis Reservoir, Grenada Lake, Lake Enid, Arkabutla Lake, Ross Barnett Reservoir, Columbus Lake, Kemper Co. Lake, Bay Springs Lake, Lake Ferguson, Eagle Lake, Pascagoula Marsh, Flower Lake, Tunica Cutoff, Lamar Bruce Lake and Aberdeen Lake by culturing tissues from a minimum of 30 LMB from each lake.

Sampling and necropsy- All samples were obtained by Mississippi Department of Wildlife Fisheries and Parks biologists. Fall and spring survey samples and samples for investigations into fish kills were obtained by electrofishing. The fish were directly placed on ice and transported to the College of Veterinary Medicine, Mississippi State University. The fish were measured, weighed and necropsied. Gross pathology and parasite burden were noted and a sample of epidermis, spleen and tissue lining the air bladder lumen were taken for virus analysis.

Virology- The tissue samples were placed in Hank's Balanced Salts Medium containing 400 IU/ml penicillin, 400 µg/ml streptomycin and 200 µg/ml amphotericin B at 1:10 (tissue: medium) and held at -70^{o} C. The samples were homogenized, centrifuged for 10 min at 400-x g and the supernatant inoculated onto cells of the fathead minnow cell line (FHM), incubated at 30(C and observed for 10 days. Cytopathic effect was noted. Medium from cultures were then passaged onto new cultures for a blind passage (on cultures that had no cytopathic effect) and to confirm infectivity (on cultures that showed cytopathic effect). Media from cultures that demonstrate cytopathic effect were frozen at -70^{o}C. DNA was extracted from cultures demonstrating cytopathic effect and confirmed to contain LMBV using ranavirus

specific PCR.

Results and Discussion:
Over 1400 LMB were evaluated for LMBV from 17 different fisheries. The primary objectives of this study were 1) to evaluate various lakes for the presence of LMBV; 2) to determine if young of year bass are being infected; and 3) to determine if LMBV is spreading or becoming more prevalent in Mississippi waters.

Fall and Winter Evaluations- In late summer Tunica Cutoff, Lake Ferguson, and Lake Whittington experienced LMB specific losses. Evaluation of the populations revealed that each had an infection prevalence of over 77% (table 1). In November, Enid Lake was sampled because the fall electrofishing survey showed low numbers of large LMB when compared to previous years. Additionally, Tunica Cuttoff, Lake Ferguson, and Sardis Reservoir were sampled. In this sampling all sizes of LMB that were brought up by electrofishing were taken for virus analysis to determine if LMBV infection was correlated to size and to determine if young of the year LMB in Sardis were becoming infected. We found no difference in LMBV infection rates among various sizes of fish in any of the lakes sampled. The smallest fish sampled was 6 cm and it was infected with LMBV. In Sardis Reservoir the smallest fish that was sampled was 8 cm and the smallest fish infected was 10 cm. The small fish sampled were hatched in the spring. Thus LMBV infection is not age related and the Sardis LMBV was being efficiently transmitted to the young of the year one year after the LMBV associated deaths. In late December of 1999, Bolivar County Lake also experienced losses of LMB, but no LMBV was detected in this population.

Spring Evaluations- the fisheries sampled in spring of 1999 were re-sampled in the spring of 2000 to determine the changes in the distribution and prevalence of the virus. The results of the survey are summarized in table 1. The trend suggests an overall increase in percentage of bass infected in the lakes that had a low percentage in 1999. The largest increases were seen in Pascagoula Marsh (0 to 43%), Lake Enid (3 to 37%), Lake Ferguson (0 to 30%), and Columbus Lake (7 to 25%). Bay Springs remained at the 29% prevalence of infection. One fish of 30 (3%) from Ross Barnett cultured positive for the virus whereas no virus was detected in 1999 but this is not considered a significant change considering the numbers sampled. LMB populations from Eagle, Grenada, Arkabutla and Kemper Co. lakes tested negative for LMBV as they did in 1999. Only the Sardis Reservoir LMB population demonstrated a decrease in LMBV prevalence. Of the four additional lakes evaluated in 2000, Flower and Lamar Bruce Lakes demonstrated low percentage LMBV infection while Tunica Cutoff and Lake Aberdeen demonstrated high percentage infection.

Water	% with LMBV in spring 1999	% with LMBV in Fall 1999	% with LMBV in Spring 2000
Columbus	7	nd	25
Bay Springs	29	nd	29
Eagle	0	nd	0
Pascagoula	0	nd	43
Ross Barnett	0	nd	3
Enid*	3	79	37
Grenada	0	nd	0
Arkabutla	0	nd	0
Kemper	0	nd	0
Ferguson**	0	86	30
Sardis	53	30	19
Flower	nd	nd	3
Tunica***	nd	79	74
Aberdeen	nd	nd	31
Lamar Bruce	nd	nd	6

Table 1: Summary of results from LMBV survey in Mississippi Waters[ð].
[ð] Data not shown: Lake Whitington and Bolivar Co. Lake were sampled in the fall and winter of 1999 after LMB kills and 78% and 0% cultured LMBV positive respectively.
*Lake Enid had reduced electrofishing success in fall 1999.
**Sampling after fish kill on 9/15/99 had 89% infected with LMBV.
***Sampling after fish kill on 8/20/99 had 77% infected with LMBV.
nd-not determined

(Continued on page 12)

Fourth International Symposium on AQUATIC ANIMAL HEALTH

September 2–6, 2002 New Orleans, Louisiana USA

***** Note that it is important to send your information for the mailing list to the address below to ensure receipt of meeting announcements**

Following the great success of the three previous International Symposia on Aquatic Animal Health, it is a pleasure to announce that the 4th Symposium will be held at the beautiful Sheraton New Orleans Hotel in Louisiana, USA, September 2 to 6, 2002. The 4th International Symposium on Aquatic Animal Health is jointly sponsored by the Fish Health Section of the Asian Fisheries Society, the European Association for Fish Pathology, the Japanese Society for Fish Pathology, the International Association for Aquatic Animal Medicine, and the National Shellfisheries Association. The 2002 Symposium will be hosted by the Fish Health Section of the American Fisheries Society and the organizing committee is chaired by Ron Thune. This will prove to be an outstanding meeting in one of the more exciting and interesting cities in the world.

At present, sessions are planned for Monday to Thursday, with plenary sessions first thing in the morning, followed by 3 to 4 breakout sessions for the remainder of the day. The space we have been provided will allow the poster session to run concurrently, and several functions are planned in the poster exhibit area to provide ample time for poster viewing and discussion. Make sure to mark your calendar and plan to attend the 4th International Symposium on Aquatic Animal Health in New Orleans in September, 2002.

To be added to the mailing list to receive announcements and the call for papers visit the Symposium web site at **www.vetmed.lsu.edu/isaah2002.htm**

Requests can also be sent to isaah2002@vetmed.lsu.edu or by regular mail to ISAAH2002, Department of Pathobiological Sciences, School of Veterinary Medicine, Louisiana State University, Baton Rouge, LA, 70803 USA.

(Continued from page 11)

Although incidence of LMBV infection over two years does not define a trend, it does suggest that the infection rate is on the increase. Alternatively, fluctuations in weather patterns can be associated with changes in pathogen prevalence and by chance we could have observed a relatively low year followed by a high year. The most obvious result of the study is the finding that LMBV is prevalent in Mississippi, occurring at detectable levels in 70% (12 of 17) of the separate LMB populations evaluated. Also, the presence of the virus does not appear to be transient. This suggests that, given opportune environmental conditions, more LMBV associated LMB losses can be expected in Mississippi. The challenges will be to determine the conditions that lead to the losses, determine the true affect LMBV disease has on LMB populations and (if necessary) to identify management options that can lesson the impact of the losses on the populations.

References:

Hanson, L.A., L. Petrie-Hanson, M. Rudis, K.O. Meals, V.G. Chinchar, 2001. Persistence of largemouth bass virus infection in a northern Mississippi Reservoir after a die-off. Journal of Aquatic Animal Health 13, 27-34.

Plumb, J., J. Grizzle, H. Young, A. Noyes, S. Lamprecht, 1996. An iridovirus isolated from wild largemouth bass. Journal of Aquatic Animal Health 8, 265-270.

The 27th Eastern Fish Health Workshop

at the Holiday Inn - Mount Pleasant in Charleston, South Carolina. Registration will begin on Monday, 18 March from 5:00 - 7:00 pm, followed by three full day sessions, 19, 20, and 21 March 2002. Come early and stay late to visit the sites and sounds of this wonderful city, even garner continued education credits while you visit!

Continued Education Opportunities

Two Continuing Education opportunities are being planned to be presented in connection with the Eastern Fish Health Workshop. These sessions are being organized through the Continuing Education Committee of the Fish Health Section of the American Fisheries Society. Continuing Education Credit will be provided for those who participate in the sessions.

- **Bothriocephalus and Fish Health Inspections.** This will be a 1.5 hour session presented by Andrew Mitchell of the ARS/USDA Laboratory, Stuttgart, AR. The session will focus on the identification criteria for Bothriocephalus for the purpose of fish health inspections. The session will be held at the meeting site hotel for the Eastern Fish Health Workshop on Monday 18 March 2001 from 7:00 - 8:30. This is immediately after the registration period of 5:00 - 7:00 pm the same evening. Individuals participating in this program will earn 1.5 Credit Hours of CE Credit. Contact person: P. R. Bowser (prb4@cornell.edu).
- **Fish Hematology.** This will be a 4.0 hour session presented by Jill Arnold of the National Aquarium at Baltimore. The course will cover blood cell morphology of teleosts and elasmobranchs to include blood collection, slide preparation and microscopic evaluation of blood cells. The session will be held at the SCDNR Marine Resources Research Institute in Charleston on Friday 22 March 2001 from 8:00 am - 12:00 noon. Individuals participating in this program will earn 4.0 Credit Hours of CE Credit. Contact person: A. Segars alsegars@hargray.com).

N.B. - Instructions for registration and fees for the continued education sessions will be announced at a later date.

In addition to our general sessions on research and clinical reports, there will be six **special sessions** included within the formal proceedings. The subjects of these sessions and the individuals chairing each section are:

- **Managing health in commercial aquaria** - Brent Whitaker, National Aquarium, Baltimore.
- **Keeping them pretty: diseases of tropical fish** - Stephen Smith, Virginia Polytechnic Institute, Blacksburg
- **That devil "white spot"... Ich!** - Harry Dickerson, University of Georgia, Athens
- **What's happening to our coral reefs?** - Garriett Smith, University of South Carolina, Aikens
- **Alone on the beach: strandings and associated health issues** - Cindy Driscoll, Cooperative Oxford Laboratory
- **What's wrong with that lobster!** - Bruce Estrella, Massachusetts Department of Marine Fisheries, Pocassett

Not only will there be a complete session on the final day (March 21) but that evening will also feature our Annual Banquet with entertainment (already included in the cost of registration. Therefore, we encourage you to please make your departure plans for Friday, 22 March.

Lodging accommodations must be made with The Holiday Inn - Mount Pleasant at (843) 884-6000 or (800) 290-4004. Check-in time is 3 pm and checkout time is noon. The Holiday Inn has established a special room rate of $79.00 + tax/night for single occupancy ($5.00/night per additional adult). Identify your affiliation with the Eastern Fish Health Workshop to secure reservations at these greatly reduced prices before 21 February 2002.

A $115.00 registration fee (U.S. currency equivalent) includes workshop proceedings, refreshments during breaks, full all you can eat hot buffet breakfasts and luncheons on each day of the proceedings, a get-acquainted reception on Monday evening, and the 27th 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 21 February 2002. Contracts for food services necessitate a late registration fee of $135.00 after this date.

EDUCATIONAL OPPORTUNITIES

Pre-Meeting Symposium - The impacts of myxozoan parasites in wild and farmed finfish

At the next IOCOPA meeting, to be held in Vancouver BC in August, 2002, there will be a pre-meeting symposium on the impacts of myxozoan parasites in wild and farmed finfish. The meeting will be on July 31 - Aug 2 in Nanaimo, BC. Complete details regarding transportation, registration, accommodation and abstract submission will be available shortly at:
http://www.pac.dfo-mpo.gc.ca/sci/aqua/english/symposium.htm or by contacting the local organizers directly:

Simon Jones
Department of Fisheries and Oceans
Pacific Biological Station
Nanaimo, British Columbia
Joness@pac.dfo-mpo.gc.ca
http://www.pac.dfo-mpo.gc.ca/sci/aqua/profiles/jones.htm

Tim Goater
Chair, Biology Department
Malaspina University College
Nanaimo, British Columbia
goatert@mala.bc.ca
http://www.mala.bc.ca/www/discover/biol/tgoater2.htm

CALL FOR PAPERS
The 8th Annual Whirling Disease Symposium
"PUTTING A FRESH SPIN ON WHIRLING DISEASE"
February 13-15, 2002
Marriott City Center Hotel, Denver, Colorado

Please share your latest findings at the whirling disease symposium, which will include these sessions:

- Session I: **Distribution and Dissemination**
- Session II: **Parasite Research**
- Session III: **Oligochaete Research**
- Session IV: **Salmonid Research**
- Session V: **Ecology**
- Session VI: **Diagnostic Methods**
- Session VII. **Management and Control**

For more information, contact:
The Whirling Disease Foundation
P.O. Box 327
Bozeman, Montana 59771-0327
(406) 585-0860 phone; (406) 585-0863 fax
whirling@mcn.net; www.whirling-disease.org

NEW DATABASE OF WILD FISH HEALTH INFORMATION IS UNVEILED BY U.S. FISH AND WILDLIFE SERVICE

An extensive national database outlining the distribution of disease-associated pathogens in America's wild and free-ranging fish populations -- viewed as critical to fishery management decisions throughout the United States was unveiled by the U.S. Fish and Wildlife Service. Scientists said it points to "a relatively healthy picture."

The National Wild Fish Health Survey is the first effort to develop a readily accessible, reliable and scientifically-sound database that documents the national distribution of specific pathogens (organisms capable of causing disease) in free-ranging fish. The project was prompted in 1996, in part, when whirling disease began killing trout in Montana and Colorado. Whirling disease has also been found in trout populations in 20 other states.

Biologists have expressed concern about earlier theories that more fish pathogens might be infecting fish populations previously believed immune to certain diseases, but the Survey does not show that to be happening.

Cathleen Short, Assistant Director for Fisheries and Habitat Conservation, said Senator Conrad Burns deserved credit for being "a driving force" behind making the Survey a reality. "Healthy fish mean a healthy environment and a healthy economy," said Short. "This Survey tells us about potential threats to the well-being of America's fish populations and helps managers see that this resource remains vital and abundant."

Short said that much of the present understanding of fish pathogens and the diseases they cause has been gained by observing captive fish populations in either hatcheries or laboratories, and that "surprisingly little is known about the prevalence of pathogens among wild, free-ranging fish. That's another reason why this Survey is very important."

Short said the Survey indicates that the overwhelming majority of fish tested from the wild are healthy, "and that's terrific news for the nation."

The Survey is conducted through a partnership of natural resource management organizations, including other Federal, Native American, State and private agencies and groups. It is available to fisheries managers and the public on a Worldwide Web-based internet site, at http://wildfishsurvey.fws.gov.

The Survey divides fish pathogens into two main groups: Principal Fish Pathogens and Pathogens of Regional Importance. Principal Fish Pathogens are those tested at all nine U.S. Fish and Wildlife Service Fish Health Centers across the country. Many of those tested for the Survey are also included within the Service's National Fish Hatchery inspection program. This group is extensive and includes the organisms that cause whirling disease and bacterial kidney disease. The other group of pathogens tested are those that the Fish Health Centers deem important in their part of the country. Those are called Pathogens of Regional Importance and include largemouth bass virus in the Southeast and Asian tapeworm in the Southwest.

Fish pathogens comprise a large and diverse group of organisms ranging from microscopic bacteria and viruses to large parasitic worms. The severity of disease caused by fish pathogens also varies widely and depends on a number of important factors. Some pathogens cause only mild effects, if any, on individual fish while others may cause catastrophic die-offs of whole populations. Disease results from the unstable interaction of three main variables: the fish host, the fish pathogen and the water the fish live in. Fish are continually exposed to pathogens but generally become diseased when stressed by contaminants, poor water quality or other similar factors. A few pathogens may cause disease in healthy fish regardless of stress.

Understanding the distribution of fish pathogens throughout the United States will help strengthen the biological basis of laws and regulations that govern the sale and transport of aquatic species as well as aquaculture products. That information can help protect such industries from costly diseases and indirectly safeguard thousands of American jobs.

The Survey will also be an important aid to biologists working on restoration and recovery of threatened and endangered species. Knowledge about pathogens of imperiled species and the ecosystems into which they are to be reintroduced will significantly improve the success of such management actions in returning or restoring imperiled species to their natural habitats.

(Edited from a press release from the USFWS from 9/20/01)

Fish Health Section Newsletter
American Fisheries Society
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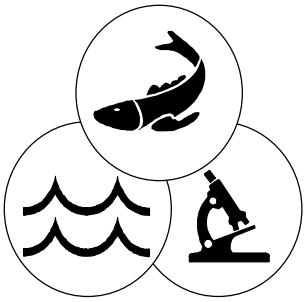

www.fisheries.org/fhs

Deadline for next issue:
December 31, 2001

Fish Health Newsletter - Editorial Policy

The *Fish Health Newsletter* is a quarterly electronic publication of the Fish Health Section of the American Fisheries Society and is available for downloading in Adobe pdf file format at **http://www.fisheries.org/fhs/newslett.htm**. 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 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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