

FHS NEWSLETTER

FISH HEALTH SECTION - AMERICAN FISHERIES SOCIETY

Volume 25, Number 2

Page 1

April 1997

Letter to the Members of FHS

Dear Members:

I wish to provide information to the Fish Health Section concerning the role of USDA-APHIS in aquatic animal health. As the nation's lead regulatory agency with responsibility for the health of agricultural animals, APHIS is committed to providing the same kinds of services for aquatic species that it has long provided for traditional livestock species. APHIS's goal is to serve the aquaculture industry, through its enabling statutes, that are consistent with the agency's overall mission and with the expressed needs of the industry.

Currently, the aquaculture industry has indicated a need for export health certification and APHIS is providing that service. Industry has also shown concern about certain foreign countries' aquatic animal sanitary regulations. Therefore, APHIS is negotiating with these countries to insure that sanitary regulations are consistent with international trade agreements and based on valid science.

APHIS also has a role in preventing losses to aquaculture by predatory wildlife and in licensing of vaccines for aquatic animals. In both cases, APHIS's role is supported by and at the request of industry.

I note that several significant exotic pathogens of aquatic animal species have recently been introduced into the U.S. APHIS believes the aquaculture industry should be concerned about the potential of foreign pathogens to affect U.S. aquaculture. APHIS is willing to participate in the prevention of such disease introductions, and in developing methods for the control of already-introduced pathogens if the industry requests the agency's assistance.

To better serve the aquaculture industry, APHIS is eager to work cooperatively with any other state or federal agency, academic institution, private organization, or fish health specialist with similar interests. The agency acknowledges the high level of professionalism and expertise of the Fish Health Section and notes a high degree of overlap between the agency's activities in aquaculture and the interests of the FHS. APHIS welcomes increased collaboration between the agency and the FHS and its members, and believes that such collaboration would serve both APHIS and the FHS.

Sincerely,
Otis Miller, Jr. DVM
APHIS Aquaculture Coordinator

IN THIS ISSUE:

IHNV	Page 2-4
Asian Tapeworm	Page 8
PKX	Page 9
Western Fish Disease Workshop	Page 10-11

FHS 25(2) 1997

DOES CHUM SALMON VIRUS (CSV) CONFERRED RESISTANCE TO IHNV IN RAINBOW TROUT OCCUR AT MUCOSAL SITES?

Kenneth D. Cain¹, Scott E. LaPatra², Bill Shewmaker², Jerry Jones², Sandra S. Ristow¹

¹ Dept. of Animal Sciences, Washington State University, Pullman, WA 99164-6353

² Clear Springs Foods, Inc. P.O. Box 712. Buhl, ID 83316

The chum salmon virus (CSV), first isolated from adult chum salmon in Japan in 1978 (Winton et al. 1981), is a reovirus which has been shown to cause little mortality in salmonid species (Winton et al. 1989); however, the virus is thought to persistently establish itself in susceptible species. LaPatra et al. (1995) have shown that fish pre-exposed to CSV are significantly protected against subsequent exposure to infectious hematopoietic necrosis virus (IHNV). This has raised questions about mechanisms that may be responsible for this immunostimulatory response. Dual viral infections are known to exist in fish. Both infectious pancreatic necrosis virus (IPNV) and IHNV have been isolated from naturally infected rainbow trout (LaPatra et al. 1993), and de Kinkelin et al. (1992) found that fish infected with IPNV were significantly protected against challenge with viral haemorrhagic septicemia virus (VHSV). Hedrick et al. (1994) showed that pre-exposure to the cutthroat trout virus (CTV), a small picorna-like virus, protected rainbow trout from IHNV challenge and resulted in the stimulation of interferon-like activity in anterior kidney cells. In all cases, however, specific mechanisms which may elicit this interference mediated protection have only been speculated, and a greater understanding of immunity and pathogenesis associated with these viruses is needed. In conjunction with other experiments evaluating mucosal immunity in fish, a short study was designed to evaluate viral presence in mucosal sites of fish exposed to CSV and IHNV. In addition, it was determined whether anti-IHNV activity in gastrointestinal (GI) mucus of CSV-exposed fish was stimulated when compared to mock-exposed fish. This anti-IHNV neutralizing activity is thought to be a possible non-lymphoid defense mechanism and has recently been identified in the GI mucus of rainbow trout (Cain et al. 1996).

Groups of juvenile rainbow trout were waterborne exposed to 10^4 TCID₅₀/ml of CSV, 10^4 pfu/ml of IHNV, or mock exposed to PBS for 1h in a static bath immersion. Single groups (40 fish/tank) of mock and CSV-exposed fish and duplicate groups of IHNV challenged fish were monitored for mortality throughout the study. In addition, two replicate groups per treatment were maintained and sampled at intervals. Five fish from each of the replicates were randomly sampled at 1, 7, 14, 21, and 28 days post exposure (dpe). From one replicate, cutaneous and GI tract mucus was collected and assayed for virus and anti-IHNV activity. In the other replicate, whole fish samples were removed and processed by standard methods for histological evaluation.

Mortality in CSV and mock exposed groups was 2.6% (1/40) and 0% (0/40) respectively, while IHNV challenged fish had a cumulative mortality of 58.8% (47/80). When averaged over the entire study, anti-IHNV activity in the GI tract mucus of CSV-exposed fish was only slightly depressed rather than stimulated when compared to mock challenged fish. It is possible, that antiviral components may have bound non-specifically to CSV, which would limit their ability to bind and neutralize IHNV *in vitro*. This suggests that this defense mechanism does not play a role in CSV conferred IHNV resistance. However, in some specimens different times of appearance of CSV in cutaneous and GI mucus compared to IHNV appearance were found (Table 1). CSV was detected

in external and GI mucus of fish at 7 and 14 dpe and remained in a percentage of fish sampled throughout the 28 day study. Histologically, multifocal hepatic lesions began to appear by 14 dpe, were widespread at 21 dpe and began to regress by 28 dpe in CSV-exposed fish. IHNV was detected in the external mucus of 100% of fish at 1 dpe, but was not isolated beyond 14 dpe. In the GI tract, IHNV was only detected at 7 dpe when systemic infection was most severe as evidenced by mortality and histological examination which revealed extensive hematopoietic cell necrosis in kidneys of infected fish. No virus or histologic lesions were detected in mock challenged fish.

Differences observed between the appearance of IHNV and CSV in the mucosa are interesting and may relate to differences in pathogenesis between the two viruses. Previous studies have shown that IHNV detected in mucus collected from the external surface of fish resulted from the normal progression of the disease and that the integument may be a primary site of virus replication and a possible portal of entry (LaPatra et al. 1989). However, pathological changes in the epithelial cells of the skin of fish challenged with IHNV have not been observed (Cain et al. 1996). This suggests that initial replication of IHNV leads to an increase in virus concentrations in the external mucus, but that virus is cleared by some mechanism before cellular changes occur. CSV may follow a different strategy. Observation of hepatic lesions indicates that CSV establishes a low level systemic infection prior to appearance in the external or GI mucus.

In regard to the ability of CSV to confer resistance to fish challenged with IHNV, it is unlikely that non-lymphoid defenses in the mucosa are involved. The systemic persistence of CSV, however, may stimulate the host's immune system and potentially provide an enhancement of other non-specific or non-lymphoid defenses in the circulation. This would help to explain resistance to IHNV and substantiate the importance of these defenses in fish confronted with viral infections. Enhanced antiviral cytokine production along with other immunostimulatory responses may result during this type of infection. If methods to stimulate these mechanisms could be developed then they may lead to new and novel approaches for control of viral infections in fish. Nevertheless, further investigation of CSV and other avirulent viruses will undoubtedly lead to a greater understanding of both host-pathogen relationships and fish immunology in general.

References:

- Cain, K.D., S.E. LaPatra, T.J. Baldwin, B. Shewmaker, J. Jones, and S.S. Ristow. 1996. Characterization of mucosal immunity in rainbow trout *Oncorhynchus mykiss* challenged with infectious hematopoietic necrosis virus: identification of antiviral activity. *Diseases of Aquatic Organisms* 27: 161-172.
- de Kinkelin P., M. Dorson, and T. Renault. 1992. Interferon and viral interference in viroses of salmonid fish. In: *Proceedings of the OJI international symposium on salmonid fishes* (T. Kimura, ed) Hokkaido University Press, Sapporo. p. 241-249.
- Hedrick, R.P., S.E. LaPatra, S. Yun, K.A. Lauda, G.R. Jones, J.L. Congleton, and P. de Kinkelin. 1994. Induction of protection from infectious hematopoietic necrosis virus in rainbow trout *Oncorhynchus mykiss* by pre-exposure to the avirulent cutthroat trout virus (CTV). *Diseases of Aquatic Organisms* 20: 111-118.
- LaPatra, S.E., J.S. Rohovec, and J.L. Fryer. 1989. Detection of infectious hematopoietic necrosis virus in fish mucus. *Fish Pathology* 24: 197-202.
- LaPatra, S.E., K.A. Lauda, M.J. Woolley, and R. Armstrong. 1993. Detection of a naturally occurring coinfection of IHNV and IPNV. *Am. Fish. Soc./Fish Health Sec. Newsl.* 21: 9-10.
- LaPatra, S.E., K.A. Lauda, and G.R. Jones. 1995. Aquareovirus interference mediated resistance

- to infectious hematopoietic necrosis virus. *Veterinary Research* 25: 1-5.
- Winton, J. R., C.N. Lannan, J.L. Fryer, and T. Kimura. 1981. Isolation of a new reovirus from chum salmon in Japan. *Fish Pathology* 15: 155-162.
- Winton, J. R., C.N. Lannan, M. Yoshimizu, and T. Kimura. 1989. Response of salmonid fish to artificial infection with chum salmon virus. In: *Viruses of Lower Vertebrates* (W. Ahne and E. Kurstak, eds) Springer-Verlag, Berlin, Germany. 270-278.

Table 1: Prevalence of CSV and IHNV in the external and gastrointestinal (GI) tract mucus of rainbow trout. Data represents the number of fish testing positive for virus/total fish sampled. Virus titers of samples collected throughout the study ranged from a low of 1×10^2 pfu/ml to a high of 8×10^4 pfu/ml for CSV-exposed fish and from 2.1×10^3 to 1.7×10^5 pfu/ml for IHNV-exposed fish.

External (skin) mucus					
days post exposure:	1	7	14	21	28
CSV-exposed	(0/5)	(1/5)	(1/5)	(2/5)	(2/5)
IHNV-exposed	(5/5)	(4/5)	(1/5)	(0/5)	(0/1)
Gastrointestinal (GI) mucus					
CSV-exposed	(0/5)	(0/5)	(2/5)	(4/5)	(3/5)
IHNV-exposed	(0/5)	(4/5)	(0/5)	(0/5)	(0/1)

ANNOUNCEMENTS

AQUACULTURE APPLICATION OF CONTROLLED DRUG AND VACCINE DELIVERY

An International Congress on the improvement of bioavailability and on the administration methods of therapeutic and prophylactic tools including sanitary measures in the fight against infectious diseases of farmed aquatic animals, will be held from **May 21 to 23, 1997**, in Udine, Italy. The theme is of great interest because of the possibility of many applications in the near future. The official language of the Congress, organised with E.E.C. contribution, will be English. There will be an introductory lecture for every theme followed by specific sessions of oral communications of 15 minutes with discussion, and posters. At the end of the Congress, it is scheduled a final Round Table.

For further information, that you will find anyway in the "First Announcement and Call for Papers", near to be published, please contact:

Prof. G. Giorgetti - Dr. A. Amadei
Dipartimento di Ittiopatologia Istituto Zooprofilattico delle Venezie
Via della Roggia, 94-33030 Basaldella di Campoformido (UD), Italy
Tel. 0039/432/561196-561532; FAX 0039/432/561532

or Dr. I. Roelants
Zoological Institute of the University of Leuven
De Berlotstrasse 32, B - 3000 Leuven, Belgium
Tel 0032/16/323710; FAX 0032/16/394575

FIRST CALL FOR PAPERS, CATFISH 2000, THE FIRST INTERNATIONAL

ICTALURID SYMPOSIUM The Program Committee for the First International Ictalurid Symposium invites contributed papers for this conference scheduled for **June 23-28, 1998** in Davenport Iowa (Quad Cities area of Illinois-Iowa). Sessions will cover biology and management of channel, flathead, blue, and white catfish, as well as smaller members of the family. We especially solicit presentations that focus on: population dynamics including age growth, recruitment, reproduction, and mortality; assessments of stockings of public waters; genetic relationships among catfishes; catfish behavior and sensory capabilities; movement and migration studies; population characteristic in large rivers, streams lakes, and reservoirs; human dimensions including socioeconomic analyses, angler attitudes, competitive fishing, and edibility and consumption advisories; sampling techniques; effects of rod-and-reel angling, non-angling techniques of fishing like "noodling," and non-rod-and-reel methods including limblines, trotlines, and jug fishing; commercial fisheries; habitat requirements; effects of habitat alteration on populations; and harvest management through regulations. The Committee will consider all submissions; however, The Committee recognize that some studies may not yet be completed but abstracts should be as definitive as possible. Papers may report results of recent investigations or cover topics from a historical perspective, or review a topic (review papers). In all cases, authors should relate their results to the broader literature. Please submit abstracts ranging in length from 150 to 350 words that may be typed or sent electronically via FAX, modem, or email.

Send enquiries and submissions to Steve Eder, Missouri Department of Conservation, by February 1, 1997. Hard Copy: PO Box 180, Jefferson City, MO 65109-0180 E-mail: eders@mail.conservaion.state.mo.us
FAX: 573/526-4047

Acceptance of abstracts will be based on review by the Program Committee and outside reviewers. Once abstracts are accepted, first-draft manuscripts will be due by January 15, 1998. Manuscripts will be peer reviewed by experts in the field. Papers accepted and presented will be published in a hard-cover proceedings that will serve as a major reference for catfish researchers in the 21st century.

7th Congress of the International Society of Developmental and Comparative Immunology
July 21-25, 1997, Williamsburg, VA: hosted by College of William and Mary, School of Marine Science,
Virginia Institute of Marine Science. Contact: **Stephen Kaattari**, VIMS, PO Box 1346, Gloucester Point, VA
23062. 806-642-7362, fax 804-642-7186, E-mail Kaattari@vims.edu.

Third International Symposium on Aquatic Animal Health
August 30 -September 3, 1998 Baltimore, Maryland, USA

The 3rd International Symposium on Aquatic Animal Health will be held in Baltimore on the east coast of the USA from August 30 until September 3, 1998. The symposium will be the first major international meeting to focus comprehensive presentation and discussion on the health of a diversity of aquatic animals including shellfish, fish and marine mammals.

The symposium will be sponsored by the American Fisheries Society -Fish Health Section, Asian Fisheries Society, European Association of Fish Pathologists, International Association for Aquatic Animal Medicine, Japanese Society of Fish Pathology, and the National Shellfisheries Association. The meeting is supported by the John Hopkins University and the University of Maryland at Baltimore.

For further information please contact: Dr. Sarah L. Poynton, Division of Comparative Medicine, John Hopkins University School of Medicine, Ross Research Building 4th Floor, 720 Rutland Avenue, Baltimore, MD 21205 USA, ph: (1) 410-955-3273, Fax: (1) 410-550-5068, E-mail: spoynton@welchlink.welch.jhu.edu.

Aquaculture Trondheim '97 Conference Trondheim, Norway -August 10-12, 1997

This conference will be organized by the European Aquaculture Society (EAS) in cooperation with the Nor-Fishing Foundation (NFF). It is the second time that an EAS conference is arranged together with the world's largest aquaculture trade exhibition - AQUA NOR. The Aqua Nor trade show will take place immediately after the conference, from August 13-16, 1997. "Cultivation of cold water species: production, technology and diversification" has been chosen as the unifying theme for the Aquaculture Trondheim '97 Conference. Moreover a workshop on 'selection, operation and management of recirculation systems for aquaculture' is being scheduled to run in conjunction with the conference.

The conference programme, running over two days, will consist of plenary presentations on marine aquaculture production (aquaculture production of marine fish, of shellfish and of salmonids), feed supply of raw materials; and on production and technology (production strategies and procedures; production units and technology; feeding, handling and quality); parallel sessions on (1) shellfish production technology; (2) cultivation of marine fish, and (3) cultivation of salmonids; poster papers; and workshops on (1) water quality, (2) status of halibut farming, and (3) feed and feedstuff technology. Many of the invited presentations will highlight the various aspects of production, including juvenile production and clams, ongrowing, feed and feedstuff technology, production strategies and equipment design.

More information on the conference can be obtained from: European Aquaculture Society, Aquaculture Trondheim '97, Slijkensesteenweg 4, B-8400 Oostende, Belgium. Tel. +32 59 32 38 59; Fax +32 59 32 10 05; E-mail: eas@unicall.be or EAS home page: <http://allserv.rug.ac.be/jdcaluwe/eas/easho.htm>. More information on the exhibition from: AquaNor '97 exhibition, Nor-Fishing Foundation, Nidarohallene, N-7030 Trondheim, Norway. Tel.: +47-73 92 93 40; Fax +47-73 51 61 35

FISH DISEASE WORKSHOPS. July 14-16 or July 16-18, 1997. The Monterey Bay Aquarium, Monterey, CA, will be hosting two (identical), 2 ½ day workshops on marine fish diseases consisting of approximately 15 hours of lecture and 5 hours of wet lab. A faculty consisting of Michael Kent, Ph.D. (Department of Fisheries and Oceans - Canada), Martin Chen, Ph.D. (California Department of Fish and Game), Jack Fournie, Ph.D. (U.S. Environmental Protection Agency), George Benz, Ph.D. (Southeast Aquatic Research Institute and Tennessee Aquarium) and Dennis Thoney, Ph.D. (Aquarium for Wildlife Conservation, New York) will lecture on the diagnosis and treatment of diseases of marine fishes and related topics. These workshops are applicable to the public aquarium, aquaculture, veterinary and other fish health professions, as well as to hobbyists, but will have a particular emphasis on captive fish health management. The registration fee of \$200 includes all lectures and associated notes, all supplies associated with wet labs, five hosted coffee breaks, admission to the Aquarium on workshop days and a catered dinner in the Monterey Bay Aquarium's new "Outer Bay" wing on Wednesday night (July 16) for all participants. For further registration information contact Teri Allen (408) 648-4823, FAX (408) 644-7597 or e-mail: Tallen@mbayaq.org.

Call For Nominations

The Awards Committee is soliciting nominations from the Fish Health Section membership for the S.F. Sniesko Distinguished Service Award and for Special Achievement Awards.

Individuals nominated for the **S.F. Snieszko Distinguished Service Award** must be nominated by a current member of FHS. The person making the nomination should obtain six letters of recommendation from fish health professionals that support the nominee's dedication to research, teaching and/or service to the field of fish health. The recommendation letters should be submitted with a **current curriculum vitae** for the nominee, and a letter of nomination to the awards committee. The S.F. Snieszko Distinguished Service Award is the **highest award** for the FHS, presented for the purpose of honoring individuals for outstanding accomplishments in the field of fish health. **Nominations will be accepted until June 16, 1997**

The Special Achievement Award is presented to FHS member who has made a significant accomplishment in the fish health field regarding a new discovery, diagnostic method, publication, etc... The achievement must meet high standards of science and survive peer review. Individuals to be considered for this award must be nominated by a current member of the FHS. The letter of nomination should clearly state: 1) the accomplishment; 2) the significance of the accomplishment to the field; 3) the implication of the accomplishment (local, regional, national or worldwide). Copies of any articles or other documents relating to the work should be included. Nominations for this award should be made within one year of the accomplishment and may be submitted to the Awards Committee at any time.

Please submit nominations for both awards to: Dr. Robert Durborow Awards Committee Chair, Cooperative Extension Building, Kentucky State University, Frankfort, Ky 40601

Asian Tapeworms Found in Common Carp in the San Juan River, Utah

□ Jerry Landye and Beth McCasland
U. S. Fish and Wildlife Service, Pinetop Fish Health Center
P.O. Box 160, Pinetop, Arizona 85935

As part of Fish & Wildlife Service's fish health initiative within the San Juan River Recovery Implementation Program, an Asian tapeworm, *Bothriocephalus acheilognathi*, survey was begun May, 1994 by the Pinetop Fish Health Center. This was prompted by the October, 1993 collection of a *Ctenopharyngodon idella*, white Amur, by Fish and Wildlife personnel. During the initial survey from Aneth to Mexican Hat, UT (45 river miles), *Rhinichthys osculus*, speckled dace, *Pimephales promelas*, fathead minnow, and *Cyprinella lutrensis*, red shiner were actively sampled for the tapeworm, but none were found in the 40 fish sample.

A more extensive survey was conducted in October, 1994 from Shiprock, NM (River Mile-144) to Mexican Hat, UT (River Mile-53.5). From this 90 mile survey, 110 speckled dace and 33 red shiners were examined with no evidence of the Asian tapeworm. Near Bluff, UT (River Mile-82) *Cyprinus carpio*, common carp were added to the survey with the first carp (87 mm) producing 18 Asian tapeworms from the stomach. A total of 19 carp (80-260 mm total length) were assessed for the tapeworm with 6 positive fish (80-210 mm total length) including a 100 mm specimen just upstream of Mexican Hat, UT, the end of our fishery investigations. Since the common carp was found infected while other cyprinids from the same river mile were not, it suggests that the carp was the initial carrier of the tapeworm. In the Virgin River, NV-AZ-UT, Heckmann, Deacon, and Greger (1986) implicated the red shiner as the original carrier of this infection.

Fish and Wildlife personnel found infected red shiners, fathead minnows, and speckled dace from April, 1995 in San Juan River samples (River Mile 82 to 128). Additional samples taken in May, 1995 and October, 1996 have documented the spread of the tapeworm in common carp into the New Mexico portion of the river (River Mile 157). No Asian tapeworms were found during an examination of the white Amur (MSB#14885, collection date: October, 1993, San Juan River, River Mile-104) from the collections of the University of New Mexico, Museum of Southwestern Biology.

Mitchell (1994) summarized reports that the Asian tapeworm has been found in 16 species of cyprinids in North America including the above three species. We have found infections of this tapeworm in two additional species (*Gila cypha*, humpback chub and *Gila elegans*, bonytail chub) in the Colorado River drainage of Arizona.

Acknowledgments

Members of the San Juan River Recovery Implementation Program provided specimens in the field to the USFWS Pinetop Fish Health Center personnel. They included individuals from the U.S. Fish & Wildlife Service (New Mexico Fisheries Resource Office and Grand Junction FRO), New Mexico Game and Fish Dept., University of New Mexico, and Utah Division of Wildlife Resources. Jim Brooks and Mike Buntjer (NMFRO) collected the first carp with an Asian tapeworm infection.

References

- Heckmann, Richard. 1993. The Asian fish tapeworm, *Bothriocephalus acheilognathi*, is alive and thriving in Utah ponds and streams. FHS/AFS Newsletter. 21(4):11.
- Heckmann, R.A., J.E. Deacon, and P.D. Greger. 1986. Parasites of the woundfin minnow, *Plagiopterus argentissimus*, and other endemic fishes from the Virgin River, Utah. Great Basin Naturalist. 46(4):662-676.
- Mitchell, A. 1994. *Bothriocephalosis*, Parasitology XII:1-7 in Thoesen, J.C. (ed.), Suggested procedures for the detection and identification of certain finfish and shellfish pathogens. 4th ed., Version 1, Fish Health Section, American Fisheries Society.

Intraspecific and interspecific comparisons of PKX, the cause of proliferative kidney disease of salmonid fishes, using small subunit ribosomal DNA

Michael L. Kent¹, Robert H. Devlin², Dominique M.L. Hervio², Jaswinder Khattra²

¹Department of Fisheries and Oceans, Pacific Biological Station, 3190 Hammond Bay Road, Nanaimo, B.C., V9R 5K6, Canada.

²West Vancouver Laboratory, Department of Fisheries and Oceans, 4160 Marine Drive, West Vancouver, B.C., V7V 1N6, Canada.

The following represents the abstract for an article for the Journal of Aquatic Animal Health.

The taxonomy of the PKX myxosporean, the cause of proliferative kidney disease (PKD) of salmonids, has long been an enigma because only immature spores are consistently associated with the infection. PKX shows some affinities with the genera *Sphaerospora* and *Parvicapsula* species. In the early 1990's one of us (M.K.) proposed that PKX may be the extrasporogonic form of *Sphaerospora oncorhynchi*, which has been observed in salmonids where PKD is enzootic. Recently, the sequence of the small subunit ribosomal DNA (SSU rDNA) of PKX was deposited in Genbank (# U70623) by D. Saulnier and co-workers. We designed PKX-specific primers by aligning this sequence with that of coho salmon, with those of other myxosporeans that we have sequenced (e.g., *Henneguya salminicola*, *Kudoa thyrsites*), and with other myxosporean rDNA sequences from Genbank. Using these primers, PKX rDNA was amplified and sequenced from the kidneys of infected salmonids from British Columbia, Washington, California, Newfoundland and England. We found no differences between these isolates and the original sequence (U70623). This comparison was limited to 211 bp at the 3' end of the SSU. Nevertheless, these results indicate that PKX from different regions of the world are closely related (i.e., they are probably the same species). We designed two additional sets of PKX-specific primers using SSU rDNA sequence comparisons as above. These primers gave a strong positive reaction with all kidneys infected with PKX that were tested, including kidneys with only the intraluminal sporogonic forms of PKX. These same primers did not amplify rDNA from several salmon kidneys infected with either *Sphaerospora oncorhynchi*, *S. truttae*, or *Parvicapsula* sp. Sequence comparison of SSU rDNA of PKX with putative *S. oncorhynchi* rDNA sequence showed only 67% homology over 181 bp, which further suggests that PKX is not *S. oncorhynchi*.

WESTERN FISH DISEASE WORKSHOP**June 18-20, 1997****Bodega Bay, CA**

HOSTS: University of California, Bodega Marine Laboratory
California Department of Fish and Game

LOCATION:

The workshop will be held at the University of California, Bodega Marine Laboratory, a research facility located on a 362-acre biological reserve in Bodega Bay, approximately 65 miles from the San Francisco International Airport. From the airport, take 101 North, across the Golden Gate Bridge to Petaluma. Take the Washington/Central Petaluma Exit, and continue on Washington Avenue heading West. This road becomes Highway 1 at Valley Ford, and continues to the town of Bodega Bay. In Bodega Bay you will drive past the Tides Restaurant and through a sharp hairpin turn. After the hairpin turn you will come to an intersection with Eastshore Road, you will see a sign for Bodega Head, Marinas, and Westside Park. Turn left onto Eastshore Road, then right at Bay Flat Road, and drive around Bodega Harbor past Spud Point Marina and Westside Park. BML Housing is approximately 1/4 mile beyond Westside Park, on the right. The main gate to the laboratory is about 1/4 mile further along Bay Flat Road.

REGISTRATION:

The Continuing Education Session on DISEASES OF MARINE INVERTEBRATES will be conducted on Wednesday, June 18 by Carolyn Friedman of the California Department of Fish and Game. Registration is \$15.00 which includes a half-day laboratory session with microscopes available for examination of slides. Enrollment is limited to 40 participants. The lecture/laboratory session will cover normal marine invertebrate gross anatomy and histology, and selected infectious diseases of aquaculturally important species.

The Western Fish Disease Workshop Technical Session will be conducted Thursday, June 19 and Friday, June 20. Registration is \$50.00, which includes two lunches and all coffee breaks during the workshop, as well as a social gathering on Wednesday evening. A separate ticket can be purchased for dinner on Thursday evening at \$15.00 per person. You must register in advance by sending a check or money order along with the enclosed registration form **by April 30, 1997** to: Kristen Arkush, UC Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, CA 94923. Please make checks payable to Bodega Marine Laboratory. Receipts will be available at the workshop.

During the workshop, tours of the Bodega Marine Laboratory, including the Winter-Run Chinook Captive Broodstock Project rearing facilities, will be provided by staff members.

LODGING:

Bodega Bay is a popular summer destination, and lodging can be difficult to find, so be sure to make your reservations as early as possible! A block of rooms has been reserved at two hotels. At the Bodega Coast Inn, 35 rooms are available at a rate of \$85.00 single or \$95.00 double occupancy, but you must place your reservation by May 1. Contact the Bodega Coast Inn

directly at (707) 875-2217. At the Inn at the Tides, 35 rooms have been held at a rate of \$110 per night. Contact the Inn at the Tides at (707) 875-2751 to **make your reservations by May 17**. To offset costs for student attendees (or anyone with limited travel funds), several dormitory-style rooms will also be provided at BML Housing. Single occupancy rates range from \$14.00-\$16.00, and double occupancy rates from \$16.00-\$20.00. Please contact Missy Ragland at BML to confirm at (707) 875-2002.

AIR TRAVEL:

You may fly into the San Francisco International Airport, Oakland Airport, or the Santa Rosa Airport. No public transportation services are available to Bodega Bay, so it is best to rent a car or to car pool.

FOOD:

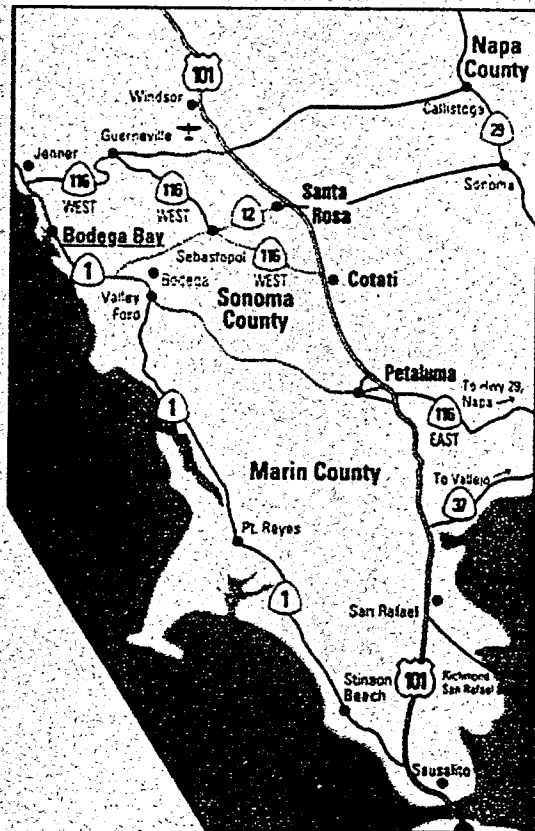
Lunch and coffee breaks will be provided during the technical session. The cost of registration will include these services plus a social gathering on Wednesday evening. A separate ticket will be offered for the cost of the dinner on Thursday evening, and family members/guests can also attend by purchasing tickets in advance.

OTHER ACTIVITIES:

Bodega Marine Laboratory is located on the northern California coast. Enjoy the wine country in Sonoma or nearby Napa. Beaches, redwood forests, and coastal hiking trails are all within a short driving distance. Enjoy the workshop, then stay a few extra days and treat yourself and your family to a summer getaway!

INFORMATION:

If you need further information, please contact the workshop coordinators, Kristen Arkush at (707) 875-2062, kdarkush@ucdavis.edu, or Bill Cox at (916) 358-2829.



*Find out more about Bodega Bay at
<http://www.bodegabay.com>*

1997 ANNUAL MEETING OF THE AMERICAN FISHERIES SOCIETY FISH HEALTH SECTION

SEPTEMBER 4-6, JUNEAU, ALASKA

Meeting and hotel

The 1997 meeting will be held at the Westmark Baranof Hotel in Juneau, Alaska September 4-6. The meeting will begin at 8:00 AM on Thursday the 4th and continue through about 5:00 PM on Saturday the 6th. A block of 100 rooms has been reserved at rates of 89\$ (Baranof) and 98\$ (Westmark) for singles or doubles per night. Rooms will be held under "Fish Health Section Meeting" at this rate until July 10, 1997. Room reservations can be made by calling 1-800-544-0970 or 1-907-586-2660. Complimentary shuttle service from the Juneau International Airport is provided by the Baranof and its sister hotel, the Westmark.

Transportation into Juneau

Juneau is located in the panhandle of southeast Alaska and can be reached only by boat or airplane. The Alaska Marine Highway Ferry System travels from Seattle providing a pleasant two day voyage on their flagship, the Columbia. Reservations may be made by calling the ferry system office at 1-800-642-0066. Alaska Airlines provides full jet service to Juneau year round and Delta Airlines extends summer service, usually until mid September. The meeting has been scheduled to include a Saturday night such that Super Saver air fares can be had. Juneau is also a good "jumping off point" for those who might wish to make this meeting the beginning of a family vacation for further travel to Anchorage and Denali Park in the southcentral area or to the interior via Fairbanks.

Juneau weather is unpredictable and noted for rain almost anytime of the year but early September often has sunny skies with temperatures in the 60s with the potential for frost at night. **Important note for fisherpersons:** coho salmon fishing in early September is excellent and usually at its peak. Halibut fishing should be good as well. Fishing is available from shore or by charter boat. Additional travel information may be obtained from the Juneau Convention & Visitors Bureau at 1-907-586-2201.

Registration

Conference registration will be handled by Ted Meyers, Alaska Department of Fish and Game, CFMD Division, P.O. Box 25526, Juneau Fish Pathology Lab, Juneau, AK 99802-5526 (telephone 1-907-465-3577). A registration fee of \$100 will cover the costs of break refreshments, meeting rooms, A/V equipment, meeting packet with abstract/agenda booklet and a prime rib/fresh halibut banquet on the evening of September 5th. Please fill out the attached registration form and make checks payable to "FHS Annual Meeting". The registration deadline is June 1, 1997.

FHS 1996-97

Executive Committee

JoAnn Leong, President
 Jim Winton, Immediate Past President
 Scott LaPatra, President-Elect
 Jerri Bartholomew, Secretary-Treasurer
 Chair, Technical Standards
 Chair, Professional Standards

Standing Committees

Archives(appointed by Pres.)
 Yolanda Brady, Chair
 Tony Amandi
 Rod Getchell

Awards (appointed by Pres.)
 Bob Duborow, Chair
 Larry Hanson, 2 years
 Frank Hetrick, 3 years

Nominating Committee (Elected)
 Pete Walker, Chair
 John Plumb, 2 years
 Diane Elliot, 3 years

Membership and Balloting (Appointed by Pres.)
 Jill Jenkins, Chair
 Lisa Collins

Professional Standards (appointed by Pres.)
 Mike Kent, Chair
 Ray Brunson
 Martin Chen

Bd. Of Certification (appointed by Pres.)
 Ray Brunson, Chair, 3 years
 Debbie Buchard, 2 years
 Scott Foott, 2 years
 Dorothy Keiser, 3 years
 Richard Wolke, 3 years

Blue Book Advisory (appointed by Pres.)
 Paul Reno, Chair
 Diane Elliot
 Chris Horsch
 Jim Bertonlini
 Ron Thune
 Ralph Elston

Technical Procedures (appointed by Pres.)
 Rod Horner, Chair
 Kevin Amos
 John Schachte

Newsletter
 Larisa Ford, Co-editor
 Beverly Dixon, Co-editor

Time and Place (appointed by Pres.)
 Ted Meyers, Chair
 Sarah Poynton

Ad Hoc Committees

Bylaws Review/Procedural Manual
 Ted Meyers, Co-Chair
 Ron Thune, Co-Chair
 Spike Bealeu
 Vicki Blazer
 John Cvitanich
 Ron Hedrick
 Randy MacMillan
 John Plumb
 Beth MacConnell

Scientific Journal
 Margaret Ewing, Co-editor
 Ron Hedrick, Co-editor

Continuing Education
 Craig Olson, Chair
 Jan Gleckler
 Charlie Smith
 Gary Fornshell

Fish Health Section Newsletter

The Fish Health Section Newsletter is a quarterly publication of the Fish Health Section of the American Fisheries Society. Submissions on a topic of interest to fish health specialists are encouraged with the understanding that material is not peer reviewed. Articles should not exceed two newsletter pages and should not have more than five references. Submissions should be submitted on disk in Word perfect 5.1 or in a generic form that can be read on WP5.1 for IBM. Disks will be returned if a SASE is included with your submitted article. Also, we will be glad to publish any abstract of a paper that has been submitted to the *Journal of Aquatic Animal Health* (whether accepted or not by JAAH) . Submissions should be addressed to the editors listed below:

Dr. Deverly Dixon
Department of Biological Sciences
California State University at Hayward
Hayward CA 94542

Phone: 510-885-3422
Fax: 510-885-4747
Email: BDIXON@CSUHAYWARD.EDU

Dr. Larisa Ford
Department of Fisheries & Wildlife Resources
University of Idaho
Moscow ID 83844-1136

Phone: 208-885-7608
Fax: 208-885-9080
Email: lford@uidaho.edu

Fish Health Section-American
Fisheries Society/Newsletter
Dept Fish & Wildlife
University of Idaho
Moscow ID
83844-1136

**BULK RATE
U.S. POSTAGE PAID
NON -PROFIT ORG
MOSCOW ID
PERMIT #466**

MS

003534 DR 9712 000208
Glenn L. Hoffman
Rt 3 Box 36
Kearneysville, WV 25430

27

