FHS FISH HEALTH SECTION—AMERICAN FISHERIES SOCIETY

NEWSLETTER

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Prevalence of Plasmacytoid Leukemia In British Columbia Chinook Salmon

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Plasmacytoid leukemia (PL), also known as marine anemia, has been diagnosed in netpen-reared chinook salmon (*Oncorhynchus tshawytscha*) at several locations in the Sunshine Coast region of British Columbia, Canada since 1988 (Kent et.a. 1990, Dis. Aquat. Org. 8:199-209). Previously in British Columbia, PL had only been diagnosed in this area and only in fish that had been in seawater for at least one year. This report summarizes the results of a survey conducted in July to December 1990 to determine the prevalence of PL in the three major, readily accessible, fish farming areas of the B.C. coast.

Five separate sites from each of these areas (Sunshine Coast, west side of Vancouver Island, and Campbell River) were selected for the survey. Moribund chinook salmon, which had been in seawater for six months to two years, were examined. Kidney, spleen, liver, pyloric caeca, posterior intestine, and ocular and periocular tissues were removed and immediately placed in Davidson's solution. The tissues were processed using standard histological techniques and 6 μm sections were stained with hematoxylin and eosin. Diagnoses were based on histological analysis.

Plasmacytoid leukemia was unequivocally diagnosed at 4 of 5 sites in the Sunshine Coast, 0 of 5 sites on the west coast of Vancouver Island, and at 1 of 5 sites in the Campbell River area. The disease was found in two year classes of chinook (those introduced into seawater in the springs of 1989 and 1990) at two of the affected sites in Sechelt.

This is the first report of PL in fish that have been in seawater for less than six months. The observation of PL in the Campbell River area is the first report of the disease outside of the Sunshine Coast region in British Columbia. Another site in the Campbell River area was also found to be positive after this survey was completed. The occurrence of this disease in the Campbell River area is of considerable concern because this area is rapidly becoming the major region for production of netpen-reared chinook salmon in B.C. This area is also vital to the sport and commercial salmon fisheries.

The occurrence of PL in the Campbell River area does not necessarily mean that PL has recently spread to this area. This is a newly recognized disease, in which the gross lesions mimic those of bacterial kidney disease. Therefore, confirmatory diagnosis of PL is based on histopathological examination, and it is possible that affected fish were overlooked or misdiagnosed in the past. The mode of transmission of PL has yet to be determined. If the disease is truly new to the Campbell River area, it is not known if it was introduced by horizontal transmission from fomites, by movement or escape of chinook from the Sunshine Coast, or by transmission from wild fish.

The occurrence of PL in chinook that were in seawater for only six months is perhaps an indicator of either a freshwater source of infection or of vertical transmission. However, these particular fish were placed at the same site with PL positive yearling fish which would suggest that relatively rapid horizontal transmission in seawater may have occurred.

Although PL has not been reported in salmon reared in fresh water in B.C., a similar disease has been observed in freshwater-reared chinook in California and Washington (Hedrick et. al. 1990. Dis. Aquat. Org. 8:189-197; Morrison et. al. 1990. Dis. Aquat. Org. 8:99-104.) These outbreaks were associated with an intranuclear microsporidium, *Enterocytozoan salmonis* (Chilmonczyk et. al. 1991. J. Protozool., in press). This microsporidium was also found in most of the fish with PL in B.C., but its role is unclear because we have been able to transmit PL in the apparent

absence of the parasite (Kent and Dawe 1990, Cancer Res. (Suppl.) 50:5679-5681S; Newbound and Kent 1991, Dis. Aquat. Org. in press).

The occurrence of PL in 6 month-old-smolts and in a new geographic area emphasizes the need for further work to establish the source, etiology, pathogenesis and transmission of PL. Tests sensitive enough to detect subclinical PL infections in freshwater hatcheries, netpens, and the wild are urgently needed.

This survey was funded by the Aquaculture and Commercial Fisheries Branch, and the Animal Health Branch of the British Columbia Ministry of Agriculture and Fisheries.

Susceptibility of Atlantic Salmon to Erythrocytic Necrosis Virus (ENV)

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Viral erythrocytic necrosis (VEN) has been documented in various species of marine and anadromous fishes throughout the world. Along the west coast of North America, natural occurrences of VEN have been reported in Pacific herring, chum, pink, coho, and chinook salmon, and in steelhead trout. It has been demonstrated that the causative virus (ENV) can be transmitted by both waterborne exposure and injection. Transmission of ENV from herring to chum and pink salmon by intraperitoneal injection has been documented. The ease of transmission, general susceptibility of salmonids, and widespread range of ENV suggest that it poses a threat to netpen-cultured salmonids.

Because Atlantic salmon are becoming increasingly popular as a cultured species in British Columbia they were tested and shown to be susceptible to infection by ENV from herring using intraperitoneal injection. The challenge inoculum, prepared from kidney tissue of ENV-infected herring, was homogenized in BSS, filtered through a 0.45 μm filter, and injected (0.1 mL) into Atlantic salmon fry (mean wt 2.0 g). Control fish received a similar injection of BSS only. Duplicate groups of 20 fry were challenged, and a single group of 20 fry served as controls. Fry were held in separate tanks in fresh water at 15°C and were observed for 5 weeks. Losses in the challenged groups at 5 weeks were 40% and 35%; those in the control group were 25%. None of the controls developed erythrocytic inclusion bodies typical of VEN. This was true for both the dead and surviving control fish. Cytoplasmic inclusions typical of VEN were observed in erythrocytes of challenged fish by 3 weeks after infection, and by the experiments termination at 5 weeks post-challenge, all of the challenged survivors were positive for erythrocytic inclusions. Inclusions observed early in the infection were associated with the nucleus and in many cases appeared to be budding from the nucleus. In more advanced cases, however, they took the form of eosinophilic, cytoplasmic bodies typical of ENV-infections. Ultrastructural analysis revealed numerous hexagonal and pentagonal particles characteristic of ENV. Virions with a mean diameter of 175 nm were observed in erythrocytes from both the infected herring used for the challenge and the experimentally infected Atlantic salmon. The losses associated with the challenged groups were not significantly higher than those in the control group. This experiment establishes only that Atlantic salmon are susceptible to infection with ENV. The close association of ENV-infected wild herring with netpen-reared Atlantic salmon may result in occurrences of VEN in these fish.

Additional studies are planned to determine whether Atlantic salmon of smolt size are susceptible to waterborne transmission of ENV and to determine whether the ENV-infections result in mortalities.

Isolation of an Epitheliotropic Herpesvirus from Cultured White Sturgeon (*Acipenser transmontanus*)

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A previously undetected herpes virus has been isolated from juvenile white sturgeon (*Acipenser transmontanus*) skin and appears associated with mortality. The white sturgeon herpesvirus (WSHV) induces both hyperplasia and necrosis of the epithelium. There is no apparent involvement of any other tissues. The virus has been isolated using a recently established cell line from the skin of white sturgeon (WSSK-1) but failed to replicate in two other cell lines from the same species or in the CHSE-214 and EPC lines derived from chinook salmon (*Oncorhynchus tshawystcha*) and common carp (*Cyprinus carpio*), respectively. Cytopathic effects in WSSK-1 cells were characterized by syncytia 2 - 4 d after inoculation of cells at 20°C. The virus replicates in WSSK-1 cells at 10, 15 and 20°C but not at 5 or 25°C. Virions detected in both infected tissues and WSSK-1 cells

were characteristic of herpesviruses with hexagonal capsids, a mean diameter of 110 nm, a deeply staining core surrounded by the tegument and an external envelope with a diameter of 230 nm.

The virus has been consistently recovered from the infected population of fish for a period of 6 wk but not thereafter. The virus has not induced mortality in juvenile sturgeon following bath exposures to WSHV but the virus can be recovered from these fish.

Epitope Changes in the Nucleoproteins of IHNV Isolated From Years 1982 - 1990 At Dworshak National Fish Hatchery

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For the past eight years, infectious hematopoietic necrosis virus (IHNV) has caused severe losses of steelhead at the Dworshak National Fish Hatchery in Ahsahka, Idaho. In 1982, IHNV was first confirmed in returning adult steelhead; and during that same year, a 48% loss of production was experienced. In 1983, there was a greater than 80% isolation of IHNV among female broodstock. Later that year, 98% of juvenile steelhead died. In 1984, 37% of all eggs were destroyed because it was determined that the parents were IHNV-positive, and only 10% of production was lost. Brood year 1985 was more severe, yielding a 65% loss of production. In 1986, 3.4 million eggs were reared at the Kooskia facility on virus free water in an attempt to circumvent infection by the virus. When these fingerlings, hatched at Kooskia, were returned to Dworshak, a loss of 35% due to IHNV was experienced after rearing in Dworshak's river water supply. In 1987, adult sampling revealed only a 6% incidence of IHNV-positivity; and losses were held that year to 10%. In brood year 1988, 75% of steelhead fingerlings were lost although there was only a 4.5% incidence of positivity in the adults. (Olson, W.H., Owsley D.E., Rockowski, J.J. IHN Virus at Dworshak National Fish Hatchery - Past and Future. Presented at the IHN Committee Meeting, University of Idaho, April 27, 1989.) In 1989, 1.2 million eggs (9.8% of production) were culled because the parents were IHNV-positive, and in September of that year on the station at Dworshak a cumulative loss of 78% of steelhead fry was recorded. Nineteen ninety has been a relatively quiet year however, and through September 30, minimal losses from IHNV at Dworshak have been recorded (Joe Lientz, personal communication).

We have used monoclonal antibodies made to the glycoprotein (G) and nucleoproteins (N) of the virus (Ristow, S., Arnzen J.M., Cleveland, T. and Fagerness, T. FHS/AFS Newsletter, 17(4) 3 1989; Ristow S.S. and Arnzen, J.M. Journal of Aquatic Animal Health 1:119, 1989), to examine various isolates from the years 1982 to 1990. Each isolate was examined by indirect fluorescence with five antibodies [1NDW14D, 2NH105B, 2NC042C, 3GH92A, and 3GH127B] and by serum neutralization with two antibodies [3GH92A and 3GH127B]. The first antibody, 1NDW14D, originally made to the nucleoprotein of the Dworshak 2 isolate of IHNV (Ristow and Arnzen, 1989), has reacted with over 150 isolates of IHNV in our laboratory. Two other monoclonal antibodies, 2NH105B (originally made by immunization to the nucleoprotein of a 1982 Hagerman isolate) and 2NC042C (originally made by immunization to the nucleoprotein of a 1979 Coleman isolate), are significant because 2NH105B has identified all electrophoretic type 2 isolates (Hsu et al, 1986) which have come through our laboratory and 2NC042C identifies an epitope on the nucleoprotein which was originally found on the nucleoprotein of the 1979 Coleman (California) isolate from chinook salmon.

With the monoclonal antibodies 2NH105B and 2NC042C, we were able to determine several changes in the nucleoprotein of viruses at Dworshak during the years 1982 through 1990 by indirect fluorescence [Table 1]. The single 1982 isolate from steelhead examined gave a negative reaction with both antibodies. Although the 1984 isolate from steelhead gave a positive reaction with 2NH105B, the 1984 chinook isolate was negative with this antibody. In 1986 all four steelhead and chinook IHNV-isolates were positive for the 2NH105B epitope in indirect fluorescence and we have noted a positive reaction to 2NH105B continuously through 1990.

The epitope recognized by 2NC042C first appeared in our collection of isolates in 1987 in an adult chinook salmon. This epitope later appeared in another chinook salmon IHNV-isolate in 1989 and in two steelhead isolates in 1990 [Table 1]. It will be interesting to see whether this epitope appears more consistently in future isolates of the virus at Dworshak.

All Dworshak IHNV isolates were positive with the glycoprotein recognizing antibodies (3GH92A and 3GH127B), indicating that these epitope(s) are relatively conserved. This is an important finding because we have observed that the older Coleman isolates from California chinook salmon, including Coleman 2 and Coleman 3 (Hsu et al, 1986), are not neutralized by either of the anti-G antibodies. This indicates that there is at least one major difference in the epitopes of glycoproteins of the IHNV-isolates at Dworshak and those found in California.

We thank Wayne Olson, Jon Streufert, Joe Lientz, Kathy Clemens, Colleen Hesson and Elizabeth Steiner for their valuable time and assistance to us in securing the isolates

used in this study. This paper is the result of work supported by Bonneville Power Project DE-PS79-88BP92431 and by the USDA Western Regional Aquaculture Consortium agreements 87-CRSR-2-3219, 88-38500-4027 and 89-38500-4287.

Table 1. Indirect fluorescence and serum neutralization studies on isolates from Dworshak Hatchery during the years 1982-1990. St= steelheat trout; ChS= chinook salmon; KOE= kokanee salmon. (+) indicates a positive reaction and (-) indicates a negative reaction. D= Dworshak; KOO= Kooskia; BC= Breakfast Creek; SK= Skull Creek; Fe= female; Ad= adult; Mor= mortality; Tk= tank; O= ovarian. Fluorescence results antibody codes as follows: 1= 1NDW14D; 2= 2NH105B; 3= 2NCO42C; 4= 3GH92A; 5= 3GH127B.

			Fluorescence Results					Log 10 Plaque	Log Reduction with	
Year	Species	Desig.	1	2	3	4	5	Titer	4	5
1982	St	D	+	-	-	+	+	6.8	3.4	4.4
1984	St	D2	+	+	-	+	+	5.4	2.8	3.1
1984	ChS	D4#129	+	-	-	+	-	5.1	3.3	3.0
1986	St	D	+	+	-	+	+	5.9	3.9	2.2
1986	Chs	D	+	+	-	+	+	5.6	2.1	2.8
1986	St	DPond5	+	+	-	+	+	5.5	4.0	5.5
1986	ChS	DTank6	+	+	-	+	+			
1987	ChS	DFemal	+	+	-	+	+			
1987	St	DPnd83	+	+	-	+	+	5.3	3.8	3.1
1987	ChS	DTk1	+	+	-	+	+	6.0	2.5	2.3
1987	ChS	D Adul	+	+	-	+	+	5.5	5.5	4.1
1988	St	DTk121	+	+	+	+	-	5.3	5.3	4.3
1988	St	DTk16	+	+	-	+	+			
1988	St	DTk118	+	+	-	+	+			
1989	St	DTk3	+	+	-	+	+	6.4	5.7	4.2
1989	ChS	DFe3Ad	+	+	-	+	+	6.3	4.0	4.2
1989	St	KooMor	+	+	+	+	+			
1990	ChS	DTk102	+	+	-	+	+			
1990	St	DBP731	+	+	-	+	+	6.2	3.7	3.8
1990	St	DBP732	+	+	+	+	+	6.2	6.2	4.9
1990	St	D470	+	+	+	+	+			
1990	ChS	D460	+	+	-	+	+	7.0	4.9	4.1
1990	KOE	IK/SFe	+	+	-	+	+	6.8	3.4	5.1
1990	KOE	BCFKS	+	+	-	+	+	7.2	4.6	4.1
1990	St	D85	+	+	-	+	+	6.3	3.6	2.1
1990	St	D50	+	+	-	+	+	6.6	3.2	3.9
1990	St	D44	+	+	-	+	+	6.7	2.8	3.4
1990	KOE	SkCFeO	+	+	-	+	+	6.5	3.2	3.5

Experimental Infections with *Nucleospora salmonis* n.g.n. sp.: An Intranuclear Microsporidium from Chinook Salmon (*Oncorhynchus tshawytscha*)

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Nucleospora salmonis infections were induced in juvenile chinook salmon (*Oncorhynchus tshawytscha*) by intraperitoneal injections of cells from the kidney of fish with naturally-occurring *Nucleospora salmonis* n.g.n. sp. infections. A mild hyperplasia of the hematopoietic tissues of the kidney and spleen were observed 3 wk after injection at water temperatures of 15°C. By 5 wk postinjection, populations of lymphoblasts, some of which contained intranuclear forms of the parasite, were abundant in the kidney and spleen but also occurred in the leptomeninges, skeletal muscle, coelomic mesenteries, hepatic sinusoids and periorbital connective tissues of the eye. Plasmodial stages were abundant within the nucleus of blast cells in stained kidney imprints from infected fish but spores were only rarely detected. At 7 wk postinjection, the infections had progressed to a severe systemic disease with features similar to naturally-occurring infections with the microsporidium. These included anemia accompanied by a leukemic condition in which lymphoblastic cells were found disseminated throughout most tissues including prominent accumulations in the lamina propria of the posterior intestine. Mortalities occurred among infected fish between 53 - 60 d postinjection and infections were detected in most survivors at the end of the study at 9 wk postinjection. Moderate numbers of spores were found most often in dead fish and survivors examined at the end of the study (63 d). The potential for treatment of infections with fumagillin DCH was demonstrated by the absence of mortalities and microscopic signs of clinical infections and a marked decrease in detection of the parasite among chinook salmon fed the drug (0.1 g/kg food at 1.5% body weight per day) between 3 and 7 wk postinjection.

Range Extension of *Perkinsus (Dermocystidium)* sp. (Apicomplexa) Infections in Farmed Atlantic Salmon (*Salmo salar*) of Eastern North America

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We earlier reported that *Perkinsus* sp. (Apicomplexa) caused disease in smolt and adult Atlantic salmon reared in sea cages in Atlantic Canada (FHS/AFS Newsletter 18:3-4). Recently, we found numerous *Perkinsus* sp. parasites and severe multiple granulomas in a pre-market (1 Kg) Atlantic salmon in a sea cage in Cobscook Bay, Maine. The fish originated in a local hatchery and was put into the sea cage as an S1 smolt in spring 1990. The fish was anorexic, underweight and exhibited weak and irregular swimming prior to euthanasia. At necropsy there were numerous white-yellow foci in the hypertrophied kidney, liver and spleen. Histologically, there were numerous small (2-3 μm dia) stages of *Perkinsus* sp. dispersed throughout the well defined granulomas. The parasites reacted strongly with periodic acid Schiff reagent. No other pathogens were present. Similar lesions were present in several other market salmon from this farm. *Perkinsus* sp. is apparently a common parasite of farmed Atlantic salmon in the Bay of Fundy region (Cawthorn, unpublished observations); its economic significance to the Atlantic salmon farming industry
needs investigation.

Picorna-like Virus From Trout Broodstock in Washington

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A picorna-like virus was recently isolated from Washington Department of Wildlife's brown trout (*Salmo trutta*) broodstock. The virus is similar to the one isolated in California (Yun, Hedrick and Wingfield, Fish Health Newsletter 17(2), 5, 1989) and Oregon (LaPatra et al., Fish Health Newsletter 18(2), 6-7, 1990). Isolation of the virus

was from ovarian fluid samples with techniques described in above articles.

The brown trout broodstock originated from eggs received from California in the early 1970's. No evidence of disease has been encountered in the adult fish or any progeny.

A rainbow trout (*Oncorhynchus mykiss*) and cutthroat trout (*O. clarki*) stock from Washington State were previously examined for the picorna-like virus with negative results.

Fish Parasitology and Fish Disease Research in the Soviet Union

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For six months during 1989, I visited the major fish disease and aquaculture facilities in the USSR. I represented the U.S. National Academy of Science as an exchange scientist visiting Moscow, Leningrad, Alma-Ata, Leningrad, and Kishinev as well as towns and laboratories near these cities. I also spent 11 days in Gdansk, Poland comparing research with fish parasitologists there. The purpose of my trip was to examine various type specimens, visit other parasitologists, and provide lectures on my research. The goal of this report is to summarize the status of fish parasitology and fish disease research in the Soviet Union whereby members of the Fish Health Section may become acquainted with research in that country.

Fish parasitology has been emphasized in the USSR at least partially because of the large annual fish consumption (40 lbs per capita.) Russian fish disease researchers continue to do excellent work in parasite systematics, morphology and ecology but they have difficulty entering other areas of research endeavor due to the lack of equipment and experience. Their interest in systematics and morphology is exemplified by the 3 volume series edited by Dr. Oleg Bauer on the "Parasites of Fishes in the USSR." The series is written in Russian but will soon be available in English. The progress is also exemplified in numbers of described species of fish parasites. In 1958, 784 species had been described, in 1962, 1112 species and by 1982, 1649 species. It has been estimated that there will be over 2,000 species of fish parasites identified in the USSR when the descriptive phase has been completed. There is a fish disease research center in each of the Soviet Republics. All USSR scientists expressed great interest in cooperative research with USA scientists.

Moscow: At the All-Union Helminthological Laboratory and the All-Union K.I. Skryabin Institute of Helminthology, I examined all the known species of *Diplostomum* in fish and in most cases these were type specimens from Dr. Shigin's collection. I also had access to the type specimen for *Bothriocephalus aechelognathi*, the Asian fish tapeworm, which exists throughout the Soviet Union. It may have been introduced with a Chinese fish shipment. I returned to the U.S.A. with a complete set of stained *Diplostomum* metacercariae in fish from the USSR which will be donated to the Manter collection at the University of Nebraska. I also visited the Moscow Medical Institute and Moscow State University.

Rybnoye, Dmitrov Region: At the All-Union Research Institute of Pond Fisheries, I visited with Dr. Musselius (past director) and Dr. P. Golovin (new director). The Institute of Pond Fisheries is the primary center for applied fish disease research in the USSR and research conducted here is closely allied to fish production. They have trained many fish disease specialists now located at fish farms and other research institutes.

Leningrad: At the Zoological Institute, the main center for fish parasite research in the USSR, I discussed cooperative research with Drs. O. Pugachov and O. Bauer. I was provided with type specimens of each major fish parasite group by the specialist for that area at the Zoological Institute. Dr. Bauer has recently published 3 volumes on the parasites of fishes in the Soviet Union which is being translated into English. I also visited with Dr. Ivanov, who discovered and described the phylum Pogonophora. Dr. Voronin plans to publish an extensive volume on the fine structure of microsporideans. I was given a tour of the Ropsha Aquaculture facility near Leningrad where they have developed a cold water strain of carp.

Alma-Ata: At the Zoological Institute near the capital of Kazakhstan, and in cooperation with Dr. D. Zhatkanbayeva, I conducted research on the efficacy of praziquantel against select fish parasites. This was the first time praziquantel had been used against fish parasites in the USSR and there appears to be major potential for its use in the Soviet Union.

Kishinev: During an International meeting in Hungary, I met Dr. Ilyae Trombitsky and started cooperative research with him. This activity was curtailed because of the political climate at that time. I was able to visit all major aquaculture facilities in Moldavia and assisted in proper classification of several fish parasites. Dr. Trombitsky and I have been cooperating on utilizing biological control methods for diplostomatosis using a microsporidan hyperparasite.

Please vote on the following proposal! Remove this ballot, vote, and send to the address on the flip side of this page, due one month after receipt of this newsletter.

A PROPOSED AMENDMENT TO THE BYLAWS OF THE FISH HEALTH SECTION THE AMERICAN FISHERIES SOCIETY

An amendment to the by-laws of the Fish Health Section of the American Fisheries Society, as proposed and voted upon favorably by the members in attendance at the annual business meeting in Annapolis, MD in July 1989 is hereby presented to the membership. As required by our section bylaws, the creation of a new standing committee must be approved by an amendment to the bylaws, determined by favorable mail ballot of at least two thirds majority of the membership at large.

The proposed amendment provides for the establishment of the **Blue Book Advisory Committee** as a permanent standing committee, separate from the Technical Procedures Committee. The composition and duties of the **Blue Book Advisory Committee** shall be as follows:

The Blue Book Advisory Committee shall consist of a chairperson and four of more members appointed by the president. It shall be the responsibility of the committee to compile and distribute the Fish Health Section's "Blue Book" , Procedures for the Detection and Identification of Certain Fish Pathogens. The committee's duties shall include editorial responsibilities such as format, review and coordination with the Technical Procedures Committee to determine needs for appropriate additions or revisions to the "Blue Book", and distribution of same to the membership and other interested parties or agencies.

My vote on the proposed Amendment to the Bylaws:

In Favor_____

Opposed _____

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Gdansk, Poland: I visited with Dr. J. Rokicki at the University of Gdansk and established cooperative research dealing with protozoan parasites of three spine sticklebacks found in pristine and polluted environments. Future research efforts by the two of us will emphasize the role of pollution on parasite load and myxosporeans.

Space limitations required that the editors summarize the report submitted by Dr. Heckman. We apologize to Dr. Heckman and recommend that those wishing further information contact Dr. Heckman.

Fish Health Management in Asia

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The Regional Workshop on Fish Health Management was held in Pusan, Republic of Korea from October 8 to October 15, culminating a 12 month project. I had the opportunity to serve as Team Leader on the project and Workshop Chairman and provide here a brief overview. The aim of the project was to accelerate fish health management in Asian countries (where over 80 percent of the world's aquaculture production occurs) by identifying the needs and developing an appropriate action plan. The program was funded by the Asian Development Bank (ADB) and implemented by the Network of Aquaculture Centers of Asia-pacific (NACA) based in Bangkok, Thailand. The project covered infectious disease issues of marine and freshwater fin fish, crustaceans, molluscs, and seaweeds as well as environmental, public health and regulatory issues in aquaculture. Eighteen governments from south, southeast and east Asia participated in the program and sent official representatives to the Workshop. Prior to the Workshop, the study team visited most of the participating countries and prepared a preliminary report for each country on aquaculture production, occurrences of disease, infrastructure and rules and regulations for disease management, national programs, public health and environmental issues.

Over 100 diseases and disease syndromes were identified during the course of this project. While some of the diseases are relatively well characterized, most fish diseases in developing countries of Asia-Pacific are poorly understood in terms of causative factors, management, prevention and even the precise level of adverse economic impact. The project estimated that the farm value of aquaculture production for 1990 in 15 developing countries was US$ 22.7 billion and that, using conservative assumptions, fish disease was estimated to account for lost revenue in the 15 countries of at least US$ 1.36 billion in 1990 alone. The actual annual losses in these 15 countries may be two to six times this estimate.

At the workshop, attended by over 100 persons, each participating government made a status presentation. The bulk of the workshop was taken up with technical subject area presentations and discussions led by international and regional resource people. A synthesis session followed during which a consensus on regional needs in fish health management was reached, a workshop proceedings was prepared and adopted during the final session. The needs identified by the participants were:

> National capabilities (facilities and manpower) in all countries need to be upgraded although the detailed analysis shows much greater need for certain countries.
>
> A region wide system of coordination on fish health issues is needed and would serve to facilitate training, regional research, and information transfer regarding both emergency and routine disease information. NACA was identified as the logical organization to implement this activity between governments since NACA already exists as an intergovernmental organization in Asia.
>
> An array of Centers of Excellence for training, regional research coordination and related activities needs to be developed in the region for the various commodity groups and specific discipline areas. These Centers would be developed from existing national facilities with appropriate augmentation and with coordination from NACA.
>
> The following issues require further definition in Asia and working groups need to be established to address them: public health and aquaculture products; fish disease control mechanisms including consideration of quarantine systems; environmental assessment and management of aquaculture activities in relation to the environment; water quality criteria for economically important cultured species; fish nutrition, feed management and related issues; standardization of fish disease diagnostics and diagnostic methods for fin fish, crustaceans and molluscs; development of standard training materials and methodology, especially suited to "trainers" and the fish farmer.
>
> Coordination between regional organizations and international aid organizations is needed to most efficiently utilize limited financial resources in the region.

The detailed recommendations, country reports and technical session reports will be published in April 1991 in a single volume of about 500 pages. It will be available through NACA. Mailing address: Network of Aquaculture Centers of Asia-Pacific, c/o UNDP, G.P.O. 618, Bangkok 2, Thailand.

Brown Bullhead Neoplasia Data Request

Since 1985 Cornell University has had a cooperative contract with the New York State Department of Environmental Conservation to study fish health problems in feral and stocked fish in natural waters throughout New York State. Neoplasia in brown bullheads is one of the problems we have chosen to study. Orocutaneous papillomas have been observed in brown bullheads from certain waters in most of the major drainage systems throughout New York State. These neoplasms have been observed at least since the 1930's. Several ponds and reservoirs in the state exhibit epizootics of orocutaneous papillomas in which 40-100% of adult fish are affected. The cause(s) of these neoplasms remain an enigma. Sediment samples from 4 sites with papillomas and 1 control site were analyzed for polycyclic aromatic hydrocarbon (PAH) carcinogens and for mutagenic activity using the Ames Assay (with and without fish microsomal enzyme activation.) Assays revealed neither mutagenic activity nor elevated levels of PAHs in sediments. Virus isolation attempts and extensive ultrastructural study of papilloma tissue have failed to reveal a viral agent. In addition, immunoperoxidase studies of papilloma tissue using rabbit anti-bovine papillomavirus antibody yielded negative results. To make the story even more confusing, disturbing levels of hepatic neoplasia have been observed in brown bullheads in waters both with and without epizootic orocutaneous papillomas. In some of these waters 15-50% of brown bullheads have benign and/or malignant neoplasms of the hepatocytes and/or biliary tissue. Since relatively little published information is available on the distribution of neoplasms in feral brown bullheads, we would like to obtain as much information as possible. If you or your colleagues regularly study brown bullheads or if you receive reports from fisherman in your locality, we would appreciate any information regarding neoplasia (or lack thereof) in these fish. Also, if any of you have studies or have ideas regarding the role of natural carcinogens or natural tumor promoters in tumorigenesis in fish in natural waters, we would appreciate your input. Please send correspondence to: Jan Spitsbergen, DVM, Ph.D, Department of Avian and Aquatic Animal Medicine, New York State College of Veterinary Medicine, Ithaca, NY 14853.- *submitted by Derek Currie.*

A Proposed Amendment to the By-Laws of the Fish Health Section of The American Fisheries Society

An amendment to the by-laws of the Fish Health Section of the American Fisheries Society as proposed and voted upon favorably by the members in attendance at the annual business meeting in Annopolis, MD in July 1989, is hereby presented to the membership. As required by our section by-laws, the creation of a new standing committee must be approved by an amendment to the by-laws as determined by favorable mail ballot of at least two thirds majority of the membership at large. The current proposed amendment provides for the establishment of the Blue Book Advisory Ad-Hoc Committee as a permanent standing committee separate from the Technical Procedures Committee. The composition and duties of the Blue Book Advisory Committee shall be as follows:

The Blue Book Advisory Committee shall consist of a chairman and four or more members appointed by the president. It shall be the responsibility of the committee to compile and distribute the Fish Health Section's Blue Book "Procedures for the Detection and Identification of Certain Fish Pathogens". The committee's duties shall include editorial responsibilities such as format, review and coordination with the Technical Procedures Committee to determine needs for appropriate additions or revisions to the Blue Book and distribution of same to the membership and other interested parties or agencies.

J.H. Schachte

-Ballots are included in this newsletter. Please vote and forward to Kathy Hopper as addressed.

Blue Book Update

By the time this newsletter is in print the Blue Book Committee hopes to have its first draft completed and in review by the committee.

The next step is general review. The committee plans to get as much review from practicing fish health experts as possible. Depending on demand we may have to establish a cut off point.

What I would like to do is see how many people we have that are interested in reviewing the Blue Book with an equal representation of federal, state, commercial, and academic reviewers.

If you are interested please drop me a letter or postcard with your name, addresses, phone number, and affiliation stating you would like to be placed on the Blue Book Review list.

Your input will be appreciated.-*John C. Thoesen, Blue Book Committee Chairman. Fish Health Unit, P.O. Box 155, Lamar, Pennsylvania 16848.*

1991 Fish Pathologist Examination

Application Deadline for August Exam

Individuals seeking certification as an AFS/FHS Fish Pathologist must have their application submitted and approved by July 1, 1991 in order to take the qualifying exam. The examination will be scheduled during the month of August, 1991. Examinees will be notified of exact dates.

Application forms and information concerning required qualifications can be obtained by calling the Chairman of the Board of Certification, Ralph Elston, at (206) 683-4151 or the Chairman of the Professional Standards Committee, John Cvitanich at (503) 746-1442.

Assistant/Associate Professor

Louisiana State University is conducting a search for an Assistant or Associate professor (tenure track) in aquaculture. The successful candidate will conduct research on infectious diseases of warm water fish using modern biotechnological approaches (i.e. recombinant DNA, protein chemistry, cell biology, etc.) to study infectious agents or infectious agent/host interactions, including immune responses; develop an independent, extramurally-funded research program; participate in an ongoing fish disease research program as appropriate. Qualified applicants will have a Ph.D. in Microbiology, Molecular Biology, Fish Pathology or a related field. To apply send a letter of application, curriculum vitae, and the names of three references by April 15, 1991 to Dr. Ron Thune, Department of Veterinary Science, Louisiana State University, 111 Dalrymple Building, Baton Rouge, LA 70803 (504/346-3308; FAX 504/346-5715). LSU and the Louisiana Agricultural Experiment Station are an equal opportunity/affirmative action employer.

Book Review

"Mollusc Diseases: Guide for the Shellfish Farmer" by Ralph A. Elston was recently published (1990) by the Washington Sea Grant Program, University of Washington Press, P.O. Box 50096, Seattle, WA 98145-5096. 73 pp. ISBN 0-295-97001-4 : $9.95

Drawing on the strength of many years as an internationally known shellfish pathologist, Dr. Ralph Elston has assembled a short but concise and workable guide of the major diseases of bivalve molluscs. The guide is written in an easily understandable language and is arranged into sections that describe the hosts, geographic distribution and factors influencing mortality or severity of the most significant mollusc diseases. An emphasis is placed on their diagnosis, treatment and prevention. For the reader wishing to pursue more details, each section concludes with the definitive references for each disease. Although oysters are the major host species discussed, attention is also given to diseases of clams and scallops. Excellent illustrations of the anatomical details of the bivalve molluscs, critical to understanding the disease processes and for proper sample collections, are also provided. The author's insights into the successful management of larval stages in hatcheries provides basic essentials for minimizing the effects of specific and opportunistic pathogens limiting hatchery production. The volume closes with a list of the laboratories that can provide assistance for disease diagnosis and a glossary. Although the guide is directed to the shellfish farmer, the information will assist agency managers, researchers and students wishing to obtain the basics for principal diseases encountered by oysters and other selected molluscs.

Shortcourse

July 8-19, 1991 -- Shortcourse: "Disease Diagnosis and Control in Marine Shrimp Culture". The University of Arizona, Tucson, Arizona. Application deadline is May 15, 1991. For information: Donald V. Lightner, Department of Veterinary Science, The University of Arizona, Building 90, Room 202, Tuscon, Arizona 85721. Tel: (602) 621-8414. FAX: (602) 621-6366.

Passages

The Olympia Fish Health Center, USFWS office in Olympia, Washington has moved. Its new address is 3704 Griffin Lane SE, Suite 101, Olympia, WA 98501. Phone 206-753-9046. Stationed at this office are Ray Brunson, John Morrison, Kim True, Jan Yancey and Linda Moore.

Russell Lee has moved from Montana. His new address is P.O. Box 278, Wellsville, Utah 84339.

Charles W. Johnson has moved. His new address is Haywood Technical College, Freedlander Dr., Clyde, NC 28721.

Letters to The Editor

An Update on Canadian Concerns

In the absence of environmentally benevolent politicians and other decision-makers, Canadian fisheries and aquatic resources need an advocate to speak strongly for their interests. We believe that AFS can play that role in Canada, for who is better prepared to comment on the policies and proposals that

potentially affect aquatic resources than we, the experts?

Now that we know what we need to do, the next question is how can the AFS influence decision-making activities in Canada. The answer is communication. To influence policy in Canada, we must have a forum to effectively convey our message to government, to the media, to other advocacy groups, and especially to the public. There are problems, however, associated with AFS fulfilling this role in Canada. These problems relate largely to nonrecognition, misconception, and lack of critical mass.

It is the goal of the Canadian Concerns Committee to rectify these problems and shape the AFS into a major force in the Canadian aquatic resource community. To address this long-term goal, we have identified a number of objectives for 1990 - 1991. These objectives include:

(i) to facilitate a name change for the AFS;
(ii) to assess the feasibility of establishing a Canadian office of the AFS;
(iii) to identify sources of funding for the Canadian office; and,
(iv) to develop a network of Canadian fisheries professionals.

The Name Change

To be a driving force in Canada, the AFS must be, and must be perceived to be, a group of professionals whose primary goal is the scientific management of aquatic resources to ensure their health and perpetuation and provide for the optimum use and enjoyment by all of the people on this continent. The present perception of the AFS as a group of American fisheries scientists and managers is a continuing stigma, viewed by many Canadians as "U.S. meddling" in their affairs. In a recent membership poll, the name of the society has been identified as a major impediment to increasing our credibility in Canada.

Les Stanfield and Bob White are spearheading the name change initiative, in association with more than forty dedicated Canadian and American sub-committee members. Their forthcoming article in Fisheries will provide a concise rationale for the name change, and we hope that you will carefully consider this matter before deciding how you will vote in the upcoming referendum.

The Canadian Office

To increase the profile and effectiveness of the AFS, we must have both a structural and a functional presence in Canada. We believe that establishing a Canadian Office of the AFS will fill both of these needs. The physical presence of an office with a Canadian address will provide policy makers and the public with a tangible reminder of our existence and our mission, and facilitate their communication with us. From a functional perspective, the office will provide a focal point for interaction with all target groups. In addition, it will coordinate the activities of Canadian members to ensure that the most appropriate people are working on various initiatives. Funding for the Office is now being sought from within the Society, from various levels of government, and from other sources.

Environmental Concerns

One of the critical requirements in terms of increasing our profile and effectiveness, is the development of a timely mechanism for participating in policy decisions and becoming more active in environmental conservation issues. We are currently responding to this need through the development of the Network of Canadian Aquatic Resource Professionals (NOCARP). This network will be supported by a database which contains specific information on Canadian professionals with both the interest and expertise to participate in policy decisions. The system is modelled after the inventory established by the North Pacific International Chapter and would be similarly used to assign members to committees and to coordinate responses to environmental concerns. We anticipate that the Network will be administered by the Canadian Office, thereby ensuring that timely responses to environmental and other issues can be prepared, as appropriate.

We feel that achievement of the current objectives of the Canadian Concerns Committee will go a long way towards convincing Canadian fisheries professionals that the AFS is indeed an organization that can function as effectively for them in Canada as it does for American members in the United States. Increasing the level of membership and activism in the society will virtually assure our long-term success in Canada. In addition, we must embark on an aggressive and protracted education campaign to acquaint ourselves to all of the groups that are involved in resources management in Canada, especially the public. We challenge all to get involved and promote the Society to your colleagues. And, who's going to ultimately benefit from your efforts? ... the resource of course. And after all, that's why we're all here!

Don MacDonald and Terry Marshall,
Co-chair, Canadian Concerns Committee

Meetings

Regional Aquatics Workshop. April 26, 1991. Milwaukee, Wisconsin. Contact Rich Sajdak (414) 771-3040.

AFS Western Division Annual Meeting. July 15-19, 1991. Boseman Montana. Student participation is especially encourage. Students should contact Mike Moberly, Chairman, Student Concerns Committee, Coordinator, Student Papers Session, 4704 N.E. 55th, Seattle, Wa. 98105; Phone 206-522-6402.

Second International Symposium on Viruses of Lower Vertebrates. July 29-31, 1991. LaSells Stewart Center, Oregon State University, Corvallis, Oregon, USA. Contact J.L. Fryer, Department of Microbiology, Oregon State University, Corvallis, Oregon 97331-3804. Telephone 503-737-4441. Fax 503-737-0496.

14 th Annual AFS/FHS Annual Meeting. Mark O. Hatfield Marine Science Center, Oregon State University, Newport, Oregon. Aug. 1-3, 1991. Contact Paul Reno at HMSC 2030 S. Marine Science Dr., Newport, OR 97365; phone 503-867-0147, FAX 503-867-0105.

European Association for Veterinary Pharmacology and Toxicology, 5th Congress. August 18-22, 1991. Copenhagen, Denmark. Contact Folke Rasmussen, Chairman of the Congress, Karlegogard, 91 Karlegovej, DK-3400 Hillerod, Denmark.

3rd International Congress of Comparative Physiology and Biochemistry. August 25-30, 1991. Tokyo, Japan. Contact Congress Secretariat, 3rd International Congress of Comparative Physiology and Biochemistry, Zoological Institute, Faculty of Science, University of Tokyo, Hongo, Tokyo 113, Japan. FAX 81-3-816-1965.

European Association of Fish Pathologists Fifth International Conference: Diseases of Fish and Shellfish. August 25-29, 1991. University for Horticulture, Budapest, Hungary. Contact EAFP Meeting Secretary, Institute for Veterinary Medicine, Federal Health Office, Alt-Marienfelde 17-21, D-1000 Berlin 48, Germany.

Deadline for summer newsletter is:

May 1, 1991.

FHS OFFICERS AND COMMITTEES 1990-91

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Voting Members

Charlie Smith, Chair & President (406) 587-9265
Vicki Blazer, President-Elect (404) 542-1165
John Schatche, immediate Past President
(315) 337-0910
Scott LaPatra, Secretary-Treasurer (208) 543-8217
Rich Holt, Nominating Committee (503) 737-1854

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Rod Horner, Technical Procedures Committee
Randy MacMillan, Newsletter and Publications Committee
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Bill Rogers, Scientific Journal

STANDING COMMITTEES

Nominating

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John Hawke (2 years)
Paul Reno (3 years)

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Martin Chen
Bob Durborow
Rod Getchell
Leni Oman
Ed Noga
Ron Thune
Chris Wilson

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Dennis Anderson

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Mike Kent
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Paul Janeke (1 year)
John Hnath (2 year)
Ron Thune (2 years)
Bob Olson (3 years)

Finance

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Kathy Hopper
(Membership)
Randy MacMillan
(Newsletter)

Awards

Fred Meyer, Chair
David Locke (2 yr)
Steve Leek (3 yr)

Time and Place

Ron Hedrick, Chair
Ed Noga (1 yr)
John Rohovec (2 yr)

Archives

Toni Amandi, Chair
(503) 737-1855
Glenn Hoffman

Fish Health Section Newsletter

The Fish Health Section Newsletter is a quarterly publication of the Fish Health Section of the American Fisheries Society. Submissions of any length on a topic of interest to fish health specialists are encouraged with the understanding that material is not peer reviewed. Submissions should be addressed to the ediotr or to a member of the publication committee.

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