FISH HEALTH SECTION
AFS
NEWS LETTER

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MYXOSOMA CEREBRALIS AT COLEMAN NATIONAL HATCHERY

In June of 1985, steelhead trout reared at the Coleman National Fish Hatchery on the Sacramento River of California were found to be infected with *M. cerebralis*. These fish were scheduled for release in February 1986. Extensive discussions between the California Fish and Game Department and the U.S. Fish and Wildlife Service resulted in the decision outlined in the following news release issued by the U.S.F.W.S. Region 1 office in Portland, Oregon.

December 16, 1985

Coleman Steelhead Production to End

U.S. Fish and Wildlife Service Regional Director Richard Myshak determined today that no more steelhead trout will be produced under existing Service fish health policy at Coleman National Fish Hatchery, Shasta County, California, until a parasitic infection, called whirling disease, is controlled at the facility.

"Because Coleman provides most of the adult steelhead run returning to the Upper Sacramento River, this was a very difficult decision," Myshak stated. "Although the parasite is widespread in California and Nevada, it has not been found in Northwestern steelhead stocks. Despite very long odds that Coleman produced steelhead would stray that far to the north and infect these stocks, I cannot guarantee it. British Colulmbia, Idaho, Oregon and Washington fishery agencies and private trout growers have urged us and the California Department of Fish and Game to kill the infected fish rather than stock them into waters that would give them potential access to the ocean and possibly to the Northwest."

The Service has offered the California Department of Fish and Game as many of the 1.3 million fingerling steelhead at the Coleman Hatchery as they might use to stock landlocked waters previously exposed to the parasite. The remaining steelhead fingerlings will be destroyed and buried. The 2,700 adult steelhead presently being held at Coleman for spawning will be killed and provided to Indian tribes and social welfare programs. The parasite poses no possible threat to human health to those who would eat infected fish.

The technical name of the parasite infecting about three-fourths of young steelhead at Coleman is *Mxyosoma cerebralis,* which causes skeletal deformities and abnormal whirling behavior in hatchery trout. Sampling by Service and State biologists indicates that the source of the infection in Coleman fish is the water supply within the 374-square-mile Battle Creek watershed. While steelhead at Coleman have not begun the whirling behavior yet, the myxosoma infection was detected by microscopic examination of fish tissues, indicating the presence of spores formed by the parasite.

Recent steelhead counts past the Red Bluff Dam on the Upper Sacramento River have ranged from 1,500 to 10,000 annually, and averaged about 4,000. As a stopgap measure, the Service will experimentally rear some steelhead at their Tehama-Colusa Fish Facility if they can remain free of the disease. Service and California Department of Fish and Game biologists are working cooperatively to determine the best alternatives for increasing the survival of steelhead to adulthood.

Myshak, referring to a meeting he had with California Department of Fish and Game personnel, stated, "We totally agreed that the long-term solution to our current dilemma is a need for a disease-free water supply for the Coleman Hatchery. The production from that facility is imperative if we are to have a future steelhead sport fishery in the Upper Sacramento. There is a Federal responsibility to continue steelhead and chinook hatchery production because the construction of Shasta and Keswick Dams blocked about half of the total salmon and most of the steelhead produced by the Sacramento River system—they no longer could spawn naturally in the Upper Sacramento, Pit and McCloud Rivers."

With regard to chinook salmon, Myshak ordered the release of 350,000 late fall run fish on December 6 from Coleman Hatchery. These salmon were not infected with whirling disease. An additional 12 million Coleman fall chinook will be released in May and June of 1986 if they remain free of the disease. Salmon have been found to be far less susceptible to whirling disease than trout. However, the potential for infection does exist.

NOMINATIONS SOUGHT FOR SNIESZKO AWARD

The Awards Committee solicits nominations for the S.F. Snieszko Distinguished Service Award. This is the highest award given by the Fish Health Section and is presented for the purpose of honoring individuals for outstanding accomplishment in the field of fish health. Nominations and dossiers of support should be sent to a member of the Awards Committee before February 1, 1986.

Dennis Anderson
Chairman, Awards Committee
U.S.F.W.S.
Fish Disease Control Center
P.O. Box 917
Fort Morgan, CO 80701

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ERRATA

In the last issue of the Newsletter we reprinted a report from the SFI Bulletin that identified a large bacterial gill disease loss at a Washington State Hatchery. We have been informed by anonymous sources that a Federal Hatchery was actually involved.

The editors also apologize for several typographical and proofreading errors that occurred in Stuart Sherburne's article on Atlantic Menhaden. We hope our occasional lapses will not discourage anyone from sending us material.

FROM THE EDITORS

As we enter our third year as editors of your newsletter, we would like to take this opportunity to thank the many persons who contributed items to us. Without your support, our job would be impossible. At the recent annual meeting of the AFS in Sun valley, Idaho, the first newsletter competition was held. Your FHS Newsletter was declared the winner over the publications from the other Sections of the AFS. We are pleased with this recognition but the credit must go to those who sent the material. We pledge to continue to do our best if you will pledge to send at least one small item in the coming year.

In this issue are several important developments. First is the completion of the new edition of the Fish Health Blue Book resulting from the enormous efforts of Kevin Amos and the Technical Procedures Committee. The Publication Committee determined that it was in the best interests of the Section to publish the book ourselves but the AFS has agreed, for a fee, to serve as a clearing house for future requests for the book. While this will greatly simplify advertising, bookkeeping and ordering problems, it will mean that the price of the Blue Book will be $12.00 for AFS members and $15.00 for non-members. However, in order to rapidly recover our publication costs the AFS has agreed to a one-time-only, reduced price to members of the Fish Health Section. Inside is the flyer with an order form and instructions.

The second important item regards the detection of *M. cerebralis in* steelhead trout at the Coleman National Fish Hatchery in California. The U.S.F.W.S. administrators were required to balance the known features of the biology of the disease, the value of the fish, the needs of California and the importance of insuring the disease was not transmitted to stocks of fish in the Pacific Northwest. While the decision against release of the fish was not an easy one, we believe that it is imperative to do everyting possible to prevent the spread of this and other untreatable diseases of fish and we strongly support the decision of the U.S.F.W.S. in this matter. One important issue raised by this experience involves the need for a national policy for U.S. Title 50 disease agents when they occur in anadromous fish.

Included in this issue is our first advertisement. We hope the membership will support companies that use the Newsletter to make their products and services known to you. The FHS financial situation will also be helped by revenue from the sale of the Blue Book. Formerly, the Section did not receive any funds from this source. Finally, all of you know at least one person who should be a member of FHS but for some reason is not. During the coming year, try to humiliate them into joining. You will feel better by strengthening the FHS and we certainly need the money. Best wishes in the coming year.

Jim Winton
Dave Ransom
John Rohovec

PASSAGES

Kent Hauck has left Alaska and is now Fishery Pathology Supervisor, Nampa Hatchery, 3806 S. Powerline Road, Nampa, ID 208-466-2415.

* * * * * *

J. Randy MacMillan, Area Fisheries Specialist, Stoneville, MS, recently accepted a new position with the College of Veterinary Medicine, Mississippi State University. Dr. MacMillan assumed his new position as Associate Professor of Aquatic Animal Medicine on June 17, 1985.

* * * * * *

Michael Kent has moved from U.C. Davis to take a research position at the Battelle Marine Research Laboratory, 439 Sequim Bay Rd., Sequim, WA 98383, 206-683-4151.

* * * * * *

Ted Meyers is now with the Alaska Department of Fish and Game F.R.E.D. Division, Juneau Headquarters, P.O. Box 3-2000, Juneau, AK 99802-2000. Phone 907-465-4160.

THIRD EDITION OF BLUE BOOK AVAILABLE

Kevin, H. Amos, Chairman
Technical Procedures Committee

The Fish Health Section has long appreciated the need for an established standard methodology for diagnosing fish diseases. To this end, the first two editions of the "Blue Book" were published in 1974 and 1979.

The technology for detecting infectious agents, as well as regulations controlling the dispersion of infected fish, advanced rapidly in the late seventies and early eighties. It was in this atmosphere that Bill Klontz, then President of the Section, suggested that the "Blue Book" be revised using the most sensitive yet economical methods of pathogen detection with special emphasis on "certification" methods. This effort was inaugurated in 1981 at the Boulder meeting of the Section. Our intent at that time was to produce a loose-leaf document whose pages could be easily replaced as technology changed. These methods were to augment the existing "Blue Book."

As our endeavor proceeded, technology changed, as did the number of pathogens of concern. This resulted in the third edition of the "Blue Book" being a very carefully and slowly revised document. Many of the methods are similar to those described in the old book, whereas others have changed significantly - much as a result of research to determine if the accepted methodologies were the best methods.

One will notice upon receiving the "Blue Book" that many authors contributed. The Technical Procedures Committee appreciates their efforts in making this edition the most complete and up-to-date publication possible.

Finally, I would like to mention a word of appreciation for all those who helped in this task but are not mentioned in the book (you know who you are) and for the continued support by Presidents Klontz, Shotts, Hoffman, Evelyn and Rohovec. Thanks! Now, go out and use the "Blue Book" for good fish health.

REPORTS FROM PAST MEETINGS

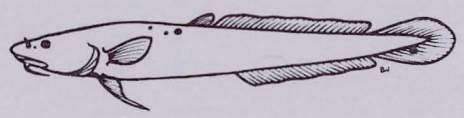
International Meeting on Fish Immunology. The first international meeting on fish immunology was held in Sandy Hook, New Jersey on September 8-12, 1985. Over 90 persons attended and 54 papers were presented. Topics covered included: fish immunoglobulins, lymphocytes, histocompatibility complexes, lymphoid organs, cell structures, immune responses, immunomodulation, and immunity to disease agents. The keynote address was given by Dr. G.W. Klontz. The banquet speech was delivered by Dr. Carl Sindermann. The current intent is to hold a second meeting within two years in Britain. Abstracts can be obtained by addressing requests to Dr. Joanne Stolen, Sandy Hook Laboratory, Highlands, NJ 07732. Submitted by Steve Kaatari, Oregon State University, Corvallis, OR 97331.

* * * * * *

The **Northwest Fish Culture Conference** was held at the Executive Inn at Tacoma, Washington December 3-5, 1985. Several hundred persons attended. Papers on fish pathology mostly dealt with IHN virus, *Myxosoma cerebralis,* proliferative kidney disease and dropout syndrome. Abstracts of the papers are due to be published and copies may be obtained from Jim Winton, Hatfield Marine Science Center, Newport, OR 97365.

* * * * * *

The tenth annual **Eastern Fish Health Workshop** was held in Chestertown, Maryland June 17-20, 1985. Hosted by the National Marine Fisheries Service, Oxford, Maryland and Washington College of Chestertown, the meeting was attended by about 40 people. A program with the titles of the 33 papers presented may be obtained from Doug Anderson, National Fish Health Research Laboratory, Leetown Box 700, Kearneysville, WV 25430.



FUTURE MEETINGS

January 19-23, 1986 World Mariculture Society. This international meeting will be held at the MGM GrandHotel in Reno, Nevada. For information contact Dr. William Hershberger, Univ. of Washington School of Fisheries, Seattle, WA 98195.

July 22-24 Fish Health Section Annual Meeting and Eastern Fish Health Workshop will be held in Leetown, West Virginia. For information contact Pete Bullock, National Fish Health Research Lab, Leetown Box 700, Kearneysville, WV 25430.

FROM THE EPA

The following is a memo issued Dec. 9, 1985 by the U.S. Environmental Protection Agency, Region 10, 1200 Sixth Ave., Seattle, WA 98101. It was sent to fisheries workers in many states who had written to the EPA voicing concerns over proposed, strict, NPDES requirements for Idaho fish hatcheries and the possible use of this program as a model to be followed in all other states.

Re: National Pollutant Discharge Elimination System (NPDES)
Evidentiary Hearing

To All Interested Parties:

EPA has reached a settlement with twenty-three trout rearing facility operators regarding their request for a NPDES permit evidentiary hearing. This settlement results in one major change to the permit; the submittal of a best Management Practices (BMP) plan has been deleted. The permittee is still, however, required to operate and maintain the facility as efficiently as possible.

The 5.0 mg/l total suspended solids (TSS) effluent limit is not affected.

Enclosed is a copy of the settlement agreement. If you have any questions regarding this settlement please call Henry Elsen, Assistant Regional Counsel, at (206) 442-1169.

/s/Robert S. Burd
Director, Water Division

WHIRLING DISEASE CONTROL AT THE COLEMAN NATIONAL HATCHERY

James Warren
U.S. Fish and Wildlife Service, Vancouver, WA 98665

Background

The history of whirling disease in California goes back to 1966. Isolated cases encountered in the next 18 years were controlled by eradication and site disinfection. In early July 1984, juvenile trout at the Mount Whitney and the Black Rock State Fish Hatcheries displayed classic signs of whirling and black tail but little mortality. In these cases, pathologists believe whirling disease first occurred but went undetected in 1983 in fish held at the Black Rock Hatchery. Some of these fish were planted above the Mt. Whitney Hatchery before the disease was diagnosed.

Alerted by two more cases uncovered in commercial trout hatcheries on the Mokelumne River on the west slope of the Sierras, state pathologists began a detailed survey to determine the range of whirling disease in waters of the state. To date the pathogen has been detected in cultured and wild salmonids in at least 50 locations, including several tributaries to the Sacramento River. Few instances of overt mortality have been encountered to date.

Chris Horsch, federal fish pathologist at the Coleman National Fish Hatchery was notified by California DF&G personnel early in 1985 that some 350,000 trout had been destroyed at the Darrah Springs SFH upstream from Coleman because of suspected whirling disease. The diagnosis was never confirmed but Chris initiated a routine for detailed examination of young steelhead and chinook salmon at Coleman. For several months all reports were negative. In June, however, signs of infection were detected in steelhead fingerlings and a confirmed diagnosis was made in late July. The chinook remained free of infection.

Disease control measures at Coleman NFH

Fish production at Coleman now utilizes raw water from Battle Creek. Fish carrying viral, bacterial and parasitic fish pathogens reside upstream from the hatchery. Fish disease control has been a major difficulty at the hatchery since its construction. A dependable, pathogen-free water source would prevent access to dangerous pathogens, greatly improve fish health and quality, and increase the number of viable smolts produced. Since *M. cerebralis* has been detected in resident rainbow of up to four years of age in Battle Creek above Coleman, continued rearing and release of steelhead trout could greatly amplify whirling disease in the Sacramento River basin and present a threat to other salmonid resources through straying. Salmon production should pose no threat of disease spread as long as they remain uninfected.

At a meeting held on December 5, 1985 between Fish and Wildlife Service and California Fish and Game personnel the following recommendations were made to prevent the spread of whirling disease and to protect the fishery resources of the Sacramento River basin:

1. The current year-class of late fall chinook now ready for migration at the Coleman NFH will be released. Coleman will continue to rear chinook salmon fingerlings, monitor them for whirling disease and release them into the Sacramento River as long as they remain uninfected by whirling disease.

2. The current stock of adult steelhead, ready for spawning at Coleman, will not be spawned. These fish will be given to the Food Bank or other appropriate outlet for domestic consumption by the elderly or needy.

3. Adult wild steelhead in Mill Creek will be captured and spawned. The goal of this work is to create a new migratory run of steelhead into the upper Sacramento River basin that takes advantage of ocean growth to attain an adult size of 12 to 18 pounds.

4. The current "river trout" strain of steelhead on hand at Coleman will be terminated. The 1.3 million fish now on hand will be distributed into isolated waters for put-and-take trout fishing where the fish cannot escape into streams where they could migrate and spread whirling disease. Fish in excess of stocking needs will be destroyed to eliminate any threat of spreading whirling disease.

5. State and federal fishery biologists have agreed to look into the feasibility of introducing approximately 100,000 steelhead eggs from pathogen-free sources in the Pacific Northwest. This move could accelerate the restoration of upper Sacramento River steelhead. Considerable biological evaluation is needed.

6. Engineering studies are already underway to determine the most practical pathogen-free water supply for the Coleman NFH. Pumped well water and various systems for disinfecting Battle Creek water are being examined. None of the options can be installed within the next year or two because millions of dollars of funding, complex design work and a significant construction project all must be arranged and committed. Carrying this out in the existing budgetary climate will be challenging to all concerned.

7. California DF&G fish pathologists and fishery administrators may prepare technical data and policy recommendations based on their experience with whirling disease. The Coleman episode stirred fear among Pacific Northwest fish producers and observations made in California may be of value in up-dating federal and state fish disease control policies and regulations.

A close watch is being maintained on the health of cultured fish in both federal and state fish hatcheries in California. The drastic measures outlined to contain whirling disease demonstrate the use of high quality technical information, close coordination between technical and administrative personnel and intensive communications between state and federal fishery management organizations. Much remains to be done.

FINAL APPROVAL FOR NATCHEZ ANIMAL SUPPLY COMPANY TO MARKET FORMALIN

Fred Meyer
National Fishery Research Laboratory, LaCrosse, WI 54601

On 26 September 1985, the U.S. Fish and Wildlife Service (Service) received verbal word from the U.S. Food and Drug Administration (FDA) that Natchez Animal Supply Company has been approved to market formalin (Formalin-F) for use as a therapeutant on cultured fishes. The effort to register formalin has taken over 12 years to accomplish. Now that formalin is legally registered, it is imperative that fish culturists purchase the registered product rather than generic products. They are risking much more than a few dollars when they do not use registered products when they are available. Masoten, Sulfamerazine in Fish Grade, and Finquel recently were withdrawn or are no longer available because too many fish culturists were purchasing the generic products.

FDA announced in April 1982 that the Service had provided adequate data and information to demonstrate the safe and effective use of formalin to control external parasites and fungi on fish and fish eggs and to delineate drug residues and environmental impacts. However, because the Service was not a licensed manufacturer, efforts had to be directed toward finding a sponsor that would provide proper drug labeling, information on manufacturing methods, facilities, and controls, and file an environmental impact analysis report regarding the manufacture of formalin. When FDA completes its review of the NADA and accepts the data, formalin will be fully registered and available for fishery use.

ORDER FORM

Please use this form to order your copies of the Fish Health Section Blue Book at the special member price of $9.00 per book. To take advantage of this offer, you must be a current FHS member and enclose payment with this form. Checks or money orders for the total amount should be made out to: Fish Health Section/American Fisheries Society. This offer expires June 30, 1986.

Number of copies requested _____ @ $9.00 (U.S.) each.

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Send this form and your payment to:

James R. Winton
Marine Science Center
Newport, Oregon 97365

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THE ASIAN FISH TAPEWORM, *BOTHRIOCEPHALUS ACHEILOGNATHI,* INFECTING ENDANGERED FISH SPECIES FROM THE VIRGIN RIVER, UTAH, NEVADA, AND ARIZONA

Richard A. Heckmann, Department of Zoology
Brigham Young University, Provo, UT 84602

and

Paul D. Greger and James E. Deacon
Environmental Consultants, Inc.,
4452 Live Oak Drive, Las Vegas, NV 89121

The Asian fish tapeworm has now found its way into several species of fish taken from the Virgin River. Many of these fish are native to that river and its drainages.

During a preliminary survey of parasites of endangered fish species from the Virgin River near St. George, UT, 60% of the roundtail chubs, *Gila robusta seminuda,* were infected with the Asian fish tapeworm. From the same site no woundfin minnows ,*Pagopterus argentissmus,* (180) (number examined in parenthesis) flannelmouth suckers, *Catostomus latipinnis* (2), largemouth bass, *Micropterus salmoides* (3), or speckled dace, *Rhinichthyes osculus* (2) were infected with *B. acheiolognathi.* The second author conducted surveys of fish parasites for ichthyofauna from the Virgin River approximately 75 km south of St. George in both Nevada and Arizona. He preserved cestodes taken from fishes of these areas for classification. These cestodes were sent to Heckmann and were identified as the Asian fish tapeworms. Fifty-three percent of the woundfin minnows and 86% of the redside shiners from the Virgin River near Mesquite, Arizona, were positive for *B. acheiolognathi.* From similar specimens and data pertaining to preserved cestodes obtained near Beaver Dam Wash, Arizona, it was noted all five species of fish — Virgin River spinedace, *Lepidomeda mollispinis mollispinis* (82), speckled dace (97), Virgin River roundtail chubs (64), woundfin minnows (103) and redside shiners, *Notropis lutrensis* (53) — were infected with the Asian fish tapeworm. Infection rates ranged from 3.6% (speckled dace, winter sample) to 88.8% (Virgin River roundtail chub, fall sample). One woundfin minnow contained 80 cestodes in the intestine. All fish mentioned in this report are native species except redside shiners and largemouth bass. Some species such as the woundfin minnow, Virgin River spindace and roundtail chub are found only in the Virgin River and its tributaries (Deacon and Williams, 1984, Proc. Biol. Soc. Wash. 97:103-118).

The Asian fish tapeworm is characterized by a pit-viper-like scolex (Fig. 1) and numerous microtricles (Pool. 1984, J. Fish. Biol. 25:361-364). Bauer, Egusa, and Hoffman) 1981, *In:* Review of Advances in Parasitology. Ed. By Slusarski, Polish Academy of Sciences, Polish Scientific Publishers, Warsaw, Poland. pp. 425-443) have stressed that this parasite spreading into new localities results in heavy infections of young fishes especially cyprinids. The Asian fish tapeworm infections need to be closely monitored and a management program developed to protect these fish species from becoming extinct.

The Asian fish tapeworm, *Bothriocephalus acheiolognathi,* has been considered one of the most dangerous pseudophyllidean cestodes for cultured carp in Europe. The species was first described from the intestine of young grass carp cultured in South China. From China, cestode infections have followed grass carp imports into Europe, Russia, and the United States (Hoffman, Schubert, 1984, *In:* Distribution, Biology, and Management of Exotic Fishes, Courtney and Stauffer (eds.). Johns Hopkins University Press, Baltimore. pp. 233-261).

Drs. Glenn Hoffman and Lauritz Jensen confirmed the identification of the cestode.

Figure 1. Scanning Electron Micrograph of the scolex of *Bothriocephalus* showing the characteristic shape and bothria -- 100X.

A SYNOPSIS OF THE MOST SERIOUS DISEASES OCCURRING IN MAINE SHELLFISH

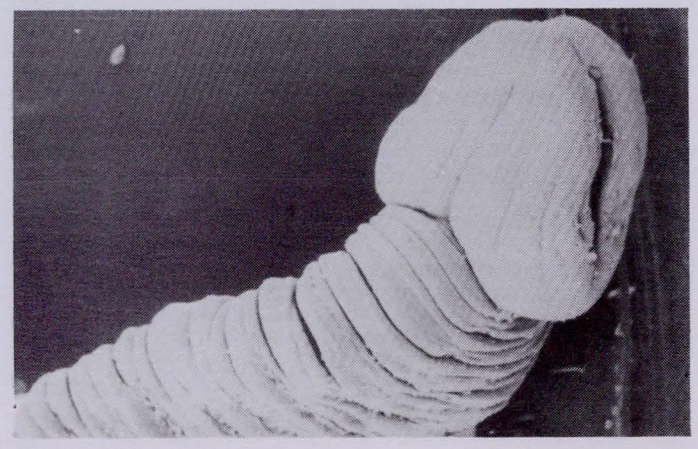
Stuart W. Sherburne and Laurie L. Bean
Marine Resources Laboratory,
West Boothbay Harbor, ME 04595

Since the inception of the DMR Pathology unit in 1979, we have examined approximately 5,700 shellfish for evidence of disease and other abnormalities. The species examined included 2,992 blue mussels, *Mytilus edulis;* 1,356 oysters, (American and European) *Crassostrea virginica* and *Ostrea edulis;* 1,605 soft-shelled clams, *Mya arenaria;* 181 sea scallops, *Placopecten magellanicus;* 50 quahogs, *Mercenaria mercenaria;* 44 black clams, *Arctica islandica,* and 11 Yugoslavian oysters, *Arca noae.* Approximately 90% of the specimens were sampled from 50 areas along the Maine coast as part of our endemic disease survey. The remainder of the specimens were submitted for examination from other states and institutions. Examinations included, in the majority of cases, both gross and microscopic examinations by light microscopy of thin tissue sections prepared by routine histological methods. When needed, special stains were used to further delineate the organism.

Two diseases, a bacterial disease affecting sea scallops, *Placopecten magellanicus,* and a cancerous condition in soft-shelled clams, *Mya arenaria,* are known to cause mortalities in their respective hosts. At least four areas of our coast contain populations of sea scallops with large brown abscesses in the muscles and viscera which make the scallops unmarketable. This bacterial disease was first reported from Harpswell Sound In 1977, in Muscongus Bay in 1979, the Damariscotta River in 1980, and the St. Croix River in 1981. It is apparently exclusive to Maine's waters, with heaviest infections usually occurring in upper river locations. Further work on the prevalence and identification of the causative agent of this disease is of the EPA Lab at W. Kingston, R.I., following an oil spill at Long Cove, Searsport, Maine. Neoplasms were again found in 1972 after a jet fuel spill in Harpswell and in 1980 in Dennysville following a herbicide spray drift accident which occurred in 1979. Routine sampling of the Damariscotta River in 1983 showed, unexpectedly, severely affected neoplastic clams. Since 1983 we have found 10 areas from Portland to Lubec that contain populations of neoplastic clams.

Studies have been initiated with the Maine Bureau of Health to have neoplastic tissues and sediments examined for evidence of possible carcinogens or other substances that may be harmful to human health.

The first record of a fungus disease in any species of scallop was from a specimen submitted in March 1981 from the Sheepscot River; Austin Farley of the Oxford, Md. NMFS pathobiology laboratory diagnosed the first records of a protozoan parasite of the genus *Minchinia* in blue mussels, *Mytilus edulis,* from the Damariscotta River in 1978 and the York River in 1979. Farley also diagnosed *Minchinia nelsoni* (MSX) in an American oyster, *Crassostrea virginica* that had been collected from the Marsh River on January 12, 1983 and held in ambient seawater until July 19, 1983. This was the first record of MSX north of Cape Cod. A Herpes-type virus, reported in American oysters from the Piscataqua and Marsh Rivers in 1970, and considered endemic to these river systems, has not been evident in oysters examined from these areas to date.



SILVER NITRATE PENCILS A RAPID MARKING TECHNIQUE FOR INDIVIDUAL FISH IDENTIFICATION

L.M. Bootland, R.M.W. Stevenson, and P. Dobos
University of Guelph, Guelph, Ontario, Canada. NIG 2W1

We have been studying the artificial induction and maintenance of the IPNV-carrier state in yearling brook trout, with the aim of developing a challenge protocol for adult vaccination trials. Virus incidence in feces and blood components and antibody levels in serum were followed in individual fish for twelve weeks post-infection. Therefore, fish had to be marked so that each fish was identifiable over a long time period. In this, and many other types of fish studies, it was crucial that the marking technique not cause permanent injury nor affect the health of the fish. For example, tagging was not considered an appropriate method as the entry point can become necrotic and susceptible to bacterial infections.

We have successfully used silver nitrate pencils to chemically brand 23-29 cm brook trout. Each pencil is a 15 cm wooden stick that has been commercially tipped with 75% silver nitrate. The pencils are the only equipment needed. They are inexpensive, costing from fifteen to thirty cents each, and readily available from most pharmacies as single pencils or in packages of 20 or 100. (As they are intended for use in removal of warts, care must be taken to avoid contact with human skin during use.)

For marking, the fish were anesthesized and surface mucus gently removed from a small area between the dorsal fin and lateral line, using a paper towel. Some remaining moisture was necessary to activate the silver nitrate, but excess moisture caused marks to blur. The silver nitrate pencil was held upright and a symbol made by running the pencil against the skin for approximately three seconds. If contact time was too long, the brand went through the skin. Fish were immediately put back into the water for recovery, with no effect on the brand. Fish did not sustain any permanent injury if marked correctly, as the brand did not break the epidermis.

For this study, the symbols consisted of dots and bars. Bars lasted longer than dots and larger symbols were more permanent. One pencil was used to mark two to three fish, depending on the size of the symbol. Marks were initially a light color (Figure 1), but turned dark with time, and were distinct for at least three months. Once fading began, the symbols were easy to remark.

This technique was initially used for marking channel catfish (Thomas, A.E., 1975. Prog. Fish-Cult. 37:250-252) and seems applicable not only to scaleless fish but also species with small scales.

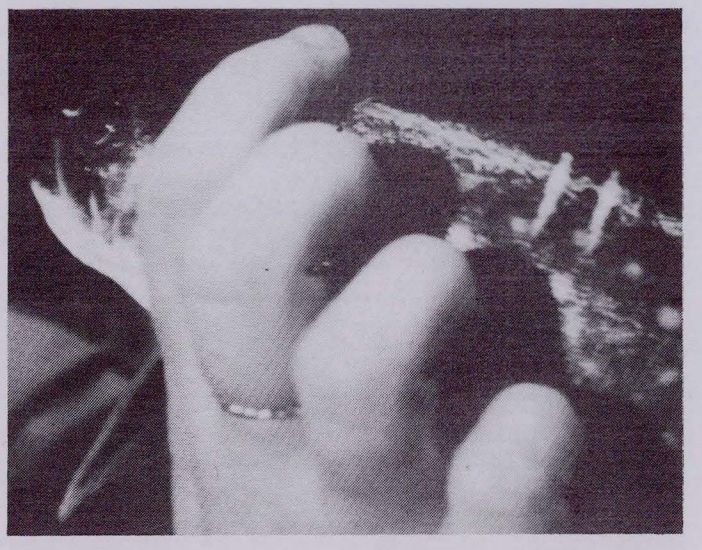


Figure 1. Silver nitrate brand immediately after marking an adult trout.

SURVIVAL OF *EDWARDSIELLA ICTALURI* IN POND WATER AND MUD

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Edwardsiella ictaluri, the causative agent of enteric septicemia of catfish, is involved in about one-third of all disease cases in diagnostic laboratories where channel catfish is the predominant species examined. *E. ictaluri* causes disease primarily when water temperatures range from 18°C to 28°C; this temperature prevails during May and June and again in September and October in the catfish culture belt. These investigations were undertaken to confirm earlier reports of *E. ictaluri* not surviving in water and determine if it could survive in pond bottom mud. Survival of *E. ictaluri* was determined in pond water at 5° and 25°C and in bottom mud at 5°, 18°, and 25°C. In mud incubated at 25°C, *E. ictaluri* maintained itself at $10^{6.5}$ cells/ml for 95 days; at 18°C, the organism was present at approximately one log higher for 40 days. However, *E. ictaluri* survived for less than 10 days in water at 25°C and less than 15 days in water and mud at 5°C. These data demonstrate that *E. ictaluri* can survive in pond bottom muds for an extended period of time and therefore may serve as a source of infection from spring through the fall. In view of these data, it is unlikely that *E. ictaluri* is a true obligate pathogen, but survival is restricted by environmental conditions.

REPORT ON THE THIRD ANNUAL IR-4/FDA WORKSHOP FOR MINOR USE OF NEW ANIMAL DRUGS

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The Third IR-4/FDA Workshop for Minor Uses of New Animal Drugs was held 25-26 September 1985, in Rockville, Maryland. The day before the IR-4/FDA Workshop began, FDA sponsored a one day (24 September) "Symposium on Minor Use Animal Drug Research." In the aquaculture session, the production systems for shrimp, crayfish, trout, salmon, and catfish were presented, emphasizing disease problems and potential controls. The priority list of chemicals for all of these cultures were, in priority order: (1) a replacement for malachite green, (2) oxolinic acid/nalidixic acid, (3) chloramine-T, (4) erythromycin, (5) Terramycin, (6) formalin, and (7) benzocaine.

Major issues raised at the workshop included (1) how to solve the problem of the purchase of generic products by fish culturists instead of the registered products, (2) the need for better communications between IR-4 and the aquaculture interests, (3) the need for greater involvement by the user groups, the drug industry, and university researchers in the registration process on minor drugs, (4) the need to develop more sources of funding, (5) the need to identify more compounds, especially antibiotics, that already have registrations in major species, and (6) the need to solve the medicated feed problems of small hatcheries.

At the one-day symposium, FDA stated they were encouraged that all species are capable of metabolizing the reference drug, fenbendazole, in the same way. In order to protect the public, FDA needed this information to answer how minor species metabolize drugs.

Dr. James P. McVey of the National Sea Grant College Program, Rockville, was the speaker at the Minor Species banquet on 25 September 1985. He said aquaculture is moving into intensive culture and 'we're where the chicken industry was 30 years ago". He felt that aquaculture is going to add many more species and, as a result, will need more chemicals and drugs to survive.

Dr. Robert H. Kupelian, National Director of the IR-4 program, mentioned that he expects several aquaculture clearances to be achieved yet this year. These include sulfadimethoxine plus ormetroprim for bacterial infections in catfish and oxytetracycline for gaffkemia in lobsters and for bacterial diseases in alligators.

IHN STRIKES RAINBOW TROUT AT TWO WASHINGTON DEPARTMENT OF GAME HATCHERIES

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IHN epizootics occurred at two eastern Washington WDG hatcheries, Chelan and Tucannon. At Chelan, two outbreaks were noted. The first was observed in June and July, 1985 in Tokul Creek stock rainbow yearlings (2-3 fish/lb). Of the four raceways infected, total IHN losses ranged from 3 to 12%. A total of 54,300 fish were lost to IHN, destroyed, or planted in two isolated lakes. In October, 1985 a second IHN outbreak was seen in Tokul Creek stock rainbow fingerlings (12-20 fish/lb). In the second outbreak 125,000 fish were lost to IHN or destroyed. At Tucannon Hatchery the IHN epizootic occurred in Spokane stock rainbow fingerlings (8-10 fish/lb) in September and October, 1985. Two ponds of fish were affected with total IHN mortality ranging from 3 to 12%. At Tucannon, 36,000 fish were lost to IHN or destroyed.

In the 3 IHN outbreaks the rainbow stocks used were certified IHN free. Also, in both hatcheries, horizontal transmission of IHNV from carrier fish in the water supplies was suspected to be the source of the virus.

With these 3 outbreaks, a total of 6.5 million steelhead, rainbow, and cutthroat trout eggs and fish have been lost to or destroyed because of IHNV in Washington Department of Game hatcheries in the past 5 years.

FIRST ISOLATION OF *LACTOBACILLUS PISCICOLA* FROM LAKE TROUT IN ONTARIO, CANADA

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While vaccinating 3-year-old lake trout (*Salvelinus namaycush*) by intraperitoneal injection with Furogen® (Aqua Health Ltd., Toronto), 10,000 fish were handled individually. Ten fish were found with superficial, skin lesions approximately 1.5 cm in diameter. This was of immediate concern because of the hatchery's history of furunculosis. Bacteriological examination of three fish consisted of inoculating tryptic soy broth with lesion material, heart, liver, spleen, and kidney, and incubating for 48 hours at 20°C. Tryptic soy agar plates were then streaked from the broth cultures. *Aeromonas salmonicida* was not found, but a small, white colony type was found in abundance in all of the fish, occurring as an axenic culture in some organs. It was identified as *Lactobacillus piscicola,* on the basis of the characteristics described by Hiu *et al.*, (1984, Int. J. Syst. Bacteriol. 34:393-400). It differs from the initially described isolates in that it ferments sorbitol, as do two previously described isolates of *Lactobacillus* sp. from Canadian fish (Cone, 1982. J. Fish Diseases 5:479-475). These Canadian isolates differ from our isolates and *L. piscicola* in that they are positive for arabinose and negative for esculin fermentation.

This is the first time that this bacterium has been isolated in Ontario. At present, it appears to be of no concern as there have been no associated mortalities.

MYCOBACTERIOSIS IN MONTANA WHITEFISH

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Mycobacterial lesions were observed in 40 of 82 mountain whitefish (*Prosopium williamsoni*) collected from a six mile stretch of the Missouri River below Holter Dam in Montana. No lesions were observed in 30 rainbow trout collected from the same area. All fish collected were examined for gross mycobaterial lesions in internal organs. No mortality was noted and no external sign of disease was present in any fish examined. Of those fish with mycobacterial lesions, nearly half (19 fish) had infections termed severe. The liver was the organ most commonly affected, followed by the kidney, spleen, testis and viscera.

IHNV IN CALIFORNIA COHO

NEWS RELEASE FROM CALIFORNIA DEPARTMENT OF FISH AND GAME

The Department of Fish and Game reports it has destroyed some 7.3 million silver salmon eggs at Trinity River Hatchery in the wake of what may be the first known detection of the viral disease IHN in silvers.

An estimated 9.3 million eggs have been collected over the past two months at the hatchery during a record run of nearly 11,000 silver, or coho salmon. The DFG said the disease, which can kill fish by destroying the blood system, was found in adult spawners.

Hatchery personnel said they will retain 2 million eggs collected during latter stages of the run—when the disease incidence appeared to be abating—to meet the annual production goal of 500,000 yearling silver salmon. Tests for the disease will be run before scheduled release of the young fish in the spring of 1987.

IHN, or infectious hematopoietic necrosis, is a common malady of king salmon in the Sacramento River system and, in recent years, among king salmon at Trinity Hatchery. Fish pathologists say, however, the disease has never been reported among silver salmon.

In past years of abundant silver salmon eggs at the hatchery, the DFG said, excess eggs have been hatched and reared to fry size and distributed into headwaters of tributary streams within the Trinity River basin. Discovery of IHN prevents such distribution this year.

Trinity River Hatchery was put into operation in 1963 as an attempted mitigation measure for lost spawning and nursery habitat of salmon and steelhead above Lewiston and Trinity dams. The hatchery's annual production is 500,000 yearling silver salmon, 1.2 million yearling king salmon, up to 4 million king salmon fingerlings and 350,000 yearling steelhead.

BRIEF REPORTS

An update of Bill Klontz's research on PKD indicates that trout respond to infection with a dramatic increase of 600,000 m.w. beta globulins and that this response is dose dependent. He has also found a "glowing organism" in leech egg cases on Riley Creek plants when examined by F.A. using convalescent PKD-infected trout serum and rabbit anti-trout globulin.

* * * * * *

Approximately 5% of adult (3 to 6 years) Atlantic salmon broodstock in marine net-pens at the Manchester Marine Experimental Station, Manchester, Washington, are affected with a systemic granulomatosis. The condition is apparently a metabolic disease and non-lethal but would, however, cause a problem with consumer acceptability if the fish were marketed. Lee Harrell, National Marine Fisheries Service, Manchester, WA.

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The bylaw changes were approved by a unanimous vote. Unfortunately, only 43 members (less than 10%) took the time to mail their ballot. "Is anybody out there?" Pink Floyd

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Rowan Gould says the AFS/FHS Directory will be available soon. If you have moved since sending him your address, you may want to let him know immediately at 202-653-8772. The final copy is going to the typist soon.

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FISH HEALTH NEWSLETTER

The Fish Health 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 and should be addressed to one of the editorial staff or to a member of the publication committee.

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