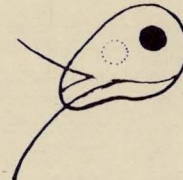


FISH HEALTH SECTION

A S F

NEWS LETTER



Volume 9, Number 2

APRIL - JUNE, 1981

RED TIDES: PARALYTIC SHELLFISH POISON BY JOHN W. HURST, JR.

Editor's note: Mr. Hurst is Director of Resource Services for the Maine Department of Marine Resources, Fisheries Research Laboratory, West Boothbay Harbor, Maine 04575.

Toxic algae blooms have been recorded and described throughout recorded history. For example, the Bible makes reference to red tide in Exodus 7:20-21.

"And Moses and Aaron did so, as the Lord commanded; and he lifted up the rod, and smote the waters that were in the river in the sight of the Pharaoh, and in the sight of his servants, and all the waters that were in the river were turned to blood. And the fish that were in the river died; and the river stank, and the Egyptians could not drink of the water of the river; and there was blood throughout all the land of Egypt."

The dinoflagellate responsible for Paralytic Shellfish Poison on the North Atlantic Coast of Canada and the United States is *Gonyaulax tamarensis* var *excavata* with a similar *Gonyaulax catenella* responsible for PSP on the West Coast.

Gonyaulax "blooms" typically occur following a set of environmental circumstances which provide a stable water column, high light intensity and temperature, high nutrient run-off from land, and wind and current-generated upwelling of bottom water. Intense proliferation is frequently seen localized in "windrows," so that wide variations in toxicity levels may exist in the same geographic locality. The organisms thrive at 15-17° C, but encyst and sink to the bottom at temperatures below 10° C, where they become a source of ensuing blooms.

Shellfish which harbor *Gonyaulax tamarensis* var *excavata* include the soft shell clam, bar (surf, sea, hen) clam, quahog (little neck clam), razor clam, ocean clam, blue and red mussels, scallops and various whelks. Each species differs in its efficiency in concentrating the organism, as well as in its ability to eliminate it. High levels of toxin are frequently found in mussels; bar clams may remain infested for long periods of time. Lobsters, crabs and finfish are not affected. Because *Gonyaulax tamarensis* var *excavata* does not invade muscle, the meat of scallops is not toxic, although the remaining tissues may be extremely dangerous. This organism, which is highly concentrated in the tissues of these shellfish, is broken down upon human ingestion and exposure to gastric acid, releasing a potent neurotoxin which blocks neuromuscular transmission via interference with the axons' permeability to sodium. The poison is fifty times as strong as curare. Symptoms, which may occur within five to thirty minutes of ingestion, typically progress from circumoral tingling or burning to parasthesias of the extremities followed by numbness which affects the face, arms, legs and neck. Proprioception is gradually impaired and the patient may experience ataxia and dizziness. Nausea and vomiting are frequent. Severe intoxication may produce death through respiratory paralysis. An effective antidote or antitoxin has not yet been developed.

PSP is generally recognized as being toxic to warm blooded animals from their ingesting of toxic shellfish. Recently the potential effects of *Gonyaulax tamarensis* var *excavata* blooms on finfish was first realized when the toxins caused an extensive herring kill in the Bay of Fundy in 1976. Through a combination of field and laboratory studies the picture has now clearly developed that the kills result from toxin transferred through planktonic herbivores. Laboratory studies indicate that pollock, flounder, salmon and cod are also sensitive to the toxin. While it is apparent that finfish are sensitive to the toxin, they, unlike filter feeding shellfish, present absolutely no public health hazard as they do not accumulate the toxin to any extent.

Maine has developed a PSP monitoring plan designed to differentiate toxic shellfish growing areas from nontoxic ones. The PSP monitoring program consists of a series of 18 primary and 200 secondary sampling stations. The 18 primary stations, based on previous data, are a good indicator of the presence of PSP when it is present at low levels.



Author John Hurst, Jr.
sampling for PSP in his Boothbay Harbor lab.

Once PSP is identified at a primary sampling station, samples are collected from adjacent secondary sampling locations which indicate what is going on in the clam growing areas.

The purpose of this extensive sampling is to better identify areas of toxicity from those that are not toxic. This monitoring plan has allowed for reasonable exploitation of the shellfish resource while assuring public health protection. Monitoring of shellfish is conducted from April until late fall.

CATARACTS PREVALENT IN NORTHWEST SALMON

A significant increase of cataracts has occurred this production year in salmon hatcheries in Washington. Speculation on the cause has centered on the possibility of a diet high in calcium in conjunction with a low level of zinc. This condition is coincidental with a shift in herring meal from Pacific herring to an eastern source. Fisheries officials are attempting to remedy the situation by adding zinc to the diet.

Submitted by Ray Brunson, USFWS Fisheries Assistance Office, 2625 Parkmont Lane, Olympia, Washington 98502.

FHS 9(2) 1981

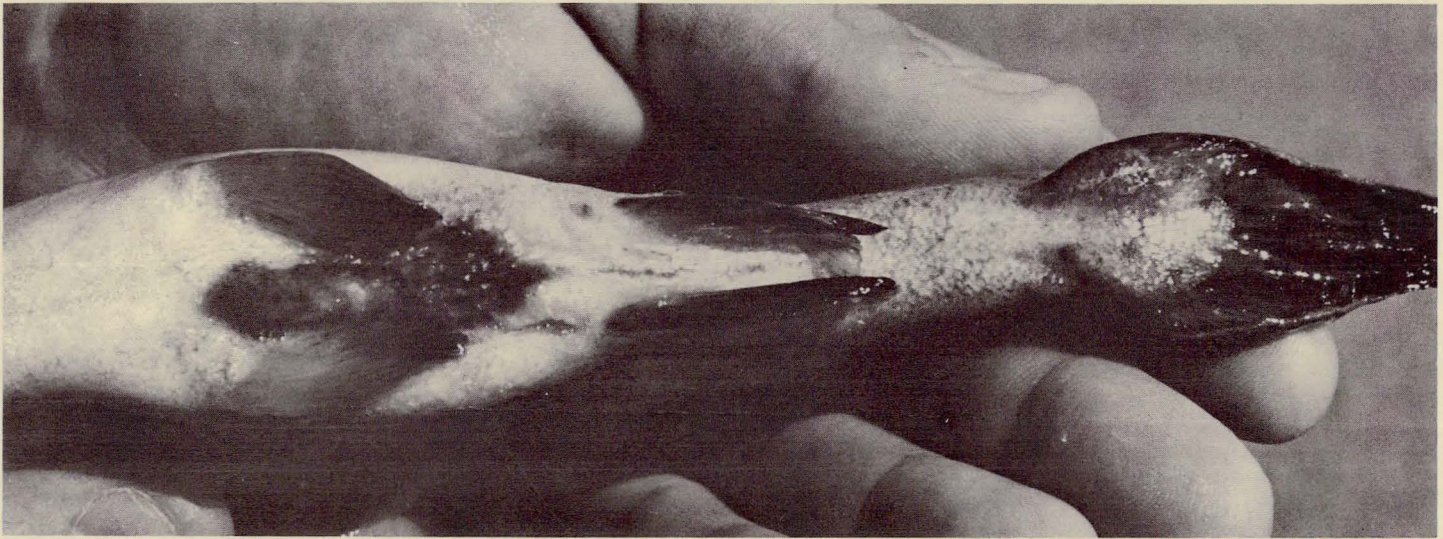
Kuperman drop pp 3 & 4
Capillaria callosities p. 5

STEREO WHAT ? !

No, you are not seeing double. Posterior of the pelvic girdle, this deformed rainbow trout has two of everything! Private trout grower and FHS member Bill Blake of Spruce Head, Maine recently brought this 12-inch specimen to the Maine Hatchery Lab. Although it has the usual two ventral fins, they are widely separated with a darkly pigmented patch between and posterior to them. There are two, perfectly

formed anal fins and two lower caudals. The tail, in fact, is not unlike those of certain strains of ornamental goldfish. Most unusual of all is the presence of duplicate anuses! At this point it has not been determined which one was functional. It will also be interesting to find out which, if any, internal structures are duplicated and at what point this duplication begins.

PGW



WASHINGTON HATCHERIES SUFFER IHN OUTBREAKS

Fish health and fish culture workers of the State of Washington Department of Game have had their hands full trying to contain outbreaks of IHN virus at three hatcheries this spring. To date, over 1,000,000 trout have been destroyed at the Skamania and Mossyrock Hatcheries. As this issue went to press, the decision had just been made to destroy an additional 100,000 legal-sized rainbow trout at the Cowlitz Hatchery. Kevin Amos, Pathologist/Virologist for the Washington Department of Fisheries, submitted the following report.

Along with the rest of the Northwest, the isolation of IHN in Washington hatcheries this past year is on the upswing. Last fall, IHN was isolated from ovarian fluids in spring chinook salmon on the Lewis River. The resulting eggs - about 250,000 - were destroyed and the hatchery disinfected. The Lewis River, which is a tributary of the Columbia, experienced an epizootic in 1973 in juvenile fall chinook, and even though these fish were also destroyed, there is some evidence that the spring chinook were in contact with the falls back in 1973. Fortunately, virus was not isolated this year in Lewis River fall chinook adults.

In addition to this new isolation in Department of Fisheries hatcheries, several new isolations and outbreaks of IHN have occurred this past spring in Department of Game hatcheries. The isolations include rainbow, cutthroat and steelhead at the Cowlitz Trout Hatchery; steelhead at the Mossyrock Hatchery; and summer steelhead at the Skamania Trout Hatchery. We are currently trying to sort out the source of infection along with strain identification. Dan Mulcahy of the U.S. Fish and Wildlife Service is cooperating with our efforts in identifying the different IHN we are isolating.

For further information, contact: Kevin Amos, Washington Department of Fisheries, Salmon Culture Division, 115 General Administration Building, Olympia, Washington 98504.

MYCOBACTERIAL INFECTION IN WILD WHITEFISH

Because of the awareness of a physician interested in fish health, a mycobacterial infection was diagnosed in 12 of 40 (30%) mountain whitefish (*Prosopium williamsoni*) caught in the Missouri River below Holter Dam in Helena. Infected fish contained numerous whitish, nodular lesions throughout the visceral organs.

Infected fish were taken to the Montana Department of Fish, Wildlife and Parks in Helena and from there to the USFWS Fish Cultural Development Center in Bozeman where a *Mycobacterium* species was isolated from lesions. The organism is currently being identified as to species by a staff member of the Department of Microbiology at Montana State University in Bozeman.

The lesions grossly and histologically resemble those described by Lund and Abernathy (1978) for mycobacteria infected whitefish caught in the Yakima River in the State of Washington.

For further information contact: Charlie Smith, Fishery Biologist, USFWS, Fish Cultural Development Center, 4050 Bridger Canyon Road, Bozeman, Montana 59715.

REVISED FHS PROFESSIONAL STANDARDS COMMITTEE

Following are the names, addresses and business phone numbers of the members of the revised 1980 - 1981 committee:

Mr. Paul W. Janeke, Chairman
USFWS Fish Disease Control Center
P.O. Box 917
Fort Morgan, Colorado 80701
(313) 867-9474

Dr. James C. Carlisle, D.V.M.
Dept. of Avian and Aquatic
Animal Medicine
NY State College of Vet. Med.
Cornell University
Ithaca, New York 14853
(607) 256-5440

Dr. John H. Schachte, Jr., Ph.D.
NY Dept. of Environmental Conservation
Fish Disease Control Unit
8314 Fish Hatchery Road
Rome, New York 13440
(315) 337-0910

Mr. Douglas L. Mitchum
Wyoming Game and Fish Dept.
Game and Fish Laboratory
University of Wyoming
P.O. Box 3312
Laramie, Wyoming 82071
(307) 745-5865

Dr. David P. Ransom, Ph.D.
Oregon Aqua-Foods, Inc.
88700 Marcola Road
Springfield, Oregon 97477
(503) 746-4484

FISH PARASITOLOGY TRANSLATIONS

Parasitology translations, including fish parasitology, are being listed in a series in the *Journal of Parasitology*. Interested persons can find these in the following volumes: 61:162-174 (1975), 63:183-192 and 398-400 (1977), 64:1107-1114 (1978) and 66:559-563 (1980). The 1981 list is in preparation. A list of translations completed prior to 1971 will be published as a special issue of the *Index-Catalogue of Medical and Veterinary Zoology* (ARS, USDA, Beltsville, MD 20705).

Submitted by Glenn L. Hoffman.

MORE ON ACID RAIN

"As pH in lakes, streams and ponds is being lowered, loss of fish, and the interference with reproduction of fish and amphibians is occurring across the Northeast particularly at high elevations where natural buffering capacities are especially low. Additional changes in water chemistry due to the leaching of aluminum from soils or the deposition of metals such as lead and cadmium are also posing a danger to aquatic ecosystems."

So reads the summary paragraph of the section on damage to aquatic ecosystems by acid rain and heavy metals fall-out in the *NORTHEAST DAMAGE REPORT of the Long Range Transport and Deposition of Air Pollutants* prepared for the Northeast States for Coordinated Air Use Management and the New England Interstate Water Pollution Control Commission by Jennie E. Bridge and F. Peter Fairchild. The 72-page report summarizes much of the basic knowledge gathered on the subject to date and implies some dire predictions for the future of inland and anadromous fisheries, terrestrial ecosystems and forest production and even human health in the Northeast if steps are not taken to curb the problem.

The effects of acid rain on fisheries will be the topic of a major international symposium being held on August 2-5 at Cornell University in Ithaca, New York. The symposium is being jointly sponsored by the U.S. Fish and Wildlife Service and Fisheries and Oceans Canada. We hope to bring you a report on this meeting in the next issue.

Some further excerpts from the *NORTHEAST DAMAGE REPORT*:

"In 1975, a comprehensive study of water chemistry and fish surveys of 217 Adirondack region lakes above 2,000 ft. elevation showed that 51% of the lakes had surface pH values less than 5.0. There were no fish in 90% of these acidified lakes, compared with only 4% of the lakes being similarly acidified and devoid of fish in 1927-37 (Schofield, 1975)."

"The latest Adirondack sportfishing resource inventory determined that nearly 11,000 acres of water have reached the critical state of acidification, and much of this being remote former brook trout ponds. In lakes both above and below 2,000 ft., it is estimated that 180 former brook trout ponds (7,130 acres) are now devoid of fish. A former sportfishing yield of 5 lb. fish/acre/year is now estimated at 2 lb./acre/year, representing an estimated loss of some 22,000 lbs./year, attributed to atmospheric acid (Pfeiffer and Festa, 1980)."

"Although the initial concern in the Adirondacks was with the acidification and loss of cold water brook trout ponds, vulnerable warm water habitats and food chains are also being lost or endangered. In the Adirondack region, a number of former bass lakes, including Woodhull, Big Moose, and Canada Lakes have lost their smallmouth bass populations, and reproductive failure associated with increased acidity is suspected. Several other marginal pH bass waters including Cranberry Lake and Tupper Lake appear to be suffering marked population declines (Pfeiffer and Festa, 1980)."

"In a study of three Maine rivers, the expected seasonal pH and alkalinity pattern was borne out, in spite of an abnormally small snowpack during the winter of 1980. Even though spring snowmelt was not a major hydrologic event, the pH of two major rivers declined to 6.0 (from a summer value of over pH 7.0). The pH of a small tributary decreased to less than pH 5.0. All sites had very low alkalinity at this time, so that any major input of acid, as from melting of a heavy snowpack, could have severe consequences for salmon fry in these streams (Haines, 1980)."

"One third of the salamanders, and half of the frogs and toads in the U.S. breed in ponds, some of which are becoming abnormally acidic in the Northeast. Spotted salamander egg mortality is greater than 65% in ponds with higher acidities - pH 4.5 to 5.0 (Pough, 1976)."

"Even at acidified lake pH values that are not physically harmful to fish, field and laboratory experiments in the Adirondacks of New York have demonstrated that toxic conditions for fish may be produced by dissolved inorganic aluminum (Schofield and Trojnar, 1980; Schofield, 1980). Such increased aluminum concentrations can lead to fish mortality at 0.2 ug/l or higher (Cronan and Schofield, 1979)."

"Mercury levels in fish from some remote lakes in Maine are greater than 2 mg/Kg exceeding the new FDA standard of 1 mg/Kg for human consumption, although the fish are not affected at these levels. No mercury can be attributed to industrial or

agricultural sources, and there is no evidence in the local geology of any mercury deposits. It is concluded that atmospheric deposition is affecting the mercury cycling and increasing the mercury uptake in fish (Akielaszek and Haines, 1981)."

COMING EVENTS: MIDWEST WORKSHOP LOOKS LIKE A ZINGER!

Sept. 15 - 16, 1981. 12TH ANNUAL MIDWEST FISH DISEASE WORKSHOP. Location: Holiday Inn, LaCrosse, Wisconsin. This one looks like a blockbuster! Fish Culturists and fish pathologists alike have been asking for a meeting with a relaxed, open-forum format which allows ample time for questions and discussions. This is it! Scheduled work sessions include: "Malachite green: Do we need it or not?" by Fred Meyer; "Kidney disease control by erythromycin: Does it work?" by Bill Klontz and Pete Bullock; "New antibiotics for redmouth" by George Post; "Vaccines: Past, present and future?" by Guy Tebbitt and Bill Paterson; and, "Development of genetic tolerance to infectious diseases: Is it practical and safe?" by Vince Mudrak and John Schachte. Another module has been reserved for contributed papers. Contact: James W. Warren, Fish Disease Control Center, P. O. Box 252, Genoa, Wisconsin 54632.

Sept. 16 - 18, 1981. 111TH ANNUAL MEETING OF THE AMERICAN FISHERIES SOCIETY. Location: The Classic Hotel and Convention Center, Albuquerque, New Mexico. Contact Carl R. Sullivan, AFS, 5410 Grosvenor Lane, Bethesda, Maryland 20814.

Oct. 18 - 20, 1981. NORTHEAST DIVISION/AFS ANNUAL WORKSHOP: ENVIRONMENTAL CONTAMINANTS AND WARMWATER FISHES. Location: National Fisheries Center, Leetown, West Virginia. The program will include such topics as point and non-point sources of contamination, acid rain, acid mine run-off, heavy metals, pesticides, herbicides, Kepone, nuclear wastes, residual chlorine, management of fisheries in contaminated waters and fish kill assessments. Contact: Willie Barnes, Experimental Hatchery, USFWS, Route 3, Box 40, Kearneysville, West Virginia 25430.

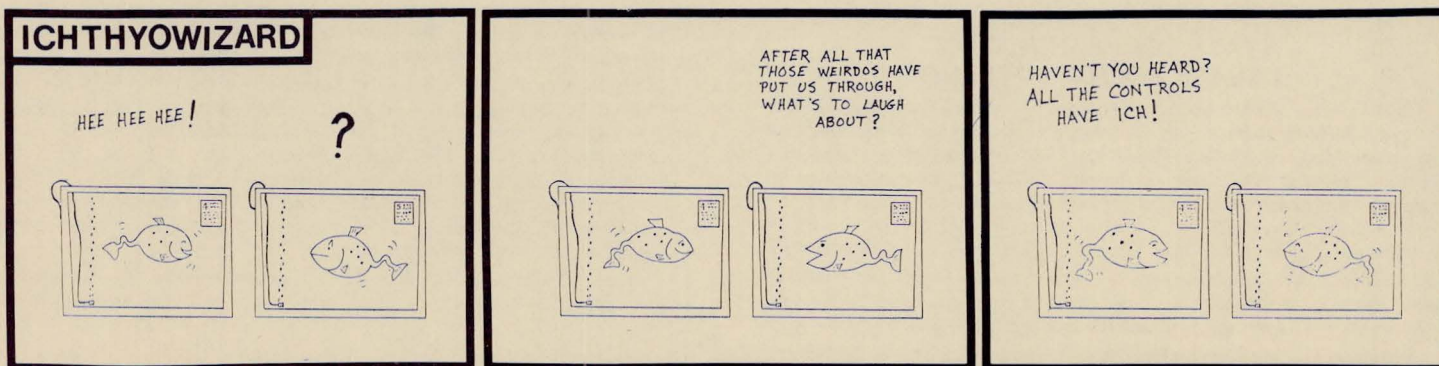
Nov. 30 - Dec. 4, 1981. FISH HEALTH COURSE. Location: Haywood Technical College, Clyde, North Carolina. The course is designed to give the trout farmer basic information needed to maintain a practical fish health management program for his operation. The course will include basic disease prevention, field recognition of disease problems, treatment calculations and applications, vaccines, drugs, handling fish kills, stress diets, handling stress, reconditioning poor water quality and water chemistry. The course will be instructed by Dr. Robert Busch, Director of the Rangen Research Laboratory, Inc. in Hagerman, Idaho. A minimal registration fee will be charged. Contact: Charles W. Johnson, Fishery Training Specialist, Haywood Technical College, Clyde, North Carolina 28721.

Feb. 8 - 12, 1982. QUALITY IMPROVEMENT IN FINFISH AQUACULTURE. Location: Boulder, Colorado. Sponsored jointly by the Fish Health and Fish Culture Sections of the AFS, the purpose of the workshop is to provide practicing fish culturists and fish health specialists as well as persons in the related service industries with an up-to-date review and evaluation of the elements determining quality improvement in finfish aquaculture, and to encourage information exchanges on the state of the art. Contact: G. Ian Pritchard, Canada Dept. of Fisheries and Oceans, Resource Services Directorate, 240 Sparks Street, Ottawa, Ontario K1A 0E6 or John H. Schachte, Jr., NY Dept. of Environmental Conservation, Fish Disease Control Unit, 8314 Fish Hatchery Road, Rome, New York 13440.

March 26 - 31, 1982. 47TH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCE. Location: Portland Hilton Hotel, Portland, Oregon. Contact: Dr. Laurence R. Jahn, Wildlife Management Institute, 709 Wire Building, 1000 Vermont Ave. NW, Washington, DC 20005.

NEW TRANSLATION AVAILABLE

Some of you have already received copies of the English translation of the book *Tapeworms of the Genus Triaenophorus, Parasites of Fishes* by B. I. Kuperman 1973 (1981 transl.). I have some additional copies available on a first come, first serve basis. Glenn L. Hoffman, USFWS, Fish Farming Experimental Station, Box 860, Stuttgart, Arkansas 72160.



LEETOWN BIOLOGICS SYMPOSIUM A MAJOR SUCCESS

Editor's Note: The International Symposium on Fish Biologics: Serodiagnostics and Vaccines hosted in April at the National Fish Health Research Laboratory at Leetown, West Virginia was a resounding success according to many who participated in the event. The guest list included many, many prominent names in the fields of fish health diagnostics and fish health research from all over the world. A "program" of abstracts is available with more material to come.

Major recent contributions in the development of serums and vaccines for fish health and other medical applications were presented to nearly 150 scientists attending the International Fish Biologics Symposium, April 26-30, at the National Fisheries Center at Leetown, WV.

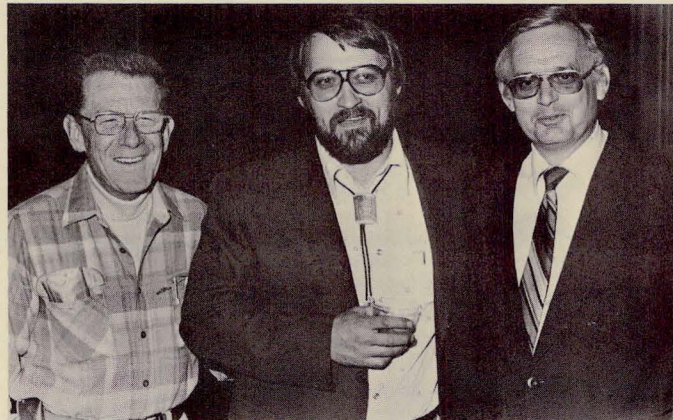
The four-day seminar, sponsored by the International Association of Biological Standardization in cooperation with the Fish Health Section of the American Fisheries Society, the National Science Foundation and the U.S. Fish and Wildlife Service, attracted scientists from throughout the United States and several foreign countries.

Happy symposium participants. Dr. G.W. "Bill" Klontz (1982 FHS President-Elect), FHS President Dennis "Andy" Anderson (what is that around his neck?) and Dr. G.L. "Pete" Bullock. (Andy's glass reportedly contained some of Pete's "Kool-Aid.")

symposium proceedings were videotaped for a permanent record of the various transactions.

The symposium was officially convened on April 27 with welcoming remarks by Dr. Robert E. Putz, NFC Director, and Dr. Blake F. Grant, NFHRL Director. The entire event was organized by Dr. D.P. Anderson with assistance from Mrs. Ora W. Dixon, Dr. Grant, Dr. G.L. Bullock, Dr. R.C. Simon, Dr. P.W. McAllister and others of the NFC staff, and Drs. M.M. Dorson, W. Hennessen, B.J. Hill, C. Huygenlen and W.D. Paterson.

The symposium was one of several major events in conjunction with the 50th anniversary of the Leetown fisheries facility.



Research papers presented at the symposium will be published in an international series of books widely recognized in medical and veterinary biologics. In addition to these papers, a dozen scientific reports and displays were also presented. Entire

BOOKS AND PUBLICATIONS

BIOLOGICAL CLOCKS. By John Brady. University Park Press, Baltimore. 1980. 59 pp. \$5.95.

BIOLOGICAL MONITORING OF FISH. Edited by C.H. Hocutt and J.R. Stauffer. 1980. Available from AFS, 5410 Grosvenor Lane, Bethesda, MD 20014. 432 pp. \$31.95.

FISH FEED TECHNOLOGY. Edited by K.W. Chow. FAO-ADCP/REP/80/11. Available from Unipub, New York. 1980. 335 pp. \$21.50.

PUBLICATIONS LIST — CALENDAR YEAR 1980. A list of 9 technical paper reprints published by the staff of the LaCrosse National Fishery Research Laboratory and the Southeastern Fish Control Laboratory. List and reprints available from: Rosalie Schnick, USFWS, National Fishery Research Laboratory, P.O. Box 818, LaCrosse, Wisconsin 54601.

TAPEWORMS (CESTODA, LIGULIDAE) OF THE FAUNA OF THE USSR. By M.N. Dubinina. Amerind Publishing Co. Pvt. Ltd., New Delhi, India. 1980. English translation. Available from the U.S. Dept. of Commerce, National Technical Information Service, Springfield, Virginia 22161. 320 pp.

TAPEWORMS OF THE GENUS TRIAENOPHORUS, PARASITES OF FISHES. By B.I. Kuperman. Amerind Publishing Co. Pvt. Ltd., New Delhi, India. 1981. English translation from Russian. Contact Glenn Hoffman. Also available from the U.S. Dept. of Commerce, National Technical Information Service, Springfield, Virginia 22161. 222 pp.

UNIPUB FISHERIES PUBLICATIONS CATALOG — 1981. Books, documents and technical papers on a wide variety of fisheries topics. Includes the 1981 Revised FAO Fisheries Documents Catalog. Available from Unipub, 345 Park Avenue South, New York, NY 10010.

STATE OF WASHINGTON DISEASE POLICY FORMING

A Fish Disease Task Force has been working on a proposed Fish Disease Control Policy for the State of Washington. The task force is composed of diagnosticians from state, federal and private fish disease labs within the state representing a wide variety of aquaculture activities. Aquaculture in Washington ranges from inland hatcheries and anadromous hatcheries to marine net pen rearing operations and involves state, federal, tribal and private operators. These activities deal with a valuable resource which should be protected by a sensible disease control plan.

A draft proposal is now under internal review by the Washington Department of Fisheries and the Washington Department of Game. When completed, it will provide guidelines for the shipment of fish and fish products into and within the state.

Submitted by Ray Brunson, USFWS Fisheries Assistance Office, 2625 Parkmont Lane, Olympia, Washington 98502.

NEW PRODUCT

WHY DIDN'T THEY THINK OF IT SOONER DEPARTMENT: The 1981 Nalgene Labware Catalog features a new tube rack which may prove handy for those of us who work in a laboratory. The Nalgene Slant Racks are typical 40-tube racks with a new twist. Their end plates are shaped in such a way that, when set on their sides, they lay at either 5° or 20° slants. This enables you to simply lay the rack of tubes on its side after autoclaving to obtain uniform deep butt or aerobic culture slants. The 5° setting may prove useful for tube incubation of cell cultures as well.

The autoclavable polypropylene racks are available for two tube diameters: 15-16 mm (Cat. No. 5935-0016) and 20 mm (Cat. No. 5935-0020). Nalgene products are available through scientific supply vendors and *not* directly from the company. The catalog is available from Nalgene Company, P.O. Box 365, Rochester, New York 14602.

DIAGNOSTIC SERVICES LIST

The revised list was due at *AQUACULTURE Magazine* July 1st. However, I think we can make corrections after the deadline, so please send additions and corrections to Glenn L. Hoffman and Drew Mitchell, USFWS, Fish Farming Experimental Station, Box 860, Stuttgart, Arkansas 72160.

AEROMONAD SEPTICEMIA BLAMED FOR MASSACHUSETTS CARP DIE-OFF

Around June 1, 1981 an extensive fish kill occurred in the Merrimac River in Massachusetts and New Hampshire. Only common carp (*Cyprinus carpio*) were involved, with dead and dying fish reported along a seventy mile stretch between Manchester, NH and estuarine waters in northeastern Massachusetts. Affected individuals reportedly crowded the mouths of inlets before dying.

Officials from the Massachusetts Division of Fisheries and Wildlife at first suspected a possible Spring Viremia of Carp outbreak due to the clinical signs. However, samples sent to Dr. Phil McAllister at the National Fish Health Research Laboratory in Leetown, West Virginia proved negative. In the meantime, lab technician Debbie Spigarolo at the State of Massachusetts' McLaughlin Trout Hatchery in Belchertown, MA isolated and confirmed the identity of *Aeromonas hydrophila* from other Merrimac River specimens indicating the carp population suffered an epizootic of infectious dropsy.

To my knowledge, no kill of this nature or severity has been reported in Massachusetts. Needless to say, public and media interest was intense as to the cause of the kill.

Submitted by: Robert P. Madore, Aquatic Biologist, Division of Fisheries and Wildlife, Field Headquarters, Westboro, Massachusetts 01581.

The NFHRL's Senior Scientist, Dr. S.F. Snieszko, participated in the proceedings. However, Dr. Ken Wolf, NFHRL Senior Research Scientist and scheduled banquet speaker, was unable to attend due to illness.

The sessions were chaired by members of the IABS and fishery research scientists at the NFHRL and from many parts of the world with six categories and major participants as follows:

Biologics Symposium Organizers. Dr. W. Hennessen of Switzerland (left) and Leetown hosts Mrs. Ora Dixon and Dr. Doug Anderson.



Biologics used for serodiagnosis of fish pathogens (viruses) — Drs. C. Huygenlen (Belgium), P.E. McAllister, W. Ahne (Federal Republic of Germany), J.A. Plumb, B.L. Nicholson, S. Pochebit, J.C. Leong, P.J. Enzmann (Federal Republic of Germany), Tokuo Sano (Japan) and R.N. Swanson.

Biologics used for serodiagnosis of fish pathogens (bacteria) — Drs. F. Hetrick, G.L. Bullock, R.A. Busch, Peter Smith (Norway), E.B. Shotts, B.S. Roberson, R. Lallier (Canada), W.A. Rogers, R.M.W. Stevenson (Canada), J.H. Crosa and Mr. D. Groman.

Preparation of biologics (technical aspects) — Mr. J.J. Majnarich, Drs. J. Rohovec, B.J. Hill (United Kingdom), Takashi Aoki (Japan), B.L. Lidgerding, A.L. Scott and Mrs. O.W. Dixon.

Standardization of biologics for fishes — Drs. W. Hennessen (Switzerland), G.W. Klontz, R.C. Simon, R.S. Robohm, L.W. Clem, W.B. van Muiswinkel (The Netherlands), N. Miller, L.J. McCumber and G.A. Ingram (England).

Protection to the immune response in fishes — Drs. W.D. Paterson (Canada), B.S. Roberson, M.M. Dorson (France), T.C. Fletcher (Scotland), C.J. Lobb, D.I. Dawe, A.E. Ellis (Scotland), R.L. Thune and T. Kitao (Japan).

Biologics for immunization of fishes — Drs. T.P.T. Evelyn (Canada), M.A. Cardella, W.D. Paterson, B. Austin (United Kingdom), G.L. Tebbitt, D.F. Amend, E.M. Walczak, P. deKinkelin (France) and J.B. Alexander (England).

For further information contact: Dr. Doug Anderson, Biologics Section, National Fish Health Research Laboratory, Route 1, Kearneysville, West Virginia 25430.

NEWSLETTER FORMAT RESPONSE: IS ANYBODY OUT THERE?

The response to our newsletter format referendum in the Jan. - March issue was totally underwhelming. To date, a total of just 35 members have responded - leading us to wonder if anyone is out there (?).

Of those who have replied, the results are as follows:

1. Return to the old format - 3 votes.
2. Try to find a cheaper, yet professional-looking format within our present financial means - 12 votes.
3. Stick with the new format. We'll accept a dues increase if it becomes necessary - 20 votes.

The FHS Annual Meeting at Starkville, Mississippi is coming up as this issue goes to press. In addition to the increased cost of printing our newsletter in this format, we will have to consider postage costs which went up recently and, in all likelihood, will soon go up again. It would have been nice to have heard from even 10% of the membership before facing these decisions.

PGW

IS CAPILLARIA CATOSTOMI A PATHOGEN?

In 1962 one of us (GLH) found an epizootic of *Capillaria catostomi* (Nematode: Trichuridea) in *Lepomis macrochirus* and *L. cyanellus* at Leetown, West Virginia. There were numerous worms invading the mucosa of the intestine and caeca with obvious hemorrhage.

During the past several years we have been seeing a similar condition in golden shiners (*Notemigonus crysoleucas*). Histopathology reveals variously degenerate, cystic, hyperplastic, anaplastic, sloughing epithelium. The submucosa is inflamed and hemorrhagic (Ch. Smith, USFWS, Bozeman, MT). Enteritis in heavily infected individuals is apparent. Many of the fish are severely emaciated; apparently not feeding well. This is obviously a pathogenic situation, but although we have not found any other causal agents, we are not absolutely certain that *C. catostomi* is the sole cause of the problem. Capillarids and related trichurids of mammals and birds are devastating nematodes. In the meantime we hope to do some research on potential anthelmintics for *Capillaria* of fish. These candidates include meldon (Co-Ral), levamisole, dichlorvos (DDVP) and piperazine.

Submitted by Glenn L. Hoffman, Andrew J. Mitchell and Brenda Rodgers, U.S. Fish and Wildlife Service, Fish Farming Experimental Station, P.O. Box 860, Stuttgart, Arkansas 72170.

LYDIA SCYPHIDIA

HOW DO YOU FEEL ABOUT TEACHING MITOSIS IN PUBLIC SCHOOLS?

PERSONALLY, I'M DIVIDED ON THE ISSUE.

THIS STRIP JUST KEEPS GETTING CILIA!

EDITOR'S NOTE:
THE PRECEDING TERRIBLE PUNS COULD HAVE BEEN AVOIDED IF YOU HAD TAKEN THE TIME TO SEND IN A CONTRIBUTION TO FILL THIS SPACE.

PGW

P. G. Walker
ME Dept. Fish & Wildlife
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