



Fish Health Section Newsletter

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Volume 4

January-March 1976

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Number 1

A Presidential Message 1976

I guess it is appropriate for a new president to address the membership by saying "thank you" for your vote of confidence and I am looking forward for the challenge of serving as your president. In my case I sincerely mean it - thank you. The challenge for me has two meanings: (1) there is a need for continued progress in the FHS, and (2) after eleven years of Federal service, I have accepted a position with Tavolek Laboratories, a new company of Johnson and Johnson, Inc., whose business will be fish health.

This commitment by a major biologic company and other companies emphasizes the increased awareness of fish disease control for successful development of aquaculture. This importance has always been stressed by the FHS and within the last ten years the role of fish pathobiologists has had a major impact on the way hatcheries manage their business. Although our contribution has been significant, the fish pathobiologist has received criticism from both top management and the hatcherymen. It is therefore natural that we seek others with similar problems for collaboration and self assurance. This is one of the major reasons that spawned the Fish Health Section.

Those who make up the FHS come from a variety of educational backgrounds (re-tread fishery biologists, microbiologists and veterinarians). Unfortunately, a certain "pecking order" within the Section has led to a battle between the have and the have nots. Problems and weaknesses within the Section have surfaced, and recently the possible threat of eradicating the fish pathobiologist emerged because of the conflict with State Veterinary Practices Acts. This to me is currently the FHS's greatest challenge. In order for our profession to survive, we urgently need to set professional standards. The time has come to set aside our own personal jealousies and work toward a common goal that promotes professionalism within our Section, but let us not forget - it is the fish resource that must be the beneficiary.

I strongly believe that everyone within the Section should have and use the opportunity to contribute, either in committees or by submitting their ideas. I also believe that we have been too salmonid and infectious disease oriented; we need to expand our base to include those working on nutritional diseases, toxicology, pet fish, shellfish, warm water fish in the government, in the universities, and in the private sector. To accomplish this, I am proposing a workshop this fall (1976) and have given the committees the following specific objectives to accomplish:

- 1) PROFESSIONAL STANDARDS COMMITTEE: (a) nominate a slate of candidates for the Board of Certification for the registry of fish health inspectors, (b) following a special spring election, start the registry, (c) contact international, federal, and state agencies to accept our registry as official, and (d) develop procedures for general professional certification and coordinate activities with the legislative liaison committee.

**Board Of Certification Election
Ballot On Back Page - VOTE TODAY**

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- 2) TECHNICAL STANDARDS COMMITTEE: (a) review literature of new diagnostic techniques and evaluate for use in research, diagnostics, and field conditions. (b) identify areas of needed improvement and (c) update methods in our manual.
- 3) MEMBERSHIP COMMITTEE: (a) assume responsibilities of dues collecting and membership forms, (b) keep updated lists of current members and their areas of expertise, and send to all members and new members, and (c) conduct a survey of past members and other fish pathobiologists who are not members to determine why they are not.
- 4) NEWSLETTER COMMITTEE: (a) to expand scope of newsletter to other areas of fish health, (b) solicit opinion and editorials on controversial issues, and (c) start a section for job opportunities.
- 5) AD HOC LEGISLATIVE LIAISON COMMITTEE: (a) review current fish disease legislation and prepare critiques representing the Section, (b) recommend to the Professional Standards Committee guidelines for professional certification, academic training, and work experience, and (c) contact states with Veterinary Practice Acts where possible problems exist for practicing fish pathobiologists and determine what can be done to comply without excluding non-veterinarians.
- 6) AD HOC PROGRAM COMMITTEE: arrange for a fall meeting in the Central United States lasting two to three days covering a broad range of fish health subjects.
- 7) AD HOC BY-LAWS AMENDMENT COMMITTEE: (a) change our election of officers to coincide with the National AFS meeting, (b) coordinate with the Fish Culture Section to give Section Presidents voting rights on the AFS Executive Committee, (c) prepare other amendments to allow smoother functioning of Section activities, (d) include amendments for membership voting to coincide with the special election for the Board of Professional Certification.
- 8) AD HOC COMMITTEE FOR GLOSSARY OF FISH HEALTH TERMS: complete and publish the glossary.
- 9) Other Areas of FHS Activities: (a) explore possibility of changing name of Newsletter to avoid confusion with the Leetown Fish Health Newsletter, (b) explore need for increased dues, (c) explore possibility of cost sharing with AFS, and (d) determine ways of financing student training and refresher workshops.

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The NEWSLETTER of the Fish Health Section of the American Fisheries Society is published four times annually in accordance with Section objectives and mailed to the Section membership in good standing at the time of publication. The use of company or registered trade names does not constitute an endorsement but serves only to keep the members informed. Contributions to the NEWSLETTER are encouraged and should be sent to one of the following Committee members no later than the 15th of the month preceding the date of publication to be included in the next quarterly issue.

- Dr. Robert A. Busch (editor), Fish Pathology Laboratory, School of Natural Resources, Humboldt State University, Arcata, California 95521
- Dr. Brian Allee, New Business Research, Weyerhaeuser Co., 3400 13th Ave. S.W., Seattle, Washington 98134
- Dr. John Gratzek, Dept. Medical Microbiology and Veterinary Medicine, University of Georgia, Athens, Georgia 30602
- Dr. Glenn L. Hoffman, Fish Farming Experiment Station, P.O. Box 860, Stuttgart, Arkansas 72160
- Dr. Donald V. Lightner, Environmental Research Laboratory, Tucson International Airport, Tucson, Arizona 85706

To accomplish the above objectives will require a great deal of effort by those serving on committees. Each committee will give a report of their activities at the workshop next fall.

I urge everyone to express ^{his} their views through the committees...your help will be appreciated. If you want, contact me personally and I will see that your views are represented. For those who claim they are "too busy" to contribute or have not joined the FHS because we have nothing to offer, I cannot condone your smug attitude for we all have obligations and varied interests. Furthermore, is there anyone who is so secure in ~~their~~ job or who believes ~~themselves~~ above the others that they cannot benefit from recognized professional standards? I doubt it! Remember, the future and development of aquaculture and protection of our fishery resource depends on the control of diseases (in the broadest sense of the word) and there is no group more qualified than the FHS to lead the way. However, we must have the cooperation of the members and put our house in order, or someone else will do it for us.

Donald F. Amend, Ph.D.
President AFS/FHS

Committee Appointments of the Fish Health Section - 1976

EXECUTIVE COMMITTEE

Donald F. Amend, President
Dave McDaniel, Vice President
Ivan McElwain, Secretary-Treasurer
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Robert Busch, Newsletter Committee
Richard Heckman, Professional Standards
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Hal Wolf, Nominating Committee

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Glenn Hoffman
Don Lightner

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TECHNICAL PROCEDURES COMMITTEE

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Gary Camenisch
Ron Goede
Steve Leek
John Plumb

AD HOC COMMITTEES:

1. Legislative Liaison Committee

Richard Stroud, Chairman
Ray Bendele
Pete Bullock
Bill Klontz
Fred Meyer
Gary Wobeser
Richard Wolke

2. Program Committee

Don Lewis, Co-Chairman
Don Lightner, Co-Chairman

3. By-Laws Amendment Committee

Jim Warren, Chairman
Fred Meyer
John Plumb

4. Glossary of Fish Health Terms Committee

Bill Klontz, Chairman
George Post

Aquatic Animal Health An Editorial Comment

TO KILL OR NOT TO KILL
-A REPLY-

I would like to respond to the invited comments on this subject as given in the preceding Newsletter (FHS/AFS NEWSLETTER, 3(4)). I have given a lot of thought to this subject ever since I was a witness in the Michigan whirling disease court case in 1969 which resulted in the destruction of a man's livelihood without adequate indemnification.

In further introduction, it is not common practice in human or veterinary medicine to destroy infected populations. Hoof and mouth disease is the most notable exception that I can recall. In some other cases the carcasses of condemned animals are salvaged. And yet, good control has been achieved with many diseases without eradication...avian coccidiosis is controlled by sanitation and chemotherapy, human malaria is controlled by vector eradication and chemotherapy, and yellow fever is controlled by vector eradication and immunization.

We do need better surveillance, treatment and control of fish diseases as the previous authors have well described. However, destruction of infected fish stocks should be done only under certain conditions. Because I have worked with whirling disease since its arrival in North America about 1958, let me use it as an example. It is now in Pennsylvania, New Jersey, Connecticut, Massachusetts, West Virginia, Virginia, Ohio, Michigan, and Nevada. During the past 18 years infected stocks have been confiscated in eleven instances in Nevada, Pennsylvania, Michigan, Connecticut, California, New Jersey and West Virginia. As far as I know only California has achieved eradication. Two national fish hatcheries did effect eradication following fish confiscation, but both built expensive modern concrete raceways and utilized well or spring water which was free of *Myxosoma cerebralis*. Contaminated water can be disinfected with ultraviolet irradiation. On the other hand, the other fish culturists in the above states have learned how to reduce the parasite load to a point where healthy fish can be raised...a situation almost identical to the poultry farmers' control of fowl coccidiosis. In some areas the organism is established in natural waters. Further fish confiscation would probably have little effect on reducing the present enzooticity unless almost all salmonids were destroyed! Can we afford that?

To kill or not to kill? As an example, let me propose this for whirling disease:

1. Where whirling disease is enzootic (states mentioned above) suggest that each salmonid culturist do everything possible to reduce the number of spores on his property and have his fish checked for *M. cerebralis* before shipping to areas where this parasite does not exist. In these enzootic areas the fish are infected, but usually not diseased.
2. Where whirling disease is not enzootic (a new outbreak) if indemnification is possible, kill the fish, disinfect, reconstruct etc., as needed to achieve eradication. If indemnification is not possible the fish



culturist should do everything possible to control the disease and no fish farmer with *M. cerebralis*-free stock should accept fish from such a source. These fish are likely to be intensely infected and diseased.

3. If killing is deemed necessary, someone should find a way to utilize condemned fish. The product is wholesome food and completely harmless when cooked. In the livestock industry even T.B. positive cattle are utilized, as are cattle infected with liver flukes.

As another example, consider ichthyophthiriasis. Ich is far more devastating than whirling disease and enzootic nearly everywhere. It would be impossible to eradicate it by killing the known contaminated stocks. We should increase control through better surveillance, therapy, and consideration for the recipient of fish shipments.

In the absence of an adequate fish disease law, fish culturists should protect themselves by requiring certification of stock they purchase as free of major diseases.

Dr. Glenn L. Hoffman
U. S. Fish and Wildlife Service
Fish Farming Experimental Station
P.O. Box 860
Stuttgart, Arkansas 72160

Hear Ye... Hear Ye...

BE A PATRON OF THE SECTION

FHS members come to the aid of your Section. Like everyone else these days the Fish Health Section is feeling the money crunch. For your present \$2.00 annual dues you are getting a lot for your money...more than we can afford! Each quarter the NEWSLETTER costs between \$85 - \$100 to print and mail. With approximately 200 members, this leaves little in the sock for stationary, envelopes, postage, etc. for the various committees and for expenditures for our up-coming National Workshop. Needless to say, one of the topics of discussion at the workshop will be on ways of improving our financial position. Options that will be discussed are an increase in membership dues, a seprate charge for the NEWSLETTER, registration fees for meetings, and a by-laws change to permit the Executive Committee to assess the membership when costs rise. We are writing this editorial so that all of you have plenty of opportunity for "attitude adjustment" by the time of the workshop. In the meantime, we would like to appeal to your goodwill and ask for a personal contribution to your favorite "needy charity"...the Fish Health Section. All kidding aside, we do need additional revenue in the immediate future but cannot get it before the planned date of the up-coming workshop. If any of you would care to help the FHS through this crisis, your personal check made out to "Fish Health Section/AFS" and marked "contribution" would be greatly appreciated. Please send your contributions at your earliest convenience to:

Ivan B. McElwain, Sec./Tres.
Fish Health Section/AFS
P.O. Box 917
Fort Morgan, Colorado 80701

thank you

COMMITTEE NEWS & REPORTS

-NOMINATING COMMITTEE-

CANDIDATES FOR THE FHS/AFS BOARD OF CERTIFICATION

Pursuant to Article VII,
Section 1., paragraph f. of

the By-Laws of the Fish Health Section, the following list of nominees for the five (5) member Board of Certification is submitted to the membership for election and appointment. The eight candidates include Mr. Dennis E. Anderson, a practicing diagnostic virologist with the USFWS Fish Disease Control Laboratory in Fort Morgan, Colorado. Mr. Anderson has been active in the Fish Health Section since its beginning and is experienced in the day to day problems of diagnostic certification of fish diseases. The second nominee is Dr. Graham L. Bullock, a research microbiologist with the USFWS Eastern Fish Disease Laboratory in Kearneysville, West Virginia. Pete is a widely recognized expert in diagnostic bacteriology and serology and has served as a past president of the Fish Health Section. Dr. John L. Fryer is a Professor of Microbiology at Oregon State University and has been an active researcher in diagnostic techniques and protective immunization of fish. John is also a past president of the Fish Health Section and partly responsible for its beginnings. The fourth candidate is Mr. John G. Gnath, a fish pathologist for the state of Michigan. John has been active in the state's efforts to control whirling disease and infectious pancreatic necrosis virus disease in the state's fishery. Dr. Ron W. Goede is a pathologist for the state of Utah. Ron has been most active as a practicing diagnostician and in coordinated efforts at fish disease control both within the state of Utah and with the Colorado River Wildlife Council.

Mr. David O. Locke is the Superintendent of Fish Hatcheries for the state of Maine. Dave has long been active in combating fish diseases and has been most successful in his control of viral disease. The seventh candidate is Dr. Fred P. Meyer, Director of the USFWS Fish Control Laboratory in LaCrosse, Wisconsin. Fred is noted for his warmwater fish disease expertise and for his successful effort in getting an acceptable Board of Certification proposal through the Fish Health Section membership this past year. The last candidate is Mr. James W. Warren, Director of the USFWS Fish Disease Control Laboratory at Genoa, Wisconsin. Jim is another practicing fish disease diagnostician who is particularly noted for his long active role in writing and guiding various pieces of fish disease control legislation on the international, national, and state level.

The Official Mail Ballot for the Election of the FHS Board of Certification is found on the last page of this NEWSLETTER. Please vote and mail your completed ballot today. Ballots will be counted by the 15th of June and the results of the election reported in the next issue of this NEWSLETTER. For comment of further information, contact Mr. Harold Wolf, Chairman of the Nominating Committee, Fish Disease Laboratory, 2111 Nimbus Road, Rancho Cordova, California 95670.

-AD HOC PROGRAM COMMITTEE-

NATIONAL FISH HEALTH SECTION WORKSHOP PLANNED

Dr. Don Lewis and Dr. Don
Lightner, co-chairmen of the

ad hoc Program Committee established by FHS President Dr. Don Amend have announced tentative plans for a Second National Fish Health Section Workshop.

The three day meeting is tentatively planned for Denver, Colorado on August 24-26. The program will take the form of chaired panel discussions on the following topics:

Tropical Fish Health Problems - Dr. Jack Gratzek, chairman

Warm Water Fish Health Problems - Dr. Tom Welborne and Dr. John Plumb, co-chairmen
 Marine Fish and Shellfish Health Problems -
 Cold Water Fish Health Problems - Dr. Pete Bullock, chairman
 Health Problems of Fish in Nature - Dr. Roger Grischkowsky, chairman
 Fish Immunology -
 Vaccine Development - Dr. John Fryer, chairman
 Serodiagnosis -
 Toxicology - Dr. Gerry Bouch, chairman
 Nitriton - Dr. John Halvor, chairman

Each session will be approximately two hours in length and allow for ample discussion time in pertinent subject areas. The meeting will also be used to place several items of importance before the membership for discussion and balloting. Discussions are presently underway with the American Fisheries Society for publication of the proceedings, possibly as a special edition of the Transactions of the American Fisheries Society.

Dr. Lewis and Dr. Lightner invite further comment from the membership on the final design and nature of the Workshop so as to insure its constructive value to all aspects of the fish health profession. For comment or further information, contact Dr. Donald H. Lewis, Department of Veterinary Microbiology, Texas A&M University, College Station, Texas 77843 or Dr. Donald V. Lightner, Environmental Reserach Laboratory, Tucson International Airport, Tucson, Arizona 85706.

-FINANCE COMMITTEE-

FINANCIAL REPORT FOR FISCAL YEAR 1975 The financial report for fiscal year 1975 for the Fish Health Section of the American Fisheries Society as provided for in Article VII, Section 1.c. of the FHS By-Laws is given:

1975 Income	
Membership Dues - 187 members @\$2.00 each	374.00
1974 Balance	- 7.20
Interest on Savings Account CY 1975	9.27
Total 1975 Income	<u>376.07</u>
1975 Expenditures	
Postage	44.00
Printing Costs	<u>320.92</u>
Total 1975 Expenditures	<u>364.92</u>
1975 Balance	11.15

For comment or further information, contact Ivan B. McElwain, Finance Committee Chairman, P.O. Box 917, Fort Morgan, Colorado 80701

PROFESSIONAL NEWS & VIEWS

YIELD AND ANTIGENICITY OF *Herpesvirus salmonis* In order to prepare diagnostic antiserum for serological identification of *Herpesvirus salmonis*, it was necessary to have a susceptible host cell system and to grow the agent in quantity. Accurate methods of quantification were needed as were methods for purifying and concentrating antigen for

immunization. Over an incubation span of 90 days, inocula of 10^4 PFU of *H. salmonis* showed no CPE and lost their infectivity in BB, BF-2, and FHM cells, but there was a 16-fold increase in RTG-2 cells, and they showed CPE.

Herpesviruses generally have only mediocre antigenicity, and *H. salmonis* has the added limitation of low yields...a total of about 10^5 PFU per ml...less than 1% of that attained by CCV. Growth characteristics of *H. salmonis* were determined, and the curves showed when peak titers could be expected, but that only about 15% of the infectivity was released. The great bulk of the infectivity remained cell-associated and hence, with great quantities of undesirable cellular antigens. A comparison showed that between ultracentrifugation, polyethylene glycol and ultrafiltration that the latter was preferred for concentrating semi-purified *H. salmonis* for use in immunization.

Rabbit antisera have been prepared. After testing and standardization, it is anticipated that availability will be announced in the April 1976 issue of FISH HEALTH NEWS. (For comment or further information, contact Dr. Kenneth E. Wolf, Eastern Fish Disease Laboratory, Leetown Route #1, Box 17A, Kearneysville, West Virginia 25430)

Aeromonas salmonicida IN LAKE TROUT During October of 1975, a Pennsylvania state fish hatchery experienced lake trout mortalities due to *A. salmonicida*. The clinical infection did not respond to normal levels of Terramycin fed with the diet. The epizootic was finally controlled with a Nitrofurantoin drug mixed with feed at a rate of 2.5 grams Nitrofurantoin/100# fish/day. At the same hatchery, Hyamine 1622, used at 2 ppm for 68 minutes on three consecutive days, was suspected to have caused salmonid mortalities. The Hyamine treated fish exhibited convulsive behavior, spiraling, and flaring of the opercular flaps. For comment or further information, contact Mr. Cecil Houser, Benner Spring Fish Research Station, Bellefonte, Pennsylvania 16823.

SUSCEPTIBILITY OF ATLANTIC SALMON TO ENTERIC REDMOUTH DISEASE

In the United States, the geographic occurrence of enteric redmouth (ERM) has spread from the Intermountain West to the Southwest and East. We tested the susceptibility of Atlantic salmon to ERM, and they proved vulnerable to the causal bacterium. In fact, the ERM bacterium was as virulent as the furunculosis organism *Aeromonas salmonicida*.

Salmon fingerlings that had been injected intraperitoneally with 5×10^5 cells of either ERM or *A. salmonicida* and held at 12.5 C, died within 96 hours. About half of the test fish died when they were exposed for only 30 minutes to water containing 10^7 cells per ml of either bacterium. Horizontal transmission of both furunculosis and ERM was also achieved. Between 55 and 60% of the salmon died after 14 days when exposed to effluent from rainbow trout infected with furunculosis or ERM.

Histopathological changes found in ERM infected salmon were similar to those reported for the disease in rainbow trout. Pathologic changes occurred mostly in the kidneys, where severe necrosis of hematopoietic elements was evident. Necrosis also occurred in the mucosal epithelium of the intestine, pyloric caeca and in liver cells. Concentrations of the ERM bacterium were found in most internal tissues, especially vascular tissue of liver, kidneys, and gills.

Results of our studies indicate that every effort should be made to prevent introduction of ERM into watersheds where Atlantic salmon occur. (These studies were conducted by G. L. Bullock, H. M. Stuckey, and R. L. Herman of the Eastern Fish Disease Laboratory and C. E. Smith of the Boseman Fish Cultural Development Center. For comment or further information, contact Dr. G. L. Bullock, Eastern Fish Disease Laboratory, Leetown Route #1, Box 17-A, Kearneysville, West Virginia 25430)

UNUSUAL MYXOSPORIDIAN FOUND IN RAINBOW TROUT Recently, personnel at the Fish Disease Control Center found the unusual Myxosporidian parasite, *Henneguya zschokkei* (*H. salminicola*) in rainbow trout at a large trout and salmon hatchery in California. Spores were found in tissue that was being prepared for the digestion detection technique for *Myxosoma cerebralis*. Help with the identification was given by Dr. Glenn Hoffman of the USFWS Fish Farming Experiment Station in Stuttgart, Arkansas. (For comment or further information, contact Mr. Paul W. Janeke, Fish Disease Control Laboratory, P.O. Box 917, Fort Morgan, Colorado 80701)

LIFE HISTORY AND HABITAT ANALYSIS OF THE EYE FLUKE *Diplostomum spathaceum* (Trematoda: Diplostomatidae) in Utah Work has been conducted for the last two and a half years concerning the problem of diplostomatosis in Utah fishes.

Diplostomum spathaceum (Trematoda: Diplostomatidae) causes a disease known as diplostomatosis or eye fluke disease. The disease was found to be widespread throughout Utah in desert, mountain valley and alpine lakes. A total of 756 snails were examined and two species, *Lymnaea stagnalis* and *L. palustris* were found to be positive for *Diplostomum spathaceum*. Examination of 836 fish, which included 19 species, revealed 10 species (*Catostomus ardens*, *C. discobulus*, *C. platyrhynchus*, *Gilia atratia*, *Micropterus salmoides*, *Richardsonius balteatus*, *Salmo clarki*, *S. garidneri*, *S. trutta*, and *Salvelinus fontinalis*) positive for metacercariae of *D. spathaceum*. The only avian hosts positive for adult stages of *D. spathaceum* were *Larus californicus* and *L. delawarensis*. For comment or further information contact Dr. James Palmieri, Hooper Foundation, University of California, San Francisco, California or Dr. Richard Heckmann, Department of Zoology, 153 WIDB, Brigham Young University, Provo, Utah 84602.

EXPERIMENTAL BIOLOGICAL CONTROL OF THE EYE FLUKE DISEASE (*Diplostomum spathaceum*) BY A PROTOZOAN HYPERPARASITE *Nosema strigeoideae* (Protozoa: Microsporida). Although previously unsuccessful, biological control of *Diplostomum*

spathaceum through hyperparasitism now seems possible. For the past 40 years chemical and physical control of the snail and fish hosts of *D. spathaceum* have proved fruitless. Court, Hussey, and Ameel (1960, Ann. Zool. Fenn. 3:317-336) reported a large proportion of snails which were infected with sporocysts of *Diplostomum* collected in areas around Douglas Lake Biological Station in Northern Michigan were hyperinfected with a species of *Nosema* (Protozoa: Microsporida). Hussey (1971, J. Protozool. 18:676-679) reported a species of *Nosema* (*Nosema strigeoideae*) to be host specific for *D. spathaceum* even in cases where double triple trematode infections existed within the same snail. A successful collaborative effort to locate and isolate *N. strigeoideae* in areas surrounding the Douglas Lake Biological Station was carried out during June 1975 by Dr. Anne Cali of the Department of Pathology, Armed Forces Institute of Pathology and by Dr. James Palmieri of the Hooper Foundation in San Francisco.

Isolation of *N. strigeoideae* for laboratory and field studies concerned with the biological control of *Diplostomum* are presently being carried out at Brigham Young University. Exposure of spores of *N. strigeoideae* to laboratory reared *Lymnaea auricularia* containing experimentally developed sporocysts of *D. spathaceum* proved successful. It was found that the spores selectively attack the mother and daughter sporocysts as well as the developing cercarial embryos and retard, distort, and disrupt the normal development of cercariae thus cercarial release does not take place. The average period needed for development of *Nosema* with *Diplostomum* is from 13 to 20 days. Spores of *N. strigeoideae* seem to have no outward pathological effect upon the mulluscan host.

This preliminary investigation suggests that further work is needed to determine if *N. strigeoideae* might be useful in the biological control of *D. spathaceum* by preventing it from leaving the snail host and entering its fish second intermediate host.

This work was supported in part by grant 410-95-611 from Utah Division of Wildlife Resources. For comment or further information contact Dr. James R. Palmieri, Hooper Foundation, University of California, San Francisco, California; Dr. Anne Cali, Department of Zoology, Rutgers, The State University, New Brunswick, New Jersey; and Dr. Richard A. Heckman, Department of Zoology, 153 WIDB, Brigham Young University, Provo, Utah 84602.

EXOTIC TAPEWORM The Asian fish tapeworm, *Bothriocephalus gowkongensis*, has travelled rapidly from China to Central Asia, West Asia, Europe, Malaysia, New Zealand, and the U.S.A. Although the parasite has been found in many fishes, the rapid transfer was apparently through the many recent transfers of the Chinese grass carp or white amur, *Ctenopharyngodon idella*. Dr. G. L. Hoffman of the U. S. Fish Farming Experiment Station has found *B. gowkongensis* in golden shiners, *Notemigonus crysoleucas*, and the fathead minnow, *Pimephales promelas*. Dr. W. A. Rogers of Auburn University has found it in the white amur. Because of the parasites loose host specificity, it is not known how it reached the United States.

Although *B. gowkongensis* has caused serious damage in white amur and European carp culture in Asia and Europe, it has not been as harmful in American fish culture. However, it should be considered a threat and watched carefully.

In the U.S.S.R., *B. gowkongensis* has become mainly a parasite of the European carp, *Cyprinus carpio*, both cultured and wild. Perhaps *B. gowkongensis* will prove beneficial in the U.S.A. in the role of a biological control agent of *C. carpio*. (for comment or further information, contact Dr. Glenn L. Hoffman, Fish Farming Experimental Station, P.O. Box 860, Stuttgart, Arkansas 72160)

MEETINGS & MISCELLANY

SEVENTH ANNUAL MID-WEST FISH DISEASE WORKSHOP The 7th Annual Mid-West Fish Disease Workshop, sponsored this year by the U.S. Fish and Wildlife Service, will be held at the Ramada Inn near the airport in LaCrosse, Wisconsin. This year's workshop will begin at 8:30 a.m. on July 14th and will conclude at 4:30 p.m. on July 15th.

The general theme of the 1976 workshop is "Show and Tell". Key specialists in the diagnosis of fish diseases, in the research and development of laboratory techniques, in the mass immunization of fish and a variety of other important areas will chair "mini-sessions" devoted to topics of wide interest. Emphasis is being placed upon illustration of techniques, facilities and equipment which will aid others in putting new methods into practice.

A highlight of the two-day workshop will be a buffet dinner following which Dr. S. F. Snieszko, known around the world as a foremost fish disease specialist, will reminisce about his past and offer thoughts on the future. Early workshop reservations should be made. For further information contact Mr. James W. Warren, P.O. Box 252, Genoa, Wisconsin 54632 (608-689-2730). For motel reservations contact Ramada Inn, 2325 Bainbridge St., LaCrosse, Wisconsin 54601 (608-783-5381).

DISEASE PAPERS GIVEN AT WORLD MARICULTURE SOCIETY Several papers concerning aquatic animal health were given as part of the seventh annual meeting of the World Mariculture Society recently held in San Diego, California. The chemical control of *Lagenidium*, a fungal pathogen of marine crustacea and filamentous (*Leucothrix*) gill disease of penaeid shrimp were discussed by investigators from East Carolina University and the Environmental Research Laboratory of the University of Arizona. John Hawke of Auburn University's Agricultural Experiment Station surveyed the diseases of striped bass, *Morone saxatilis* and pompano, *Trachinotus carolinus* cultured in earthen ponds. Other papers included the susceptibility of cultured American lobsters to a chitinolytic bacterium and the effects of various disease treatments on the nitrification capacities of biological filters in recirculating aquaculture systems. The high level of interest and wide variety of pertinent subject material evidenced at this meeting is indicative of the rapidly increasing awareness of disease problems in mariculture operations.

PROFESSIONAL OPPORTUNITIES

POSTDOCTORAL POSITION A postdoctoral research position on piscine erythrocytic necrosis (PEN), a viral infection of marine fish, is immediately available. The applicant should have a background in virology and cell culture and experience in electron microscopy is desirable. The position has a salary of \$10,000 per year. The closing date for applications is June 1, 1976. All interested applicants should send their curriculum vitae and three letters of reference to Dr. Bruce L. Nicholson, Department of Microbiology and Migratory Fish Research Institute, 254 Hitchner Hall, University of Maine, Orono, Maine 04473. The University of Maine is an equal opportunity/affirmative action employer.

FISH DISEASE RESEARCH ASSISTANT Applications are being sought for a fish disease assistant at the U. S. Fish Farming POSITION AVAILABLE Experimental Station, Stuttgart, Arkansas. The position will be as assistant to Dr. Glenn Hoffman in research on parasitic diseases and the diagnosis of infectious diseases. Salary will be \$10,764 per year. The applicant must have a masters degree wherein the program included parasitology, bacteriology and/or virology. The applicant must be on the Civil Service Register as a Zoologist or Microbiologist. For further information, contact Dr. Glenn L. Hoffman, Fish Farming Experiment Station, P.O. Box 860, Stuttgart, Arkansas 72160.

Technicians and Microbiologists Tavolek Laboratories, Inc., a company owned by Johnson and Johnson, is establishing a research laboratory in Seattle, Washington to develop vaccines and pharmaceuticals for pet fish, shellfish, and all intensively cultured fish. Technicians and Microbiologists with a broad fisheries background and/or experience will be needed immediately and in the near future. Please send resume to Dr. Donald F. Amend, Tavolek Laboratories, Inc., 5219-190 S.W., Lynnwood, Washington 98036.

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