

Fish Health Section Newsletter

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Number 2

FHS MODULE SCHEDULED FOR NATIONAL MEETING

The Fish Health Section is planning a special module or session to be incorporated into the program of the 105th annual meeting of the parent American Fisheries Society to be held in Las Vegas, Nevada, September 10-13, 1975. The planned module will be moderated by Dr. William T. Yasutake of the Western Fish Disease Laboratory and include papers concerned with the many aspects of aquatic animal health. The module will be divided into two very broad major categories: diseases and their control.

An abstract of the session states that approximately 600 million tropical fishes are imported annually into the continental United States. An evaluation of samples of fishes imported and the water in which they were shipped from Southeast Asia indicated that the parasitic load is less than would be expected in native fishes. The presence of bacteria of definite public health importance is also minimal. The isolation of a herpesvirus supports the observation that viruses, like bacteria, are found in water from various sources.

Noninfectious diseases such as "white-spot", "sore back", fin mutilation and certain eye problems frequently lead to significant monetary loss in salmonid propagation. Prevention of these and other noninfectious diseases can be effected best through increased attention to hatchery management practices.

In other types of aquaculture, such as marine crustaceans, infectious and noninfectious diseases have occurred often enough to present a major disease problem. The penaeid shrimp are presently receiving a major portion of the effort of research and development in crustacean aquaculture.

Various methods of immunization of fish have been investigated for a number of years. A novel technique for delivering vaccines to fish has recently been developed which uses two principles: vacuum infiltration and forced tissue perfusion. This unique method of vaccination may very well be employed with other aquatic animals.

Coordinated interagency efforts to control serious fish diseases in the Great Lakes basin are rapidly becoming a reality. The Fish Disease Control Committee established by the Great Lakes Fishery Commission has made some key proposals. These proposals are a comprehensive Model Fish Disease Control Program designation of certain diseases as "Emergency Diseases", a model fish disease eradication plan to guide agency action, a recommendation for Commission endorsement of Federal fish health legislation and others.

A tentative program includes:

Introductory remarks by Mr. Courtney Gustafson, President,
Fish Health Section, American Fisheries Society.

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Aquatic Animal Health An Editorial Comment

In an effort to provide an open forum for the free exchange and discussion of controversial ideas and opinions, the FHS/AFS NEWSLETTER inaugurates a new feature, "Aquatic Animal Health, An Editorial Comment". I invite your signed editorials on current subjects of vital interest to the broad spectrum of our members. It is my hope that the active participation of our membership in the use of this means of expression will result in a stimulation of our thought, a test of our reason, a furthering of our understanding and a strengthening of our philosophy. Contributions will be accepted or rejected solely on the basis of their timeliness and merit without further editing. Appropriate space for rebuttal will be provided in future issues for the NEWSLETTER.

If we as professionals are to rise to the increased demands being placed upon us by the diversity of disease associated problems of a rapidly growing fishery industry, it will come more easily out of a joint effort marked by a free and mutual exchange of ideas, expertise, knowledge, and funding. Without the free communication of either the problems or their solutions across the broad boundaries of our membership, there is much to be lost and even more to be wasted.



Robert A. Busch, Editor
FHS/AFS NEWSLETTER

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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. The use of company or registered trade names does not constitute an endorsement but serves only to keep 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 into the next quarterly issue.

- Dr. Robert A. Busch (Editor), Fish Pathology Laboratory, Bldg.#48,
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- Mr. Charles R. Berry, Jr., (eastern U.S.), Department of Fisheries and
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- Dr. Richard A. Heckman (western U.S.), Zoology Department, 143 Wid B,
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COMMITTEE NEWS & REPORTS

-FINANCE COMMITTEE-

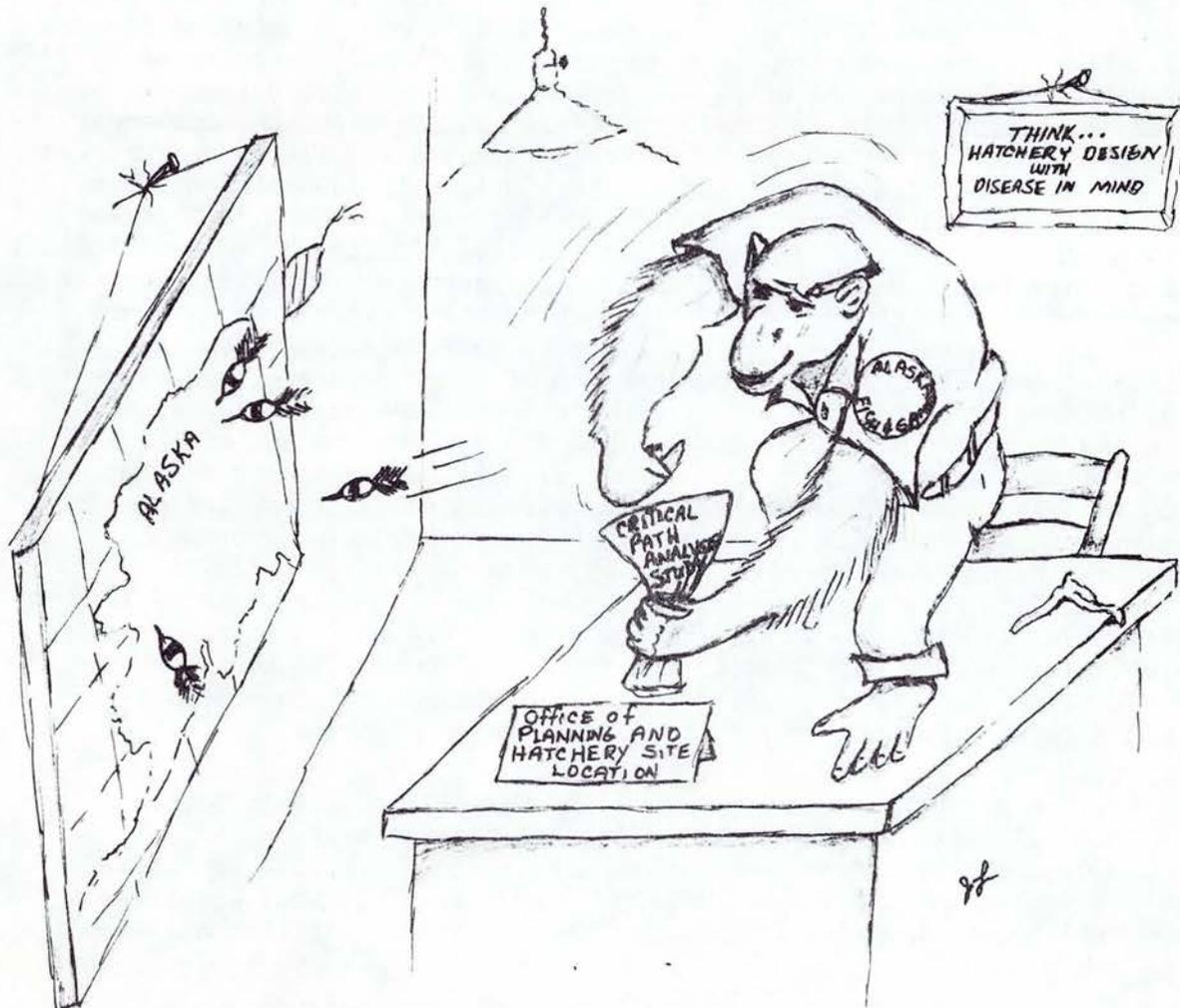
MEMBERSHIP/MONEY LAGGING

Ivan McElwain, Secretary-Treasurer, reports there are 150 paid members in the Fish Health Section as of June 1, 1975. This is slightly behind last year's rate and reflects many members who have been lost due to non-payment of 1975 dues. If every member recruited a friend, we could be well over 300 strong and everybody knows there is strength in numbers so let's get going. Additional paid membership would allow us to expand our services and perhaps have another national meeting. For comment or further information contact Mr. Ivan B. McElwain, Sec.-Tres., P.O. Box 917, Fort Morgan, Colorado 80701.

-TECHNICAL PROCEDURES COMMITTEE-

PROCEEDINGS OF THE 1974 FHS/AFS DENVER WORKSHOP

According to Mr. David W. McDaniel, Chairman of the Technical Procedures Committee, the manuscript of the proceedings of the 1974 FHS/AFS Denver workshop entitled "Suggested Procedures for the Detection and Identification of Certain Infectious Diseases of Fishes" is in press. Copies should be available the end of July and will automatically be received by members in good standing of the Fish Health Section (if your mailing address has a big red check on it, your dues are in arrear and you will not be receiving your copy). For further information contact Mr. David W. McDaniel, Chairman - Technical Procedures Committee, 7313 Castle Road, Manassas, Virginia 22110.



PROFESSIONAL NEWS & VIEWS

MICHIGAN WHIRLING DISEASE 1975 OUTBREAK - A REVIEW AND SUMMARY

The recent whirling disease outbreak in the State of Michigan FHS/AFS NEWSLETTER 3(1) was brought up to date and summarized

in a recent report issued by the Fisheries Division of the Department of Natural Resources. A routine annual health inspection performed on DNR's Sturgeon River Rearing Station in the spring of 1975 revealed the presence of whirling disease spores. This discovery resulted in the decision to destroy all the fish, 500,000 yearling rainbow trout and 2.1 million coho salmon smolts, and permanently discontinue the operation of the Sturgeon River station. These were major decisions with far reaching effects and because of their importance and significance to Michigan's fisheries program, a rather detailed documentation of the events, starting prior to the time of the discovery of the disease through the execution of the mandate, was made.

In the fall of 1974, a total of 902,000 rainbow trout received that spring from Charlevoix Hatchery were on the Sturgeon River station. At that time, 268,000 of these apparently healthy fish were stocked into various inland waters of both the Upper Peninsula and State of Michigan proper as well as Lake Huron and Lake Michigan. Concurrently, in the spring and early summer of 1974, 1,526,000 coho salmon of both the Michigan and Washington strain were brought onto the station in three lots from the Platte River Hatchery. In the late fall of 1974, 500,000 of the apparently healthy Washington strain coho were returned to the Platte River Hatchery.

In December of 1974, a state fish pathologist, investigating a disease problem at the Sturgeon River station, found no evidence of whirling disease spores. However, samples taken in a routine inspection in February of 1975 and examined in March of the same year proved to be positive for spores of Myxosoma cerebralis. This diagnosis was confirmed later in the same month by both Dr. Glenn Hoffman of the Eastern Fish Disease Laboratory and Mr. Jim Warren of the Genoa Fish Control Laboratory. Original diagnosis was from rainbow trout sampled in February, 1975 and confirmed in March, 1975 from both rainbow trout and coho salmon on the station. Additional epidemiological sampling conducted in March, 1975 confirmed the presence of whirling disease in the stocks of coho salmon transferred back to the Platte River Hatchery, in native populations of the Sturgeon River up to five miles below the station and immediately above. Confirmation of spore presence in various lots of rainbow trout planted out of the station as described in the fall of 1974 led to the conclusion that whirling disease was present at the Sturgeon River Rearing Station in the fall of 1974 and that most of the 268,000 rainbow trout stocked at that time were infected. This includes dissemination into the inland waters of the Upper Peninsula, Michigan proper, Lake Huron, and Lake Michigan. Myxosoma cerebralis was also diagnosed in fish from a commercial hatchery about ten miles north of the Sturgeon River station but no part of the same watershed. As far as can be determined, no fish were distributed from this commercial facility for the stocking of any waters. Limited data indicates the absence of any whirling disease infection in lots of fish produced prior to the fall of 1974.

Following a briefing on the nature of the parasite and its potential effect upon hatchery and native populations of fish as well as the concerned opinions of affect natural resource agencies in both the United States and Canada through the Great Lakes Fish Disease Control Committee of the Great Lakes Fisheries Commission, the unilateral decision was made

by the state of Michigan to immediately destroy all fish at the Sturgeon River Rearing Station and 100,000 infected Washington strain coho salmon at the Platte River Hatchery, to disinfect all facilities, and to discontinue use of the Sturgeon River Rearing Station. All fish were destroyed by burial in quicklime at local selected sanitary landfill sites. Hatchery buildings were fumigated with paraformaldehyde gas and equipment disinfected with live steam or chloride. Dried ponds were treated with quicklime at the rate of 0.1 pounds per ft². Adjustment of the diversion dam and the installation of tight stoplogs at the pond entrances will prevent river water from flowing through the ponds.

To minimize the effects of a reduction of 80 percent in the inland rainbow stocking program and 30 percent in the number of coho released in the spring of 1975, the entire schedule has been re-evaluated resulting in numerous adjustments. Stocking locations and levels were reestablished by priority so that major popular fisheries were affected as little as possible, thus also preventing any significant economic stresses upon associated recreational industries and communities. Due to planned hatchery output in 1976, production loss next year should be absorbed, however, efficiency is expected to be poorer and the risk of disaster greater. Permanent replacement of the lost Sturgeon River production capacity will be made up by future hatchery expansion. The Fishery Division is recommending that the Oden Fish Hatchery be developed into a 250,000 pound capacity production unit including a new water source and water reuse systems at an estimated cost of \$2.5 million.

From its experiences with Myxosoma cerebralis, The Fisheries Division of the Michigan Department of Natural Resources has formulated the following conclusions. When whirling disease was first detected in Michigan in 1968, an all out effort was made to fully control its spread and hopefully eradicate it. The disease did spread into the East Branch of the originally infected Tobacco River and its upper tributaries. Vigorous control efforts were extended to this stream system. Five years of annual chlorine or rotenone treatments did not eliminate the parasite. Some fish which re-occupied these treated areas became carriers year after year. However, as long as it was assumed that the disease was still very much restricted in its distribution, control efforts aimed at eradication were not only considered justifiable, but mandatory!

This has now changed. Eradication is out of the question, and whirling disease, therefore, must now be considered endemic to Michigan. However, the Michigan Department of Natural Resources has committed itself to not knowingly aid in the distribution and amplification of the parasite. This position carried with it the rather severe consequences of destroying 2.5 million fish and abandonment of the 150,000 pound production Sturgeon River station.

The most ideal or effective long term control method is to produce all fish on disease free or closed water sources. This will not be entirely feasible for Michigan. However, new fish production facilities will be developed to the greatest extent possible on disease free water sources with the application of water re-use concepts. The recent outbreak of whirling disease rather painfully illustrated, again, the importance of providing all fish production facilities with as much protection against all types of diseases as possible. Prevention rather than the cure of diseases should be of the highest priority. This will be their policy throughout the entire fish cultural cycle, from egg take (disease-free brood stock) to stocking. (for comment or further information contact Mr. Harry Westers, Hatchery Planning Specialist, Fisheries Division, Michigan Department of Natural Resources)

DRY-INNOCULATION METHOD FOR VIRUS ASSAY The Fish Disease Control Center in Fort Morgan, Colorado is using the dry-innoculation method for virus assay of fish tissue. In this procedure, dry microculture plate wells are first inoculated with the prepared fish tissue sample. Suspended cells from the appropriate fish line are then layered on top of each inoculum. In theory, as the cells settle to the bottom of the well, they tend to "pick up" virus particles that are suspended in the inoculum more efficiently. It was suspected that in previous techniques utilizing established monolayers of susceptible cells, the suspended virus could become layered above the cell sheet in the culture medium and/or adhere to the walls of the well, thereby, never coming into effective contact with the cells. So far, experience with the dry-innoculation technique suggests that sensitivity has been increased and that CPE occurs at an earlier time. (for comment or further information contact Mr. Ivan B. McElwain, Director, Fish Control Laboratory, P.O. Box 917, Fort Morgan, Colorado 80701)

LYMPHOCYSTIS AND DIAGNOSTIC HEMATOLOGY IN WINTER FLOUNDER After a 14 month study of the winter flounder (Pseudopleuronectes americanus) hematological characteristics, it has

been found that the formed elements of the blood reflect the health of the fish and are quite responsive to seasonal environmental changes. High RBC counts, Hb concentrations and hematocrits were found in late summer, autumn and into winter; leucocyte numbers were at annual low levels during this time. After a period of fasting and reproductive development followed by spawning, the emaciated fish have the highest annual leucocyte count. An annual high peak in the percentage of immature RBC's follows the resumption of feeding. Erythropoiesis initiates the high RBC counts, Hb concentration and hematocrits found in late summer. A high incidence of lymphocystis was found during spring when fish were most debilitated. The investigators welcome comments on these findings by freshwater fish disease investigators and would like to learn of previous reports of lymphocystis in winter flounder. (For comment or further information contact Dr. Dave Bridges or Dr. J. Cech, Research Institute of the Gulf of Maine, P.O. Box 2320, South Portland, Maine 04106)

PATHOBIOLOGY OF SHELL DISEASE AND FIN EROSION IN THE NEW YORK BIGHT Researchers at the Middle Atlantic Coastal Fisheries Center's Sandy Hook Laboratory have been monitoring the response of marine organisms to the disposal of dredge spoil, sewage sludge and waste chemicals on a portion of the Continental Shelf known as the New York Bight. Shell disease, an ulceration of the exoskeleton caused by either fungus or bacteria, has been found in crabs, lobsters and shrimp from the Bight area. The incidence of fin erosion in winter flounder is also much higher in the Bight area. Bacteriological and immunological studies are in progress to determine if a specific microbial agent causes fin erosion. Studies have also been carried out on the bacterial, invertebrate and fish populations of the Bight area. An antimicrobial resistant coliform has been found. A number of papers suggesting the relationship of environmental stresses to disease incidence are available from the Sandy Hook Laboratory. (for comment or further information contact Dr. John Pearce, Middle Atlantic Coastal Fisheries Center, Sandy Hook Laboratory, Highlands, Jew Jersey 07732)

PASTEURELLA SUSPECT IN NOVA SCOTIA
SALMON MORTALITY ERADICATION ATTEMPT

A serious Atlantic Salmon mortality occurred at the Fisheries and Marine Service Kejimikujik Fish Culture

Station last summer. The disease outbreak, which was caused by a bacterium tentatively identified as a Pasteurella spp., resulted in high pond mortalities between May and August, 1974. Approximately 15,000 post-yearling parr and 90,000 under-yearling parr were lost during this period. Efforts to confirm the identity of the causative agent are now under way. Although there are indications that this particular disease problem might have occurred at Kejimikujik Hatchery in past years, it cannot be established from available records.

The Fisheries and Marine Service staff in Halifax decided to destroy all stocks at the hatchery and completely disinfect the station over winter. While this action resulted in the station being temporarily closed until May, 1975, it was considered necessary to prevent further dissemination of the disease to natural waters and at the same time prevent further outbreaks of the disease in the Hatchery.

Destroyed stocks were scheduled for release into the LaHave River in 1975. Unfortunately, this action will affect a very successful Atlantic salmon stocking program in the River. Up to 70,000 hatchery-reared juvenile salmon have been released annually into the LaHave River above Morgan Falls from Kejimikujik Fish Culture Station since 1971 and this year over 450 adult salmon, originating from these hatchery releases, returned to Morgan Falls fishway. (for comment or further information contact Mr. W. D. Paterson, Research & Development Directorate, Halifax Laboratory, Fisheries and Marine Service, Halifax, Nova Scotia, CANADA)

ERM MOVES EAST TO MISSOURI

The enteric redmouth (ERM) bacterium was cultured from a yearling rainbow trout at a commercial hatchery in Missouri during a certification inspection in March, 1975. During May of 1975, extensive fingerling (3"to4") rainbow trout mortalities were investigated at the same hatchery. The ERM bacterium was routinely cultured from the kidney of all moribund fish. An estimated 65% of the fingerlings had died during the three weeks prior to the May investigation. This report is the first confirmed case of ERM in Missouri. (for comment or further information contact Mr. Gary Camenisch, Fish Pathologist, 666 Primrose Lane, Springfield, Missouri 65807)

STATUS OF BACTERIAL GILL DISEASE
AND FURUNCULOSIS IN PENNSYLVANIA

Bacterial gill disease caused by an unidentified Flexibacter spp. continues to be the greatest fish

disease problem in Pennsylvania. In 1974, 64 outbreaks of this disease were recorded taking a heavy toll of fingerling fish. The recorded incidence of furunculosis outbreaks also have increased and a Terramycin resistant strain of Aeromonas salmonicida has been isolated. Brook and rainbow trout at several hatcheries have suffered high mortalities due to Hexamita in 1974 and again this year. (for comment or further information contact Mr. Cecil Houser, Benner Springs Fish Research Station, Bellefonte, Pennsylvania 16823)

CHLORINE IMPLICATED IN MASSIVE FISH KILLS IN VIRGINIA

Several million fish of various

species died during May of 1974 in the James River estuary near Norfolk,

Virginia. A kill of equal size occurred again in June of 1975. Fisheries Biologists at the Virginia Water Control Board believe chlorine from sewage treatment plants in the area to be the primary causative agent, however, the seasonal nature of the kills remains unexplained. Many fish were found to have broken backbones, the break usually occurring immediately above the visceral cavity. Histopathological and hematological examinations are being conducted. The contribution of infectious disease to the mortality has been ruled out. The investigators welcome comments on this case from anyone who may have investigated a similar kill. Particularly puzzling is the incidence of broken backs in affected fish. (for further information or comment contact Mr. David Chance, Virginia Water Control Board, P.O. Box 11143, Richmond, Virginia 23230)

ULTRAVIOLET DISINFECTION ANSWER TO UNIQUE
DISEASE PROBLEM AT FISH GENETICS LABORATORY

A recurrent bacterial gill
disease problem caused a
10-15% annual loss of

rainbow trout fry at the Fish Genetics Laboratory, Beulah, Wyoming. This disease problem was serious because it could mask genetic evaluation of growth performance in rainbow trout families. Occurrence was during the early winter 1971-1973 and was non-specific for strain or family.

Since commonly accepted chemical prophylaxis could also mask genetic performance, this solution was unacceptable. Because the gill disease was aggravated by minimum water flows, our solution was the installation of a 650 watt ultraviolet (UV) unit to treat incoming water. Eggs were incubated and swim-up fry maintained on UV treated water for ten days after first feeding. We then added raw (untreated) water to the system. The mortality ceased after following this procedure. In this way we avoided possible confusion of genetic effects with those resulting from chemical prophylaxis and undue mortality. (UV dosage per unit flow was not given - ed.) (for comment or further information contact Mr. James L. Brauhn or Mr. Jack. D. Howe, Fish Genetics Laboratory, Beulah, Wyoming 82712)

BIOLOGICAL RESPONSE OF COHO SALMON TO
CROWDING STRESS IN INTENSIVE FISH CULTURE

The severity of the stress
caused by holding 4-5 inch
coho salmon at population

densities (P.D.) of 1, 2, 4, 6 and 12 lbs/ft³ (density index = 0.1, 0.4, 0.8, 1.2 and 2.4 at the loading rate of 1 lb/gpm), after acclimation to 0.5 lbs/ft³ was evaluated by measuring the resulting disturbances in the regulation of blood sugar, osmolality and chloride.

At P.D.'s greater than 1 lb/ft³ crowding stress occurred as indicated by the substantial hyperglycemia which developed but it was severe only in the 6 and 12 lbs/ft³ groups. About 7 days were needed for the salmon to normalize their blood sugar levels at these higher crowding levels. The variance in blood glucose mean values followed the same pattern showing that crowding stress at population densities of 2, 4, 6 and 12 lbs/ft³ also compromises the precision of blood sugar regulation in coho salmon. However, normalization occurred within about 5 days in this case.

Osmoregulation, as indicated by the mild hypochloridemia that developed, was not severely compromised at any of the population densities studied.

In the case of 6-8 inch smolting coho; increasing their population density to 2,4,6 or 12 lbs/ft³ imposed severe blood chemistry disturbances which required about 2 weeks to recover from. However, a population density of 1 lb/ft³ imposed no particular stress. (for comment or further information contact Dr. Gary A. Wedemeyer, Western Fish Disease Laboratory, Bldg.#204, Naval Support Activity, Seattle, Washington 98105)

MEETINGS & MISCELLANY

MIDWEST FISH DISEASE WORKSHOP The Third Annual Midwest Fish Disease Workshop will be held July 14-15 at the Ramada Inn, Carbondale, Illinois. The workshop sessions will begin at 9:00 A.M. on July 14 and conclude at 1:00 P.M. on July 15. From 2:30 to 5:00 P.M. on July 15 there will be a visit to a striped bass fingerling production unit and to a fish farm producing channel catfish and hybrid sunfish. A social event is planned for Monday, July 14 at 6:00 P.M. (for comment or further information contact Mrs. Bettye Doerr (618-453-2532) or write Dr. William M. Lewis, Director, Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois 62901)

UNIVERSITY OF GEORGIA FISH DISEASE WORKSHOP The University of Georgia, College of Veterinary Medicine is sponsoring a Fish Disease Workshop July 23-25, 1975. Diseases of fishes will be covered in a general way but prevention and control of infectious and noninfectious diseases will be emphasized. Extensive consideration will be given to water quality and to the maintenance of closed filtration systems and problems encountered in their maintenance. Laboratory sessions will be devoted to microscopic examination for parasites, bacteriological examination and sensitivity testing. Television tapes will be used to familiarize participants with post-mortem examination procedures and identification of common parasites. The fee is \$75.00 which includes the cost of a banquet July 23rd. Preregistration is required and enrollment is limited to 25.

WILDLIFE DISEASE ASSOCIATION The 24th Annual Wildlife Disease Association Conference is scheduled for August 21-23, 1975 at the University of Guelph. This year's Conference Theme is "Wildlife Disease in Perspective". A session on Diseases of Poikilothermic Vertebrates will be chaired by Dr. Harry W. Huizinga. (for further information contact Dr. Harry W. Huizinga, Department of Pathology, Ontario Veterinary College, Guelph University, Guelph, Ontario, CANADA)

INTERNATIONAL WILDLIFE DISEASE CONFERENCE The Third International Wildlife Disease Conference is scheduled for August 26-29, 1975 in Munich, Germany following the North American meeting in Guelph, Canada. Contact W.D.A. for possible group travel arrangements.

AMERICAN FISHERIES SOCIETY The 105th Annual Meeting of the American Fisheries Society is scheduled to be held September 10-13, 1975 at Caesar's Palace in Las Vegas, Nevada. A special session for the Fish Health Section is to be moderated by Dr. William T. Yasutake of the Western Fish Disease Laboratory in Seattle. See elsewhere in this NEWSLETTER for more information concerning the FHS session. For further information contact Dr. James P. Clugston, U.S. Fish and Wildlife Service, Georgia Cooperative Fisheries Unit, School of Forest Resources, University of Georgia, Athens, Georgia 30602

U.S. TROUT FARMERS ASSOCIATION CONVENTION The United States Trout Farmers Association (USTFA) gets its wheels back under it with a convention scheduled for October 5-8, 1975 at the Sawmill Creek Hotel, Huron, Ohio. (for further information contact Mr. Gary Wright, Executive Director, U.S. Trout Farmers Association, P.O. Box 681, Buhl, Idaho 83316)

WORLD MERICULTURE SOCIETY The 1976 annual meeting of the World Mericulture Society will be held at the Town and Country Hotel, San Diego, California, January 25-29. For further information contact Dr. James W. Avault, Jr., 249 Ag. Center, Louisiana State University, Baton Rouge, Louisiana 70803

NATIONAL FISH CULTURE WORKSHOP Our sister Fish Culture Section of the parent American Fisheries Society is planning a national workshop for January, 1976. The workshop is being planned on the national level to bring together a diversity of individuals and ideas in aquaculture. Watch this NEWSLETTER for further information.

NORDEN LABORATORIES HOSTS FISH HEALTH SYMPOSIUM A "Symposium on Health, Disease, and Disease Prevention in Fish" was held June 9 and 10 in Lincoln, Nebraska by Norden Laboratories, Inc. The two day symposium was chaired by Dr. Michael Sigel of the University of Miami School of Medicine and included speakers from across the country representing the many facets of current fish health research as well as Norden's own research staff.

The major emphasis of the meeting was to identify and elucidate disease problems of economic importance throughout the industry and the potential for their successful biological and pharmacological control. The symposium included sessions on; 1) Basic problems of immunology and infection, 2) An overview of diseases and immunization in cultured fishes, 3) Propagation of viruses and virus production, 4) Diseases in fish including ornamental fish and shellfish, 5) Quality control, adjuvants and delivery systems, 6) Licensing, diagnosis and inspection of biological products.

At a banquet following the meetings, Dr. Sigel reviewed some of the more subtle points of the proceedings with the aid of Norden's most versatile graphic arts staff. Various investigators were awarded items of laboratory equipment to fulfill a particular demonstrated need (John Gratzek can now be sure that his experimentally infected fish will die with the aid of his new 20# maul so long as he was able to get it through airport security - try and explain that one to the man) The valuable contributions of all participants were dually recognized and rewarded by being accorded admiralty in The Great Navy of the State of Nebraska will all duties, rights, and privileges thereof.

The proceedings of the symposium are to be published in the near future by Norden Laboratories. Details on their availability will be carried in this NEWSLETTER. For further comment or information contact:

Dr. M. Michael Sigel
Department of Microbiology
University of Miami School of Medicine
P.O. Box 520875, Biscayne Annes
Miami, Florida 33152

Mr. Cecil F. Metzger, Manager
Public Relations Department
Norden Laboratories, Inc.
P.O. Box 80809
Lincoln, Nebraska 68501

(Recent meetings such as this and similar instances of a growing spirit of cooperation between industry, government, and research institutions in the area of fish health point up the increasing significance of the field and the fishery industry as a whole. It is hoped that we all might work together even more effectively in the future to the mutual benefit of all involved and the prosperity and growth of the fishery industry. Such cooperation should continued to be encouraged, acknowledged, and rewarded in the future. - ed.)

WESTERN FISH DISEASE CONFERENCE The 16th Annual Western Fish Disease Conference was held June 25 and 26 at the University of Idaho with the honorable G. W. "Wild Bill" Klontz presiding. The usual roundtable, no-holds-barred, jump-in-and-get-wet format typical of this meeting was again used. The meeting was attended by a diversity of interested people from around the western United States, Alaska, and Canada.

Discussions included the status of various state, national, and international fishery related pieces of legislation (Jim Wood of Washington Department of Fish and Game made the solemn promise to the EPA that "if they were willing to keep the human waste out of the water, he would do his best to keep the fish waste off the land". A growing emphasis on the epidemiology of diseases outside of the hatchery situation and the impact of hatcheries upon them was noted as were the importance of non-infectious, environmental, and stress oriented diseases. The majority of the discussions were devoted to new developments among the infectious diseases and methodologies for their management, treatment, and control.

The 1976 meeting will be involuntarily hosted by Mr. Hal Wolf and the California Department of Fish and Game. For further information or comment contact:

Dr. G. W. Klontz
College of Forestry
Fisheries Resources
University of Idaho
Moscow, Idaho 83843

Mr. Hal Wolf, Director
Fish Pathology Laboratory
Department of Fish and Game
2111 Nimbus Road
Rancho Cordova, Calif. 95670

PUBLICATION AVAILABLE ON PLANS FOR A NATIONWIDE SYSTEM FOR ANIMAL HEALTH SURVEILLANCE

According to Dr. S. F. Snieszko, a booklet has been recently prepared

by the Panel of the Committee on Animal Health of the National Academy of Sciences for the design of a nationwide system for the surveillance of animal health including that of fishes. It describes the present inadequate system and proposes improvements. Several references are specifically made toward aquatic animal health problems. It is suggested that persons interested in diagnosis, control, eradication, and evaluation of the cost of diseases secure a copy of this publication. It is currently available at a cost of \$4.25 from the National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Avenue, Washington, D.C. 20418)

"WHAT'S BUGGING THAT FISH?"

A brochure entitled "What's Bugging That Fish?" is an angler's guide to fish diseases and parasites. It was prepared by the Nebraska Game and Parks Commission in cooperation with Monte A. Mayes, Harold W. Manter Laboratory, University of Nebraska State Museum. This well illustrated brochure is a contribution of Federal Aid in Sport Fish Restoration, Project F-4-R, Nebraska. It answers the question of what to do about preparing the fish as food when it shows signs of parasitism or infection. Single copies are available free by writing the Nebraska Game and Parks Commission, Information and Education Division, Lincoln, Nebraska 68503

COMPARATIVE AND ENVIRONMENTAL PATHOBIOLOGY PROGRAM ESTABLISHED

The Department of Pathology at the University of Maryland School of Medicine in Baltimore has recently established a program of Comparative and Environmental Pathobiology. There are twelve participating faculty

with expertise in a variety of plant and animal models, especially fishes. The program is seeking applications from qualified students for study toward the Ph.D. degree in Pathology with an emphasis on environmental toxicology. During the next year the staff plan to offer a course in Fish Pathology which will stress naturally occurring diseases of fishes and toxic interactions with aquatic pollutants. This course will be open to interested investigators and fisheries personnel. The approach will stress reactions at the tissue, cellular and subcellular levels.

An electron microscopic diagnostic service for use in fish kills and in diseased states of fishes is currently available. (for further information or comment contact Dr. David E. Hinton, Ph.D., Comparative and Environmental Pathology Program, Department of Pathology, University of Maryland School of Medicine, 31 South Greene Street, Baltimore, Maryland 21201)

HAPPY BIRTHDAY The Fish Disease Control Center, operated by the U.S. Fish and Wildlife Service in Fort Morgan, Colorado, has just completed its first full year of operations. During the year, the Center provided inspection, diagnostic and certification services to more than 120 Federal, state and private hatcheries and fishery programs located throughout the western states. The Center is directed by Mr. Ivan B. McElwain with assistance from Mr. Dennis E. Anderson and Mr. Paul W. Janeke. The bulk of the laboratory testing is handled by technicians: Ms. Kay M. Pursel, Ms. Sheryl L. Schmatjen and Ms. Andrita S. Ybarra. Among the services offered are the most up-to-date techniques in the analysis of fish tissue for viral, bacterial, and parasitic pathogens. For information contact Mr. Ivan B. McElwain, Director, Fish Control Laboratory, P.O. Box 917, Fort Morgan, Colorado 80701.

**MAJOR CONSTRUCTION PROGRAM TO DOUBLE
BRITISH COLUMBIA SALMON OUTPUT**

The big news for fisheries workers in British Columbia was the March 24, 1975 announcement by Canada's Minister of State - Fisheries, the Hon. Romeo LaBlanc, of a major development program to double B.C.'s salmon output by about the year 1990. The program will be geared to use proven enhancement techniques such as artificial spawning channels, hatcheries and fishways. Funding will be provided through the Federal Government and the program carried out in cooperation with the British Columbia Government. The program will come about in two phases; the first phase, to be completed in 1976, will involve the planning of specific development projects and facilities as to their nature, design, and siting; the second phase, commencing in 1977, will involve the accelerated construction of new enhancement facilities after detailed plans for the overall program have been given final government approval. The entire program, the costs of which are tentatively estimated at \$250-300 million, is expected to eventually pay for itself in terms of increased returns to salmon fisherman. (for comment or further information contact Dr. Trevor P. T. Evelyn, Pacific Biological Station, P.O. Box 100, Nanaimo, British Columbia, V9R 5K6, CANADA)

FEDERAL/STATE FISHERIES RESEARCH FUNDING

A paper entitled "Federally Aided Fishery Research: A National Overview" was presented by William H. Massmann of the U.S. Fish and Wildlife Service at the 1975 Northeast Fish and Wildlife Conference in New Haven, Connecticut. This report brings us up-to-date, for the first time since 1969, with respect to the amounts of money spent on fishery research in the states and distribution of expenditures according to the kinds of studies, species and habitat.

Massmann's article shows that about one-third of state fishery research is supported by the U.S. Fish and Wildlife Service through the Federal

Aid in Fish Restoration and Anadromous Fish Conservation programs. Under these cooperative programs, \$12.7 million in combined federal and state matching funds was scheduled for fishery research during the year ending in June 1974.

State research during the year focused on fish studies (\$7.7 million), environmental studies (\$8.3 million) and general studies (\$1.7 million). In fish studies, applied research accounted for \$6.1 million, while basic research expended \$1.6 million. In environmental studies, habitat surveys took \$1.2 million, studies to improve fish habitats required \$1.1 million and studies to evaluate damage to fish habitats, \$1.0 million. General studies emphasized comprehensive and area planning, user studies, fisherman surveys, economic studies, fishery values and research techniques.

Major fish species on which research efforts were concentrated included striped bass (\$0.9 million), rainbow trout (\$0.7 million), cutthroat trout (\$0.5 million), walleye (\$0.4 million), largemouth bass (\$0.3 million), coho salmon (\$0.3 million), and brook trout (\$0.3 million). Of the money programmed for research on 50 fish species, 53 percent was for warm-water fishes, 47 percent for cold-water species and less than 1 percent for marine fishes.

Trends in depth and intensity of research, from 1969 to 1974, show increased funding for planning, basic research, and rainbow trout studies, but decreased expenditures for efforts in environmental studies and marine fish investigations.

Review of the character of federally aided fishery research provides an insight concerning the problems, opportunities, and needs for information that fishery biologists and administrators consider most important. However, we also need to know how much of the current research is vitally needed, how many results are being applied, and how much the research costs in relation to the yield of results. (reprinted from the Fish and Wildlife Reference Service Newsletter, June, 1975 - ed.) (Copies of Mr. Massmann's paper are available from the Fish and Wildlife Reference Service, 2100 West Mississippi Avenue, Denver, Colorado 80223)

FHS MODULE SCHEDULED - continued from page 1

A survey of parasites, bacteria and viruses associated with tropical fish imported from Southeast Asia. John B. Gratzek, Emmett B. Shotts, and Jack L. Blue, University of Georgia, Athens, Georgia.

The impact of noninfectious diseases in rainbow trout raised commercially. George W. Klontz, University of Idaho, Moscow, Idaho.

Major diseases in the intensive culture of penaeid shrimp. Donald V. Lightner, University of Arizona, Tucson, Arizona.

A novel technique for delivering vaccines to fish. Donald F. Amend, Western Fish Disease Laboratory, Seattle, Washington.

Fish disease control in the Great Lakes Basin. James W. Warren, Hatchery Biologist Laboratory, Genoa, Wisconsin.

Further information and a definite time schedule for this meeting should be forthcoming in the May-June, 1975 issue of the AFS Newsletter. All members of the Fish Health Section are urged to attend and actively participate in this year's annual meeting. For further comment or further information contact Dr. William T. Yasutake, Western Fish Disease Laboratory, Building #204, Naval Support Activity, Seattle, Washington 98105.

RED CHECK ON YOUR MAILING LABEL ??

If so, believe it or not, according to our records your 1975 Fish Health Section dues are in arrear. With this being the case, you will not be receiving future issues of the NEWSLETTER nor your copy of the 1974 FHS/AFS Denver Workshop Proceedings. Please use the application blank provided on the last page. Don't delay, do it today!!

Membership in the Fish Health Section of the American Fisheries Society is available to and encouraged for all persons interested in aquatic animal health and furthering the stated objectives of the Section. Please fill out the attached blank for either new or renewal membership. Annual dues in the amount of \$2.00 are payable by check or money order made out to the Fish Health Section/AFS. Mail your payment together with the completed application form as soon as possible to:

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By charter, Fish Health Section membership is open only to individuals who are members in good standing of the parent Society. AFS membership applications are available from the Secretary-Treasurer or Chairman of the Membership Committee.

Dr. Robert A. Busch, Editor
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