

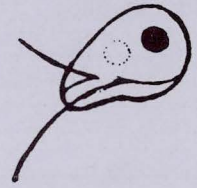
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Snieszko 1, 3, 9, Committees 2, 3, No. Blood-5

FISH
HEALTH
SECTION

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NEWS
LETTER



H Hoffman

Volume 12, Number 2

April, 1984

DR. S. F. SNIESZKO 1902 - 1984

Dr. Stanislas F. Snieszko, 81, one of the world's leading authorities on fish diseases and fish health management, died Thursday, January 12, 1984 in City Hospital, Martinsburg, WV. Death was attributed to a heart attack.

In addition to a distinguished research career spanning more than half a century, Dr. Snieszko was an eminent author, editor, lecturer, instructor and consultant whose accomplishments were highly-regarded throughout this country and in many parts of the world.

Born on January 28, 1902 near Krakow, Poland, he received a Master of Science Degree from Jagellonian University in 1924 and two years later he earned his Doctorate Degree in bacteriology and chemistry.

Dr. Snieszko first came to the United States in 1929 as a Rockefeller Foundation Fellow at the University of Wisconsin, returning to Poland in 1932 to head the Department of Agriculture at Jagellonian. He returned to this country as a visiting microbiologist at Cornell University in 1939. Due to the war in Europe, he was unable to return to Poland and accepted a position at the University of Wisconsin until becoming a naturalized American citizen and entering military service.

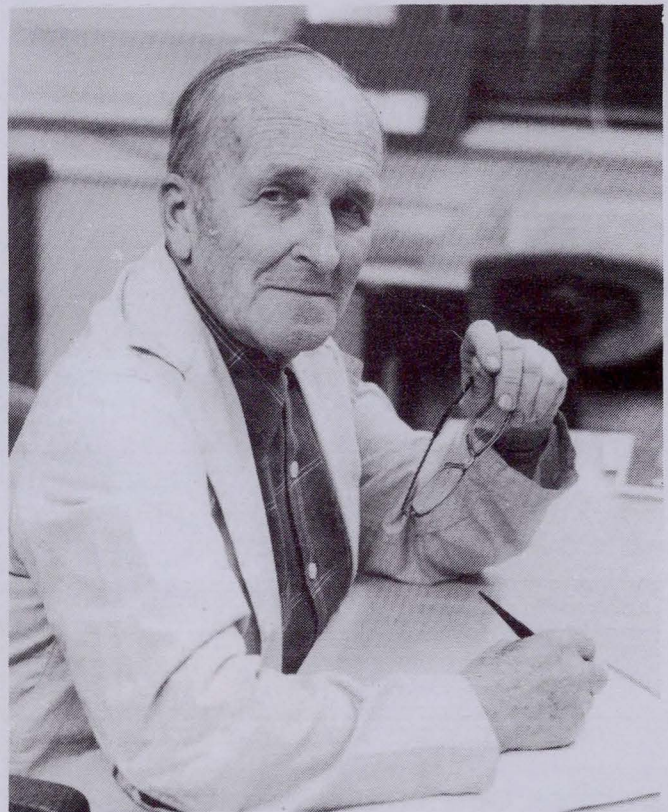
With a background in microbiology and an interest in fish, he joined the small research staff at the then U.S. Fisheries Experimental Station at Leetown in 1946, after completing service with the army.

Between 1948 and his retirement from the U.S. Fish and Wildlife Service in 1972, Dr. Snieszko directed research and training activities that had national and international involvements. Although officially retired in 1972 with the title of Senior Scientist, Dr. Snieszko maintained an office and a work schedule at Leetown, continuing his contributions to fisheries resources as an author, editor and advisor.

As a result of his research and administrative leadership, scientific endeavors at Leetown evolved from the Microbiological Laboratory and Eastern Fish Disease Laboratory to today's modern National Fish Health Research Laboratory of the National Fisheries Center.

In 1954, Dr. Snieszko also initiated comprehensive fish health training programs for U.S. and foreign fishery personnel, which over the years have attracted hundreds of participants. He also designed a decimal system for library cataloging of scientific literature that is still in use.

Author of more than 200 professional publications, Dr. Snieszko contributed to a number of books on diseases of fish and shellfish.



Active in numerous scientific societies and organizations, he has garnered many awards and honors, including the U.S. Department of the Interior's Distinguished Service Award, the American Fisheries Society's Award of Excellence, the Wildlife Disease Association's Distinguished Award, and the Barnett L. Cohen Award for Excellence from the American Society of Microbiology. He also has been honored by the Zoological Society of London and the European Association of Fish Pathologists. In 1972, he received an Honorary Doctorate of Science from West Virginia University. Most recently, he was honored by being named the first certified fish pathologist in the 113-year history of the American Fisheries Society.

FHS OFFICERS AND COMMITTEES 1983-84

EXECUTIVE COMMITTEE

Voting Members

Glenn Hoffman, Chairman and President, FHS
Trevor Evelyn, President-Elect
Emmett Shotts, Immediate Past President
Doug Anderson, Secretary-Treasurer
Jim Warren, Chairman, Nominating Committee

Non-voting Members (Chairmen of Standing Committees)

John Rohovec, Newsletter and Publications Committee
Tom Schwedler, Awards Committee
Howard Jackson, Membership and Balloting Committee
Paul Janeke, Professional Standards Committee
Kevin Amos, Technical Procedures Committee

STANDING COMMITTEES

Nominating

Jim Warren, Chairman (elected)
John Schachte
Diane Elliott

Newsletter and Publications

John Rohovec, Chairman
Dave Ransom
Jim Winton
Tom Wellborn
Jack Gratzek

Membership and Balloting

Howard Jackson, Chairman
Ron Goede

Technical Procedures

Kevin Amos, Chairman
Emmett Shotts
Ray Brunson
Ken Johnson
Ellis Wyatt

Professional Standards

Paul Janeke, Chairman
Jim Carlisle
Doug Mitchum
Dave Ransom
Bev Larson

Finance

Doug Anderson, Chairman
Howard Jackson (Membership)
John Rohovec (Newsletter)

Awards

Tom Schwedler, Chairman
Emmett Shotts (two years)
Dennis Anderson (three years)

BOARD OF CERTIFICATION

(Elected)

Doug Mitchum, Chrm. (3 years)
Tom Wellborn (1 year)
Jim Warren (2 years)
Gary Camenisch (2 years)
Kevin Amos (3 years)

AD HOC COMMITTEES

(Appointed)

Archives

Joe Sullivan, Chairman

Bylaws

Emmett Shotts, Chairman
Jim Warren
Fred Meyer

Directory

Rowan Gould

Fish Health Evaluation

Ron Goede, Chairman
others to be selected

International Meeting

Dick Heckmann, Chairman
Bill Rogers
Leo Margolis
Barry Hill
Dave Conroy

Program

Glenn Hoffman, Chairman
Ken Johnson

Time and Place

Drew Mitchell, Chairman
Billy Griffin
Jimmy Camper

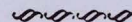
FINANCE COMMITTEE

The FHS treasury is now carrying 3 accounts with the following balances: General Fund, \$3872.72; Certification account, \$1707.72; and Glossary account, \$193.87. The accounts are with the Bank of Charles Town (WV). The glossary has been published; a decision will be made at the FHS-Little Rock, Arkansas meeting as to whether to continue this as a separate account. Annual dues are now paid to the parent society (AFS) and our fair share is given to us quarterly. Publication of the Newsletter is presently the major expense.

The present term of the Secretary-Treasurer is now one year. The proposal to change the bylaws and lengthen this term to 2 to 3 years will be discussed at the Arkansas meeting. Since this office acts as a central location for funding of committees, improved communication and stability might be achieved by such a move.

A Fish Immunology Sandy Hook Symposium is being held in Sandy Hook, New Jersey, September 8-12, 1985, supported partially by the AFS-FHS. One registration fee (\$75) will be given by FHS funds.

Doug Anderson, Chairman
Finance Committee



DIRECTORY COMMITTEE

The directory committee has met with Nick Parker, FCS Past President, who was co-responsible for the **Fish Culturist Registry**. We feel a similar publication for fish health section members would be useful. We will be sending a questionnaire to each FHS member to collect pertinent information. This material will be published as a separate registry or as a second section of an updated **Fish Culturist-Health Specialist Registry** (discussions are at a preliminary stage). In the next few weeks, we will be soliciting opinions on make-up of a Key Word Index which best describes our field. If anyone has a few minutes, and has an opinion on the contents of a directory - especially a Key Word Index - address comments (before April 30) to:

Rowan W. Gould
R.D. #2, Box 240
Wellsboro, PA 16901
717-724-3322

Rowan W. Gould, Chairman
Directory Committee



TECHNICAL PROCEDURES COMMITTEE

For the past two years, the Technical Procedures Committee has been struggling with the task of rewriting the "Blue Book." Our goal is not to create a totally new document, but to update sections in which technology and research have improved the sensitivity and efficiency of detecting certain pathogens. Our end product, which we hope will be ready for publishing this summer, will be in a loose leaf notebook form. Changes or additions will then be easily accommodated by replacing one page rather than having to publish a whole new book.

The sections of the "Blue Book" have been assigned to various committee members who in turn have solicited outside expertise in the completion of their task. The following people are cooperating in our effort:

General Examination Procedures - Amos, Groberg, Mulcahy, Brunson

Methods for Viral Diseases - Amos, Groberg, Mulcahy, Plumb

Methods for Bacterial Diseases - Shotts, Bullock

Methods for Parasitic Diseases - Hoffman, Wyatt, Johnson

I am very enthusiastic that we will meet our deadline and have a product for review at the Midwest Fish Disease Conference this summer. I recognize that the "Blue Book", at any instant, will not be perfect but at least will reflect an accepted state-of-the-art.

Kevin Amos, Chairman
Technical Procedures Committee

COMMITTEE REPORTS

NOMINATING COMMITTEE

The nominating committee is compiling a slate of candidates for the next FHS elections. There will be one vacancy on the Board of Certification. Two candidates who have been identified are Joe Lientz and John Grizzle. Candidates for Secretary-Treasurer are Roger Herman and Doug Anderson. Nominees for President-Elect are Paul Bowser, Bill Rogers, and John Rohovec.

Jim Warren, Chairman
Nominating Committee

PROFESSIONAL STANDARDS COMMITTEE

Following many years of enthusiastic discussion and effort, the Fish Pathologist certification program was implemented January 1, 1982. The objective of this program is to identify the professional general practitioners of the fish health field. To qualify for this recognition, individuals must have a relatively broad spectrum of appropriate education, experience and technical skills.

Procedures for the recertification of Fish Health Inspectors were completed and implemented in April of 1983. The initial five-year recertification date occurred in July 1983 for the first ten individuals certified as Fish Health Inspectors by the FHS.

Three major projects were begun during 1983 and are continuing at this time. First, and closest to completion is standards and procedures pertaining to censure of certified Fish Health Inspectors and Fish Pathologists and revocation of such certificates.

Secondly, a review of the Fish Health Inspector certification program was initiated. This process is intended to clarify grey areas, further distinguish this program from the Fish Pathologist program and to tighten or modify qualifications where necessary.

The third and most difficult of our tasks is the development of the written examination which must be given to all qualified applicants for Fish Pathologist certification beginning January 1, 1985. Generally speaking our intention is to solicit examination questions from fish health specialists worldwide, to establish a committee to edit these questions, to establish a computer bank of questions and to develop the process for administering the examination.

Suggestions pertaining to PSC activities are welcome. Please feel free to contact any PSC member in this regard.

Paul W. Janeke, Chairman
Professional Standards Committee

INTERNATIONAL MEETING COMMITTEE

The International Meeting Committee for the FHS-AFS has been planning a possible meeting for 1985 in the United States. Initially established as a three member committee (Heckmann, Hill, Conroy), it was expanded this year with two additional members (Rogers and Margolis). Barry Hill is from England, David Conroy from Venezuela and Leo Margolis from Canada. The other two members are from the United States. The consensus of the original committee is that we should have an International Fish Disease Meeting in 1985 at a site in the United States. Suggested sites have included Snowbird, Utah; Athens, Georgia; Corvallis, Oregon; Denver, Colorado; and Davis, California. The program would include invited papers and presentations on most of the fish diseases. There would be discussions on fish certification and training of fish health specialists. The committee welcomes suggestions from the members of the FHS-AFS and interested foreign fish health scientists.

Richard Heckmann, Chairman
International Meeting Committee

BOARD OF CERTIFICATION

At present there are twenty active, certified Fish Health Inspectors. Of the original ten certifications in 1978, eight have been recertified after a five-year period, one FHI has retired and one has not applied for recertification. There are three individuals whose applications are now in review.

Currently, there are nineteen active, certified Fish Pathologists. Certificate Number 1 was given to and accepted by Dr. Stanislas F. Snieszko. Four applications are being reviewed.

Persons desiring to be certified as Fish Pathologists are reminded that December 31, 1984 is the deadline for applications not requiring examination.

Doug Mitchum, Chairman
Board of Certification

PASSAGES

Dr. Martin F. Chen is now a member of the fish pathology section of California Fish and Game. The address is 2111 Nimbus Rd., Rancho Cordova, CA 95670. Phone 916-355-0811.

Peter G. Walker has moved from Maine to Colorado to become the state fish pathologist for the Colorado Division of Wildlife. He will be located at the Fish Disease Control Center, P.O. Box 914, Fort Morgan, CO 80701. Phone 303-867-9474.

George Baxter, Professor of Zoology, University of Wyoming, will be retiring at the close of the Spring Semester (1984). George began educating fishery students at Wyoming shortly after WWII and was with the fishery program at the University for many years. A retirement gathering is planned for April 28, 1984 in Laramie. All of George's friends, associates, and students are invited to attend the gathering. A scrapbook is being assembled and anyone wishing to contribute (stories, reminiscences, photos, etc.) is encouraged to do so. For information about the party and to forward material for the scrapbook, please contact Robert W. Wiley, Wyoming Game and Fish, Route 2, Box 25, Laramie, WY 82070.

TEXT OF A LETTER TO MRS. S.F. SNIESZKO ON BEHALF OF FHS MEMBERS

January 16, 1984

Mrs. S.F. Snieszko
107 Sunset Dr.
Martinsburg, W. Va. 25401

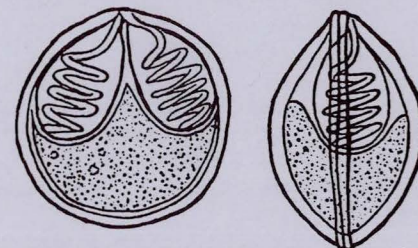
Dear Julia,

On behalf of the Fish Health Section of the American Fisheries Society (467 members), I want you to know that your loss is also our great loss. "Doc" was the helpful leader who, more than anyone else, was responsible for building a very effective situation in the United States where now nearly everyone has access to a person trained to help with the diagnosis, prevention, and treatment of fish disease.

Stan's friendly, helpful, effective teaching has "rubbed off" on many people and it has made this a better world to live in.

Nothing can replace your great loss but I want you to know that we are sharing your grief. We also wish you a speedy recovery from your recent accident.

Affectionately,
Glenn L. Hoffman
President, Fish
Health Section of the
American Fisheries
Society



SECOND CALL FOR PAPERS JOINT FISH HEALTH SECTION/AFS AND ANNUAL MIDWEST FISH DISEASE WORKSHOP, SHERATON-LITTLE ROCK, LITTLE ROCK, ARK, JULY 10-12, 1984

Persons interested in presenting a contributed paper should submit an abstract not to exceed one page, typed single-spaced, on white bond paper (8½ x 11 inches with 1¼ inch margins). Any aspect of fish disease work will be welcome. Contributed papers will be limited to 15 minutes including discussion time. The deadline for papers has been extended to **April 23, 1984**. Send abstracts to Glenn L. Hoffman, Fish Farming Experimental Station, USFWS, P.O. Box 860, Stuttgart, AR 72160 (Telephone 501-673-8761 or 501-673-7710), or S.K. Johnson, Room 110, Texas A&M University, College Station, TX 77843.

In addition to contributed papers there will be invited papers and at least three panel discussions. Planned are panel discussions on PKD, *Ceratomyxa*, Emerging Bacterial Diseases, and Inspection/Certification. Discussion from the floor will be encouraged.

Lodging -- A special price of \$28 single, \$34 double has been obtained at the Sheraton-Little Rock. Make reservations with Sheraton-Little Rock, 6th and Ferry, Little Rock, AR 72202 by calling Reservations - 1-800-325-3535 or 501-374-3331 or use the hotel registration form enclosed in previous announcements. Free limousine service from the airport to the Sheraton-Little Rock will be provided.

Banquet -- The banquet will be July 11 evening and will include awards, unfinished business, installation of new president, and presidential address. A cash bar will be available from 6:00 P.M. to 7:00 P.M., just prior to the banquet.

Registration Fee -- Will be \$30 and cover cost of facilities, coffee and doughnut breaks, banquet, and fish farm tour. Checks should be made to Fish Health Section/AFS. Those planning to attend should notify the Fish Disease Section, Fish Farming Exper. Sta., USFWS, Stuttgart, AR 72160 (501-673-8761 or 501-673-7710).

FISH HEALTH POSITION

Title: **Area Extension Fisheries Specialist**

Headquarters: Extension Wildlife and Fisheries Department, Stoneville, Mississippi (Washington County)

Major Duties: The Specialist will work with commercial fish farmers to solve disease, production and aquatic weed problems; will be responsible for planning and conducting workshops and short courses on all aspects of commercial fish production; will prepare supplementary information for these courses for distribution as bulletins; will work closely with other specialists to develop a comprehensive approach to increase commercial fish production; and will develop programs for teaching conservation of natural resources to youth groups. Program emphasis will be on fish disease diagnosis and control.

Starting Date: May 1, 1984, or as soon thereafter as possible.

Qualifications Required:

Minimum: Master's degree in Fisheries Management with training in fish pathology and some experience in commercial aquaculture systems.

Preferred: Doctorate in Fisheries Management with demonstrated ability in fish health management; two or more years experience in disease diagnosis and control in commercial aquaculture production systems.

Position is open until March 30, 1984, or until an acceptable applicant applies, whichever is later.

Inquiries should be directed to Mr. Milburn Gardner, Personnel Officer, P.O. Box 546, Mississippi State, Mississippi 39762; Telephone 601-325-3402.

FUTURE EVENTS

June 3-15, 1984. The Texas A&M College of Veterinary Medicine is offering a two-week course entitled "Aquamed". This course is designed for individuals with professional interest in health management of aquatic animals. The first week of the course considers general biology, management and production of commercially important warmwater fish and shellfish. The second week is primarily oriented toward infectious and non-infectious diseases and pathogenic processes, including treatment and control. Persons interested in the course should contact Dr. Don Lewis, Department of Veterinary Microbiology, College of Veterinary Medicine, Texas A&M, College Station, Texas 77843, Telephone 409/845-4167.

July 18-20, 1984. Sixth Conference on Food and Drugs from the Sea. This meeting will be held at the University of Rhode Island in Kingston, RI. The conference is sponsored by Marine Technology Society, International Marine Food and Drug Resources Committee, 1730 M Street, NW, Suite 412, Washington, D.C. 20036.

August 5-19, 1984. American Society of Parasitologists. The annual meeting will be held at Snowbird, Utah. Contact co-chairmen Drs. Richard A. Heckmann (801-378-2495) and Ferrow L. Anderson (801-378-4145), Department of Zoology, Brigham Young University, Provo, Utah 84602.

September 11-14, 1984. First International Colloquium on Pathology in Marine Aquaculture. The colloquium will allow for scientific communications in the form of oral presentations, posters and round table discussions. Papers in either French or English will be accepted, and abstracts are required before May 31, 1984. For information contact Laboratoire de Pathologie Comparee, Place E. Bataillon - 34060 Montpellier Cedex FRANCE.

February 5-8, 1985. Second International Conference on Warm Water Aquaculture Fin Fish. To be held at Brigham Young University, Hawaii Campus, Laie, Hawaii 96762. Contact chairman T. Aaron Lim at same location.

CAREER OPPORTUNITIES CENTER

The Fisheries Educators' Section of the American Fisheries Society will sponsor a Career Opportunities Center at the 114th Annual Meeting of AFS, August 13-15, 1984 at Cornell University, Ithaca, N.Y.

EMPLOYERS in government, private and academic fishery organizations are asked to send information about actual or anticipated position openings to the COC Chairman. Any additional pamphlets, notices or information about civil service, application or other procedures would be most appreciated. By advance arrangement with the COC Chairman, the Career Center may be used for interviewing.

JOB SEEKERS for fishery positions, both entry and mid-career, are encouraged to send a current resume to the COC Chairman.

Employer and job seeker files will be available for inspection August 13-15, 1984. Job information is welcome any time, but timely vacancy and resume submissions are encouraged in June and July, 1984.

Please send materials by August 1, 1984 to:

Dr. James M. Haynes, Chairman
FES Career Opportunities Committee
Department of Biological Sciences
SUNY College at Brockport
Brockport, NY 14420
716-395-2729

ANEMIA OF CULTURED CHANNEL CATFISH

ALABAMA

John A. Plumb, Department of Fisheries and Allied Aquacultures, Alabama Agricultural Experiment Station, Auburn University, AL

In April 1983 severe anemia (no blood disease) began to occur in cultured channel catfish in Alabama, and this condition persisted throughout the summer. Approximately 70 of these cases were diagnosed at the Alabama Fish Farming Service Center, Greensboro, AL and the Southeastern Cooperative Fish Disease Laboratory, Auburn University, AL. Specimens submitted to these laboratories were examined for viral, bacterial and parasitic diseases. Although *Aeromonas hydrophila*, *Edwardsiella ictaluri*, *Flexibacter columnaris* and *Ichthyophthirius multifiliis* were found on some fish, none of these pathogens was consistently present and no viruses were isolated. All moribund specimens had extremely pale gills, livers, kidneys and spleens and white intestines. The intestines of many fish exhibited intussusception. Blood of severely anemic fish was light pink and the hematocrits of moribund fish ranged from 1 to 9 but apparently normal fish showed hematocrits as low as 20. Anemia occurred in channel catfish in all areas of Alabama where channel catfish were grown and one case in Georgia. Environmental conditions and water quality varied greatly between ponds and areas where anemia occurred, however, the common factor was that all affected populations were receiving commercially pelleted feeds. When fish farmers either switched feed brands, changed to high protein feed (32% to 36%) or stopped feeding, mortality ceased within a week.

A toxic substance in the feed has not been identified, however, the anemia was reproduced experimentally in cage cultured channel catfish. Anemia appeared in the test fish 7 days following initial application of the feed. Severely anemic fish had hematocrits as low as 2-5 while the average hematocrits (of affected populations) was 25.8 compared to an average of 37 for control fish. Hemoglobin concentration and erythrocyte counts were lower in affected fish than controls and clotting time of the blood was greater in test fish. The mortality during the study was 9% in the test fish compared to .05% in the controls.

MISSISSIPPI

John R. MacMillan, Area Extension Fisheries Specialist, Mississippi Cooperative Extension Service, Stoneville, MS

A severe acute anemia, commonly called "white lip" has been observed in catfish held in grow-out ponds in the Mississippi Delta. The anemia is observed in harvestable-size catfish during October and November only, and has been detected at this time of year since 1980. Only one pond of catfish on a farm is usually affected and only in harvestable-size fish (0.75 lbs.) Fingerling catfish in the pond do not appear to be affected but up to 100% of the harvestable-size fish may be affected. Less than 1% of the total ponds (65 acres) in Mississippi have had this problem.

Clinically the fish are anemic with hematocrits lower than 1% PCV which causes a severe pallor, hence the name "white lip". Extensive hemosiderin deposits are observed in the hemopoietic tissues. Fish with this anemia cease feeding. Cytologic evidence indicates erythropoiesis in the hemopoietic tissue has ceased. Myelopoiesis appears cytologically normal. No other morphologic changes have been detected. Fish die from hypoxia or 2° bacterial infections and affected fish appear incapable of recovery.

This disease is morphologically similar to a disease of catfish observed in Alabama called "No Blood Disease". Researchers at Auburn University feel this disease is related to a dietary or feed component. In Mississippi we can find no evidence for this. The disease in Mississippi is observed in catfish held in one pond on a farm. All fish on a farm receive the same feed. The acute nature of this disease and its restricted spatial and temporal behavior lend credence to a toxic etiology. However, toxins have not been identified. Tests for infectious agents have so far been negative.

ISOLATION OF INFECTIOUS PANCREATIC NECROSIS VIRUS FROM ESTUARINE FISH

*P.E. McAllister,
National Fisheries Center, Leetown, WV*

Significant fish kills, involving southern flounder, hogchoker, spot, and Atlantic silverside, occurred in the Pamlico River estuary in North Carolina from December 1981 through July 1982. Dead and dying fish were examined for bacterial infection and parasites and for toxic residues from industrial and agricultural chemicals, but no abnormalities were detected. Internal organs were assayed in cell culture and a virus was isolated. The virus was identified as infectious pancreatic necrosis (IPN) virus. Further studies showed that the isolate was most closely related to IPN virus found in Europe--the first such isolation made in North America. The virus infects but does not kill young trout and is being used to develop a vaccine for control of IPN in trout and alternative reagents for viral diagnostics. The diversity of estuarine fishes affected by the virus might indicate that the virus, although recovered at significant concentrations, might be merely an accidental infection.

*Frank Hetrick,
University of Maryland, College Park, MD*

IPN virus was isolated from 30 day old striped bass experiencing mass mortalities in a private hatchery located on the upper Chesapeake Bay. The outbreak occurred in water having a salinity of 5‰ and a temperature of 18-20°C. Virus was isolated in CHSE-214 cells from all pools of fish tested and it serotyped with the North American strains of IPN virus by neutralization tests. Virus was also isolated from the kidneys of 4 of 6 surviving fish 6 months after the outbreak, indicating a carrier state exists. Controlled transmission studies are planned in May to determine if the isolate is a causative agent of mortalities in striped bass.

INFECTIOUS PANCREATIC NECROSIS IMMUNIZATION

P.E. McAllister,
National Fisheries Center, Leetown, WV

Three candidate IPNV vaccines--killed, reduced virulence, and avirulent virus preparations--were evaluated for their capability to stimulate a protective response in young trout. Both avirulent and reduced virulence preparations proved to be effective vaccines. The reduced virulence preparation was not suitable for vaccinating fish younger than 42 days because the residual activity of the virus killed younger fish. The avirulent IPN virus preparation was used to vaccinate fry as early as 10 days post-hatching and a protective response was evident within 3 weeks. Trout vaccinated with the avirulent preparation 42 days after hatching were still carriers of the virus at 1 year of age, and the virus isolated from carrier fish retained its avirulent character.

SHRIMP IMMUNIZATION

Don Lewis, Department of Veterinary Medicine,
College of Veterinary Medicine, Texas A&M
College Station, TX

Pond studies on shrimp immunization have been conducted over the past two seasons at the shrimp mariculture facility at Texas A&M University. Just prior to stocking, post-larval shrimp were exposed to vibrio bacterins by osmotic infiltration technique for approximately 30 minutes. Three to five days after exposure phagocytic index increased 3-5 fold and within 8-10 days bacteriolysins, agglutinins and precipitants developed in the hemolymph of the shrimp. Six weeks later the hemolymph components were still present. Shrimp survived challenge to 100 LD50 doses of pathogenic vibrio. Production in immunized ponds was approximately 40 percent greater than in non-immunized ponds. These studies were conducted over a two year period. Biochemical characterization of the hemolymph components suggest components are lectin in nature.

COMPARATIVE SUSCEPTIBILITY OF THREE SPECIES OF TROUT TO FURUNCULOSIS WITH REFERENCE TO THEIR IMMUNE AND SECRETORY RESPONSES

R.C. Cipriano and C. Starliper, National
Fisheries Center, Leetown, WV

Collaborative studies were conducted with the West Virginia Department of Natural Resources at their Reeds Creek Hatchery to determine the basis for the resistance of three species of trout to furunculosis. These investigations were conducted to develop a furunculosis-resistant strain of brown trout by selectively breeding for specific criteria.

Furunculosis is endemic at the Reeds Creek Hatchery. Mortality is most severe in brown trout, intermediate in brook trout, and almost nonexistent in rainbow trout. Antibody activities from convalescent fish against *Aeromonas salmonicida* were studied but no differences were observed among the three species. Furthermore, sera from convalescent rainbow, brook, and brown trout equally protected other trout from experimental infections. These results indicated that protection had developed in the serum from each species of trout, that the respective activities were equivalent among the species, and that the protective ability of the sera was also similar. Therefore, we concluded that serum activities did not have an integral effect on the disparate resistance of each species to furunculosis.

We examined these fish to determine whether they produced a substance in mucus that was active against bacterial invasion. We found that fish produced a component that was active against the furunculosis bacterium. We also observed that the mucous activity correlated with the susceptibility of the three species to the disease.

Brown trout, the most susceptible to furunculosis, produced the least mucous response. Resistant rainbow trout had the greatest activity, and brook trout, which had intermediate mortality, also had an intermediary level of mucous activity against the bacterium.

Only 12% of brown trout brood stock at Reeds Creek Hatchery had a mucous activity comparable to the mean response of resistant rainbow trout. These fish were mated and their progeny designated resistant. Other brown trout were mated and their progeny were designated nonresistant. Six months after hatch, the nonresistant progeny had suffered a 48% mortality from furunculosis whereas the resistant progeny had only a 2% mortality.

Samples from both groups of progeny were examined to determine incidences of bacterial infection. Nonresistant progeny had 77% incidence of infection whereas resistant progeny had a 12% incidence of infection.

These experiments indicate that salmonid mucus contains an element that is an important secretory component of defense against bacterial invasion. We have since determined that the mucous precipitin is not related to any serum component. Further characterization and selection for the secretory component will be an essential element for the development of disease resistant stocks of fish.

WHIRLING DISEASE INFECTIVITY PRODUCED AND IDENTIFIED

K. Wolf and M. Markiw, National Fisheries Center,
Leetown, WV

During 1982, scientists at the National Fish Health Research Laboratory discovered that tubificid oligochaete worms played a participating role in the life cycle of *Myxosoma cerebralis*. The objective for 1983 was to learn how the worm participated and, if possible, what form the infectious stage had. The linchpin between the two parts of the life cycle was produced experimentally, identified, and shown to be the initiator of infection in fish. Conversely, *M. cerebralis*, never actually shown to infect fish, initiates the worm phase of the whirling disease cycle.

The new findings came to light during work with methodology used earlier to show the involvement of tubificid worms as a required intermediate host. Hatchery pond soil was first depopulated by pasteurization, then tubificid worms, known not to be naturally involved with whirling disease, were placed with the soil. Spores of *Myxosoma cerebralis* were given to worms and, at regular intervals for months thereafter, water, soil, and worms were sampled and examined. Three and one-half months after initiation a new form of myxosporean, *Triactinomyxon*, was found in worms and water. Infection of the worm is initiated by the organism known as *M. cerebralis*. In spite of orthodoxy that postulates initiation of worm infection by *Triactinomyxon*, experimental results show instead that worm infection is initiated only by spores of *M. cerebralis*.

When susceptible trout are exposed to *Triactinomyxon*, fish develop clinical whirling disease and produce spores of *M. cerebralis*. In addition, whirling disease occurs if the *Triactinomyxon* is given orally, sprayed on the gills, or injected intraperitoneally. *Myxosoma cerebralis* spores are not produced following intramuscular injection of the *Triactinomyxon*.

The *Triactinomyxon* first appears as waterborne at 3.5 months, precisely the time when infectivity of whirling disease is known to first appear. More important and critical to scientific support of the newly propounded relationship of myxosporean in worm and in fish is the fact that the *Triactinomyxon* reacts positively with antiserum prepared against *Myxosoma cerebralis*.

SURVEY OF FISH DISEASES IN THE SOUTHEASTERN UNITED STATES

Thomas E. Schwedler, Extension Fish and Wildlife Specialist, Stoneville, MS

The 1982-83 Fish Disease Committee of the Southern Division of the American Fisheries Society completed its survey of disease diagnostic laboratories in the southeastern USA. There are several trends that are noteworthy. Overall, the reported cases increased by 20% above 1981-82. There were also changes in the number of cases of certain diseases: *Edwardsiella ictaluri* increased from 4.2% to 9%; external fungi increased from 1.9% to 7.4%; and "no blood" disease, which has not been reported previously, accounted for 2.2% of the cases in 1982-83. A complete listing of the survey is available from Tom Schwedler, Disease Committee Chairman, Southern Division of the American Fisheries Society, Extension Wildlife and Fisheries Department, Delta Branch Experiment Station, Stoneville, Mississippi 38776.

FLORA OF ESTUARINE AND COASTAL MARINE STRIPED BASS

R. MacFarlane and G.L. Bullock, National Fisheries Center, Leetown, WV

Bacteriologic studies have been undertaken at the National Fisheries Center, Leetown, with both wild and cultured striped bass. Comparative studies on intestinal bacteria of striped bass from the Hudson River and Long Island Sound showed that bass from the Hudson River consistently had 100 to 1000 times the number of bacteria as the striped bass from Long Island. The most predominant types of bacteria in fish from both areas were known fish pathogens. Exposure or injection of several types of these organisms produced death in experimental striped bass at 70 F but not at 54 F.

Exposure of test striped bass to a mixture of arsenic, lead, copper, selenium, and cadmium at 10 times the environmental level of these contaminants consistently protected the bass against experimental bacterial infection. However, when striped bass were exposed to individual metals and then challenged with bacteria, copper protected against injection, cadmium also protected but showed toxicity and arsenic caused bass to be more susceptible to infection. Lead or selenium neither protected nor increased susceptibility to infection.

These studies show that wild populations of striped bass carry potential pathogens in their intestines and that at least arsenic can enhance infection.

PATHOLOGY OF MARINE FISHES COLLECTED NEAR OIL-WELL-DRILLING PLATFORMS

John M. Grizzle, Department of Fisheries and Allied Aquacultures, Auburn University, AL

Fish were collected near two active drilling platforms and from four control areas near the Flower Garden Banks, a natural reef area in the northwestern Gulf of Mexico. Most gross lesions in the fish were caused by parasites and were not more common near platforms. Hepatomegaly occurred in gray triggerfish, creole-fish, wenchman, and sash flounder collected near drilling platforms. Hepatomegaly could have resulted from differences in food between sampled stations or because toxicants directly affected the fish near platforms. Red snapper, vermillion snapper, creole-fish, wenchman, and sash flounder collected near the drilling platforms had more frequent or severe acute histological lesions than controls. Toxicants are suspected as the cause of these lesions because the types of lesions were consistent with a toxicosis, infectious agents were not associated with the acute lesions, and prevalence or severity of the lesions

increased near drilling platforms that were probably sources of toxicants. The types of toxicants causing these histological lesions cannot be determined from the results of this study because the lesions found could have been caused by a variety of chemicals potentially released from drilling platforms.

ISOLATION OF APPARENT PATHOGEN OF SALTWATER CHINOOK

Ralph A. Elston, Batelle-Northwest Marine Research Laboratory, Sequim, WA

and

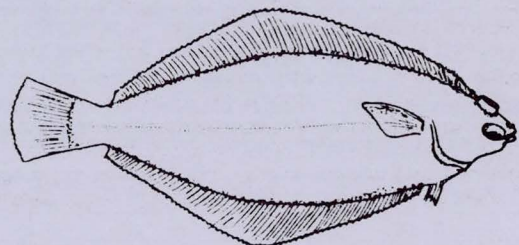
Lee Harrell, National Marine Fisheries Service Manchester, WA

In the last FHS Newsletter, Lee Harrell reported a disease in fall chinook held in saltwater about 1½ years, which was associated with an intracellular infectious organism, possibly a fungus. Substantial mortality due to the disease continued over a 4 month period. An organism which is identical in morphology to the presumptive infectious agent has been isolated from moribund fish. The organism was isolated in CHSE cells and appears to be adapting to culture conditions. After replication in cultured cells the organisms appear to rupture the cell membrane in a fashion similar to that occurring *in vivo*. After 6 subcultures, an average of at least 10% of the cells become infected within one week. In addition, electron microscopic examination of the organisms confirms their intracellular location *in vivo* and reveals that, among other things, they divide by daughter cell division. Experiments are being set up to attempt reinfection of fish with the tissue culture isolate.

UNIQUE MICROORGANISM ASSOCIATED WITH BRANCHIAL DISEASE IN RAZOR CLAMS

Ralph A. Elston, Battelle-Northwest Marine Research Laboratory, Sequim, WA

Histological and ultrastructural examination of razor clams sampled during a recent mortality from Washington's beaches revealed gill lesions in 83% of the clams. An unusual microorganism was associated with the lesions. The microorganism, apparently a prokaryotic cell as determined by electron microscopy, occurs intranuclearly in nonciliated branchial epithelium. Infected nuclei swell to as large as 16 µm X 25 µm (normal size 4 µm - 6 µm) as the organism enlarges within the nucleus. The distended nuclei then rupture the cytoplasmic membrane as observed by interference contrast microscopy of living infected material. The distended nucleus provides an unusual vehicle for the pathogen as it leaves the cells. Ultrastructurally, the organisms are membrane-rich with nucleoidal material and a ribosomal matrix but lack organelles other than membrane-bound vacuoles. Their identity remains enigmatic because although they have some characteristics of prokaryotes, they are larger than bacteria. The organisms contain irregular, deep furrows suggesting the first stage of a cleavage process. Studies are underway to experimentally induce infection of clams and to determine the geographic range of the organism.



BRIEF REPORTS

The American Society of Parasitologists publication of abstracts is available. It includes hundreds of abstracts with more than twenty covering recent reports of parasites in fishes. Richard Heckmann, Brigham Young University, Provo, UT.

A very heavy infestation of *Achtheres ambloplitis* caused problems in smallmouth bass brood stock at the Mammoth Spring National Fish Hatchery, Arkansas. As many as 500 were present in the mouths of individual fish. Jimmy E. Camper, USFWS, Rt. 3 Box 68, Heber Springs, AR 72543.

Channel catfish continuously exposed to 6 mg/liter nitrite and intraperitoneally (IP) injected with *Aeromonas hydrophila* had a lower bacterial LD50 than control fish. The bacterial clearance rate from fish IP injected with *A. hydrophila* was reduced by exposure to 5 mg/liter nitrite. *Flexibacter columnaris* infections occurred spontaneously during 7-day exposures to 5 mg/liter nitrite; none of the control fish became infected. These results indicate that sublethal concentrations of nitrite predispose channel catfish to bacterial diseases. Dr. John Grizzle and Larry Hanson, Department of Fisheries, Auburn University, Auburn, AL 36830.

Kevin Amos of the Washington Department of Fisheries reports that in a Lake Washington sockeye experiment 20 adult female sockeye (from a known IHNV carrier population) were trapped as they left salt-water, and were held in solitary freshwater confinement until sexual maturation. Ten females survived to maturity, but all failed to exhibit IHNV, some even after repeated spawnings. These results were somewhat surprising considering that the incidence of IHNV in spawners in the wild ranged from 70-95% positive.

In the state of Washington this past year there was a failure to isolate IHNV from anadromous stocks of salmon, steelhead, and cutthroat, which in the previous two years have consistently had a high carrier rate. Kevin Amos, Washington Dept. of Fisheries.

Alaska Dept. of Fish and Game pathologists have detected FAT false positive particles in *Yersinia ruckeri*, *Aeromonas salmonicida*, and *Renibacterium salmoninarum* conjugates supplied by the National Fisheries Center in Leetown, W. Va. Filtration (0.45 µ) was successfully used to remove the particles.

Cellular immunity might play a significant role in anti-parasite resistance in catfish. Immunologists at the University of Georgia College of Veterinary Medicine found direct evidence that a cytotoxic cell kills *Tetrahymena pyriformis*. These workers have also demonstrated, indirectly, that the cytotoxic cell kills *Ichthyophthirius multifiliis* ("Ich"). The research group is now studying ways to nonspecifically augment the cellular immunity in fish by dietary vitamin supplementation, with the aim of enhancing resistance of catfish to parasitism by "Ich." Donald L. Evans, University of Georgia.

A 5-20% mortality has been noted in newly feeding rainbow fry at six Washington Department of Game hatcheries. Clinical signs include: darkened body, protruded and hemorrhaged vent, ascites, and bilateral exophthalmia. Internally, the spleen is enlarged and intestine is hemorrhaged. Fungal hyphae can be seen in the intestine and body cavity. *Aeromonas sp.* and *Pseudomonas sp.* have been isolated from the enlarged spleen. All viral examinations have been negative. The disease is similar to the intestinal mycosis of trout as described by H.S. Davis and E.C. Lazar, 1940 (Trans. Amer. Fish. Soc. 70:254-271). Standard treatments, i.e., addition of antibiotics in the feed have had no effect. Steve Roberts, Washington Dept. of Game, East Wenatchee, WA.

A recent review of data compiled at UGA and at NFHRL by Cipirano, Pyle, Shotts and Waltman related to pathogenesis mechanism of *Y. ruckeri* indicates that both the Hagerman (Serotype I) and O'Leary (Serotype II) strains are equally pathogenic in fish. Currently NO consideration should be given to changing the certification standards.

Isolation of *Edwardsiella ictaluri* from danios (*Danio devario*) by Waltman, Blazer and Shotts is the second incidence where this organism has produced disease in a non-ictalurid species. Detailed reports are being prepared.

Research at UGA by Shotts, Hsu and Waltman on yellow pigmented bacteria causing fish diseases shows that only *Flexibacter columnaris* strains produce chondroitinase.

Dr. Harry W. Dickerson and Dr. John B. Gratzek of the College of Veterinary Medicine, University of Georgia, have recently had a paper accepted dealing with their work on the intraperitoneal growth of *Ichthyophthirius multifiliis*. Their technique holds great promise in the study of immunity to the disease, for recovering sterile tomites for *in vitro* life cycle studies, and maintaining cultures of the organism.

Dr. John B. Gratzek and Dr. Vicki Blazer, University of Georgia, report the presence of a metacercariae embedded in the gills of ornamental fish produced in some Florida fish farms. It was determined that the cercariae are elaborated only from the live-bearing cone snails prevalent in some Florida ponds. The ramshorn snail and the pond snail did not harbor the cercariae. Severely affected fish were not tolerant to low oxygen levels nor did they tolerate shipping. Severe infestation resulted in distension of the operculum with obvious enlargement of the gills. This problem is most intense on farms where snails have not been controlled. Suspected definitive hosts are herons or cranes.

Winter time mortality of catfish reared in Mississippi continues to be a problem. Moribund fish may appear clinically normal or have external mycoses or opportunistic parasitic infestations. Some fish have loss of mucus, petechial hemorrhages and areas of depigmentation in the skin. No known water quality parameters, other than temperature, have been associated with this syndrome. Infectious organisms have not been consistently isolated. Research at the Mississippi Agriculture and Forestry Experiment Station, Stoneville, MS continues. John R. MacMillan, Mississippi Cooperative Extension Service, Stoneville, MS 38776.

A severe, diffuse, epithelial hyperplasia has been observed in the gills of channel catfish reared in Mississippi. The problem can occur in all sizes of catfish but is temporally restricted to March and April, and then in September and October. From less than 1% to nearly 100% of the fish in a pond may be affected and die. Several possible causes of this problem are being investigated including environmental toxins and infectious agents. No known water quality parameters have been associated with this problem. John R. MacMillan, Mississippi Cooperative Extension Service, Stoneville, MS 38776.

The supply of THE GLOSSARY OF FISH HEALTH TERMS has been exhausted. If 500 copies are reprinted they will sell for \$8 or \$9 (up from \$5). If it is revised it will sell for \$9 or \$10. Revision will demand a volunteer editor and committee because Dr. Post, the original editor, has retired. If you feel the Glossary is needed in either form, please send your wish to Sec.-Treas. Dr. Doug Anderson, National Fish Health Lab, Box 700, Kearneysville, W. VA. 25430 immediately.

Special Contribution — Tributes to Doc

Ken Wolf and Pete Bullock
National Fish Health Research Center
Kearneysville, West Virginia

If we had a revolving disc on which were printed the words *mentor*, *neighbor*, *friend*, and *"boss"*, it would correctly represent the 60 or so collective years that we had the benefits and privilege of virtually daily association with "Doc."

His style as a mentor was enlightened; he did not lead as much as suggest, offer opportunity and provide encouragement and support. That particular kind of approach was applied to all levels of his staff. When his office door was open, he too was "open"; he was never too busy to sit back and *listen*--an all too infrequent virtue among men. Whatever the topic--research or personal matter--he usually offered sage counsel and advice, but left decisions to the individual. Not just because of his years--he had the rare attribute of being *wise*.

His wisdom is apparent wherever we look in our profession--he was the prime mover of symposia, the initiator of fish disease leaflets, the editor of reference books, the person who started instructional courses of week-long and months-long duration, the health scientist who anticipated needs for cell culture and virology, histopathology, regional placement of diagnosticians and especially the need for enlightened administrators at regional and Washington levels.

For himself and his staff, "Doc" had a standard of quality that had to be met. Whether it was feeding, cleaning and caring for experimental fish, or writing scientific and administrative reports, shoddy work was simply not acceptable. Sub-standard manuscripts, for example, were returned to the writer as often as need be.

As a neighbor, "Doc" and Julia (and whichever dog was currently intelligent enough to realize that the Snieszko's were the softest touch in Leetown) took daily walks around the warmwater fish backponds. Enroute, favorite trout in the run were hand fed as were domestic ducks that frequented the ponds. He was, at heart, an ardent conservationist who literally kept tubs of bran in which he raised "meal worms", the beetle larvae, that he fed the wild birds and of course his famous robin. (Commenting on the robin's lack of toilet discipline, Julia said, "They *sing* for other people.") During winter "Doc" dished out hundreds of pounds of bird feed to feathered visitors, but his largess did not include sparrows and starlings. Those of us who hunt, were at times the butt of gentle reproach for killing game. Nevertheless, dead starlings were known to accumulate at a disposal site near the bird feeder. Perhaps a biological phenomenon like the lemming's migration.

Without ever imposing, "Doc" was a friend of everyone on his staff. He was pleased when a new child was added to a family and was concerned when problems or difficulties arose. He was a friend of many but seemed to reserve being a "buddy" to no one--save "Yulia". Their relationship was special and, if anything, it grew stronger with the passing of time.

Use of the word "boss" connotes only an administrative acknowledgement that someone has to be in charge. "Doc" was an enlightened manager of people who set an example of excellence and was always most fair. He never acted like a "boss". He was punctual in all matters, and arrived and departed work on time. Incongruously, he advised staff members that they should not put in extra time at work, because they were not paid to do so. His object lesson did not take; it was a rare day when he left the laboratory without a briefcase. Apparently, the paperwork he did at home did not count as "extra" work.

His thinking never became entrenched--new techniques, methods and equipment always intrigued him. He delighted in showing a bit of new technology, but always after first mastering whatever was required--behind a closed door. He was just as interested in comparable showings by the staff. However, new equipment was ordered only after it was explained to him just where in the crowded facility the unit was to be placed and just how it was to be used to meet a laboratory goal.

There is no question of just how much "Doc" gave to America. We have expressed our wish that his genes could continue to contribute had he begot children. Of course, such an intellect could be misdirected--maybe he wanted to ensure that such capability could not be misused.

Perhaps as individuals we would not have prospered under his influence as we did. Yet in the arena of foreign policy, we have an amateur's opinion that "Doc" would have been masterful as a diplomat in America's dealing with European nations. He was ever aware of the art of compromise--relating projected ideals and goals with the reality of the actual situation.

We miss you "Doc".

Ken and Pete

Glenn L. Hoffman, Fish Parasitologist, USFWS
Fish Farming Experimental Station,
Stuttgart, Arkansas 72160

It is not difficult to find nice things to say about my former boss, Stan Snieszko. While thumbing through my files I came across a copy (always save a copy!) of my letter to him upon his retirement in 1972 at age 70:

"Dear Stan,

I Thank you for

1. Establishing the Eastern Fish Disease Laboratory.
2. Establishing the Fish Disease Course.
3. Establishing the Fish Hatchery Biologist (diagnostician) system.
4. Establishing the national fish disease reporting system.
5. For stimulating the formulation of international and national fish disease legislation.
6. Personally, for hiring me.
7. For being a chief I could talk with, who would listen, and whose ideas I could respect.

Good luck,
Glenn

Another item (1957), still extant in my voluminous files, also is characteristic of Stan. It is part of the usual huge mass of work involved in Government hiring:

"Dear Glenn,

You may soon receive your "Position Description" which was revised in Washington. You may be surprised to see your fancy title. Do not take it too much to heart. In order to secure for you a better grade, it was necessary to make your duties sound complicated and your title impressive. When you come to Leetown you will find out that we are trying to operate in a simple manner and all ranks, titles, etc. are for the records and files only.

Sincerely yours,
STAN
S.F. Snieszko
"Bacteriologist"

Need I say more? He was a great guy.

FISH HEALTH NEWSLETTER

The Fish Health Newsletter is a quarterly publication of the Fish Health Section of the American Fisheries Society. Submissions of any length on a topic of interest to fish health specialists are encouraged and should be addressed to one of the editorial staff or to a member of the publication committee.

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