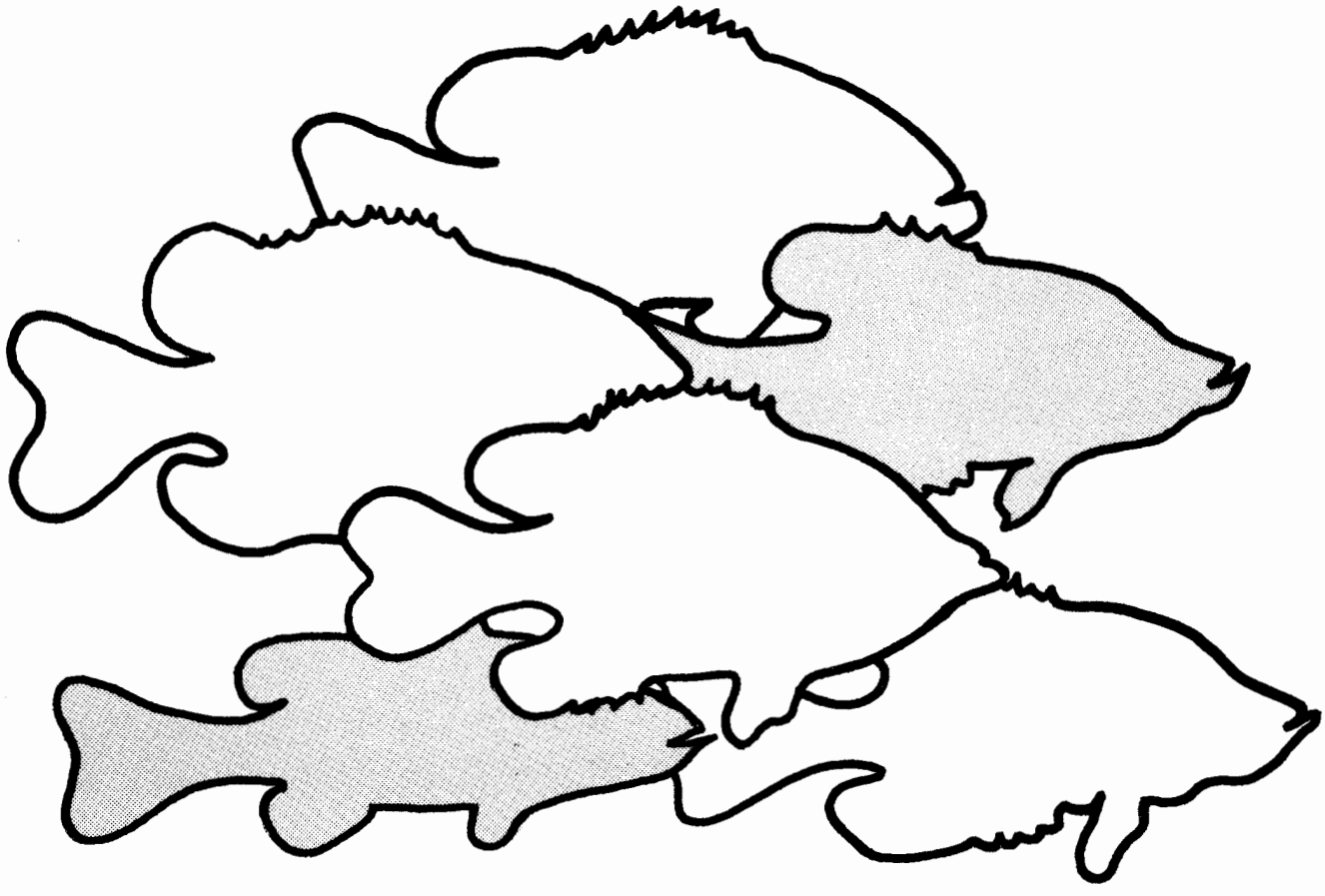
AMERICAN FISHERIES SOCIETY

PROCEEDINGS

ANNUAL MEETING
MISSISSIPPI CHAPTER



VOL. VII
February 17, 1983
Mississippi State, MS

PROCEEDINGS

ANNUAL MEETING OF THE MISSISSIPPI CHAPTER
AMERICAN FISHERIES SOCIETY

17 February 1983

College of Veterinary Medicine
Mississippi State, Mississippi

OFFICERS

C. H. Pennington, President
USAE Waterways Experiment Station

H. Randall Robinette, President-elect
Mississippi State University

John A. Baker, Secretary-Treasurer
USAE Waterways Experiment Station

Printed by the Mississippi Department of Wildlife Conservation
Jackson, Mississippi

ANNUAL MEETING OF THE MISSISSIPPI CHAPTER

of the

AMERICAN FISHERIES SOCIETY

17 February 1983

at

Mississippi State, Mississippi

Please make your plans to meet with the Mississippi Chapter, American Fisheries Society, on 17 February 1983 in the Veterinary Medicine Lecture Room I2005, College of Veterinary Medicine, Mississippi State, Mississippi.

Agenda

0745-0830 Registration.

0830-0850 Call to order and welcome.

0850-0930 Acid Rain - Dr. Daniel D. Richter, Oak Ridge National Laboratory.

0930-0950 Break.

0950-1100 Business meeting.

1100-1200 Tour - College of Veterinary Medicine.

1200-1300 Lunch - College of Veterinary Medicine Cafeteria.

1300-1400 Technical Session I

"Immunodiagnostics of Channel Catfish: White Blood Cells and Their Changing Relationship with Disease." C. J. Lobb, C. Ellsaesser, and L. W. Clem.

"The Effects of Temperature on in vitro Mitogenic Responses of Channel Catfish Lymphocytes." L. W. Clem, N. Miller, R. Sizemore, and C. J. Lobb.

"Mineral Requirements of Channel Catfish." D. M. Gatlin and R. P. Wilson.

"Winter Feeding of Hybrid Sunfish." M. W. Brunson.

1400-1415 Break.

1415-1515 Technical Session II.

"Feeding Selectivity Studies of Larval Striped Bass Morone saxatilis (Walbaum) Under Intense Culture Conditions." W. W. Falls.

"Evaluation of Three Spawning Containers for Channel Catfish." R. L. Busch.

"Use of ^{14}C-Glycine Uptake by Isolated Fish Scales as a Relative Growth Measure." S. T. Ross.

"A Color Coded, Fluorescent Microtaggant®, for Marking Small Fishes." K. W. Thompson, L. A. Knight, and N. C. Parker.

1515-1530 Break

1530-1630 Technical Session III

"Use of Cluster and Correlation Analysis in the Development of an Economical Sampling Scheme for Mississippi Sound." F. C. Sutter, T. D. McIlwain, and J. Warren.

"Bryozoans, Possible Environmental Indicators of Bear Creek, Mississippi." C. M. Cooper and J. W. Burris.

"Warmwater Fish Responses to Low pH Waters." R. J. Muncy, H. R. Robinette, and R. Reagan.

"Macroinvertebrate Composition in the Lower Mississippi River: A Comparison Over Various Habitats and River Stages." D. C. Beckett, C. R. Bingham, and L. G. Sanders.

1630-1645 Adjourn.

ABSTRACTS

Title: Immunodiagnostics of Channel Catfish: White Blood Cells and their Changing Relationships with Disease

Authors: Craig J. Lobb, Catherine Ellsaesser, and L. William Clem. University of Mississippi Medical Center, 2500 North State Street, Jackson, MS 39216.

Current methodology involving the use of monoclonal antibodies and flow cytometry has permitted the differentiation and statistical analysis of blood leukocytes from individual channel catfish. These studies show that leukocytes can be divided into four distinctive groups; lymphocytes, monocytes, thrombocytes, and blast cells. Furthermore, lymphocytes can be divided into two types. The first (sIg^+) contains immunoglobulin on their cell surface whereas the second does not (sIg^-). The sIg^+ cells appear to be similar to B cells whereas the sIg^- cells appear to resemble T cells. These characterizations coupled with altered ratios of monocytes and blast cells in diseased animals suggest that such analysis of these leukocyte populations may be of prognostic value in predicting catfish health.

Title: The Effects of Temperature on *in vitro* Mitogenic Responses of Channel Catfish Lymphocytes.

Authors: L. William Clem, Norman Miller, Robert Sizemore, and Craig J. Lobb. University of Mississippi Medical Center, 2500 North State Street, Jackson, MS 39216.

Lymphocytes from 22°C acclimated channel catfish were cultured *in vitro* at different temperatures with LPS and ConA (B and T cell mitogens respectively in higher animals) and assayed for DNA synthesis. The magnitude of the response to LPS was relatively temperature independent and the kinetics predictable on a Q_{10} basis. The response to ConA was quite suppressed at lower *in vitro* temperatures. The results of *in vitro* temperature-shift and cell-mixing experiments indicated that the lack of responsiveness to ConA at low *in vitro* temperatures could not be attributable to the development of suppressor cells. Furthermore, the results of studies with cells from fish acclimated to different *in vivo* temperatures showed profound effects on the *in vitro* temperature requirements for responses to ConA but not to LPS. These studies clearly indicate that fish T-like and B-like cells are differentially affected by both *in vivo* and *in vitro* temperatures and hence support the idea that low temperature immunosuppression in ectotherms may result primarily from effects on T rather than B cells.

Title: Mineral Requirements of Channel Catfish

Authors: Delbert M. Gatlin, III, and Robert P. Wilson. Mississippi State University, P. O. Drawer BB, Mississippi State, MS 39762.

An ongoing project in our laboratory has been the determination of various mineral requirements of channel catfish. In our first study the phosphorus requirement of channel catfish was reevaluated. Growth, serum phosphorus, bone ash, bone calcium and bone phosphorus data from two 11 week studies indicate that 0.4% available dietary phosphorus is adequate for maximum growth and bone mineralization. In our second study, two 10 week experiments established the essentiality of magnesium for channel catfish and determined their dietary magnesium requirement. A minimum magnesium level of 0.04% was required to maintain normal growth, serum and bone magnesium levels. The dietary zinc requirement of channel catfish was determined in our third study. Serum alkaline phosphatase activity, serum zinc, bone zinc, and bone calcium data indicated that their minimum dietary zinc requirement was 20 mg Zn/kg diet. In a preliminary study, the minimum dietary selenium requirement of channel catfish was determined to be between 0.1 and 0.5 mg Se/kg diet based on glutathione perioxidase specific activities in liver and plasma and growth data.

Title: Winter Feeding of Hybrid Sunfish

Author: Martin W. Brunson. Mississippi State Universtiy, P. O. Drawer LW, Mississippi State, MS 39762.

The effects of supplemental feeding on the winter growth of male bluegill (Lepomis machrochirus) X female green sunfish (L. cyanellus) F_1 hybrids were investigated. Four 0.04 ha ponds were each stocked at the rate of 2471 fish per ha. Fish in two of the ponds were fed daily while fish in the remaining two ponds subsisted only on natural food. After 90 days at water temperatures below 15°C, fed fish were significantly ($P < 0.05$) heavier, but not longer than non-fed fish. Coefficients of Condition (K) for fed fish showed a significant ($P < 0.05$) increase through the winter and were significantly higher than K for non-fed fish, which showed no significant change in K through the winter.

Title: Feeding Selectivity Studies of Larval Striped Bass Morone saxatilis (Walbaum) Under Intense Culture Conditions

Author: Falls, W. W.[1] Gulf Coast Research Laboratory, East Beach Drive, Ocean Springs, MS 39564.

Five dry-foods (three formulated Hi-Pro® pellets, Master Mix®, and Purina®) and four live-foods (Daphnia, Artemia, Acartia, and wild pond-reared freshwater zooplankton) were evaluated in three feeding trials to determine their acceptability for 5 to 60 day-old stripped bass. A fourth study compared four diets (zooplankton, Master Mix®, Master Mix®, and Artemia, and a three-food combination) to Artemia in a pilot-scale, Intensive culture system at the Gulf Coast Research Laboratory, Ocean Springs, MS. Other objectives were to determine food selectivity, to determine when fry feed, and to develop mass culture techniques for food organisms acceptable to striped bass fry.

Three feeding trials were run in triplicate under controlled light (16-h day) and temperature (18-20°C) conditions in 109.8-L aquaria with undergravel filters, crushed oyster shell substrate, and synthetic seawater (8-10°/$_{oo}$). In trial four, striped bass were reared in brackish water (2-4°/$_{oo}$) under ambient conditions in 1890-L cylindrical, fiberglass semi-closed, recirculating tanks. Daphnia were reared in 109.8-L aquaria, Acartia in 1890-L fiberglass tanks using the "brown" water culture technique, Artemia in 75.7-L plastic garbage cans filled with synthetic seawater, and zooplankton in an 0.1-ha pond.

Larval striped bass accepted zooplankton, Master Mix®, Purina®, Master Mix®and Artemia combination, and the three-food combination after being initiated to feeding from age 5 to 14 days on Artemia nauplii, then gradually transferred to the alternate foods. Highest percent survival was observed with zooplankton (predominantly copepods) as the food source. Greatest growth was the three-food combination. Fry positively selected copepods and Artemia nauplii, and negatively selected against Artemia cysts, cladocerans, and rotifers. Fry 13-, 21-, 27-, and 4-days old were feeding continuously in large enough concentrations for mass production of striped bass fry, whereas the pond-reared, freshwater zooplankton could be mass cultured for striped bass fry production.

[1]Present Address: Mississippi State University, Drawer V, Mississippi State, MS 39762

Title: Evaluation of Three Spawning Containers for Channel Catfish

Author: Robert L. Bush. Delta Branch Experiment Station, P. O. Box 197, Stoneville, Mississippi 38776.

Three containers were evaluated as spawning receptacles for channel catfish (Ictalurus punctatus) during the 1981 and 1982 spawning seasons at Stoneville, Mississippi. When given a choice, channel catfish preferred a rectangular metal can to two plastic containers of different shapes and dimensions. Nevertheless, this selectivity did not reduce spawning success when only one of the less preferred containers was available to the brood fish.

Title: Use of ^{14}C-Glycine Uptake by Isolated Fish Scales as a Relative Growth Measure

Author: Stephen T. Ross. University of Southern Mississippi, P. O. Box 5018, Hattiesburg, MS 39406.

Assessment of short-term growth rates of individual fish is important to both applied and basic fishery research. Measurement of short-term growth allows immediate detection of effects of altered biotic or physical components of the environment. Two principal approaches for measuring short-term growth are analysis of daily banding patterns in otoliths and the rate of uptake of ^{14}C-glycine by isolated scales. The latter technique is a relative measure having the advantage of being non-destructive.

Through field and laboratory experiments, I assessed the utility of the glycine uptake technique in studying growth of the minnows Notropis venustus and N. lutrensis. Laboratory results show a response latency to altered food abundance of up to 10 days. Also, individual variation is quite high. Glycine uptake by fish in nature, at equivalent temperatures, was always less than uptake by laboratory maintained fish.

The labelled glycine technique has limitations, but may be useful in situations where more conventional techniques for assessing growth are impractical.

Title: A Color Coded, Fluorescent Microtaggant® for Marking Small Fishes

Authors: Kenneth W. Thompson, Luther A. Knight, Jr., and Nick C. Parker[1]. University of Mississippi, University, MS 38677.

The injection and retention of a fluorescent, laminated plastic Microtaggant® using a needleless hypodermic injector have been investigated and compared with that of more conventional fluorescent pigments for the marking of small fishes. Using this technique juvenile striped bass (Morone saxatilis) as small as 48 mm standard length and "Yazoo" darters (Etheostoma sp.) as small as 30 mm standard length have been successfully marked. Microtaggants® have also been applied to numerous other species including golden shiner (Notemigonus crysoleucas) and to numerous species of Centrarchidae.

While there are some disadvantages to this technique, the high mark retention, low mortality and broad range of encoded information indicate that Microtaggants® could provide a useful ecological tool for population estimates and distribution studies especially of juveniles and very small species.

[1]Southeastern Fish Cultural Laboratory, Marion, AL.

Title: Use of Cluster and Correlation Analysis in the Development of an Economical Sampling Scheme for Mississippi Sound

Authors: Frederick C. Sutter, Thomas D. McIlwain, and James Warren. Gulf Coast Research Laboratory, East Beach Drive, Ocean Springs, MS 39564.

Data from eight years (October 1973 to December 1981) of trawl sampling (16 foot and 36 foot trawls) in Mississippi coastal waters were studied using cluster and correlation analysis techniques to evaluate the effectiveness of previous sampling and to determine where effort could be economized. These analyses were based on an examination of 20 targeted species of finfish and invertebrates deemed commercially or potentially commercially important. Results indicated that the collections could be reduced to a transect of samples running from the Back Bay area of Biloxi to outside Dog Keys Pass. Seasonal variation in catch were taken into account by increased sampling during appropriate times of the year.

Title: Bryozoans, Possible Environmental Indicators of Bear Creek, Mississippi

Authors: Charles M. Cooper, and John W. Burris[1]. USDA-ARS Sedimentation Laboratory, P. O. Box 1157, Oxford, MS 38655.

Bryozoans of the Bear Creek Watershed in Leflore, Sunflower, and Humphreys counties were examined from September, 1976 through September, 1977. Four species are indigenous to the three lakes in the system which had the lowest total solids, sedimentation rates, and pH. These included Plumatella fruticosa (Allman), Lophopus crystallinus (Pallas), Fredericella sultana (Blumenbach), and Pectinatella magnifica (Leidy). Absence of bryozoans, especially, environmentally sensitive Pectinatella magnifica, in downstream areas correlated with degradation of downstream habitat. Selective habitation of these invertebrates along the Bear Creek environmental gradient indicates the possible use of these organisms where they occur as environmental indicators of habitat quality.

[1]Mississippi Department of Wildlife Conservation, Route 3, Box 70, Canton, MS 39046.

Title: Warmwater Fish Responses to Low pH Waters

Authors: Robert J. Muncy, H. Randall Robinette[1], and Roland Reagan[1]. Mississippi Cooperative Fishery and Wildlife Research Unit, P.O. Drawer BX, Mississippi State, MS 39762.

Stocking and fisheries management recommendations were evaluated for 25 newly constructed ponds in the Divide Section of the Tennessee - Tombigbee Waterway under a study funded by US Corps of Engineers. Construction design and spoil fill materials greatly influenced water quality, biological parameters, and fish management potentials. Low pH waters were found to greatly impact fish populations. A series of over 100 new small ponds offer an unusual opportunity to study impacts of pH on warmwater fish populations.

[1]Mississippi State University, P.O. Drawer LW, Mississippi State, MS 39762.

Title: Macroinvertebrate Composition In The Lower Mississippi River: A Comparison Over Various Habitats and River Stages

Authors: David C. Beckett, C. Rex Bingham, and Larry G. Sanders. USAE Waterways Station, P.O. Box 631, Vicksburg, Mississippi 39180.

We investigated benthic macroinvertebrate composition in four aquatic habitat types in the Lower Mississippi River. The biotas of three dike fields, a natural bank, a secondary channel, and an abandoned channel were sampled over a high flow (flood stage), two moderate, and two low flow periods. The biotas present in the natural bank, the secondary channel, and the abandoned channel showed only minor changes in composition over the various flow regimes. The natural bank was consistently dominated (numerically) by the burrowing mayflies Tortopus incertus and Pentagenia vittigera and hydropyschid caddisflies. The consistently most common taxa in the secondary channel were the sand dwelling chironomids Robackia claviger and Chernovskiia orbicus, while phantom midges, tubificid oligochaetes, and fingernail clams were always the most abundant macroinvertebrates in the abandoned channel.

Unlike the other habitats, the dike fields showed large changes in biotic composition which correlated with changes in river stage and resultant alterations in current and substrate. At high and moderate flows the dike field benthos had no strong similarities to any of the other communities sampled. However, at low flows the dike field macroinvertebrates were very similar in composition to the benthic community present in the slack-water, mud-bottomed abandoned channel. This study indicates that the distribution of macroinvertebrates in the Lower Mississippi River is a function of the physical characteristics of the system, notably current velocity and substrate composition.

Title: The Effect of Temperature on the In Vitro Primary and Secondary Anti-Hapten Antibody Forming Cell Response of the Channel Catfish

Authors: Norman Miller, and L. William Clem. University of Mississippi Medical Center, 2500 North State Street, Jackson, MS 39216.

Lymphocytes from antigen primed and unprimed channel catfish were cultured in vitro at 32, 27, 22, and 17 C in the presence of different hapten-carrier conjugates. At various time intervals, the cultured cells were assayed for anti-hapten antibody secreting cell (PFC) responses using a modified indirect Jerne plaque assay. The results of this study clearly show that the magnitude of the in vitro primary anti-hapten PFC response to thymus dependent (TD) antigens is inhibited by low in vitro temperatures. However, low temperatures do not significantly inhibit the magnitude of the secondary response to TD antigens or the primary response to a thymus independent antigen. Low temperatures mainly affect the kinetics of these latter responses, with the time to the peak response being delayed as predictable on a Q_{10} basis. These data support the contention that low temperature immunosuppression in fish results primarily from an inhibitory effect on the generation of helper cells.

Title: Winter Feeding of Channel Catfish in Mississippi, Arkansas, and Texas

Authors: H. Randall Robinette,[2] Robert L. Busch, Scott H. Newton[1], Calvin J. Haskins[1], Scott Davis[2], and Robert R. Stickney[2]. Mississippi State University, P. O. Drawer LW, Mississippi State, MS 39762.

Fingerling channel catfish (Ictalurus punctatus) fed a 25% crude protein practical feed grew as well as or better than fingerlings fed a 35% crude protein practical feed in both Mississippi and Arkansas ponds during 2 consecutive winters. Fingerlings in Texas grew better on the 35% protein feed, although poor survival may have affected the results. The 35% protein feed provided no growth advantage to adult fish in Mississippi. Both feeds had equivalent energy to essential amino acid ratios and both contained 12% fish meal. There were minimal differences in feed conversion ratios and survival of fish fed the 2 feeds in Mississippi and Arkansas.

[1]University of Arkansas at Pine Bluff, Pine Bluff, AR.
[2]Texas A&M University, College Station, TX.

Title: The Use of Mississippi River Dike Pools as Habitat by Larval Fish

Authors: Timothy R. Bosley, C. H. Pennington, Michael E. Potter, and Carolyn L. Bond. USAE Waterways Experiment Station, P. O. Box 631, Vicksburg, MS 39180.

A study was conducted from April through October 1980 to characterize the seasonal changes in distribution, diversity, and abundance of icthyoplankton within the Cracraft dike field on the Lower Mississippi River. During high to moderate river stages (April through June), diversity and abundance of larval fish was greater at open pool stations than at nearshore stations. Under low water conditions (July through October), diversity was low and greatest concentrations of larval fish tended to be along the shoreline inside the middle bar rather than in the open pool. Fishes in the dike pools were mainly shads, bluegill, and silversides. The larval fish community along the riverside of the middle bar was not substantially different from that of the main channel.