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Carl Eigenmann, Indiana University,  
First President, Indiana Biological  
Survey, ca 1893.

**Deadline for material to be  
included in the next issue  
of Biodiversity Issues:**

**June 1, 2007**

## President's Message

**Richard E. Wagner, Ph. D.**



With each passing season change occurs. The Survey has grown substantially over the last three years and we are experiencing rapid growth in membership, staff, and some changing of the guard. Over the next several years the newsletter will feature spotlights on each of the Board of Trustee members, as well as highlight each of the full-time staff members at the Aquatic Research Center. I think that as we become better acquainted that you will see the dedication of the individuals that have made the Indiana Biological Survey a success. I want to personally thank Brian Caskey who has served the Biological Survey as Treasurer of the Aquatic Research Center. He has done a tremendous job organizing and working with staff and the Board to keep the Center functioning. Dr. Paul Rothrock is currently directing the research objectives of the Aquatic Research Center and also is the editor for the publication series. Mr Steve Newhouse has taken over the Newsletter along with his duties as Secretary of the Board. Special thanks to all of these individuals for the tremendous job they

have done. I want to reiterate that the Biological Survey is a volunteer run organization. None of the Board of Trustees nor the Director of Research position has been a paid position. The time that each of these individuals has committed is what has made the opportunities for students to be trained and receive chances to become aquatic scientists.

As President of the Board, I personally want to thank you for your trust and belief in the mission of the Aquatic Research Center. Our organization is continuing to make some management changes that the Board believes will be important for the sustainability of the Aquatic Research Center. During the next several months we will be adding several full-time staff that will significantly increase our abilities. This action will provide more opportunities for junior scientists and students to take advantage of the internship program and the Visiting Scientists and Post-graduate student program. We are adding field staff to lead crews that are field ready and possess the abilities to accurately identify species collected in the field. Our newsletter *Biodiversity Issues*, has become the vehicle for communication (along with our web page) among our members. Stephanie Worden is the webmaster for our web page and we welcome Steve Newhouse as editor of the Newsletter. Please send Steve any pieces that describe your activities and research to share among the members. Paul Rothrock, our Vice President, is in the process of reviewing several articles for our publication research series *Miscellaneous Papers of the Indiana Biological Survey*, and we are releasing our forth book that will focus on crayfish of the Ohio River drainage.

**So what is the objectives of the Aquatic Research Center?** Our mission is to conduct research on the

aquatic fauna and flora of Indiana and to train future generations of students for replacement. It has been said often that there is a "brain drain" in Indiana where our best and brightest students leave the state after graduation. The Biological Survey is taking the required steps to prevent that from happening by creating an atmosphere of serious research, including biological specimens, equipment, library, and brain power, is available to mentor and encourage. We are beginning our own research agenda that will focus on specific research objectives that are not being conducted by the State agencies. For example, the education and outreach of the Survey's mission is being met by organizing research forums, and developing workshops, classroom short courses (both for credit and continuing education). We will be sending field crews into the field to supplement our specimen holdings (not just in Indiana but to other states, too), we are trading materials with other institutions to make better use of materials from other parts of the country where material is either orphaned or is no longer wanted. To prevent specimens from being

discarded, we will make an effort to work with others as long as the involvement benefits the aquatic resource and the preservation of Indiana's aquatic fauna and flora.

**Membership Benefits.** Our goal this year is 100 members! So what does a member get for their \$30? All members in good-standing are eligible to submit manuscripts for consideration in the *Miscellaneous Papers of the Indiana Biological Survey Aquatic Research Center*. Please submit manuscripts to Dr. Rothrock for consideration. In addition, members get discounted prices on books, posters, and other natural history materials. Members have received a 33% discount on the "Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage" and will receive a 20% discount on the "Coastal Wetlands of the Laurentian Great Lakes: Health, Habitat, and Indicators". These three books are quickly becoming must have reference materials. Members are entitled to access to the Center's library and has access to topic literature searches. Interlibrary loan materials are provided by the Center to members. In

addition, members have voting privileges, access to the specimen holdings of the Biological Survey, and are notified of field opportunities. Past field trips have included surveys of Mayfield Cave, trips to the lake counties of Northern Indiana to participate in burrowing crayfish surveys, and sampling in West Virginia. Watch for additional trips including crayfish collecting in western Kentucky and surveys of Indiana's outstanding resource waters.

**New Business Office Address.** The Aquatic Research Center, Indiana Biological Survey has a new business address. Please send your dues and publication orders Attention to the Treasurer, Aquatic Research Center, Indiana Biological Survey, P.O. Box 458, Brownsburg, Indiana 46112, or visit our website at: [www.indiana.edu/~inbsarc](http://www.indiana.edu/~inbsarc) – the home for the Biological Survey. Finally, please consider asking a friend or colleague to join the Biological Survey, we can surpass our goal if each member just brings one addition person. §

## Division Research Features

### Collections: The backbone of the Aquatic Research Center

The Aquatic Research Center has significant research holdings that are indispensable to the study of the natural history of Indiana fauna and flora. The possession of these specimens separate the Survey from the variety of consulting firms and other non-government agencies that also claim to be interested in natural history preservation. The Heritage database is an important database that is used for conservation planning. This database includes literature and published data, some observational sightings and other anecdotal information. Although many important decisions are based on information in this database, this is problematic for researchers. Researchers require the ability to validate and verify information. When information contained in the Heritage database is based on non-vouchered specimens there is no feasible way to determine if the information is factual. Although this information may be "real" it is

impossible to verify since there would not be any actual specimen to check or observe. Without the ability to verify these specimen records the location information has to be taken as dubious or unverifiable. There are situations when the information can be indirectly verified if the unvouchered information corresponds with other vouchered records. The discrepancy occurs, however, when these records are oddities or contradict vouchered specimens then the information is compromised.

So what is the basis for a specimen collection? The specimen collection serves as a living representation of past collection events. The benefit of having an actual specimen is multi-fold. One of the primary reasons why specimens are retained is so that identity can be verified. For many species the stability of the nomenclature has been volatile and without a specimen one cannot be certain of a past species presence. In the study of natural history and zoogeography, the dispersal mechanisms and invasive nature of organisms causes some species to be considered exotic or invasive when they are able to colonize places far away from their natural

habitats. So to be sure of species identity a voucher specimen is necessary. So how much change has occurred in North American species? Well the taxonomy of fishes has changed dramatically since the late 19<sup>th</sup> century. Jordan and Evermann (1896) in their monumental work entitled, "The Fishes of Middle and North America" boldly stated that with the completion of their project that no further work on North American ichthyology was required. If one were to look at this document, perhaps as many as half of the names recorded for these fish species would be unrecognizable.



But Jordan and Evermann's statements has proven to not be true. One example includes the taxonomy of the darter (Percidae: Etheostomatini). The species known during Jordan's time has changed dramatically. Jordan recognized

numerous genera, but currently only four genera are recognized among numerous subgenera. These former genera are all considered former genera are now recognized as subgenera.

So why is this important? For several reasons, first we need to understand the linkages between the environment and the web of trophic dynamics that cause cascading effects when elements are removed. Is one species more important than another? Each species is not indispensable until the underpinnings of the community collapses and the trophic web changes into a single trophic chain. Then it is too late to restore these situations.

But why do we need preserved material? Well, without the preserved material we cannot be sure of what the original authors collected. For most specimens these are called vouchered specimens, but when this material is the type of the species when it is described, we then have specific designations such as holotype, paratypes, or lectotype to indicate that this material has additional value. Another reason we desire preserved material is so that studies of clinal or geographic variation of a species can be evaluated.

It is a well known fact that a species is often larger in northern portions of their range than southern. Likewise, similar patterns are observed with increasing altitude. More northern and higher altitude specimens will possess higher meristic counts due to the lower temperatures which is known to slow down development. So, in order to determine phylogenetic relationships or systematic patterns in species we need to observe specimens over the entire range of the species. When variation that cannot be explained by clinal patterns are seen we often will consider these unique units or distinct species. So ideally a strong collection will have a series of specimens from a wide range of locations throughout the species range.

The Aquatic Research Center has a strong regional commitment to the Great Lakes and Ohio River drainages and especially to the fauna and flora of Indiana. The Aquatic Research Center has made a concerted effort to obtain material from throughout eastern North

America. There are few species that are endemic (found only within) the political boundaries of Indiana. So, it is necessary to study material from throughout the full range. We search other regional collections in adjacent states and large collections such as the Museum of Natural History to try and fill in the gaps.

So next time you visit the Center and see the rows of individuals of a species, make sure you see whether we have specimens from a wide range of locations from Indiana, as well as, other places throughout North America. If you have the opportunity to provide specimens from other locations, please consider donating material. §

## New Additions to the Aquatic Research Center Division of Fishes: Fishes from the Land of 10,000 lakes

The Division of Fishes has been actively processing fish collections donated from the State of Minnesota. During the last year over 340 collections have been donated and processed from the Bell Museum of Natural History. Significant additions to the collection include specimens from the following watersheds: Minnesota, St. Croix, Missouri, Boundary waters, Red River of the North, Mississippi, and many of the inland lakes.

So what does fish from the land of 10,000 lakes have to do with Indiana? The regional collections benefit from the unique species such as the Plains topminnow *Fundulus sciadicus*; burbot *Lota lota*; trout-perch *Percopsis omiscomaycus*; southern brook lamprey *Ichthyomyzon gagei*; brassy minnow *Hybognathus hankinsoni*, and Topeka shiner *Notropis topeka*.

Numerous cyprinids unique to northern states were obtained from Minnesota including bigmouth shiner *Notropis dorsalis*, Ozark minnow *Notropis nubilus*, finescale dace *Phoxinus neogaeus*, northern redbelly dace *Phoxinus eos*, and pearl dace *Margariscus margarita*.



Slenderhead darter *Percina phoxocephala*



Plains topminnow *Fundulus sciadicus*



Burbot *Lota lota*



Trout-perch *Percopsis omiscomaycus*



Southern brook lamprey, *Ichthyomyzon gagei*



Brassy minnow, *Hybognathus hankinsoni*



Topeka shiner *Notropis topeka*

Among the common species that were added include creek chub *Semotilus atromaculatus*, spotfin shiner *Cyprinella spiloptera*, bluntnose minnow *Pimephales notatus*, Johnny darter *Etheostoma nigrum*, slenderhead darter *Percina phoxocephala*, blackside darter *Percina maculata*, and fathead minnow *Pimephales promelas*. By obtaining specimens from a variety of watersheds the Center has benefited by increasing the range of holdings for these species.

Additional benefits to increasing holdings of Minnesota specimens include the ontogenetic series that were included in the samples. Specimens ranging from small juvenile specimens to moderate sized adult specimens were accessioned into the collection. The increase in ontogenetic series such as the burbot added invaluable information for life history studies.

With the increase of watershed assessments throughout many Midwestern States it becomes imperative that vouchered material from these studies be retained for future confirmation and use by taxonomists, systematists, and ecologists.

Regional collections have space limitations, which causes museums such as the Bell Museum to have to eliminate certain common species from their holdings. The benefit of sharing resources between regional collections provides valuable material that would otherwise be lost. Minnesota's loss is Indiana's gain. §



Red shiner, *Cyprinella lutrensis*

*All photo credits are copyrighted and belong to Konrad Schmidt. Konrad is a non-game aquatic biologist for the Minnesota Department of Natural Resources. His personal involvement has been instrumental in the formation of the Native Fish Conservancy (NFC), the Flier newsletter, and the North American Native Fish Association (NANFA). His tireless efforts to protect and conserve native fishes is unmatched. Way to go Konrad! Keep up the great work.*



Redside dace, *Clinostomus elongatus*



Finescale dace *Phoxinus neogaeus*



Lake chub, *Cousieus plumbeus*

### Wabash River Symposium Available!

The Indiana Academy of Science through the generous support of the Rivers Institute at Hanover College produced an exceptional series of papers that describe and highlight research on the Wabash River and tributaries.

The event highlighted the research and accomplishments of an honorary member of the Biological Survey, Dr. James R. Gammon. Dr. Gammon's research on the Wabash River was a focal point and the keynote address by Dr. Gammon was the highlight of the first evening events.

A series of invited papers covered all aspects of the terrestrial and aquatic assemblages, geology, and water quality of the Wabash River. Many of these papers were published in this special issue of the Proceedings.

In addition, a Bioblitz of the famous Otter Creek was organized. This location is the case study for the series of papers that were published by ecologists world-wide on the adventitious nature of stream fishes in the journal *American*

*Naturalist*. Indiana State University and the Rivers Institute hosted the Bioblitz, which was a success and enjoyed by all in attendance. In addition, some of the areas top scientists participated in the event. §

*List of Papers appearing in the Proceedings of the Indiana Academy of Science – Wabash River Symposium:*

-Karnes, DR. *et al.* 2006. The Wabash River Symposium. Proc. Acad. Sci. 115(2):79-81.

-Karnes, DR *et al.* 2006. Results of Short Term BioBlitz of the Aquatic and Terrestrial Habitats of Otter Creek, Vigo County, Indiana. Proc. Acad. Sci. 115(2):82-88.

-Homoya, MA 2006. A Brief Survey of the Rare Terrestrial Natural Communities and Associated Vascular Flora of the Wabash River Corridor in Indiana. Proc. Acad. Sci. 115(2):89-93.

-Jackson, M T 2006. Forest Communities and Tree Species of the Lower Wabash River Basin. Proc. Acad. Sci. 115(2):94-102.

-Fisher, BE 2006. Current Status of Freshwater Mussels (Order Unionoida) in the Wabash River Drainage of Indiana. Proc. Acad. Sci. 115(2):103-109.

-McMurray PD Jr *et al.* 2006. An Annotated List of the Aquatic Insects Collected in 2004 in the Wabash River Watershed, Indiana. Proc. Acad. Sci. 115(2):110-120.

-Stephan AK *et al.* 2006. Present and Historic Distribution of Fishes in South Fork Wildcat Creek, Tippecanoe, Clinton and Tipton Counties, Indiana. Proc. Acad. Sci. 115(2):121-135.

-Simon, TP 2006. Biodiversity of Fishes in the Wabash River: Status, Indicators, and Threats. Proc. Acad. Sci. 115(2):136-148.

-Whitaker, JO Jr 2006. Small Mammals of the Wabash River Bottoms. Proc. Acad. Sci. 115(2):149-155.

-Sobat, SL *et al.* 2006. Changes In the Condition of the Wabash River Drainage from 1990-2004. Proc. Acad. Sci. 115(2):156-169.

-Simon, TP 2006. Development, Calibration and Validation of an Index of Biotic Integrity for the Wabash River. Proc. Acad. Sci. 115(2):170-186.

-Pyron, M 2006. James Gammon: The Wabash River Man. Proc. Acad. Sci. 115(2):187-195.