CHARACTERIZATION OF MYXOZOAN ACTINOSPORE FROM A COMMERCIAL CATFISH POND IN THE MISSISSIPPI DELTA

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THE MYXOZOA ARE AN IMPORTANT GROUP OF PARASITES THAT INFECT A WIDE VARIETY OF FISH SPECIES WORLDWIDE. WE'VE IDENTIFIED FOUR PREVIOUSLY UNDOCUMENTED MYXOZOAN LIFE CYCLES IN CATFISH PONDS, THE IMPACTS OF WHICH ARE UNKNOWN. IDENTIFICATION OF THESE PARASITE LIFE CYCLES INCREASES OUR KNOWLEDGE OF THE COMPLEX ECOSYSTEMS THAT EXIST IN AQUACULTURE PONDS AND THEIR AFFECTS ON FISH HEALTH.

The Myxozoa are an important group of metazoan spore-forming parasites. Their complex life cycles primarily involve a myxospore stage in a fish and an actinospore stage in aquatic annelids (oligochaetes and polychaetes) or bryozoans. Surveys of actinospores from aquatic oligochaetes have been conducted in both wild and commercial aquaculture settings. Catfish aquaculture in the southeastern United States is known to sustain several myxozoan life cycles, the most notable being *Henneguya ictaluri,* the causative agent of proliferative gill disease (PGD) in channel and hybrid catfish.

The oligochaete host in the *H. ictaluri* life cycle is the ubiquitous bottom-dwelling worm *Dero digitata*. Common in most catfish production ponds, *D. digitata* is a known host for the aurantiactinomyxon, echinactinomyxon, raabeia, and triactinomyxon collective groups of actinospores, 2 of which have been linked to a myxospore stage in channel catfish. The actinospore diversity of infected *D. digitata* was surveyed from a channel catfish production pond in the Mississippi Delta region for the elucidation of unknown myxozoan life cycles. In this study *D. digitata* (n= 2,592) were collected from the bottom sediment of a channel catfish production pond. After 1 week of daily observation, a total of 6 genetically different actinospore types were observed. The collective groups were classified as 2 aurantiactinomyxons, 2 helioactinomyxons, 1 raabeia, and 1 triactinomyxon (Figure 1). Overall prevalence of myxozoan infections in the isolated oligochaetes was 4.4%. Four previously undescribed actinospore types were identified and characterized molecularly and morphologically. Phylogenetic analysis revealed the raabeia and one of the helioactinomyxon (type 1) actinospores were closely related to the group of myxozoans known to parasitize ictalurids in North America. To date, no myxospores stage in fish have been linked to the newly sequenced actinospores reported in this survey. The morphological and molecular data generated from this study will assist in the identification of myxospore counterparts for these actinospore stages and aid in the elucidation of unknown myxozoan life cycles in catfish production systems.

This work generated DNA sequences for four previously undocumented parasite life cycles present in catfish aquaculture ponds in Mississippi. These sequences can be used to identify alternate life stages of these parasites in fish. Elucidation of these life cycles will help in evaluating the risk these parasites pose to catfish production and development of management practices to minimize their impact on catfish health.

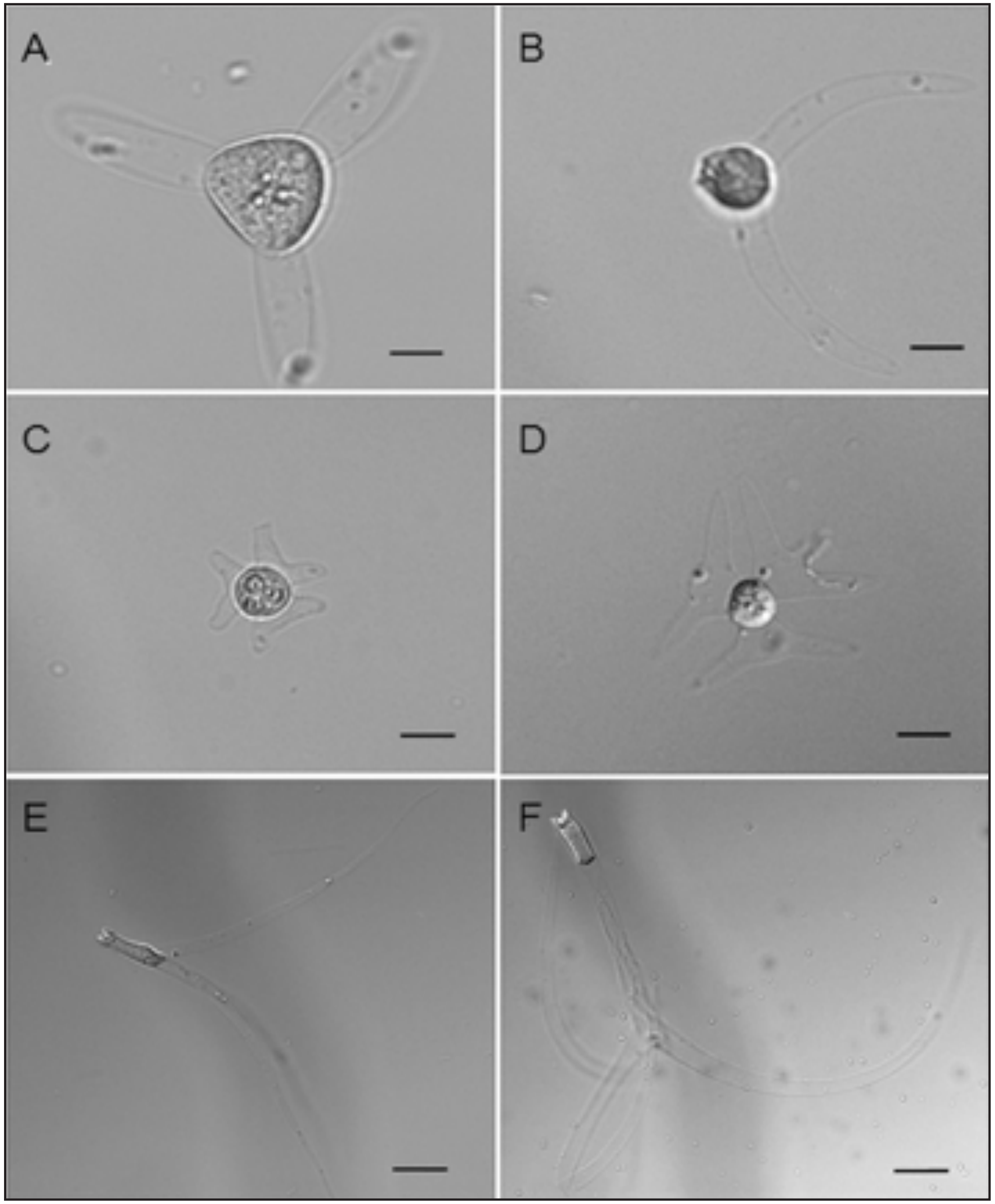

Figure 1: *Microscopic images of actinospore types: (A) Aurantiactino-myxon-type actinospore of* Henneguya ictaluri. *(B) Aurantiactinomyxon-type actinospore of* Henneguya exilis. *(C) Helioactino-myxon type 1 actinospore. (D) Helioactinomyxon type 2 actinospore. (E) Raabeia-type actinospore. (F) Triactinomyxon-type actinospore. Scale bars for A–D represent 10 ųm in length. Scale bars for E–F represent 25 ųm in length.*