



- Large colony of *Ephydatia fluviatilis* found in Middle Tennessee

Under 5x and 12x magnification, a sample of tissue displays recently formed gemmules throughout (yellow dots in image). Gemmules are small circular formations of silica spicules that will last throughout the winter weather to form new colonies of sponges post winter season.





Under 40X magnification, a gemmule from the sample above is viewed to examine the gemmuloslceres that form the structure of the gemmule. This examination helps identify the species of the sponge. -Epydatia fluviatlis





# **Examining morphological and genetic diversity of freshwater** sponges in Tennessee Damon Stinson, Micah Chapman, Cole G. Easson **Department of Molecular Biosciences**

Gregory Mill Dam in Smyrna, TN. A small section of this colony was sampled to be examined under magnification.

Morphological examination can help identify the genera & species. Genetic data will still be essential for further classification.

Freshwater sponges are an important part of aquatic ecosystems. There are approximately 5,000 known species of sponges with only 150 identified freshwater species. Out of 33 known species to North America, 14 species (42%) are found in Tennessee making it a diverse habitat for these invertebrates. To date, these 14 species have been identified using morphological taxonomic characteristics. Freshwater sponges in Tennessee will mostly reproduce asexually via gemmulation, and the characteristics of these gemmules are crucial for freshwater sponge taxonomy. Presently, there is limited research conducted on the freshwater sponge populations in Tennessee, and research to date has primarily focused on morphological taxonomy, which is based on the taxonomy of European freshwater sponges. In the current study we have collected and identified adult sponges and gemmules from their habitats in Tennessee. Here we have combined identification using genetic markers in addition with morphological data, and we aim to assess potential genetic divergence of North American freshwater sponges from those in Europe. Using our dual classification methodology, within one semester, we have identified four different genera and species along with the addition of a new species in Tennessee that is rare for North America. Using this dual classification methodology, we aim to better understand the diversity and distribution as well as potentially identify currently unclassified freshwater sponges in Tennessee.

## Middle Tennessee

Circular checkmark locations are sites examined by Dr. Cole Easson.

Pinpointed locations are previous sites examined by Dr. John Copeland of LMU.



A DNA extraction was conducted on 16 samples that were collected from the six locations. 28S primers were used to generate approximately 300 base pair segments. DNA was successfully extracted from all samples tested. A gel electrophoresis image (right) shows successful amplification of 28S amplicons in selected samples.





Pictured above is a field photograph of the specimen Spongilla cenota, found at Nice Mill Dam in La Vergne, TN. This is a record find for Tennessee and with the addition of this species, nearly half of all Freshwater sponge species found in North America are found in Tennessee.



Species to date –

- Spongilla cenota
- Radiospongilla crateriformis
- Eunapius fragilis
- Ephydatia fluviatilis

Pictured to the right is a sponge displayed by Dr. Easson that has an algae symbiont shown. Upon later examination it was determined that some sponges found in the area were currently in gemmulation mode due to very poor water quality. Sponges can not tolerate poor water quality and will produce gemmules as they retreat.



#### **GENUS FREQUENCY**



- To date, four different genera have been identified from six different locations. This data is from 33 identified specimen.

### Locations to date -

- Nice Mill Dam (La Vergne, TN)
- Walter Hill Dam (Murfreesboro, TN)
- Gregory Mill Dam (Smyrna, TN)
- Little Buffalo River, (Lawrence, TN)
- Readyville Mill Dam (Readyville, TN)
- Elam Mill Dam (Christiana, TN)



Most sponges found in freshwater streams will be located on the underneath side of large rocks, as shown above.



