

## Water quality (pre-service Earth science teachers)

[Dr. Melissa Lobegeier](#) is using thecamoebians to discover a new way to look at central Tennessee water quality. By studying thecamoebian tests in lake sediments, she will place contemporary water quality in a historical context.



**Water quality:** Using thecamoebians to investigate freshwater quality today and in the recent past. This project will involve pre-service teachers in scientific studies of water quality by using a new method of examining the water quality of various bodies of water within Murfreesboro, TN using microscopic invertebrates, thecamoebians. Thecamoebians are testate rhizopods (Kingdom Protista, Phylum Sarcodina, Class Lobosa). They are small in size and build mineralized shells that can be preserved in the fossil record. Thecamoebians either secrete their shell, which is composed of silica or complex organic matter, or construct it using foreign grains cemented together. They are found in all freshwater environments, including environments with sufficient moisture such as tree bark and wet moss (Scott et al., 2001). In the last 35 years they have been used to detect eutrophication, land-use changes and pollution in Canada (Patterson et al., 1996; Kumar and Patterson, 2000; Patterson and Kumar, 2000; Patterson and Kumar, 2002; Patterson et al., 2002) and Europe (Asioli and Medioli, 1992; Asioli et al., 1996). More recently, these organisms were used as water quality indicators in freshwater lakes in Florida (Escobar et al., 2008).

Thecamoebians are valuable tools for understanding both temporal and spatial variability of anthropogenic impacts in a watershed (Scott et al., 2001). The small size of thecamoebians gives them an advantage over other groups commonly used in bioassessment, such as macroinvertebrates and fish, as they can be collected with minimal disturbance to the environment. Only small samples of sediment are needed to acquire statistically significant populations of these organisms. Another advantage is that the preservation potential of the shells allows for the collection of quantitative historical data on water quality with short sediment cores providing a record of populations dating back decades to centuries.

In 2013 participants will collect and analyze thecamoebian populations from Todds Lake in Murfreesboro. Black Fox Spring, which begins in a Tennessee Wildlife Resources Agency protected wetland, travels through several subdivisions and receives runoff from lawns and driveways (James et al., 2006). It ends at Todds Lake in Murfreesboro. Todds Lake is also located near a subdivision, a strip mall and a gas station, and could possibly be receiving runoff from those areas.

**Mentor Dr. Melissa Lobegeier.** Dr. Lobegeier has mentored 12 undergraduate researchers, including two undergraduates supported by StepMT, a project funded by the National Science Foundation. Mentored students have made numerous presentations at the Geological Society of America Annual Meeting. Although classically trained as a foraminiferal micropaleontologist, she moved into the burgeoning field of applied paleontology with an EPA

grant to study the application of thecamoebians to water quality research in the Southeastern U.S.

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