

## **Phylogeny, taxonomy and ecology of *Calostoma* (Boletales, Basidiomycetes)**

*Calostoma* is a morphologically and ecologically enigmatic genus of homobasidiomycetes (mushroom-forming fungi). This genus has a broad disjunct distribution ranging from eastern North America and the neotropics, to temperate and tropical Asia and Australasia. Forming gasteroid fruiting bodies with abundant gelatinous tissues and a brightly colored peristome, *Calostoma's* bizarre morphology has historically left its taxonomic placement in dispute. Recent molecular studies place *Calostoma* in the large order Boletales, but its exact placement is not well resolved. The ecological role of *Calostoma* is also undefined – it has been described as both saprotrophic and mycorrhizal. I propose to study the phylogenetic relationships and ecological mode of *Calostoma* using a combination of molecular, morphological, and isotopic approaches. Using phylogenetic analyses of ribosomal and protein-coding gene sequences, I will estimate both the higher-level placement and species-level relationships of *Calostoma*. I will use molecular and isotopic methods to determine whether *Calostoma* is mycorrhizal (as my preliminary results suggest) or saprotrophic. The intellectual merit of this project will result in a well-resolved phylogeny for *Calostoma*, which will be used to understand patterns of ecological and morphological evolution. Broader impacts of this study will be addressed by contributing these results to the Tree of Life web project.