Ectomycorrhizal fungi (Emf) are obligate mutualists of many ecologically and economically important tree species such as pine, oak, and cottonwood trees. Understanding the evolution of complex interactions between microbes and their plant symbionts is essential for conservation and plant systems. Russulaceae is a family of mushroom-forming fungi and one of the most diverse lineages of Emf. Here I will use a number of phylogenetic and comparative genomic approaches to discuss the evolutionary history of Russulaceae with insights into how they have diversified in relationship to their plant hosts.