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Melanin: a key trait determining both the assembly of ectomycorrhizal fungal communities and ecosystem function

#### ABSTRACT

Two of the most pressing goals in ecology are to predict the consequences of major environmental perturbations, such as shifts in climate, on the structure of biological communities, and to determine how alterations of biological communities influence essential ecosystem services and functions. Among the most important biological communities are those of soil microbes. Evidence from preliminary research suggests that a single physiological trait, melanin production, strongly influences the structure of a major soil fungal community along a precipitation gradient, and many kinds of evidence suggest that fungal melanin concentration significantly influences nutrient cycling and carbon sequestration. I propose, therefore, to link community structure to ecosystem function via the level of melanin production, a key fungal trait. Given the certainty of future perturbations in climate and other factors that affect biological communities, there is a clear need to be able to predict the effects of such perturbations on communities and, furthermore, to be able to predict the consequences of such change to critical ecosystem processes. This research has the potential to serve as a model system in which to do so.