**THE MACROEVOLUTIONARY ORIGINS AND CONSEQUENCES OF ECOLOGICAL DIVERSIFICATION IN LICHENS**

Matthew P. Nelsen1\*; C. Kevin Boyce2; Robert Lücking3; Richard H. Ree1; H. Thorsten Lumbsch1

1 The Field Museum of Natural History, USA; 2 Stanford University, USA; 3Botanischer Garten und Botanisches Museum, Germany; \* E-mail: mpnelsen@gmail.com

Here we traced the underlying pathways by which symbiotic and phenotypic diversification occurred in one of the most iconic symbioses—lichens—while evaluating their ecological and macroevolutionary consequences. By inferring a time-scaled phylogeny of over 3300 species of lichen-forming fungi (LFF), we identified occasional instances of symbiotic instability that increased both the magnitude and diversity of lichen contributions to ecosystem processes from the Mesozoic through the Cenozoic. Symbiont switches broadly coincided with shifting environmental conditions, and the convergent evolution of phylogenetically or functionally similar associations in diverse lineages. We then inferred when LFF invaded arboreal habitats, and place them in a broader and more comparative framework by highlighting their paleoecological implications, and discussing them in the context of climate, vegetation, and the evolution of other epiphytic or arboreal lineages.