

Biology Seminar

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The evolution of complexity in vascular plant reproductive structures

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Vascular plant reproductive structures are extremely diverse in form and are often quite complex; for example, many flowers are composed of highly specialized organs in intricate arrangements. Such diversity has not always been present—

the earliest known reproductive structures are very simple—but quantifying how complexity has changed through time is challenging because it is difficult to even define exactly what complexity is. In this talk, I discuss several approaches to understanding temporal patterns in complexity based on analyzing the number of component parts in reproductive structures. Using a large data set of living and fossil taxa, I analyze simple counts of part types as well as quantify functional interactions among part types using network analysis. These approaches reveal two major increases in morphological complexity, first in the Devonian and then in the Late Cretaceous, with a more gradual rise in interactions among part types over the Mesozoic. They also suggest that maximum complexity depends on functional diversity, where structures that perform more, or more specialized, functions evolve more part types and more interactions among those parts.