DEPARTMENT OF BIOLOGY | UNIVERSITY of WASHINGTON

Biology Seminar

By: Dr. Berry Brosi

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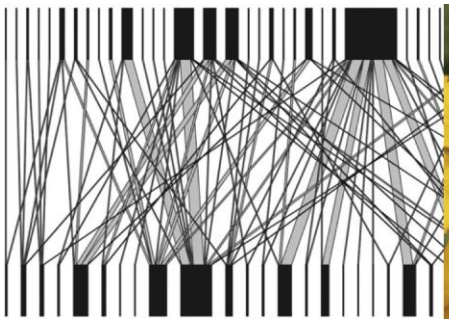
https://www.brosilab.org/

Overcoming Structure / Stability Trade-offs in Ecological Networks



Monday, October 14, 2019 | 12:00pm
HCK 132 Refreshments at 11:45am

Many biological phenomena arise from the scaling from individual interactions (e.g., between genes, proteins, metabolites, cells including neurons, organs, organisms, and species) to systems. Network approaches have transformed the study of such systems, given that the structure of networks is typically non-random and often strongly related to system-level functioning and response to perturbations. Still, many network structural features are associated with clear trade-offs. For example, in mutualistic ecological networks (networks of species interacting for mutual benefit), increases in connection density and a property called nestedness are both associated with higher robustness to coextinctions, but lower probability of local stability. Can such seemingly strict trade-offs be overcome? This is a key question at several levels of biological organization, and of particular interest in ecological networks given the near ubiquity of structural properties, including nestedness, that are associated with strong tradeoffs. One potential mechanism for ameliorating strict trade-offs in networks are combinations of topological (presence-absence of links) and quantitative (link intensity) structures. I will present results on this topic combining field data, simulation modeling, and an analytical proof. All support the hypothesis that directly contrasting quantitative and topological structures can combine to reduce tradeoffs. These results may have broad implications for how network structure affects response to perturbations in other kinds of networks, including non-biological networks. I will briefly discuss ongoing and future work in my lab related to this topic, with an emphasis on integration of theory and empirical data.

Seminar Speaker Host: David Perkel