PARIS LODRON UNIVERSITÄT SALZBURG

Umwelt & Biodiversität

SEMINAR SERIES ENVIRONMENT & BIODIVERSITY

Guest Lecture

Nathan Mucchala

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Departement of Biology – Evolutionary ecology of pollination systems

Host: Univ.-Prof. Dipl.-Biol. Dr. Stefan Dötterl und Thomas Rupp, MSc

Actinomorphy to zygomorphy: effects of floral symmetry on pollination, diversification and abundance

Ongoing climate change and global warming require a detailed knowledge of the carbon cycle to better understand feedback mechanisms and the main amplifiers of large-scale climatic changes. The Arctic region currently experiences significant warming, a dramatic loss of sea ice and an increase of primary productivity. Thus, the transformation from seasonally ice-covered into a permanently open ocean forces the Arctic marine ecosystem to adapt and restructure. This has important repercussions on the Arctic carbon cycle, including atmospheric CO2 uptake by photosynthetic algae, the deposition of their organic remains to the seafloor, and long-term sequestration into sediments.

While the ancestral symmetry of angiosperm flowers is actinomorphic (radial symmetry), hundreds of lineages have independently evolved zygomorphic flowers (bilateral symmetry). Such shifts are associated with more specialized pollination systems, and lead to significant increases in diversification rates. But what are the actual benefits of zygomorphic flowers for a plant? We performed flight cage experiments with nectar-feeding bats and artificial flowers, testing how floral symmetry and orientation affect pollen removal and transfer. Nearly twice as much pollen was transferred between zygomorphic flowers, but only when angled at 45°, causing pollen to be consistently placed on the tops of bats' heads. When flowers were positioned flat (pointed upwards), bats approached from many different angles, and zygomorphic flowers performed no better than actinomorphic ones in terms of pollen transfer. Results suggest that shifts to zygomorphy allow more specialized pollination systems which, with the correct floral orientation, maximize pollen transfer success. In the final part of the talk, I explore why such specialized pollination is associated with increased diversification rates, presenting evidence that in fact zygomorphy acts to decrease extinction rates rather than (as often assumed) acting to increase speciation rates.

Friday, June 9, 2 PM

Online-Lecture

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