ENTANGLED IN A WEB (OF MUTUALISTIC INTERACTIONS)

Summary

A network is a set of elements called nodes, linked by a particular kind of interaction. In ecology the network approach is most useful for studies of food webs, epidemiology, spatial connections and mutualistic interactions. As recently demonstrated, especially plant-pollinator interactions play a crucial role in generating and sustaining biodiversity of terrestrial ecosystems. They are even regarded as "architecture of biodiversity". Usually they connect dozens or even hundreds of species, forming complex networks of reciprocally beneficial interactions. A comprehensive study of complex interactions, involving many species that form networks of various connections, has always been a difficulty in ecology. New mathematical tools allow to analyze the network properties (nestedness, node degree distribution etc.) and structure (*via* designation of species playing structural roles in the studied ecosystem), which is highly heterogeneous and asymmetric: most of the species are rather weakly connected, while some of taxa develop much more connections or much stronger relationships that expected by chance. Asymmetry distinguishes mutualistic networks from the random ones, which are highly homogenous. The repeatability of structural traits over different types of mutualism suggests that there is a common mechanism of the formation and development of various networks or system persistence. In particular *nestedness*, which is an expression of the network asymmetry, seems to play a crucial role in the functioning of real-world networks. It can be observed when the web is depicted as an adjacency matrix or a diagram, where the nodes are organised according to descending node degree. The recent discovery of the properties of complex networks mark out the necessity of new studies to be done, for the observed patterns have a crucial significance in the comprehensive understanding of the process of co-evolution and finding solutions for efficient biodiversity protection as this theoretical approach can be applied to indicate "keystone" species which determine stability of the systems in question.