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**The paradox of the plankton: linking theory to global biodiversity,
biogeography and ecosystem function**

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How it is possible for a large number of species to coexist in an environment, when all competing for the same limited resources? This question has been asked, and answered, many times by plankton ecologists over the past half-century. I will talk about the conceptual basis of some of the proposed solutions, and will then go on to look at their large-scale implications for ecosystem function in global ocean models. Topics will include multiple limiting resources; environmental heterogeneity; plankton size; trade-offs between growth, resource acquisition and storage; grazer avoidance and mixotrophy.