

## **Diversity emerging: from competitive exclusion to neutral coexistence in ecosystems**

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### **Abstract**

In this communication, we present a unifying framework to understand the emergence and maintenance of diversity in ecological systems. We do this by developing a deterministic population model including density-dependent limitation in resources and available space. Our model shows that competitive exclusion and neutral coexistence represent different regimes of the same adaptive dynamics suggesting that neutrality is the general result of an adaptive process in a finite habitat with limited energetic resources. Our model explains the emergence of biodiversity through mutation and its maintenance through neutrality. We show that this framework provides the theoretical foundations to understand the emergence and maintenance of diversity in microbial ecosystems.

### **Keywords**

Emergence, Diversity, Adaptive dynamics, Competition, Neutrality.