

MICROBIAL ECOLOGY

Obeying the law

Large islands have more indigenous species than small islands — a reflection of the taxa-area relationship, an ecological law that applies to animals and plants. Some scientists thought that the number of microbial species (both prokaryotes and eukaryotes) found in samples would be a random mix, since the dispersion of microorganisms is much less restricted than that of animals and plants. Essentially, this view held that species number would be independent of the size of the area sampled. Now, two papers published in *Nature* report that microbial diversity is area-dependent and that the taxa-area relationship is a universal law.

Using culture-independent sampling methods to document species diversity, two groups investigated whether the size of the area sampled has any relationship with microbial diversity. Green and co-workers sampled microbial *Ascomycota* fungi in the desert soil of a 62-square-mile Australian park, whilst Horner-Devine and colleagues sampled bacteria in the sediment of half an acre of a salt marsh in New England, USA. Samples were analysed using molecular techniques such as ARISA (automated ribosomal RNA intergenic spacer analysis) — a community fingerprinting technique — for the fungal samples and 16S rDNA sequencing for the bacterial samples. Statistical analyses revealed that fungal and bacterial communities that were close together were more similar than communities that were sepa-

rated by large distances. Community differences seem to result from the effect of local environmental factors rather than geographical separation.

Not only should microbiologists appreciate that the microbial world is incredibly diverse, uncultured and largely uncharacterized, we should now realize that microbial communities are not random mixtures but are structured communities that obey the universal taxa-area relationship. Since microorganisms participate in biogeochemical processes that are essential for life on Earth, understanding microbial diversity has important implications for all of us.

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References and links

ORIGINAL RESEARCH PAPERS Green, J. L. *et al.* Spatial scaling of microbial eukaryote diversity. *Nature* **432**, 747–750 (2004) | Horner-Devine, M. C. *et al.* A taxa-area relationship for bacteria. *Nature* **432**, 750–753 (2004)

