

Bozen 2018



Follow micro-organisms MacArthur's and Wilson's equilibrium theory of island biogeography?

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In our 2016 meeting, I reported on "Dispersal of ciliated protozoa: lessons from a 4-year-experiment with environmental mesocosms". The experiment was performed in three plastic containers filled with tap water and pieces of broken glass: 1.5 l, surface area 468 cm²; 6 l, 875 cm²; 12 l, 1500 cm². The containers were placed on the south of a roof garden with vegetables and were investigated monthly.

Altogether, only 20 ciliate species were observed at 25 sampling occasions during April 2009 and October 2012: 14 species in the 1.5 l container, 11 in the 6 l container, and 9 in the 12 l container. This was opposite the expectation, viz., the widely accepted MacArthur's and Wilson's (AW) theory of island biogeography, i.e., that the number of species increases with area size. When I asked the audience for an explanation, only one colleague gave a rather harsh comment, viz., that my analysis was wrong because based only on ciliates while the AW theory requires the investigation of many groups of organisms in a certain area. She suggested me to attend her university lecture on ecology. However, I could not remember to have seen an investigation of this kind. Indeed, her suggestion was nonsense as you can see in the book of AW and many textbooks on ecology.

MacArthur and Wilson (1967) noticed in their book that some data do not or only partially fit their theory. They explained this with special ecological conditions. However, later several studies questioned AW, e.g., Dickerson and Robinson (1985), who performed a similar experiment as I did, using ciliates and some algae. They state: "Contrary to the MacArthur-Wilson prediction, small microcosms had significantly higher species richness than large microcosms." They showed that habitat quality and/or species diversity appear to be more important than area size. In this context, we should remember AW: "Differences in the ecology among islands can distort the area-diversity curve because such differences do occur over short distances in many parts of the world; area alone cannot be assumed in any particular case to be a precise predictor of species diversity". Unfortunately, this does not help my data because the containers were virtually identical and side by side except for the amount of water and surface area. Thus, the island theory of AW is questioned for micro-organisms. Supported by the FWF, Project 26846-B17.

References

- Dickerson, J.E.Jr., Robinson, J.V. 1985. Microcosms as islands: a test of the MacArthur-Wilson equilibrium theory, *Ecology*, 66, 966–980.
- MacArthur, R.H., Wilson, E.O. 1967. *The Theory of Island Biogeography*. Princeton University Press, New Jersey. V + 203 pp.