Dispersal of ciliated protozoa: lessons from a 4-year-experiment with environmental micro-and mesocosms

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Still, there is a widespread believe that microscopic organisms have cosmopolitan distribution because they are easily spread by, e.g., air and water. Presently, two dispersal models are discussed, viz., cosmopolitanism vs. moderate endemicity (~ 1/3 of species). Current research clearly favours the moderate endemicity model ranging from bacteria to rotifers. However, the reasons for the restricted distribution remain unclear. Several have been discussed, e.g., dispersal by air, water, animals and low cyst weight. Thus, I performed a 4-year-experiment using a microcosm with 1.5 l water and two mesocosms with 6 and 12 litre water. Each container was investigated monthly. As the early data showed few species and considerable extinction, I performed two kinds of controls: centrifuged container water was used as culture medium for a variety of ciliates and a chemical water analysis at end of the experiment. Altogether, only 20 ciliate species were observed at the 25 sampling occasions: 14 in the 1.5 l microcosm, 11 in the 6 l, and 9 in 12 l mesocosms. Most of the species found are terricole or semiterricole, and all can produce resting cysts. The observations show repeated extinction and recolonization of the ciliate fauna. Air dispersal was dominant. As many cyanobacteria developed, I supposed that they produced substances restricting ciliate growth. However, this was disproved by the controls mentioned above. Dispersal by animals was also observed, viz., once I saw a raven cleaning a piece of bread in the 6 l container followed by a ciliate bloom. Masses of cyanobacteria, various algae, rotifers (*Phialina roseola*), and biting midges developed frequently; especially, the insect larvae fed on the accumulating mud destroying cyst reservoirs. Island biogeography suggests the larger the area the more species. The opposite occurred in my experiment.

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