Artificial selection of ecological interactions in microbial communities

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Abstract

Artificial selection of communities in laboratory conditions generally consist in selection procedures on two-species communities of macro-organisms. Alternatively, artificial selection has been applied on multi-species microbial communities, but they lack to provide clear evidence for selection occuring at the level of ecological interactions. We set up an original protocol for microbial community selection at low cost, in a minimal time and space. The selected trait was the CO2 emission. For twenty one generations, we selected three communities among thirty in each one of the six lines for random (control) or low CO2 emission. In the low emission lines, we observed a decrease in CO2 emission as compared with the control treatment, which means that artificial selection was efficient. At the end of the selection experiment, the genetic structure of the community was analyzed with a fingerprint method, which provides an indicator of the number of species through the number of DNA fragments of different lengths. We found that diversity was lower in the selected lines as compared with the control lines. We evaluated ecological interactions between " species " on the basis of the correlation coefficient. We observed an effect of the artificial selection treatment on the structure of the interaction network. The same species could be involved in positive interactions in the control, but in negative interactions in the low CO2 emission treatment. Agregation also differed between the two treatments. These results indicate that artificial selection can be efficient in selecting ecological interactions emerging at the community level.

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