Community coalescence and transplanting of acidophilic communities.

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In nature integral communities of microbes frequently move between ecosystems in a process called community coalescence. Here we use acidophilic communities from mine waste sites to test the potential of such communities to coalesce and their local adaptation. In industrial applications, microbial communities from acidic environments are frequently mixed to create an optimal inoculum but mechanisms behind it are poorly understood. Recent studies show that in other systems one community can dominate the structure of the coalesced assembly, at the same time maximising its function. We mixed four acidophilic communities in groups of two, three and four, grew them on pyrite and compared their function and structure at the start and end. To test local adaptation, we transplanted twelve communities in reciprocal substrates and compared their final performance in terms of acid generating potential. We found that the best performing mixtures contained the community performing best in isolation. The mix of all four communities generated the most acidity overall. The starting composition did not predict the efficiency of the coalesced communities, but their final structure correlated with performance. The communities studied did not show local adaptation: community performances were driven by substrates quality rather than by the community composition. Our findings are relevant to the understanding of the ecological dynamics of microbial acidophilic communities as well as showing ways for predicting how microbial communities perform prior to running bio-leaching processes.