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# Evidences for a core microbiota resulting from earthworm-plant interactions

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## Abstract

The core microbiota concept has been proposed to describe the subset of a microbiota associated with a given host and going beyond macroenvironment differences. In soils, there is an overlap between the so-called rhizosphere and the drilosphere (burrows and casts), defined as the functional domains under the influence of plant roots and earthworms respectively. Plants and earthworms have been sharing the same soils over geological times, thus microbial communities living at the congruence of rhizosphere and drilosphere could be specific of plant-earthworm interaction, as a consequence of their coevolution. Here we tested the hypothesis that a specific core microbiota exists in rhizosphere in the presence of earthworms and in drilosphere in the presence of plants, that remains consistent in three different soils. We grew barley in microcosms in the presence/absence of the endogeic earthworm *Aporrectodea caliginosa* and investigated the structure of microbial communities (16S rRNA gene amplicon sequencing). We found that (i) rhizosphere community assembly was always impacted by the presence of earthworms and (ii) cast communities were controlled by earthworms in the rich soil, but mainly under the influence of plants in the poor soil. We observed a core microbial co-occurrence network of plant/earthworm interactions, shared in cast and rhizosphere and absent from the bulk soil, with a modularity corresponding to the type of soil. Tracing back the origin of microbial taxa according to a hierarchical model, we established that microbial communities from rhizosphere in the presence of earthworms and from casts in the presence of plants were mainly originating from (1) the bulk soil and (2) microhabitats shaped by plants or earthworms alone. A significant remaining proportion of the microbial community was strictly due to the plant-earthworm interaction, justifying the claim that a core microbiota can be specific of an interaction between macro-organisms such as plants and earthworms.

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