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## **BIOLOGICAL SOIL CRUSTS: ANCIENT AND WIDESPREAD MICROBIAL COMMUNITIES**

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In areas where plant cover is restricted and plant litter scarce, light reaches unimpeded the soil surface, creating a habitat for microbial phototrophs. These in turn support plant-independent complex soil communities known as biological soil crusts (BSCs) because of the physical effect they have on soil surface consolidation. It is now known that BSCs account for a sizeable fraction of the global microbial phototrophic biomass, and that they are globally relevant contributors to the nitrogen cycle. At the local scale, they become important ecosystem components, particularly in arid lands, as agents of C and N fertility, as well as in erosion control. But BSCs face serious challenges from a variety of human activities, chiefly from trampling by cattle and off-road vehicles. Consequently, the enhancement and restoration of natural BSC cover is emerging as a promising means for sustainable management of arid soils, with significant efforts are being currently conducted in China, Europe and the US. Recently presented fossil evidence suggests that BSC-like communities have colonized Earth's terrestrial sediments since at least the mid Proterozoic (1.3 billion years ago), and may represent the major type of terrestrial ecosystem before the advent of higher plants in the Devonian, some 0.4 billion years ago. In this presentation, I review some of my group's findings regarding the biology of soils crusts, in which we used a variety of approaches that combines traditional microbiology and omics-based microbial ecology techniques with geoscience.

