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Microbial Assimilation of Atmospheric CO_2 to Synthesize Organic Matter in Soils

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Like higher plants, microbial autotrophs possess photosynthetic systems that enable them to fix CO_2. Whilst present in large numbers in soils, the capacity for soil microorganisms to fix CO_2 and their importance in terrestrial C cycling has not been quantified. To measure the activities of microbial autotrophs in assimilating atmospheric CO_2, seven different soils were incubated with 14C labelled CO_2 for 80 d, and the 14C-labelled organic C synthesized was determined. The results indicate that the synthesis rates of 14C-lablled organic C ranged from 0.0134 to 0.103 g C m$-$2 d^{-1}, and were closely related to RubisCO activities and the abundance of cbbL-genes in the soils, indicating that the synthesis could be attributed to soil microbial autotrophs. This finding suggests that microbial assimilation of atmospheric CO_2 is an important process in the sequestration and cycling of terrestrial C that, until now, has been largely ignored.