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Incorporation of microbial biomass carbon into the soil microbial food web and soil organic matter

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Soil organic matter is one of the most important pools of the global carbon cycle. Soil microorganisms do not only catalyze its mineralization and transformation, but they are also a carbon source for the formation of refractory soil organic matter. We tested the relevance of this carbon source by incubation of soil with genetically and ^{13}C-labeled *Escherichia coli* cells. We analyzed cell survival, carbon mineralization and stabilization, the persistence of the genetic label, and the incorporation of the labeled carbon into fatty acids and the microbial food web. After 15 weeks, no more viable cells were detectable, but after 32 weeks, only about half of the carbon was mineralized and the genetic label still could be detected. The fatty acids originating from *E. coli* were readily degraded, but the incorporation of the label into some other fatty acids indicated that the *E. coli* biomass carbon was incorporated into other microorganisms. Molecular analyses showed rapid incorporation into fungal rRNA. Bacteria also incorporated the labeled carbon, and some taxa were distinctively feeding on *E. coli* biomass, because they contained no unlabeled rRNA. These bacteria belong to groups characterized by gliding motility and known as micropredators and seem to efficiently utilize carbon supplies to a nutrient-poor system such as soil. This study traced the fate of microbial biomass carbon in soil for the first time in such detail.