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## Fungal-bacterial mutualistic mechanism; fungal highway and bacterial toll

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Physical spaces and nutrients are prerequisites to the survival of organisms while no interspecies mutual strategy is documented that satisfies them. Here we find that bacterial cells co-cultured with fungus travel along the mycelia at a rate of  $\sim 30 \mu\text{m s}^{-1}$  and disperse with fungal colony expansion. This bacterial dispersal requires intact flagella and results in expanded bacterial colonization, indicating that mycelia are beneficial “highways” for bacteria to explore spatial niches. Transcriptome analysis indicates that the species interact through thiamine. The wild-type bacterium, but neither the thiamine biosynthesis- nor flagella-deficient strain, is obligatory for growth of the thiamine auxotrophic fungus, indicating that the bacterium travels along mycelia to deliver thiamine to the fungus. These evoke a novel mutualistic strategy that facilitates the communicating species to compete for environmental niche and nutrient respectively.