Bacterial volatile ammonia regulates the consumption sequence of D-pinitol and D-glucose in a fungus associated with an invasive bark beetle

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Interactions among microbial symbionts have multiple roles in the maintenance of insect–microbe symbiosis. However, signals mediating microbial interactions have been scarcely studied. In the classical model system of bark beetles and fungal associates, fungi increase the fitness of insects. However, not all interactions are mutualistic some of these fungal symbionts compete for sugars with beetle larvae. How this antagonistic effect is alleviated is unknown, and recent research suggests potential roles of bacterial symbionts. Red turpentine beetle (RTB), dendroctonus valens LeConte, is an invasive pest in China, and it leads to wide spread, catastrophic mortality to Chinese pines. In the symbiotic system formed by RTB, fungi and bacteria, volatiles from predominant bacteria regulate the consumption sequence of carbon sources D-pinitol and D-glucose in the fungal symbiont Leptographium procerum, and appear to alleviate the antagonistic effect from the fungus against RTB larvae. However, active components of these volatiles are unknown. We detected 67 volatiles by gas chromatography-mass spectrometer (GC-MS). Seven of them were identified as candidate chemicals mediating bacteria-fungus interactions, among which ammonia made L. procerum consume its secondary carbon source D-pinitol instead of its preferred carbohydrate D-glucose. In conclusion, ammonia regulated the consumption sequence of these two carbon sources in the fungal symbiont.

Speaker Biography

Min Lu is a Professor at the Institute of Zoology (IOZ), Chinese Academy of Sciences (CAS). He received his PhD in Ecology from Institute of Zoology, Chinese Academy of Sciences, China, and held a postdoctoral fellow from 2008-2009 in FABI in University of Pretoria, South Africa, and then an Associate Professor position from 2011-2015 at the Institute of Zoology, CAS. His research includes forest protection, invasion biology, and microbial ecology. He made great achievements in the scientific research of the invasive mechanism of insect-microbial symbiosis, and published more than 20 SCI papers in *Ecology*, the ISME *Journal* and *Annual Review of Ecology*, *Evolution* and *Systematics* etc.

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