Title:	Multimodal inhibition of the weedy fungi in the gardens of Odontotermes obesus
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Abstract:	Termites feed on different lignocellulosic biomass which are chemically recalcitrant and require a nutritional symbiosis with microbes to digest. Fungus-growing termites (Subfamily Macrotermitinae) have evolved to cultivate a specialized fungus, Termitomyces, as food which is cultivated on a spongy substrate called the fungus comb. But these fungal crops face constant threat of invasion by other weedy fungi, like Pseudoxylaria, which can take over the crop fungus. My thesis tries to answer how these weedy fungi are kept in check by secondary bacterial symbionts found in these colonies and what are the relationships between them and the crop and weedy fungi. Using both culture-dependent isolation of bacterial and fungal strains and culture-independent surveys using the Nanopore platform, I report the presence of several bacterial mutualists which can prevent the weedy fungus while keeping the crop fungus relatively unharmed. A sequential analysis of both the micro- and mycobiota of a degrading fungus combs identified some of the roles of these microbes in maintaining a healthy fungus comb where a coupled dynamics in the fungal and bacterial communities were seen. However, this survey also indicated the near absence of any other fungi in the comb, in spite of it being an ideal growth chamber of various other non-specific fungi. Therefore, I hypothesized that as Termitomyces and Pseudoxylaria are strictly termite associated fungi, they could have roles in controlling the growth of non-specific fungi. Through in vitro interaction assays I found that both Termitomyces and Pseudoxylaria can indeed inhibit many of these fungal contaminants. However, as Pseudoxylaria inhibits Termitomyces, I introduce a verbal model to explain the dynamics of the symbiosis. This model postulates that the fungal contaminants are prevented by Termitomyces, Pseudoxylaria as well as some bacterial mutualists. Pseudoxylaria, in its turn, is prevented by some of the bacterial mutualists as well as by the termites.
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