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Aposymbiosis of an endofungal bacterium impacts on sexual reproduction of its fungal host

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Purpose: Bacterial endosymbionts in fungi are known as endofungal bacteria, and they mostly occur in the phylum *Mucoromycota*. Although the number of researches focused on the biodiversity of these bacteria are increasing, how the endofungal bacteria affect the hosts is still elusive. Recently, we reported that *Burkholdericeae*-related endobacteria (BRE) associated with 53 isolates consisting of 22 species of *Mortierella* obtained from Japan. Among these BRE-harboring isolates, a homothallic isolate YTM39, which is described as *Mortierella sugadairana*, did not produce its homothallic zygospores in zygospore-inducing conditions that are suitable for other non-BRE-harboring isolates of this species. Considering this infertile isolate, we hypothesized that the BRE can affect the zygospore production in this isolate.

Methods: In order to test this hypothesis, we tried to eliminate the BRE from this isolate by single-sporangiospore isolation and antibiotic treatment. Then, we compared the zygospore production of BRE-harboring and BRE-free clonal lines originated from the isolate.

Results and conclusions: As a result, we successfully obtained BRE-free clonal lines by occasional spontaneous loss of the BRE through single-sporangiospore isolation and antibiotic treatment. We also found that the BRE-free clonal lines restored the zygospore production. This finding is the first case showing that a BRE can inhibit sexual reproduction of its fungal host.