Ingestion of Bacillus cereus spores dampens the immune response to favor bacterial persistence

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Members of the *Bacillus cereus* group are spore-forming bacteria commonly associated with foodborne outbreaks. The capacity of these bacteria to form highly resistant dormant entities, called spores, enables them to survive under extreme conditions. *Bacillus thuringiensis* (*Bt*) belongs to the group of *B. cereus*. Thanks to the toxins (named Cry) *Bt* produces during sporulation, *Bt* spores are the most used microbial insecticide to specifically kill lepidopteran larvae, a major pest crop. Here, we were interested in the fate and behavior of *Bt* and *Bc* in the intestine of *Drosophila* and mice (two organisms not targeted by *Bt* Cry toxins) upon ingestion of spores, as well as the innate immune responses mounted by the host.

Spore

Favorable environment & Nutrient availability

Germination

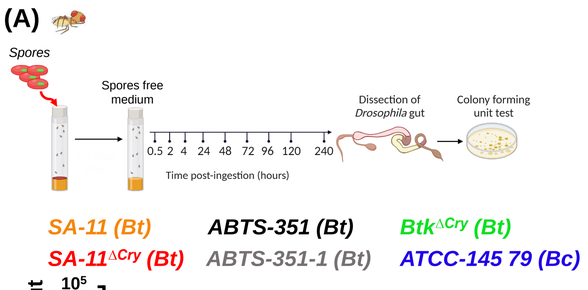
Vegetative cells

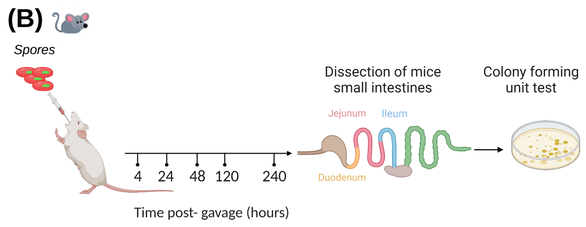
Proliferation

Stress & Nutrient scarcity

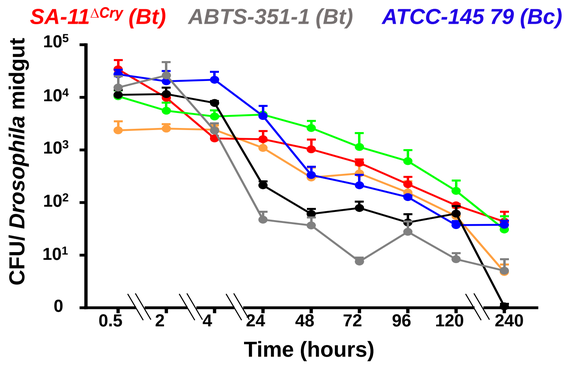
Sporulation

1) Bacteria of the *B. cereus* group persist in *Drosophila* and mice guts upon spore ingestion

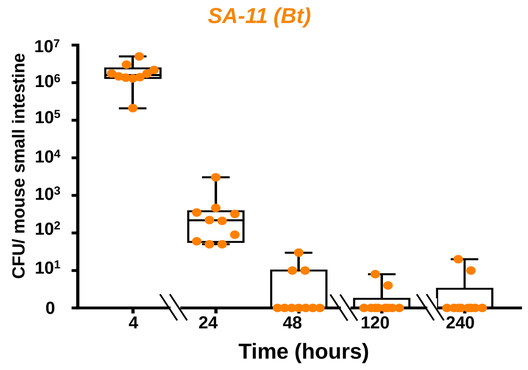


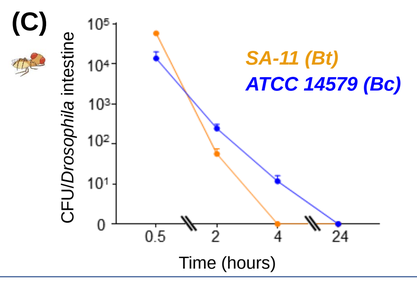


SA-11 (Bt) *ABTS-351 (Bt)* *Btk$^{\Delta Cry}$ (Bt)*
SA-11$^{\Delta Cry}$ (Bt) *ABTS-351-1 (Bt)* *ATCC-145 79 (Bc)*

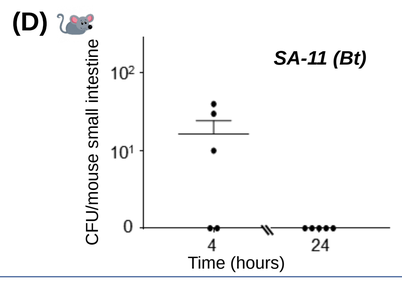


SA-11 (Bt)

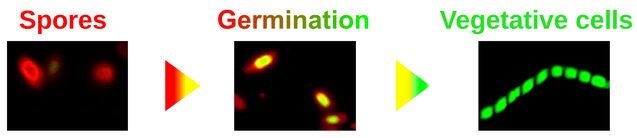


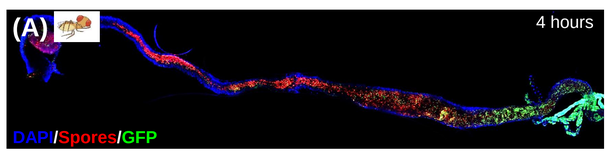


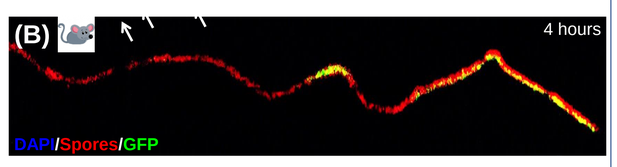
Vegetative cells

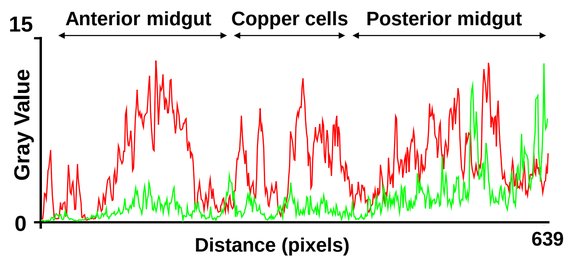


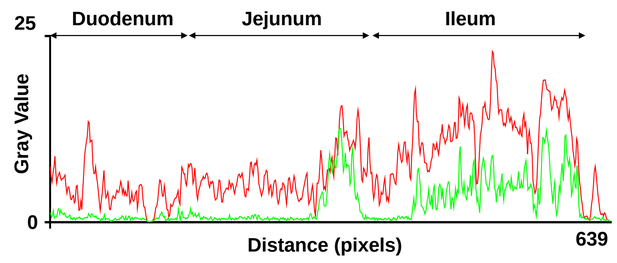
2) Spores of the *B. cereus* group germinate preferentially in the intestinal posterior regions

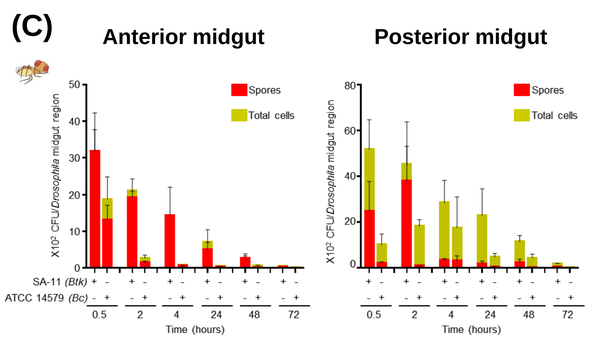


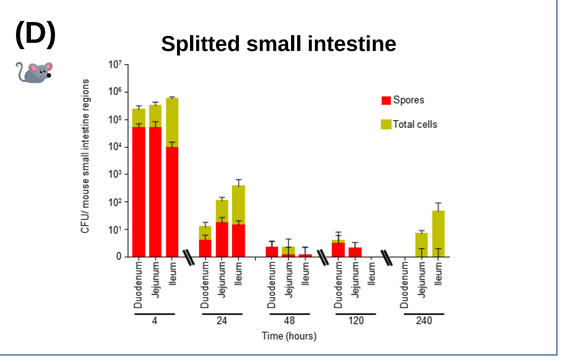




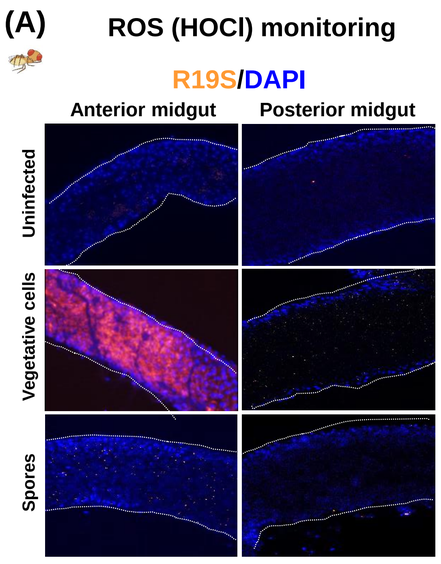


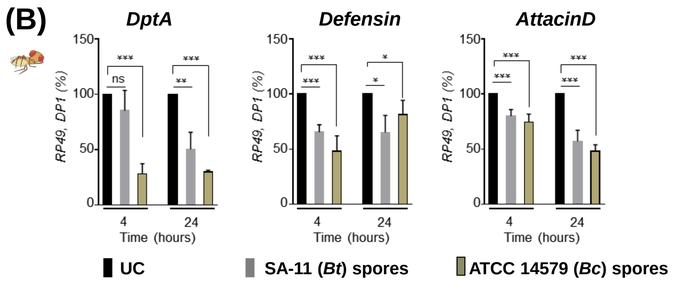


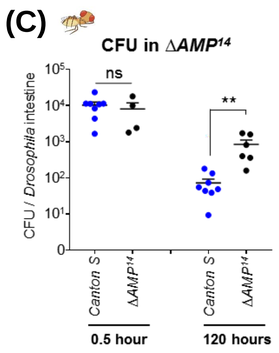


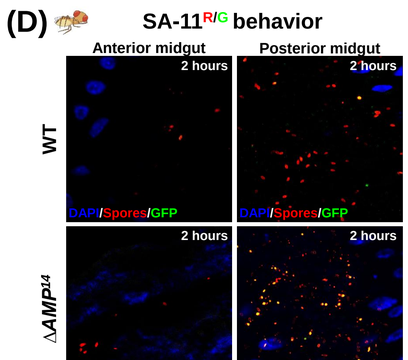


3) Spores do not trigger innate immune response in *Drosophila* midguts

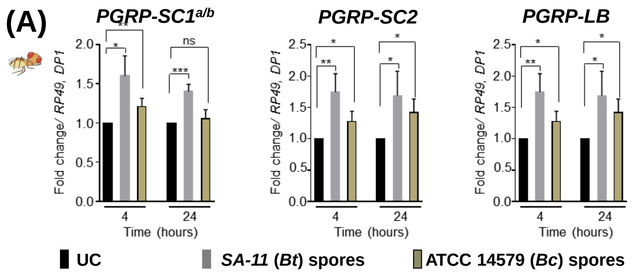


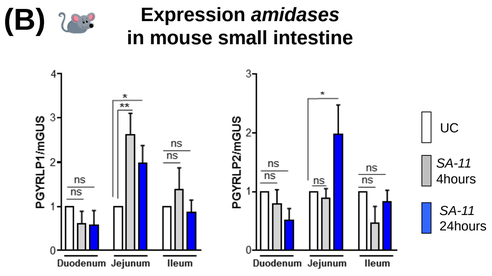


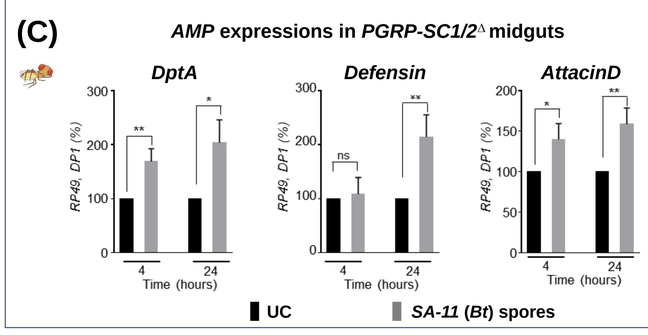


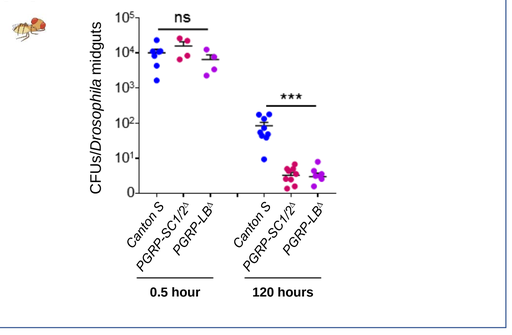


4) Amidases are involved in the intestinal persistence of *Bt/Bc*

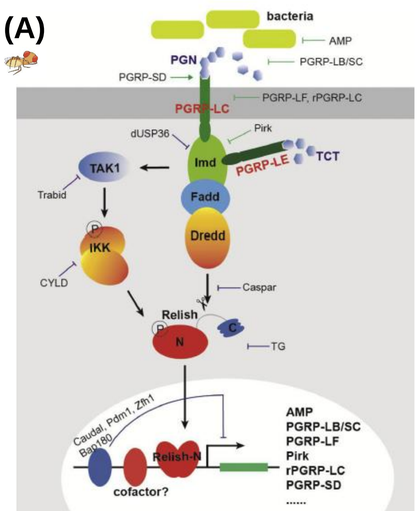




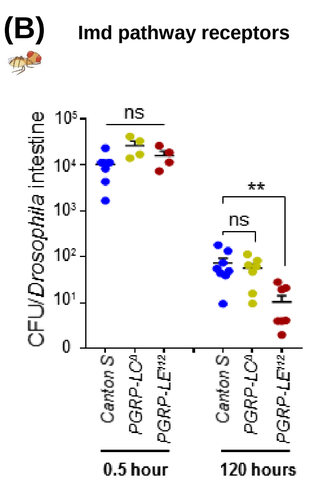


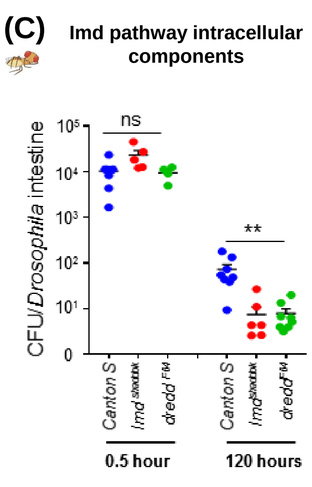


5) PGRP-LE but not PGRP-LC is involved in *Bt/Bc* persistence



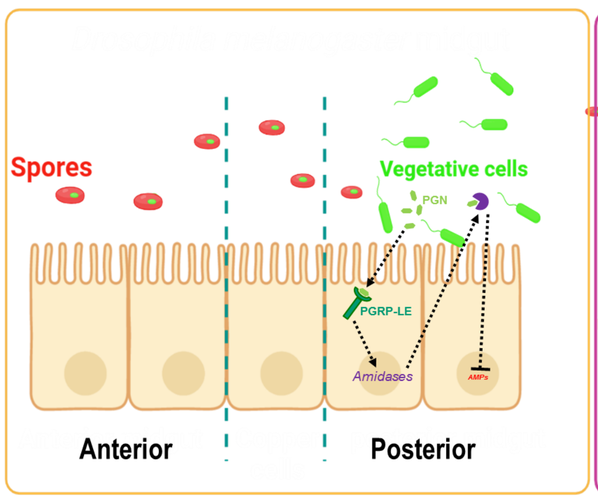
Adapted from Zhai et al., 2018

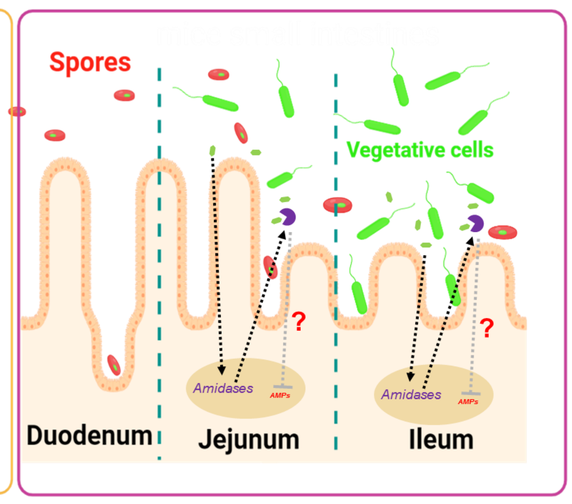




Conclusion and Model

Ingestion





Reference

Hachfi S. et al., : "Ingestion of *Bacillus cereus* spores dampens the immune response to favor bacterial persistence" (2023). *bioRxiv*