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Elucidating Host/Microbe Interactions by Comparing Ancestral and Evolved Burkholderia Resistances to Dictyostelium discoideum

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Elucidating Host/Microbe Interactions by Comparing Ancestral and Evolved *Burkholderia* Resistances to *Dictyostelium discoideum*

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Complex relationships shape how species evolve. *Dictyostelium discoideum*, a social amoeba, is an excellent evolutionary model because its behaviors provide insight on altruism, self-sacrifice, cooperation, and how these behaviors evolve. Studies found that *Dictyostelium* survival improves when evolved in the presence of *Burkholderia*, its intracellular symbiont. However, little is known about how *Burkholderia* and *Dictyostelium* adapt to each other. Specifically, I ask whether *Burkholderia* resistance, using maximum growth rate as an estimate of fitness, to *Dictyostelium*, increases or decreases when *Burkholderia* is evolved in the absence of *Dictyostelium*. Slow growth in evolved *Burkholderia* compared to ancestral *Burkholderia* may indicate that, when isolated from *Dictyostelium*, *Burkholderia* lost adaptations that improved its resistance to *Dictyostelium*. Thus, the presence of *Dictyostelium* would motivate *Burkholderia*'s resistance adaptations. Alternatively, fast growth in evolved *Burkholderia* compared to ancestral B*urkholderia* suggests evolved *Burkholderia* acquired new or better resistance adaptations in the absence of *Dictyostelium*. This result would indicate *Dictyostelium* inhibits Burkholderia resistance adaptation. Addressing fitness adaptations specifically due to the laboratory environment, I show that evolved *Burkholderia*, when plated without *Dictyostelium*, grows faster than ancestral *Burkholderia*. Adaptation to the laboratory environment caused an increase in evolved *Burkholderia* growth rate relative to the ancestral growth rate; I used this data to establish a baseline for determining variation in resistance to *Dictyostelium*. To assess *Burkholderia* resistance, I will then compare growth rates of evolved *Burkholderia* to ancestral *Burkholderia* growth rates in the presence of *Dictyostelium*. The data collected from this project will provide insight on how evolution influences existing host/microbe interactions.