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1. One thing I noticed was that this study only evaluated phage therapy over the course of the life of one plant. I have questions as to whether this would be an effective long-term therapy or whether the bacteria would eventually evolve mechanisms to both overcome phage infection and maintain nutrient intake.
2. I do not understand figure 2b. Maybe I'm just not getting it but I just fully do not know what it is showing. I wonder if Ian knew what it meant.
3. It didn't seem like the tomato plants fruited in this study, or at least they didn't mention it. I'm curious as to whether the phage therapy would have any effect on that; I would assume it increases fruiting since the leaves are less wilted and a greater rate of photosynthesis can occur.
4. Is it possible to identify a phage that binds to an incredibly essential receptor, such as one that serves as the receptor for a key signal or nutrient, and utilize that in phage therapy so any attempt to evolve resistance through the receptor would be impossible?

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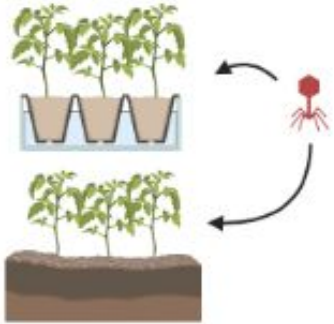
Experiment: long term phage therapy

Tomato plants are cultured in sterile environment and transplanted into a field infected with pathogen. An identical experiment will be done in a greenhouse in the greenhouse, the soil will be innoculated with pathogen at the same time the field plantsare transplanted .Because this study is looking at long term effects, a control group of unaffected plants will be left in the greenhouse group.



After 7 days (taken from og study) the rhizosphere will be innoculated with the same phage concentrations as the first study. The control will remain plants that have not been innoculated.

Plants will be allowed to go one full season. Disease incidence will be recorded and soil samples will be taken. Crop yield will also be recorded, where applicable.

Genetic, ecological, and disease incidence data will be compiled and analyzed to determine the long-term effects.

The experiment will be repeated over four years, with the field tomatoes beig planted in the same field and innoculated with the phage from the end of the previous year and the greenhouse tomatoes being innocuaed with phage and pathogen isolated from the oil from the previous year. Because of the ability to control the environment of a greenhouse, an expedited trial will be run in the greenhouse in addition to the trial mirroring the field experiment for the same number of years in order to see the extreme long term effets.

Proposed Experminet: creating an "evolution proof" phage

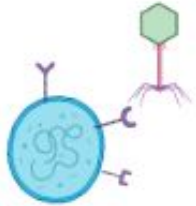
identify key receptors on the pathogen bacterium that would be candidates for the phage target

Search through the phage database for phages that bind to a similar receptor in another bacterium (or this one if we're lucky)

If a phage that infects a hist other than the pathogen is identified, isolate the recpetor binding protein and graft it into the genome of a phage with HIGH specificity for the pathogen

From the soil sample, isolate and culture the phage and the pathogen and determine resistence development by comparing combinations of ancestral bacteria, contemporary bacteria, initial modified phage, and contemporary modifed phage

Has it evolved resistance? Did it find another way to block it than the receptor? Would pairing it with another phage prevent this?



In the lab, attempt to infect the pathogen with the new phage. If infection is unsuccessful, troubleshoot potential reasons for failure, such as aa differences in the receptors, and attemp to modify to match. This is obviously way easier said than done but hey, it's just an idea, I got a little ambitions when I chose this one.

Innoculate a series on tomato plants that have been treated with the pathogen with different concentrations of the phage, use a negative control of no phage and a postive control of no pathogen

Take soil samples and record disease incidence