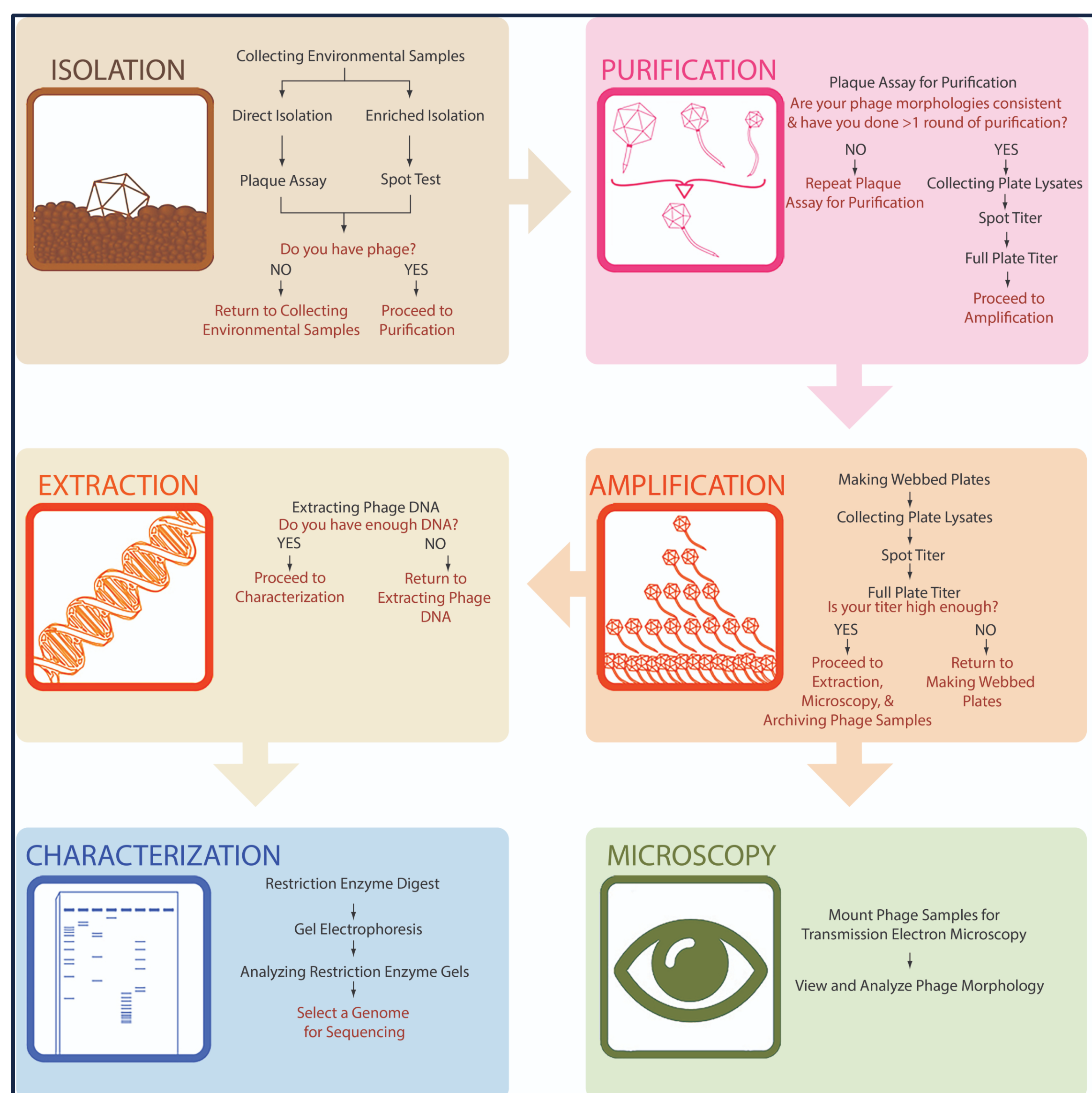


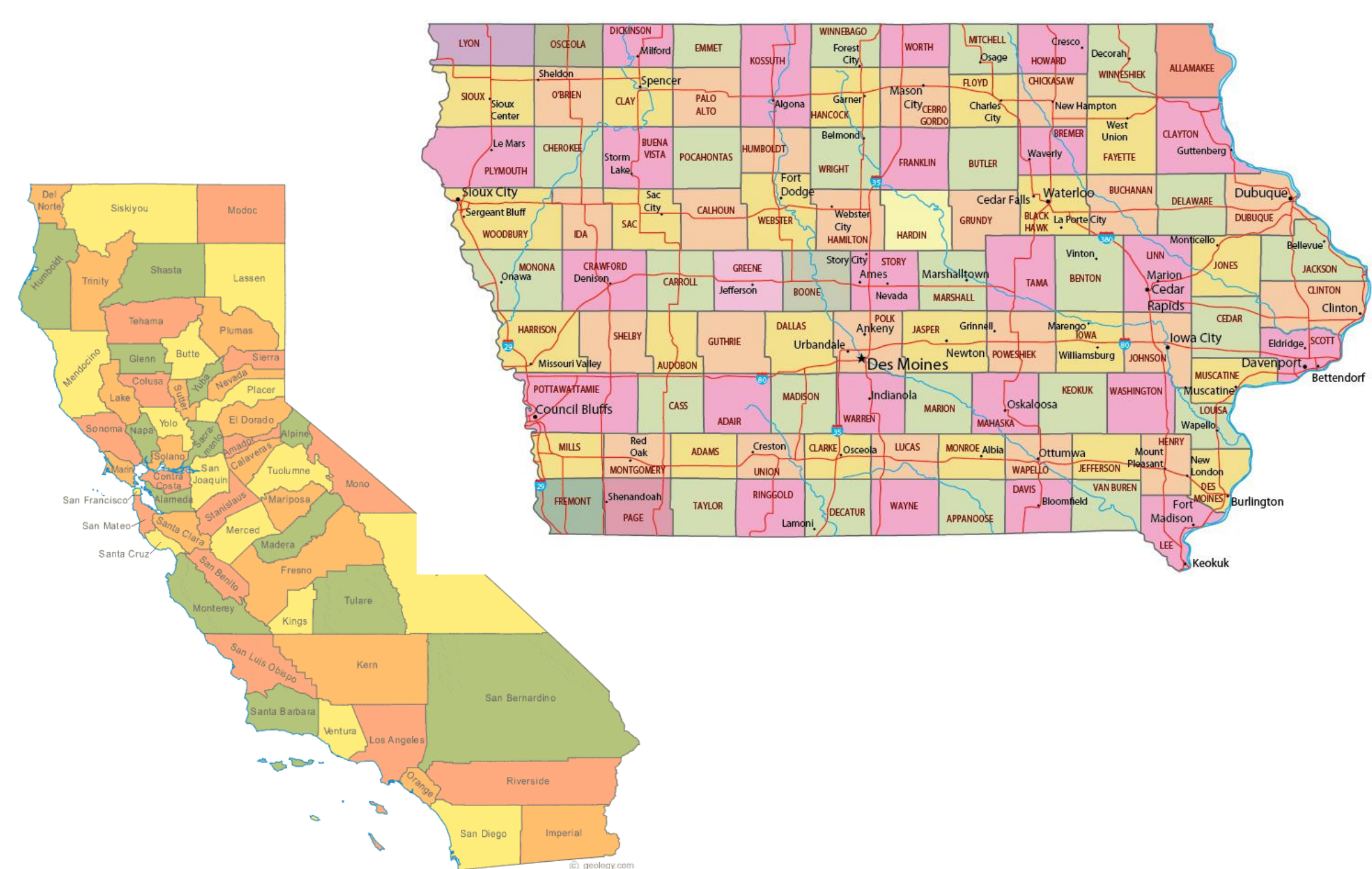
Julia Kutz, Ryan Dodds, Logan Dykstra, Taylor M. Rentschler, Emma Steinhardt, Megan VanGarven, Jacie VanderWaal, Shayler VanGelder, Byron Noordewier, and Sara S. Tolsma
 Department of Biology, Northwestern College, Orange City, IA 51041

ABSTRACT
 We used three bacterial hosts: *Mycobacterium smegmatis*, *Microbacterium foliorum*, and *Gordonia terrae*, to isolate novel bacteriophages from soil samples. We named these phages, created high titer lysates, and purified their DNA genomes. We have archived the high titer lysates at Northwestern College and the University of Pittsburgh. The genomes of three of our phages were sequenced at the University of Pittsburgh and we will be sequencing the remaining genomes this summer. Additionally, we are planning to image our phages with transmission electron microscopy at the University of Iowa or Nebraska yet this semester.

How do we find, purify, and characterize phages?



Where did we find phages?



References
 Marianne Poxleitner, Welkin Pope, Deborah Jacobs-Sera, Viknesh Sivanathan, Graham Hatfull- Phage Discovery Guide. <https://seaphagesphagediscoveryguide.helpdocsonline.com/home>
 Daniel A Russell, Graham F Hatfull, PhagesDB: the actinobacteriophage database, Bioinformatics, Volume 33, Issue 5, March 2017, Pages 784–786, <https://doi.org/10.1093/bioinformatics/btw711>

Microbacterium foliorum NRRL B-24224

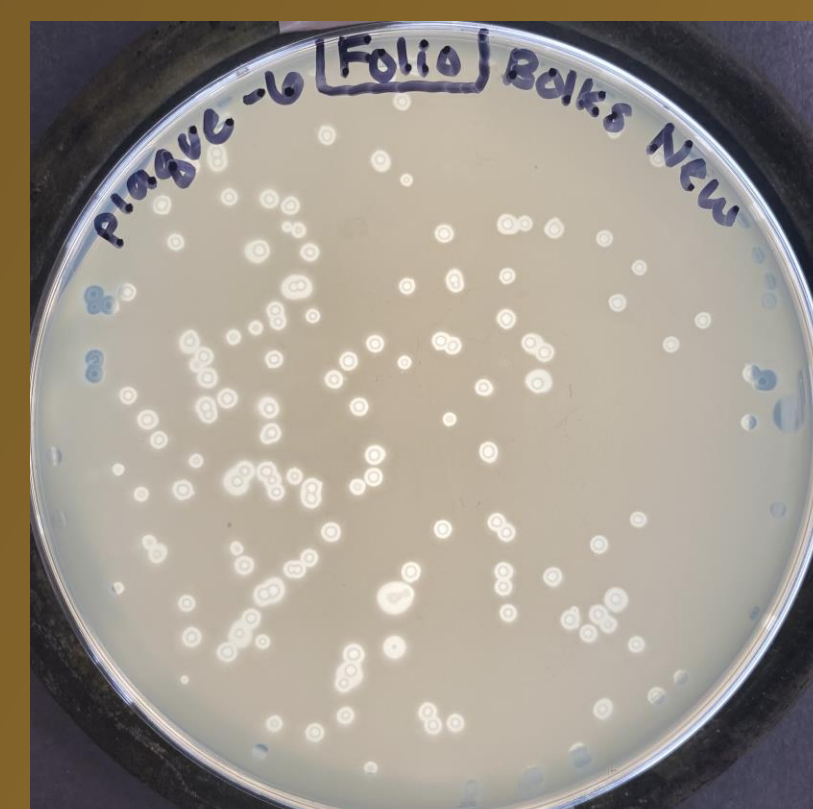


Figure 1. Kate Kralik discovered phage Bolks from soil collected outside the Bolks apartments on campus.



Figure 2. Alexandra Bryant discovered phage Bryant from soil collected in Alton.

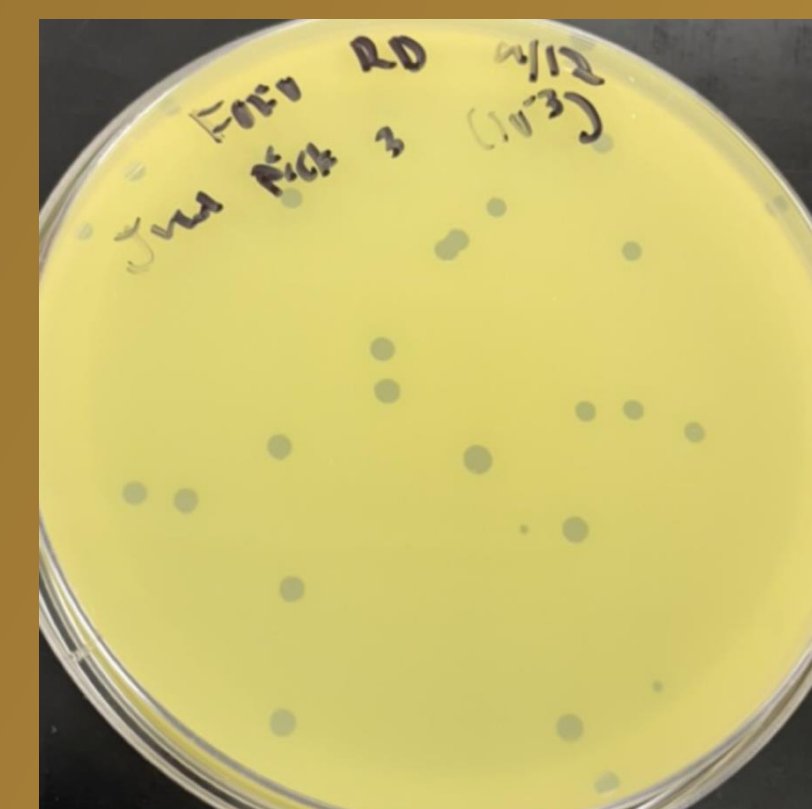


Figure 3. Ryan Dodds and Jacie VanderWaal discovered phage Dodds72 in soil collected in Sioux Center.

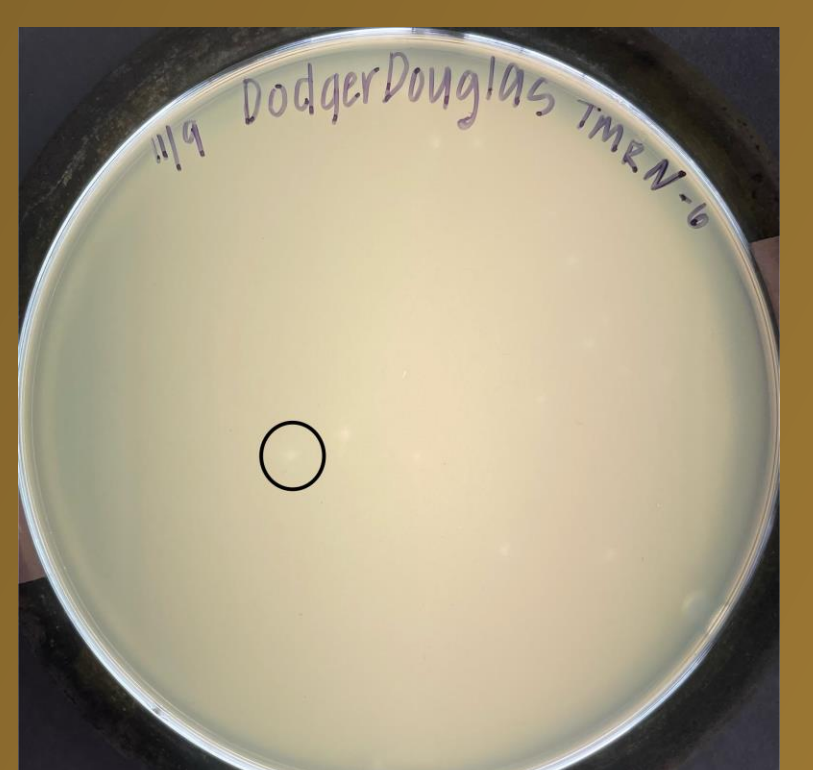


Figure 4. Taylor Rentschler discovered phage DodgerDouglas in soil collected in Sioux County.

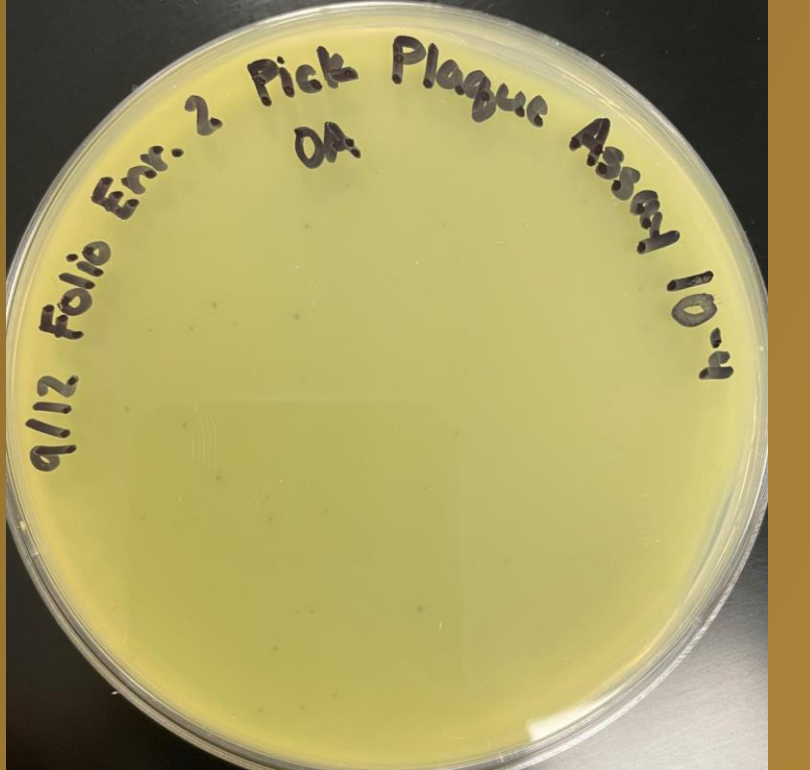


Figure 5. Olivia Anderson discovered phage Frizzle from soil collected along the Puddle Jumper Trail.

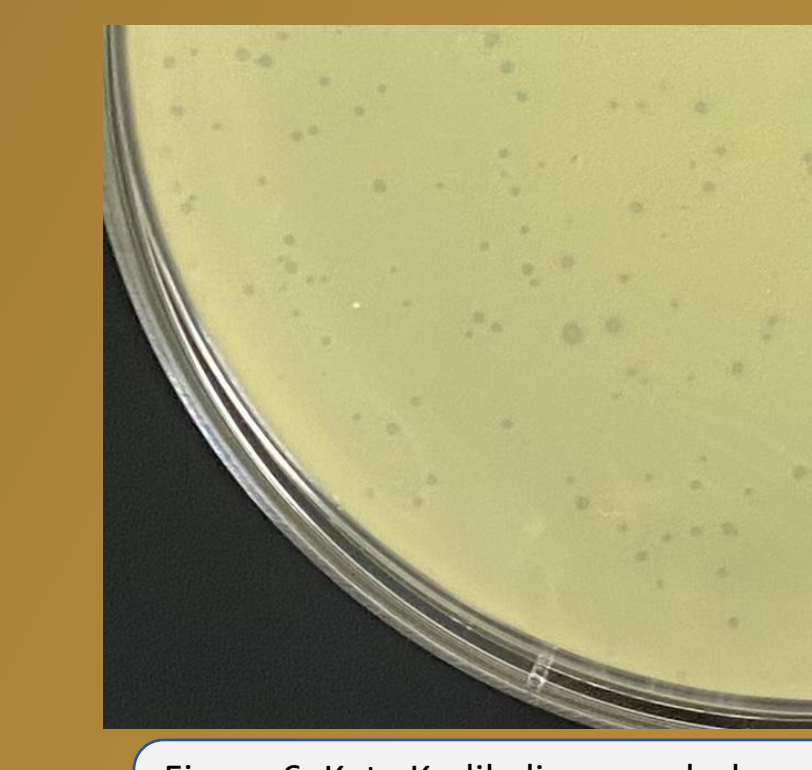


Figure 6. Kate Kralik discovered phage Kate33 from soil collected on NWC's campus.

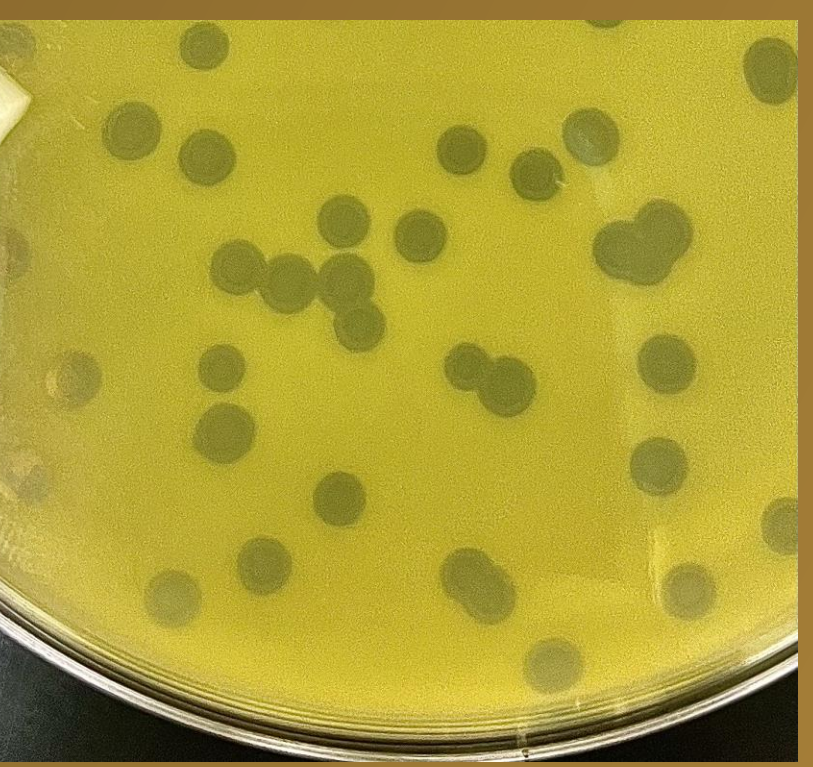


Figure 7. Jacie VanderWaal discovered phage MarRozy in soil collected in a Sioux Center corn field.

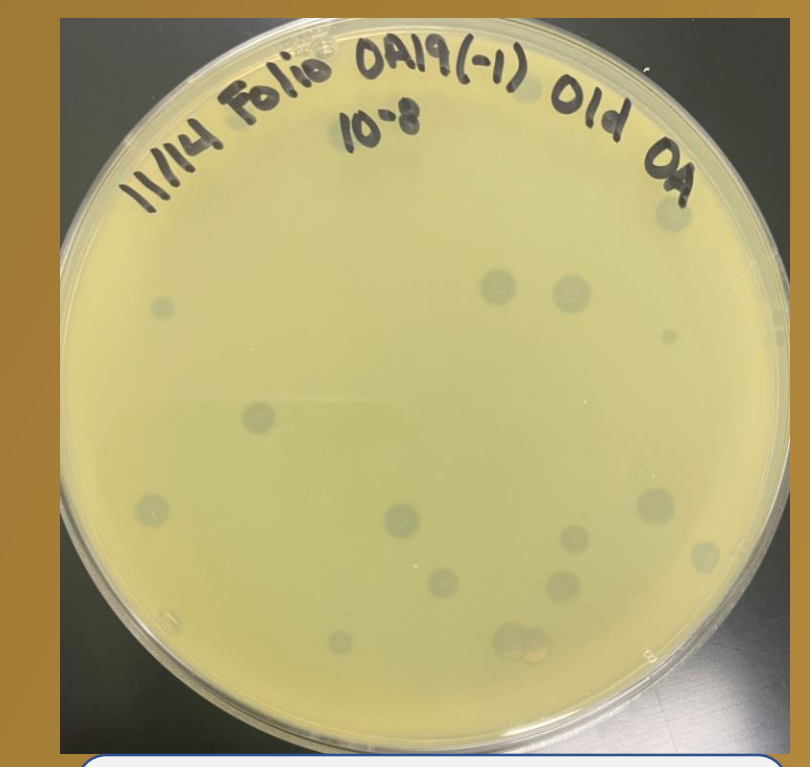


Figure 8. Students discovered phage Orpington in soil collected in Sioux county.

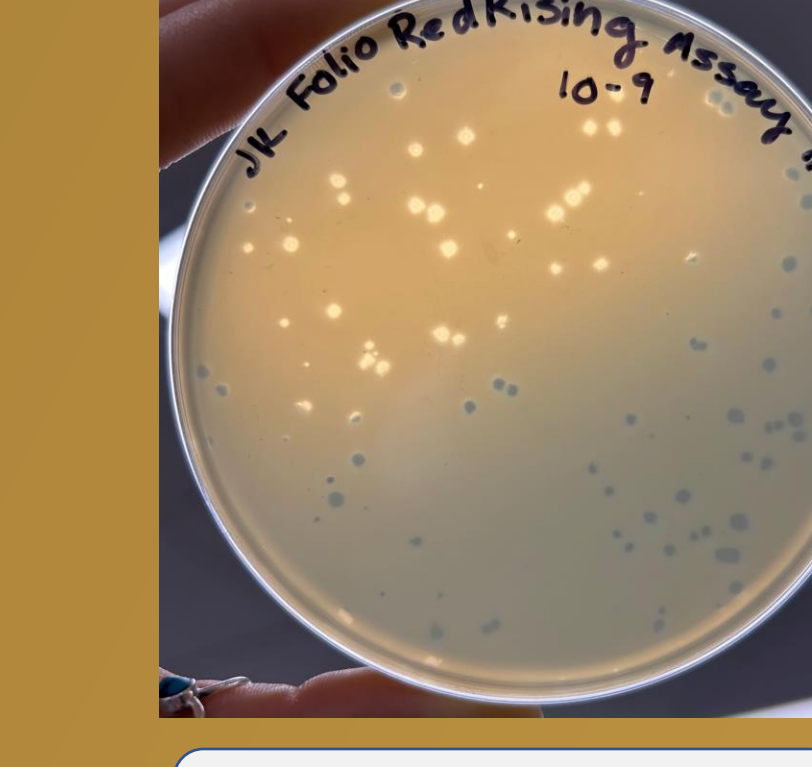


Figure 9. Julia Kutz discovered phage RedRising in soil collected in Orange City.



Figure 10. Shayler Van Gelder discovered phage Shamu in soil collected from Dr. Tolsma's garden.

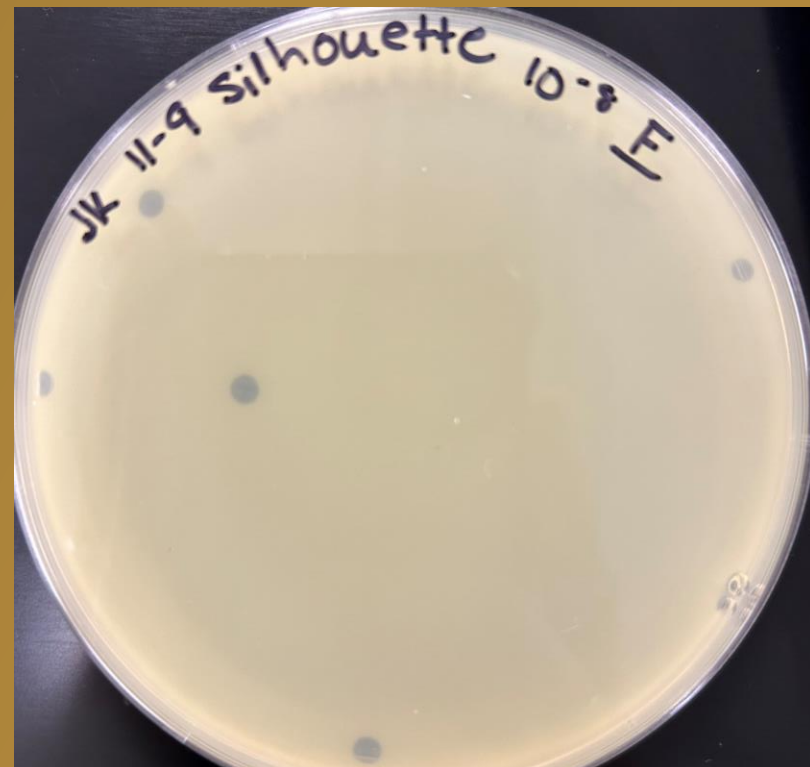


Figure 11. Julia Kutz discovered phage Silhouette in soil collected from a Sioux Center corn field.

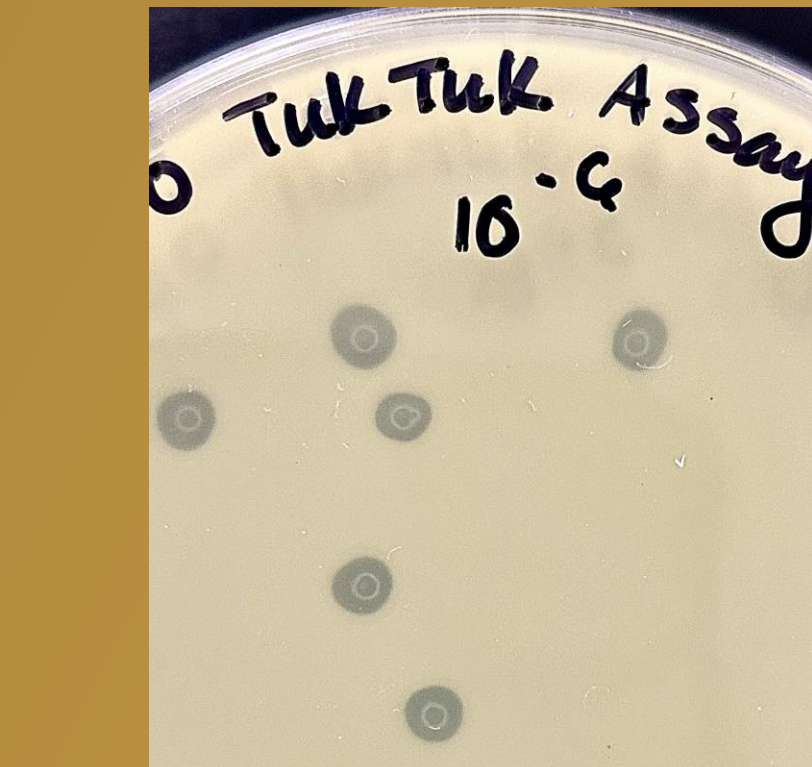


Figure 12. Alexandra Bryant discovered phage TukTuk in soil collected from Ames, IA.

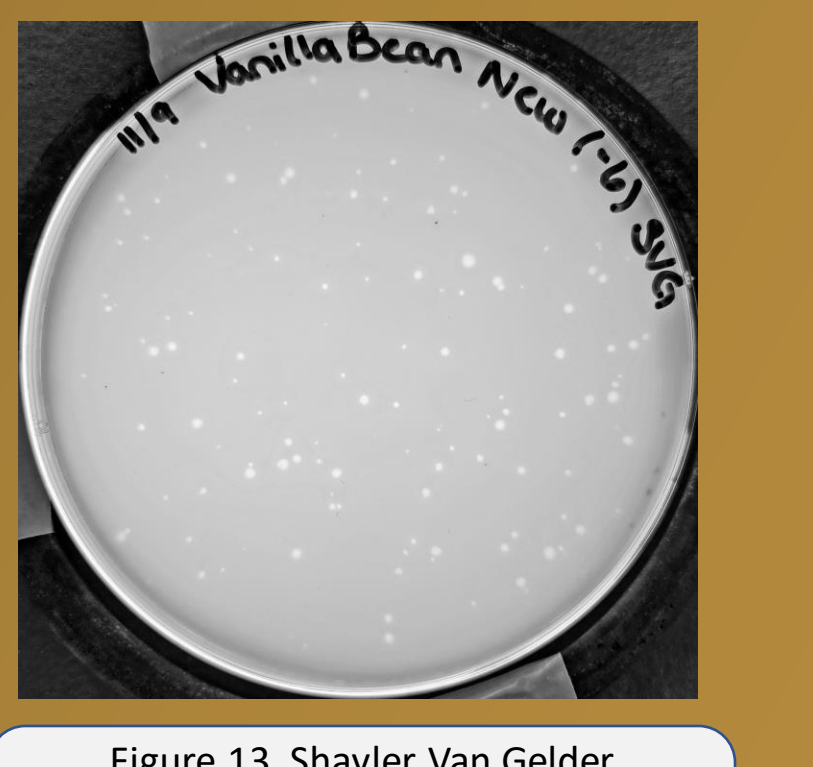


Figure 13. Shayler Van Gelder discovered phage VanillaBean in soil collected from a Sioux Center corn field.

Discovered in one of the three hosts but not pictured include: Loader, Shannon, Tatupu, WillieW, WinnieLou, ZacharyLane, RedRaider89, RedRaider, and IndyRo.

Gordonia terrae 3612



Figure 14. Jacie VanderWaal discovered phage CoveyB in soil collected in Sioux Center.

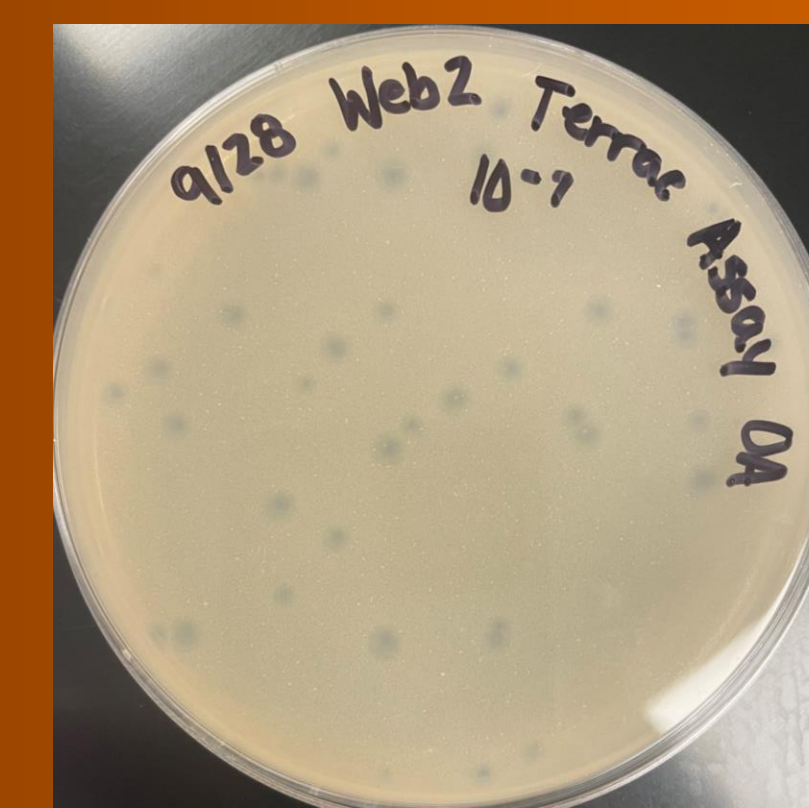


Figure 15. Olivia Anderson discovered phage Jumper in soil along the Puddle Jumper Trail.



Figure 16. Taylor Rentschler discovered phage KoBear in soil from Sioux Center near a goat yard.

Mycobacterium smegmatis mc²155

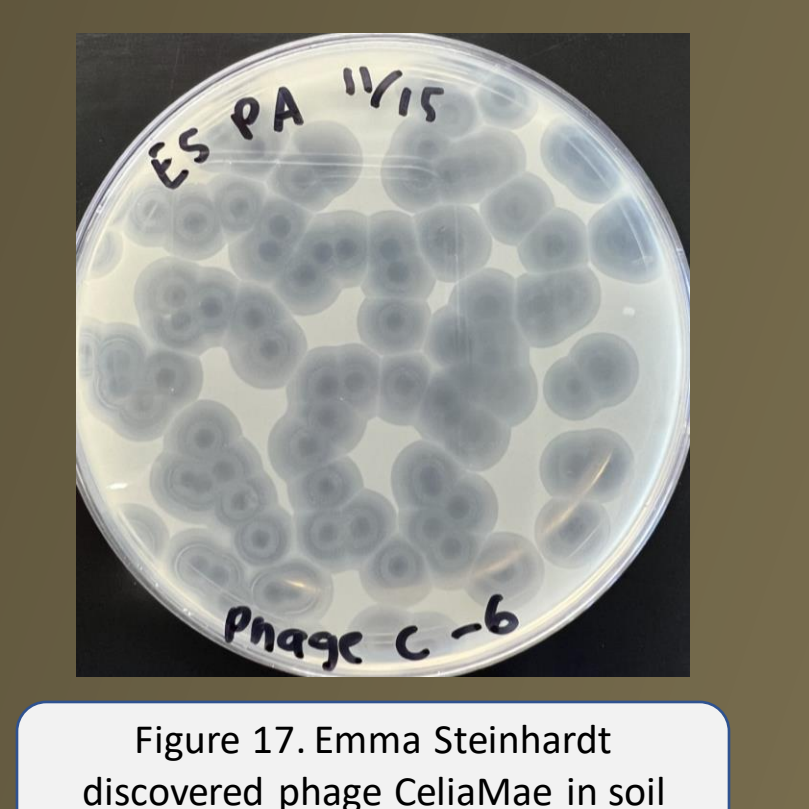


Figure 17. Emma Steinhardt discovered phage CellaMae in soil from Clovis, CA.



Figure 18. Emma Steinhardt discovered phage Clovis0613 in soil from Clovis, CA.

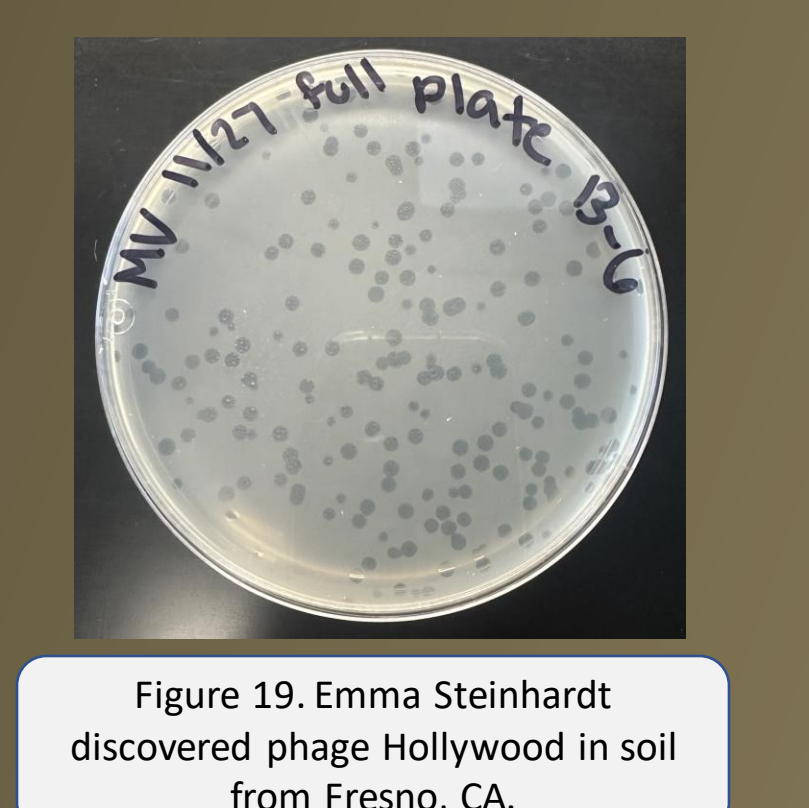


Figure 19. Emma Steinhardt discovered phage Hollywood in soil from Fresno, CA.

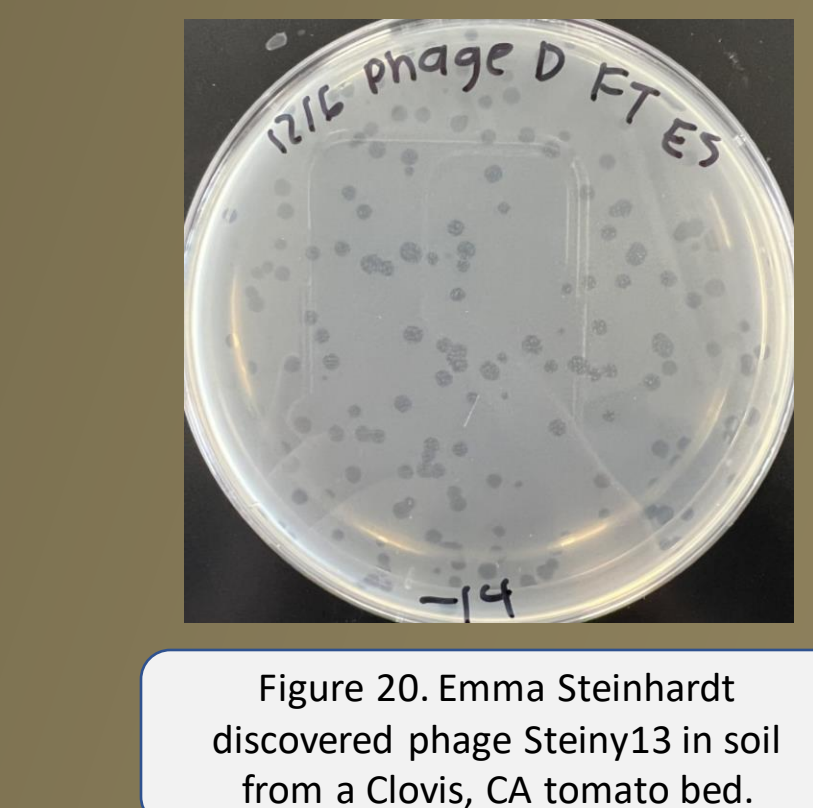


Figure 20. Emma Steinhardt discovered phage Steiny13 in soil from a Clovis, CA tomato bed.



Figure 21. Megan Van Garven discovered phage Megatron06 in soil collected on NWC's campus.

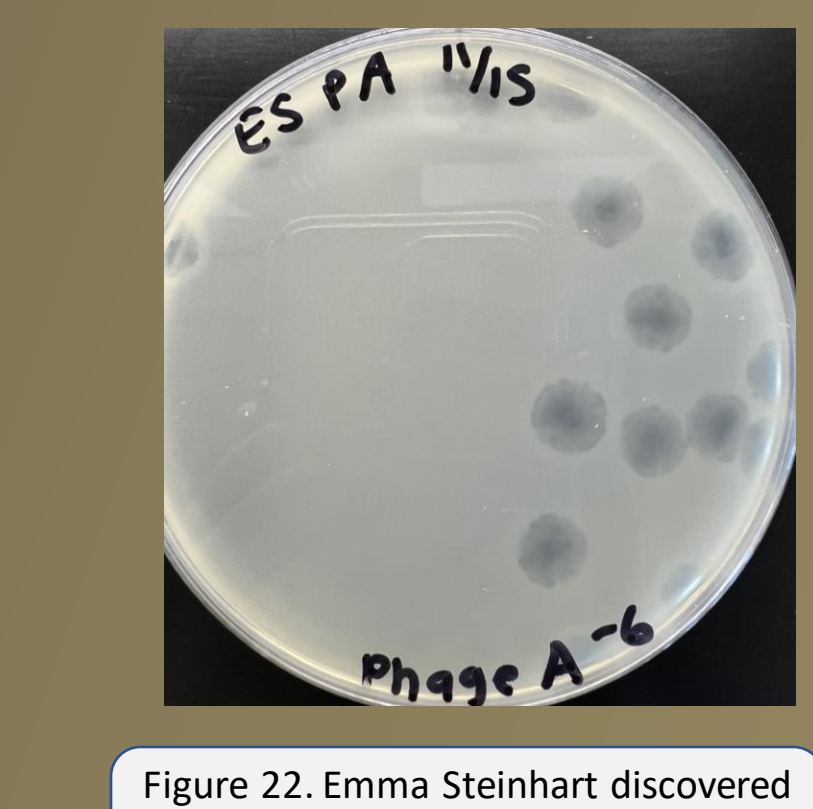


Figure 22. Emma Steinhardt discovered phage MiamiMessi in soil collected in Clovis, CA.

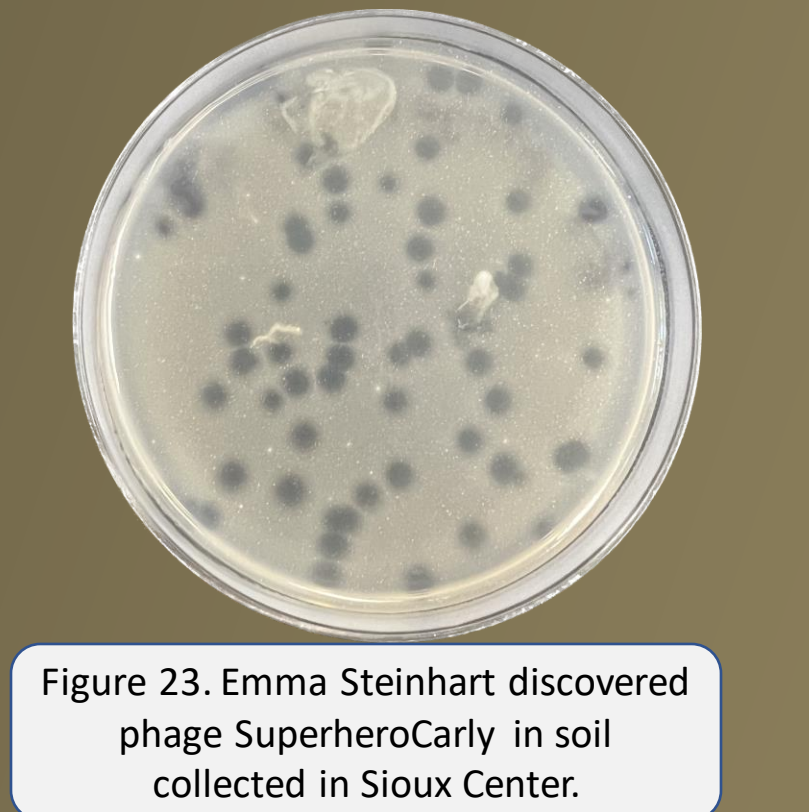


Figure 23. Emma Steinhardt discovered phage SuperheroCarly in soil collected in Sioux Center.

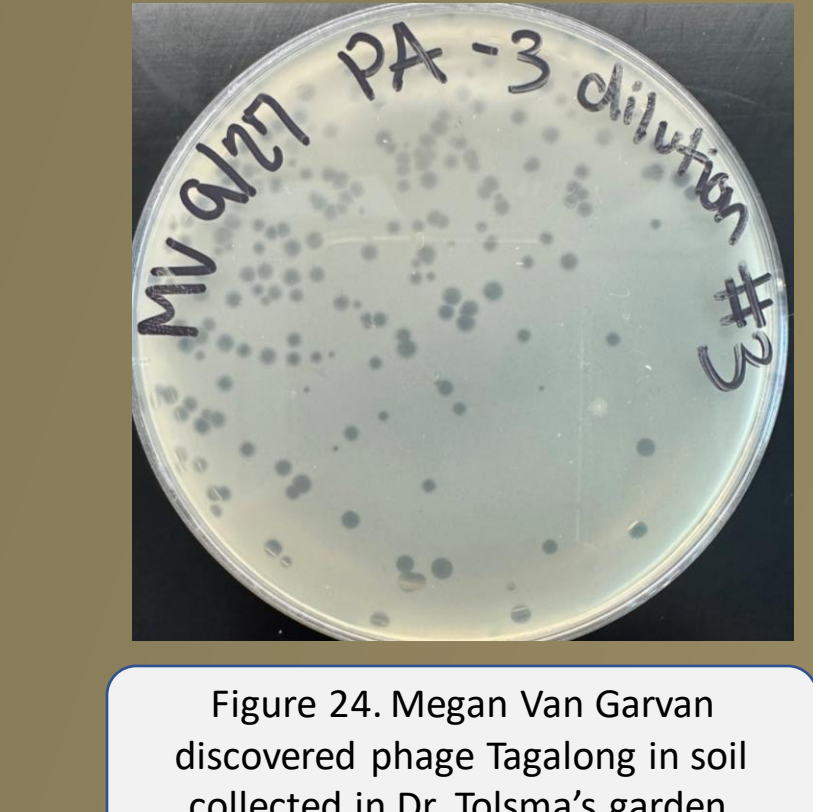


Figure 24. Megan Van Garven discovered phage Tagalong in soil collected in Dr. Tolsma's garden.

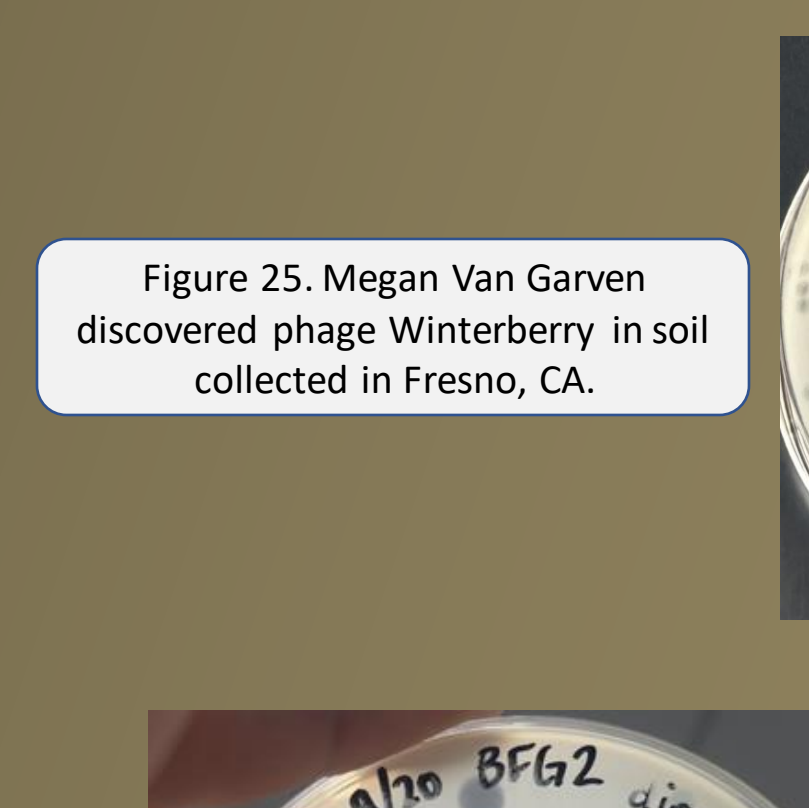


Figure 25. Megan Van Garven discovered phage Winterberry in soil collected in Fresno, CA.

We had phages Shamu, TukTuk, and Megatron06 sequenced at the Pittsburgh Bacteriophage Institute at the University of Pittsburgh over Christmas break. The Genetics and Genomics students annotated those genomes during the Spring Semester of 2024. Check out their poster!

We will sequence many of the remaining phages along with phages discovered by student in previous sections of this course over the summer.



Figure 26. Logan Dykstra discovered several phages in soil collected from the flower garden southwest of the chapel on NWC's campus.

