Analysis Tutorial Prospectus

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1. Title: Using a faceted line plot to visualize the effects of microcystin production on amoebic grazing

2. Research question(s): Does microcystin production impact amoebic grazing? How can a faceted line plot displaying changes in photopigment concentration help visualize grazing behavior of 6 strains of amoeba on 6 strains of *Microcystis*?

3. Objective(s): Communicate methods for coding a faceted line plot to visualize changes in phycocyanin and chlorophyll-a photopigment measurements as a proxy for *Microcystis* biomass. Produce a faceted line plot to illustrate potential grazing by 6 amoeba strains on 6 *Microcystis* strains.

4. Approach: A faceted line plot (or facet grid) consists of multiple subplots, all sharing the same axes for easier comparison between the different experimental conditions. I will construct a facet grid using the following functions from the ggplot2 R package: facet_grid(), geom_point(), geom_line(), and geom_errorbar(). The top row of subplots will display changes in chlorophyll-a concentrations, while the bottom row will display changes in phycocyanin concentrations. These pigment concentrations serve as proxies for *Microcystis* growth. Each subplot will display changes in pigment concentration when one particular *Microcystis* strain was co-cultured with six different amoeba strains and in the absence of amoeba. The x-axis will represent time (days), while the y-axis will represent pigment concentration (Figure 1). All in all, there will be seven lines graphed in each subplot, with each line being colorblind-friendly. I will accomplish this using either the scale_color_brewer() function or the scale_color_viridis() function.

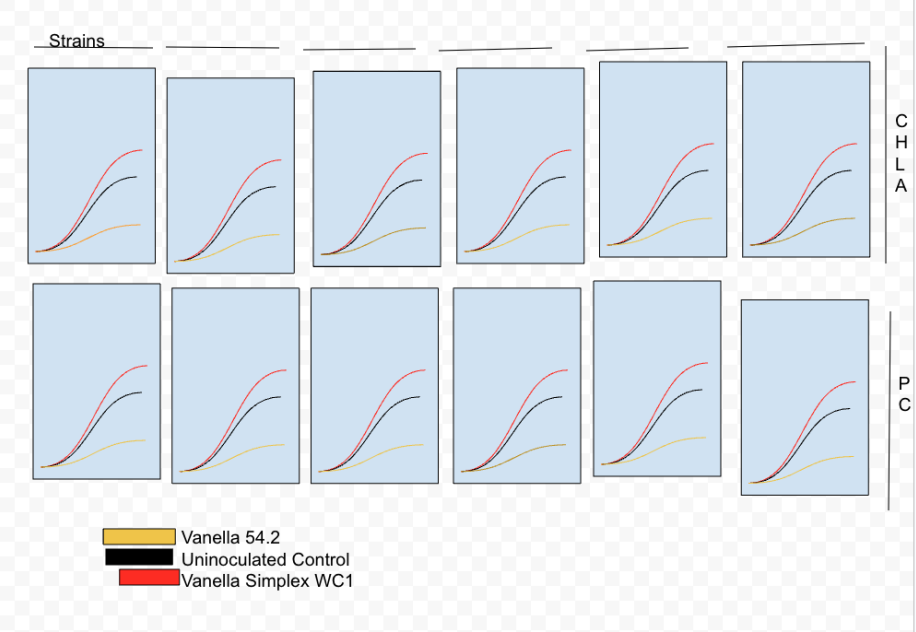

Figure 1: Proposed facet grid. Each subplot will represent one of the six Microcystis strains investigated. Vanella 54.2 (yellow) and Vanella simplex WC1 (red) are examples of amoeba strains grown in co-culture with the different Microcystis strains. The uninoculated control, Microcystis grown in the absence of amoeba (black), will serve as a baseline for *Microcystis* growth. The y-axis will quantify either chlorophyll-a (CHLA) or phycocyanin (PC) pigment concentrations. The X-axis (not shown here) will indicate the day the pigment concentration was measured.

5. Selected References

Lai J, Cui D, Zhu W, Mao L. 2023. The Use of R and R Packages in Biodiversity Conservation Research. Diversity 15(12): 1202. Mou H, Liu L, Xu Y. 2023. Panel Data Visualization in R (panelView) and Stata (panelview). J Stat Software 107(7).

Van Wichelen J, Van Gremberghe I, Vanormelingen P, Debeer AE, Leporcq B, Menzel D, Codd GA, Descy JP, Vyverman W. 2010. Strong effects of amoebae grazing on the biomass and genetic structure of a Microcystis bloom (Cyanobacteria). Environ Microbiol 12(10): 2797–2813.

Van Wichelen J, D'Hondt S, Claeys M, Vyverman W, Berney C, Bass D, Vanormelingen P. 2016. A Hotspot of Amoebae Diversity: 8 New Naked Amoebae Associated with the Planktonic Bloom-forming Cyanobacterium Microcystis. Acta Protozool 55(2): 61-87+ap1.