

## **Using Winogradsky Columns to investigate links between geochemistry and environmental microbiology with K-adult students**

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Winogradsky Columns (WCs) are microbial ecosystems that are cheap and easy to create and enable the visualization of distinctly colored microbial communities. Gradients of oxygen and sulfide are created in sediment that facilitate distinct ecological zones of microbial activity. I have used these with students ages 6 through adult, and will discuss how both scientific complexity and the active practice of science (e.g., hypothesis testing, experimental design, and data analysis) can be scaled up or down depending on resources, available time, and student age/experience. I will focus on a class project where 7<sup>th</sup> grade Earth Science students were tasked with designing experiments using Winogradsky Columns to test hypotheses about the influence of different geochemical conditions on overall microbial activity. Students collected data throughout the school year, performed time series data analysis, and communicated their findings. I will also discuss the use of WCs in elementary school summer nature camp and college laboratory settings. WCs are a powerful, flexible tools that bridge microbiology, ecology, environmental science, and chemistry – simple enough for use in elementary school, but compelling enough to be implemented successfully as science fair projects or in college laboratory courses.