



Abstract

To celebrate the conclusion of the microbiology laboratory experience (UMR BIOL 3344), students were traditionally provided an unknown microorganism and the opportunity to identify it using practiced methods. This authentic learning exercise allowed students to take ownership of the materials and resources through the development of parsimonious experimental plans and execution of metabolic and structural assays. This activity mimics real-world problems faced by professional microbiologists, employs critical thinking skills and engages students. Feedback from previous students has always been positive.

Given the need for quarantine, we strove to develop a learning opportunity promoting 1) collaboration, 2) discovery and relevance and 3) iteration.

Visual Representation of Bacterial Characteristics

Bacillus subtilis

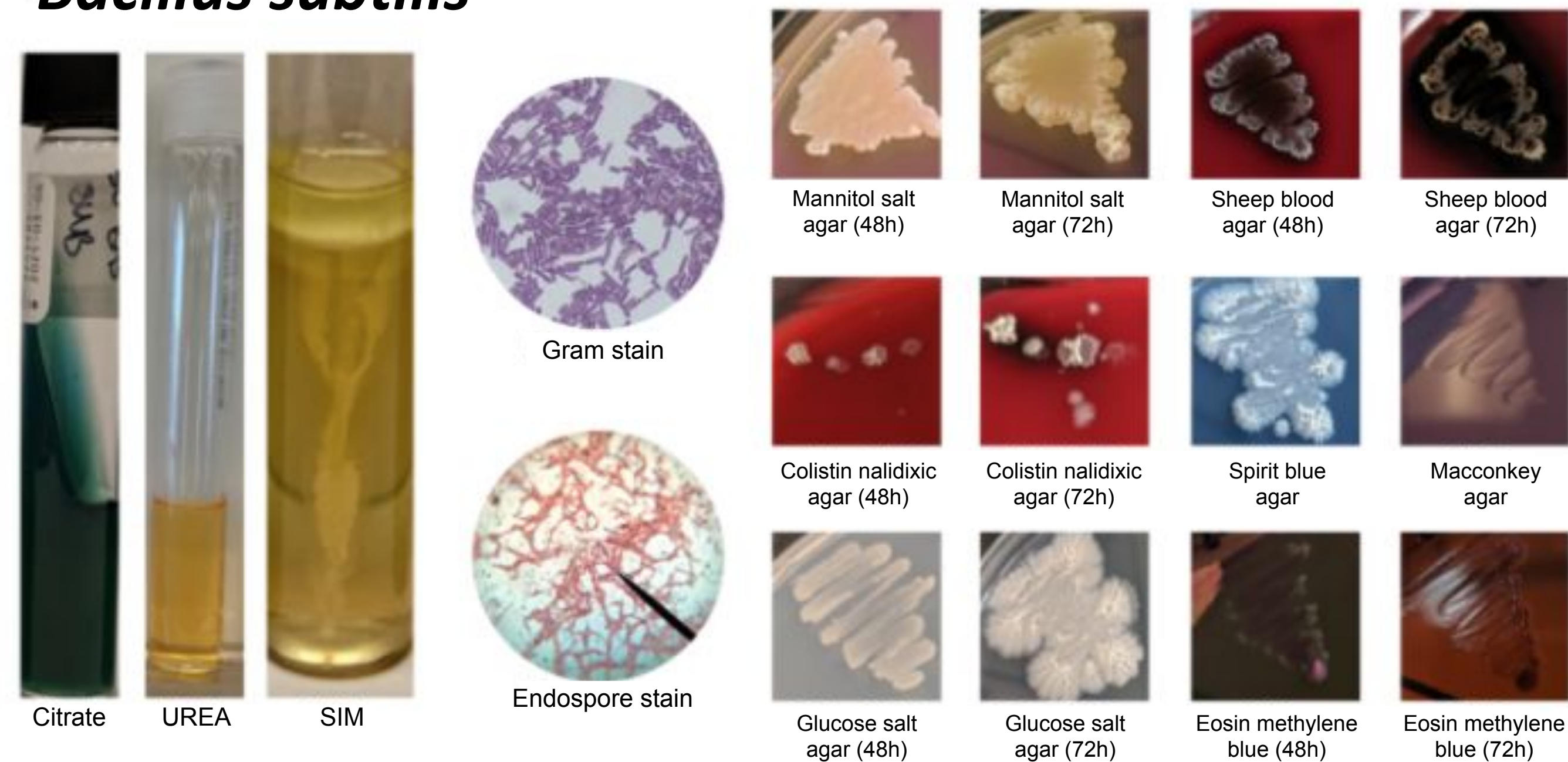


Figure 1: A pictorial representation of bacterial metabolic, structural and behavioral characteristics

Background

- Biochemical, physical and behavioral characteristics delineate bacterial species.
- Microbiology students at UMR (traditionally) employ these methods to identify an unknown organism for their final project.
- This authentic learning experience promotes collaboration, discovery and relevance and provides space for iteration.

Here, we aimed to:

- Develop an on-line, synchronous unknown microorganism project given COVID-19.
- Provide a pictorial reference for the students to use in the creation of a parsimonious dichotomous key.
- Provide a pictorial reference for the students to use while gathering data.
- Implement a validated-survey instrument to assess 1) collaboration, 2) discovery and relevance and 3) iteration.

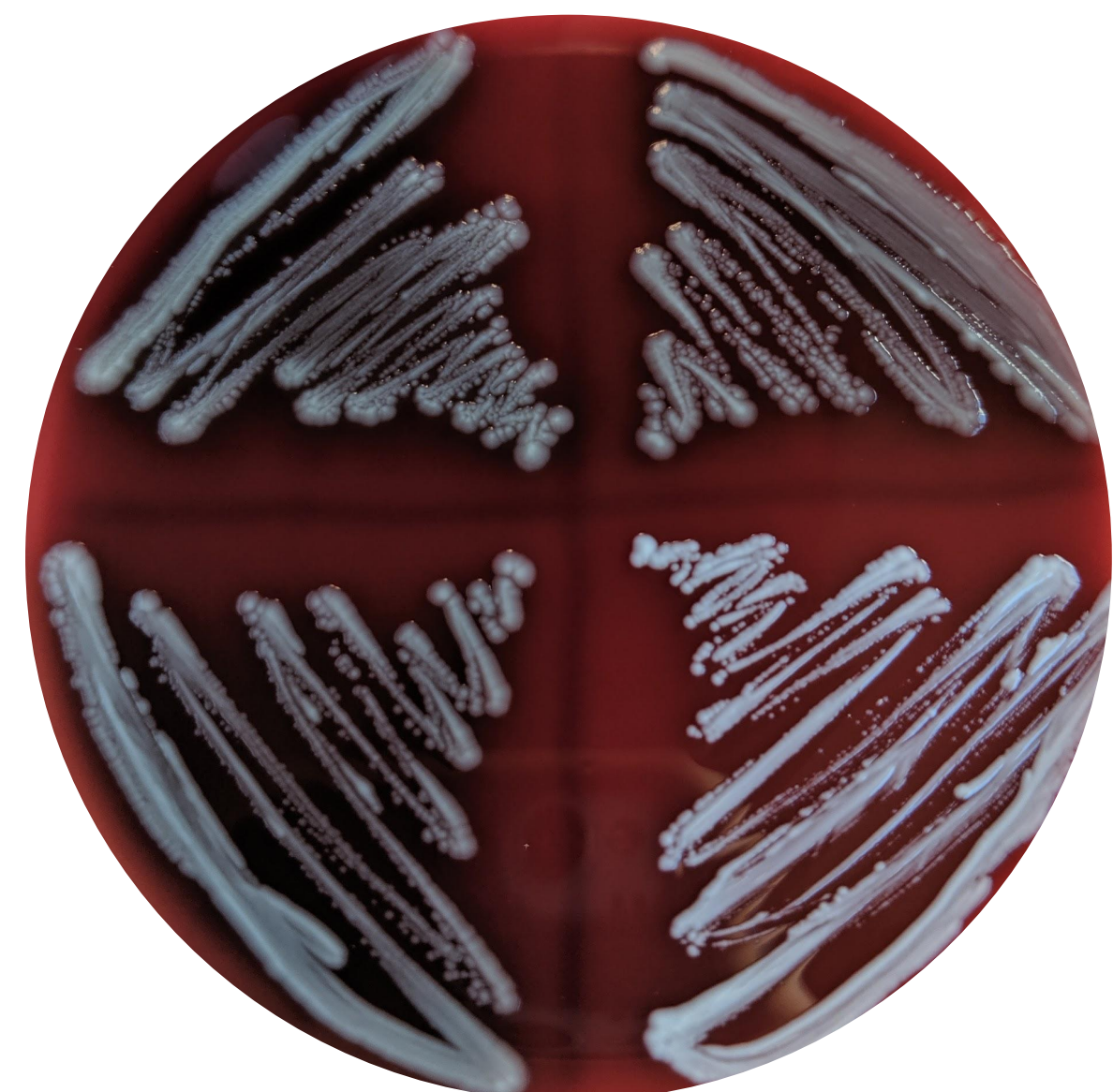


Figure 2: Hemolytic capabilities of bacterial species tested on sheep blood agar

Relevance

- Quarantine due to COVID-19 resulted in the rapid movement of coursework online.
- Hands-on laboratory experiences were unfortunately diminished.
- A project was designed that would closely mimic the authentic, collaborative, discovery-driven laboratory experience.
- To assess success, we will collect data from students employing a validated-survey instrument (results have yet to be collected).

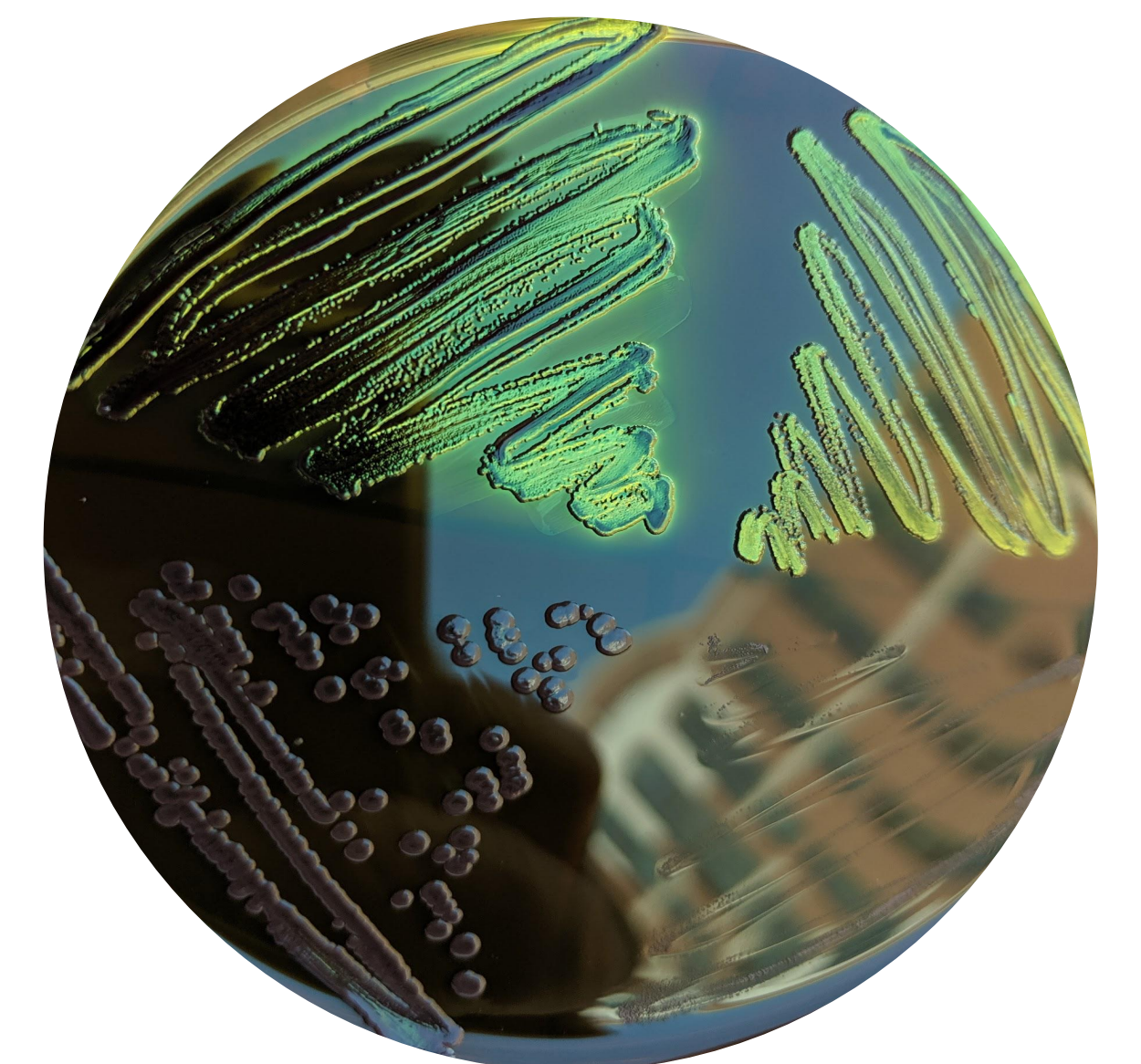


Figure 3: Eosin methylene blue agar allows for isolation and differentiation of gram (-) bacteria