

SOC Antibiotic Bioprospecting Teacher Workshop

Cost: \$1650/teacher **Dates:** TBD 2024 (8am – 4pm daily)

Location: Host in your High School Classroom/Lab for 10-16 regional teachers

Instructor: Dr. Gabriel Vargas (UW – Madison)

SOC Coordinator: Beth Hunt (BethHunt@SOCresearch.org)

Seeds of Change's (SOC) mission is to provide programming to high school students that develops their critical thinking skills through original, experiential scientific research. SOC identified antimicrobial resistance as a compelling real-world health crisis that creative young minds could seek to solve through hands-on research. To support this aim, this course is designed to train and certify teachers to run a bioprospecting research lab in their high school where students can learn how to discover novel antimicrobial candidates. SOC will support teachers/high schools who wish to establish a bioprospecting lab in their school with promotional lab equipment pricing, a repository for promising isolate storage, further isolate testing through SOC research partners, and shared intellectual property management.

Historically, bioprospecting efforts have focused on isolating antimicrobials from soil samples with a success rate on the order of 1 in 100,000. This training, however, focusses on learning how to isolate antimicrobial candidates that live symbiotically on and within insects. Research scientists are finding that bioprospecting using insect-derived samples has a much higher likelihood for success - on the order of 1 in 10-1000. SOC has 13 years of experience training students to develop original research projects focused primarily on leafcutter ant and butterfly insects. The goals of these experiential programs are to catapult each student into a scientific discovery mindset well before graduate school and in so doing motivate them to pursue education and careers in a STEM field.

This training course was developed in collaboration with SOC, Dr. Adrian Pinto's lab at the University of Costa Rica (UCR), Dr. Cameron Currie's lab at the University of Wisconsin - Madison (UW), Dr. Gabriel Vargas, Ibrahim Zuñiga, and Caitlin Carlson. In this course, teachers will learn how to:

- isolate bacteria strains from insect samples,
- establish isolate morphologies and other bioassay-determined characteristics,
- co-culture isolates for antimicrobial inhibition against antagonists
- use polymerase chain reaction (PCR) and electrophoresis to amplify and separate isolated genetic material by gene length,
- analyze 16S rRNA genetic sequence results to establish likely phylogenetic ancestry using MOLE-BLAST and MEGA, and
- learn how full genetic sequencing and antiSMASH identifies biosynthetic gene clusters (BGCs) that encode novel pathways for secondary metabolites with potential medical applications.

Potentially novel bioprospecting candidates identified in the training course and subsequent research by teachers and their students in high school bioprospecting labs can be sent for further analysis (Material Transfer Agreement required). Importantly, the high school, teachers and students that discover unique antimicrobial isolates will share intellectual property rights with SOC and our collaborating partners.

To prepare for the workshop, please read: Novel Bioactive Natural Products from Bacteria via Bioprospecting, Genome Mining and Metabolic Engineering (Sekurova, Schneider, & Zotchev, 2019) http://bit.ly/SOC_NovelAMD. We recommend all researchers using Insect-Microbiome Antibiotic Bioprospecting protocols take the Microbiology Concept Inventory on Aseptic Techniques: <http://bit.ly/AsepticWI>.