

OUTREACH INCENTIVE GRANT FUNDING: END-OF-YEAR PROJECT REPORT

Title of Proposal: What's in your football field? A high school outreach program using DNA sequencing as a tool to explore unseen microbial diversity in soils

Your Name: Dr. Alice Layton Project Date: 6/5/2103 & 6/12/2013

Additional project support received from other university or external sources:

Source	Amount	Title
<u>Center for Environmental Biotechnology</u>	<u>\$1,450.00</u>	<u></u>
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Please use this sheet to answer each of the following questions about your project (1-2 pp total)

1. **ASSESSMENT:** How did this project document or assess its engagement with the community?

Bill Dockery, the Communications Coordinator from the office of Outreach and Engagement documented the High School student participation through photography and interviewing the students. When the sequencing phase of the project is finished a publically accessible website will be used to make the data collected in this project available to students, schools and the general public.

2. **PARTNERSHIP/RECIPROCITY:** How did the university and community work together?

The University, through Elizabeth Burman, worked with teachers from the local school system involved in the Pre-Collegiate Research Scholars Program to identify High School students that would be willing to participate in the project. For this project, students from Sevier County High School, Central High School, West High School and Oak Ridge High School participated.

3. **BENEFITS:** What were the benefits (University/community) of this partnership?

This project benefits STEM related activities at both the High School level and at University of Tennessee. The seven High School students who participated in the laboratory learned basic laboratory techniques and also participated in collecting real data that will be made publically available. When the final data is ready the same students will be invited back to the University to analyze the data. We will also contact the local High Schools and try to design a single lesson plan to query the data that they can use in their biology classes.

This projects benefits the University of Tennessee in numerous ways. First, the students who participated in this project are some of the brightest in the local area. Because they enjoyed their laboratory experience, they have a positive view of UT and may decide to attend this University. This project benefited the Pre-Collegiate Research Scholars Program as rising sophomores and juniors who might later participate in that UT program had a foretaste of that opportunity by participating in this workshop. They were strongly encouraged to apply to the Pre-Collegiate Research Scholars Program and follow up contact will be made with them and their teachers this fall. Finally, this project engaged four undergraduate students. For this workshop we paired each high school student with an undergraduate or graduate student to help provide one-on-one instruction on the methods. Two of the undergraduate students did not have previous experience in DNA extraction and thus learned a skill that they will use in their research this summer. The other two students have considerable DNA extraction experience and thus were able to serve as group leaders to teach the methodology.

4. **SHARED DECISION-MAKING:** Did the community have a "voice" or role for input into this project?

The community had a "voice" in this project in that it selected the high school students that participated in the project and the student were encouraged to submit the soil samples from their High Schools used for testing. However, due to the highly technical nature of the laboratory experiments, they did not have input in the project design.

5. **SCHOLARSHIP:** Are there any examples of faculty scholarship that will be informed by this project?

One of the goals of this project was to collect relevant, state-of-the-art DNA sequencing data representing the microbial communities of soil. We fully expect that these data will be publishable in a scientific journal. Due to the success of the project we will evaluate the potential for publishing the protocol and method of engaging the students in an education journal. Also, by making this data publically accessible and publicizing the protocol we hope that we can encourage Universities and High Schools across the country to contribute their own data to generate a large database of the microbial communities in soils.

6. **CONCLUSIONS:** What conclusions and best practices can be drawn from the partnership?

This project provided a pilot test for engaging High School students in a short (6 hours one day and 2 hours on a second day), very focused laboratory experience. The students did a remarkably good job and generated excellent samples. I believe that one reason that this laboratory experience was successful was because it was fairly short and could be broken down into 2 hour intervals. This allowed us to perform the first part of the experiments and then take ~ 1 hour break for pizza and casual discussions. Following lunch the students measured their DNA concentrations which took ~ 1 to 2 hours. On the second day, the PCR experiments took about 2 hours to set up.

Another important reason for the success was due to the personal attention paid to each student by an undergraduate or graduate student. In addition to the undergraduate and graduate student mentors making sure that each step of the protocol was properly performed, I noted that the high school students engaged their mentors in discussing college applications, classes etc.

7. **FUTURE PLANS:** What are the future plans for this partnership?

We intend to continue this partnership with both the individual students that volunteered for this workshop and their High Schools in the fall through the sharing of the data collected on their samples. I also think that this type of workshop may serve as a useful short program to engage rising High School sophomores and juniors and make them aware of the Pre-Collegiate Research Scholars Program.