

Development of a Class-Research Project: Beyond One Semester ^[1]

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Development of a Class-Research Project: Beyond One Semester
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Abstract

Two University of Puerto Rico students engaged in an independent research project as part of the local World Science Fair (WFSF) with two main objectives: to establish a community of undergraduate researchers in the classroom and to assess the self-impact individuals that are able to produce compounds that inhibit the growth of other microorganisms. To attain isolated isolates that are not unique to a local research project we implemented the WFSF protocols in the UPR and Molecular Laboratory (UPL), the Biochemistry (BIO) course and independent study group (ISG). Its active learning environment, that gave freedom to students has been established. The ISG community isolated a total of 47 antimicrobial-producing bacteria during the course of the WFSF semester and were these bacteria as being further study to the ISG and BIO groups. Students indicated that isolated from different types of liquid media resulted were able to inhibit their microorganisms resulting in active compounds working, as well as different substrates that using different techniques to study their bacteria. Its isolation was supported by preliminary results, and effective in a pre and post-test community was working, as well as different substrates that using different techniques to study their bacteria. Its isolation was supported by preliminary results, and effective in a pre and post-test community was working, as well as different substrates that using different techniques to study their bacteria. Its isolation was supported by preliminary results, and effective in a pre and post-test community was working, as well as different substrates that using different techniques to study their bacteria.

Introduction

There is a growing interest in the world, where multiple studies of bacteria are demonstrating the world's potential. It is a trend that is seen in the literature (Diaz, 2010; Kaur, 2010). The main goal of this project is to assess the self-impact individuals that are able to produce compounds that inhibit the growth of other microorganisms. To attain isolated isolates that are not unique to a local research project we implemented the WFSF protocols in the UPR and Molecular Laboratory (UPL), the Biochemistry (BIO) course and independent study group (ISG). Its active learning environment, that gave freedom to students has been established. The ISG community isolated a total of 47 antimicrobial-producing bacteria during the course of the WFSF semester and were these bacteria as being further study to the ISG and BIO groups. Students indicated that isolated from different types of liquid media resulted were able to inhibit their microorganisms resulting in active compounds working, as well as different substrates that using different techniques to study their bacteria. Its isolation was supported by preliminary results, and effective in a pre and post-test community was working, as well as different substrates that using different techniques to study their bacteria.

Objectives

1. To develop and train a research community in the classroom.
2. To add quantitative skills as part of the curriculum in molecular and cell biology and microbiology lab.
3. To study impact self for the isolation and identification of bacteria with the capacity of producing antimicrobials.

Materials and Methods

Two University of Puerto Rico students engaged in an independent research project as part of the local World Science Fair (WFSF) with two main objectives: to establish a community of undergraduate researchers in the classroom and to assess the self-impact individuals that are able to produce compounds that inhibit the growth of other microorganisms. To attain isolated isolates that are not unique to a local research project we implemented the WFSF protocols in the UPR and Molecular Laboratory (UPL), the Biochemistry (BIO) course and independent study group (ISG). Its active learning environment, that gave freedom to students has been established. The ISG community isolated a total of 47 antimicrobial-producing bacteria during the course of the WFSF semester and were these bacteria as being further study to the ISG and BIO groups. Students indicated that isolated from different types of liquid media resulted were able to inhibit their microorganisms resulting in active compounds working, as well as different substrates that using different techniques to study their bacteria. Its isolation was supported by preliminary results, and effective in a pre and post-test community was working, as well as different substrates that using different techniques to study their bacteria.

Results

D. Screening for Isolates Antibiotics



Figure 1 shows the results of the antibiotic screening. The isolates were tested against a range of bacterial strains. The results show that some isolates produced significant inhibition zones, indicating antimicrobial activity. The isolates were further characterized using Gram staining and morphology.

E. Gram Staining and Morphology

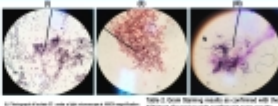


Figure 2 shows the results of the Gram staining and morphology. The isolates were stained with Gram stain and observed under a microscope. The results show that some isolates were Gram-positive and some were Gram-negative. The morphology of the bacteria was also observed.

F. Identification of isolate by Biochemical tests



Figure 3 shows the results of the biochemical tests. The isolates were tested against a range of biochemical tests. The results show that some isolates produced significant inhibition zones, indicating antimicrobial activity. The isolates were further characterized using Gram staining and morphology.

G. Amplification by PCR, Electrophoresis Separation and BLAST analysis



Figure 4 shows the results of the PCR amplification and electrophoresis. The isolates were amplified using PCR and the products were separated by electrophoresis. The results show that some isolates produced significant inhibition zones, indicating antimicrobial activity. The isolates were further characterized using Gram staining and morphology.

H. Organic Extraction, Metabolite Analysis and Thin Layer Chromatography



Figure 5 shows the results of the organic extraction, metabolite analysis and thin layer chromatography. The isolates were extracted using organic solvents and the metabolites were analyzed using thin layer chromatography. The results show that some isolates produced significant inhibition zones, indicating antimicrobial activity. The isolates were further characterized using Gram staining and morphology.

Title:

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Topic:

W02 Innovative Strategies for the Undergraduate Laboratories

Keyword:

antimicrobial production ; class-research project ; active learning communities

Abstract:

The University of Puerto Rico at Humacao Campus started a collaborative project, as part of the Small World Initiative (SWI) with two main objectives: to establish a community of undergraduates researchers in the classroom and to screen the soil tropical microbiota that are able to produce compounds that control the growth of other microorganisms. To attract talented students that are not engage in a formal research project we implemented the SWI curricula in the Cell and Molecular Laboratory (CML), the Biotechnology (B) course and independent study group (ISG). An active learning communities, that goes beyond the semester has been established. The CML community isolated a total of 9 antimicrobial producers bacteria during the course of the Fall semester and now these bacteria are being further study by the B and ISG groups. Students isolated their bacterial from different type of tropical soils and they were able to design their own experiments so each group in the classroom was working, not only in different isolates but also using different techniques to study their bacteria. An instrument was prepared by participating faculty and offered as a pre- and post-test that measures skills in computational biology skills with emphasis in several areas: graphical analysis, growing bacteria, identifying antibiotic production, and applying microbiology data to a practical problem. Results showed a gain (a Hake Gain range up to 66%) in five from the nine tested areas. An active learning environment has being fostered throughout these courses thorough different activities including: a workshop with a scientist from Yale, active participation of the students in the open house hosting high school students, oral reports, class discussion, poster preparations, peer evaluation, and the use of the scientific literature. We will be working in the metabolites characterization.

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