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Practical Approach to Bioinformatics

Nigel Yarlett

Melissa Grigione

Interim Report

Title: Practical Approach to Bioinformatics

Cornerstone #: 3 Interdisciplinary Informatics

Principal Investigators: Nigel Yarlett and Melissa Grigione

School/College: Dyson School Arts and Sciences

Date: Applied Oct 2010; Funded 2011

A) Please outline your original goals.

The goal of this proposal was to integrate a computer based informatics station obtained with a previous Thinkfinity grant with a practical laboratory informatics station. To achieve this I requested a reverse transcription polymerase chain reaction (RT PCR) instrument. RT PCR has the advantage of amplifying all RNA types (mRNA, rRNA, viral RNA) and therefore has greater scope for interdisciplinary use. The goal was that students would be able to select proteins or genes of interest and using the computer based informatics station be able to obtain the entire sequence using several databases (NCBI, EuPathdb, Sanger, ExPassy, etc). They would then be able to design RNA primers to the sequence using MacVector software purchased using the first grant. Using the equipment purchased from this grant they can now use this information to amplify the genes and insert them into a vector from which they can amplify the protein product for characterization.

B) What progress have you made towards your original goals on your project to date?

The RT-PCR workstation is set up and the PCR-UV sterilizing hood is in place and functioning hence all components are in place and ready for use. Over the winter recess I significantly modified the Advanced Biochemistry Laboratory (CHE329) to include the new informatics platform.

C) Has your project impacted students? If so, how many?

I employed the bioinformatics platform in the Spring 2011 Advanced Biochemistry Laboratory section. There were 5 students in this course, which was sufficient to test the new platform before trying it on a larger class. Each student was assigned a different protein that had not previously been cloned and expressed to make it more challenging for an advanced class. They were required to determine sequence from the genome of a particular species and compare it with the same protein from several other species for identification of highly conserved sites. They then had to design primers and use them to amplify the protein using RT-PCR. I have also used this platform for 2 students in CHE 480 Research in Chemistry as part of their research work. In all cases it was exciting to see students first hand become scientists and ask questions that go beyond the material they learn in the class room. This cutting edge technology is a great addition to our learning tools and has a huge impact on our students and their future.

D) Has your project impacted other faculty members? If so, how many?

Dr Melissa Grigione (Director Environmental Science Program) has placed a MS student in my laboratory who will utilize this technology as part of her research aimed at identifying microbial contaminants of public water supplies. Dr Demosthenes Athanasopoulos (Director of Forensic

Science Program) has also placed a student in my laboratory who will apply this platform to identify and assess time of death of cadavers.

E) What are your next steps?

I have applied for a MS program in Biochemistry to Dean Herrmann and this platform will be an important part of expanding that program. Based upon experience gained by introducing the platform in the spring to the Advanced Biochemistry class (CHE329) I have rewritten the laboratory curriculum for the Biochemistry Laboratory section (CHE326) and plan to introduce a 5 week component that will utilize this technology. There are 30 students already registered for this course hence the number of students impacted by this platform will be significant and I believe will provide them with a first class educational experience. I would like to thank the Thinkfinity grant committee for supporting this proposal which brings state of the art technology to our students.