"What I did with my summer stipend"

Physics Professor Designs Space Shuttle Experiment

Hank Brittain, Associate Professor of Physics

I felt like a kid who just smacked his first little league home run when my cardiac tissue samples began beating this summer at the Kansas State University NASA Specialized Center for Research and Training in Gravitational Biology.

Because I had been awarded a Faculty Development Grant, I spent many hours this summer hunched over a microscope, painstakingly dissecting pre-cardiac tissue from 36-hour-old chick embryos with knives thinner than a human hair.

By the next day, pin-head sized tissue had formed into crude chambers, and began pulsing rhythmically. After two months, I had enough data to indicate that the tissue, which stops developing if kept below 98.6 degrees F, would still develop once returned to that temperature, even after three weeks at room temperature. This means that experiments with this tissue designated for space shuttle flights will not be seriously disrupted by launch delays.

It is important that we study biology in a microgravity environment to answer the question: Can we grow food in space? We know that without gravity, plant root tips grow in random directions. Embryonic development is also affected—late-stage chick embryos hatch after an extended period in space, but very young embryos do not.

Future shuttle flights will carry pre-cardiac tissue as well as an experiment that I designed to study wound healing. Scheduled for launch in February 1995 on Shuttle Mission STS63, this project will examine cells that help repair damaged blood vessels. Injuries as minor as a paper cut do not readily heal in space, and I hope to show that the decreases of gravity in earth orbit impair the growth rate of these important cells.

The KSU and NASA contacts will help open doors for other Kennesaw State faculty to possibly place experiments on future shuttle flights. The experience has also given me some ideas for undergraduate research projects, and I am currently working with other biology and chemistry faculty on a proposal to the National Science Foundation for $50,000 to obtain equipment to continue applied research and teaching in cell culture systems at Kennesaw State.

"What I did with my summer stipend"

Building Better Communication Networks

Virginia Rice, Assistant Professor of Mathematics

With my summer stipend, I continued work on the inclusive edge connectivity graph parameter and began grant proposals for outside funding.

A graph consists of a set of objects called vertices and another set of objects called edges, which show relationships between the vertices. For example, one could think of the vertices as computers and the edges as the communication links between the computers.

Visually a graph looks like small circles (vertices) connected by lines (edges). The inclusive edge connectivity parameter attempts to identify vulnerable vertices, i.e., vertices where the removal of just a few edges leaves the vertex in the position that if it fails it will disconnect the graph. My current work is the search for special types of graphs where the removal of a few edges does not produce such vulnerable vertices.

I discovered a stable graph this summer and a technique that may be useful in constructing such graphs. As of yet, I have not been able to prove that this technique always works.