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UA3/8/1 L.Y. Lancaster Professorship Report

WKU Ogden College of Science & Technology

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• L.Y. LANCASTER PROFESSORSHIP
1991-1992 REPORT TO THE OGDEN FOUNDATION

Once again my gratitude is extended to the Ogden Foundation for their help in providing students with enhanced academic experiences in the Biology Department at Western Kentucky University through the L.Y. Lancaster Professorship fund. Accomplishments and benefits made possible with funds from the L.Y. Lancaster Professorship are summarized below.

Most importantly, students continue to be involved in ongoing research projects (see attached summary) initiated with funds from other sources (i.e., the Marcia Athey Fund of the Kentucky Academy of Science -\$5,637.00- and money from Peabody Coal Company) and aided with Professorship money for student salaries (\$1,806.58) and supplies (\$ 610.90). The results of these studies have been or will be presented at meetings by the student authors and/or published (see attached). It has been a pleasure to see these students grow academically and in self confidence as a result of their participation in these projects. Additionally, results from these studies have contributed significantly toward making it possible to submit a strong NIH-AREA grant proposal for \$57,104.00 (see attached).

Secondly, work has continued on the development of constructing three dimensional computer generated images from cross sections of specimens using the Spyglass Dicer™ program purchased with professorship funds last year. Lori England, a premedical student, developed embedding and sectioning procedures, videotaped images into the computer, modified them using a third program and transported them to the Dicer program. Three dimensional reconstructions of small segments of *Necturus* were generated. We know the technology will work, but are somewhat short on computer memory required for reconstructing whole animals from cross sections. I am very excited about the possibilities and can see a nationwide impact on anatomy instruction in high schools and colleges. Also, judging from new products reaching the market for medical schools (e.g., A.D.A.M.) this approach is the trend of the future in medical school instruction of gross anatomy. At this time, a proposal is being considered by the President's Unrestricted Committee for a color scanner. This unit will improve the importation of cross sectional images into the computer thus facilitating reconstruction efforts. In addition, this unit will make the use of the multimedia console (see below) more versatile. Color images from any source can be imported, modified and presented on screen in lecture. Furthermore, students can refer to any such images in the biology computer lab at their convenience.

The IBM clone computer obtained with matching funds from the professorship (3 years ago) continues to improve student (and my) productivity and enhance the quality of research projects, as well as, facilitate activities of Alpha Epsilon Delta (national premedical honor society). Analysis of data from a research project funded by N.I.H. made possible by the Jandel PC3D program provided one thesis for a biology graduate student who is now pursuing a Ph.D. degree at the University of Mississippi. A manuscript

including these results has been submitted for publication in the Journal of Comparative Physiology (international journal, see attached). Another student, Zhuming Zhang, is nearing completion on the next phase of this research project that also requires data analysis using the Jandel PC3D program. Her results are nearly complete and they verify the model proposed in the first N.I.H.-A.R.E.A. grant. Upon completion of data analysis, we intend to submit another grant proposal to N.I.H. for a confocal microscope that will greatly accelerate our search for the cells comprising the "clock". A third graduate student, Denise R. Stephens, working on a research project investigating the reproductive biology of a southeastern population of Tree Swallows on reclaimed strip mine lands of Peabody Coal Company, used the computer to analyze data and has completed her thesis. Her results, combined with additional results from this summer will be submitted for publication in *The Auk*, a national ornithological publication. As a result of Denise's work, a Peabody Coal Company representative, Joyce Fitzgerald, who provided \$326.00 worth of supplies necessary to complete the swallow project, has offered to provide equipment necessary to carry out future research work on other species inhabiting their land, in particular a recently invading population of Short-eared Owls. In addition, Joyce arranged to have an expose' on the swallow project appear in a industry publication. I am looking forward to seeing the pictures of the swallows taken by the free-lance photographer that accompanied us in the field. Finally, Alpha Epsilon Delta members have transferred their alumni address list to my computer and continued to use the word processor for correspondence. With the increased use of the computer by a number of AED members and other students, I am finding it necessary to schedule time on the computer.

Lastly, but certainly not the least, I would like to acknowledge the L.Y. Lancaster Board and in particular Dr. John Logan for their generous offer of \$2,000 to be matched with university funds in order to purchase a prototype mobile, multimedia console that will help improve instruction through the integration of innovative presentation technologies in the classroom. Dr. Claire Rinehart and I submitted a grant proposal (see attached) to the President's Unrestricted Development Fund Committee for the necessary matching funds. Thanks to the seed money provided by the board and the strong endorsements by the the Department Head, Val Dunham, Dean Charles Kupchella and Vice-President for Academic Affairs, Robert Haynes, the proposal was fully funded. Thus far we have assembled most of the hardware (*i.e.*, video projector, computer, computer projection unit, etc.) and presently the cart has been constructed in the Ogden College shop and is currently being painted. I would like the opportunity to demonstrate the operation of this console at next year's Ogden Foundation Board meeting. I would also take this opportunity to acknowledge my gratitude to John Smith and Alonzo Alexander for their advice in improving the design of the console and for the excellent job in constructing it.

This year has been a very exciting and productive year for me and a number of students, in large part due to the generosity and concern of the Ogden Foundation Board members. Again, I thank the Ogden Foundation Board for its moral and financial support of the science program and student education at Western Kentucky University.

L.Y. LANCASTER PROFESSORSHIP

1991-1992 Report
July 31, 1992

DATES	STUDENTS	PROJECTS
8/15/91-5/15/92	Chris Pergrem* ^{1,2,3,6}	HPLC-EC determination of brain octopamine levels in <i>Leucophaea maderae</i> .
8/15/91-12/30/92	Lori Ann England*	
8/15/91-5/15/92	Maya Siddiqui ^{1,3,6}	
1/10/92-5/15/92	Lori Radford	
5/15/92-	David Frost	
	Laura Lee Wilson ³	
1/10/92-5/15/92	Lori England* ⁵	3-D reconstruction of <i>Necturus</i>
1/10/92-5/15/92	Jonathan Newton* ⁵	Development of a technique to probe for the presence of a c-fos like gene in <i>Leucophaea maderae</i> .
1/10/92-5/15/92	Sherri Heady ⁵	Developed a histological technique for examining brain morphology in <i>Leucophaea maderae</i>
	Joseph Harris ⁵	
8/15/91-12/20/91	Denise Rouse Stephens ⁴	Completed her thesis on a "Southeastern population of Tree Swallows"
8/10/91-5/15/92	Zhuming Zhang ⁵	Clock control of ommatidia structure in the cockroach, <i>Leucophaea maderae</i> .

- * Student received a stipend through the L.Y. Lancaster Professorship
- 1 Coauthors of two separate papers presented at the 22nd annual Sigma Xi Student Research Conference, April 1992 at WKU. Chris Pergrem is currently enrolled at the University of Louisville Medical School.
- 2 Research team leaders responsible for coordinating the efforts of the efforts of other students on the team.
- 3 Coauthors of 2 research papers to be submitted to *J. Microchemical Analysis*.
- 4 Presented research results at the Kentucky Academy of Science annual meeting held in November 1991 at Owensboro. Ms. Stephens completed her thesis and presently is employed as a biologist with the U.S. Army Corps of Engineers.
- 5 Incidental supplies were purchased with professorship funds to enable these students to carry out a series of experiments as part of a pilot project.

- 6 Coauthors of papers presented at the 24th regional meeting of the American Chemical Society held May 27-29 at Cincinnati, Ohio and at the 10th annual Graduate Students' Symposium held at SUNY-Buffalo, in May.

Also, attached is a reprint of the article published in *The Transactions of the Kentucky Academy of Science* which resulted in part from the Foundation's support. A manuscript submitted to *The Journal of Comparative Physiology* (International Journal) in July is also attached. I also acknowledge the significant contributions of Dr. Darwin Dahl, a very capable analytical chemist at WKU, who has been collaborating with me on projects involving HPLC-EC measurements of neurotransmitters. His help has been invaluable and he is co-principal investigator on a \$5,637.00 grant recently received from the Marcia Athey Fund of the Kentucky Academy of Science to carry out the "Determination of a circadian rhythm of brain octopamine levels in the cockroach (*Leucophaea maderae*) by high-performance liquid chromatography with electrochemical detection. Dr. Dahl is also co-investigator of a grant recently submitted to NIH (attached).