

Recent Research & Funding

The research areas that are of most interest to me are multidisciplinary and involve the participation of collaborators from disparate fields such as biology, biochemistry, chemical physics and applied mathematics. Examples of current research interests include:

- *Physiology of host/parasite relationships.* The Microsporidia are a large group of highly specialized obligate intracellular protozoan parasites. Despite their wide distribution in nature and their devastating effects on a variety of animal populations, relatively little is known about the biochemical capabilities of the Microsporidia or of their interactions with the host cell environment. Indeed, previous studies concerning these parasites have dealt almost exclusively with ultrastructural descriptions of morphology and life cycle details. Historically, metabolic studies of the Microsporidia have suffered as a result of inadequate methods for prolonged *in vitro* cultivation of these organisms. Our recent development of a novel extracellular maintenance protocol extends the viability of these parasites (> 12 hours) and makes metabolic studies possible. Utilizing these culture conditions, we have begun to investigate the transport of nutrients (e.g., carbohydrates, amino acids, and nucleic acids) and the resultant accumulation of metabolites that emanate from preliminary vegetative conversion processes. We also intend to extend our study to include consideration of the energy metabolism and oxygen tolerance of these parasites. This work is being performed in conjunction with E. H. Weidner (Louisiana State University).

- *Evolutionary significance of the Microsporidia.* Preliminary studies of the genetic make-up and enzymatic composition of the Microsporidia indicate that these organisms may represent an extremely ancient evolutionary line. As such, the study of these organisms may provide significant insight into the transition from prokaryotic to eukaryotic organization. For example, ribosomes of the Microsporidia are thought to be of the smaller prokaryotic 70S rather than the larger eukaryotic 80S variety. In addition, Microsporidia apparently lack the noncoding intervening sequences (introns) that are commonly found in eukaryotic heterogeneous nuclear RNA. Finally, recent reports indicate the presence of reverse transcriptase in the spores of the microsporidian *Spraguea lophii*. We have begun a survey of a number of microsporidian species to ascertain the nature of their ribosomes, mRNA transcripts and enzymatic makeup. This work is being conducted in conjunction with E. H. Weidner (LSU).

- *Parasitological and genetic mechanisms shaping mate selection in wild turkeys.* Previous studies of the wild turkey indicate that female birds choose their mates based upon the quality of male ornamentation. Since the size of this ornamentation decreases with increasing levels of parasitic infection, if resistance to parasites is heritable, a hen's choice would maximize her fitness by enabling her offspring to resist the deleterious effects of infection. In order to investigate the genetic basis for parasite resistance in wild turkeys, we have initiated a study of the genetic variation of the wild turkey at the MHC locus. A collaborative study involving R. Buchholz (University of Mississippi) and S. Hecht (Grand Valley State University), my involvement in this project includes assistance with field tissue collections and measurements, parasite screening and *RAPD* and Southern hybridization analyses of the MHC region.

- *Parasitemia in turtles collected from northeast Louisiana.* The red blood cells of a number of turtle species have been found to harbor an obligate intracellular parasite, *Haemogregarina sp.* This infection has been shown to persist in alligator snapping turtles held in long-term captivity in the absence of their invertebrate leech host, *Placobdella sp.* A cytoplasmic inclusion body also found within the RBCs of these turtles has been recently identified as an intracellular parasitic prokaryote. This work was performed in conjunction with J. Carr, J. Knesel (ULM) and E. H. Weidner (LSU).

In addition to the faculty collaborators listed above, each of these projects involves a M.S.-level graduate student as a full partner in the ongoing research. Ms. C. Doffitt and Ms. J. Holt are involved in the microsporidian experiments while Ms. J. Grayson's recent M.S. thesis detailed parasitemia in local turtle species. Ms. M. D. Jones is currently completing comparative *RAPD* and Southern hybridization studies on hunter-killed and game-farm raised wild turkey populations.

Whereas much of my research necessitates the existence of a cellular biology laboratory facility, one of my top priorities has been the acquisition of requisite equipment. A comprehensive cell fractionation and characterization laboratory is the result of collaborative efforts of ULM biology faculty. Capitalizing on intramural and external funding opportunities, we have successfully equipped a model instructional facility that also supports our M.S.-level research program. Once a noticeable deficiency, the recently developed cellular biology facility is now a major attraction for both undergraduate and graduate students within the department.

Funded Extramural Grants

- 1- "Computer-Enhanced Human Anatomy and Physiology Instruction," A. M. Findley, K. M. Tolson and A. G. Ouchley, LEQSF-Enhancement Fund + NLU match - \$ 50,500, 1997-1998.
- 2- "BIOME: An Interactive Multimedia Center for Introductory Biology Students," R. Buchholz, A. M. Findley and F. Groves, BORSF-Enhancement Fund + NLU match - \$ 93,990, 1998-1999.
- 3- "Investigation of the Parasitological and Genetic Mechanisms Shaping Sexually Selected Characters in the Wild Turkey in Louisiana," R. Buchholz, S. Hecht and A. M. Findley, BORSF-Research & Development Fund + NLU match - \$ 86,500, 1998-2001.
- 4- "Fractionation Equipment for Cell and Molecular Biology," T. W. Sasek, A. M. Findley and S. Hecht, NSF – Instrumentation & Instrument Development Program + NLU/STAP funds - \$ 139,531, 1999-2000.

Funded Intramural Grants

- 1- "Development of a Multidisciplinary Initiative in Theoretical Biology," A. M. Findley and G. L. Findley, NLU Faculty Grants Program, 1995-1997.
- 2- "Interactive Demonstrations for Molecular and Cell Biology," NLU Campus Renewal Project Faculty Development Subprogram - \$ 2,000, 1996.
- 3- "Teaching Molecular Biology in the Laboratory," A. M. Findley, S. Hecht, T. Yamashita and M. J. Taylor, NLU Development Fund - \$ 8,000, 1998-1999.
- 4- "**BI**ology **M**ultimedia **A**uthoring **S**tation (**BIOMAS**)," Biology Dept. faculty, NLU Development Fund - \$ 9,420, 1999-2000.
- 5- "Sterilization Equipment for the Chemistry and Natural Sciences Building (CNSB) Laboratory Suite," H. C. Bounds, A. M. Findley, J. A. Knesel, D. W. Pritchett, T. W. Sasek, T. G. Lewis, W. C. Hoefler, J. L. Oakes, T. Smith and M. J. Taylor, ULM Development Fund - \$ 6,300, 2000.