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Spring 2014

Charles Walker, Professor, School of Marine  
Science and Ocean Engineering

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*University of New Hampshire - Main Campus*

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# Inquiry Journal

**Undergraduate Research Journal : Spring 2014**

## Mentor Highlights

### Charles Walker

—Brigid C. Casellini

Dr. Charles Walker is a professor of molecular, cellular, and biomedical science at the University of New Hampshire, where he has been for thirty-eight years.

Below is a correspondence with Professor Walker about his own research and his mentoring experiences with undergraduate students.

**Inquiry:** What is your current research? Did your undergraduate studies point you toward it? What interests you most about it?

**CW:** My research concerns molecular mechanisms promoting animal cancer. As an undergraduate at Miami University in Ohio, I developed an interest in marine science, particularly marine invertebrates, and spent a summer at the Shoals Marine Laboratory. At UNH and with fifteen years of support from the National Cancer Institute, we have approached animal cancer through the clam hemocyte leukemia model. We have shown that this model system has p53 protein which is 76% identical with human p53. This particular protein is involved in detecting damaged DNA before cells divide, and can lead to programmed cellular death (apoptosis) of cells that are dividing out of control. Based on our completed genomic sequence for this clam, we are aware that most p53 related genes are present and highly conserved with human sequences. All of these studies are published in human cancer-related journals and involve the efforts of undergraduates as authors (*Oncogene*, *Cancer Research*, *American Journal of Pathology* and *Cell Cycle*). For the last three years, we have used information from our studies of the clam hemocyte leukemia model to inform our studies of human cancers, particularly human



Dr. Charles Walker, professor of molecular, cellular, and biomedical science at the University of New Hampshire (Photo by Lisa

acute myelogenous leukemia. Developing novel animal models that can be used to further our studies of human health has always fascinated me and is equally attractive to UNH students at all levels.

(Photo by Charles Walker, UNH Photographic Services).

In my laboratory, we study the role of mortalin (the mitochondrial Hsp70 protein) in inactivating p53 protein in animal cancer cells. In these studies, we use both clam hemocyte cells or human acute myelogenous leukemia cells from both a cell line (KG1) and from a clinical population of cancer patients. All of these cancers demonstrate inactivation of p53 protein allowing cells to avoid p53 induced cell death. Results and broad conclusions from these studies are directly relevant to developing targeted therapies that reactivate p53 in cancer cells where mortalin inactivates the apoptotic functions of p53.

**Inquiry:** What is the purpose of a mentoring relationship? What should the student and you gain from it?

**CW:** An essential part of research in my laboratory is the training of undergraduate researchers in cellular and molecular biology. I believe that teaching undergraduate, graduate, and post-doctoral students together in the laboratory as an interactive community of scholars and colleagues is vital to developing modern physicians, research biologists, and teachers. Currently twenty-one undergraduates study under my direct supervision in our research laboratory.

I ask students in my lab to do what I do: teach. Teaching for me requires stimulating students to be excited about telling others what they have learned. Undergraduates should be proud of what they learn and be especially willing to pass it on. I believe developing this point of view should be part of their education. As cell biologist Harvey Lodish has suggested, "I firmly believe that each of us has benefited from inspiring teachers, and thus that each of us has acquired the obligation to teach at whatever level we can in order to train and inspire the generations of scientists who will follow us."

**Inquiry:** Please describe some positive, memorable mentoring experiences or mentees.

**CW:** I have always considered it an honor and a privilege to be involved in undergraduate education, particularly in the laboratory. The most satisfying part of this for me is when former students send emails or communicate through others interviewing for jobs that mentoring in my lab was one of the most valuable experiences they had at UNH.

Undergraduate students from my laboratory have been involved in over thirty-seven senior and senior honors theses and have co-authored thirty-five publications and presented fifty-two posters, nationally and internationally. Among the 150 who have worked with me during my career are over twenty-two practicing physicians and eighty others in molecular and cell biology graduate schools, industry and pharmaceutical companies, and educational institutions in the U.S. and abroad.

**Inquiry:** Please describe any difficulties or problems you have had in mentoring undergraduates.

**CW:** Sometimes there have been so many mentees working



Charles Walker with student Ben Claxton (Photo by Perry Smith, UNH Photographic Services).

in my laboratory that they have to work in shifts. Initially a frustration for me was that they all leave for graduate school or whatnot just about the time that they learn what they are doing. So technology transfer became an important issue for me, and I started asking students to teach the next generation of students in the lab. Then it occurred to me that this was just as valuable for the students as it was for our laboratory. As juniors and seniors, I feel that it is their responsibility to begin to give back. An academic program that is vertically integrated, incorporating components that extend from the beginning of the freshman year to the completion of the senior year, offers an ideal context for the engagement of juniors and seniors as mentors for other students. I promote a guided mentorship program for juniors and seniors as an invaluable opportunity for them to gain, through the process of teaching, a deeper and more mature understanding of the knowledge acquired during their three prior years of undergraduate studies.

**Inquiry:** What advice or tips would you give a faculty member new to undergraduate mentoring?

**CW:** Have fun!!! For me, nothing is more enjoyable than watching students mature in their interactive mentoring skills.

Charles Walker mentored Inquiry author Rebecca Mason (2013).

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