

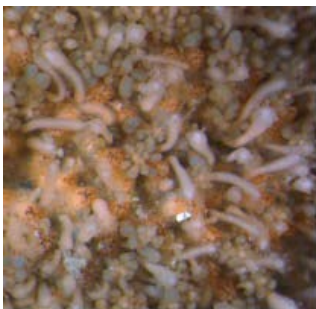
MCDB Faculty Research

TIN TIN SU SHARES HER SUMMER RESEARCH FELLOWSHIP WORK

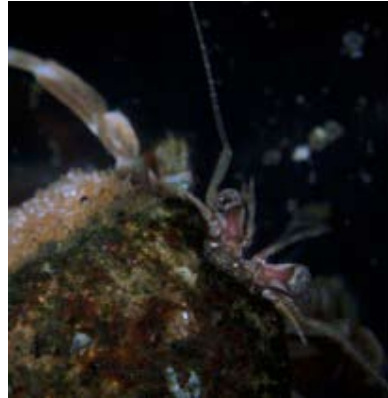


I received a Laura and Arthur Colwin Endowed Summer Research Fellowship to spend part of my summer at the Marine Biological Laboratory in Woods Hole, MA. My lab at the University of Colorado in Boulder studies how cells cope with damage to DNA. We use *Drosophila melanogaster* (fruit fly) as a model organism for most of our work in Boulder. We also use human cells and mice to test how applicable our results in *Drosophila* are to mammals, because we are interested in potential clinical application of our findings. Although most people would consider fruit flies, mice and human to be quite different from each other, these organisms represent only a tiny sub-set of all the diverse life forms that exist in the animal kingdom.

I wanted to know how applicable our findings in *Drosophila* are to other, less well-studied animal forms. This summer, I was able to work with four marine organisms that are distant from flies and mammals in terms of evolutionary descent. These are the Slipper Limpet, Sea Urchin, Ctenophore (Comb Jelly) and Hydractinia (a relative of Hydra and Sea Anemones). Most of my experiments were done with a species of Hydractinia (Photo 1) that grows on the shells of hermit crabs (Photo 2).



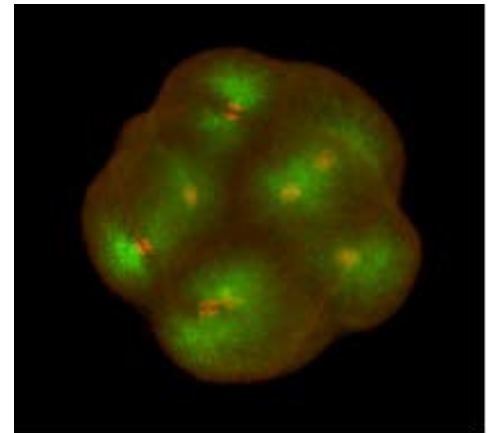
(Photo 1) A colony of Hydractinia. Little greenish blobs are eggs at different stages of maturation. Mature eggs are released during spawning, become fertilized, and are used in my experiments.



(Photo 2) A hermit crab with a colony of Hydractinia (the orange patch) growing on the top, left part of its shell.

I spawned Hydractinia with an alternating dark/light cycle to mimic the night/day transition, collected embryos and treated them with a DNA damaging chemical (Photo 3 shows a Hydractinia embryo that was fixed and stained to visualize cell division). I was particularly interested in whether cells of the embryos 'choose' to pause and fix the damage or 'choose' to die.

(Photo 3) An 8-cell stage embryo undergoing mitotic divisions. Only the top 4 cells are in focus. DNA is in red and mitotic spindles, protein structures that help divide up the DNA between daughter cells, are in green.



In *Drosophila*, cells in younger embryos are readily killed by DNA damaging agents, while cells in older embryos tend to pause and fix the damage. I found that the cells of young Hydractinia embryos pause and probably fix the damage (different from *Drosophila*), but that older embryos do this better than younger embryos, such that same dose of a DNA damaging chemical killed younger embryos more easily than older embryos (similar to *Drosophila*). The ability to respond appropriately when DNA becomes damaged is a key requirement for all cells; the failure to do so can lead to diseases such as cancer that result from loss of genetic integrity. Knowing the different responses to damaged DNA that exist across the animal kingdom could help us discover novel strategies that can help a cell deal with damage to its genetic material. I plan to incorporate what I learned about marine embryos this summer into Experimental Embryology, a critical thinking course I teach to CU undergraduates.

Article and photos by Tin Tin Su, Ph.D.