# FACULTY PROFILE:

**Betty Craig**

As you learned from the Chairman's letter, I am the Chair-elect, taking over the reins of the Department from Hector DeLuca on July 1. What an act to follow! I am honored (and excited) to be selected by the faculty to lead the Department in the coming years. I am quite new to the Biochemistry Department, joining in 2002 after having spent almost 23 years in the Department of Biomolecular Chemstry in the Medical School here at the UW. Below, is my attempt to provide a little insight into "where the new Chair is coming from".

First of all, it's "my parents fault". My father spent as much time, teaching me the fine points of baseball (yes, baseball, not softball) as my brother, and my mother argued endlessly that a way should be found for me to go to University, rather than "teachers' college". All this left me with the idea that I could do anything I set my mind to, even though I grew up in an era in which being a women and being a scientist was something of an oxymoron. My interest in science was sparked by two remarkable high school science teachers, both of whom went on to get PhDs and teach at the college level. The turning point for me was the day in 1962 when a professor from the University came and gave a talk on DNA replication (not bad for a rural New Hampshire high school with 200 kids from 7 towns). I thought this was the coolest thing I had ever heard. So I was off to university – majoring in microbiology, minoring in chemistry.

When nearing graduation, I faced the inevitable question: "What do I do with my life?" or more urgently "How will I pay the rent?" Then I learned the most amazing thing – "THEY WOULD PAY ME TO GO TO GRADUATE SCHOOL" !!!!. I could hardly believe that I could continue my education and make a living at the same time (well, survive, at $1800/year). I was off to Washington University in St. Louis. (OK, I thought I was going to the West. Of course I was going west. I just hadn't looked at the map very closely.) Here I entered the world of "molecular biology". I developed an interest in RNA, before its heyday, first studying mRNA degradation in E. coli as a grad student, and then, as a postdoc, mapping the early and late RNAs of adenovirus, using those magical new tools that we now take so much for granted, restriction enzymes.

I did eventually make it all the way to the Pacific Ocean, starting a postdoc in the Biochemistry and Biophysics Department at the University of California – San Francisco in 1976. I must say that being able to see the Golden Gate Bridge when sitting at my lab bench was awesome. But what really had attracted me to UCSF was recombinant DNA, having the inkling that this fledgling technology would open the way to ask biological questions that had simply been unapproachable up to that time.

Ahhh..., but what question? I finally settled on a "weird" response of fruit flies - a brief upshift in temperature and all the normal mRNAs are no longer associated with ribosomes and the new "heat shock" mRNAs are churning out large amounts of a handful of proteins. Not only did this fit well with my interest in regulation of mRNA synthesis, it was a wonderfully tractable system. Merely move some bottles of flies from your bench to the 37°C incubator for 15 minutes – voilà! – a source of "pure" mRNA.

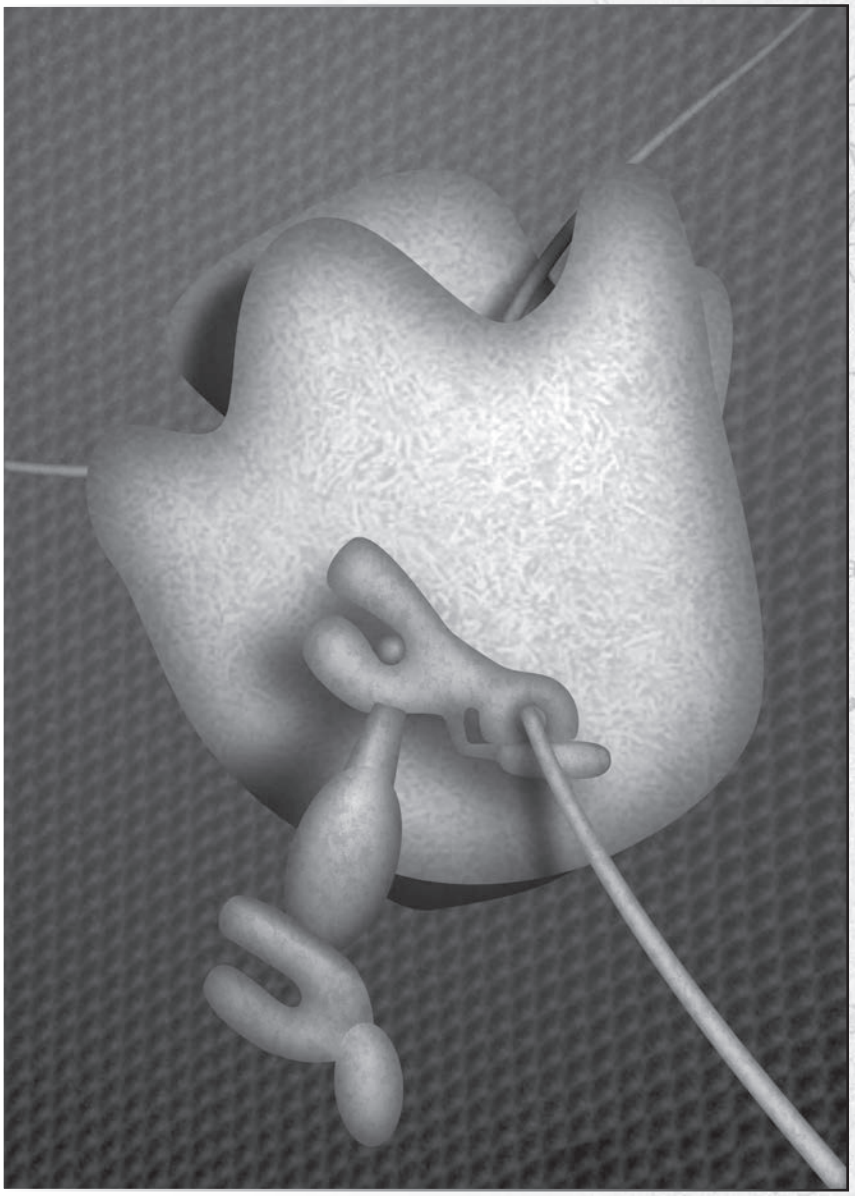
So the 70 kDa and small heat shock cDNAs were cloned and sequenced (easy to say, and

do, now, but remarkably time consuming and painful back then), opening the way for studying regulation of the response, as I had intended. But a report in Cell caught my eye – bacteria also had a response to temperature upshift, and one of the major proteins was 70 kDa. I found this tremendously interesting. Not only did organisms as divergent as bacteria and fruit flies have similar responses to an environmental stimulus, maybe, just maybe, those proteins induced were conserved in evolution. If so, they must be doing something(s) incredibly fundamentally important, but nobody had a clue what that might be!

Simply put, I have been chasing this question ever since: What do heat shock proteins do in the cell and how do they do it? I came to Madison in 1979, joining the faculty in the Biomolecular Chemistry (alias Physiological Chemistry), which for my students and myself was an incredibly supportive and productive department in which to do our research. Over the years we came to know that the proteins expressed after heat and other stresses are, in fact, some of the most conserved proteins that exist. But heat shock proteins are encoded by a large multigene family and do important things not only in times of stress, but also in the best of times. They are essential for life: performing roles from facilitating folding of newly synthesized proteins (hence the now commonly used name, molecular chaperone) to driving translocation of proteins across membranes. Long ago we switched from fruit flies to yeast as a model system – "the awesome power" of yeast genetics and new molecular tools allowing us to ask mechanistic questions we could have only dreamed about before.

In 2002 I joined the Biochemistry Department and we settled into the 4th floor of the Biochemistry Addition, close to the skylight that provides a wonderful environment for my favorite plants, just like the department as a whole provides a wonderful environment for our science. We are now much more involved in biochemical studies, trying to combine biochemistry and genetics to critically test the models we develop concerning how chaperones carry out their marvelous feats within the cell. This blend of science also brings an interesting mix to lab meetings, with the resident biophysicists exposed to suppressor and tetrad analyses and the geneticists to fluorescence anisotropy and dissociation constants. Check out our lab website at: http://www.biochem.wisc.edu/craig/lab/

I look forward to the next year(s), leading the department and chasing chaperone function. I will also get my exercise traversing between the 1st floor department office and my 4th floor lab. I can already hear the mantra in my head … stairs or elevator…stairs or elevator…..



*Chaperone protein model*