QUESTION AND ANSWER WITH DR. NANCY CRAIG


Nancy Craig, Ph.D.

After 30 years of research, Nancy Dr. Craig of Molecular Biology and Genetics says she remains "entranced" by the phenomenon of DNA that moves itself around in the genome.

Q: How did you decide to specialize in the study of transposable elements?
Dr. Craig: When I was a postdoc, I worked on the bacterial virus phage lambda. It's a classic tool for molecular biology. Intriguingly, it inserts itself into and excises itself out of the bacterial genome. Lambda is also extremely target-site specific. By contrast, transposable elements appear to insert in many different places in the genome. Then I happened to read an article in the journal Nature about a transposable element that inserts at a specific site in the genome (the way lambda does). I thought that was fascinating. How could this transposable element defy the rules and insert at a specific site? So I decided to change my research focus from studying phage lambda to studying that transposable element, and continued by focusing specifically on the molecular mechanisms that enable transposable elements to move.

Q: How far do transposable elements move, anyway? And what makes them move?
Dr. Craig: Some of them can move from anywhere in the genome to anywhere else in the genome; others move only to nearby regions of the genome. Some – like retroviruses – move between cells. The particular type of transposon that I study has an enzyme (called transposase) that does the breakage and joining; transposase cuts the transposon out of one place in the genome and splices it into another.

Q: So they don't exactly "jump"? Is the term "jumping gene" a misnomer?
Dr. Craig: I actually think symbionts would be a better name. The host cell provides a place for the transposable element to copy itself. And the transposable element provides genetic diversity to the host. It's symbiotic.

Q: But weren't transposons once consigned to the category of "junk DNA"?
Dr. Craig: People knew much of the genome was not genes. The term junk DNA was used to refer to the non-gene space: non-coding DNA. However, thanks largely to the Human Genome Project, we've realized that much of the so-called junk DNA has important biological roles. For example, transposons may help regulate gene expression.

Q: So your enthusiasm for transposable elements has not faded?
Dr. Craig: Not at all. DNA is the most interesting thing I've ever heard of. It's such an elegant solution to the problem of how you transmit information to progeny. On top of that, that some of it is mobile is extraordinary. They're not junk at all.