Q & A

Clement Kent

Clement Kent was born in Washington, D.C., and studied mathematics as an undergraduate at the University of Toronto. For twenty years, he worked in the computer industry, including stints as Vice President of Research and Development as well as Chief Technical Officer at software firms. He currently is a Ph.D. student in Ecology and Evolutionary Biology at the University of Toronto co-supervised by Prof. Marla Sokolowski and Prof. Joel Levine.

Why did you change careers? Although computing is certainly fast-paced and varied, I found myself reading science journals in the evenings for intellectual stimulation. Looking at advances in modern biology, I realized that there were opportunities for people with strong computer skills, and that I could combine my vocation with my avocation there. Many of my colleagues were surprised, but not a few were envious! I think burnout is a real risk in the computer field and people need to move to new challenges to stay fresh.

Why did you become a theoretical biologist? As an undergraduate I worked hard at pure math, but was interested in its applications — I thought I'd become an astronomer, but I was always fascinated by biology. My only undergrad biology course, which seemed accessible to a mathematician who could program computers, was "Models in Ecology" by Prof. Jyri Paloheimo. He mixed bifurcation and chaos theory with practical fisheries management models; I owe him a great intellectual debt.

What advice would you give someone thinking about switching to biology from math or physics? Do it! It's fun, but be prepared for some hard work. Unlike math and physics, success in biology requires learning a large number of disparate facts about how organisms work. Don't be discouraged; look to role models like Seymour Benzer, Robert May, Albert Barabaszi to see how it can be done. One of the best things about modern biology is the explosion of data, which puts researchers interested in theory and modelling in an ideal position.

If you knew earlier on what you know now, would you still pursue the same career path? I would have moved back into biology much earlier. I was seduced by money and career success in computers, so greed kept me staying there longer than I should have. I am more fulfilled thinking about and doing biology, although much poorer.

Who would be at your ideal conference? I'd love to be marooned on a desert island (with whiteboards, or at least a smooth sandy beach to scribble on) with Michael Lynch, Ralph Greenspan, Norbert Perrimon, John Mattick, Michael Wade, Thomas Whitham, Sara Via and Allen Moore. Perrimon, Mattick and Greenspan each have their own unique perspectives on how complex gene networks might work, while Whitham, Wade and Moore extend evolutionary network thinking to social and ecological communities. Via and Lynch are the brilliant sceptics whose smart null hypotheses keep everyone else grounded in facts. I'd like to hear this group discuss how natural selection affects the interaction of molecular/genetic and ecological networks.

Do you have a scientific 'hero'? If I had to choose just one, it would be E.O. Wilson. I highly recommend his autobiography to early career scientists.

What is the importance of theoretical and computational approaches in biology? I'm biased: the most important work in biology today is being done by reductionist cell and developmental biologists who find out how life works, one hard-won fact at a time. However, their discoveries sometimes seem to make an enormous scree pile of loosely connected nuggets of information. The job of theoretical biologists is twofold: first, to discern pattern in the mountain of facts and propose testable hypotheses which simplify the mountain's structure; and second, to apply quantitative methods from theory to sharpen the analysis of experimental data. The second job perhaps carries less prestige in the theoretical community but arguably is as important as the first. Computational biologists add one more task to the list:

building the data and information rich systems which facilitate access to and use of the mountain of facts.

What do you think about the 'electronic revolution' in publishing? The value of online tools will only increase with time as the mountain of facts grows higher and broader. This is why it is essential that information be freely available: the public pays for most non-proprietary research, and should have full access to it (after the shortest blackout period compatible with keeping for-profit journals in business). Freedom of access alone is not enough, however: structured repositories for data sets large and small are essential and use of them should become mandatory.

What ethical obligations do biologists have? Our first ethical obligation is education of the public and decision makers. The gap between what science understands and what the public comprehends grows ever larger. Lawmakers don't understand the scientific method, with its inherent uncertainties and lack of dogmatic answers to complex questions. They need our help. Talking about the role of researchers in public policy Daniel Pauly recently remarked that providing impartial, relevant, expert advice both to governments and to the interest groups which pressure them is where biologists can have the greatest impact.

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