Know Your Wisconsin Mathematician

Interview with Nigel Boston, UW-Madison, by J. Sriskandarajah

You were born in the United Kingdom. What impression did grade school make on you?

I attended a very competitive school (Manchester Grammar School, which turns 500 this year) from ages 11-17. I learned an awful lot there about many subjects, such as Latin, Greek, French, Chemistry, and Physics, and loved all of it.

Some of your research is in Number Theory. Did you become interested in this area at an early age?

As an undergraduate, I was fascinated by group theory and number theory, but when I went to grad school, nobody did number theory. However, I found I could solve some questions in it by applying group theory. I still do that as my style of research.

Did your family influence your intellectual development in any particular directions? Tell me about growing up and becoming a mathematician?

My parents were very supportive, but neither of them went to college, so they left it up to my school to advise me. In England at that time, you decided at age 15 what you'd specialize in and everyone expected me to choose Latin or Greek. The thing I liked about Latin and Greek was the orderliness and logic, so Math made more sense to me to go into.

As I recall, you went to Cambridge University as an undergraduate. What was the environment like?

It was very competitive. My peers valued people who had the natural ability to answer questions without seeming to try hard. We had to master doing well, while still appearing laid back.

You received your Ph.D. from Harvard University. How would you compare this environment?

Again very competitive, except that there people would brag about all the hours they worked, which seemed perverse to me after my undergrad experience. The great thing about Harvard was getting to meet and know some of the best mathematicians in the world.

What is the best part of being a mathematician?

I get to pull back the curtain and see the infrastructure of this world we find ourselves in. It's also great to be paid just to think about things, learn new things, and share them.

What is the worst part?

University politics can get pretty ugly. As Sayre said, "Academic politics is the most vicious and bitter form of politics, because the stakes are so low."

At what other universities have you taught, and how to they compare to the University of Wisconsin?

I was at the University of Illinois at Urbana-Champaign for 12 years before coming to UW, as well as a year each in Dublin and South Carolina. At each place, I was looking to promote interdisciplinary research, such as applying abstract algebra to computer science and electrical engineering. I've found that nowhere comes close to UW in terms of multidisciplinary cooperation between different departments. Even though Dublin and SC gave me named chairs, I returned to UW.

Do you see any difference between students in the U.K. and the U.S.A.?

The system is more accelerated in the UK, where you might learn in high school what Americans typically learn in the first few years of college. We started calculus at age 13, for instance. The Americans catch up, so ultimately there's not much difference.

What other careers do you think you might have been good at?

As I said earlier, I had a great love of Latin and Greek, so I could have easily become a classical scholar.

Has the way that you do mathematics changed over the years?
There's been a shift in how everyone does mathematics versus how they did it twenty years ago, in that these days we have access to two amazing tools, Google and computer algebra systems. These days, before my students or I attempt a research problem, we can first search and see if anyone has done anything similar and secondly conduct some computational investigations to see what we expect to be true. Of course, in the end, we have to write proofs the same way as ever, but we save time by avoiding dead ends. For me personally, my math has changed over the years in that I did only pure math 20 years ago. As time has passed, I've found I can apply what I know in all kinds of fields.

How would you describe to, let say a freshman or sophomore HS student, how a professional mathematician really does math?
In my own case, I go to a lot of seminar talks and read a lot of articles and find out what others are working on, open problems in the field, and what is considered important. Often I will be able to connect one of these with something I've encountered elsewhere. This is especially useful when attending talks in computer science or electrical engineering, where I'm always looking to try to apply something I know from pure math in a novel way. It's good to know your own skill set. Mine is applying group theory and number theory, still. It also helps to be like Feynman, who suggested you have a bunch of tools you're really good with and just try each of them on every problem you meet.

Where do you think mathematics is going, and then closely allied to that, where do you think it should go?
There are many interesting developments in mathematics, such as the growing applications to broader areas such as biology and linguistics, the increase in collaborative papers (with the ultimate being massive collaborations like the Polymath Project), and the growth in online discussion groups like Math Overflow. Another interesting direction is the growth in formal proof by computer – the Four-Color Theorem, for instance, has been formally verified. Each of these leads to new math, which is good. At the same time, however, Math is suffering from bad PR, so I'd wish for much greater public appreciation of all these amazing developments.

What do you think makes a mathematician successful?
Curiosity. The students who absorb what I tell them do well, but the ones who do really well are those who wonder about it, who ask themselves and me whether it's still true if we weaken some assumption.

What of your mathematical work do you like best?
I like it most when I'm working on some simple stated thing that has fundamental importance and I'm hot on pursuing some idea to try. It might fail 99% of the time, but you'll understand things better and if you try 100 things, one may work and then it's wonderful.

What does your wife think of your mathematics?
She thinks it's a nice little hobby that keeps me out of trouble.

What have been some moments that have stood out for you in your career so far?
I attended the talks by Andrew Wiles at the Newton Institute in 1993, when he announced a proof of Fermat's Last Theorem. There was a lot of activity immediately afterwards and I got interviewed by Time magazine. Interestingly, Wiles' original proof had a gap, that he fixed the next year, but when I contacted Time to tell them, they weren't interested–that wasn't newsworthy to them. Personally, getting accepted to Harvard for my Ph.D. was a big step and the start of a big adventure.

Who else in your family is good in mathematics?
My children are good at math but not interested in it as a career. I was the first in my family to go to college, but my father's brother took the actuarial exams in the UK and was for many years an actuary.

Who is a Wisconsin Mathematician that you would like to know? Send suggestions for the next KYWM to Ben Collins, collinbe@uwplatt.edu .