

Math professor drawn to simple ideas that explain a lot

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Troy Day won the Canadian Applied and Industrial Mathematics Society (CAIMS) Research Prize in 2012.

Troy Day has always felt a strong pull to understanding the world from a conceptual standpoint. He began his academic career in biology, but recognized it wasn't the experiments that inspired him. It was the theories, especially those driving evolutionary biology.

"I've always gravitated toward that sort of thing – simple ideas that can explain a lot. That's very much a mathematical thing," says Dr. Day (Mathematics and Statistics, Biology).

An applied mathematician, Dr. Day's current research focuses on evolutionary medicine — using mathematical models to understand and predict the evolution of drug resistance. His work investigates how to best use a drug to treat an infection and prevent the emergence of resistance in an individual, then across a population. His team focuses on whether or not heavy-handed antibiotic use is the best way to control the spread of resistance.

"There has been very little analysis on this from an evolutionary theory perspective, on doing the right thing to stop drug resistance," says Dr. Day. "We're seeing that when antibiotics are used in a

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lighter-handed way, the spread of resistance is much more readily controlled with the same health effects.”

Dr. Day and several graduate students work with a team of researchers at Penn State University. His team provides the theoretical mathematical framework while the Penn State researchers work in the lab. It’s a great partnership, he says, because it allows him to focus on what he loves best – the foundational concepts that propel real-world applications.

“What drives me is the idea more than anything. I do think about the end goal because I think it would be wonderful if a combination of mathematics and evolutionary biology could make some useful contribution to things people care about in terms of infectious diseases,” he says. “But that’s not what drives me – it’s more the ideas.”

Dr. Day was recently named a fellow within the [American Association for the Advancement of Science](#) for his work advancing science applications. He also won the Canadian Applied and Industrial Mathematics Society (CAIMS) Research Prize in 2012. The award recognizes innovative and exceptional research contributions in an emerging area of applied or industrial mathematics. It is particularly significant for Dr. Day because in the same year, one of his graduate students, [Elsa Hansen](#), won the CAIMS Cecil Graham Doctoral Dissertation Award. Ms Hansen is now a postdoctoral fellow at Harvard’s Centre for Communicable Disease Dynamics.

[Troy Day’s website](#)

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