



RESEARCH2REALITY

Shining a light on research & innovation.

'It's Like Speeding Up the Process of Evolution'

An interview with **Krishna Mahadevan**, Biochemist
University of Toronto

My research group primarily focuses on looking at metabolism. Metabolism is a central component of life, and if you study metabolism better, then you can harness its potential for many applications, including trying to make fuels or trying to make therapeutic molecules. The thing that's really interesting for us is the ability to actually write genomes. It's the idea of genome editing. That will allow us to program biology just the way you program computers. And that is almost like speeding up the process of evolution.

How does this process work?

The first thing in understanding any system is to figure out how things work. So once you have that basic level of understanding, one can actually figure out how, if you make some changes, it can impact its behaviour. You have a cell, a bacterial cell, and let's say you want to make the cell make a favourite product of yours. This favourite product could be ethanol. So let's say that I want to make the cell make more ethanol, then there are pathways that I need to change, increase its expression, and there are pathways that I should down-regulate or decrease its expression. And understanding which pathways contribute to ethanol, and which pathways contribute to the rest of the cell's metabolism is important, because it will help me figure out, in a targeted way, which components to play around with or change.



What is your lab focusing on right now?

Any lab or office setting, many of the products — for example this countertop, the chair you're sitting in, the clothes you're wearing — have an important component of something called nylon. Currently the nylon that's made is made in a way which is highly energy intensive, and there's a lot of potent greenhouse gas that's emitted during this process. And what we plan to do is replace this petrochemical waste process with a biological process where we will engineer the cells to spit out the nylon precursors. And that we're trying to make from cellulosic sugars and so forth.

So that's the idea. It keeps me up at night, I still think about how we can solve the problems, optimize it in such a way that it becomes a commercial reality.