Q&A: How cell developmental biology fits into the future of medicine

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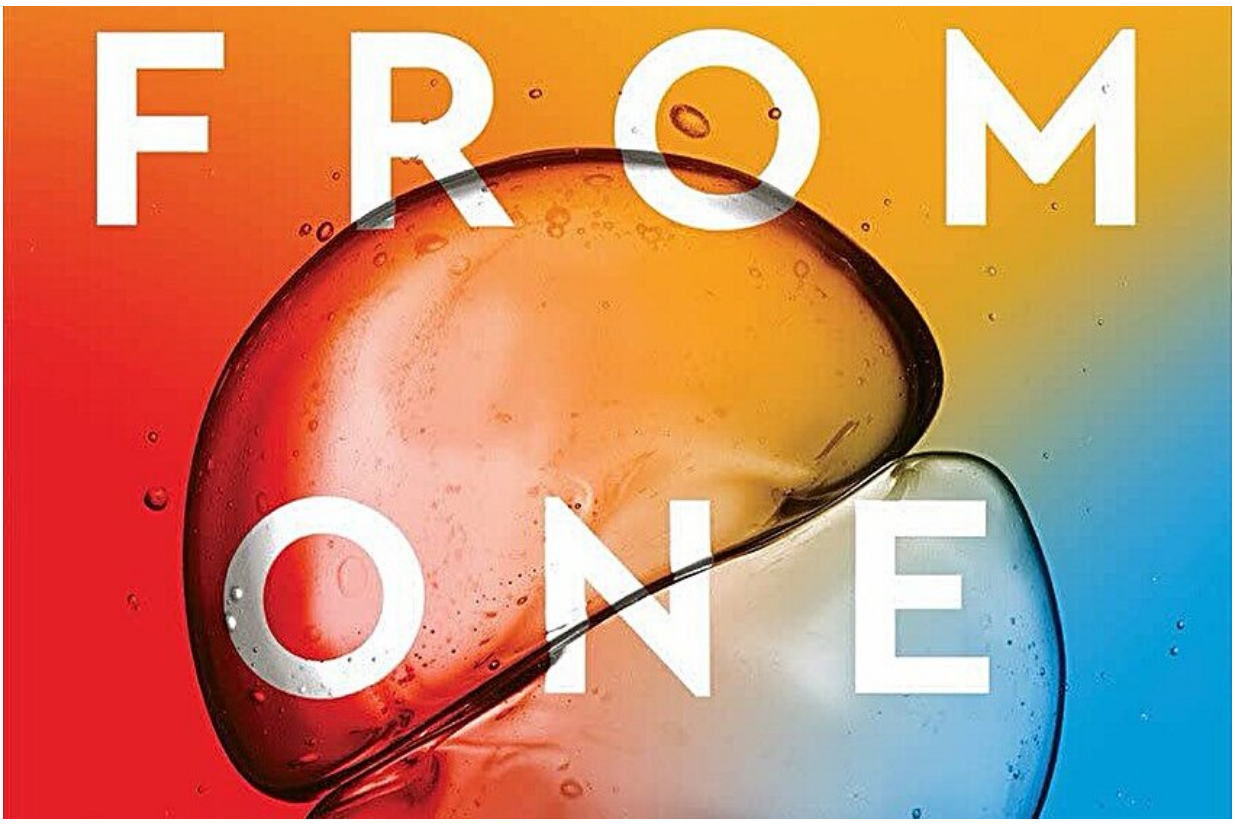

Credit: W. W. Norton

Ben Stanger, MD, Ph.D. is a practicing Gastroenterologist at Penn Medicine. He is also the Hanna Wise Professor in Cancer Research and professor of Medicine and Cell and Developmental biology at the

University of Pennsylvania.

Stanger recently published his first book, "From One Cell: A Journey into Life's Origins and the Future of Medicine." The book takes the reader on a journey from the beginning of life as a single cell. In this Q&A below, Stanger details what inspired him to write this book and more.

To start, let's set the table: What is the study of developmental biology?

The field of developmental biology investigates how animals mature as embryos from one cell—the fertilized egg.

What was the inspiration for writing a book about developmental biology?

There were a few factors at play. First off, the subject is simply fascinating. It goes to the root of how we all come into existence and forms the basis of both normal and disease physiology. I'm biased, but I think it's a subject everyone should be curious about. Second, I wanted to describe the process of discovery more tangibly than it is often portrayed—showing how what we now take as dogma often emerged from what was a thick fog at the time. Third, I believe that scientists have a responsibility to speak directly to the public about their work.

As a kid, I was drawn to science by listening to scientists first-hand—people like Carl Sagan (the author of Cosmos) who stirred my imagination by speaking with authority about their field. A motivating factor for me was the hope that others, especially young(er) readers, would read the book and be inspired to become scientists themselves.

Was there anything you learned during the writing process that surprised you?

I had always understood the role of serendipity in science, but researching the book really brought the point home. The smallest twists of fate—deviations from a standard protocol, the type of microscope you happen to use, which conference you happen to attend—can have massive ripple effects. In my own career as a cancer biologist, for example, I had no intention of studying tumor immunology when I got to Penn. But finding myself down the hall from Carl June and Bob Vonderheide changed that calculus, and now a good portion of my laboratory studies the immunology of pancreas cancer. Writing the book made it clear to me how common this is—random chance plays a huge role in science. It's humbling.

What were some of your favorite passages to write?

I especially enjoyed writing about Francois Jacob, who shared the 1965 Nobel Prize in Medicine for elucidating the mechanisms of gene regulation. Jacob suffered injuries serving in the French resistance during the second World War, so he came to science rather late in life. The problem he was working on—how does the information encoded in DNA make its way into protein—was a complete black box, and he approached it with an open-mindedness and creativity that has few parallels in science. Writing about Jacob allowed me to vicariously experience his journey from veteran to neophyte researcher to paradigm-shifting scientist.

What made you get into cell and developmental biology? How has it changed over your career?

I knew next-to-nothing about embryonic development when I started

graduate school, but some of the postdoctoral fellows in my thesis lab were developmental biologists. They struck me as smart, so I decided I should learn something about development. The more I learned the more I was hooked. There have been immense changes in the field over the past 25 years—advances in stem cell biology and our understanding of how the embryo comes together. That basic understanding is now beginning to bear fruit in the clinic, such as promising therapies for type 1 diabetes.

What do you hope readers take away from your book?

In science, there will always be more questions than answers; the pleasure lies in the pursuit of those answers.

Has writing this book changed how you approach your research?

Writing the book reinforced the notion that a researcher needs to be "fearless." By that, I mean that a researcher should not be dissuaded from approaching an interesting question simply because they lack a certain technical or conceptual expertise. Techniques can be learned, and the very point of research is to discover concepts that change our understanding of the world. There is certainly an important role for confirmatory science—doing an experiment because you think you know the answer but still need to prove it. But I am especially attracted to projects outside of my comfort zone. That approach often leads nowhere, but when it yields something new it's very satisfying.

What do you see as the next major advance in your field? Why?

If I knew that, I'd be working on it! I do think that gene editing—the

ability to change the genetic code of cells—will have a huge impact in medicine. We are already beginning to see the impact of this technology in the treatment of blood disorders, and other disease types are sure to follow. These kinds of advances are different from the types of fundamental discoveries I was talking about earlier. When a new technology comes online, its potential applications increase exponentially with the amount of effort applied.

Any final thoughts?

There's so much great science happening at Penn, and I would encourage everyone in the scientific community—from faculty to students—to communicate the beauty and wonder of their research more broadly. Scientific literacy has never been more important.

Provided by University of Pennsylvania

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