

TEMPLETON REPORT

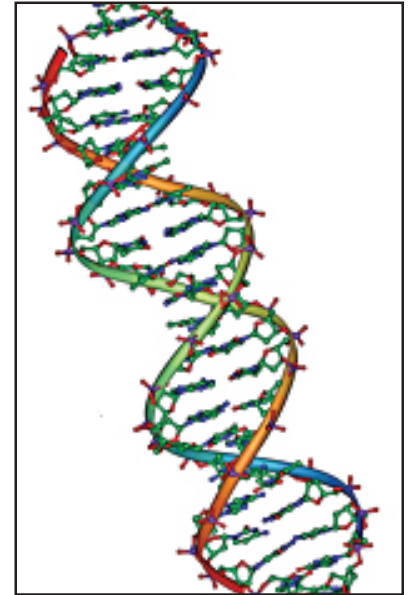
NEWS FROM THE JOHN TEMPLETON FOUNDATION

January 6, 2010

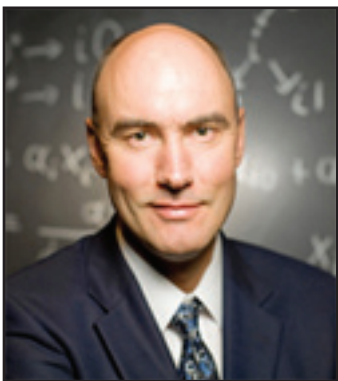
The Next Revolution in Biology

“In every field of science, when it’s successful, you think you understand all of it,” says Martin Nowak, professor of mathematics and biology at Harvard University. “In classical mechanics,” he explains, “there was a time when physicists thought, ‘Well, that’s all there is. If I know the place of the particles in the universe, I can predict the future.’ But then came quantum mechanics and relativity theory. There was a total revolution.” Nowak is hard at work trying to launch another revolution, this time in evolutionary biology. “Our understanding of evolution,” he says, “is very incomplete.”

Thanks to a five-year, multipart grant of more than \$10 million from the John Templeton Foundation, researchers will be able to explore some of the Foundational Questions in Evolutionary Biology (FQEB) that have yet to be answered. For instance, Nowak explains, “evolution does not explain the origin of life because evolution presupposes populations of reproducing individuals.” The origin of life, what he calls “prevolution,” needs more research. This would include examining the transition in which chemistry finally gave rise to biology.



Established in 2009 to mark the Darwin double anniversary (Darwin’s 200th birthday and the 150th anniversary of the publication of *On the Origin of Species*), FQEB is offering fellowships of up to \$75,000 for up to two consecutive years of research for both junior and senior scholars in a variety of fields. The deadline for applications for the first round of fellowships is February 1, and the fellows will begin work in September.



Martin Nowak

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The scholars who win fellowships will do research at Harvard or other academic institutions in the Boston area. They will be expected to participate in the creation of new research networks, to attend regular meetings, and to work across disciplinary boundaries. Priority will be given to work that has significant philosophical implications for evolutionary biology and scientific understanding more broadly.

What kind of research meets that standard? Nowak offers another example. Evolution, he says, is a kind of “search mechanism.” “It searches for constructions, for solutions, for particular cell shapes, particular organs. Evolution is always searching, but there is a space of possibilities that is being searched.” He asks, “What is that space of possibilities? How can we describe a theory of that space that is being searched?”

Another foundational question is, Why do individuals cooperate? Scientists long assumed there were only two principles of evolution: mutation and competition. But in recent years, Nowak says, they have identified a third principle: cooperation. “Why would competing individuals help each other?” he asks. The idea that natural selection favors cooperation—perhaps because individuals who cooperate get the reputation of helping others and thus gain an advantage themselves—represents a fundamental shift in evolutionary biology.

Some of the other questions to be addressed by the FQEB initiative include:

- What are the limits of evolvability, and how are these transcended?
- Why does evolution (sometimes) lead to increasing complexity?
- Are there different kinds of evolution, and is there evolution in the context of evolution itself?
- What are the natural laws of evolutionary change, and can we derive a complete mathematical theory of evolutionary laws?

The field of evolutionary biology is “ripe for new approaches and ideas,” says Barnaby Marsh, vice president of strategic initiatives at the Foundation. For Sir John Templeton, such exploration on the frontiers of science was a priority, as was interdisciplinary work that might bring fresh perspectives. The next phase of FQEB, Marsh says, will include “rigorous integrative work” with scholars in philosophy and theology.

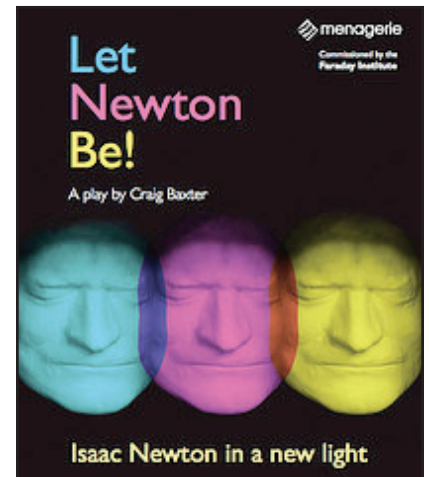
In addition to Nowak and Marsh, the board of FQEB includes Sarah Coakley, the Norris-Hulse Professor of Divinity at the University of Cambridge (UK); Mark Kirschner, Professor of Systems Biology at Harvard Medical School; Naomi Pierce, Hessel Professor of Biology at Harvard University; and Jeffrey Schloss, chair of the biology department at Westmont College.

NOTEBOOK

Newton on Stage

“God is the same God, always and everywhere. . . . In him are all things contained and moved; yet neither affects the other. God suffers nothing from the motion of bodies. [And] bodies find no resistance from the omnipresence of God.”

Many would be surprised to discover that the author of these theological musings is none other than Sir Isaac Newton. But now, thanks to a new play called *Let Newton Be!*, written by Craig Baxter and produced by the Menagerie Theatre Company in Cambridge, England, the remarkable range of Newton’s interests—and the peculiarities of his personality—may be more fully understood. The work was commissioned by the Faraday Institute for Science and Religion at the University of Cambridge with the support of a grant from the Templeton Foundation and consists entirely of words taken verbatim from Newton’s writings and those of his contemporaries.



Denis Alexander, the director of the Faraday Institute, said he wanted to use the occasion of the 800th anniversary of the University of Cambridge (where Newton studied and taught) to “illustrate the complex, difficult, lonely but profoundly religious and brilliant man Isaac Newton was.” Alexander points out that “science was almost a part-time job” for Newton, who “spent hours studying the bible every day” and wrote “millions of words on biblical themes, church history, and alchemy.”

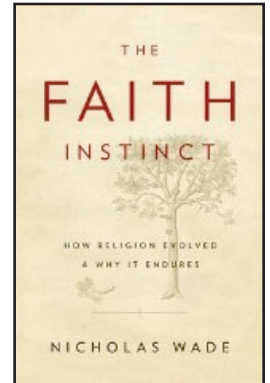
The debut performance of *Let Newton Be!*, held at Trinity College (where Newton was a Fellow), was introduced by Stephen

Hawking, who holds the same chair in mathematics at Cambridge that was once occupied by Newton himself. In its enthusiastic review of the play, *Science* magazine wrote: “From the ramblings, jottings, accounts, and notebooks—the spillings over of Newton’s strange inner world—Baxter creates a unified Newton who will awe and move modern audiences. This is Newton fully in three dimensions.”

The Faith Instinct

From a review by Judith Shulevitz in the *New York Times Book Review* of Nicholas Wade’s JTF-supported book, *The Faith Instinct: How Religion Evolved and Why It Endures*:

According to Wade, a *New York Times* science writer, religions are machines for manufacturing social solidarity. They bind us into groups. Long ago, codes requiring altruistic behavior, and the gods who enforced them, helped human society expand from families to bands of people who were not necessarily related. We didn’t become religious creatures because we became social; we became social creatures because we became religious. Or, to put it in Darwinian terms, being willing to live and die for their coreligionists gave our ancestors an advantage in the struggle for resources.



For more information, write to communications@templeton.org.

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