



AMERICAN BIOLOGIST WINS NOBEL PRIZE IN CHEMISTRY FOR DNA WORK

October 9, 2006

Last week, American biologist Roger Kornberg of Stanford University won the Nobel Prize in chemistry for his work explaining how cells use genetic information to make proteins.

The central dogma of molecular biology is that DNA makes ribonucleic acid, or RNA, which then makes proteins. It is the proteins, which number in the millions, that help cells work and give them their unique characteristics, be they brain cells, kidney cells or heart cells.

DNA transcription

Genetic information would be locked in DNA were it not for the first half of this protein production process -- DNA transcription -- in which DNA is converted to "messenger RNA" using a molecule called "RNA polymerase."

Kornberg was the first to photograph the DNA transcription process, showing how strands of DNA and fragments of RNA fit into compartments of the RNA polymerase molecule before producing messenger RNA, which goes on to create proteins in the cell.

"In an ingenious manner Kornberg has managed to freeze the construction process of RNA half-way through," the Nobel committee said. That let him capture the process of transcription in full flow, which is "truly revolutionary," the committee said.

"The purpose of our work was to discover, unravel the complexity, ultimately to visualize directly the machinery that reads out the genetic information," Kornberg told the NewsHour.

The atomic detail of Kornberg's photographs, taken using X-rays instead of ordinary light, has allowed scientists to better understand the process by which RNA is converted into proteins.

Applications of Kornberg's work

The unique properties of stem cells, and even the effects of diseases like cancer and heart disease, are results of changes to the transcription process, making Kornberg's work important to medical researchers.

"In some cases, the machinery is perfectly normal but it makes mistakes, and we are able to better understand how those mistakes are made and how they're corrected. That's actually a subject of our ongoing research at the moment," Kornberg told the NewsHour.

New drugs and therapies can be created down the line, though Kornberg does not work for any particular industry.

"I'd rather be rich with knowledge than rich in other ways," he told the Mercury News.

Science in the family

Roger Kornberg is not the only one in his family involved in the sciences. His brother Thomas is a biochemist and his brother Kenneth is an architect who designs biomedical buildings.

Their mother Sylvy Ruth Levy was a chemist and his father, Arthur Kornberg, won the Nobel Prize in medicine in 1959 with Spaniard Severo Ochoa for their work in how genetic information is transferred from one DNA molecule to another.

"I took my children to the lab on weekends. And they did trivial things in the laboratory. And in Roger's case, it was a fascination that's persisted throughout his life," Arthur Kornberg said on the Oct. 4 NewsHour.

Roger also acknowledged the role of science in the family.

"Science was a part of dinner conversation and an activity in the afternoons and on weekends. Scientific reasoning became second nature," he said.

When Roger was 8 or 9, his parents asked him what he wanted for Christmas, and he said a week in the lab.

The Kornbergs are not the first to have multiple Nobel winners in the family. The Curies won five, including two by Marie Curie for her work on radiation, and in 1915, Sir William Henry Bragg and his son William Lawrence Bragg shared the prize for their use of X-rays to study crystals, the method Kornberg used 85 years later to photograph RNA polymerase.

-- Compiled by Annie Schleicher for NewsHour Extra

© 2006 MacNeil/Lehrer Productions