

Genes and Nobel Prizes run in the family

Roger Kornberg wins Nobel Prize 47 years after his father.

By Marion Softky
Almanac Staff Writer

In 1959, Dr. Arthur Kornberg of Portola Valley won the Nobel Prize in Medicine for synthesizing DNA, the molecule that carries the master code for all life, in a Stanford laboratory.

On Dec. 10, 2006, his oldest son, Dr. Roger Kornberg of Atherton, will receive the Nobel Prize in Chemistry for the next-generation discovery: how RNA copies the genetic information coded in DNA, and uses it to build proteins, which can then grow into blood, bone, nerve or hair. This process is called transcription.

"Transcription is necessary for all life," said the Nobel press release. "This makes the detailed description of the mechanism that Roger Kornberg provides exactly the kind of 'most important discovery' referred to by Alfred Nobel in his will."

It was a week of celebration at Stanford, as the university celebrated two Nobel prizes in three days to faculty of the Medical School, where Dr. Kornberg is a professor of structural biology. Dr. Andrew Fire, a professor of pathology and genetics, won the Nobel Prize in Medicine for related work on how RNA can turn off processes that lead to diseases, such as cancer or inherited diseases like Down's syndrome.

"Roger Kornberg is one of our nation's treasured scientists," said Dr. Philip Pizzo, dean of the School of Medicine. "His work has deepened our understanding of the 'message of life,' and how it contributes to both normal and abnormal human development, health, and disease."

What Roger Kornberg did was supposed to be impossible. It did take 20 years of dogged, detailed research to figure out how the key enzyme, called RNA polymerase, actually copies the genes from DNA into RNA, which then regulates creation of other cells.

"The DNA holds the genetic information, but it's silent; you have to get the information out," explained Eric Shooter of Portola Valley, an emeritus professor of neurobiology at Stanford. "You have to have a mechanism to read the DNA."

Working at Stanford, Dr. Kornberg and generations of colleagues managed to isolate complex molecules, analyze their structure, and show how they worked — down to the atomic level.

This was not easy; RNA polymerase has some 30,000 atoms. At a university-wide celebration Oct. 6, Joseph Puglisi, chair of the Department of Structural Biology at the medical school, credited Dr. Kornberg's expertise in biology, chemistry and physics — and his tenacity — for his success.

"It was a technical tour de force that took about 20 years of work to accomplish," Dr. Puglisi said. "Like other great scientists, Roger doesn't quit. He's stubborn."

Key to mapping the atoms in RNA polymerase were pictures taken with high-intensity X-rays at the Stanford Synchrotron Radiation Laboratory at the Stanford Linear Accelerator Center (SLAC), which stretches two miles into the foothills just south of Sand Hill Road.

"We could not have solved the problem without the exceptional facilities given to us by SLAC. They were indis-

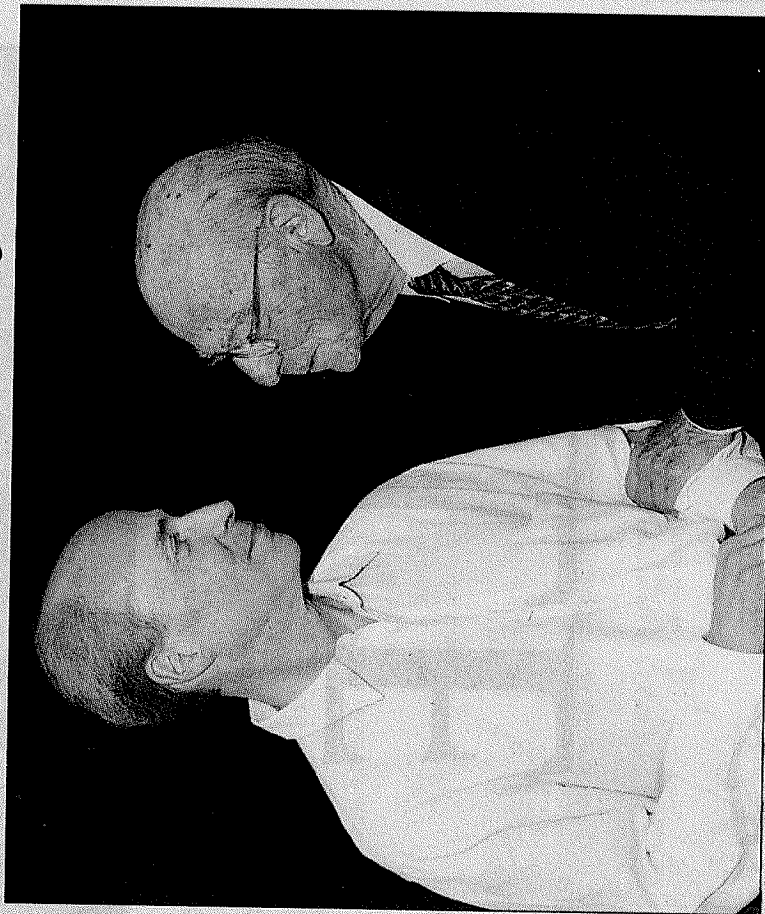


Photo by Linda Cicero/Stanford University News Service
Roger Kornberg of Atherton, the Nobel laureate in chemistry for 2006 listens to his father, **Arthur Kornberg** of Portola Valley, the 1959 Nobel laureate in medicine, after a press conference Oct. 4 at Stanford.

pensable," Dr. Kornberg said.

Since the early 1990s, Dr. Kornberg and his team — including his wife, Yahlil Lorch, also an associate professor at Stanford — beamed the lab's really bright X-rays through crystallized proteins, and watched how the X-rays scattered. The results showed the three-dimensional atomic structure of proteins in great detail — and even caught them in the act of changing.

"These studies offer our most detailed

glimpse into the inner workings of one of nature's most remarkable molecular machines," said SLAC Deputy Director Keith Hodgson.

In the genes

Dr. Arthur Kornberg was one of those who has been expecting his son to get the Nobel Prize for several years. "His work has been awesome," the earlier Nobel

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Prize winner said. "It was always a matter of when, not if. You never know."

Growing up in Portola Valley, Dr. Kornberg's three sons, Roger, Tom and John, had the advantages of scientific nurture, as well as Nobel genes.

At the celebration, Dr. Arthur Kornberg recalled how he used to take one of his boys along when he went to the lab, and give them projects — like measuring pH. When he asked Roger what he would like for Christmas, the answer was, "A week in the lab."

When he was at Woodside High School, Roger Kornberg had the chance to work in the laboratory of Dr. Paul Berg, another Stanford Nobel Prize winner.

"Roger was a scientist from the beginning. He never showed any other interest," said his

brother, Thomas Kornberg, also a scientist, and professor of biochemistry at the University of California-San Francisco.

The third brother, John, is an architect who lives in Portola Valley and designs laboratories.

Roger Kornberg remembers talking science at dinner and doing it on weekends. "Both my parents had fine scientific minds, and taught by example how to approach questions and problems in a logical, dispassionate way," he said. "Scientific reasoning became second nature."

Roger Kornberg received his undergraduate degree in chemistry from Harvard in 1967, and his doctorate from Stanford in 1972. Between 1972 and 1975, he went to England, where he was a postdoctoral fellow and staff member at the Laboratory of Molecular Biology in Cambridge. After two years as assistant professor at the Harvard

Medical School, he returned to Stanford in 1978 as a professor of structural biology.

Dr. Kornberg is a member of the National Academy of Sciences and other leading professional organizations. He has received numerous awards, edited professional magazines, and published more than 180 journal articles.

The Kornbergs live in Atherton and have three children in local schools, including a son at Stanford. No word yet on whether they're headed into science.

December in Stockholm will be the second visit for Arthur and Roger Kornberg. Roger remembers it vividly from when he was 12, and his father was honored.

The count is not final yet, but quite a few Kornbergs look forward to Stockholm during a time of long nights. "It's the best party in the world," said Arthur Kornberg. ■