Howard Martin Temin Biography

Howard Martin Temin

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Biography

Howard Temin proposed in the 1960s the provirus theory of how the ribonucleic acid (RNA) genes of retroviruses combine with the deoxyribonucleic acid (DNA) of host cells. As one of the first to discover the viral enzyme reverse transcriptase that copies the RNA, he largely proved that his theory was correct. For this discovery, he received part of the 1975 Nobel Prize in physiology or medicine.

Temin was born in Philadelphia, where his father was a lawyer and his mother was active in civic activities. He majored in biology at Swarthmore College, graduating in 1955. He began research on a tumor-producing virus called the Rous sarcoma virus while a graduate student at the California Institute of Technology, where he received his Ph.D. in 1959. While there he was a student of **Renato Dulbecco** (1914-), and also worked with Max Delbruck and Matthew Meselson, all of whom made major contributions to the understanding of cell mechanisms. Temin joined the faculty of the University of Wisconsin-Madison in 1960 and has spent his entire career there.

The ability of a virus to cause tumors was first described in 1911 by the American pathologist **Peyton Rous** (1879-1970), for whom the virus was later named. Further study had to await the genetic discoveries and techniques of the 1940s and 1950s. In 1960 Temin theorized that after being infected by the virus, the host cell made copies of the virus as well as itself. After other scientists showed in 1961 that the genetic material of the Rous virus was RNA, Temin also proposed that after the virus enters the cell it copies its RNA genes into DNA (the provirus). This DNA enters the cell's nucleus and becomes part of the cell's own DNA, where it directs production of the next generation of the virus and is inherited by future cell generations. In 1970, Temin and his co-worker, Satoshi Mizutani, showed that the Rous sarcoma virus contained an RNA-copying enzyme (or polymerase) before it infected the cell. The enzyme, which directs DNA production from RNA, was later named reverse transcriptase.

In addition to his Nobel Prize, Temin received many other honors including the American Chemical Society Award in Enzyme Chemistry, the Gairdner International Award, and the Albert Lasker Award in Basic Medical Research. He was also a member of the American Academy of Arts and Sciences and the National Academy of Sciences.