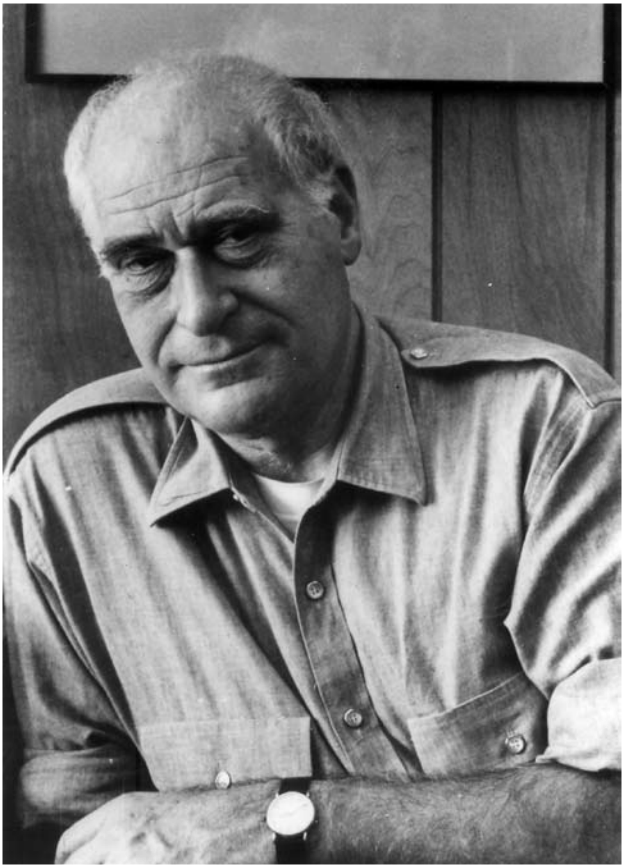
NATIONAL ACADEMY OF SCIENCES

GUNTHER S. STENT
1924–2008

A Biographical Memoir by
SAMUEL H. BARONDES

Biographical Memoir



GUNTHER S. STENT

March 28, 1924–June 12, 2008

BY SAMUEL H. BARONDES

GUNTHER STENT'S PROFESSIONAL interests progressed in stages from the simple to the complex: from physical chemistry to molecular biology to neuroscience to philosophy. One feature remained constant: his gift for writing about his ideas in well-crafted prose.

Born into a prosperous and assimilated Jewish family in Treptow, a suburb of Berlin, Stent's childhood was disrupted by a series of traumatic events that began when he was nine. First, the Nazis came to power and the persecution of Jews began. Shortly thereafter, his chronically depressed mother, Elli, was hospitalized in a psychiatric sanitarium, and subsequently committed suicide. By 1938 in the aftermath of *Kristallnacht,* his father, Georg, fled to London to escape the Gestapo, and the 14-year-old Gunther joined him later after illegally crossing the border into Belgium. By the age of 16 Gunther had made it to Chicago, where he moved in with his married sister, Claire.

Matriculated as a freshman at Hyde Park High, Stent worked furiously to make up for lost time. By taking extra courses and going to summer school he managed to graduate in 21 months. In the process he came under the influence of his composition teacher, Miss Rubovits, who taught him how to write, and to whom he always remained grateful. When he graduated he was awarded a Cook County scholarship for study at the University of Illinois at Urbana-Champaign.

At Illinois, Stent became interested in physical chemistry and stayed on to do graduate work in the laboratory of Frederick T. Wall. For his Ph.D. thesis he studied the complex mixtures of copolymers of butadiene and styrene that were used to make synthetic rubber. In the process he developed a method for separating the mixtures into fractions containing molecules of equal length, so that they could be used to make a product that was more like natural rubber. But he was disappointed to find that his method could not be scaled up enough to be useful for manufacturing tires.

While working in Wall's lab, Stent read Erwin Schrödinger's book *What Is Life?*. In it Schrödinger considered the idea that a gene, the physical basis of heredity, is made up of a sequence of a few components that encode hereditary information, an idea that Schrödinger attributed to Max Delbrück, a young German physicist. Although Stent had no prior interest in biology, he was attracted to Delbrück's idea and arranged to do postdoctoral research in the new lab that Delbrück was setting up at Caltech.

Stent's move to the Delbrück lab in 1948 provided him with the intellectual family that he longed for. Eighteen years older than Stent, Delbrück had already done the classical work with Salvador Luria on mutations in bacteriophage that would earn them a Nobel Prize. Delbrück was not only a gifted researcher with a knack for building a productive team (the famous Phage Group) he was also a *pater familias* who took a strong interest in all aspects of the personal lives of his disciples, from the people they dated to the music they listened to. These disciples were an exceptionally talented group that included during Stent's time Seymour Benzer, Renato Dulbecco, and Elie Wollman. From these gifted colleagues Stent learned molecular biology.

From Delbrück he learned much more. In a 1998 memoir[1] Stent tells us: "Psychobabblically speaking, he became the father figure I never had…I sought to emulate Max's absolute moral integrity and his fabulous intelligence. For me, he was the measure of all things." As a father figure Delbrück's influence continued long after Stent left his lab. It was Delbrück who suggested that Stent round out his training by studying DNA chemistry in Herman Kalckar's lab at the University of Copenhagen (along with James Watson who would then leave for his appointment with destiny in Cambridge); it was Delbrück who then pointed him in the direction of André Lwoff, with whom Stent spent a year at the Institut Pasteur, hanging out with the likes of François Jacob and Jacques Monod; and it was Delbrück who years later encouraged Stent's nascent interest in philosophy. As Stent summed it up in the memoir, "Throughout my career, one of my highest ambitions was to achieve things that would make Max think well of me."

In 1952 Stent took a faculty job at the University of California in Berkeley where he remained active, even after formal retirement, almost until the time of his death. First, he studied DNA replication. Then he shifted to RNA transcription and translation. Working with messenger RNA from both phage and bacteria he and his students found that its transcription and translation are a dynamically coupled process, and that translation of a messenger RNA molecule begins while it is still being transcribed. In a study of the biosynthesis of beta-galactosidase he found that nucleotides were being added to mRNA at a rate of about 43 per second and that amino acid residues followed closely behind, being added to the growing polypeptide chain at the rate of about 15 per second.

In 1963 Stent's writing career began with the publication of an influential book, *Molecular Biology of Bacterial Viruses.*

Three years later it was followed by *Phage and the Origins of Molecular Biology,* which he edited, along with James Watson and John Cairns, and then in 1971 by *Molecular Genetics: An Introductory Narrative.* But even as he was telling the stories of his rapidly developing field, his interest was shifting from molecular biology to neuroscience.

I first met Gunther in Boulder, Colorado, in the summer of 1969 while this shift was underway. We were both participants in the second intensive study program organized by Francis O. Schmitt's Neuroscience Research Program that brought together a small group of scientists (including Max Delbrück) for three weeks of lectures, discussion, and socializing on the campus of the University of Colorado. Stent was especially interested in the lectures I gave on brain protein synthesis and on neuronal recognition, and he sought me out to discuss them. He was about to start a sabbatical in Steven Kuffler's Department of Neurobiology at Harvard where he would work with John Nicholls on the nervous system of the leech, and he saw me as someone who bridged his established interest in molecules with his new one on the workings of nerve cells. It was a time of great excitement not only because we were participating in the dawn of neuroscience but also because the meeting coincided with the landing of a man on the moon. While Gunther was preparing to explore his new field I was about to move west to help found the Department of Psychiatry and the Neuroscience Program at the University of California in San Diego. In this expectant atmosphere Gunther and I became friends.

Gunther's sabbatical with Nicholls set the stage for years of research on neuronal circuits in the leech, his last period of experimental work. At first he and his trainees, William B. Kristan and W. Otto Friesen, concentrated on physiological studies of the circuits that control swimming. In the process they discovered a central rhythm generator that imposes the swimming rhythm on the motor neurons via a set of identified excitatory and inhibitory synaptic connections. Later Gunther turned his attention to an analysis of neuronal migration and axon arborization in the development of the leech nervous system. Working with David Weisblat and other trainees, he devised methods for studying cell lineage by intracellular injections of markers—first horseradish peroxidase and later fluorescein and rhodamine—which foreshadowed those used today. While these studies progressed, Gunther was undergoing his final transformation: to philosopher.

Although I hadn't noticed signs of this transformation when we first met, it was already underway. Stimulated by the Free Speech Movement that paralyzed Berkeley in 1964, Gunther had been asked to give a series of seven public lectures that became the basis of his 1969 book, *The Coming of the Golden Age: A View of the End of Progress*. In it he bemoaned what he considered to be the antirational and excessively hedonistic attitudes of the students who were turning his beloved university upside down. Rather than see this as a passing phase he took it as the start of a long downward spiral that would also freeze science in its tracks.

Such pessimism did not sit well with many of Gunther's colleagues, but it didn't prevent him from playing a central role in the biological sciences at Berkeley. In 1980 he became chair of the Department of Molecular Biology and presided over a period of considerable growth. During his tenure, it became the Department of Molecular and Cell Biology and included a division of neurobiology that soon had a life of its own. Gunther's honors came pouring in, including election to the American Academy of Arts and Sciences, National Academy of Sciences (elected in 1982), European Academy of Sciences, Akademie der Wissenschaften und der Literatur, and American Philosophical Society.

Gunther's later years were largely devoted to writing, the professional activity that brought him the greatest pleasure. As he explained in an autobiographical piece[2]:

> Publishing papers was what I liked best about science. No sooner had I started a research project, than I was thinking about the paper I would write about it. Long before I had found anything worth reporting, I was already composing the opening paragraph of the report. I thought of publishing as a way to a conversation. Compared with the joy of telling, the joy of discovery played such a minor role in my motivation that I don't believe I would have done science if I had been Robinson Crusoe. Isolated, out of my colleagues' earshot, I wouldn't have made experiments, even if there happened to be a fully equipped lab on the island, with Man Friday available as a postdoc.

In 1998 Gunther published his most unusual work, *Nazis, Women and Molecular Biology: Memoirs of a Lucky Self-Hater.* It revolved around his experiences when he came back to Berlin in 1946 (at the age of 22, while still in graduate school, and only eight years after his escape) with a temporary commission in the U.S. Army to screen captured German scientific documents. The book is a poignant description of his troubled early romantic life, his struggles to make peace with himself, and his complex relationship with the German nation that he had so much wanted to belong to as a child but that had cast him out.

When Gunther published this memoir, his first wife, Inga Loftsdottir Stent, whom he married in 1951, had already died. He subsequently married Mary Burgwin Ulam, who survives him. Also surviving him are his son, Stefan Stent, and his stepsons, Alexander Ulam and Joseph Ulam.

Gunther's last major work, *Paradoxes of Free Will,* relied heavily on the thinking of another of his heroes, Immanuel Kant. In it Gunther argued that we have two types of innate minds: one (the faculty of practical reason) that evolved so that we can take personal responsibility for our conduct as moral agents, and the other (the faculty of theoretical reason) so that we can make accurate inferences about causality in space and time. To the first mind the notion of free will is intuitively obvious while to the other it is nonsense; and the competing intuitions of these two innate minds pose an essential paradox that we have to accept because there's no getting around it.

Published in 2002 by the American Philosophical Society, *Paradoxes of Free Will* received the John Frederick Lewis Award for the best book the society put out that year. It was a particularly appropriate honor for a profoundly intellectual man who liked nothing better than a good paradox.

NOTES

1. G. S. Stent. *Nazis, Women and Molecular Biology: Memoirs of a Lucky Self-Hater.* Kensington, Calif.: Briones Books, 1998.
2. G. S. Stent. Autobiography. In *A History of Neuroscience in Autobiography*, vol. 2, ed. L. R. Squire. San Diego: Academic Press, 1998.

SELECTED BIBLIOGRAPHY

1949

With F. T. Wall. A theory of vapor pressures of liquids based on the van der Waals' equation of state. II. Binary mixtures. *J. Chem. Phys.* 17:1112-1116

1950

With E. L. Wollman. Studies on activation of T4 bacteriophage by cofactor. *Biochim. Biophys. Acta* 6:292-3036, 307-316, 374-383, 538-550.

1955

Decay of incorporated radioactive phosphorus during reproduction of bacteriophage T2. *J. Gen. Physiol.* 38:853-865.

With C. R. Fuerst. Inactivation of bacteriophages by decay of incorporated radioactive phosphorus. *J. Gen. Physiol.* 38:441-458.

With N. K. Jerne. The distribution of parental phosphorus atoms among bacteriophage progeny. *Proc. Natl. Acad. Sci. U. S. A.* 41:704-709.

1957

With M. Delbrück. On the mechanism of DNA replication. In *The Chemical Basis of Heredity*, eds. W. D. McElroy and B. Glass, pp. 699-736. Baltimore: Johns Hopkins University Press.

1959

With D. Pratt. Mutational heterozygotes in bacteriophages. *Proc. Natl. Acad. Sci. U. S. A.* 45:1507-1515.

With G. H. Sato and N. K. Jerne. Dispersal of the parental nucleic acid of bacteriophage T4 among its progeny. *J. Mol. Biol.* 1:143-146.

1961

With S. Brenner. A genetic locus for the regulation of ribonucleic acid synthesis. *Proc. Natl. Acad. Sci. U. S. A.* 47:2005-2014.

1963

Molecular Biology of Bacterial Viruses. San Francisco: W. H. Freeman.

1965

With H. Bremer, M. W. Konrad, and K. Gaines. Direction of chain growth in enzymic RNA synthesis. *J. Mol. Biol.* 13:540-553.

1966

Genetic transcription. *Proc. R. Soc. Lond. B.* 164:181-197.

1969

With H. Manor and D. Goodman. RNA chain growth rates in *Escherichia coli*. *J. Mol. Biol.* 39:1-29.

The Coming of the Golden Age: A View of the End of Progress. New York: Natural History Press.

1971

Molecular Genetics: An Introductory Narrative. San Francisco. W. H. Freeman.

1973

A physiological mechanism for Hebb's postulate of learning. *Proc. Natl. Acad. Sci. U. S. A.* 70:997-1001.

1974

With W. B. Kristan and C. A. Ort. Neuronal control of swimming in the medicinal leech. *J. Comp. Physiol.* 94:97-119, 121-154, 155-176.

1975

Limits to the scientific understanding of man. *Science* 187:1052-1057.

1977

With W. O. Friesen. Generation of a locomotory rhythm by a neural network with recurrent cyclic inhibition. *Biol. Cybernet.* 28:27-40.

1978

Paradoxes of Progress. San Francisco: W. H. Freeman.

With D. A. Weisblat and R. T. Sawyer. Cell lineage analysis by intracellular injection of a tracer enzyme. *Science* 202:1295-1298.

1985

The role of cell lineage in development. *Philos. Trans. R. Soc. Lond. B* 312:3-19.

1990

With G. P. Keleher. Cell position and developmental fate in leech embryogenesis. *Proc. Natl. Acad. Sci. U. S. A.* 87:8457-8461.

1993

With L. Gleizer. Developmental origin of segmental identity in the leech mesoderm. *Development* 117:177-189.

2002

Paradoxes of Free Will. Transactions of the American Philosophical Society, vol. 92, pt. 6. Philadelphia: American Philosophical Society.