

## ***The Long and Short of Long-Term Memory***

The 2006 Herbert G. Cohen, MD, Memorial Lecture in the Neurosciences

Eric R. Kandel, MD

University Professor of Physiology and Cell Biophysics, Psychiatry,  
Biochemistry and Molecular Biophysics

Co-recipient of the 2000 Nobel Prize in Physiology or Medicine

Author of *In Search of Memory: The Emergence of a New Science of Mind*

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4:00 pm – 5:30 pm

The Faculty Club

Columbia College of Physicians and Surgeons

New York, NY

It was standing room only in the Medical Center Faculty Club as Columbia psychiatrist and neuroscientist Dr. Eric Kandel delivered the 2006 Herbert G. Cohen, MD Memorial Lecture in the Neurosciences, *The Long and Short of Long-Term Memory*.

His lively presentation backed by evocative images of family photos and historic scenes, Kandel traced the trajectory of his event-filled life, from his birth in Weimar Vienna a week after the 1929 crash of the New York Stock Exchange, through the traumas of the Anschluss and his family's subsequent forced resettlement in Brooklyn when he was nine years old, to his present day life in New York. Images also included slides of the sea snail *Aplysia*, which he used to elucidate fundamental principles of how memories are formed and stored in the brain, for which he shared the 2000 Nobel Prize in Physiology or Medicine. Kandel said that while he had spent 50 years studying memory research, "it was not at all planned out," and that his life had been "one accident after another."

Eric Kandel's early intellectual interest was in history, and he concentrated in the subject while an undergraduate at Harvard College. However his path in the study of memory began, unconventionally enough, with a college romance with Anna Kris, the daughter of Freudian psychoanalysts Ernst and Marianne Kris. It was Freud, then, himself a pioneer in revealing the importance of unconscious neural processes, who would be at the root of Kandel's interest in the biology of motivation and of memory. This led to years of study and work at New York University Medical School – where he had first intended to become a psychoanalyst – then training in neuroscience at the NIH, where he studied the cell biology of the hippocampus, developing a "modern biology of the hippocampus." Kandel said that his three years at the NIH not only "taught me to do science," but taught him what he wanted to do with his life, which was to study memory.

Dr. Kandel said that his personal and professional history related to ethical issues in neuroscience on two levels: the historical and the practical. In historical terms, he noted how we have learned some very painful lessons, by way of psychiatrist Robert Lifton, MD, author of *The Nazi Doctors: Medical Killing and the Psychology of Genocide*, and geneticist Dr. Benno Müller-Hill, author of *Murderous Science: Elimination by Scientific Selection of Jews, Gypsies, and Others in Germany, 1933-1945*, such as the important

fact that being well-meaning has nothing to do with ethics. For example, in the history of genetics at one time all the best scientists were eugenicists. Psychiatry took this seriously and sterilized mentally retarded adults, and not only patients with schizophrenia but their first-degree relatives as well. The medical community was comfortable with manipulating human inheritance and countervailing forces did not exist.

On a practical level, it related to his own work with the animal model of cognitive disorders. Mice don't get Alzheimer's disease, he said, but as they age, 60%-70% experience memory loss. By observing this natural memory loss in mice, which is analogous to that in humans, researchers see where the animal's memory storage capacity goes wrong. As a consequence, Kandel's laboratory was able to devise drugs that in mice seem to reverse both the cause of the memory loss and the behavior associated with memory loss. This led Kandel to found a biotechnology firm called Memory Pharmaceuticals, that is now conducting clinical trials with an investigational therapy to potentially help restore memory and forestall the onset of Alzheimer's.

What are the ethical issues in this, he asked. First, if cognitive enhancers make mice function better, should we all take them? His answer to this was emphatic no, that medicine should not exist to prepare one for everyday life. And secondly, there was the issue of a person having "too much memory" – that drugs that prevent the formation of traumatic memories, might, for example, with firefighters, mitigate the development of Post-Traumatic Stress Disorder. Kandel said that he did believe that there were instances where doing such a thing would be right.

Dr. Kandel concluded his talk with two points: that he felt he had led a very privileged life, believing that he had been fortunate in a number of circumstances. Without a doubt the greatest of these is his family: he is especially proud of his wife, Dr. Denise Kandel, who has had a long and distinguished scientific career of her own, as an internationally recognized and prize-winning expert in the etiology and consequences of drug use, with an emphasis on smoking and nicotine dependence, who is Professor of Sociomedical Sciences (in Psychiatry) at Columbia; of his two children; and of his grandchildren. He showed several photographs of his family, among those his wife's wedding photo and the group portrait of them taken at the Nobel Prize ceremony. He had learned that it is difficult in life to plan in detail where to go, but said that one must always have an idea where one wanted to be. "In my gut," he said, he always felt he was on the right track. His second point was that his entire academic life had been spent in Universities, mostly at Columbia, where he had not only been provided with "fantastic and challenging" students and colleagues, but also the chance to evolve as a scientist, and to learn by doing, and not through books.