

# Brain waves from the sea

**Chris McManus** sifts through the past of a Nobel prizewinner

CORBIS



**Eric Kandel: a science laureate with a soft spot for Freud**

Scientists' lives can be rather dull. The 19th-century psychophysicist Gustav Theodor Fechner influenced Freud, Ernst Mach and William James, and is in every introductory textbook, but his autobiographical note could say only: "My life is without any remarkable events; it took place mainly at my desk." The historian of science Edwin Borning concurred, writing: "For 70 years he had lived the quiet life of the learned man" from there "faring forth... on many and varied great adventures of the mind".

While there are many biographies of the writers and politicians who have become Nobel laureates, there are relatively few for science laureates — their lives, sad to say, typically not meriting them. Similarly, while writers' and politicians' autobiographies are usually fascinating, scientific autobiographies are often stilted, with their cataloguing of innumerable conferences, meetings with other colourless scientists and concern with hypotheses, inspirations and experiments that are already becoming the dry dust of history. Often only of interest to family, friends and colleagues, such autobiographies can have all the charm of a tedious evening viewing a neighbour's holiday snaps: descriptions of people one does not know, unfunny jokes and minor dramas. As the author of this book, Eric Kandel, himself recognises, "*Doing science in collaboration with interesting and creative people... is dramatically different from... reading about science*".

Kandel, who shared the 2000 Nobel Prize for Medicine for his work elucidating the molecular biology of memory, reveals in his autobiography that he has characteristics of both the scientist and the artist. He is surprisingly tedious when talking about the science, but fluent and interesting when describing his life, and particularly the influence of his childhood in prewar Vienna. *In Search of Memory* describes both the search for Kandel's own background and the biological underpinning of what the Nobel prize citation described as "the very basis of our ability to exist and interact meaningfully in our world". Memory matters; indeed, without it there would be no sense of us being human, which Kandel nicely emphasises with a quote from Tennessee Williams: "Has it ever struck you... that life is all memory, except for the one present moment that goes by so quickly you hardly catch it going?"

Kandel's elegant, careful experiments, particularly on the nervous system of *Aplysia*,

the sea slug, with its 2,000 brain cells and relatively simple behaviours, identified a host of fundamental processes for forming and maintaining memories, mechanisms shared across most species including man. Nevertheless, the description of this work is rather pedestrian, with its detailed chapters on who did what with whom in understanding AMPA, cAMP, CPEB, and the rest of the alphabet soup of molecular biology. Despite this, the implications are wide ranging. For, as Kandel suggests, "the anatomy of the neural circuit is a simple example of Kantian *a priori* knowledge, while changes in the strength of the neural circuit reflect... Locke's notion that practice makes perfect".

Kandel was clearly chasing bigger fish than a few interacting molecules, and his education and background set him up well for doing it, making him as much an artist as a scientist. He was born in Vienna in 1929 into of the many Jewish families who went to America after *Kristallnacht*. He was left with an enduring love of Viennese culture and philosophy, and an abiding hatred of the anti-Semitism he still finds in Austria.

When in 2000 the Austrian media kept phoning "to tell me how pleased Austria was that there was yet another Austrian Nobel prize, I had to remind them that this was an American Nobel prize", he writes.

In America, Kandel was educated first at a Hebrew school and then a local public school in Brooklyn, before being accepted at Harvard University and majoring in modern European history and literature, particularly German literature. There, he read Freud, revelling in the ideas and the beauty of the writing. Chance and fate then intervened; after the death of his charismatic literature teacher, he fell in love with Anna Kris, the daughter of the psychoanalysts Ernst and Marianne Kris. Kandel fell not only for Anna, but also for psychoanalysis. "No other views of mental life approached psychoanalysis in scope or subtlety," he writes. He was particularly compelled by the fact that psychoanalysis "was at once imaginative, comprehensive, and empirically grounded", adding, with half a century's hindsight, "or so it appeared to my naive mind". Ernst Kris also taught Kandel that "neither trained introspection nor creative insights" would create a science of mind on their own; "it needs experimentation".

The affair with Anna was to finish, as also was the affair with "my first love — psychoanalysis", although the latter lasted long enough for Kandel to switch to medicine, and

for a while he practised psychiatry. He is often asked about the benefits of his own analysis, and always replies: "To me, there is little doubt." As Freud recognised, a residue always remains of our earlier infatuations. He returns and returns to Freud and his writings, quoting Freud's aphorism that "biology is truly a land of unlimited possibilities" and recalling how Freud described his research on the nervous system of crayfish as "the happiest hours of my student life". Having decided to study individual brain cells, Kandel notes that Freud had "sought to solve the hidden riddle of mental life by studying the brain one nerve cell at a time". Later, while recalling hours spent listening to action potentials in a crayfish brain, Kandel comments: "I was becoming a true psychoanalyst; I was listening to the deep hidden thoughts of my crayfish!"

Neuroscience, like so much biology, has been invaded by a radical reductionism for which the only legitimate ways of studying mind, thought and behaviour are seen as molecular genetics, cell biology and neural imaging — and then often by researchers with little knowledge of psychology, psychiatry or neurology. If psychoanalysis is known about, it is primarily by an overwhelming, ill-informed gut instinct that defence mechanisms, the id and the Oedipus complex must be the work of a non-scientific devil — or perhaps "Sigmoid Fraud", as one of my medical students once wrote. Neural reductionism in its worst forms can be like counting the frequency of punctuation marks in Shakespeare while entirely missing the deep humanism of the texts themselves. But Kandel himself never makes such naive errors.

Perhaps the most intriguing (if at times frustrating) chapter of the autobiography is "Biology and the renaissance of psychoanalytic thought". Kandel continues to watch psychoanalysis, noting that as radical reductionism took hold in biology, so a more radical version of psychoanalysis also took hold, in which "biology... is irrelevant to psychoanalysis", it becoming a discipline "strangely unconcerned with empirical evidence or with the brain as the organ of mental activity". Kandel, however, still finds hope for psychoanalysis, seeing psychotherapy as a learning experience, and he puts faith in the potential of brain imaging. Returning to Freud, he speculates that "had imaging been available in 1895, when Freud wrote *On a Scientific Psychology*, he might well have directed psychoanalysis along very different lines, keeping it in close relationship with biology".

Chris McManus is professor of psychology and medical education, University College London.