

BOOK REVIEW

The later sections of the book broaden the scope even further, discussing Capgras syndrome (the delusion that close relatives have been replaced by imposters), religious experience in temporal lobe epilepsy, idiot savants, multiple personality disorder, the biological basis of laughter, 'mind-over-body' in medicine, and the nature of consciousness. The specula-

tive accounts offered range just as widely in their level of explanation, encompassing both neurotransmitter systems and evolutionary psychology. If anything, the book suffers from being too broad in the material covered. The result is insufficient focus on common themes, although two ideas do recur as leitmotifs: first, that our everyday experience of the world is very

much a construction by the brain; and second, that our sense of a unitary self is illusory, as we are each made up of innumerable distinct neural systems.

I thoroughly enjoyed reading this book. It provides nourishing food for thought throughout, even though some parts are best taken with hefty grains of salt.

A History of Molecular Biology

By Michel Morange

*Harvard University Press. \$39.95, 384 pp.
ISBN: 0-674-39855-6*

REVIEWED BY WILLIAM BYNUM
*Professor of the History of Medicine
Wellcome Institute for the History of Medicine
183 Euston Road
London, NW1 2BE*

The history of recent science has often proved a battlefield. Historians sometimes accuse scientists who turn their hands to reporting history as being naive and uncritical, writing 'tunnel-vision' accounts of their topics. In turn, scientists often look with suspicion on the anthropological and sociological perspectives that historians bring to bear on laboratory life. They complain that historians put in the politics and bickering but leave out the point of it all—the science.

I have spent a good deal of my professional life trying to encourage dialogue between the two communities, and I would like to invite Michel Morange to some future meeting, for here is a professor of biochemistry who has read and assimilated the relevant historical literature—even though he does not agree with all of it—and knows science from the inside.

He succeeds brilliantly in producing a sensitive, sophisticated account of his subject that is accessible to the general reader. Along the way, one learns a lot about history and a lot about molecular biology. Morange's volume wonderfully demonstrates that historical analysis can provide an effective means of understanding present-day concerns. Originally published in French in 1994, this fluent translation (with more than three-quarters of its references to English language publications) is to be welcomed.

Morange has divided his monograph into three parts, devoted to the birth, development and expansion of what has become the pivotal contemporary science.

The discipline of molecular biology had a gestation and birth of about three decades, during which the nature of viruses and phages was elucidated, the one gene—one enzyme hypothesis was established, the nuances of bacterial reproduction were studied and the chemical nature of the gene was greatly debated. The chief players in this act of the drama—which extended until just after World War II—included Linus Pauling, Max Delbrück, Joshua Lederberg and Salvador Luria. Morange also provides lucid assessments of the contents and impact of Erwin Schrödinger's modestly entitled little volume, *What is Life?* and Niels Bohr's famous lecture, *Light and Life*. Morange also re-examines the influence of the Rockefeller Foundation on the discipline that was first called 'molecular biology' in 1938 by Warren Weaver, head of the Foundation's Natural Science Division from 1931.

The 1953 papers in *Nature* of James Watson and Francis Crick on the helical structure of DNA heralded the developmental phase of molecular biology. With it came a physical model of gene replication and Crick's famous enunciation of the 'central dogma'. Knowledge of the role of messenger RNA and of protein synthesis also dates from this period; I still remember the announcement to our biochemistry class that Jacques Monod, François Jacob and André Lwoff had just been awarded the 1965 Nobel Prize for Medicine or Physiology.

This and other Nobel Prizes catalyzed the expansion of molecular biology throughout Europe and North America, and it is to Morange's credit that he brings his story right up to the present

time. The chapter on genetic engineering is a model of clarity, both in its analysis of public fears and in its quiet emphasis on the fact that the techniques of genetic engineering are fundamental to all aspects

of contemporary molecular biology research. Further chapters on gene splicing, oncogenes and DNA amplification round out this exemplary book.

Two themes permeate *A History of Molecular Biology*. The first is the changing historical relationship of molecular biology to related disciplines such as genetics, developmental biology, biochemistry, immunology, physics and cell biology. As a biochemist, Morange is especially sensitive to chemical contributions to his subject, but equally aware of the fact that all life science cannot be reduced to molecular biology. Indeed, as he points out, cell biology has enjoyed an especially fruitful period during the past two decades. He predicts that the integration of molecular and evolutionary biology will be a source of creative interdisciplinary interaction in the coming years.

A second theme is the fundamental role of technique in the creation of new knowledge. Although he gives less prominence than I would have expected to X-ray diffraction analysis of molecular structure (Dorothy Hodgkin, for instance, gets no mention), he is sensitive to the importance, *inter alia*, of the electron microscope, the ultracentrifuge, chromatography, radioisotopes, and spectroscopy in the creation of classic molecular biology. He cites an unnamed disgruntled Nobel Laureate who remarked that Kary Mullis's work on DNA amplification was a mere technical trick, unworthy of the ultimate scientific Prize, awarded in 1993. As Morange reminds us, however, science and technology are now so intertwined that it is not always possible to say where one ends and the other begins.

