History lesson

Benno Müller-Hill

A History of Molecular Biology

by Michel Morange

translated by Matthew Cobb

Harvard University Press, Cambridge, MA,

2000. 352 pages, £11.95

ISBN 0-674-00169-9

Michel Morange, a French professor of biochemistry, has written a history of molecular biology in 21 chapters that is now available in a paperback version in English. Molecular biology arose when geneticists, physicists and biochemists came together and moved DNA into the centre of their interest. 'A molecular biologist is a biochemist without a licence' was a description by Erwin Chargaff, a biochemist who discovered the base-pairing regularity of DNA.

Morange's historical overview begins with a description of the 'roots of the new science', i.e. *Drosophila* genetics and protein chemistry. From there, it took a long time until the structure and function of DNA and proteins became finally known. In this context, Morange mentions briefly the colloid theory of proteins, which claimed that amino acids are non-covalently connected, adding that several Nobel prizes were awarded for this work. Unfortunately, he does not include their names and discoveries.

In fact, there are many details not mentioned that would be interesting to know. When writing about the One Gene–One Enzyme hypothesis, Morange does not mention Adolf Butenandt and Alfred Kühn. They made the discovery, but indeed they did not spell it out. Oswald Avery's work is then discussed in detail and the reason why he did not get a Nobel prize. Morange mentions the claim of a French bacteriologist, André Boivin, to have repeated Avery's experiment with *Escherichia coli* but nobody could repeat Boivin's experiments. This is followed by chapters on the phage group, the role of

physicists in molecular biology and in bacterial genetics: how lucky Joshua Lederberg was to have used *E. coli* K12, the only *E. coli* strain that contained an F factor!

The next chapters are on the double helix, messenger RNA and the genetic code. All this is written in a rather abstract manner. I would have liked to read, for example, what happened to Heinrich Matthaei after his discovery that poly-U makes polyphenylalanine. It is as if the people who did the experiments are shadows, who did not exist before and after their discoveries. However, the chapters on the 'French School' are different, i.e. describing André Lwoff, François Jacob and Jacques Monod. Indeed, Morange gives strong emphasis to their work and life. Monod has a footnote of about half a page on his political and literary activities. According to Morange, 'the work of the French school...made it possible at last for molecular biology to come of age'. However, 'molecular biology made little progress between 1965 and 1972'. So the isolation, functional analysis and protein sequence of the Lac and Lambda repressors is just boring science that does not need to be discussed. Would he have come to a different conclusion had scientists from the Institut Pasteur isolated these repressors? Furthermore, Morange seems to believe that Gunther Stent was by and large right when he wrote in 1968 that molecular biology had come to an end. What a mistake! Cloning of DNA in *E. coli*, DNA sequencing and synthesis, large scale X-ray and NMR analyses were still to come, and are indeed aptly described in later chapters.

But Morange includes only a few recent works in molecular biology in his book. For example, he does not mention Jeffrey Miller's mutant analysis of the Lac repressor, Roger Kornberg's and others' work on the structure of the nucleosome, or Mark Ptashne's work on transcriptional control by Gal4 in yeast. Apoptosis, prions and conditional knock-out mutants of the mouse do not seem to exist. Admittedly, inclusion of all these items would have changed the size and structure of the book.

A book becomes exciting when even experts learn things they did not know before. The most troubling news for me was that Pauling published two papers announcing *in vitro* proof of his instructive theory of antibody formation [*Science*, **95**, 440–441 (1942) and *J. Exp. Med.*, **76**, 211–220 (1942)]—discoveries that he could not repeat. According to Morange, Pauling and other immunologists never quoted these results again. There are more of these stories in the book that will be of interest to the general reader.

Although there are occasional misprints, the book is well translated. And despite its emphasis on the work of the French school and the gaps in the history of recent molecular biology, the book is certainly a must for historians as well as for biochemists interested in the roots of their science. However, I do not think that this book will appeal to the younger molecular biologists, who will have already learned the early history during their lectures on biochemistry and molecular genetics. Such a history of molecular biology is yet to be written.

The author is professor at the Institute of Genetics at the University of Cologne.

E-mail: muellerhill@uni-koeln.de

DOI: 10.1093/embo-reports/kvd036

Aging stochastically

Suresh I.S. Rattan

A Means to an End. The Biological Basis of Aging and Death

by William R. Clark

Oxford University Press, Oxford, UK.

233 pages, US\$ 27.50

ISBN 0-19-512593-2

I have read this book twice. Not because it is, as it claims on its cover, '... a highly readable, provocative account of some of the most far-reaching and controversial