From gene regulation to natural philosophy

Giorgio Bernardi

Origins of Molecular Biology: a Tribute to Jacques Monod
Agnes Ullmann (ed)
ASM Press, Washington, DC, USA
358 pages, \$50/£30
ISBN 1555812813

The revised edition of *Origins of Molecular Biology: a Tribute to Jacques Monod*—a book originally published 25 years ago—is most welcome, because it represents a record of Monod's personal and intel-

lectual life by many friends and colleagues, and because it includes some attractive new features. In particular, the short biographies (autobiographies, in many cases), or afterthoughts, of the contributors make a most interesting reading, in that they often reveal themselves more in these notes than in their contributions. Furthermore, the new preface and Agnes Ullmann's biography of André Lwoff (who shared the 1965 Nobel Prize in Physiology or Medicine with Monod and François Jacob), the warm, moving foreword by Edmond Fischer, Monod's Nobel lecture and his list of publications (with details about the translations of *Chance and Necessity* into several languages) are important additions. Several pictures give the reader the feeling of a visit to Monod's laboratory.

As far as the laboratory atmosphere is concerned, it is difficult not to be struck by the differences from today's situation. The exciting, creative surroundings, largely due to the simultaneous presence of people from different countries (mainly France and the United States) in the same place, have

long gone, a great loss not only for French but also for American science.

The contributions reveal different facets of Jacques Monod. Not surprisingly, the most penetrating portrait is that from François Jacob, who described "Jacques...a very warm and generous man of great charm" and "Monod... an incredibly dogmatic, self-confident, and domineering" individual, adding that "working with the former was an exceptional pleasure. Arguing with the latter could be a difficult experience." I had a much less intimate knowledge of the man, but personally experienced the accuracy of this portrayal by Jacob. My first encounter with Monod was in the early 1960s on the occasion of a visit to the Pasteur Institute to attend a seminar. I saw a young man attacking—destroying would be a more appropriate term—the speaker (a very well-known American scientist) in a way that would be inconceivable nowadays. When I asked a neighbour in the audience who that arrogant person was, and I was told that it was Monod, I could hardly believe it as he looked so young. In fact, this youthful appearance lasted throughout his life (see the picture on p294, taken a few days before his premature death at 66). My first impression completely changed in the following few years, when Monod most generously helped me to set up my laboratory, first in Strasbourg, where he came to chair the jury of my French thesis, and then in Paris. I had the good luck to sit for several years on the Committee of Molecular Biology, which he chaired, and to visit him a number of times. The lunches we had together on the occasion of the Committee's meetings were fascinating, as he had an extraordinary intellectual charm and very wide-ranging interests. As a small token of my admiration, I proposed his name for the Molecular Biology Institute at the Faculty of Sciences in Paris (now Institut Jacques Monod), which he founded, and, later on, I organized a meeting on the tenth anniversary of his death. (The proceedings, edited by Agnes Ullmann, Ernesto Quagliariello and myself, provided some additional insights into Monod's personality.)

One of the most important aspects of Ullmann's book is that it conveys the feeling

of the difficult problems that had to be overcome in order to understand the regulation of gene expression. Molecular biology rests on three pillars: the DNA double helix, the regulation of gene expression and the genetic code. The problems that confronted molecular biologists were very different in the three cases. Both the double helix and the genetic code are 'static' problems. In contrast, the regulation of gene expression is a dynamic, tremendously complex problem, underlying all action in the living cell. The experimental and intellectual challenge was much bigger than in the other two cases (reading *The Lac operon* by Benno Müller-Hill will convince anybody about this point). However, the problem was solved by Jacob, Monod and their collaborators. This breakthrough was only achieved because of the experimental ingenuity and the sharp, rigorous thinking of the two men. The triumph of the Jacob-Monod theory was followed by another success concerning the allosteric properties of proteins by Monod, Jeffries Wyman and Jean-Pierre Changeux.

Jacques Monod, like François Jacob, was not only a great scientist, but also a profound thinker able to deal with very general issues. His *Chance and Necessity*, published in 1970, "the fascinating and ambitious attempt...to integrate the new knowledge [molecular biology] into a general understanding of Nature" (in the words of Manfred Eigen), is still a book that should be read by all biologists. Its conclusions may not be generally shared in the light of what we have learned in the past 35 years, but its logical approach to the problems under consideration, the sheer beauty of many of its pages, and the strong, courageous ethical commitment of the author provide lessons for every reader.

In conclusion, Agnes Ullmann, who took such a direct part in the history presented, should be warmly congratulated (together with the American Society for Microbiology) for having produced such a special book.

Giorgio Bernardi is President of the Stazione Zoologica Anton Dohrn in Naples, Italy.

E-mail: bernardi@szn.it

doi:10.1038/sj.embor.7400198