nature

Volume 248 April 26, 1974

Twenty-one years of the double helix

WE celebrate in this issue the twenty-first anniversary of the appearance of J. D. Watson and F. H. C. Crick's short paper *A Structure for Deoxyribose Nucleic Acid* in *Nature*. A few will be offended by the equating of the twenty-first birthday with the process of coming of age when in the past few years the age of maturity has dropped to eighteen in many countries. We can do little for them. Rather more, with good cause, will say that there were earlier milestones than 1953 which marked the turning point in the fortunes of molecular biology. 1943 was a key year, with Avery's work on pneumococcus DNA at the Rockefeller Institute and Beadle and Tatum's on *Neurospora* at Stanford. As Macfarlane Burnet put it in *Genes, Dreams and Realities*, genetics was by these experiments directly implicated in biochemistry through micro-organisms. Others will also have their favourite years during which a quickening occurred, but few would carp at the Watson–Crick announcement being given pride of place as a starting point of something absolutely new and some (though perhaps not many physical scientists—either through ignorance or conviction) might go along with Medawar in calling it "the greatest achievement of science in the twentieth century".

We have tried to give a varied view of the history, present scene and prospects in molecular biology, from Chargaff's iconoclastic essay to Gurdon's report on the exciting developments in introducing macromolecules into living cells. One thing has become clear. A central contribution of the magnitude of Watson and Crick's stirs up the culture of science to a quite remarkable degree, and it is a change in the cultural climate, perhaps more even than the actual discovery itself, which breathes new life into science. Suddenly there are all sorts of new questions of history, philosophy, method and attitude to occupy the minds of the best scientists, along with the starker scientific questions and the less edifying ones of funding, organisation and priorities. Cultural revolutions in science are rare and immensely stimulating to those touched by them.

From the historical point of view an interesting aspect is the way in which the structure came to be accepted. As Brenner puts it, there was initially only a small band of believers and a positive effort had to be made to convince the biological community both of its correctness and profound relevance. This conforms to a classical view of a seminal idea's acceptance—first accepted by the few, later sweeping all before it. Contrast it with a more recent revolution in the earth sciences. There a whole army was waiting to pick up the central dogma of plate tectonics and make it their own. Was Watson–Crick the last great scientific idea that needed missionaries? It seems unlikely. Although the number of scientists waiting for things to drop into their lap is greater than ever before, there is no sign that the community is any more sensitive to revolutionary ideas, however plainly presented.

The philosophical debates stirred up by molecular biology almost seem like a re-run of some of the issues generated by the explosive advances in physics early in this century. In the 1920s Eddington was talking in *The Nature of the Physical World* of his two tables; one a commonplace, substantial table—a "thing"; the other a scientific table, pervaded by fields of force and electric particles—an "influence". He clearly distinguishes between a "familiar world" and a "scientific world revealed by physics". The present debate in biology between reductionists and holists seems to resurrect all these old distinctions. Is a biological system more than the sum of the properties of its parts? For the philosopher, molecular biology has posed some fine questions.

Yet however stimulating molecular biology has been to historians and philosophers, the most fascinating debate has been among scientists themselves. Has the influence of molecular biology been good on biology as a whole? You will find both positive and negative answers in the articles that follow. Has molecular biology really done nothing for medical science as Burnet and many others would claim? Has it so distorted the funding of medicine that competent medical science is at risk, and has it practically destroyed certain fields of research, such as human nutrition, to which it is very difficult to attract first-rate talent? Is the pursuit of a Nobel prize through molecular biology the ultimate aim of every budding biologist? So the muttering goes, both in public and in private. These are not questions for quick answers; they are ones, however, that those outside biology should be aware of, for they represent the very central issues of science and science policy and, who knows, may crop up anywhere else at very short notice. It only needs the right sort of paper in *Nature* to start it all off.

100 years ago

DR. LYON PLAYFAIR, C.B., has given notice that, on the House of Commons going into committee on the Education Estimates, he will call attention to the deficient ministerial responsibility under which the Votes for Education, Science, and Art are administered, and will move for a Select Committee to consider how such ministerial responsibility may be better secured. We believe that Dr. Lyon Playfair's views are strictly in accordance with those of the best scientific men of the country, namely, that the only satisfactory way of dealing with the subject will be by the appointment of a Minister for Education, Science, and Art.

From *Nature*, **9**, 511, April 30, 1874.