We are all molecular biologists now

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Designs for Life: Molecular Biology after World War II

by Soraya de Chadarevian
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Given that the 50th anniversary of the discovery of the structure of DNA is approaching, it is particularly apposite to review the early history of molecular biology as this field developed in Britain after World War II. Focusing

on the MRC Laboratory of Molecular Biology (otherwise known as the LMB) in Cambridge, Soraya de Chadarevian describes the political, social and intellectual forces that led to the establishment of an institution that has not only spun-off other major research institutes, but has also served as a model for the ethos and practice of modern biological research.

As a historian, Soraya de Chadarevian does not rely on the often imperfect recollections of protagonists. Instead, she has based the story on contemporary documents and so provides a unique perspective on the various strands of research that coalesced into molecular biology as we know it today. The book is full of fascinating insights and intriguing nuggets. For example, the now iconic photograph of Francis Crick and James Watson demonstrating their DNA model actually remained unpublished for 15 years (even more remarkably, the participants all have different recollections of the time and place of the session!). An MRC official once described John Kendrew's model of myoglobin as "an anatomical model of abdominal viscera" and molecular biology was somewhat disingenuously characterized — by biochemists — as 'a subdivision of biochemistry'.

When the LMB opened in its present incarnation in 1962, it was the first institution to incorporate the term 'molecular biology' into its title, although the phrase is, at least scientifically, of considerable antiquity. Arguably driven by the need to supplant the science of death by the science of life, the original MRC Unit for the Study of the Molecular Structure of Biological Systems was founded in the immediate aftermath of World War II. By the late 1950s, under Max Perutz's leadership, it had diversified from its initial remit of using X-ray crystallography to study protein structure and had incorporated genetic studies into the nature of the DNA code. At about the same time, it was mooted that Fred Sanger, then in the Department of Biochemistry, should amalgamate his protein sequencing group with Perutz's unit to form an institute in which the cross-fertilization of widely disparate disciplines could be harnessed to interpret the cell and, ultimately, the organism in terms of how its macromolecular constituents interact. The subsequent evolution of molecular biology has decisively vindicated this multidisciplinary approach — what is important is not the precise techniques used to study a problem, because the choice is so often dependent on technological advances, but a combination of suitable molecular and biological approaches to interpret the biological relevance of the observations.

Although multidisciplinary was at the core of the molecular biology concept, it was also an Achilles' heel. When Sir Lawrence Bragg left the Cavendish Laboratory in Cambridge in 1953, the Department of Physics felt unable to continue housing the MRC Unit, and the search for new premises began. The saga of how this search initially fell victim to the exigencies of the local situation, and how these in turn forced the creation of the LMB, provides compelling insights into the deliberations and motivations of both government and university committees. As with the founding of Perutz's MRC Unit at the Cavendish, the ultimate course of events was determined by only a few individuals. The constraints demarcating subjects, allied with concerns about teaching, were a serious obstacle to a single university depart-

ment embracing all the disciplines within the embryonic institute. Finally, the Regius Professor of Physics resolved the situation by offering space for the laboratory on the site of the new Addenbrooke's Hospital. This protracted birth led initially to a slightly strained relationship between the established biochemical church and its new offspring. In retrospect this seems akin to the passage of adolescence, and today, parallel evolution and horizontal intellectual transfer have ensured that the research facilities, and many of the research topics, found in a modern biochemistry department and in a molecular biology institute are essentially indistinguishable.

Scientists from the LMB have themselves established highly successful institutes elsewhere and, equally importantly, many imitate the LMB's concept of a research institute where the tyranny of instant publication and grant applications is banished. As Perutz and his colleagues fully recognized, to practise science optimally, scientists need time to think and to discuss without the distractions of incessant administrative minutiae. The success of Sydney Brenner's nematode project and the determination of the structure of the mitochondrial ATP-generating system, to take two of many examples, is justification enough for this approach.

And whither the science now? From its reductionist origins in biophysics and biochemistry, molecular biology has evolved. Today the emphasis is more synthetic: the ultimate aim is still to understand the organism as such. It does not now seem too optimistic to suppose that Crick and Brenner's proposed Project K — the solution of *Escherichia coli* — will become a reality during the next decade.

For all practising molecular biologists, for all those who aspire to be one and even for those biologists who have not quite realized that their science has a molecular basis, this book is essential, and highly recommended, reading. If not today, then tomorrow we shall all be molecular biologists.

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