What Mad Pursuit

A personal view of scientific discovery

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What is a discovery? Something unexpected, and with consequences. The discovery of the double helix is such an example. Was it difficult? Obviously. It needed preserverance, commitment, good ideas and luck. Maybe in that order. What was important was the discovery itself, not who happened to do it. Had Watson and Crick not done it, somebody else would have sooner or later, give or take a few years. Discovery is there for everybody to pick up, it is not an invention. This brings us back to the old distinction between Art and Science. In Science there is a race, a matter of getting there first, in Art you run your own race, there are no competitors. If you do not create it, no one else ever will. How this hold up logically is one thing, but in practice due to the utter largeness of potential figuration spaces, the distinction is a sound one.

Biology is a messy subject. It is not physics and it is definitely not mathematics. Crick has been in touch with both. Physicists he can relate to, after all he was one himself initially. But mathematics? Mathematicians are not scientists, they are not really interested in how the world really works. They just want to play around with abstract concepts. Occasionally they are intrigued by biological things. The genetic code being an example. Here is some nice combinatorical puzzle that should yield to superior mathematical insight. It does. Elegant solutions are produced, the problem is that they are irrelevant. Solutions in biology are messy, the product of long evolution. It is only when you fully realise and appreciate this, you can start doing bilogy. Mathematicians do not. Occasionally they get into the subject. The illustrious Rene Thom is a prime example. A man with strong biological intuition, Crick remarks, but unfortunately of a negative sign. Whatever idea Thom will have, Crick writes, it is sure to be wrong.

The finding of the structure of DNA was partly a mathematical problem, namely that of finding the inverse of the scattering procvess. Not enough information is available to get a mathematical solution, hence the biologist has to be a little bit like evolution itself, i.e. guessing, inventing tricks, and trust some luck. So what goes into the solution is more than abstract thinking. It is tinkering, using whatever is available to you, in order to cut down possibilities. As a technical problem in molecular biology it is not outstandingly difficult, the elucidation of the structure of collagen was just as difficult, if not more. The point is that DNA is far more central to biology than collagen. If you want to make discoveries, you should focus on the real central issue.

Molecular biology came into its own in the 50'sand 60's. It attracted a lot of very talented people, and became a very competetive field, in which what was considered recent did not refer to the last decades, not even the last few years, but the last week or so. A technical subject in which things were moving very fast and just to stay in top was an achievemnet by itself. In retrospect it might seem deceptively easy. Conceptually simple

experiments. But most of research is plodding. And, as Crick points out, the real hard problems may ironically be easier to solve than the more humdrum, for the reason that solutions might be more canonical, allowing so many approaches and explanations to be rejected from the outset. While in a more standard problem, so many things could work, so it can become hopeless to choose. And progress in science is after all a matter of rejection, just as in evolution itself. The significance of a scientific result is that it cuts out on possibilities and hence makes finding your way easier. The hard thing is not to do, but to know what not to do. Indeed most scientists do get lost, especially in biology. Nature is so complicated, Crick reminds the reader, that many theories can be used to explain a lot fo things. Indeed it is hard to reject what has worked, but this is the unsentimental attitude to take for a real scientist who is interested in how things are, not in their own theories.

In the 70's Crick turned to the brain and conciousness. Many people shy away from this, believing that the brain is essentially a Black Box, and we should leave it as that. This is the idealists top-down approach, but the instincts of a Crick are the opposite. He really wants to know how things really work, down at the most fundamental level. What is wrong with that, he asks rhetorically. Any such insights are bound to be illuminating, no matter what the general philosophical objections may be as to a complete understanding. The Devil is to be found in the details.

Brain research attracts three kinds of people. Those in neuroscience, and those are the real scientists. Then people in AI, and they are engineers, what they may come up with are, in the words of Cricks, mere demonstrations (i.e. existence proofs that allow you not to worry) not actual models. But finally there are the mathematicians, they are definitely not scientists, being too intellectually lazy actually to delve into technical experimental accounts, and they are no engineers either, simply people who like to mess around with abstract thinking.

An auto-biography is a recollection, and as such steeped in nostalgia. the life of a scientist is that of an initial struggle, and if lucky and succesful, the rewards of distinction and prestige. The latter may be rewarding for personal reasons, but what gives a life its drama and its verve, are the early years, when things were still in the balance, and life was lying ahead filled with possibilities. And clearly the first few chapters of the book have their undeniable charm. Then the rest becomes far smoother going. Good for the main protagonist, maybe less engrossing for the reader.

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