

## Introduction to Classics Essay

As recounted elsewhere in this issue, Max Delbrück started his scientific career in the early 1930's in, among other things, the then young field of quantum electrodynamics. Then, in Copenhagen in August 1932, he attended the opening address by Niels Bohr at the 'International Congress on Light Therapy' on the topic 'Light and Life'. In his talk Bohr suggested that his Complementarity Principle, formulated in 1927 and one of the key ingredients in the Copenhagen interpretation of quantum mechanics, might be relevant for biology as well. Specifically he wondered whether the property of life in a cell, and the understanding of the molecular processes taking place in the cell in term of atomic physics, might be mutually exclusive – examining the cell at the level of detail needed for the latter might require killing it.

These ideas of Bohr converted Delbrück from theoretical physics to biology, and he went on to become one of the founding fathers of the field of molecular biology. His talk 'A Physicist Looks at Biology' given in 1949 at a meeting in Connecticut and reproduced here as a Classic, recounts Bohr's influence on him and the task he set himself – to see whether Bohr's suggestion was indeed relevant for the understanding of life. In place of simple elegant mathematically precise natural laws valid everywhere and for all times, which is what the physicist is accustomed to, in biology he finds strikingly different dominant features – the influences of evolution and environment, a sense of history and of purpose and selective advantage. Delbrück recalls in a few well-chosen words the paradoxes that gave rise to the quantum mechanical understanding of atoms and molecules, and thus of chemistry, and gives illustrations of the Complementarity Principle. And contrasting all this with what one finds in biology, he explains why the physicist is puzzled and finds strangeness at every turn.

The 1953 Watson and Crick discovery of the structure of DNA was just a few years away. Delbrück returned to his 1949 theme in his Nobel lecture in 1969 with the title 'A Physicist's Renewed Look at Biology: Twenty Years Later' (Maybe another classic some time hence?). Some years later, as expressed in a course of lectures given at Caltech during 1974-75 and published posthumously as '*Mind from Matter?*' (reviewed in this issue), he reassessed the relevance of Bohr's ideas and had this to say:

*"It might be said that Watson and Crick's discovery of the DNA double helix in 1953 did for biology what many physicists had hoped in vain could be done for atomic physics: it solved all the mysteries in terms of classical models and theories, without forcing us to abandon our intuitive notions about truth and reality."*

Still, as an expression of a physicist's appraisal of the problems of biology, the 1949 lecture is a marvellous piece. You will enjoy it.

N Mukunda

