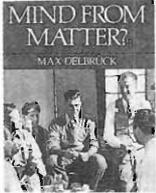


## ‘Mind from Matter ? As Essay on Evolutionary Epistemology’

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*'Mind from Matter ? As Essay on Evolutionary Epistemology'*

by Max Delbrück

edited by Gunther S. Stent,

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Max Delbrück began his scientific career as a theoretical physicist. However, inspired by a 1932 lecture by Niels Bohr titled “Light and Life”, where Bohr suggested the importance of the Complementarity Principle of quantum mechanics for the understanding of life, he decided to devote the rest of his scientific career to molecular biology. He became one of those who created this new field, and grew to attain an almost mythical status in it. And he reflected upon his own experiences in a 1949 essay “A Physicist looks at Biology”, and again in 1969 in “A Physicist’s Renewed Look at Biology – Twenty years Later”.

During 1974–75 Delbrück gave an extempore twenty lecture course at the California Institute of Technology, with the broad aim of assessing whether Niels Bohr’s expectations had been fulfilled. The present book grew out of his notes for these lectures, organized and edited by his colleagues after his death in 1981.

The range of topics covered is breathtakingly vast, all the way from our present under-

standing of the cosmic evolution of the universe to the emergence of the quantum mechanical understanding of microscopic phenomena; and against this canvas, the formation of the solar system and the planets, and the emergence of life on the earth. Each relatively short chapter gives an incisive account of one or another aspect of this enormous picture.

The main grand question before Delbrück is: can we understand how mind arose from an initially mindless ‘material’ universe? In building up to his answer, he provides masterly surveys of the growth of mathematics and of physics from their beginnings down to modern times, including the intricacies of the Gödel theorems on the one hand and of quantum mechanics on the other. Mechanics, electromagnetism, statistical physics and the relativity theories are covered on the way. Major philosophical developments such as the Cartesian cut and the later Kantian notion of a priori categories of thought are also brought into the discussion.

Initially Delbrück adopts the naïve realist standpoint, which takes the world as existing on its own ‘out there’, while our senses present a faithful picture of it to our minds. This standpoint suffices for an account of the initial occurrence of life on earth some three billion years ago; the appearance of photosynthesis; and then the spreading out of the many branches of the ‘tree of life’ guided by natural selection. Delbrück emphasizes both the unity and the continuity of the myriad forms of life – in the material biochemical sense,

and in the psychic sense of organisms sensing their surroundings and reacting to them. But by the time he comes to describing the way the senses and the mind actually work, the limitations of the naïve realist point of view become clear. The intricate – and not yet fully mapped out – pathways of the various senses in the brain, and the way in which the brain – mind ? – creates for itself a specifically and selectively treated image of the external world, are astounding. The human observer is seen to be far from passive.

As part of this account, Delbrück brings in the ideas of Konrad Lorenz on the one hand, and the results of Jean Piaget on development and child psychology on the other. Lorenz's explanation of the relative roles of phylogeny and ontogeny – the development of the species over enormous periods of evolutionary time versus the experience of one individual member of the species during one lifetime – as an explanation of Kant's ideas is simply fascinating. This helps us understand the basis for the Kantian a priori categories of thought, based on Darwinian evolution, in a way not available to Kant in his own lifetime. The description of Piaget's findings – acknowledging that according to professional psychologists there has been much progress since – illustrates the ways in which the innate potentialities in every individual, thanks to slow evolutionary development, are realised and put to use based on individual experience of and interaction with the world. The unique role of the language faculty in humans is also covered in the discussion.

Delbrück's final answer to his main question is that the mind is not mysterious at all – it is a capacity resulting from selective pressures in the world of life. Quoting him: "The point of view of the evolutionist forces us to view mind in the context of other aspects of evolution.... In the context of evolution, the mind of the adult human ... ceases to be a mysterious phenomenon, a thing unto itself. Rather, mind is seen to be an adaptive response to selective pressures, just as is nearly everything else in the living world." It also transpires that the 'riddle of life' has been solved, thanks to Watson and Crick, in much simpler and merely mechanical ways than Bohr had expected. In that sense, the mysterious features of quantum mechanics lie beyond an explanation of the phenomenon of life! However it is good to remind oneself that another very distinguished thinker, Erwin Schrödinger, had in "*What is Life ?*" traced the very possibility of life – specifically, the gene – to the principles of quantum mechanics.

This book is full of treasures, and needs a mature mind to absorb the points it makes. And it needs to be read more than once. The sweep, the grandeur of the canvas are stunning. One may prefer one's own conclusions at the end, but one would have been infinitely better informed by reading Delbrück than otherwise.

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