This is Biology: The Science of the Living World

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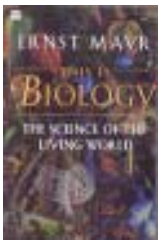

This is Biology: The Science of the Living World
Ernst Mayr
Universities Press India Ltd., 1997.
Price: Rs. 350/-.

In the realm of scientific publications, books on life sciences abound. They come in all sizes and varieties, describing the many fascinating aspects of life on this planet. They also cater to different levels of readers, from those written for the lay person to treatises on advanced and specialized topics in biology. In this context, the book under review, *This is Biology: The Science of the Living World* by Ernst Mayr occupies a special status as it covers profound issues in biology that can be understood even by someone who has only a basic knowledge of science.

Mayr, whose long scientific career that spanned eight decades, was an ardent champion of many issues, one of the most significant being the advocation of a holistic view of biology. In the later half of the 20th century, when molecular biology was making inroads into almost all branches of life sciences, Mayr was one among the few stalwarts who defended "organismal" biology. His scientific foundations being laid strongly in natural history and systematics, typological thinking and reductionism were abhorrent to him. Mayr strongly believed that though living systems do obey the laws of physics and chemistry at the molecular level, this does not enable one to predict the behaviour of higher order structures such as the cell, let alone a complete organism. As more complex systems evolve, they acquire novel properties that cannot be deduced from their constituents. Thus, biological systems have unique properties that are not present in the inanimate world, one of the most important being the presence of historically acquired information in the form of a genetic programme that guides the functioning and development of the organism. In his own words, "The claim that every attribute of complex living systems can be explained through the study of the lowest components (molecules, genes or whatever) struck me as absurd. Living organisms form a hierarchy of ever more complex systems, from molecules, cells and tissues through whole organisms, populations and species. In each higher system, characteristics emerge that could not have been predicted from a knowledge of the components". In the book, Mayr has essentially crystallized many of these concepts that he has championed.

The book can be broadly divided into two halves. In the first half, Mayr presents his arguments for the emergence of a new philosophy of science that takes into account the unique properties of living systems. "The classical physical sciences, on which the classical philosophy of science was based, was

dominated by a set of ideas inappropriate to the study of organisms; these include essentialism, determinism, universalism, and reductionism. Biology, properly understood, comprises population thinking, probability, chance, pluralism, emergence and historical narratives. What we need is a new philosophy of science that could incorporate the approaches of all sciences, including physics and biology". What follows is a journey that encounters the different philosophical milestones and the arguments as to why they are inadequate to include biology. Mayr makes his points in his characteristic uncompromising style choosing specific examples from different branches of life sciences. In the discussion on law versus concepts Mayr states: "The classical philosophy of science has made curiously little reference to the important role of concepts in theory formation. The longer I study theory formation, however, the more I am impressed by the fact that theories in physical sciences are usually based on laws, those in biology on concepts". It was the lack of appreciation of this ambiguity that prompted Popper to declare that "Darwinism is not a testable scientific theory, but a metaphysical research programme".

The real treat is the second half where he takes us on a journey through the conceptual developments in biology starting from the early days of systematics to modern day molecular biology. What is endearing about the book is not so much the information, but the conceptual insights that it provides with absolute clarity and lucidity. In Mayr's view, natural history and systematics provides the "What" question in biology, developmental and molecular biology provides the "How" question (proximal cause) and natural selection to a large extent the "Why" question (ultimate cause). The second half of the book is a validation of these ideas. In the process, the reader is treated to a conducted tour through the major conceptual breakthroughs in biology, including molecular biology. Interestingly, the section on molecular biology is not very broad, not so much due to the dearth of information, but as Mayr admits, to his own inadequacy of knowledge of the subject. The last chapters cover human evolution and the impact of biology on ethics and morality.

Today, biology is witnessing an unprecedented information explosion. In all the excitement generated by these new discoveries, it is easy to forget the conceptual issues and questions that are central to biology. The book's main achievement is to restore the intellectual issues to centre stage where they really belong. I would recommend the book to any one with a serious interest in the history and philosophy of science, both professional scientists as well as students of science, particularly students of life sciences. The book is a forceful reminder that the life sciences, far from being mere "stamp collection" is a science full of life.

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