THE PHILOSOPHY OF PHYSICAL SCIENCE

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by

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PREFACE

THIS book contains the substance of the course of lectures which I delivered as Tarner Lecturer of Trinity College Cambridge in the Easter Term 1938. The lectures have afforded me an opportunity of developing more fully than in my earlier books the principles of philosophic thought associated with the modern advances of physical science.

It is often said that there is no "philosophy of science", but only the philosophies of certain scientists. But in so far as we recognise an authoritative body of opinion which decides what is and what is not accepted as present-day physics, there is an ascertainable present-day philosophy of physical science. It is the philosophy to which those who follow the accepted practice of science stand committed by their *practice*. It is implicit in the methods by which they advance science, sometimes without fully understanding why they employ them, and in the procedure which they accept as giving assurance of truth, often without examining what kind of assurance it can give.

There should be no conflict between the claim that a philosophy is scientifically grounded and the claim that it is, so far as it goes, a true philosophy. But in a specialised work of this kind the primary object must be to ascertain and discuss the philosophy which, whether true or not, is the present philosophy of physical science in the sense stated above. Those of us who believe that science, notwithstanding continual failures and readjustments, is slowly drawing nearer to the truth, are content that philosophic truth should be reached by the same method of progressive advance.

In order to make sure of our scientific foundations it is found necessary to enter rather deeply into the principles of relativity theory and quantum theory. Since the intention is

to give, not merely an exposition, but a justification of the views to which they lead, some parts of the book introduce matters of considerable technical difficulty. Generally I have abstained from mathematical formulae; this, however, is not wholly out of consideration for the general reader, but because those whose minds are too much immersed in mathematical formulae are likely to miss what we are here seeking.

The discussion, although relating to the same subject matter, is mainly on different lines from that given eleven years ago in *The Nature of the Physical World*. The starting point in the present treatment is *knowledge*. The title of the earlier book might have been expanded into "the nature of the physical universe, with applications to the theory of physical knowledge"; the corresponding title of the present book would be "the nature of physical knowledge, with applications to the theory of the physical universe". The change of emphasis makes for a more logical sequence of ideas; but primarily it reflects a change which has occurred in physical science itself. It is significant of this change that the contrast between the scientific table and the familiar table, with which *The Nature of the Physical World* opens, had become a contrast between the scientific story and the familiar story of experience at the beginning of *New Pathways in Science*. The first was, I believe, the natural form of expression according to the scientific outlook of 1928; the second had become more natural six years later.

Neither the scientific advances of the last decade nor the years of reflection have altered the general trend of my philosophy. I say "my philosophy", not as claiming authorship of ideas which are widely diffused in modern thought, but because the ultimate selection and synthesis must be a personal responsibility. If it were necessary to give a short name to this philosophy, I should hesitate between "Selective subjectivism" and "Structuralism". The former name refers

to the aspect most prominent in the first eight chapters; the latter refers to a more mathematical conception which dominates the rest of the book. Both can now be carried much farther than in *The Nature of the Physical World*. The domain of subjectivity has been extended as a consequence of our better understanding of quantum mechanics; and the conception of structure has been made more precise by the connection now recognised between the foundations of physics and the mathematical Theory of Groups.

With this "philosophy of physical science" as a nucleus, I endeavour in the last two chapters to develop the outline of a general philosophical outlook which a scientist can accept without inconsistency. I am not among those who think that in the search for truth all aspects of human experience are to be ignored save those which are followed up in physical science. But I find no disharmony between a philosophy which embraces the wider significance of human experience and the specialised philosophy of physical science, even though the latter relates to a system of thought of recent growth whose stability is yet to be tested.

A. S. E.

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