Metascience (2009) 18:139–142
DOI 10.1007/s11016-009-9244-3

REVIEW

A COMPANIONABLE COVERAGE OF THE PHILOSOPHY OF SCIENCE

Stathis Psillos and Martin Curd (eds), *The Routledge Companion to Philosophy of Science*, London: Routledge, 2008. Pp. xxvii + 619. £95.00 HB.

By Roman Frigg

Philosophy of Science, broadly construed, is as old as philosophy itself. It was only in the early twentieth century that it emerged as a distinct sub-discipline with its own professional standards and institutional structures, and it has come a long way since these pioneering days. During the century's first four decades the focus was primarily on what nowadays would be referred to as 'general philosophy of science', the study of problems that arise in all scientific disciplines alike. Since the 1960s philosophers have increasingly paid attention to issues in particular sciences – at the beginning primarily in mathematics, physics and biology. Later on chemistry, economics, and the social sciences followed suit. And in the last few decades these so-called 'philosophies of the special sciences' have reached unprecedented maturity. The 1960s saw another important development: the entry of history of science into philosophical debates, which led to a style of argument that based philosophical analysis on detailed historical case studies. In the 1980s, finally, sociological, and more generally humanities, perspectives on science entered the scene and contributed yet another way to approach the study of both the practices and the results of the sciences.

This plenitude of schools, movements, and approaches can be bewildering, and keeping track of all of them is a Herculean task. So novices and seasoned practitioner alike may be grateful for a guiding hand, and that is what the new *Routledge Companion to*

Philosophy of Science provides. At over 600 pages long, it contains fifty-five articles documenting the state-of-the-art in the field. These articles are divided into four parts. Part I, entitled 'Historical and Philosophical Context', groups together introductions to particular schools or episodes within the philosophy of science – 'Critical Rationalism', 'Logical Empiricism', and 'The Historical Turn in the Philosophy of Science' – and entries that place the philosophy of science within the broader context of philosophy. 'Philosophy of Language', 'Metaphysics, Pragmatism and Science', 'The Role of Logic in Philosophy of Science', and 'The Epistemology of Science after Quine' each deal with an important philosophical field and show how issues in this field are related to problems in the philosophy of science; 'The History of Philosophy and the Philosophy of Science' places the development of philosophy of science as an independent discipline in the context of the entire Western intellectual tradition and traces its roots.

The articles in Part II – 'Debates' – introduce the reader to the main debates in current philosophy of science by tracing their development, introducing the basic stances, and discussing the main arguments. 'Confirmation' presents the puzzles surrounding the evidential bearing of observations on theories and discusses different concepts of confirmation. 'Bayesianism' provides an introduction to the currently most influential quantitative account of confirmation, namely the Bayesian approach, and 'Experiment' examines the practices in science that produce the evidence against which theories are tested. And how are we to understand theories? 'The Structure of Theories' reviews different analyses of the nature of scientific theories and 'Theory Change in Science' discusses the way theories change in the light of evidence. A number of articles are dedicated to the realism versus antirealism debate. 'Realism/Anti-Realism' introduces the reader to the realism problem and terms of the debate, while 'Empiricism, Inference to the Best Explanation, Underdetermination', and 'Relativism about Science' elaborate on different positions and arguments in this discussion. 'Essentialism and Natural Kinds and Laws of Nature' continue this discussion with a special focus on the reality and character of kinds and laws. These are closely related to another important question: whether, and if so in what way, science provides explanations of its subject matter, which is the issue considered in 'Explanation'. How should science proceed, and are there methods that clearly set off science

from other human activities? This is the subject matter of 'Scientific Method' and 'Naturalism and Values in Science', which explore related issues. In 'Social Studies of Science' we are introduced to the investigation of the social dimension of science, which is continued with a special focus on the concerns of women in 'The Feminist Approach to the Philosophy of Science'. 'Ethics of Science' explores ethical questions that arise in, and in connection with, science.

Part III – 'Concepts' – is dedicated to the analysis of important concepts in philosophy of science. 'Causation' discusses one of the hotly debated issues in current philosophy of science, and 'Mechanisms' and 'Determinism' deal with issues that are in many ways closely related to discussions about the nature of causation. 'Probability' provides an introduction to probability theory and its different interpretations, which is important for understanding probabilistic causation as well as many other issues in the philosophy of science, most notably confirmation theory. Most philosophers agree with a characterisation of science as an activity that aims at representing the world. 'Representation in Science' discusses what is meant by representation, and 'Models' investigates the nature of what is often taken to be the vehicle of representation, namely scientific models. 'Idealisation' and 'Truthlikeness' deal with concepts that are essential to understanding the nature of representation in the sciences, where a situation is rarely, if ever, represented faithfully. To find out how well a model or a theory match reality we make predictions that we then test against observations, which often involve quantitative measurements. 'Prediction, Observation, Measurement', and 'Scientific Discovery' discuss issues that arise when linking up representations with experimental findings. These findings, in turn, serve as evidence for or against certain hypotheses. 'Evidence' examines what conditions a particular finding has to satisfy to count as evidence for a certain claim. But we don't want to test any old theory: we want to test good theories. 'The Virtues of a Good Theory' discusses what the notion of 'good theory' involves. As important as the relation of theories to facts is the relation that theories bear to other theories. Among these relations, two stand out, and are the subjects of 'Unification and Reduction'. The special sciences, to which Part IV is dedicated, also introduce concepts that give rise to questions. Particularly pertinent are the notions of function in biology, and space-time and symmetry in physics. 'Function', 'Space and Time' and 'Symmetry' provide

accessible introductions to the issues that arise in connection with these concepts.

As mentioned at the beginning, over the last few decades the philosophies of individual sciences have reached unprecedented maturity, and, as the programmes of large conferences such as the biennial PSA meetings reveal, an ever growing amount of the effort expended on philosophy of science is invested in a reflection on the problems of the special sciences. The articles in Part IV – 'Individual Sciences' – documents the state of play in this corner of philosophy of science. Among the first individual sciences to be subjected to detailed philosophical scrutiny were mathematics and physics, followed by biology and chemistry. The results of these endeavours are documented in 'Mathematics', 'Physics', 'Biology' and 'Chemistry'. They were soon followed by other disciplines, among them the ones discussed in 'Cognitive Science', 'Economics', 'Psychology' and 'Social Sciences'.

The companion ends with an extended index, which provides great help in navigating this sizeable volume. And there will be plenty of opportunity for this! This well conceived companion, which brings together an impressive collection of distinguished authors, will be invaluable to novices and experienced readers alike.

Department of Philosophy, Logic and Scientific Method
London School of Economics
London, UK