Paul Humphreys, ed. *The Oxford Handbook of Philosophy of Science*. Oxford University Press 2016. 944 pp. 175.00 USD (Hardcover ISBN 9780199368815).

In his more than famous *The Structure of Scientific Revolutions* (1962), Thomas Kuhn claimed that textbooks (and thus also handbooks, one might add) have many important roles that have been underestimated in our understanding of the nature and development of science. Students, for example, get socialized to the practices of science through examples and norms documented in textbooks. They are, so to say, framed into the current paradigm with the help of textbooks; they learn a new life-form. Textbooks and handbooks also document the changes of science, and thus scientific revolutions could be read off from the pages of them. But, they might have many more important functions in the republic of scholars.

The *Oxford Handbook of Philosophy of Science* (OHPoS), edited by Paul Humphreys, with its 900 pages and 42 essays, is a magnificent collection of essays by leading scholars. In the first sections of this review, the content of the volume is summarized, and in the second part, some remarks are added regarding what is *documented* in this particular textbook about the current status of the philosophy of science.

OHPoS consists of three major parts. The first is devoted to 'Overviews.' As Humphreys claims in the 'Introduction,' *philosophy* of science has recently become *philosophies* of science (in the plural), and the first section documents this fragmentation. There are chapters on computational sciences (it is, as its title says, more like an 'advertisement'), social sciences, biology, psychology and cognitive sciences, and physical sciences. The last, by Stathis Psillos, is devoted to 'general philosophy of science' (GPoS).

Despite the many philosophies of *X* (where *X* ranges over scientific disciplines like physics, biology, economics, medicine etc.), Psillos argues that GPoS is unavoidable, where the subject of general philosophy of science is 'Science-in-general' (144.), the latter being a rational abstraction. It is claimed that GPoS has both an explicative and a critical function: it can explicate those similarities and differences that a certain notion (e.g., explanation, experience) exhibits in the various scientific fields. As a matter of fact, this strategy of explication is sensitive to the historical and actual details of scientific practice, thus it does not correspond to what might be called the 'general philosophy of science before the 1960s' which was criticized by so many post-Kuhnians.

That is why GPoS in Psillos's sense and particular philosophies of sciences form a 'seamless web' (155.). 'Biology, strictly speaking,' says Psillos (155.), 'is a cluster of sciences or disciplines: ecology, paleontology, synthetic biology, and others … The philosophy of biology-in-general stands to the philosophies of various biological subdisciplines as GPoS stands to philosophies of the various sciences.' One might well wonder, however, where this path leads: if philosophy of biology is to be preferred (according to many recently) to GPoS (or its earlier renderings) just because of its being more particular (and hence concrete and substantive), then philosophical investigation of paleontology (say 'philosophy of paleontology') is to be preferred to philosophy of biology for the very same reasons. But as it happens to every scientific idea, 'philosophy of paleontology' will have its own renderings, versions, and sub-disciplines, like 'philosophy of paleoclimatology.' Today's 'bottom-up substantial philosophies of science' will be tomorrow's 'top-down general philosophy of science.'

Nonetheless, every chapter of Part 1 could be read both as a summary of the field and as an original paper, dealing with the possibilities and critical points of the given field. Though one shall not be dissatisfied at all and should keep in mind that a single volume—900 pages and 42

chapters—could not cover everything, there are (and will be) fields that are uncovered and painfully missing. While jurisprudence and law are treated in a different Oxford Handbook, their omission is understandable and appropriate; the neglect of philosophy of chemistry, however, is quite curious.

Part 2 of OHPoS is devoted to so-called 'traditional topics.' The label is justified with the 22 chapters, each on a specific topic and written by a leading scholar. Such issues as causation, induction, confirmation, determinism, epistemology, ethics, the notion of experiment, laws of nature, models, probability, explanation, nature of theories, progress and realism, etc. are treated in detail and with great precision. Though there are minor overlaps, they are always reasonable and proportional, and thus the individual chapters are suitable for the classroom.

The final 13 chapters are gathered under the label 'New Directions.' Important themes such as astrophysics, complexity theory, computer simulation, the nature and role of data, emergence, neuroscience, and some recent arguments against evolutionary theory are introduced and discussed. Furthermore, classical themes, like cosmology, empiricism, sociology of science, mechanical philosophy, and the influence of Thomas Kuhn are reviewed in the light of contemporary literature. In this part, most of the cited publications in the bibliographies are between 2000 and 2016; a major part is from between 1990 and 2000, and from before 1990 mainly classical texts are cited. 'Complexity Theory' and 'Social Organization of Science,' written by Michael Strevens and Martin Carrier respectively, are the only exceptions, and the question arises whether these documents are of interest to the authors or whether the literature of these fields should be renewed from now on.

A few more words about the significance and documentation value of OHPoS may be in order. Two different works may have played similar roles in the twentieth century. One of them is Herbert Feigl's and May Brodbeck's *Readings in the Philosophy of Science* (New York: Appleton-Century-Crofts, Inc., 1953). The other is *International Encyclopedia of Unified Science* (University of Chicago Press, 1938-1969, IEUS), edited by Rudolf Carnap, Charles Morris, and Otto Neurath. The former is a collection of essays with an influential introduction by Brodbeck. It summarized the current state of the discipline with (reprinted) articles written by leading (mainly logical empiricist) scholars. The other was the enormous project of Neurath representing the various scientific disciplines from the viewpoint of unified science.

While Brodbeck called attention to the fact that science has its own social, psychological, historical and ethical dimension, *philosophy* of science shall abstract from all these in order to pursue logical analysis. On the other hand, as many have argued recently, IEUS had its own social and political connotations even on the level of philosophy of science (given that the authors of the movement talked about 'philosophy' at all). The various philosophical, logical and meta-scientific questions of the sciences (like physics, biology, linguistics, economics, cosmology, psychology, probability, etc.) were addressed mainly from this perspective.

The point is that while both Feigl-Brodbeck and the editors of IEUS declared their intentions of what should be considered as philosophy of science, OHPoS does not. It shows that since Thomas Kuhn's *Structure*, philosophy of science has had many struggles over history, sociology, relativism, antirealism, and the values connected to and detached from science, and also that 'the challenges posed by the Kuhnian era have largely been answered' and that '[t]he philosophy of science absorbed lessons from historical studies of science' (8). This being said, it seems that philosophy of science should not be identified or correlated with history or sociology of science and there is indeed a certain domain that is apt for genuinely *philosophical* analysis. But a detailed definition or an explicit statement that unites the individual chapters is missing.

Be that as it may, again without being greedy, a few more chapters would have been useful, and not just for the balance of the alternative accounts of philosophy of science. The reader may want some information on the *history of philosophy of* science—as regards the happenings of the twentieth

century. *Historical philosophy of science* is also missing, though it is a rapidly growing form and/or sub-discipline of philosophy of science.

Hans Reichenbach required that '[t]he philosophy of physics should be as neat and clear as physics itself' (*Philosophic Foundations of Quantum Mechanics*, University of California Press, 1944/1965, vii). If we know how clear and neat *science* is, philosophy of science could indeed aim at that grade of clearness and neatness. It is a further (meta?-) question whether the truth of the conditional's antecedent is (in)dependent of philosophy of science.

The hardcover edition of OHPoS is well-structured and edited (with a useful index) and will be a nice adornment to bookshelves. What is more important, however, is that the *Oxford Handbook of Philosophy of Science* is a real masterpiece for anyone who teaches and/or does research in philosophy of science. It's worth every penny. Or cents—depending on your space-time location.

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(Supported by the ÚNKP-16-4-II. New National Excellence Program of the Ministry of Human Capacities)