arguments. Despite its weaknesses, Norton's anthology provides a valuable, and currently rare, resource for environmental philosophy.

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REFERENCES

Allen, Timothy F. H., and Thomas B. Starr (1982), *Hierarchy: Perspectives for Ecological Complexity.* Chicago: University of Chicago Press.
Callicott, J. Baird. (2002), "Choosing Appropriate Temporal and Spatial Scales for Ecological Restoration", *Journal of Biosciences* 27: 409–420.
Ellner, Stephen (1987), "Hierarchy Theory and Practice", *Ecology* 68: 1126.
Huston, Michael A. (1994), *Biological Diversity.* New York: Cambridge University Press.
Levin, Simon A. (1992), "The Problem of Pattern and Scale in Ecology: the Robert H. MacArthur Award Lecture", *Ecology* 73: 1943–1967.
Norton, Bryan G. (1987), *Why Preserve Natural Variety?* Princeton: Princeton University Press.
——— (1991), *Toward Unity among Environmentalists.* New York: Oxford University Press.
O'Neill, Robert V., Donald L. DeAngelis, Jack B. Waide, and Timothy F. H. Allen (1986), *A Hierarchical Concept of Ecosystems.* Princeton: Princeton University Press.
Ricklefs, Robert E. (1987), "Structure in Ecology", *Science* 236: 206–207.
Sarkar, Sahotra (1984), review of *Hierarchy: Perspectives for Ecological Complexity. Philosophy of Science* 51: 359–361.

John Stachel, ***Einstein from 'B' to 'Z'.*** Einstein Studies, vol. 9. Boston: Birkhäuser (2002), xi + 556 pp., $69.95 (cloth).

John Stachel was the founding editor of the *Collected Papers of Albert Einstein* and is among the world's most knowledgeable experts on Einstein. When he dared to publish a collection of essays under the title *Einstein from 'B'to 'Z,'* he must have had his tongue in cheek. The 'A' is left out to indicate that the volume does not exhaust all aspects of Einstein's life and work. It is also possible to find some idiosyncratic biases in the book. Nevertheless, this collection of 37 essays written over the past 25 years gives a surprisingly comprehensive and balanced picture of Einstein.

The first chapter on the "Human Side" contains some short, authoritative biographical overviews as well as topical discussions, e.g. on Einstein's Jewish identity. These biographical pieces, although few in number, suggest that Einstein's political awareness and his standpoints on social issues are dearest to Stachel's heart. But with all his sympathy for Einstein, he is very careful not to give in to hagiographic temptations. It is no accident that Stachel also included a chapter on his involvement in "Editing the Einstein Papers." It is his credo that any Einstein scholarship must be grounded on the critical and comprehensive evaluation of all available documentary evidence.

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The major portions of the book are ''Surveys of Einstein's work'' and essays grouped in chapters on ''Special relativity,'' ''General relativity,'' and ''Quantum Theory.'' Attempts at reconstructing Einstein's path to the theory of special relativity are particularly dependent on the close scrutiny of all pertinent documentary evidence that can possibly be unearthed. The historical accounts of Einstein's early work have, clearly, benefited greatly from the first two volumes of Einstein's *Collected Papers*. Stachel himself contributed to the historical evaluation of the new material contained in these volumes, e.g. in a paper on the, as he argues, overestimated role of the Michelson-Morley experiment in the context of discovery of special relativity.

Stachel's essays on the history of general relativity take up the largest part of the volume. This is a topic that he had been working on continuously over the years. Indeed, an early essay on ''Einstein's Odyssey: His Journey from Special to General Relativity'' dates from 1979, while another one that gives an account of the ''First Two Acts'' of this story is dated 2002. Our understanding of Einstein's path to general relativity has changed and deepened considerably during those years, and it can now be documented by some previously unknown manuscripts and a fair amount of pertinent scientific correspondence. It was a long and winding road that led Einstein from the first conception of the equivalence hypothesis in 1907 (Act I), via the introduction of the metric tensor as the crucial mathematical ingredient of a generalized theory of relativity in 1912 (Act II), towards the generally covariant field equations of gravitation in 1915 (Act III).

Stachel's early, ground-breaking contributions to our understanding were of a conceptual nature. It was he who pointed to the significance of the now famous hole argument, devised by Einstein in 1913 in order to prove the impossibility of physically meaningful covariant field equations. The fallacy of this argument, realized after the breakthrough of 1915, was an insight of deep philosophical implications. The hole argument was superseded by the point-coincidence argument. Both are now at the center of modern philosophy of space and time. Stachel also was the first to point to the problem of the rotating disk as the missing link for Einstein's introduction of a non-Euclidean metric tensor field into the theory.

The wealth of documentary evidence for the genesis of general relativity has made a reconsideration of previous accounts of Einstein's path necessary and meaningful. It appears that some of the earlier assumptions in the reconstruction of this period need to be revised, such as the crucial understanding of the conceptual significance of restrictive coordinate conditions in Einstein's non-covariant theory of 1913. Since these assumptions also bear on the role of the hole argument, the history of general relativity remains a topic of debate. If only for this reason, Stachel, who has

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been a party to this reanalysis, might have chosen the incomplete alphabet as the title for his book on both ends: *Einstein from B to Y.*

Two substantial essays in the volume discuss Einstein's "Fifty Years of Struggle," to quote one of Stachel's titles, with the quantum. Another essay provides a reassessment of the prehistory of Einstein's light quantum hypothesis by discussing specifically the role that Wien's work would have played for the young Einstein. Characteristically, Stachel approaches the topic from both an historical and philosophical perspective, and especially in these essays on quantum theory, Stachel ventures into the still largely unexplored later decades of Einstein's life. In his analysis, he draws on the most interesting quotes from Einstein's later correspondence which Stachel knows so well.

The book concludes with several essays that discuss Einstein's relationship to other physicists and colleagues (Newton, Eddington, Infeld, Lanczos, Bose, Pauli) and with a reprint of Stachel's critiques of two standard biographies of Einstein, those by Pais and Fölsing.

About a third of the essays are previously unpublished or published in obscure places. On the other hand, I found a few important essays missing, such as a long review article on the history of relativity, or a systematic reflection on understanding scientific discoveries as historical artifacts. But since these essays bear on our picture of Einstein only implicitly, they have been left out. Fortunately, another volume is in preparation that will collect Stachel's critical writings. We can expect it to bear further witness to his mastery of critical, content-oriented, but socially and politically aware history and philosophy of science.

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