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MILIČ ČAPEK

BERGSON AND MODERN PHYSICS

A REINTERPRETATION AND RE-EVALUATION

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PREFACE

Milič Čapek has devoted his scholarship to the history and philosophy of modern physics. With impeccable care, he has mastered the epistemological and scientific developments by working through the papers, treatises, correspondence of physicists since Kant, and likewise he has put his learning and critical skill into the related philosophical literature. Coming from his original scientific career with a philosophy doctorate from the Charles University in Prague, Čapek has ranged beyond a narrowly defined philosophy of physics into general epistemology of the natural sciences and to the full historical evolution of these matters. He has expounded his views on these matters in a number of articles and, systematically, in his book *The Philosophical Impact of Contemporary Physics*, published in 1961 and reprinted with two new appendices in 1969. His particular gift for many of his readers and students lies in the great period from the mid-nineteenth century through the foundations of the physics and philosophy of the twentieth, and within this spectacular time, Professor Čapek has become a principal expositor and sympathetic critic of the philosophy of Henri Bergson. He joins a distinguished group of scholars – physicists and philosophers – who have been stimulated to some of their most profound and imaginative thought by Bergson's metaphysical and psychological work: Cassirer, Meyerson, de Broglie, Metz, Jankélevitch, Zawirski, and in recent years, Costa de Beauregard, Watanabe, Blanché, and others. Now, with his monograph on *Bergson and Modern Physics*, Professor Čapek has set forth the little-attended and interesting physical doctrine of Bergson in its entirety, and with its systematic connections to actual physics of the time and later. This monograph completes Čapek's earlier papers on these questions; it was anticipated by his noted essay on 'Bergson's Theory of Matter and Modern Physics', *Revue philosophique* 77 (1953) which has recently appeared in English in *Bergson and the Evolution of Physics* (ed. by P. A. Y. Gunter), University of Tennessee Press, Knoxville, 1969, pp. 297–330.

The young Čapek, working as a country schoolteacher, was happily startled by Bergson's cordial letter about Čapek's dissertation, complimenting him for his insight into the significance of Bergson's views on matter and their relations to modern physics. It is our own pleasure to publish the mature reflections and new insights of our dear colleague on the same topic to which he brought a clear perception in his doctoral thesis.

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Boston Studies in the Philosophy of Science are devoted to symposia, congresses, colloquia, monographs and collected papers in the philosophical foundations of the sciences. Professor Čapek has joined energetically and incisively with the scientists and philosophers who gather together for the discussions at our Colloquia. Some of his contributions appear in *Boston Studies*: 'The Myth of Frozen Passage: the Status of Becoming in the Physical World', vol. II, pp. 441–463; 'Ernst Mach's Biological Theory of Knowledge', vol. V, pp. 400–420; 'Two Types of Continuity' [forthcoming]. His Bergsonian studies not only reflect his own commitment and philosophical labor but also suggest the interest, sensitivity, and stimulation which may be brought to the central tasks of philosophical analysis of the sciences by research into metaphysics, phenomenology, and philosophies of nature.

Boston Center for the Philosophy of Science, Boston University

ROBERT S. COHEN
MARX W. WARTOFSKY

AUTHOR'S PREFACE

An old proverb says that 'the books have their destinies' (*habent sua fata libelli*) and this is certainly true of this one. The first idea of writing it occurred to me in 1940 when as a student at the Sorbonne I was encouraged by Professor Emile Bréhier to write an article about Bergson and modern physics for *Revue philosophique*. This must have taken place in the late spring since the German offensive was already in a full swing; yet, neither I nor Mr Bréhier expected that Paris would be in Nazi hands within a month. This is why I did not even begin to write the article; the whole project was forgotten for years. In 1950, long after the war was over, I hardly hoped that Professor Bréhier would remember his kind invitation; but he did – and thus the article "La théorie bergsonienne de la matière et la physique moderne" was finally written and appeared in *Revue philosophique* in January 1953. This article together with another one which appeared nearly at the same time in *Revue de métaphysique et de morale* represented a sort of outline for the book to be written. But various circumstances – and various interests – prevented me from working on it. All that I was able to do in this respect was several articles in English and French and my participation in the discussion section "Bergson et la physique" at the centenary *Congrès Bergson* at Paris in 1959. Thus I did not begin to write this book systematically before the fall of 1965 and, while its major part had been finished in the middle of 1968, some parts were added and some re-written as late as the fall of 1970. But this delay proved to be salutary; for although the most decisive and revolutionary changes in physics took place in the first four decades of this century, important discussions about their epistemological and metaphysical significance continued and I was thus able to take them into account. Thus the book in its final form is different from what was originally envisioned as. None of its parts has been previously published except Chapter 2 of Part I which appeared with some insignificant modifications under the

title "Ernst Mach's Biological Theory of Knowledge" in *Boston Studies for the Philosophy of Science* vol. V (1969).

In referring to Bergson's writings I use abbreviations, that is, the initial letters in the titles of the English translations; for instance, *C.E.* for *Creative Evolution*, *C.M.* for *The Creative Mind* etc. For the convenience of the reader references are made to the paperback editions of Bergson's works, for all hard cover editions, except the two books just mentioned, are out of print.

Finally, I wish to express my thanks to all those who in various ways made the publication of this book possible: in the first place, to the editors of this series, Professors Robert Cohen and Marx Wartofsky; to all those, besides the editors, who read the parts of the manuscript and made some suggestions; to Boston University for several generous grants; to those departmental secretaries and graduate students, in particular to Mr and Mrs B. Hallen, who helped me to type the manuscript; finally to Professors Robert Cohen and Paul Sagal as well as to my wife who read the proofs. It is needless to say that for the book in its final form the responsibility is entirely my own.

Boston, May 14, 1971 MILIČ ČAPEK

INTRODUCTION

When Bergson's views about the nature of matter were formulated in *Matter and Memory*, especially in its fourth chapter, in 1896, they appeared, in contrast to the prevailing classical picture of the physical world, so grotesquely improbable, that they were largely ignored. Even later, after the publication of *Creative Evolution*, when Bergson's philosophy became both fashionable and controversial, his views of matter were rarely analyzed; if they were, they were compared to the irresponsible speculations of German Romantic *Naturphilosophen*. This was at least the view of René Berthelot, who concluded his criticism of Bergson's 'philosophy of physics' on the following harsh note: "Thus the way in which Bergson's views on matter developed show the uncertainty of his thought and the extravagance of his results. Do not mistake for the rise of a star this unsteady light of the will-o'-the wisp floating over the swamps of Romanticism." He explicitly compared Bergson's views with the speculations of Goethe and Schelling on nature. This was written in 1913, one year after Russell's scathing attack on Bergson's philosophy in general.[1] But Russell, unlike Berthelot who was one of a few opponents who read attentively all Bergson's works, did not even mention Bergson's views about the physical world; he thus missed an opportunity for further invective and ridicule.

It is interesting to observe what the attitude of Bergson's admirers was in this respect. By 'admirers' I do not mean the uncritical public, which at the time when Bergson's philosophy was fashionable, was crowding the halls of the Collège de France and applauding its master. This public was mainly responsible for the appearance of pseudo-Bergsonism, which was nothing but a mere literary fashion, comparable to existentialism today. It is hardly any exaggeration to say that the content of this pseudo-Bergsonism consisted in the enthusiastic response to the emotional color of certain words, like 'intuition', 'création', 'élan vital', without the

slightest effort at critical analysis. In this sense what Julien Benda called "le succès du bergsonisme" [2] was in truth the greatest damage done to the authentic Bergson's thought; authentic Bergsonism was misunderstood because it was wrongly identified with its fashionable and literary counterfeit. But even critical and responsible disciples of Bergson and those who showed a disciplined, positive attitude to his thought were mostly embarrassed by Bergson's treatment of the physical world; either they passed it over completely or they politely expressed their embarrassment.

There is one explanation for this attitude of Bergson's opponents and disciples: the year 1896 – the date of the publication of *Matter and Memory*. Although at that time the first rumblings under the foundations of classical physics were discernible, hardly anybody could then guess even remotely the extent of the coming scientific revolution. The classical corpuscular-kinetic view of nature still remained unchallenged. The evidence for the corpuscular structure of matter and electricity was steadily increasing and the epistemological doubts of Stallo and Mach about the fruitfulness of mechanistic explanations were both isolated and premature. Even when the complexity of the atom was discovered, its constituent parts – the electrons and the nuclei – still retained a number of the classical features of the ancient Lucretian atom: its permanence through time (the materialization and dematerialization of the electrons was discovered only in the fourth decade of this century), its definite shape and definite spatio-temporal location (which only de Broglie's discovery of the undulatory nature of matter in 1924 made questionable). Similarly, despite the increasing difficulties in constructing a satisfactory mechanical model of the aether, nobody doubted its analogies with an elastic medium in which transverse vibrations take place. Certainly nobody anticipated that the aether would eventually lose – under the impact of Michelson's experiment – even the most basic kinematic properties. The view that matter and its spatio-temporal framework eventually would be stripped of their classical, mechanistic features, which yielded so easily to pictorial models, was at that time looming on a very distant horizon, indeed – and only in a few and heretically daring minds.

Bergson was one of these, and he was fully aware why his theory of matter was either ignored or misunderstood: "This particular point [i.e. his philosophy of physics] has been hardly noticed for one very simple

reason: since my views about this question were formulated at the time when it was regarded as self-evident that the ultimate material elements should be conceived in the image of the [macroscopic] whole, they confused the readers and were most frequently set aside as an unintelligible part of my work. It was probably assumed that this was an accessory part. Nobody, with a possible exception of the profound mathematician and philosopher Whitehead, noticed... that this was for me something essential which was closely related to my theory of duration and which lay in the *direction* in which physics would move sooner or later."[3] In other words, Bergson was fully aware that it was the non-pictorial character of his 'model' of matter, conceived as consisting of imageless events, which was the main stumbling block for his readers. Writing these words in 1938 he was also aware how far physics had moved since the years 1912–1913 – the time of Russell's caricature and Berthelot's indignation. It has moved still farther since 1938.

An interesting question arises in this context: to what extent can a thinker imaginatively anticipate the future development of science? Bergson, in stressing the word 'direction' ('in which physics would move') rightly disclaimed the anticipation of any specific discovery. For only the general line of the future development can be foreseen – and that only by a thinker who has an unusual insight into the inadequacies of the accepted conceptual scheme. Yet even the anticipation of the general trend sometimes does imply important specific features. Democritus did not anticipate the law of multiple proportions nor the size of the atoms; but he *did* anticipate the atomistic structure of matter and the limitlessness of space – not a small achievement at his time! To use a less well known example: when Nicolas d'Autrecourt was forced in 1348 to recant his view that light moves with a finite velocity, and that this velocity is too great to be perceived, he was forced to deny what Olaf Roemer experimentally confirmed more than three centuries later. It was Bessel who first determined the parallax of the 'fixed' stars in 1837, thus confirming Giordano Bruno's view, expressed two and a half centuries earlier, that "the stars beyond Saturn" are only apparently "fixed", their motion being imperceptible because of their enormous distance. Bacon and Descartes did not anticipate the kinetic theory of heat in its details: but they *did* anticipate one of its basic ideas – that the difference between the solid and liquid state consists in the degree of internal molecular motion. Now it

would be absurd to say that Bergson anticipated Heisenberg's principle; but he *did* anticipate the elementary indeterminacy of microphysical processes which restricts the applicability of Laplacean determinism to the physical world. (In this respect, he was not alone; before him Boutroux and Peirce were bold enough to affirm it.) He certainly did not anticipate wave mechanics; yet – like Whitehead later – he did assert that matter consists of imageless vibrations devoid of any intuitive, material substratum. But more about this in the text of this book.

The book consists of three parts. The first deals with the biological theory of knowledge in the way it was amended by Bergson; comparisons are made with the older views of Spencer, Helmholtz, Mach, and Poincaré, and with more recent views of Reichenbach and Piaget, which Bergson's view resembles, but from which it also differs. This aspect of Bergson's thought was largely ignored; René Berthelot, who was one of a few who was aware of it, rejected it because of his traditional rationalism. Yet without an understanding of this aspect of Bergson's philosophy, no genuine understanding of his other views is possible. The second part deals with the meaning of the controversial term 'intuition'; it explores in great detail the structure of the Bergsonian *durée réelle*, shows its implications, and takes into account some significant criticisms. The third part deals with the Bergsonian theory of matter and its relation to contemporary physics. It shows that his central ideas are closely related both to his general theory of duration and to his biological theory of knowledge; it traces Bergson's relations to other thinkers, especially to Leibniz, Boutroux, Whitehead, Bohm and de Broglie; it analyzes what is valid and what is wrong in his later comments on the theory of relativity. Two appendices deal with Russell's complex relations to Bergson and with the much discussed relation of microphysical indeterminacy to freedom. Appendix III deals with Bergson's views on entropy and their relations to modern cosmogony.

NOTES

[1] René Berthelot, *Un romantisme utilitaire*, Paris, 1913, II, p. 213, Bertrand Russell, 'The Philosophy of Bergson', *The Monist* **22** (1915) 321–347.
[2] Julien Benda, *Sur le succès du bergsonisme*, Paris, 1914.
[3] Bergson's letter to the author, July 3, 1938.

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