SCIENCE LIVES

David Bohm's unfinished revolution

An anniversary offers scientists an opportunity to revisit the work of an audacious physicist

By **Alex Gomez-Marin**

Equally at home among scientists and mystics, the American-British physicist David Bohm (1917–1992) was considered a "spiritual son" by Albert Einstein and a "science guru" by the Dalai Lama. Bohm's career was filled with extraordinary collaborations and unexpected turns: He conducted his graduate studies under the supervision of Robert Oppenheimer; joined the faculty at Princeton University, where he worked closely with Einstein; and was subjected to a federal investigation for his Communist affiliations. He subsequently relocated to Brazil and later Israel before finally joining the faculty at Birkbeck College in London.

As a preeminent theoretical physicist of the 20th century, Bohm was arguably the first to offer a sustainable alternative to the Copenhagen interpretation, the ruling ontological-epistemic omelet that to this day remains hard to unscramble. He also made innovative contributions to relativity theory and plasma physics, and his reformulation of the Einstein–Podolsky–Rosen paradox inspired John Bell to craft his famous inequalities, the experimental validation of which was awarded the Nobel Prize in Physics in 2022. With his student Yakir Aharonov, Bohm discovered the quantum effect that bears their names, and with Basil Hiley, he further developed his initial "hidden variables" theory into an "ontological interpretation" of quantum mechanics and introduced the "quantum potential" as the underlying guide of the behavior of particles.

The Essential David Bohm
Lee Nichol, ed.
Routledge, 2003, 368 pp.

Bohm didn't stop there. He felt that the study of matter and mind went hand in hand. With neuroscientist Karl Pribram, he entertained the "holonomic brain" theory, an approach to human consciousness that extends beyond the dominant tenets of mechanistic reductionism. "Even the electron is informed with a certain level of mind," he claimed. He explored the nature of thought in a decades-long collaboration with Indian philosopher Jiddu Krishnamurti, examining together how thought creates most (if not all) of the problems that it seeks to solve. This later gave rise to "Bohm dialogue," a discussion practice that was intended to unveil our attachment to presuppositions and from whence creativity can emerge.

This year marks the 20th anniversary of the publication of *The Essential David Bohm*, a volume conscientiously edited by Lee Nichol that presents a broad, nontechnical overview of Bohm's scholarship and includes a selection of the physicist's original works, including unpublished seminars, personal letters, and transcribed dialogues. The anniversary offers scientists a timely opportunity to revisit the ideas of this rebellious thinker.

Nichol structures the book in three main parts, each centered around the notion of order: "Universal Orders" draws from Bohm's work on the physics of the nature of the Universe, perception, and consciousness; "Individual Orders" deals with the ego, the self-world image, and the value of the individual; and "Collective Orders" delves into social dialogue as a generative order. Rather than pursuing a "theory of everything," Bohm sought a new "order" that would transcend the deep problems at the foundations of physics. Borrowing the image of an ink drop in a rotating glycerin cylinder, he conceived of one of his signature ideas: manifest reality, or what he called "the explicate order," as unfolding from (and enfolding into) what he called "the implicate order."

A second idea that Nichol brings to the fore is Bohm's notion of "undivided wholeness," whereby the subject becomes an active participant of the object under investigation rather than a detached observer. Often considered a vague concept, Bohm progressively elaborated his understanding of wholeness as innately dynamic, alive, and open-ended throughout his career.

Nichol's synthesis dispels the perennial claim that Bohm was trying to draft physics into some kind of quasiclassical Newtonianism. For decades, Bohm was alone in keeping the Copenhagen door from closing, insisting that other views were possible and viable. The point, he maintained, was not whose interpretation was correct, but rather to avoid entrenched scientific dogma.

An exemplar of free scientific inquiry in the face of dogmatic ridicule and marginalization, Bohm was adept at identifying conceptual treasures hidden in plain sight. His revolution remains unfinished, but its seeds are starting to bloom in fundamental physics, consciousness research, and social studies. *The Essential David Bohm* offers readers an opportunity to think anew about the ideas that captured the imagination of the late physicist.

A student of Oppenheimer, colleague of Einstein, and adviser to the Dali Lama, David Bohm pursued provocative ideas that, at times, defied disciplinarity.

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The reviewer is at the Instituto de Neurociencias, Consejo Superior de Investigaciones Científicas–Universidad Miguel Hernández de Elche, Alicante, Spain. Email: agomezmarin@gmail.com.

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