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Book review

Albert Einstein: One Hundred Authors for Einstein, Wiley-VCH Verlag GmbH & Co., ISBN 10: 3-527-40574-7, 2005.

Modern science is the result of a long-term process of accumulating and transforming knowledge that new elites were able to employ to master practical challenges.

This laboratory of knowledge originated at the very beginning of the history of scientific thinking with Aristotle and Plato, and proceeded thorough the centuries until a few decades after Einstein's "Annus Mirabilis".

The significance of the Einsteinian Revolution cannot be grasped without retracing this long process; living, as if in a flashback, all of science's advances and errors through the centuries, together with key scientific and philosophical debates; meet the ancient scientists, be part of Einstein's life, his historical period, and its scientists.

Albert Einstein: One Hundred Authors for Einstein is a book that gives you this opportunity. To fully enjoy it, read it quietly, forget your present scientific knowledge, and learn about science progress starting from its origin.

One can read the first part of the book, "Worldview And Knowledge Acquisition", as if one is a pupil who had the great fortune to have Einstein as teacher. A teacher rejecting any form of artificial authority, whose teaching method was based on the "voluntary exchange of knowledge between pupil and teacher". A teacher who said "I never teach my pupils; I only attempt to provide the conditions in which they can learn" (*Comenius and Einstein as Educators*).

Driven by such a teacher you will come across the most hotly debated questions that were still open when Einstein was a student. Some of these questions were fundamental ones, like the concept of Absolute Space in Newtonian mechanics (*Absolute Space: Mach vs Newton*) or the concept of absolute time (*Time in the Embryonic Stages*). Others involved trying to explain experiments that could not be understood with the understanding of physics at that time, in which electromagnetism was known but not fully understood (*Why does a Light Mill Revolve?*) (*Electricity and Heat: The Connection between two invisible forces*). Finally, other questions involved the speculations of bright minds that opened the way to future progress *(Of Dwarves and Giants: The Transformation of Astronomical Worldviews*), (*Curved Universes before Einstein: Karl Schwarzschild's Cosmological Speculations*), (*Truth and Freedom in Mathematics: The Emergence of Non-Eucledian Geometry in the 19th Century*).

Later on in the book, reading His Life's Path, we can discover from this magnificent teacher the right way to learn: "He was a master of questioning. And this genius, often described as naive, was based in large part on this: on simply asking, posing questions Galileo and Newton before him had also concerned themselves with in another manner" (*Riding on a beam of Light*).

In this imaginary trip through the history of scientific knowledge, you will fully appreciate having Einstein as your teacher, sharing his human and scientific experiences.

The second part of the book (*Einstein – His Life Path*) will take you inside the major events of Einstein's life, from his experiences as a school pupil (Einstein's Teachers) to his University studies in Switzerland (Einstein's Swiss Years). It will also introduce you to aspects of his private life: his relationships with music (Albert Einstein and Music) and with the women of his life (Einstein's Women; The Woman in Einstein Shadow); his work for the German Zionist Movement (Albert Einstein and the German Zionist Movement; Albert Einstein and the Hebrew University) and the problems of the physicist community during the National Socialist era (The Physics Community in The National Socialist Era).

The years at the turn of the 19th century were the most exciting for the science community. Einstein was a "young" member of a community of distinguished scientists: mathematicians, physicists, and philosophers. Some of the articles of the book are devoted to the human and scientific relations between Einstein and the scientists of his period: Ernst Mach (*Albert Einstein and Ernst Mach*), Hendrick Antoon Lorentz (*Hendrick Antoon Lorentz and Albert Einstein*), Henry Poincaré (*Henry Poincaré and the Theory of relativity*), Wolfgang Pauli (*Pauli and Einstein*), Arnold Sommerfeld (*Einstein and Arnold Sommerfeld: Impression from their Correspondence*) and James Clerk Maxwell (*Einstein and James Clerk Maxwell: Unification, Imagination and Light*). Most contemporary scientists respected Einstein's revolutionary ideas, but some strongly rejected them (*Philipp Lenard and Johannes Stark: Two Nobel Laureates Against Einstein*).

This second part of the book also deals with some of the open and intriguing scientific questions of Einstein's era. The theory of Brownian motion, first discovered by the botanist Robert Brown in 1828 and measured by the French chemist Jean Perrin in 1909, was one of the fundamental scientific contributions of Albert Einstein (*Brownian Motion*); The concept of inertia (*What is Inertia*), still an open problem, that

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Einstein analyzed in describing the Theory of General Relativity.

From these articles you can feel the scientific atmosphere of this golden age of science: discussions, debates, and different opinions but also human and scientific relationships.

The final article of the second part (*Einstein as Historian of Science*) is particularly relevant in understanding Einstein's use of the history of science in progressing scientific knowledge and teaching: ''In Einstein's view, the recovery of the significance of historical events was more important than their chronology and contexts''.

With the articles in the final part of the book (*Einstein's World Today*), this imaginary trip through the evolution of knowledge arrives in recent times, when Einstein's heritage and revolutionary ideas of physics become, sometimes dramatically, evident in the new discoveries of physics, astrophysics and cosmology. Special Relativity and its mass-energy equivalence had a quick and dramatic technological application in the nuclear weapons used during the Second World War. Einstein, whose commitment to human rights and pacifism was already well known (Einstein's Political File), spent the last years of his life using his scientific authority to raise the problems of how scientific knowledge is used. The Russel–Einstein Manifesto (*The Russel–Einstein Manifesto*) against the dangers of nuclear armaments shows, for the first time, that there are ethical problems in the use of science. This manifesto had a great impact when published (*German Scientist and the Effects of the Russel–Einstein Manifesto*) and opened a debate which, starting with physics, has progressively touched all the scientific disciplines. This debate is still dramatically open today in all fields of science and technology, from biology and bioengineering to enviromentalism and other human activities.

General Relativity, the other fundamental aspects of Einstein's scientific heritage, was more difficult to appreciate, as it was not directly involved with technology, but only with a fundamental understanding of the Universe and its laws. General Relativity remained for many years a speculative research field of a few theoretical physicists, astrophysicist and mathematicians. In the early 70s, General Relativity was still regarded as a little more than a speculative field, and Cosmology had just started along the path of observational discoveries which eventually convinced the scientific community that Mach and Einstein's ideas could be remarkably accurate. In the early 60s, Penzias and Wilson measured the black body radiation which was already theoretically predicted in 1946 by Robert Dicke and George Gamow, opening up a new era in Cosmology. A few years later, with the first discovery of a *pulsar*, the new era of relativistic astrophysics began. This aspect of Einstein's heritage is still open, and new discoveries will come in the future from satellite experiments and observations.

Forty years ago, when I was an undergraduate student in physics, I knew from my studies the magnificent teacher Albert Einstein who, in ''One Hundred Authors for Einstein'', has guided us towards discovering the ways of knowledge. As was the case for most physics students of that time, I come across Einstein and Infeld's book ''The Evolution of Physics''. Reading it gave me an endless love for knowledge.

In quietly reading ''One Hundred Authors For Einstein'', you will feel the same love, the intimate pleasure of a critical understanding of knowledge. Back in the noisy modern information society, you will deeply appreciate Einstein's words: ''Information is not knowledge''.

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