



# Introduction

Written by a global array of experts in science, history, sociology, and law, *Scientific Thought: In Context* is intended to introduce to younger students (especially those just beginning their study of biology, chemistry, physics, earth science, etc.) insight into the power of science and a hint of the richness and complexity of scientific thought.

At the core of scientific thought is the assertion that the laws of physics and chemistry are the same throughout the universe. Although humans now understand some of the key laws that shape the cosmos, other laws—and the multitude of manifestations that evolve from them—remain shrouded in wonderful mystery to be peeled back by future generations. Such is the power of science’s self-corrective mechanisms that, far above differences in culture and regardless of the language used to describe those laws or the social station of the eye viewing them (or whatever has evolved to be something akin to an eye in that part of the universe), ultimately the laws of science will be found to be the same.

These assertions regarding science and scientific thought do not, however, diminish value in the study of science as a cultural phenomena and manifestation. It is also true that students and other readers just beginning to explore the laws of biology and chemistry often have far less exposure to formal philosophical thought than to hard science. Accordingly, *Scientific Thought: In Context* is not intended to be a comprehensive history of science or to deeply explore the philosophy of science. Mindful of its audience, *Scientific Thought: In Context* only attempts to stab a toe, perhaps in some places to wade ankle deep, into the turbulent currents of intellectual thought surrounding the long history of scientific studies.

The editors and authors have intended only modest exploration—an audience appropriate glimpse—of the expanse of the philosophical waters. It would be inappropriate to force younger students to dive into the complexities of French narrative theory, evaluate the merits of ecofeminism, or suffer premature overexposure to elements of what can be an intellectually complex and acrimonious debate surrounding the tensions between science, philosophy, and cultural studies most often dubbed the “Science Wars.” However, it is important for readers to know that vast oceans await. If this book allows students who are just beginning their studies of science and the history of science some insight into the diversity and rich complexity of the field, it will have achieved its primary objective.

*Scientific Thought: In Context* was designed to contain an extensive timeline as a chronological record of the evolution of science. The timeline serves as a valuable reference tool that allows readers to readily place events *in context* with scientific developments in other fields and historical milestones. Moreover, the timeline provides compelling reading in its own right. Starting with developments in ancient history, the timeline provides a narrative of the broad multicultural influences on the advancement of scientific thought.

To be sure, at its very best science transcends culture and unifies us. The deepest truths of science are knowable to all, regardless of age, gender, social condition, or cultural tradition.

Yet it is equally true that throughout the course of human history, science and society have advanced in a dynamic and mutual embrace, each influencing the other. While students learn of the grandeur and power of science and the scientific method, they should also know that scientific thought was (and is) often ignored in favor of cultural tradition, sifted through theological filters, or reduced to being a handmaiden to military tactics and weaponry. Scientific thought has been suppressed and swept from the philosophical stage during various periods in human history only to—by its virtue and strength as the most robust way to know the world—rekindle itself as a candle in the intellectual darkness.

It is important for all readers to understand that abundant evidence exists that sexism, racism, militarism, colonialism, and economic philosophy all influenced the course of human intellectual development, and the history of science is no exception. Studies of societal and cultural bias and prejudice also prove that selective picking and choosing of facts without scholarly discernment is, at best, unhelpful, and at worst—as in the case of Soviet Lysenkoism—deadly. Too readily does ignorance of science and scientific thought swell the ranks of book burning mobs, religious extremists, or cultish followers of pseudoscience.

With this in mind, the editors are indebted to a diversity of distinguished scholars for their generous contributions of time and compelling material. Given our intended audience, the selection and construction of entries was a balancing act of assessing what was interesting, informative, and intellectually understandable. Admittedly, the editors are scientists and not disposed to view science as a fashionable manifestation of political or popular culture. Accordingly, we do not agree with all of the philosophical and historical assertions made in this book. We have, however, encouraged scholars who represent highly diverse backgrounds and perspectives to express their views.

Ignorance, mysticism, and zealotry present true and grave dangers to science and the advancement of human rights and Enlightenment ideals. Within this context, the philosophical excesses on both sides of the “Science Wars” are trivial. Students not exposed to the intellectual heritage (and baggage) of scientific thought will be unable to make tempered and rational decisions regarding the appropriate application of scientific thought to modern issues.

Ideally, studies of the history of science from a cultural perspective can shed light upon previously overlooked contributors and their contributions and deepen appreciation for the commonality of science. Understanding the vulnerabilities of scientific thought, however historically transient, is also key to ensuring that science is advanced by intellectual ability and continues to offer humankind the best hope of a meritocracy of thought—where barriers of authority, class, wealth, religion, race or ethnicity might be cast aside.

*K. Lee Lerner & Brenda Wilmoth Lerner, editors  
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Primarily based in London and Paris, the Lerner & Lerner portfolio includes more than two dozen books and films that focus on science and science related issues.

The excerpt below comes from American physicist Richard Feynman's (1918–1988), *The Feynman Lectures on Physics*.

The things with which we concern ourselves in science appear in myriad forms, and with a multitude of attributes. For example, if we stand on the shore and look at the sea, we see the water, the waves breaking, the foam, the sloshing motion of the water, the sound, the air, the winds and the clouds, the sun and the blue sky, and light; there is sand and there are rocks of various hardness and permanence, color, and texture. There are animals and seaweed, hunger and disease, and to the observer on the beach; there may be even happiness and thought. Any other spot in nature has a similar variety of things and influences. It is always as complicated as that, no matter where it is. Curiosity demands that we ask questions, that we try to put things together and try to understand this multitude of aspects as perhaps resulting from the action of a relatively small number of elemental things and forces acting in an infinite variety of combinations....

A few hundred years ago, a method was devised to find partial answers to such questions. *Observation, reason, and experiment* make up what we call the *scientific method*.

What do we really mean by “understanding” something? We can imagine that this complicated array of moving things which constitutes “the world” is something like a great chess game being played by the gods, and we are observers of the game. We do not know what the rules of the game are; all we are allowed to do is to *watch* the playing. Of course, if we watch long enough, we may eventually catch on to a few of the rules....

—Richard Feynman

Editor's Note: Richard Feynman was awarded the 1965 Nobel Prize in Physics for his contributions to the advancement of quantum electrodynamics (QED). Dr. Feynman led an interesting life: As a young scientist he participated in the development of the first atomic bomb, and near the end of his life he was instrumental in determining the cause of the space shuttle *Challenger* disaster. Dr. Feynman played the bongo drums, loved diversity of culture, and expressed his views on the relationship of scientific thought to society through anecdotal stories contained in several books including *Surely You're Joking, Mr. Feynman*. He is considered by many to be one of the greatest teachers of physics.