

Gerald Holton, *Science and Anti-Science*. Cambridge, Mass./London: Harvard University Press, 1993, 203 p.

Holton's *Science and Anti-Science* is an interesting book, although not for the obvious reasons. The confrontation one might expect between the extreme positions regarding western science, is only explicitly elaborated in the last two chapters. What precedes is more attractive from an historiographic point of view.

Several questions as "what characterises good science" are restated in the preface. However, the author does not answer them in a clear and unambiguous way. In a certain sense, he restricts himself to a narration of some developments in the history of science, leaving it to the reader to draw his or her conclusions.

The first two chapters deal with the influence of Ernst Mach on positivism and on the development of the natural sciences. Holton's major contribution here is certainly his critical description of the transference of Machian thinking and the introduction of the theories of the Vienna Circle to researchers in the United States (P. Carus, W. James, J. Loeb, B.F. Skinner, Philipp Frank and A. Einstein). More particularly, it is fascinating to read about Philipp Frank's role in this process.

Quite interesting in these chapters is the emphasis that Holton puts on sociological factors. That the importance of correspondence between scientists can no longer be denied, is made clear by Holton's review of Mach's position regarding relativity. According to the author, a correct evaluation seems to depend on the interpretation of two words in a letter to Petzoldt and an undated letter of Einstein.

Chapter 3, at first sight, treats an entirely different topic. After two chapters on Mach (and Einstein), Holton focuses on Niels Bohr (although after a while the attention switches back to Einstein). The theme has to do with rhetoric in scientific papers or texts. As in the foregoing chapters, Holton relies on his preferred approach, viz. the historiographical method, applied, in this case, to the acceptance of Bohr's model and special relativity. In this part of the book, Holton's favourite subject of the dichotomy 'thema-antithema' surfaces (*Thematic Origins of Scientific Thought: Kepler to Einstein*, Cambridge: Harvard University Press, 1973).

The next chapter concerns Jeffersonian thinking. Holton argues that besides the traditional research programs of Bacon (for applied science)

and Newton (for basic science), one also has to consider Jefferson's praxis as a paradigmatical way of doing science. Although Jefferson could not match with scientists such as Lavoisier, Laplace, Young and many others, according to Holton, "[...] Jefferson has a good understanding of the heart of the scientific method. (p. 112)" One can dispute whether it suffices to have an articulated view on science while lacking a fruitful scientific praxis within the scientific enterprise, to deserve a separate label. If it is Holton's only purpose to give this new type of program (for socially and politically relevant science) a name, then one can ask where and when the program in fact originated.

In Chapter 5, Holton analyses Oswald Spengler's *Untergang des Abendlandes*, as an example of a 'cyclicist'. Einstein is viewed as a linearist (one wonders whether it is possible to find a historio-cyclist among scientists regarding their own research) and is placed opposite to Spengler. At the end of this chapter, Holton mentions two other possibilities: scientific pluralism and hierarchism. Steven Weinberg is seen as a 'hierarchist', although it is not clear why he could not be a linearist (see, e.g., Weinberg, *Dreams of a Final Theory*, London, Hutchinson, 1993). It is Holton's intention to state that cyclicism is a fertile soil for anti-science feelings, while pluralism, hierarchism and linearism are not.

The last chapter tackles the central question, whether the manifestations of the anti-science movement (e.g. astrology, attacks on relativity theory, creationism) are to be considered dangerous or negligible. A typical example of anti-science in Russia is Lysenkoism, while creationism is cited as an equally typical variety in the United States.

The rest of the chapter concentrates solely on the anti-science phenomenon in America. Holton's main concern goes as follows (p. 148):

[...] in a democracy, no matter how poorly informed the citizens are, they do properly demand a place at the table where decisions are made, even when those decisions have a large scientific/technical component. In that lies the potential for erroneous policy and eventual social instability. [...] History has shown repeatedly that a disaffection with science and its view of the world can turn into a rage that links up with far more sinister movements.[...] It is thoughts of this kind which the phenomenon of anti-science raises in the minds of many intellectuals [...]. By themselves, all the astrologers, anti-evolutionists, spiri-

tualists, psychics, and peddlers of New Age thinking could otherwise be merely a target of our condescension or a source of amusement.

According to Holton, there are now several reasons to believe that conventional science is in effect becoming gradually delegitimised (he cites novelist Kurt Vonnegut and even president Václav Havel).

After sketching out a 'framework' — which is rather a 'network' of extra-scientific influences on theory-development — Holton tries to connect the hostile attitudes of science to the general world pictures whereof they are an expression. Through an analysis of modernism as a pro-scientific movement, and a negation of all its characteristics, Holton obtains a characterisation of anti-modernism, and *a fortiori* of the anti-science movement. Doing so, Holton succeeds to underpin his theory regarding the existence of the multi-faced anti-science movement.

It is his conviction, that the anti-science phenomenon originates in ignorance. Therefore, three types of intervention make sense to Holton (p. 179): (1) the formation of a modern world view that will preempt the attractions of its opposite; (2) bringing out the internal contradictions in the alternative picture; (3) widely visible exposure of the failures of the claims of parascience and persistent action to prevent its formal acceptance into schooling systems.

The counter-constructs embodying parascience are a minority view today, but their entrenchment is a living reminder of an old world-wide struggle of mutual delegitimation of rival cultural claimants (p. 178). How alarming this is felt to be depends, according to Holton, on one's degree of satisfaction with or allegiance to the contemporary world picture. Nevertheless, "it is prudent to regard the committed and politically ambitious parts of the anti-science phenomenon as a reminder of the Beast that slumbers below. When it awakens, as it has again and again over the past few centuries, and as it undoubtedly will again some day, it will make its true power known (p. 184)." It is worth noticing that Holton's analysis refers mainly to the situation in the United States. The conditions there seem to be more alarming than they are in Europe. However, one cannot be cautious enough.

After a while, the reader suspects that the chapters are independently developed: as if they were separate articles (chapter 2 is 'clearly' nothing *more* than an extensive reply on Gereon Wolter's *Mach I, Mach II,*

Einstein und die Relativitätstheorie: Eine Fälschung und ihre Folge). This is confirmed on page 191, where Holton reveals the sources for the original articles. Inevitably, this implies that the book in its entirety, lacks a certain coherence and does not present fully articulated views. Nevertheless, a devoted Holtonian will not be disappointed.

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