CHAPTER 5

Scientific Humanisms
Sarton, Reichenbach, and the Crisis of Western Science after World War I

Alan Richardson

> Nature is blind, and faith in its benevolence and meaning is unfounded. But it is approached ever more closely through unceasing effort, surrounded and caught in the mesh of the finest conceptual net – in the sure consciousness that a knowledge of nature is one of the highest goods man is capable of attaining.
>
> Hans Reichenbach, "The World View of the Exact Sciences"

One feature of the historiography both of and by those trained in analytic philosophy, the main tradition in Anglo-American academic philosophy in the second half of the twentieth century, is the degree to which it resists using certain framing terms that are otherwise quite ubiquitous in intellectual history. It would be hard to imagine a history of twentieth-century literature, for example, that did not use – even if it ultimately rejected – the term "modernism." That term, despite being fairly straightforwardly applicable to certain aspects of the nascent project of analytic philosophy in the 1920s and 1930s, is only very rarely deployed in writing about the philosophy of the twentieth century, however.

There are reasons for this absence, of course. Two that deserve mention are, first, that historians of analytic philosophy tend to use their actors' categories as their analytic categories. Thus, if Bertrand Russell calls himself at some time slice a "logical atomist," historians of analytic philosophy will write about his philosophy at that stage as "logical atomism." Even their higher-order framing notions – such as "analytic philosophy" itself – tend to be used only because the historical actors (eventually) used them also. A second reason for this category modesty reflects the degree to which the historical writing in history of analytic philosophy is informed by the sensibilities of analytic philosophy itself. To use "modernism" as a term of art to discuss specific types of twentieth-century philosophy would be to understand "modernism" itself as a term that makes good philosophical sense. But to someone of analytic sensibilities, this is a dubious proposition at best – for what sort of philosophical

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sense could be made of a term that does not seem metaphysical, epistemological, logical, methodological, semantic, ethical, or even clearly aesthetic?

Compare, on these scores, a term that is in common usage in the history of analytic philosophy: "naturalism." "Naturalism" is a term that is important to many of the historical actors in that history – one cannot understand, for example, W. V. Quine's or Ernest Nagel's philosophy without understanding that they meant to endorse naturalism. Moreover, while "naturalism" as it is understood in analytic philosophy is not obviously a phrase that is limited to any one of the subdisciplines of philosophy, it can be and routinely is relativized to those subdisciplines. That is, when we are asked to get clear on the commitments of naturalism, we carve it into ontological naturalism, ethical naturalism, epistemological naturalism, methodological naturalism, etc. While these clarifications might not seem terribly promising as slogans – "ontological naturalism assumes only natural and no supernatural objects" seems analytic or circular – one can hope that a more serious consideration of these elements of naturalism will yield a set of substantive commitments. On this score, "modernism" seems less promising. What would ontological or methodological modernism even be? One scarcely knows where to begin.

My concern in this chapter is not modernism but humanism. "Humanism" occupies a middle ground in the historiography of analytic philosophy. Some historical analytic philosophers have used the term – almost always as a term of commendation. But it has not occupied much historical attention. I think this is unfortunate, because, it could be argued, much of the reception of philosophy, analytic and not, in the twentieth century (and now into the twenty-first) is bound up with concerns perhaps best expressed in terms of humanism. I gesture at that argument, but it is too large for one short chapter. My attention here is more circumscribed. Here I want merely to sketch a few episodes in the history of something I call "scientific humanism" (what I call by that term importantly does not accord with the views of some of my historical actors) and say something about why those episodes mattered to those who participated in them and why they ought to matter to us.

Varieties of Scientific Humanism

Among historians of philosophy of science, one statement of the core commitments of a view its author calls "scientific humanism" will be especially familiar, perhaps. In his "Intellectual Autobiography," Rudolph Carnap says this about some of the core commitments of the

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famous group of logicians, philosophers, and scientists he belonged to in the 1920s and 1930s – the Vienna Circle:

> I think that nearly all of us shared the following three views as a matter of course which hardly needed any discussion. The first is the view that man has no supernatural protectors or enemies and that therefore whatever can be done to improve life is the task of man himself. Second, we had the conviction that mankind is able to change the conditions of life in such a way that many of the sufferings of today may be avoided and that the external and the internal situation of life for the individual, the community, and finally for humanity will be essentially improved. The third is the view that all deliberate action presupposes knowledge of the world, that the scientific method is the best method of acquiring knowledge and that therefore science must be regarded as one of the most valuable instruments for the improvement of life. In Vienna we had no names for these views; if we look for a brief designation in American terminology for the combination of these three convictions, the best would seem to be "scientific humanism." (Carnap 1963a: 83)

The three views that Carnap outlines are clear enough and we need not belabor them. Moreover, it would not be appropriate to argue with Carnap about the usage of words, and thus I grant to him that the views he presents can be called "scientific humanism." When I enunciate later a somewhat different constellation of views and wish to call them by the same term, we will thus differentiate them from what I call "Carnapian scientific humanism."

To find an alternative version of scientific humanism to this one, let us draw out briefly the core commitment of Carnap's views and the place of both science and humanity within them. There are no higher powers that can solve human problems. Thus, the solution to human problems is our own task. The solution to human problems depends on achieving reliable knowledge. Science is a source of reliable knowledge. Thus, science can be used as a tool – an "instrument" – in the solution to human problems and the improvement of the human estate. This set of views is ultimately one form of a pragmatic justification for science – science is humanly valuable because it can help us reliably solve our problems.

The details of this view can be filled in in a variety of ways. Leaving aside the "no supernatural protectors" part of the view (Carnap's own version of this rejection is that supposed claims about supernatural protectors are meaningless claims and have no place in knowledge or rational decision making), we are still owed something in the way of what "improvement in the conditions of life" of some or all humans amounts to, and an account of the role of scientific knowledge in rational decision making. Carnap

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himself has a long answer to the latter issue, embedded in his project of the logical foundations of probability (Carnap 1950b), but we shall not concern ourselves with that account here. The former question gets us closer to our ultimate concern: There are at least two dimensions along which answers to the question of the articulation of problems and solutions, as problems and solutions, are relevant. First, there is the question of how to articulate and individuate problems. In particular, how far removed from scientific knowledge-making will the language of the articulation of problems be? Second, what normative language is necessary for the articulation of problems as problems, and of solutions as improvements in the human estate?

On the last issue, Carnap will part company from many American pragmatists who might otherwise be sympathetic to his scientific humanism. For unlike the pragmatists (see Chapters 6 and 8), Carnap will not be able to rely on either a philosophical or a scientific account of human nature and flourishing to point to an objective problem in need of an objective solution. Instead, Carnap thought all valuational claims express subjective values and desires and this expressivism in ethical judgment points to a different concern – the problems that occur in the frustration of the pursuit of subjective value. How exactly subjective values are aggregated into the social problems demanding policy solutions is a difficult, though perhaps not intractable, problem. It too is, fortunately, beyond our concern here.

The fact remains that the view fits firmly into a pragmatic justificatory stance: Science is good as a tool for the solution to problems. And it is in opposition to this pragmatic stance that I wish to articulate a different view that could also with right be called "scientific humanism." My alternative owes more to classical rationalism than to pragmatism. Its vision of scientific humanism is (with details to be filled in in various ways) this: Science is not humanistically valuable merely as an instrument for the solution of human problems; it is also valuable in itself as an intellectual pursuit of humans. Science is an expression, indeed perhaps the most central expression, of humanity; it fulfills our rational demand for the acquisition of knowledge, both of the world and of ourselves as knowers of the world. This might sound like an embarrassingly moralistic vision to those of a pragmatic bent, but humanism in most of its forms surely has a moralizing or edifying point.

It is perhaps unnecessary to give historical examples of people who have held versions of this view. It is a fairly common view – especially among scientists – even to today. But I would like to give a pair of historical

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examples to show its historical importance in the modern era, and to show that it can be developed in importantly different directions. Within the seventeenth-century context the person with whom I most associate this view is Baruch Spinoza. Spinoza's *Ethics* (2018/1677) is a long argument for exactly this view: The expression of human conatus (human essence in its active striving) is found in the acquisition of articulated causal knowledge of the world. Those who pursue the life of acquisition of such knowledge live from reason as free persons (as much as is humanly possible) and come closest in the mortal realm to the infinite and eternal intellectual love of God. This high rationalist variety of scientific humanism continues right through the Enlightenment of course, finding perhaps fullest expression in the Marquis de Condorcet and his view of the infinite perfectibility of humanity (Condorcet 1955/1795). In Condorcet, too, scientific knowledge is not merely a tool to be used in this perfectibility; the pursuit of knowledge is itself a crucial dimension of the increasing perfection of humanity.

In the German Enlightenment, the view also took on a more subtle tone and perhaps darker hue in the work of Immanuel Kant. For Kant, the pursuit of knowledge is an intrinsic project of reason, an expression of the highest of the human faculties. It is also a task that cannot be completed and any attempt to complete it depends on an unwarranted and faulty attempt to use reason beyond the bounds of experience. Moreover, in and of itself the pursuit of scientific knowledge is not quite an expression of moral improvement. However, the critique of reason that his transcendental philosophy provides reveals how scientific knowledge is possible and at the same time also reveals that we can think of ourselves as free. Thus, for Kant, the coming to self-consciousness of the epistemic subject reveals how we can and must embrace the moral vocation of reason. Similarly, in lieu of Condorcet's vision of the infinite perfectibility of humanity, Kant can only offer the demand of reason in its practical employment to attempt as much as possible to bring the conditions of the Kingdom of Ends (where everyone can act from moral duty) into existence on Earth – again, a task that cannot be completed but is binding on humanity.

Of course, we need not mine the early modern period for elite examples of the view. Cruder versions of the view have been a part of most public defenses of science by scientists and other public intellectuals for the past sixty years or more. It is not too much of a distortion to say that C. P. Snow's (in)famous remarks on "the two cultures" – scientific and literary – offered a form of scientific humanism. His aim was precisely to claim that "literary intellectuals" had missed half of culture, with a strong suggestion

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that it was the better half that they had missed. This is not scientific humanism at its subtlest or most edifying, but it is proud and it is unrelenting. Whatever philistinism scientists might perpetuate upon humanities and the arts, the reverse was much, much worse: Literary intellectuals were, by and large, scientifically illiterate to the point of being prehistoric. Having noted that literature professors could not explain the second law of thermodynamics, Snow raised the stakes:

> I now believe that if I had asked an even simpler question – such as, What do you mean by mass, or acceleration, which is the scientific equivalent of saying, Can you read? – not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight into it as their neolithic ancestors would have had. (1959: 16)

One can find echoes of Snow's contempt for literature professors all the way up to the present day in the work of public intellectuals who are scientists or who fancy that science needs them to defend it from the relativists, the irrationalists, the feminists, and the social justice warriors.

A more generous form of scientific humanism animated the work of Snow's contemporary, Jacob Bronowski. Bronowski's 1973 television series and book, *The Ascent of Man*, was not simply about what science could tell us about the ascent of humanity from the veldt to modern times; the pursuit of scientific knowledge was itself the greatest form of ascent humans had achieved. Bronowski was, he told us, interested in telling us a story of the human and the personal in the realm of scientific ideas, but he wanted also to do more than that. For Bronowski, the form of rational knowledge that was found in science was the vocation of humanity, its highest expression and its conscious embrace of human nature. The series ends on precisely this point:

> And I am infinitely saddened to find myself surrounded in the west by a terrible loss of nerve, a retreat from knowledge into – into what? Into Zen Buddhism; into falsely profound questions about, Are we not really just animals at bottom; into extra-sensory perception and mystery. They do not lie along the line of what we are now able to know if we devote ourselves to it: an understanding of man himself. We are nature's unique experiment to make rational intelligence prove itself sounder than the reflex. Knowledge is our destiny. Self-knowledge, at last bringing together the experience of the arts, and the explanations of science, waits ahead of us. (1973: 268)

That final gesture of synthesis and reconciliation should not confuse us. If knowledge is our destiny then the explanations of science, by virtue of

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being in the realm of knowledge, must ultimately weigh more and be more expressive of humanity than are the experiences of the arts.

World War I and the Crisis of the European Sciences

I mention Bronowski because his work brings me close to the topic of the rest of this chapter. Bronowski's ascent of man was largely a history of science, but he tells us in the introduction to the book that he intended it as a "philosophy" (Bronowski 1973: 11) – a philosophy of nature, including human nature. Bronowski was a mathematician, a biologist, an author of literature, a polymath, but he was not a professional historian or philosopher of science. Indeed, by 1973 he might have been quite suspicious of what professional history and philosophy of science had become – a highly professionalized endeavor with little interest in edification and arguing over accounts of the development of science that were not likely to support his own vision. But I want to argue that professionalized history and philosophy of science as it developed after World War I was in fact deeply influenced by the form of scientific humanism that I have enunciated, more so than by Carnap's form of it. I illustrate these claims with two main cases. The great founder of professional history of science, George Sarton, argued explicitly for a robust form of scientific humanism that depended for its expression precisely on rigorous and encyclopedic history of science. My second case is more subtle. I argue that some forms of logical empiricist philosophy of science, a logic-based form of philosophy of science associated with the Vienna Circle and colleagues in various other parts of the world, were more attached to my form of scientific humanism than to Carnap's. I argue the case for Hans Reichenbach here.

Scientific humanism in my formulation (henceforth, "scientific humanism") was not a dead letter in the 1920s when Carnap met with the Vienna Circle and found there a shared "Carnapian scientific humanism." It was, however, under considerable pressure and, if ever it could be taken for granted, it certainly had lost any claim to self-evidence by November 1918. The reason for this is simply stated: World War I was for the countries of the West an unprecedented human and cultural disaster; yet it had been fought among the most scientifically advanced of countries, using the most technically advanced equipment and weapons. For the confident expression of the inevitable improvement of humanity through scientific advancement, World War I was a fundamental crisis.

There were myriad ways to reject scientific humanism after World War I. Among the more famous and least subtle ways was Oswald Spengler's

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declinist project (Spengler 1991/1922/1918). Armed with an allegedly objective view of the morphology of history, Spengler argued that the West was in inevitable decline. From this it follows that the forms of scientific knowledge enshrined in the West were no bulwark against decline. Various forms of *Lebensphilosophie* (philosophy of life) and philosophy of existence also arose after the war and were by and large forms of anti-scientific humanism and sometimes forms of anti-scientific anti-humanism. The threat that was so keenly felt by the intellectual classes – and perhaps most strongly in the defeated countries of the Germanophone world – was a form of nihilism arising from the destruction of their worlds by the very tools they had thought had made their civilization the greatest in world history. The problem is expressed by the narrator of Erich Maria Remarque's wrenching war novel, *All Quiet on the Western Front*:

> I am young, I am twenty years old; yet I know nothing of life but despair, death, fear, and fatuous superficiality cast over an abyss of sorrow. I see how peoples are set against one another, and in silence, unknowingly, foolishly, obediently, innocently slay one another. I see that the keenest brains of the world invent weapons and words to make it yet more refined and enduring. And all men of my age, here and over there, throughout the whole world see these things; all my generation is experiencing these things with me. What would our fathers do if we suddenly stood up and came before them and proffered our account? What do they expect of us if a time ever comes when the war is over? Through the years our business has been killing; –it was our first calling in life. Our knowledge of life is limited to death. What will happen afterwards? And what shall come out of us? (1982/1928: 263)

This nihilism resonated with readers of the novel who had served in the war. Here is how Carl Zuckmayer (1994/1929: 23) expressed the point in his review of the book. (This passage begins with the more literal translation of the title: "In the West, Nothing New.")

> Nothing new. Except for a few hundred thousand people the world was collapsing, along with everything that until then had fulfilled and enlivened them; except that they did not know whether it was now the void, the end, a complete dissolution that would swallow them up – or the whirlpool and obscurity of a new creation. Yes, that they did not even ask, nor had any idea whether they were the plow or the earth, the axe or the wood, seed grain or a rotting carcass.

Within this context, German and Austrian professors saw a form of anti-science taking hold in their students during and after the war. Where a life dedicated to the pursuit of knowledge had once seemed like a noble and responsible goal of the student, professors now saw their students

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seeking something else, often enough expressed in language such as "the search for authentic experience and meaning."

Many who saw this threat took the opportunity to endorse scientific humanism, but often of a new and more subtle kind than the classic versions scouted earlier. One very interesting case is Max Weber in his famous lecture, "Science as Vocation." In the lecture, Weber is withering on the striving of young people in 1917 for "experience" and "personality." He ascribes this attitude at least in part to an anti-scientific point of view. He gives a reading of Plato's Cave allegory in which "the sun is the truth of science, which alone does not snatch at illusions and shadows but seeks only true being." Having raised this vision of Plato, Weber asks:

> Well, who regards science in this light today? Nowadays, the general feeling, particularly among young people, is the opposite if anything. The ideas of science appear to be an otherworldly realm of artificial abstractions that strive to capture the blood and sap of real life in their scrawny hands without ever managing to do so. Here in life, in what Plato calls the shadow theatre of the cave, we feel the pulse of authentic reality; in science we have derivative, lifeless will-o'-the-wisps and nothing else. (Weber 2004/1917: 14)

Weber rejects this view, not in order to go back to Plato, but rather to reject the mutual presupposition of both positions: that there is some ultimate meaning to life or the world, whether it is to be found in the pursuit of scientific knowledge or in one's own most inner and authentic experience. In a figure of speech that recalls Kant's claim that enlightenment is humanity's release from self-imposed nonage, Weber ascribes the belief in such meanings to childishness:

> Apart from the overgrown children who can still be found in the natural sciences, who imagines nowadays that a knowledge of astronomy or physics or chemistry could teach us anything about the meaning of the world? How might we even begin to track down such a "meaning," if indeed it exists? If anything at all, the natural sciences are more likely to ensure that the belief that the world has a "meaning" will wither at the root! (2004/1917: 16)

Where does Weber leave us in light of this? Essentially with the view that the value in science cannot be found in existing meaningful things that are studied in science or any other realm of knowledge – the world, God, happiness, being, what have you. It can only be found internally as a presupposition of the practice of science. That the truths of chemistry are worth knowing is a presupposition of chemistry but not one it can defend against attacks from those who do not similarly presuppose it. Whether we

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accept or reject this presupposition is, he says, an expression of "our ultimate attitude toward life" (2004/1917: 18).

This is, I would argue, a form of scientific humanism, but a form quite different from Spinoza's or Kant's or indeed Bronowski's. It does not answer – indeed rejects as meaningless the demand for an answer to – the question of the ultimate meaning of human life or of scientific work. Nevertheless, the scientific vocation bears within itself an answer sufficient for itself of whether it is worthwhile to pursue science. Weber speaks as a scientist about the virtues of science. If you are unmoved, then you lack the vocation for science. There is no triumphal "ascent of man" here – no insistence that the ultimate telos of humanity is self-knowledge through understanding what science reveals about the extra-human world. Weber is even more minor key than Kant – science isn't even a vocation of reason anymore in the Kantian sense of a vocation of any finite rational being.

There is, however, a social role for the scientific vocation that is more than merely self-certifying and that genuinely counts as an ethical good embedded within value-free science. For Weber, the vocation of science includes the demand of teaching, and it is in their role as teachers that scientists play a social role that cannot be played by any other profession. Only the disinterested and dispassionate teacher can confront their students with the proper set of "inconvenient facts" (Weber 2004/1917: 22) – inconvenient, that is, to the moral and political interests and values of the students. Weber concludes: "I believe that when the university teacher makes his listeners accustom themselves to such facts, his achievement is more than merely intellectual. I would be immodest enough to describe it as an "ethical achievement," although this may be too emotive a term for something that is so self-evident" (Weber 2004/1917: 22).

So, on Weber's view, there is a value to doing science as a scientist that you cannot expect to convince those without the vocation for science to agree with. There is also a social value in the teaching of science in bringing inconvenient facts before all members of the society. Because of the universalism of science (both in its topics and its pursuit), some projects associated with other humanisms Weber sets aside. For example, in elaborating his view, Weber at one point eschews using his perspective to evaluate human cultural achievement, saying (Weber 2004/1917: 23): "I do not know how you would go about deciding 'scientifically' between the value of French and German culture." If we are briefly scouting alternative humanisms available after World War I, it is useful perhaps to note that there were various forms of "new humanism" being developed that had no trouble with that question. Indeed, there were some postwar new humanisms that claimed to be aspects of German culture. A representative case is found in Paul Hensel's 1921

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essay, "The New Humanism." He begins the essay by comparing the new humanism of the twentieth century with Renaissance humanism that sought to celebrate the works of pagan antiquity, saying that there were of course similarities but that:

> The difference is more important, and it is this that is our concern above all things here. It is striking that new humanism is not a general European presence, but rather predominately a German concern and thus it cannot be as thoroughly carried through outside Germany as that has been in the land of its origin, no matter how great its effects there later became. (1930/1921: 272, translations from Hensel are my own)

Hensel attempts to explain the astonishing fact that new humanism is predominantly a German affair by in part claiming that there was a greater degree of scholarly concern among the Germans than among the French from the eighteenth century onward on the works and culture of Greek antiquity. Concerning themselves overly with the Romans, by the mid-eighteenth century the French had had enough and issued the call "back to nature," whereas the Germans were truer to the humanist calling and instead said "back to the Greeks"! Hensel's view seems to be that only the Germans carried forward the true spirit of Renaissance humanism whereas the French changed that project into a form of naturalism.

For Hensel, ultimately, given the history he provides, the crucial figure for new humanism is Goethe, who somehow was able to combine in one person the figures of the philosopher, the poet, and the scientist. For this reason, Hensel (1930/1921: 277) ends his remarks by saying that: "anyone's stance toward new humanism depends on what Goethe means to them. And, thus, new humanism is above all a German concern."

Hensel was not a major philosophical figure in 1921 and is not one now. I briefly raise his remarks here to indicate that it certainly was not the case that "humanism" in Europe after the war was inevitably going to be any form of scientific humanism or any form of political project that would aim for a unity of humanity or universal human flourishing. I mention Hensel for another, more extrinsic reason: He was in 1915 one of two directors – with the mathematician Max Noether – of Hans Reichenbach's dissertation, and Reichenbach's views do interest us here.

Scientific Humanism after World War I in History and Philosophy of Science

The early twentieth century was a time for the consolidation of history of science and philosophy of science as distinct professional practices. The single most important figure in the professionalization of history of science

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in this time period was George Sarton. As we shall see, his vision of the intellectual import of history of science was an extremely robust form of scientific humanism. Within the newly professionalizing vision of philosophy of science, scientific humanism was neither as explicit nor as robust, but I argue that in at least one version of logical empiricism – that of Hans Reichenbach – it can be uncovered.

Sarton began presenting his vision for history of science as "the new humanism" in 1918 in a paper published in French. He presented substantially the same case in 1922 at a talk before the American Association for the Advancement of Science in Boston and on the pages of his new history of science journal, *Isis*, in 1924. In the 1924 paper he presents the program of New Humanism in three principles. First, "human progress is essentially a function of the advance of positive knowledge" (Sarton 1924: 9). Second, "the progress of each branch of knowledge is a function of the progress of the other branches" (Sarton 1924: 10). He dubs this principle "the unity of knowledge." Third, "the progress of science is not due to the isolated efforts of a single people but to the combined efforts of all peoples" (Sarton 1924: 11). This principle he calls "the unity of mankind." The reason why this becomes a project in the history of science, in the first instance, is that because they are theses about the progress of science, the principles of the New Humanism can only be demonstrated historically. He pursued this project through his entire, unbelievably productive career. For example, the "unity of mankind" thesis is illustrated and motivated in dozens of essays he wrote about texts and artifacts from around the world and across historical epochs. His interests spanned material from Babylon, Egypt, India, China, the Islamic world, and much else. This was not mere eclecticism but a concerted effort to detail and appreciate some of the contributions to knowledge of all people and all civilizations.

Sarton is very clear that the New Humanism is most importantly trained on the progress of positive knowledge, of science, precisely because a science has a uniquely progressive historical development. Within the history of human endeavor, he tells us:

> The history of science would be, of course, the central history, for it would be, among these three [the other two being the history of religion and of art], the only one evidencing a continual accumulation and improvement. In spite of a few momentary regressions the history of science is, indeed, essentially a tale of progress, of conquest; the progress is slow but sure, the conquests are inalienable; man cannot tell another tale of such greatness. It is unique. This is especially obvious if the history of thought is truly encyclopedic and oecumenic, for peoples or races may degenerate or

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> disappear, or some branches of science may be temporarily neglected, but if one takes a broad view of the whole tree of knowledge, deriving its substance from the whole world, the growth may be sometimes irregular, it is never interrupted. (1924: 31)

Sarton argues that this vision of the history of science allows a new philosophy – New Humanism itself – to be drawn from the study of history. This work goes forward in the spirit of more traditional humanisms but with a different and more synoptic vision:

> The New Humanism is a revival of the knowledge patiently elaborated and accumulated for many centuries by men of science, but neglected and despised by men of letters and educators, – its integration with the rest of our culture; its main spring is the history of science. It undertakes to bring together for the first time, scientists, historians, philosophers, sociologists; to coordinate and harmonize their points of view; to broaden their horizon without lessening the accuracy of their thought; to make the accomplishment of their higher task easier in spite of the increasing wealth of knowledge. (1924: 32)

While this may seem a form of triumphalist scientific humanism that my claim about the crisis induced by World War I should rule out, upon closer examination one sees within the project a clear acknowledgment of the crisis both intellectually and materially and a deeper way in which the project requires an encyclopedic vision of the history of science. Sarton argues that the unities of knowledge and humanity embedded in the New Humanism are real but hidden. They are under threat, especially in the early postwar years, from a more superficial but more self-evident social and political disunity:

> This enables us finally to solve another paradox: how can one reconcile the unity of mankind, which I postulated, with a chronic state of distrust, of discord and war, alas! but too obvious? Quite simply: the unity is hidden but deep-seated; the disunity, widespread but superficial. The unity is felt and expressed primarily by the few men of all nations whose aims are not selfish, or provincial, nationalistic, racial or sectarian in any other way, but largely human, the very few men upon whom has devolved the fulfillment of mankind's purpose; the disunity, the antagonism of interests, is felt and expressed by an overwhelming majority of other men. (1924: 15)

It is not too much to say that one educational goal of the history of science is to increase substantially the number of people who appreciate the deeper unity of humanity and, thus, to work against distrust, discord, and war.

This can be seen practically in the curious way that the 1924 essay ends – with two surprising appendices. The first appendix, spanning

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several pages, is "an urgent appeal to American scholars" (Sarton 1924: 35) for subscriptions to *Isis*, which had been founded in 1913 but was forced to have a hiatus from publication from 1914 to 1919. The appeal is directed at American scholars because of the ruination of the European economy by the war. Sarton was at pains to argue that the important work of the journal and the New Humanism itself depended on subscription money. If the direct appeal for money in order to advance the New Humanism was not persuasive, Sarton provided a second appendix, this one listing the names of authors and patrons of *Isis* in its first five years of production (one before and four after the war). The list includes over ninety persons distributed in over a dozen countries, including India and Japan. There are many luminaries in the world of science and history of science, including Svante Arrhenius, Pierre Boutroux, Émile Durkheim, P. E. B. Jourdain, Jacques Loeb, Hélène Metzger, Wilhelm Ostwald, Henri Poincaré, and Abel Rey. The point was no doubt to impress upon the reader that the vision for the New Humanism was not idiosyncratic to Sarton, and that a major international intellectual undertaking was indeed under way.

There is a more direct way in which Sarton saw his New Humanism as being able to begin to heal the wounds of previous wars and dissuade nations from entering new ones. He argued that the arguments nations typically gave for wars were self-interested and fraudulent – an attempt to raise narrow political or commercial interests to the standard of truth. By fostering scientific ways of thinking and standards of truth, the New Humanism would induce a higher honesty:

> Even as no honest man would care to obtain advantages for himself or his family by misrepresentation, no honest country would attempt to magnify itself by force or fraud at the expense of others. If the truth standard of politicians and diplomatists was the scientific standard instead of the legal or commercial, our international ideal would be accomplished without any difficulty. (1924: 27)

The result would be what Sarton calls "true internationalism" (1924: 26).

Some of the themes we have just scouted in Sarton are reminiscent of some of the larger elements of the logical empiricist project. Most well known, perhaps, is their insistence on the unity of science, which seems a close cousin to Sarton's unity of positive knowledge. There is more than a hint of the "unity of mankind" in the unity of science project, also, which very often emphasized its internationalism. We have already seen, however, Carnap expressing a quite different view from Sarton's regarding scientific humanism. So, our question here is, was there in logical

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empiricism a form of the more robust humanism we have found in common among Spinoza, Sarton, and Bronowski, and more subtly and problematically also in Kant and Weber? In accordance with practice in current literature on logical empiricism, I refrain from talking generally about the project and argue that there is such a theme in a single, more specific exemplar.

Hans Reichenbach was five years younger than Sarton and had served in the war, despite his commitment to pacificist principles, in the German army wireless telegraphy unit. In the between-war period his more popular work (which was extensive) repeatedly pointed to the importance of science and philosophy of science in solving a specific problem of the early twentieth century: he saw his culture riven by a deep divide between the everyday world of life and the modern world of science. He began his 1930 essay, "The Philosophical Significance of Modern Physics," on just this point: (Reichenbach 1978/1930b: 304): "Alienation between the world of science and the world of everyday life has emerged in our time with a force never known before." The principal guilt for this unsatisfactory state of affairs he lays at the feet of the academic philosophy of his day, which he sees as enforcing this split, assigning to Einsteinian or quantum physics its realm but claiming they amount to conceptual fictions from the point of view of everyday life. The split was troubling, not merely because it amounted to an attempt to live "a double life" (1978/1930b: 304), but also because it prevented the proper lessons of contemporary science from informing the life of the present. This lends a specific cultural significance in 1930 to the philosophy of science:

> Here, then, lies the source of that unfortunate rift, and, with all the diligence in the world, the scientifically untutored will not be able to bridge it unless philosophy, on its part, shows the way to unification. Thus we view the work of present-day philosophy of science not only from the standpoint of its scholarly significance, as a clarification of basic scientific concepts, but also from the standpoint of society. Seen from this vantage-point, a clarification of basic concepts is at the same time a reinterpretation of outmoded philosophical ideas, and only the disclosure of the continuity between the workaday world and the scientific world will be capable of carrying out that incorporation of the cultural fruits of science. (1978/1930: 305)

Now, this problem – the integration of everyday and scientific world views – might seem to be chiefly due to the progress of esoteric science; who would expect the average person to understand relativity theory or quantum mechanics? This requires, on Reichenbach's behalf, two responses. More superficially, Reichenbach was not, of course, trying to

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convert each person into another Albert Einstein or Niels Bohr. But his long engagement in the public understanding of science, which led, among other things, to his books *From Copernicus to Einstein* (1942/1927) and *Atom and Cosmos* (1932/1930), did presume that the concepts of science were not wholly beyond the ken of the average person and that an understanding of both the world view of science and how it was achieved was available to the average citizen. Following from this, and more importantly for understanding Reichenbach's project, he, as we have seen, wanted to blame educated people and especially philosophers for the split between the everyday world and the world of science. He argued that philosophy in Germany at the time was a fundamentally conservative activity that tried to wall off the scope of science so that far more traditional philosophical concepts could be seen as fundamental to everyday and social life. This was an intellectual project of the philosophy of his times but not the only role philosophy could play, nor the one it should play.

The chief lesson, then, of taking the world of contemporary science seriously was a rejection of philosophical doctrines, especially calcified Kantian doctrines of the a priori as determined by a rigid set of concepts that could not be rejected or replaced and in terms of which the world had to be understood. He returned again and again to this rejection of the a priori as necessary and immutable and underscored continually the liberating nature of the new sciences of nature on precisely this score. The essay I just quoted ends on exactly this point:

> It is, perhaps, to be regarded as the most significant result of modern scientific knowledge that the picture of the world to which it has led has at the same time brought to light a new vision of man as a thinking mind, for science has shown us that reason is no rigid scaffolding of logical pigeonholes, that thinking does not consist in the endless repetition of outmoded norms. She has taught us instead that man grows with his knowledge, that he carries within him the capacity for forms of thought of which he could not so much as conceive at earlier stages of his existence. (1978/1930: 322)

In other writing from this period, Reichenbach goes beyond this and argues that the liberation of thought in the development of modern science stands in close kinship to the ways of thought and action found in modernizing trends in contemporary society. In this way, modern science stands actually in quite close relation to some social and political aspects of contemporary life – just as they both stand opposed to rigid systems of concepts and values found in academic philosophy. He writes in another popular essay of the period that:

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> It has become ever more obvious that decisive new insights into the meaning of life, be it visions of human society, or of the relationship between the sexes, or of education of children and adolescents, or of the distribution of work and leisure in daily life, are not found by speculative philosophers but by people in practical life who discover new values in their activities and are able to make them acceptable to others through the impact of their personalities. Specifically, it is the academic philosopher's alienation from the revolutionary social processes of our time which explains why so much that is said in academic quarters about these matters seems strangely sterile and remote from life. (1978/1931: 386)

So, Reichenbach's project was to configure a new philosophy of nature that was precisely the counter to the conservative academic philosophy of his times. One final theme that connects that new philosophy of nature – and of the human knower of nature – to the postwar crisis of the twentieth century and also to Weber's version of scientific humanism is this: In rejecting the old "reason and the understanding have only a single eternal form" view of the a priori, Reichenbach was rejecting neither the a priori itself nor, certainly, the need for a conceptual understanding of nature. Instead, he was insisting that in the realms both of concepts and values, there is ultimately human choice and, thus, human responsibility. Reichenbach's view was that his new account of the knowledge of knowledge indicated the ineliminable role of the will in knowledge and also in social life. But there are no external or internal guarantees of correctness of volition. All that he can offer instead are two things: resoluteness of will and willingness to live in a society that aims for the consilience of wills. He never gave up this view and puts the points this way toward the end of his final book, *The Rise of Scientific Philosophy* (1951: 300, 301):

> We try to pursue our own volition ends, not with the fanaticism of the prophet of an absolute truth, but with the firmness of the man who trusts his own will. We do not know whether we shall reach our aim. Like the problem of a prediction of the future, the problem of moral action cannot be solved by the construction of rules that guarantee success. There are no such rules.
>
> If a person knows that moral rules are of a volitional nature, he will be ready to change his goals to some extent if he sees that otherwise he cannot get along with other persons. Adaptation of goals to those of other persons is the essence of social education.

It is not too much to say that throughout his career Reichenbach pursued a philosophy of modern science that was also a philosophy of responsible social life.

Reichenbach's vision lacks the encyclopedic scope and the sheer grandeur of teleological ambition of Sarton's, of course. But it is a synthetic

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vision in its own right – for the way in which modern science has rejected traditional epistemological and meta-ethical positions is not, for Reichenbach, something the working scientist is well placed to argue. For such tasks, Reichenbach argues for a specialized group of scientifically and philosophically trained specialists, a research community in philosophy. Scientific philosophy has its own task in the modernizing projects of the twentieth century – and it is a task very much within the spirit of scientific humanism.

Coda

I have in this chapter sought to demonstrate that at the originary moment for professionalized history of science and philosophy of science in the 1920s and 1930s, there were robust scientific humanist visions embedded in some prominent exemplars of that work. This is dead obvious, if currently underappreciated, in the case of Sarton. Reichenbach's scientific humanism is less obvious, less expansive, less optimistic and teleological, but no less real.

Almost a hundred years on, things have clearly changed. Within history of science, in a variety of idioms from postmodernism to Latourian nonmodernism (Latour 1993) to a turn to social and cultural history, itself replete with what Steven Shapin has called "tone-lowering" gestures (Shapin 2010), the scientific humanism of Sarton has all but vanished from sight. The more subtle humanisms of logical empiricist and other early twentieth-century philosophy of science are more robustly found in analytic philosophy of science, although perhaps too often expressed in the mode of being a foot soldier in the science wars that raged in the 1990s and blamed sociology, history, and philosophy of science for decreased trust in science (and flare up occasionally still). These days the main and very vocal proponents of scientific humanism tend to be public scientists, and their vision seems less humane than triumphalist and more in need of than informed by serious work in history or philosophy of science.

This intellectual situation seems unsatisfying and dysfunctional. I am less interested in raising the tone than in understanding the stakes. Crises press in upon us from all sides – climate disasters, technology pressed into oppressive economic and social agendas, political extremism. We may no longer think of scientific progress as the master narrative of modernity, but we certainly need scientific and technological progress (as well as moral clarity, political will, social solidarity, critical thinking, etc.) to help us with many problems, including those caused by foolish past and current uses of

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science and technology. The popular scientific humanism of today seems scarcely up to the task that confronts us. We need humanities scholars – in history and philosophy of science and in many other fields – to help us achieve a scientific humanism or an alternative to scientific humanism capable of joining with the urgent integrated political action that alone can see humanity through its current crises.

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