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DUHEM IN DIFFERENT CONTEXTS: COMMENTS
ON BRENNER AND MARTIN

ABSTRACT. These comments consist of reflections on the papers Anastasios Brenner and R. N. D. Martin presented at the Conference on Pierre Duhem: Historian and Philosopher of Science. I argue they present nicely complementary accounts of Duhem's turn to history of science: Brenner emphasizes reasons internal to Duhem's philosophical concern with scientific methodology while Martin highlights reasons derived from the broader context of Duhem's engagement with religious controversies of his culture. I go on to suggest that seeing Duhem in this broader perspective can help us cope with the conflicts between science and religion in our own culture.

At first glance the papers by Anastasios Brenner and R. N. D. Martin seem quite diverse in their preoccupations, but a bit of reflection on them reveals a common theme.¹ Both papers raise questions about the role of history of science in Duhem's thought. What larger purpose, if any, did he mean to use the history of science to serve? And, in particular, why was he especially interested in late medieval science? As I shall argue, the two papers return answers to such questions that are in some ways nicely complementary. Moreover, it seems to me that this complementarity is a consequence of the fact that Brenner and Martin situate Duhem's thought in different intellectual contexts. This leads me to wonder about how to specify a context for the study of Duhem that will enable us to learn as much as we can from the legacy of his thought. Anglophone philosophers have, for the most part, focused on the context of Duhem's concerns with science and philosophical reflection on its methodology. But, as I shall suggest, there may be much of philosophical value to be learned from locating Duhem in a broader context that includes his religious concerns and the theological problems of his culture and ours.

Brenner's paper concentrates its attention on the context of Duhem's developing philosophy of science and reveals reasons for Duhem's historical turn internal to his methodological thinking. As Brenner's narrative presents the development of Duhem's holism, it begins in an analysis of Wiener's experiment on the direction of vibration of polarized light and is later generalized into a philosophical account of experimental method. Duhem's general analysis of experiment is meant to

support holism by showing that, in order to bring experience and scientific theory into contact with one another, observed fact must be transformed into theoretically interpreted fact and that whole theories are presupposed in making such transformations. Consequently, theoretical principles cannot be established seriatim by induction. And this, as Brenner emphasizes, leaves Duhem facing a problem about how to choose among theoretical principles.

Readers of *The Aim and Structure of Physical Theory* will recall that Duhem invokes good sense to solve this problem. We test whole groups of theoretical principles experimentally. When such a group fails to square with experimental results, logic alone does not dictate which of its members are to be rejected. But at this point good sense may intervene to yield a choice. Duhem himself describes good sense rather dramatically in terms of Pascalian reasons of the heart. It might also be characterized less grandly, following Polanyi, in terms of tacit craft-knowledge of communities of scientific practice or, following MacIntyre, in terms of the local rationality of historical traditions of inquiry. The point is that good sense embodies a kind of informal rationality and so its choices are generally rational. If the good sense of scientists can itself be shaped by knowledge of the history of science, there will be a role for history of science to play in the constitution of scientific rationality.

I think it quite plausible to suppose that Duhem envisaged a role of this sort for history of science. After all, he writes history of science with the didactic aim of supporting his instrumentalist philosophy. If history could be made to teach scientists that their enterprise does best when it concentrates on saving the appearances, then it would make good sense for scientists to rally in support of the research program in energetics Duhem himself favors, even if logic alone does not dictate that they should do so. As Brenner points out, the main lesson a history of scientific theories written from a Duhemian point of view teaches is that experimental laws accumulate, the language of science grows ever richer, and science progressively becomes a more and more efficient predictive instrument.

Duhemian history of science is, of course, partisan history. Scientific realists can and do write history of science in support of their philosophical predilections. This is a game both sides in the controversy between instrumentalism and realism can play, and neither side has yet emerged from play a clear winner. Some historical episodes seem to be grist for

the instrumentalist mill; others appear to be powder for the realist cannon. So I think it would be wise to remain skeptical about whether the entire history of science or a consensus of its practitioners can be made to speak unambiguously in favor of one side or the other in the great philosophical debate between instrumentalism and realism.

Near the end of his paper Brenner draws attention to the somewhat surprising fact that Duhem did not ultimately rest content with mere instrumentalism. In *The Aim and Structure of Physical Theory*, he claims that the growing predictive success of science serves to indicate that science is making progress toward a natural classification, a classification system that, so to speak, carves nature at the joints. Though my own opinion is that this claim has a status in Duhem's thought closer to a pious hope than to a demonstrated conclusion, I think it is a bit puzzling that Duhem considered it important to advance such a claim. After all, a thoroughgoing instrumentalist does not have to take a stand on the vexed question of whether science is approaching or will converge on a natural classification. Why is Duhem unwilling to engage in skeptical suspense of judgment on this issue? Why, in other words, does Duhem think that successfully saving the appearances is not, in the last analysis, success enough for science? Some interesting but rather speculative answers to such questions emerge from considerations emphasized in Martin's paper.

Martin's account of Duhem's engagement with medieval science invokes a broad intellectual context that includes Duhem's religious concerns and those of his cultural environment. He situates Duhem in the thought-world of the Dreyfus affair in politics, the modernist controversy in theology, and the revival of Thomistic scholasticism in French Catholic philosophical circles. As he sees it, Duhem was not moved to study medieval science by disinterested historical curiosity; Duhem's agenda went beyond a simple desire to test his instrumentalism against another part of the historical record. Nor is his interest in medieval science to be explained by attributing to Duhem as a Catholic intellectual a desire to support the neo-scholastic movement. Prominent in that movement was the ambition to constrain science by insisting that it be grounded in a Thomistic philosophy of nature, and Duhem had ample reasons, both personal and professional, to resist this attempt to subordinate science to philosophy by mounting a defense of the autonomy of science. Since he had an interest in maintaining that science fares badly if it is subordinated to philosophy or theology, it would

have suited Duhem quite well to think that the Middle Ages were, scientifically speaking, dark ages.

According to Martin's narrative, Duhem discovered almost by accident that there had been good science done in the Middle Ages, and this discovery precipitated an intellectual crisis. The pressing question was whether the historical record could be used to show that science had done well enough, or even especially well, when subordinated to scholastic theology or philosophy. If it could, the historical case for the claim that science must be autonomous if it is to make progress would be undermined. So Duhem's project in the history of medieval science was, Martin argues, to show that good medieval science was not in fact grounded in or based on Aristotelian or Thomistic theology or philosophy. And there is indeed evidence that such a concern shapes the way Duhem thinks about medieval science. He assigns a pivotal and liberating role in his own narration to the condemnation of various Aristotelian theses by Etienne Tempier in 1277, and he makes much of the connection between philosophical nominalism and scientific progress in the fourteenth century.

No doubt it is in principle possible for a thoroughgoing instrumentalist to mount a philosophically interesting defense of the autonomy of science. One way to proceed is to demarcate the spheres of authority of science and religion by means of an appeal to some version of the Kantian distinction between phenomenal and noumenal realms. Science concedes to religion exclusive cognitive access to the things in themselves of the noumenal realm; in return, religion yields to science exclusive cognitive access to the appearances of the phenomenal realm. The writ of science runs no farther than saving the appearances, but within the phenomenal realm science is the supreme cognitive authority. If this division of labor could be enforced, the protracted warfare between science and religion could be brought to an end.

The trouble with such a defense of the autonomy of science is that, in practice, some of the partisans of religion will not accept peace on these terms. They are not willing to settle for coexistence with science but instead demand that it submit to religious control. Neo-scholastic thinkers of Duhem's day often insisted that it is Thomistic philosophy of nature and not science that tells the real truth about the observable natural order. It is easy to see how such a view can lead to a devaluation of or even contempt for science, and such attitudes have not been unknown in Catholic intellectual circles. These days we hear ominous

talk of Islamic science coming from the Islamic fundamentalists of Iran. Closer to home, there is so-called 'creation science', allegedly based on biblical revelation, and many Christian fundamentalists claim that it rather than evolutionary biology is on the right track in accounting for life on earth. If a strong defense of the autonomy of science is to be mounted against such practical threats as those I have mentioned, it seems to me of strategic importance to insist that science in its own right can, at the very least, aspire to become an independent source of cognitive access to the final truth about the natural order. I think it makes sense to suppose that the whiff of realism in Duhem's talk about approach to a natural classification is part and parcel of such a strong defense. Even if there is a religious way of knowing that has exclusive access to truth about supernatural things, Duhem is in a position to maintain that it does not have exclusive access to the truth about nature and so cannot on that account legitimately claim to control or preempt scientific inquiry.

But if it is granted that autonomous scientific inquiry is an independent source of cognitive access to the natural order, there is no guarantee of perpetual peace between science and religion. Even if it does not have exclusive cognitive access to the natural order, traditional Christian theology has been committed to claims that have implications for our understanding of nature. The Augustinian account of Adam's fall, if taken literally in broad outline, makes some sort of historical claim about a catastrophe in the remote human past. The Catholic doctrine of Transubstantiation is framed in terms of concepts drawn from an Aristotelian metaphysics of substance and accident. The most distinctive of Christian doctrines, the Incarnation, places constraints on the ways in which traditional Christians can consistently formulate accounts of human nature. Though it may be hoped that in the long run science and Christian theology will independently converge on a unified account of nature, in the short run conflict between the best science at a given time and the best theology of that time cannot be ruled out in advance. If a realistically interpreted science were to undermine the historical claim, the metaphysical framework or the theories of human nature alluded to above, then traditional Christians would come under increasing pressure to choose between backing off to mere instrumentalism in philosophy of science and making deep and perhaps unwelcome revisions in theology. If the retreat to mere instrumentalism is precluded for the sake of maintaining a strong de-

fense of the autonomy of science, a delicate balancing act may be required in order to negotiate successful resolutions to episodes of conflict between science and theology. In such negotiations, it cannot be assumed *a priori* that science has to be the fixed point, for scientific conceptual schemes and ontologies have changed in the past and are likely to do so in the future. But neither can it be assumed *a priori* that theology has to be the fixed point, since ecclesiastical doctrine has developed over the centuries and will doubtless continue to do so. And, of course, the whole enterprise of conflict resolution is only made more complicated by the fact that Christianity is not the only religion whose theology has implications for our understanding of nature and so can claim to be a source of cognitive access to the natural order.

So when we locate Duhem in the larger context of the theological controversies of his culture, some problems emerge that are not merely of antiquarian interest to those of us who take the cognitive claims of both science and religion seriously. One moral I would draw from considering Duhem in this context is that a strong defense of the autonomy of science may carry with it an unpredictable theological price. But I do not think this exhausts what Duhem has to teach us about how to cope with the conflicts between science and religion that persist in our own culture, and so it seems to me there is much to be learned from studies of Duhem which, like Martin's, situate his thought in its religious context.

NOTE

¹ These comments are based on the versions of their papers that Brenner and Martin presented at the Conference on Pierre Duhem: Historian and Philosopher of Science and do not take into account any subsequent revisions they may have made in those papers.

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