

The Proof of the Pudding

Review of Yafeng Shan. *Doing Integrated History and Philosophy of Science: A Case Study of the Origin of Genetics*. Cham: Springer, 2020. pp. ix + 194, idx. €84.79 (PB); €67.40 (e-book).

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For almost as long as there has been analysis describing itself as “history and philosophy of science,” there have been efforts to figure out just what “history and philosophy of science” might actually mean. Is it even possible for one and the same work to serve as both history of science and as philosophy of science? It’s hard to imagine two disciplines with more dissimilar standards for evidence, relationships to the scientific process and scientific theories, or even publication practices. One could therefore – quite profitably! – embark on the process of writing another meta-level book, describing what a potentially fruitful mode of interaction between philosophers and historians of science might look like, or elaborating an ideal theory of the circulation of knowledge between these two fields.

In this volume, Yafeng Shan takes a significantly different approach. As he writes, his aim is to support “integrated HPS by practising integrated HPS in a concrete historical case study, namely, the case of the origin of genetics” (5). He sets himself ambitious targets. Not only, he argues, should sensitive integrated-HPS work engage with the best current historiography around a particular episode, it should itself contribute to the construction of that very historiography. In other words, it should do real history of science, engaging in sophisticated, anti-anachronistic readings of historical texts. And – though this objective is expressed more in the way the book is written than assumed as a goal from the outset – it should then put those claims in dialogue with active problems in contemporary philosophy of science. Borrowing from Theodore Arabatzis and Don Howard’s “manifesto” for integrated HPS (2015), he briefly summarizes this orientation in the motto that integrated HPS needs to be both good history of science and good philosophy of science.

Another current present throughout the work – perhaps less obvious because less worn on its sleeve – also makes Shan’s approach more amenable to the integration of the philosophy and the history of science. Shan is a partisan of what is sometimes called the “practice turn” in recent philosophy of science. We see consistently in these chapters an emphasis on moving beyond science as a collection of theories, or a repository of propositional knowledge about the natural world. For Shan, Mendel’s “theory,” to the extent that we can talk of such a thing, is assuredly about his concepts (we see extensive discussion and reconstruction of his and others’ use of dominance, for instance, as essential to the development of early genetics), but it is also and importantly about Mendel’s experiments, the research problems that Mendel set himself, and Mendel’s techniques. Shan is thus a keen observer of the kinds of social and experimental aspects of science that contemporary history of science has tended to underline as well, cultivating yet more common ground.

This brings us to the content of the volume. Shan starts from a meticulous reconstruction of Mendel's research program and that of his immediate successors, particularly Hugo de Vries, W. F. R. Weldon, and (to a lesser extent) Carl Correns. These are careful and nuanced discussions, with close readings of important passages, usage of original-language source texts, corrections of translations, and extensive consultation of unpublished and archival materials. Shan then takes this foundation and develops from it a new archetype for integrated HPS work, what he calls his *exemplar-based approach*. Building from Kuhn's introduction of exemplars as solutions to problems, but significantly expanding upon the skeletal presentation in *Structure*, Shan reconstructs each of these early genetical theories as a kind of network containing conceptual elements, experimental practices, research problems, hypotheses for their solution, and patterns of reasoning that tie the networks together. With this tool in hand, and having derived clear pictures of his historical authors, he applies it to build new accounts of conceptual continuity (in particular, using as a case study changes in the concept of dominance), provide a re-reading of the question of evidence in hypothetico-deductive explanation, and, most speculatively, offer us a new approach to theory change based around a notion of "promisingness," defined in terms of the potential utility of exemplars.

Any work this ambitious inevitably leaves open avenues for critique. To use Shan's own terminology, one might say that in presenting his exemplar-based approach and applying it to a host of different historical and contemporary questions, Shan has attempted to show us the very promisingness that he holds is so crucial for the process of scientific theory change more broadly. There are assuredly more details that deserve to be worked out – I'll briefly mention two. Shan's notion of exemplar is a helpful corrective to a theory-first approach in the philosophy of science, and holds out the hope of our being able to tell more nuanced stories of incremental conceptual changes (one is reminded of an even more sophisticated version of Laudan's tripartite decomposition of Kuhnian paradigms; Laudan 1984, ch. 4). But if we include research problems, concepts, practical guides, hypotheses, experiments, and patterns of reasoning, it becomes difficult to know what *wouldn't* count as part of an exemplar – and if the notion is too broad, then conceptual continuity might come too easily.

To extend the point slightly, Shan's complex stories of the relationships between multiple exemplars – for instance, teasing out the reasons for which Mendel's work was neglected for so many years – rely not only upon the construction of these exemplar networks of research problems, concepts, experiments, and so forth, but also upon accounts of the similarities and differences of those networks and their parts. But similarity between two complex networks of this sort, where the nodes can be of very different types (from concepts to experiments) and the connections between them of correspondingly different sorts, is not a straightforward notion. Shan's approach here places the burden of demonstrating those relationships largely on his historical reconstructions, which of course in some sense does the job: Mendel's concept of dominance, say, could be shown to be related to that of de Vries by close reading of their works. But how much difference, of what sorts, between different exemplars matters, and in which contexts? There's room here, I think, for more careful theorizing about how these accounts might look.

From the other disciplinary perspective, a committed historian of science will also undoubtedly find quibbles. For instance, we see here little engagement with Mendel's institutional context, beyond some discussion of his training in botany – where do we fit into the account, an anti-HPS historian might ask, the fact that this work took place in an abbot's garden, in Mendel's peculiar personal context? But I used the word quibbles advisedly. We do see extensive consideration of precisely the

kinds of chains of textual transmission that, in my opinion, serve to ground the historical *bona fides* of Shan's analysis, consideration that even allows him to intervene productively in debates in the history of science over Mendel's conceptual framework and his sources.

Worries of this sort, however, do not in the slightest argue against the utility of such a project. As a fellow-traveler in integrated HPS, I agree wholeheartedly with Shan that the proof of the pudding is in the eating, and the numerous interesting, nuanced insights that his approach allows us to bring to the incredibly fruitful period of the development of early genetics makes the work done here worthy of the attention of any scholars interested either in this particular case study or in the prospects more generally for integrated HPS work, both within and beyond the life sciences.

References

- Laudan, Larry. 1984. *Science and Values: The Aims of Science and Their Role in Scientific Debate*. Berkeley and Los Angeles: University of California Press.
- Arabatzis, Theodore, and Don Howard. 2015. "Introduction: Integrated History and Philosophy of Science in Practice." *Studies in History and Philosophy of Science, Integrated History and Philosophy of Science in Practice*, 50 (April): 1–3. <https://doi.org/10.1016/j.shpsa.2014.10.002>.