

who only ‘reluctantly’ deigned to communicate outside the former (p. 12). In fact, the genres and modes of discourse employed by the actors within this debate are as complex as they are varied, though of course it is traditional histories of astronomy, rather than Lane, which deserve most of the criticism for the persistence of this binary perspective. Another small but frustrating flaw of the book is the poor standard of referencing. The endnotes are often vague and the bibliography conflates, for example, the works of Edward Pickering and his brother William (two men who had very different opinions about Mars), whilst some articles are listed with the wrong title and certain others are listed without volume or page information. Such criticisms are, however, greatly outweighed by how much the book does extremely well. Lane’s geographical perspective impressively enhances our understanding of the Mars canal saga.

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PHILLIP. R. SLOAN and BRANDON FOGEL (eds.), **Creating a Physical Biology: The Three-Man Paper and Early Molecular Biology**. Chicago and London: The University of Chicago Press, 2011. Pp. ix + 319. ISBN 978-0-226-76783-3. £22.50 (paperback).
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I will confess that until I read this book I was one of those legions, mentioned within, for whom the Three-Man Paper (henceforth 3MP) was a familiar reference due more to its mythical status in the history of science than to its substance. Even though I had cited the reference in a paper about genes and mutations, three words sum up what I knew about the 3MP until now: gene, green and Max Delbrück. Sloan and Fogel’s translation and treatment of the paper goes a long way toward filling in the gaps, as well as toward correcting various myths and misconceptions about it.

The 3MP – the English title of which is ‘On the nature of gene mutation and gene structure’ – was first published in German in an annual-reports-type publication of the Göttingen Academy of Sciences in 1935. Its cover was green. Max Delbrück was indeed one of the three authors, but no more substantial or significant a contributor than the other two men, Nikolai Timofeëff-Ressovsky and Karl Zimmer, each of whom contributed a different disciplinary element to the collaboration. The paper became the stuff of many legends among scientists, as the direct inspiration for Erwin Schrödinger’s famed *What Is Life* (1944) and, through that conduit, the spur for an exodus of physicists to biology; as the singular impetus for the birth of molecular biology; and paradoxically, in the view of one of its own authors, as a paper that went unnoticed in its time due to the obscurity and short-livedness of its parent publication. As the various contributors to the volume have shown, the myths not only present exaggerated or otherwise distorted accounts of the 3MP’s impact, dissemination and content, but also, in doing so, have underplayed its genuine importance in history. Comprising a translation of the original publication accompanied by commentaries from contemporary scholars, *Creating a Physical Biology* not only provides access to the content of the 3MP, but also sets it in its proper historical and philosophical context.

Five essays make up the context portion of the book, which is divided into three main parts following an introduction by the principal authors: a historical section with three essays, one of them by Sloan, a philosophical section with two, and finally the translated paper itself with a brief preface by the translator (Fogel) and a compilation of the references that appeared in the paper. The historical section, especially, brings to light how intellectual and technical advances in radiation biophysics and photosynthesis contributed to the marriage of quantum physics and biology that occurred in this paper. As William C. Summers points out, what was special and new about the 3MP was that it was the first attempt to apply the tools of the newly developing quantum physics to addressing questions about the specific biological phenomenon of gene mutation. Taken together, the five contextual chapters provide a comprehensive, if not harmonious, account of different aspects of the content and influence of the 3MP, complete with an example of the

fruitfulness of examining opposing viewpoints – exemplified in the philosophical dialogue between Nils Roll-Hansen and Daniel McKaughan – to fully appreciate the nuances and dimensions of any issue, in this case the reductionism (or not) of Max Delbrück and its effects on making biology physical.

As informative and illuminating as this book is, however, the most exciting aspect about it for me, personally, is its potential for use in graduate or advanced undergraduate seminars in the history and philosophy of science. The possibility suggested itself even before I had delved into the individual papers, although when I do get my chance to teach the course there will be one significant departure from the original. This departure will be in the sequence of the chapters as they appear in the book: in my version, the 3MP will be the first thing the students read after introduction. I will admit that sequence is a minor quibble in an otherwise stellar volume, but it was frustrating to have to constantly skip to the end to see what the commentators were talking about. Considering that the 3MP pre-dated the other contributions in this volume by three-quarters of a century, that all the other papers engage with its contents in some way or another, and that furthermore the entire book grew out of a translation project to begin with, it seems strange that the paper was in Part III rather than Part I of the book. Among the main reasons Sloan and Fogel offer in their preface for embarking on the translation project is their feeling that it was necessary to understand the significance of the 3MP ‘in its historical context, without the filter provided by Schrödinger’s interpretation and a presentist history of molecular biology’ (p. vii). But by putting the commentaries ahead of the paper, they introduce their own interpretive filters, even as they remove older ones.

Still another filter between the paper and the readers is manifested due to the absence of the original German paper in this volume. Although the authors, in particular Richard Beyler, effectively debunk the myth of the paper’s initial obscurity due to unavailability, the current and genuine scarcity of the paper is in fact one of the other justifications Sloan and Fogel offered for embarking on this book project. Given that scarcity, I believe that the inclusion of the original, either as an appendix or facing the translation, would have been of immense value, even if readers such as myself are not fluent in German. The omission was perhaps out of the authors’ hands, due to copyright issues, but nevertheless I found myself wishing for direct access, especially in those moments when the authors would drop in words and phrases from the original. It made me feel like an outsider peeping in, privy to only that which the insiders allowed me to see.

These minor flaws and omissions notwithstanding, *Creating a Physical Biology* is a great book with deeply insightful contributions from renowned scholars, a book that will continue to inspire and inform scholars, teachers and students alike for generations to come.

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MARGARET E. DERRY, *Art and Science in Breeding: Creating Better Chickens*. Toronto, Buffalo and London: University of Toronto Press, 2012. Pp. viii+281. ISBN 978-1-4426-4395-6. \$65.00 (hardback).

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Anyone familiar with Margaret Derry’s earlier work on animal breeding will expect a new book to contain detailed accounts of the long lives of domesticated animal breeds, the shorter lives of breeders, and the changes brought about in both by market, social and regulatory conditions. All of these elements are indeed to be found in *Art and Science in Breeding: Creating Better Chickens*. However, Derry now also wishes to make the role of science and scientists in the history of breeding much more central. Focusing upon North America between 1850 and 1960 – though also drawing heavily upon the British context and ranging chronologically further afield – this book