

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

charts the changing structure of the chicken-breeding industry in response to developments within science, more specifically in genetics. Derry succeeds in constructing a history of chicken breeding that is original, entertaining and informative. However, her treatment of genetics (and science more generally) is not without its problems.

The first chapter considers the ancient origins of chicken farming before turning to the history of animal breeding between the eighteenth century and the mid-nineteenth. The second reconstructs the chicken's entry into the Victorian world of fancy breeding. Together they demonstrate the existence of a chicken-breeding industry prior to 1900, one complete with shared methods, societies and standards. Derry's discussion of breeding methodology is not confined to chickens. Allowing for an appreciation of the shared language and beliefs of animal breeders is certainly important, though as a consequence what makes chickens special (for example, their rapid reproduction in comparison with other domesticated animals) is somewhat lost. While she does highlight some important nineteenth-century chicken breeders (such as I.K. Felch), this discussion is often based upon later sources. The reader is therefore left wondering precisely how influential or coherent these breeding methods were. Nevertheless, the regulatory practices of Canadian and American societies, which are described in detail, provide an important introduction to themes returned to throughout the book. These include the distinction between chicken *breeding* and chicken *farming*, breeding for beauty or use, and breeding for purity. Chapter 3 considers the rise of genetics and the efforts of geneticists to introduce Mendelian concepts to chicken-breeding practice. Chapters 4 and 5 explore a tension between geneticists and traditional breeders in the North American egg industry. Particularly noteworthy is Derry's account of the expansion of hatcheries around 1920 which, thanks to their location within the industry, gave hatchery owners unprecedented control over breeders. Chapter 6 chronicles the victory of the geneticist over the traditional breeder as large multinational corporations take over the industry, enticed by the expanding market for meat or 'broiler' chickens. Derry then includes a final chapter on the industry beyond 1950 to the present.

This book will primarily interest historians of genetics. Introducing some important primary research material, Derry's account is also based upon interviews with industry representatives which certainly help to make the final chapters (concerning 1950 and beyond) particularly revealing. The book also draws attention to a significant historiographical gap, the majority of historians of genetics having been concerned with plant rather than animal breeding. However, her discussion of genetics and geneticists is not entirely convincing. The third chapter, dedicated to the history of agricultural genetics, is confused and ranges over a large number of theoretical debates and developments, the connections between which are by no means obvious. There is also very little critical engagement with contemporary historiography. The inroads made by Jonathan Harwood and Barbara Kimmelman might lead us to expect that chicken-breeding geneticists would be more concerned with physiological problems than were their non-agricultural colleagues. Derry's account does not reflect upon these possibilities. Instead it is argued that until the proper combination of population genetics and quantitative assessment was reached, genetics had nothing to offer breeders. At the same time, geneticists are treated as entirely antagonistic towards traditional breeders, appealing to their insights when they support scientific conclusions but otherwise undermining their claims to expertise. Others who have considered the peculiar nature of agricultural genetics – including some who have focused on chicken breeding, such as Kathy Cooke – have emphasized the efforts of many scientists to work for the benefit of the traditional breeding community. Few of these (often publicly funded) breeders make an appearance in Derry's book, a great deal more attention being given to commercial breeders. These problems are perhaps due to her account of genetic history relying upon outdated secondary sources and her having primarily interviewed scientists who spent a large part of their career in the commercial sector.

While these limitations affect the value of the work for historians of genetics, they point to a larger problem with the thesis itself, one expressed in the book's title. Other than to say that it is sometimes hard to see a difference between them, the categories of 'art' and 'science' are not called into question. For Derry there is (historically) some art in the science; the breeds used by geneticists today have a history, as do some of the techniques. There is also (empirically) some science in the art; from our perspective some older breeders got it right and their techniques might deserve to be called scientific. But these two categories are always in competition with one another. Historians of science and technology have achieved more by acknowledging the independent lives of theory and practice, while at the same time highlighting how such divisions have primarily served a rhetorical purpose and often disappear under scrutiny. Rather than assume that scientists were primarily motivated by the logic of their theories, or breeders by a love for their traditional craft practices, we should recognize that scientists themselves have often made claims to artistry as bold as the claims to scientific competence occasionally made by artisans. Sometimes breeders relied upon their status as scientists, or their membership within a wider breeding community, other times they did not. On the issue of art and science, we ought not to be distracted by the question of which came first.

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ANGUS McLAREN, *Reproduction by Design: Sex, Robots, Trees, and Test-Tube Babies*. Chicago and London: The University of Chicago Press, 2012. Pp. viii + 235. ISBN 978-0-226-56069-4. \$55.00 (hardback).
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What do sex, robots, trees and test-tube babies have to do with each other, one might well ask on reading McLaren's list of seemingly disparate topics. As the author of a number of previous books that have explored the intersections of sexology, science and society, McLaren took up what he saw as a puzzle. He explains that while studying eugenicist Marie Stopes and her husband Reginald Ruggles Gates, he discovered in the archives that Gates was part of a group called Men of the Trees. What did this eager eugenicist from the early twentieth century see in a project that seemed focused on conservation of nature rather than human population control?

The answer lies in the shared emphasis on reproduction. McLaren's interest lies in the fact that in the interwar period in the United Kingdom, a number of popular writers saw reproduction as increasingly likely to be carried out by design. Questions about what it means to be modern, the role of technology and control, and the way popular culture took up such issues form the central topic of this book. In particular, McLaren tells us clearly that his central argument is that 'reproduction was a key site for many of those debating the needs of the modern mechanized world' (p. 2).

This is not a history of scientific ideas or of technology, but primarily of science fiction, literature and imagination. In the period between the wars, fresh with the horrors and worries of the first shocking 'Great' war in mind, many writers imagined the future. Some saw hope in being able to design and control reproduction so that we would end up without too many people and with the right kinds of people. Some saw the future not with hopeful fascination but with fear. They imagined brave new worlds of engineered societies and controlled reproduction. The reactions depended, in part, on whether the individuals themselves or some controlling authority were thought to be doing the designing.

While many of the writings and cases that McLaren includes are familiar, he pulls them together and adds into the mix many stories that are not well known (and not even good literature, as he notes) to reflect the views and values of society in a challenging historic period. Actually, he includes work from the late nineteenth century as well, but the focus remains on the interwar period.