Document generated on 10/12/2024 12:15 a.m.

Scientia Canadensis
Canadian Journal of the History of Science, Technology and Medicine
Revue canadienne d'histoire des sciences, des techniques et de la médecine

When Physics Became King. By Iwan Rhys Morus (Chicago: University of Chicago Press, 2005. xii + 303 p., ill., bibl., index, ISBN 0-226-54202-5 pb. US$25; ISBN 0-226-54201-7 hb. US$60.)

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Volume 30, Number 1, 2007

URI: https://id.erudit.org/iderudit/800530ar
DOI: https://doi.org/10.7202/800530ar

See table of contents

Publisher(s)

CSTHA/AHSTC

ISSN

0829-2507 (print)
1918-7750 (digital)

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Cite this review

Gooday, G. (2007). Review of [*When Physics Became King*. By Iwan Rhys Morus (Chicago: University of Chicago Press, 2005. xii + 303 p., ill., bibl., index, ISBN 0-226-54202-5 pb. US$25; ISBN 0-226-54201-7 hb. US$60.)]. *Scientia Canadensis*, *30*(1), 96–99. https://doi.org/10.7202/800530ar

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Science

When Physics Became King. **By Iwan Rhys Morus** (Chicago: University of Chicago Press, 2005. xii + 303 p., ill., bibl., index, ISBN 0-226-54202-5 pb. US$25; ISBN 0-226-54201-7 hb. US$60.)

When did physics emerge as a discipline? More specifically how and why did it become (putatively) *the* pre-eminently science? Now that physics is no longer so unequivocally "king" of the sciences—having recently ceded much prestige to the biomedical and environmental sciences—the question of its origins has acquired a peculiarly sharp significance. If the fading dominance of physics was a socio-economic and political contingency of the late twentieth century, perhaps its original rise to prominence might also be explained by similar means? Until recently, only scattered journal articles would have revealed how revisionist historiography has deployed the vicissitudes of context to account for the changing status, practice, and content of physics—in both laboratory and theoretical forms. By contrast, few younger readers could now share the presumption of Peter Harman's *Energy, Force and Matter: The Conceptual Development of Nineteenth Century Physics* (Cambridge, 1982) that physicists were motivated by the eternal questions of metaphysics, or the viewpoint of the modern physics textbook adopted in Robert Purrington's *Physics in the Nineteenth Century* (New Brunswick, 1997).

It is thus with some enthusiasm that one greets Iwan Morus's *When Physics Became King* as a volume that thoroughly historicizes its subject matter by appropriate reference to technological, institutional, and political issues. Morus's approach is amiably laid out in his introductory

chapter, albeit somewhat enigmatically entitled "Queen of the Sciences." He observes a fact that has rarely been conceded by an historian of physics in print: two hundred years ago there was no discipline called physics nor was there anyone who could be called a physicist—a term invented in the 1830s. To assert otherwise would be to overlook the very *recentness* of the phenomenon we call physics—as distinct from the much broader pre-modern notion of "natural philosophy" to which physics is a rather narrower and less ambitious heir. Morus illustrates this with a preliminary focus on a figure that is most ubiquitous in *When Physics Became King*, Lord Kelvin born in 1824 as William Thomson in Belfast —the city in which Morus composed this book. As Crosbie Smith and Norton Wise's *Energy and Empire: A Biographical Study of Lord Kelvin* (Cambridge, 1989) has emphasised, there were many intimate interconnections between this natural philosopher's concerns with mathematical theory, marine engineering, intellectual property, Presbyterianism and imperialism. Thus even an eminent natural philosopher alive a century ago did not regard his work as "physics"—nor ought we to glibly label it such.

Morus's argument goes beyond observing that forebears of present-day practitioners were not all keen to be called physicists nor to shun consideration of technology, patents, faith, or politics. The interesting thing is that Kelvin was important to Victorian culture for reasons quite distinct from those that made Albert Einstein a celebrity in the twentieth century (notwithstanding recent evidence that the author of the energy-matter equation was more worldly than popularly allowed). More generally, Morus contends that for each eminent physicist or laboratory we should consider the particularity of the cultural-material resources that were available to them and the specificity of the cultural-social forces that brought them to prominence. We can thereby break down the artificial boundary between physics and culture erected by Charles P. Snow and other scientific partisans in the mid-twentieth century.

To make the huge terrain covered by this book as intelligible as possible, the ensuing eight chapters are arranged thematically and falling within the period from the French Revolution to the outbreak of World War I. Each concisely recapitulates standard accounts, while adding in fresh primary source material and interpretive insights. These reveal the disagreements among practitioners that are all too often glossed over in Whiggish narratives, thereby making this book far more valuable than a useful textbook, occasionally challenging readers to adopt new perspectives on what might otherwise be familiar ground. Chapter 2 on "A Revolutionary Science" starts with the mathematisation of the disparate areas of mechanics, heat, electricity, and magnetism by France's rigorous

exponents of the calculus; it then seeks to link late eighteenth century political developments to the subsequent European emergence of what later became "theoretical physics."

Chapter 3 addresses the "Romance of Nature," showing how the practical and philosophical elements of *Naturphilosophie* developed symbiotically with a programme of the "correlation" of physical forces to nucleate what emerged under the name "physics." Chapter 4 concerns a topic on which Morus is most assuredly an expert: "The Science of Showmanship," especially as applied to the glamorous subject of electricity. Against a backdrop of ever more grandiose international electrical exhibitions throughout the nineteenth century, Morus leads us from William Sturgeon's modestly theatrical demonstration of the electromagnet to Nikola Tesla's high frequency spectacle of the fluorescent lamp—albeit understating the miserable poverty in which both men died.

The science of work forms the substance of chapter 5, documenting elegantly how steam mechanics and thermodynamics co-evolved, albeit not without controversy over the identity of key "discoverers" and tenets of heat physics. Chapter 6 on "Mysterious Fluids and Forces" shows how electricity was inextricably linked to phenomena both technological and highly strange in ways that challenged attempts to delineate orthodoxies. By contrast Morus brings out the industrial orderliness of astronomer's attempts at "Mapping the Heavens" and such "Places of Precision" as William Thomson's Glasgow Laboratory, the Cavendish Laboratory at Cambridge University, and the Physikalische Technische Reichsanstalt under Hermann von Helmholtz and Friedrich Kohlrausch in Berlin.

The book's final chapter "Imperial Physics" attempts the very difficult task of drawing together the multifarious strands of his arguments in summarizing how physics stood at the *fin de siècle*. Although not spelling out a strong link to the theme of empire, Morus offers interesting claims—some speculative—that go beyond conventional observations about the alleged crisis in late classical physics that brought relativity and quantum theory. He suggests that the pre-eminence of physics in defining the changing cultural balance between progress and entropy can be seen in the writings of Bulwer Lytton and H.G. Wells. Conversely the broader debates on the changing status of women were reflected in the decision of some physicists' to work with female collaborators and of others to allow only men in their lectures and laboratories; readers are left to infer for themselves whether there are broader gender implications in the metaphorical shift from physics as "queen" to physics as "king" of the sciences. Overall, though, the key to this work is the transhistorical comment that closes it. Nineteenth century physicists' awareness of the

fragility of their discipline made them work hard to create and sustain a niche for themselves in public culture. This surely captures the longer-term fortunes of physics—regal or otherwise.

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