

technological and visual value of photography to the respective sciences, places and modes of cultural production it discusses.

The Exposures series, in addition to presenting novel aspects of the history of photography, functions as a collection of introductory texts for those interested in the history of photography, visual anthropology or any of the other juxtapositions placed under scrutiny. One of the key strengths of Pinney's analysis is the way in which he integrates complex problems in the history of photography—such as the photograph as an icon or an index; the relationship between the photographic image, verisimilitude and trust; and the value of photographs in networks of exchange—with examples from the history of anthropology. This form of explication allows Pinney to root contested questions regarding the interpretation and value of the photograph in clear language and in situated contexts.

Like much of the growing literature in the history of photography and visual anthropology, the way in which Pinney utilizes and displays images in *Photography and Anthropology* makes it both enjoyable to read and a valuable example in how to integrate the reading of an image with a close reading of its value and use. The book has ninety illustrations, the majority of which are photographs. These are not superfluous to the text which surrounds them, but are used as visual evidence which motivates the narrative Pinney is able to tell between the photograph as an object of representation and an object that constructs, and has constructed, ways of looking at these representations.

Though Pinney skilfully deals with photography and photographic images, the main pitfall of this monograph is to be found in the story told about the history of anthropology. Many anthropologists continue to mythologize a history of anthropology which highlights an epistemological break between the 'armchair' anthropologist of the nineteenth century and the field anthropologist of the twentieth century, personified by Bronislaw Malinowski. Pinney, in particular, gives Malinowski the role of repositioning photography for anthropology from a visual object which is primarily an object of evidence to one which is an object of contemplation and reflection (pp. 50–62). This epistemological break ignores the broad range of nuanced visual and textual observational practices which were developed by ethnologists and anthropologists throughout the nineteenth century and which scrutinized the value, efficacy and role of photography for the study of human variety. Historians of anthropology and science should look to the recent work of Efram Sera-Shriar—his doctoral thesis 'Beyond the armchair' (Leeds, 2011) and his 'Ethnology in the metropole', *Studies in History and Philosophy of Biological and Biomedical Sciences* (2011) 42, 486–496—which speak to the problems associated with reading the history of anthropology as breaking between the nineteenth and twentieth centuries.

Bearing this in mind, *Photography and Anthropology* is still a valuable addition to the historiography of both of these sciences, and should appeal to many historians of science interested in visual culture, the communication of the sciences and the sciences of human diversity.

GEOFFREY BELKNAP  
*Harvard University*

CHRISTOPH GRADMANN and JONATHAN SIMON (eds.), *Evaluating and Standardizing Therapeutic Agents 1890–1950*. Basingstoke: Palgrave Macmillan, 2010. Pp. xiv+266. ISBN 978-0-230-20281-8. £60.00 (hardback).

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In *Evaluating and Standardizing Therapeutic Agents*, Christoph Gradmann and Jonathan Simon add new and important insights into the role of standards in pharmaceutical and medical practice, thus complementing a growing literature concerned with the part played by standards in building communities of scientists from the end of the nineteenth until the middle of the twentieth century.

Much of this literature has focused on the standardization of scientific practice in connection with the electrical industry, showing how, in order to communicate new findings and assess their validity, expanding disciplinary communities in the physical sciences depended increasingly on ‘technologies of trust’ (e.g. machines enabling quantitative measurements). This edited volume adds to this literature by gathering essays on the topic of pharmacy and medicine, which have so far received far less attention from historians and philosophers of science. Although physical instruments have also contributed to the standardization of medical practice (as Volker Hess has demonstrated in the case of the thermometer), this volume is concerned with drugs – more specifically, biological therapies – which became a mainstay of medical intervention in the period under study. Like physical instruments, drugs not only contributed to the standardization of medical practice, transforming doctor–patient relationships in the process, they also themselves became standardized. Until the advent of vaccines and sera, the dominant method for standardizing drugs had been the ‘chemical approach’, i.e. either the synthesis or the purification of a substance and the determination of its precise weight – an approach that emerged not from the apothecary’s shop, but from the laboratories of the nascent chemical industry, reflecting a shift in the main mode of pharmaceutical production at the end of the nineteenth century. However, the novel biological therapies that were developed in the 1890s could not be weighed in the same manner as chemical compounds. For their quality to be measured and controlled, numerical values had to be assigned to their physiological activity instead. Like the weight of chemical drugs, the measure of physiological activity therefore helped to legitimize the incorporation of biological therapies into the modern therapeutic arsenal, and the techniques that permitted such a measure were later extended to chemical remedies as well.

These changes did not happen in an economic and political vacuum. They occurred against a background of growing state involvement in public health, principally in imperial Germany and other countries of western Europe, where government institutions showed increasing interest in the value of novel therapeutic agents. Hence the concept of *Wertbestimmung*, meaning ‘determination of value’, is introduced by the editors at the beginning of the book, and its influence on the development of the medical sciences and pharmacy in the twentieth century is explored in several of the volume’s contributions. Because of its public-health importance, and the particular production problems it posed, diphtheria antiserum played a pivotal role in this evolution, and is the subject of the first chapters, on the early serum institutes and other producers in specific national contexts (Germany, France and, to provide an example other than that of the two great microbiological pioneers, Switzerland). In her paper on the role of the League of Nations in establishing international biological standards, Pauline Mazumdar also shows that diphtheria antiserum played a major part on the international political scene. Concluding this first part of the book is a chapter by Anne Hardy on the State Serum Institute in Denmark, which was the crucial thread tying together the international standardization project described by Mazumdar. The book then examines how the practices developed for the evaluation of diphtheria antiserum came to serve as a model for biological therapies of other kinds – with more or less success, as in the case of Almroth Wright’s therapeutic vaccines, the plant extract digitalin, the sex hormones and the polio vaccines. In that sense, *Wertbestimmung* also functioned as a ‘boundary object’, helping to communicate knowledge and mediate the interests of a variety of actors well beyond the initial model of diphtheria antiserum. Like electrical units, therefore, standard measures of physiological activity reveal the interpenetration of a wide range of interests, whether scientific, medical, political or economic. Finally, in a postface that extracts common themes from the volume, linking them to studies of recent medical science, Alberto Cambrosio highlights the fact that the essays in *Evaluating and Standardizing Therapeutic Agents* describe the beginnings of biomedicine (i.e. a ‘direct interaction between biology and medicine’ (p. 262)). This was associated with a new kind of objectivity, referred to by Cambrosio and others as ‘regulatory objectivity’, which has become a

constitutive element of modern medical practices and entities (including drug therapies), and at the centre of which standards and standardization have been situated.

In sum, by engaging with concepts such as *Wertbestimmung* and providing a rich body of empirical evidence on the role of standards in the development of biological therapies, Christoph Gradmann, Jonathan Simon and their co-contributors throw significant new light on the origins of biomedicine in the late nineteenth and early twentieth centuries.

VIVIANE QUIRKE  
Oxford Brookes University

DAVID C. CASSIDY, *A Short History of Physics in the American Century*. Cambridge, MA and London: Harvard University Press, 2011. Pp. 211. ISBN 978-0-674-04936-9. £22.95 (hardback). doi:10.1017/S0007087412000945

David Cassidy's new survey of twentieth-century physics is indeed short: about 170 pages of text. It aims for a brief introductory synthesis for students and the general public, so much of it will be familiar to scholars. It is primarily a history of American physics, though with occasional nods to developments abroad, such as for quantum mechanics. It has chapters on the *fin de siècle* emergence of American physics; growth in the First World War and the 1920s; the Depression; the Second World War, radar and the bomb; two chapters on postwar physics; Sputnik and the 1960s; and a long concluding chapter on the last four decades. A useful appendix provides data on numbers, demographics and funding of American physicists.

Cassidy's book will serve well as a synthesis for undergraduate courses in history of physics. It nicely complements recent short surveys of nineteenth-century physics, including Bruce J. Hunt's *Pursuing Power and Light* (2010) and Iwan Rhys Morus's *When Physics was King* (2005), both of which tell a mostly European story. Mary Jo Nye's *Before Big Science* (1996) covers the period from 1800 to 1940 and includes chemistry. Cassidy starts his story at the turn of the twentieth century and focuses on physics in the US. He provides a short alternative to more detailed surveys of twentieth-century physics, such as Helge Kragh's *Quantum Generations* (1999) and, on the American context, Daniel J. Kevles's *The Physicists* (1995). One regrets, though, the assumption – certainly grounded in teaching experience – that today's undergraduate can only tackle two hundred pages of text in a term.

Cassidy gives due attention both to ideas and to institutions. For the former, he generally provides clear explanations of physical concepts and theories; the book's brevity, however, at times limits discussion, and topics such as band spectra, isotopes, quantum field theory and quarks may mystify non-physics majors. For institutions, Cassidy pays particular and welcome attention to industry, where many – by the end of the century, most – American physicists worked. He shows how the rise of physics helped underpin the American century, through physicists' familiar role in nuclear weapons and other military technologies, and through their perhaps less recognized contributions to commerce; Cassidy nicely traces developments such as integrated circuits, lasers and supercomputers to their roots in physics research.

Cassidy addresses familiar issues for American physics, including the rise of collaborative Big Science, and especially the twin tensions between pure and applied science, and between political autonomy and the desire to serve national interests and tap federal funds. He shows how the American political system and society had subsumed physics by the 1970s, evident in the disappearance of powerful scientist-administrators. The book implicitly reveals this development: the early chapters include short biographical sketches of exemplary figures: Jewett, Hale, Millikan, Lawrence, Oppenheimer, Karl Compton, Melba Phillips, Vannevar Bush. These capsule biographies disappear from the postwar chapters. Cassidy documents persistent sexism, ethnic and racial discrimination and anti-Semitism in the physics profession. He also touches on historiographical debates, especially Paul Forman's thesis on military influence on postwar science