

distinctions is highly problematic, especially considering the broad body of research over the last twenty years which has worked to erase them.

The fundamental flaw of the book, therefore, is that it does not engage with recent literature on the history of science, technology or photography. Considering the emphasis on science within the book, for instance, it is disconcerting that Gillespie writes in her introduction that ‘by the early nineteenth century the term “science” was used much as it is today, referring both to the types of topic studied (the occurrences of the material universe) and to how those studies were conducted’ (p. 3). Recent works, such as Bernard Lightman’s *Victorian Popularizers of Science: Designing Nature for New Audiences* (2007), John Tresh’s *The Romantic Machine: Utopian Science and Technology after Napoleon* (2012), Josh Ellenbogen’s *Reasoned and Unreasoned Images: The Photography of Bertillon, Galton, and Marey* (2012) or Kelley Wilder’s *Photography and Science* (2009) would have dissuaded Gillespie of the belief that these histories have remained unchanged since the nineteenth century.

The potential of a book-length study of daguerreotyping in America is rich – and this emerges most clearly in Gillespie’s final chapter, where she highlights a variety of practitioners who were adapting and inventing new techniques, emulsions and perspectives for daguerreotypes. These photographers were integrating the crafts of portrait perspective, advances in chemistry and optical and mechanical instrument-making – and if Gillespie had taken this perspective as the core of her argument throughout the book, then her study would have greatly improved our understanding of the integrated histories of science, technology, art and photography in this early period. The historiographic perspective adopted by Gillespie, however, is likely influenced by the context of the book’s publication – it is part of a series on studies of innovation and invention. To this end, Gillespie’s argument focuses on explaining why the daguerreotype came to be understood as an ‘American process’. The answer to this question, for Gillespie, is that while American science was undervalued, the ideal of technological invention was privileged. American culture, in this argument, was not scientific but technologist, and thus the daguerreotype was privileged because it was a material achievement, not an intellectual one. This kind of argumentation demands compartmentalization of science and technology as epistemologically and materially distinct. In this way, Gillespie has created a history of the daguerreotype which is not reflective of the historical actors’ beliefs or actions toward photography in the mid-nineteenth century. The book, therefore, for historians of science or photography, unfortunately occludes more than it clarifies of the history of the American daguerreotype.

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PETER HOBBS, *Venomous Encounters: Snakes, Vivisection and Scientific Medicine in Colonial Australia*. Manchester: Manchester University Press, 2017. Pp. xiii + 202. ISBN 978-1-5261-0144-0. £70.00 (hardback).

doi:10.1017/S0007087417000723

Part of the long-running Studies in Imperialism series from Manchester University Press, this animal-centred account tracks the development of snake venom science in colonial Australia between 1840 and 1914. Across six thematic and broadly chronological chapters, Peter Hobbs demonstrates how animal experimentation to investigate the action of venoms and potential antidotes was practised widely across the antipodes. He seeks to write animals back into colonial science as sentient beings and indispensable (though unwilling) participants. Rather than authoritative assertions by individual investigators, venom science in Australia was characterized by ‘crowd participation and plebeian expertise’ (p. 164). Snakes loomed large in the Australian ‘ecology of dread’ (p. 3). Finding which were harmful and what to do when bitten were enduring preoccupations for white settlers as they co-colonized alongside their domesticated animals. But

with relatively few cases of humans being bitten, the main way of determining which snakes were venomous was by observing the effects of bites on familiar animals. In the first half of the nineteenth century, these bites moved from accidental to very deliberate.

In his opening chapter, Hobbins elucidates his concept of the ‘colonial animal matrix’ to highlight the contingency of ethical, economic and affective valuations of animals. Attitudes towards animals were dynamic and relational, especially with respect to the domestic animals with which Europeans co-colonized the continent. Unfortunately for snakes, they were permanently anchored at the bottom of the hierarchy and their lowly status was transferred to the other animal participants in experiments, which were most commonly canine. But it was never simply a case of observing the effects of snakebite. Envenomation was consistently dogged by questions of proof. The recurrent tension over the relative validity of clinical experience and vivisection was mediated through individuals, professional bodies and state apparatus. The second chapter, focusing on lay expertise regarding snakebites and their treatment, shows that use of vivisection to investigate venom was not driven by clinicians and men of science. ‘Spruikers’, or itinerant pushers of alleged snakebite remedies, used the spectacle of public envenomation to attract attention to their wares. These antidote shows ‘foregrounded animal sacrifice as an intimate instantiation of a universal “natural” phenomenon’ (p. 47). The middle decades of the century were a transitional period where medical elites collaborated with pedlars who demonstrated their remedies on themselves and on animals.

A remarkable feature of the history of venom science is the role of fatal accidents resulting from rash behaviour, sometimes under the influence of alcohol, which caused public sensations and spurred fresh efforts to investigate venom. The death of a merchant in Melbourne from the bite of a Ceylonese cobra in 1867 directly led to the involvement of the University of Melbourne’s first professor of anatomy, physiology and pathology, George Halford, in cobra venom research. The third chapter, which undertakes a Latourian ontology of venom, hinges around Halford’s germ theory of snake poisoning, in which venom comprised living ‘germinal matter’ from the snake that interacted with host cells to produce a hybrid nucleated cell. Halford also proposed that cholera might be caused by the clouds of desiccated cobra venom from innumerable deceased snakes. Hobbins suggests that the most alarming aspect of the germinal theory of venom was its positing of human–non-human hybridity at a time of growing human identification with animals. Halford was a critical figure in mobilizing transnational networks along which letters, papers, snakes and venom travelled unevenly between Australia, Bengal, Britain and Philadelphia.

The promotion of intravenous injection of ammonia by Halford as a treatment for snakebite sparked acrimonious medical debates over the evidentiary worth of different practices across colonial Australia and India between 1868 and 1876, explored in the fourth chapter. The nature of proof was at stake, ‘pitting the testimonies of medical gentlemen against envenomed dogs’ (p. 85). Hobbins uncovers considerable intercolonial rivalry between investigators, which extended beyond methodologies to ideas about the relative toxicity of each other’s snakes. Conflicting groups were united in the use of the hypodermic syringe, which was emblematic of experimentally controlled doses of venom and therapeutic. Syringes were components of new snakebite kits, which provided buyers with peace of mind even if on the rare occasions they were used they did as much harm as good.

In contrast with late Victorian Britain, Hobbins finds little moral opprobrium for vivisection in the Australian colonies, where pragmatic settlers more readily commoditized animals. Chapter 5 discusses the regulation of vivisection in the colony of Victoria, which was second only to Britain in legislating in this area in 1881. Hobbins shows that the regulation served mainly to protect human vivisectionists rather than animal subjects, helping to define who counted as a suitable experimenter. Such was the apparent moral worth of finding a remedy to snakebite that consideration of the welfare of all animal participants in those experiments was negligible. The final chapter

takes the account up to the First World War and investigates how Australian snakes and venoms intersected with the story of Albert Calmette's 'universal' *antivenin* which emerged from the Pasteur Institute in Saigon, situating venom science in respect of the quantitative turn in pathology, bacteriology and physiology after 1880. The data of venom science in the form of tracings, tables of numbers and microscopic observations pointed to the biochemical variability and geographical specificity of venoms, and confounded hopes that scientific medicine would provide a universal antidote.

This fascinating book remains enjoyable reading throughout, and deserves a broad audience far beyond historians of scientific medicine. An extensive and diverse range of primary sources and secondary literature has been consulted, and the book engages with numerous classic topics from the history of science, such as evidence, witnessing, expertise and authority. It serves also as a corrective to the still-dominant picture of colonials as collectors, and both highlights the specificity of Australian colonial science and reaffirms the need to focus on intercolonial circulations. It would have been valuable to learn more about Indigenous Australian conceptions of snakes and venoms. In its close treatment of the relationships between practitioners, snakes and dogs, *Venomous Encounters* is suggestive of how animals themselves have affected scientific practices.

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ROB BODDICE, *The Science of Sympathy: Morality, Evolution, and Victorian Civilization*. Springfield: University of Illinois Press, 2016. Pp. iv + 179. ISBN 978-0-252-08205-4. €28.00 (paperback).
doi:10.1017/S0007087417000735

Darwinism. Eugenics. Vaccination. Vivisection. All are topics well known to the trained historian of nineteenth-century medicine or science. Indeed, it would be easy to presume that there would be relatively little left to say on such well-rehearsed topics. However, in *The Science of Sympathy: Morality, Evolution, and Victorian Civilization*, Boddice tackles each of these themes head-on from a fresh history-of-emotions perspective.

Boddice's starting point is Darwin's idea that the basis of morality in civilized societies was derived from a natural, but highly developed, capacity for sympathy. The more sympathy a population had, the more civilized and moral it would be. In Darwin's view, this helpfully explained the apparent superiority of white, middle- to upper-class educated Victorian men. However, Boddice persuasively argues that these Victorian men possessed a particular form of emotional 'sympathy' that was radically different from that which we experience (or are expected to experience) today. This was a type of sympathy that, between around 1870 and 1900, gave birth to the idea that vivisection, compulsory vaccination, even the eugenic remoulding of societies, were all compassionate acts and, importantly, moral ones.

In pursuing this approach, Boddice sets out a framework, grounded in emotions-history methodologies, for better understanding how ideas and actions that appear abhorrent in the twenty-first century once made sense in the context of, particularly, late Victorian emotional regimes. Moreover, Boddice moves away from the abstractions of some emotions-history research to produce an impressive book which demonstrates how emotions actually worked in society, how they shaped and created medical and social interventions, how ideas led to practices.

Boddice's opening chapter examines Darwinian concepts of sympathy and outlines the emergence of a new, sympathetic and scientific man of thinking – an individual with self-defined superior intellect, emotional disposition, social insight and new experimental means to effect change. This individual also saw himself as the embodiment, if not implementer, of an evolved future for humankind, one in which suffering had been structurally reduced, all thanks to the advance of medical science, public health and eugenic measures.