

done his part of the bargain. The criminal has to consent to this of his own free will. This kind of calculation – which even Diderot subscribed to, as can be seen in the article ‘Anatomie’ of the *Encyclopédie* – is still less chilling than Fichte’s entirely formal definition by which a criminal who has been condemned to capital punishment is already a non-person. Chamayou quotes Fichte explaining that once a death sentence has been pronounced on a criminal, he is *bürgerlich tot*, ‘dead from a civil standpoint’, hence anything that is done to the physical body of the individual does not concern his civil status any longer, including his rights (p. 89). Yet Maupertuis, too, recommends we ‘not be moved by the air of cruelty we might think to find here: a man is nothing compared to the human species; a criminal is even less than nothing’ (p. 81).

Other categories of people who were considered legitimate for experimentation, moving into the second half of the nineteenth century, were the mentally ill and severely retarded, and prostitutes (particularly for inoculation experiments with syphilis). Chamayou quotes one disturbing – and disturbingly illogical – response by a prominent syphilis researcher in Paris, Dr Auzias-Turenne, to an official inquiry in 1853 into whether he could be allowed to inoculate syphilis to a group of prostitutes held at the St Lazare prison. Partly anticipating the notion of consent and treading on it at the same time, Auzias-Turenne explains that the prostitutes must agree to the experiments ‘of their own free will *and be subjected to mine* [ie. his own will]’ (p. 287).

This is a heavily Foucauldian work, filled with both the familiar jargon of that school and some of its own, such as the ‘cognitive surplus value’ (p. 179) which is extracted from the bodies of the prisoners. This sounds more Marxist, and indeed Chamayou often refers approvingly to Marx, who himself called attention to the expression *corpore vili*. Perhaps this marks the difference between Chamayou’s treatment of human experimentation and other, more scholarly

treatments, such as those by Anita Guerrini or Andreas-Holger Maehle – his more explicitly political approach. Indeed, Chamayou suggests that the problem does not reduce to a duality of the ‘purely scientific’ versus ‘ethical’ considerations: as is clear in the cases of colonial, racialised medicine (discussed in the last chapters), or the use of prisoners and prostitutes, there is a dimension of *power* and subjection which is unavoidable in this story. At the same time, as he moves away from the Enlightenment and its aporias toward nineteenth-century experimental subjects, such as soldiers or individuals with wounds which have revealed an organ enabling exceptional *in vivo* experiments, Chamayou loses some of his theoretical momentum. Rather than extending the analysis all the way until the early twentieth century, it might have been useful to have included even a brief discussion of human experimentation *before* the early modern period, so we would have a better sense of whether or not the Enlightenment constitutes a ‘break’.

Les corps vils is nicely illustrated (I recommend the reproduction of Hogarth’s *Four Stages of Cruelty*), elegantly written, if sometimes too enamoured of its own phraseology, and clearly and consistently argued, especially in the political sense mentioned above. It contains numerous vivid quotations from primary sources, often unknown. We can learn a lot about human experimentation in Enlightenment philosophy and medicine (chiefly French, but also German) from this book.

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Marc J. Ratcliff, *The Quest for the Invisible: Microscopy in the Enlightenment* (Farnham: Ashgate, 2009), pp. xvi + 315, £60.00/\$124.95, hardback, ISBN: 978-0-7546-6150-4.

Traditionally, historians of microscopy considered the eighteenth century ‘the lost century’ – Brian J. Ford, *Revealing Lens* (London: Harrap, 1973) – a time of decline in microscopy research, bookended by a burst of activity in the seventeenth century with the work of Leeuwenhoek, Malpighi, and others, and the rise of microscopy to a position of scientific prominence in the nineteenth century. Historians have attributed the nineteenth-century resurgence to the development of the compound achromatic microscope and the emergence of cell theory in the 1830s, culminating in the era of microbiology in the second half of the century. Using manuscript and printed sources not consulted by others, Marc Ratcliff revises this interpretation, contending that the eighteenth century was a time of serious microscopy research, primarily in the natural sciences. Jutta Schickore made the same point in her recent book, *The Microscope and the Eye: A History of Reflections, 1740–1870* (Chicago: University of Chicago Press, 2007), but Ratcliff provides much more detail.

Ratcliff tells his story of eighteenth-century microscopy in three parts. In Part I, 1680–1740, researchers sought to determine what constituted a good microscopical object. At first they focused on animalcules, an approach inherited from the previous century, but these invisible organisms could not provide a shared viewing experience. By the end of this period, investigators had settled on insects and seeds, both visible with the naked eye, but whose viewing could be perfected and enhanced by the use of the microscope. They could also share what they saw and communicate their findings.

From 1740 to the 1760s (Part II) there was a turning point in the history of microscopy, exemplified by the work of Abraham Trembley, whose polyp aroused enthusiasm throughout Europe because of its ability to regenerate itself. Trembley made major contributions to the shared research effort; for example, he developed ways of shipping living organisms for shared viewing. This era also witnessed the development of the experimental

research laboratory and the experimental report to which Trembley made important contributions. During these years the modern experimental report became commonplace. According to Ratcliff, Trembley was ‘the major driving force for the 1740’s take-off in microscopical research’ (p. 117).

After the polyp, microscopy research moved into marine zoology and other areas of investigation. By the end of the century (Part III), microscopy researchers took up the ‘quest for the invisible’ by turning their attention to infusoria, objects only visible with the microscope. This new focus posed classification problems, since Linnaeus’ classification system could not easily accommodate infusoria. The Danish researcher, Otto-Friedrich Müller, developed his systematics of infusoria by applying the canons of modern natural history to known microscopic species. Müller’s influence was great: he was the first to classify animalcules according to the Linnean system and in accordance with the extant physiological knowledge. His *Animalcula Infusoria* provided a foundation for microscopical zoology into the 1820s. Müller’s work allowed a whole community of microscopy researchers to constitute itself around the invisible, now that they had a common language and a systematic model to enable communication.

Overall, Ratcliff de-emphasises social and political explanations commonly used by sociologists and historians to explain science, arguing that communication and cognition were constitutive of eighteenth-century microscopy. Communication was key to the formation of a European-wide research community. Journals were the vehicle, along with scholarly societies, exchanges between individual scholars, letters, handbooks, reports, and specimens.

Ratcliff argues that the ‘the lost century’ was a construction by nineteenth-century microscopy researchers who sought to distance themselves from the ‘amateur’ work of predecessors, conducted on what they considered inferior instruments. These microscopists judged the results of eighteenth-

century research as unsophisticated compared with nineteenth-century advances in cellular theory and pathology.

This book will be indispensable for historians of microscopy and eighteenth-century natural science. Historians of medicine will find the book of interest, although the focus is not on medical microscopy. Two chapters on microscopes in the market-place provide a context for understanding microscopy questions and research. Copious illustrations and tables enhance the reader's understanding of the eighteenth-century microscopy enterprise. The book has some weaknesses. Sloppy copy-editing detracts from the reader's experience. Furthermore, Ratcliff may have included too much information: the book is dense. All in all, however, Ratcliff deserves much credit for this fine scholarly monograph.

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James C. Whorton, *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work, and Play* (Oxford: Oxford University Press, 2010), pp. xxii + 412, £16.99, hardback, ISBN: 978-0-19-957470-4.

No mere chronicle of lives of the great poisoners, *The Arsenic Century: How Victorian Britain was Poisoned at Home, Work, and Play* takes up the broad question of a society's response to a cheap and lethal substance present in multiple consumer products. Whorton's twelve chapters range widely across fashion, medicine, and technology, in exploring how arsenic got into Victorian bodies. Beyond purposeful poisoning there were many non- or less-deliberate poisonings from accidents or from chronic exposure in homes, on farms, or in mines or factories. A white powder in some common forms, arsenic was readily mistaken for innocuous white powders. Arsenical

compounds brightened candles, and, as Schweinfurt green, dyed dresses and wall-papers, including those of William Morris. Low doses were held to strengthen the heart and beautify the complexion; arsenic was an active ingredient in popular medicines. It was in sheep dip and clung to the shepherd. As a contaminant of sulphur ores, it got into sulphuric acid, and into whatever was made with that industrial mainstay, such as Manchester beer, brewed with sugar rather than malt, the sugar having been refined with such acid. Of course, arsenic's ubiquity left Victorian murderers and murderesses with ample alibis – she had bought all that arsenic only to kill rats, said one.

For most of the century it was tricky to prove arsenical poisoning, much less identify a culprit. By mid-century, the Marsh and Reinsch tests had helped to consolidate a cadre of forensic experts. But hope of certainty in outing poisoners only spurred ingenuity among defence attorneys – perhaps the arsenic seeped into the buried corpse in the groundwater? Thus arsenic remained a destabilising power within Victorian society – it affected gender roles, relations of master and servant; relations within families; among professions. A series of trials in the late 1840s disclosed a league of lower-middle-class Essex women who pursued mutual improvement via strategic poisoning and were able successfully to hint that local (male) juries would be unwise to convict any of them. The new life insurance industry, particularly in the form of burial clubs, may have served as a stimulus package for arsenic use – there could be a premium on the elimination of an extra child or inconvenient spouse or relation.

Yet much arsenical poisoning was due to frivolousness – fashion over safety – or to institutionalised neglect. Whorton also draws attention to the sort of surplus-extracting bargains between capital and labour (or consumers) that so horrified Karl Marx: at best, the response to regular damage to health of those who mined or refined arsenic ores or prepared wall-papers was minimal mitigation – a handkerchief over the face.