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Piers D. Mitchell (ed.), *Sanitation, Latrines and Intestinal Parasites in Past Populations*. Farnham; Burlington VT: Ashgate, 2015. Pp. 278. ISBN 9781472449078. \$124.95.

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This volume contains twelve articles discussing sanitation, toilets and pathogenic parasites in the past, when hygiene—as we understand the word—did not come close to meeting modern western standards. Of these twelve papers two authors, Piers D. Mitchell and Evilena Anastasiou, have contributed six (four and two respectively).

A striking element in this scholarly volume is the variety of disciplines: archaeology, medicine, biology, parasitology (including paleoparasitology and/or archaeoparasitology), sociology and history. Some articles give a meticulous description of toilets, their archaeology, construction, history and development, while others focus on biology and parasitology. In some articles, numerous tables are included (especially in chapter nine). Overall the number of illustrations is low, and some chapters have few or no illustrations.

In chapter one ("Why We Need to Know About Sanitation in the Past") Mitchell gives an overview of the themes and disciplines covered in each of the chapters and explains (rightly) that it would be impossible to describe sanitation and its history through all periods and areas on earth. The science of paleoparasitology is relatively young and many areas and periods have not yet been researched. The latrines from the title are mainly discussed in the first six chapters; the parasites mainly in the last six.

Chapter two ("Assessing the Impact of Sanitation upon Health in Early Human Populations from Hunter-gatherers to Ancient Civilisations, Using Theoretical Modelling"), the second contribution from Mitchell, describes the relationship between health and hygiene on the one hand

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and the transition from hunter-gatherers (nomads) to the first settled civilisations on the other. Some species of animals, like cattle and pigs, were domesticated. This way of life attracted parasites that found their domicile in the alimentary canal and could move from animals to men, since the excrement of both was now dropped in one place. At a later stage, people constructed toilets to tackle this problem. Mitchell states, 'It is possible that they developed...latrines to improve smells, without having any concept that it might improve their health' (p. 6). The use of (human) excrement as fertilizer on their fields was another reason for the increase of parasites, especially the worms *Ascaris lumbricoides* and *Trichuris trichiura*.¹

The theme of chapter three ("Waste Management in Early Urban Southern Mesopotamia") by Augusta McMahon is the history of the development and functioning of the very first toilets, in Mesopotamia. Already in the sixth millennium BC the discharge of wastewater had been undertaken in this area and by the fourth millennium BC toilets were being used, but these toilets were primitive and as a result people were exposed to parasites and parasite-related diseases and epidemics.

Chapter four ("Latrines and Wastewater Sanitation Technologies in Ancient Greece") deals with the history of the toilet in Minoan Crete (2100-1400 BC) and during the Classical to Hellenistic periods (fifth to first century BC). Georgios P. Antoniou and Andreas N. Angelakis describe how flushing technology was incorporated into the Minoan palaces, where toilets were more developed than their Mesopotamian predecessors. From the Classical period onwards, toilets were constructed in the typical form of Graeco-Roman toilets: a series of seats, equipped with a key-hole-like opening in front, positioned above slanting ducts, which allowed waste to be discharged into the sewers. With twelve figures, this is a well-illustrated chapter.

The volume does not contain a separate chapter solely devoted to Roman toilets, but the following chapter discusses both Antiquity and the Middle Ages ("A Tale of Two Cities: The Efficacy of Ancient and Medieval Sanitation Methods"). Here Craig Taylor clearly and meticulously compares the sanitation of ancient imperial Rome and medieval London. Both cities were equipped with a central organisation that was responsible for the removal of garbage and excrement, a difference being that in Rome, there were both open and closed sewers, while in London only open sewers were used (the sewers of Roman London having long gone out of use). Water for bathing was considered unhealthy and public bathhouses had the negative connotation of lust and prostitution.

In chapter six ("Sewers, Cesspits and Middens: A Survey of the Evidence for 2000 Years of Waste Disposal in York, UK"), Allan R. Hall and Harry K. Kenward describe the history of sewers and parasites in the English town of York. This article is the only one in this volume that is set up diachronically and it moves from Roman

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York (Eburacum) through to the nineteenth century. During York's long history, more traces of the eggs of parasitic worms are found in some periods, like the Anglian period (fifth to ninth centuries), than in the Viking Age, which followed.

In chapter seven ("Human Intestinal Parasites and Dysentery in Africa and the Middle East Prior to 1500") Evilena Anastasiou and Piers D. Mitchell restricted analysis to Egypt, Sudan, South Africa, and Israel, in spite of the sweeping title of the chapter. The authors state that vast regions in western and central (Sub-Saharan) Africa have not yet been investigated. It is interesting to learn that the origin of several species of the parasite *schistosoma* goes back 70 million years, to the time of the dinosaurs!

In Chapter eight ("Parasitism, Cesspits and Sanitation in East Asian Countries") sanitation in China, Japan, Mongolia, Korea and Taiwan is discussed. According to the authors, Min Seo and Dong Hoon Shin, much research has already been done (especially in Japan) on coprolites. The majority of the Asiatic civilisations that have been researched were agrarian societies with poor sanitation facilities, although some palaces were equipped with more developed toilets, like the palace of Wanggungri in Korea. Since agrarian societies are generally more affected by parasites than nomadic societies, the nomads of Siberia probably suffered less from such infections.

The next chapter ("New World Paleoparasitology") by Adauto Araújo, Luiz Fernando Ferreira and seven others moves from the Old World to the New World, and in it the authors reject the widespread modern belief that the colonisation of the Americas by the Europeans was made easier by the fact that the Amerind people were not able to resist certain pathogens that had been imported from the Old World. Long before the arrival of Europeans there were Eurasian helminths in the Americas, probably imported via the Bering Strait, and mummies show that these parasites had a significant effect on the inhabitants' health. The chapter ends with an enumeration of parasites, dates, archaeological sites and relevant literature.

Chapter ten ("Parasites in European Populations from Prehistory to the Industrial Revolution") by Evilena Anastasiou returns to the Old World and is mainly an enumeration of parasites and the evidence for their appearance in the coprolites and mummies of several European countries, especially the Netherlands, France, Switzerland, Austria, Germany, the Scandinavian countries and Greece, all subdivided into chronological periods. The relationship between parasites and the transition from hunter-gatherers to settled farmers especially with respect to their consumption of meat and fish is also discussed in this chapter.

In chapter eleven ("A First Attempt to Retrace the History of Dysentery Caused by *Entamoeba histolytica*") Matthieu Le Bailly and



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Françoise Bouchet describe specifically the history of the dysentery-causing parasite, *Entamoeba histolytica*. Originally, this pathogen lived only in Europe but it has migrated throughout the entire world.

Chapter twelve ("A Better Understanding of Sanitation and Health in the Past") by Mitchell is a summary of the other chapters of this volume. The transition from hunter-gatherers to settled farmers and, finally, to city-dwellers changed the relationship between human beings, their domesticated animals like cattle and pigs, and their parasites: roundworms, whipworms, hookworms and tapeworms. As a result of closer contact between men and animals, the number of parasites increased and caused intestinal diseases. Toilets were constructed to prevent or reduce stench, and feces were used as fertilizer. Paleoparasitology and archaeoparasitology are relatively young sciences, and in the coming years there is much research to be done. The volume ends with a general bibliography and a short index.

This volume is well-produced and the chapters are written in an eloquent, scientific English style. So it is disappointing that the footnotes and some figures contain annoying mistakes and inconsistencies.² There are also some problems with spelling, especially in words and names in non-English languages.³

The quality of the volume would have profited from a larger number of maps. Many locations in London and York are mentioned (chapters five and six), but the reader has no means of knowing where they are. This is also the case in chapters seven and eight.

The bibliography fails to mention an important book on the theme of this volume, Jared Diamond, *Guns, Germs and Steel: The Fates of Human Societies* (London 1997, and several reprints). In this book, the role of pathogens during the colonisation process and the early period of European hegemony is discussed. The index is short. An unimportant name, Arnald of Villanova, is listed, but persons more frequently referred to such as Pliny and Varro are lacking. Moreover, references to the Indus Valley and other important geographical names are not included. The Latin names of parasites should have been listed; they are mentioned frequently and it should be possible to find them irrespective of the way that they are referred to.

In short, this book contains useful information on the history of parasitology, still a mainly untrodden path. However, the lack of a useful index, an inadequate number of maps and the presence of annoying mistakes and inconsistencies decrease its value. Moreover, a general bibliography can be helpful but in this case it is actually redundant, since all bibliographical information is already given in the footnotes. In fact, abbreviated information in the footnotes would have saved much space.

Notes:

1. The statement that Hippocrates wrote the treatise *Airs Waters Places* (p. 16), however, is not correct. While it does belong to the so-called Hippocratic Corpus, formerly ascribed to Hippocrates, it is now clear that these treatises were not written by Hippocrates himself.
2. In chapter four, there are many mistakes and inconsistencies. The map (p. 43) shows a mixture of English, Greek, and incorrect geographical names: Athens (English), Miletos (Greek) and Pergamos (this should be Pergamon or Pergamum). Ephesus (English) = Efes (Turkish) = Ephesos (Greek) is mentioned as Efessos, which is a colloquial transliteration of the modern Greek. On p. 44 n. 12 and n. 13 we find an inconsistent use of spaces between initials, as for instance under the illustrations at pp. 48 and 49. At p. 53 n. 46 the Greek spiritus and some accents are missing. On the same page, in the main text, there is 'Philipp' for 'Philip'; in Greek Philippos. We find 'Asklipieia' (= sanctuaries of Asclepius) on p. 59, 'Asclepieia' on p. 60 and 'Asclepeion' on p. 62. The journal *Akroterian* mentioned in n. 17 is *Akroterion*. In chapter five (p. 94) we are presented with 'The 3rd century AD doctor Galen'. There is clumsiness and inaccuracy here: it should read 'the second-to-third-century doctor Galen'.
3. In German: p. 59, n. 61, 'haus' for 'Haus'; 165 n. 2 'Uber die erhaltungsfähigkeit von helmintheneiern in vorand friihgeschichtlichen moorleichen' for 'Über die Erhaltungsfähigkeit von Helmintheneiern in Vor- und Frühgeschichtlichen Moorleichen' (the text, maybe, has been scanned?). In Dutch: p. 116, n. 65: 'Oudheikundig' for 'Oudheidkundig'. In French: p. 124 n. 10 'Troisiemes Journees' for 'Troisièmes Journées'.