If you listen to the radio or read the news, you have probably already heard of Piers Mitchell's work on parasites in the Roman world. Simply put, Mitchell argues that the large presence of parasites--including whipworm, roundworm, and *Entamoeba histolytica*, the cause of dysentery--in the archaeological record of Mediterranean sites indicates that Roman sanitation practices were not all that they have been cracked up to be. As it turns out, despite their public latrines, habits of regular bathing, and legendary plumbing, the Romans failed to combat intestinal and ecto-parasites any better than did their Iron Age forebears, or their medieval descendants; in fact, they probably encouraged infestation by sitting in polluted communal water and efficiently fertilizing their crops with insufficiently composted human manure. The sense of delight in the media coverage is exactly proportionate to Rome's long fall from ascendancy in historical narratives about public sanitation and health.

What Mitchell's work exemplifies, then, is the kind of overturning of long-held narratives that is possible when past environments are revivified. In other words, the study of texts and stones alone cannot communicate a sense of the biodiversity of the past, and the myriad microscopic creatures living around, on, and in human communities. And, in turn, the presence of these tiny human mutualists can prove or disprove the words that are written, or that more often go unwritten, about public sanitation. Mitchell's edited collection on *Sanitation, Latrines and Intestinal Parasites in Past Populations* provides the latest evidence on this topic, bringing together the work of an international group of archaeologists, historians, and paleoparasitologists. It responds to two key questions not before addressed at any length: "how did sanitation change as early populations changed their lifestyles from hunter-gatherers to city dwellers, and what impact did their sanitation technologies have upon their health?" (4). These are urgent issues because, despite the strange stares and prurient interest that this topic often evokes, the proper disposal of human waste is absolutely key to the health of human communities. As Mitchell points out in his introduction, "[m]illions of children die every year from diarrhoeal illness and many adults suffer malnutrition and chronic ill health from parasites caught due to poor sanitation" (1).

The collection consists of ten essays, along with a brief introduction and conclusion by Mitchell. The collection is particularly impressive for its geographical and temporal
breadth, with essays on parasites found in Africa and the Middle East, Asia, the Americas, and Europe, and essays providing case studies of sanitation in Southern Mesopotamia, Ancient Greece, Ancient Rome, Medieval London, and York. It is equally impressive for its clarity and success in presenting what is a highly technical and scientific field of study to a general scholarly audience that really should learn about it.

The collection is bookended by Piers Mitchell's introduction, "Why We Need to Know About Sanitation in the Past," his opening essay on "Assessing the Impact of Sanitation upon Health in Early Human Populations from Hunter-gatherers to Ancient Civilisations, Using Theoretical Modelling," and conclusion, "A Better Understanding of Sanitation and Health in the Past." These combine to provide a succinct and lucid introduction to the field, its major challenges, techniques, and the wider questions that it engages. For example, determining why prehistoric populations developed certain sanitation practices is extremely difficult because no texts record the reasoning behind these practices. Reconstructing the archaeology of early latrines is also difficult, as is the recovery of public sanitation practices that don't necessarily leave an archaeological record—for example, regular and organized removal of waste. And while various methods exist for detecting past parasite populations and other micro-organisms, such as microscopy and a technique known as enzyme-linked immunosorbent assay (or ELISA), correlating these results with general health is another challenge because of the difficulty of detecting infectious diseases in past populations and of accurately determining age at death. An additional complication is a concept known as the "osteological paradox"—the fact that a pristine skeleton with no bone lesions indicative of illness might be either a frail person who immediately died when they contracted an illness, or a very robust individual who never became sick and lived a long life. Similarly the skeleton with many lesions may be that of a survivor of numerous illnesses, one of which eventually laid them low, and thus a more vigorous individual than the person with an unblemished skeleton who died immediately. One mode by which to circumvent some of these problems, as Mitchell suggests, is the technique of theoretical modeling, in which the impact of sanitation on past populations is assessed by analogy with its effect on populations today. He provides a concise example of this technique, along with a discussion of its drawbacks.

Notwithstanding the challenges of reconstructing the history of sanitation, the remaining nine essays provide a wealth of information. The first four of these cover waste management (the removal of sewage and garbage from populated areas), and the final five are concerned with parasites. Augusta McMahon's "Waste Management in Early Urban Southern Mesopotamia" asks how much the world's earliest cities recognized and responded to the public sanitation problems attendant on urbanization. The answer seems to be that they really didn't, with civic projects focused on monumental aims rather than public service and with clean water acquisition and waste management generally left to individual households. However, the "earliest currently known possible toilet" is located in this area and dates to the 4th millennium BC, although these "deep pit toilets" were not particularly widespread. Georgios P. Antoniou and Andreas N. Angelakis's "Latrines and Wastewater Sanitation Technologies in Ancient Greece" tackles the archaeological evidence for latrines, sewers, and drains in ancient Greece. Here we
learn about what is probably the earliest flush lavatory in history, located in the palace of Minos in Knossos, and that, 4000 years after their construction, the sewers of a villa at Hagia Triadha still worked perfectly to expel storm water. In a fascinating cross-cultural study, "A Tale of Two Cities: The Efficacy of Ancient and Medieval Sanitation Methods," Craig Taylor compares Imperial Rome and late medieval London based on five criteria he establishes as indicative of successful public sanitation. In establishing these criteria he raises fascinating questions about the potential differences between contemporary and past attitudes towards nuisance sights and smells. Based on these criteria, the essay concludes that the public sanitation systems of both cities ultimately failed because they were based on these sensory factors and not on an awareness of the connection between contamination and disease. In "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 take advantage of the rich archeological evidence for this area to report on all things latrine- and intestinal parasite-related for a period from the Roman settlement to the nineteenth century, providing a helpful table of archaeological evidence for specific parasite infestation.

Moving further afield, Evilenana Anastasiou and Piers D. Mitchell examine "Human Intestinal Parasites and Dysentery in Africa and the Middle East Prior to 1500," a particularly important field of study because, as the authors note, "[h]umans evolved in east Africa, and then migrated around the planet in sequential waves...so it is understandable that this region is inexorably linked with the biological and cultural evolution of our species" (121). Even though the parasitic past of this continent in particular can shed light on "human-parasite co-evolution" and the transmission of parasites from animals to humans, most previous research has concentrated on Europe and the Americas. This chapter contains very useful and clear definitions of souvenir and heirloom parasites, effects of parasite infestation and conditions for contraction and transmission, and tables of ancient parasite finds divided by region. A fascinating section on "Future Directions" discusses the very concrete links that paleoparasitology can reveal between the development of disease and changes in social organization, such as the advent of agriculture, and the authors point out the significant amount of work that remains to be done on this question in the Fertile Crescent in the Middle East, the "birthplace of agriculture." Another area of archaeoparasitology that remains in its infancy is covered in "Parasitism, Cesspits and Sanitation in East Asian Countries Prior to Modernisation" by Min Seo and Dong Hoon Shin. Much study here has focused on samples removed from mummies, and is only now extending more widely to sediments from archaeological sites. "New World Paleoparasitology" is authored by Adaauto Araujo, Luiz Fernando Ferreira, Martin Fugassa, Daniela Leles, Luciana Sianto, Sheila Maria Mendonça de Souza, Juliana Dutra, Alena Iñiguez, and Karl Reinhard. Work on ancient parasites in the Americas underpins the modern field of paleoparasitology in general, and has produced really interesting evidence disproving the notion that many infectious diseases were brought to the Americas only with colonization. This chapter includes excellent information on the difference between, and historic spread, of helminths and geohelminths, and tables providing the intestinal parasite finds in North America and South America over a lengthy time period from prehistory to the 19th Century.
"Parasites in European Populations from Prehistory to the Industrial Revolution," by Evilena Anastasiou, brings to a conclusion the survey of evidence for past parasite populations and health in global populations that this suite of essays provides. In the final chapter, Matthieu Le Bailly and Françoise Bouchet use microscopy and ELISA results to make "A First Attempt to Retrace the History of Dysentery Caused by *Entamoeba histolytica*," an "invasive intestinal pathogenic protozoa" that infects around 500 million people a year and kills 100,000 of them. They conclude that the current strain of this parasite originated in the Old World and was possibly spread to the Americas about 1000 years ago, demonstrating the significant connection between human migration history and the worldwide spread of parasites and certain infectious diseases.

Some edited collections are to be pillaged for those essays relevant to our individual disciplines or our current interests; this is not one of those collections. Reading about public sanitation issues in many places at many times is highly thought-provoking, and certain recurrent questions in particular fascinated me in this study. For example, the essays make clear the degree to which, as soon as we start living close together, our everyday lives are permeable to the waste of our neighbors and thus, in contrast to the domestic isolation suggested by our suburban and bougeois "castles," how in reality life is social in very material ways. For example, in McMahon's essay (25) we learn that 75% of individuals in a community must have access to good sanitation before the community can reap the full benefit in terms of individual growth and health: it matters that your neighbor has a working toilet as much as that you have one yourself. Although not perhaps the primary intention of the collection, this reminder of our interconnectedness is a welcome and important theme, especially when it is considered on the global level as it is here.

Another interesting aspect of the collection concerns the ways that the topic and products of public sanitation do, or don't, find their way into the social and civic imaginary. Often they are disavowed; the point of public sanitation, after all, being removal and erasure. At many times in history, this results in public sanitation being a scary business. The large and efficient sewers below Minoan palaces are a case in point, perhaps re-emerging in literary modes as the Labyrinth and its monstrous inhabitant, the Minotaur (47). In medieval London, in contrast, it's hard to determine whether visiting the privy was unpleasant because of fears of disease or because of a concern that you would be robbed while at your most vulnerable or, alternatively, would fall through the floor and drown in the worst way imaginable. In a very interesting contrast to contemporary notions and practices of sanitation, large 3rd and 4th millennium BC rubbish mounds in Mesopotamia were located next to civic buildings and became a sign of urban success, visibly building up instead of invisibly being hidden in a hole., it is unclear whether ancient Greek public lavatories were gender-specific (65).

Reading this collection, I learned that by the time of the Byzantine Empire, the onset of Christianity had led to structural modifications to lavatories to allow for gender segregation, and in medieval London public urination was considered distasteful and inappropriate while real attempts were made to separate stalls with wood partitions. Although a notion of private space is at the root of most ancient words for lavatory, very
little evidence exists for gender separation in public latrines dating from before the Byzantine Empire, and in fact such facilities could have been the site of lively conversation between users. Although not mentioned in the book, public latrines--and the legal, social, and technical dimensions of who may use them--continue to be a topic of central importance, even though the historical dimensions of these questions usually receive little discussion.

Sanitation, Latrines and Intestinal Parasites in Past Populations is an exciting read, filled with reasons why historical study is important to the contemporary world and our understanding of its lineaments. Great cohesion is evident across the collection, in terms of the central questions addressed and the format by which evidence is examined, and the authors consistently render the technicalities of their field clearly and with an eye to an interdisciplinary audience. A full integration of this material with the textual and historical record holds great promise for a significantly enriched and more layered understanding of the past, and the present.