'some of the questions' the authors formulate at the end 'may already have been answered' (p. 153).

This confession sounds somewhat naïve, and is unusual for authors who profess to edit a scientific treatise. To put it mildly, the editors are extremely modest in their scientific ambitions.

Katholieke Universiteit Nijmegen GERDA DE KLEIJN

ROMAN WATERWORKS

G. De Kleijn: *The Water Supply of Ancient Rome: City Area, Water, and Population*. Pp. v + 353, maps, ills. Amsterdam: J. C. Gieben, 2001. Cased, Hfl. 150. ISBN: 90-5063-268-8.

In recent years aqueduct studies have seen a veritable renaissance. Though led by the Germans, under the banner of the *Frontinus Gesellschaft*, other groups have also made their mark, notably one centred on the Katholieke Universiteit Nijmegen, where a number of young scholars, led until his recent tragic and shocking death by Prof. Jos. De Waele, have concentrated on Pompeii. One such is the author under review.

Perhaps the book might have been better entitled something like 'Aspects of . . .', for though there is indeed a general treatment of the water supply of Rome, that is not its main thrust. Rather, as De Kleijn puts it, 'It is the objective of this study to investigate whether data borrowed from our knowledge of the urban water supply in Antiquity are any help in answering questions about the size of Rome's population, as well as the extent and social fabric of its built-up area'. In pursuit of this aim the author shows both strengths and weaknesses.

The weaknesses are partly dictated by the paucity of archaeological evidence for internal arrangements within the city, duly recognized by the author. At Rome in particular it is very fragmentary, as compared with the great arcades across the Campagna, and to fill the gap one has often to extrapolate from sites such as Pompeii; here one could have perhaps expected more material from the author's personal experience excavating there.

But the chief weaknesses are twofold. First, stemming from the gap in archaeological evidence, is a great, perhaps excessive, reliance on literary sources. Accordingly, much of the book reads like a repeat or even a re-hash of Vitruvius and Frontinus, and this material is usually repeated uncritically, even when demonstrably wrong. Thus (p. 41) we are told that an inverted siphon 'needed a device to reduce air pressure'. This is an accurate translation of Vitruvius 8.6.6, who prescribes 'collivaria' (whatever they may be) 'per quae vis spiritus relaxetur'. *Vis spiritus* is certainly air pressure. The trouble is that, no matter what Vitruvius says, there was no air in a siphon while running, only water. This has often been noted by hydraulic engineers, most recently by Deane Blackman (*JRA* 13, 411). Indeed, the whole section on siphons (pp. 41–2) is very confused and often contradictory, without explanation, of modern accepted views and terms. Thus a *venter* is not, as stated, a siphon, but only, where provided, the viaduct forming the bottom part of one; a *geniculus* is the bend where the siphon runs from the valley hillside on to the level viaduct, not, apparently, a horizontal bend to make the conduit contour around a valley; and the Yzeron (i.e. Beaunant) siphon at Lyon had nine, not twelve (p. 39 n. 117) lead pipes.

In a way, none of this is vital, since there were few if any siphons at Rome, but it

© Oxford University Press, 2002

https://doi.org/10.1093/cr/52.2.346 Published online by Cambridge University Press

reflects what we may call a lack of instinctive feeling for technical matters that could limit a full understanding of the system. For this is the second weakness, a mirror image of the first, the over-reliance on written sources. It leads to generalizations such as (p. 42) that terracotta pipelines were more practical to repair than lead ones; yet it is at the joints where a pipeline is most likely to need repair, and a terracotta one has far more of them, since the pipe sections had to be short enough to be fired in a kiln while the lead ones came in ten-foot lengths. And, even in spite of Frontinus 4.1, anyone who has ever seen the Tiber will find it hard to believe that Romans regularly drank it (p. 86); even in antiquity it was notoriously *flavus*, and, of course, city drains and sewers such as the *cloaca maxima* discharged into it.

We now turn from weaknesses to strengths.

The greatest has already been hinted at. It is the concentration on literary sources. Not only is there a multitude of detailed references to all the obvious ones—this book could almost be used as a Concordance to Frontinus—but there is a vast range of unfamiliar references, to such writers as Pliny (both the Elder and the Younger), the Digest, *CIL*, Theodosian Code, Cic. *Fam*., and so on: in short, anywhere where a few words can cast light on water and its uses. This is valuable. So also is her Chapter 4, a compendium of legislation on water uses and entitlement. Much of this naturally comes from Frontinus, who gave a lot of space to it, but also from Ulpian and *CIL*, and the author uses it to discuss such questions as who paid a tax for a water supply, what was the emperor's responsibility (*nomine Caesaris*) and how was it exercised, and, by extension from these bases, a consideration of the underlying principles and assumptions governing water distribution.

However, the real heart of the book comes with Chapter 5. This is devoted entirely to a catalogue of *fistulae*, sections of lead pipe, and the name-stamps imprinted on them. They are organized by find-spots within Rome, and carry the names of the various emperors, private consumers, and often of individual plumbers. The topographical distribution is illustrated by no less than twenty-two city maps and seventeen tables: the whole section comes to seventy-seven pages, almost enough for a booklet on its own. In it is traced the inter-relationship of the various participants ('Q. Aiacius Censorinus had his own stamp on this fistula, just like his father or brother Q. Aiacius Modestus, and plumber Claudius Aceus'). This well complements the equally monumental study of *fistulae* by Christer Bruun in his *Water Supply of Ancient Rome* (Helsinki, 1991).

From this abundance, even plethora, of evidence De Kleijn then turns to her conclusions for the population of Rome. This is a tricky field, for nothing is more difficult than estimates of ancient population, whether based on the corn dole, water supply, or anything else. Indeed, figures for water supply (she opts for a maximum daily total of 635 million litres in 97 A.D., which is reasonable) are themselves very chancy in view of how the depth of water in the aqueduct channels varied widely depending on season and rainfall. An attempt to identify from *fistula* stamps upper-class residential districts also runs into the problem, clearly stated, that the distinction may have been vertical rather than geographical, with the rich living on the ground floors of insulae while the poor were relegated to upstairs garrets. One could wish here for some discussion of how far this was affected by the water, or aqueduct, level in different parts of the city being high enough to serve upper floors, running water being a perquisite of higher status. As it is, the conclusion drawn is that the upper class lived downtown and the poorer people had to move to the outer regions.

How, then, is one to evaluate this book within the context of aqueduct studies? A proper appreciation of Rome's water supply would probably have to approach it from

https://doi.org/10.1093/cr/52.2.346 Published online by Cambridge University Press

many angles—technical, archaeological, historical, literary, social. It is too much to expect all of these to be studied adequately within any single book. Progress must surely depend on a step-by-step process, with separate studies concentrating individually on these various aspects, then followed by a work of synthesis. For a true picture of Roman water supply, this book is a foundation stone, not the complete edifice; but the complete edifice depends on such foundations, so one cannot fairly censure the work because it is not the same book that I would have written—a common error in reviews.

On its technical side, the book should be used with caution. As a compendium of literary evidence it is admirably comprehensive. Its detailed listing of *fistulae* will be a valuable tool for specialists. And for general classicists it raises topics and questions they will find well worth considering further.

Carleton University, Ottawa A. TREVOR HODGE

ARCHAEOLOGY AND ROMAN BURIAL

J. PEARCE, M. MILLETT, M. STRUCK (edd.): *Burial, Society and Context in the Roman World*. Pp. xxiv + 272, ills. Oxford: Oxbow Books, 2000. Paper. ISBN: 1-84217-034-1.

There is an ever-increasing interest in the archaeological remains of Roman burial and also in the search to integrate and interpret the varied evidence created by ancient funerary practices. In light of this, a conference was held in Durham during April 1997 and the resulting proceedings are published in this volume. The twenty-eight chapters cover many of the central issues in the study of Roman death and burial, and represent a range of approaches. The papers include, for example, studies of cemetery excavations, regional funerary customs, specific aspects of the rite of disposal, elements of grave furnishing, and the use of above-ground markers. Many of the papers relate specific case studies to wider themes such as social status, Romanization, ethnicity, and change across time. The geographic range of the volume is impressive. The focus falls on the North-West provinces of the empire, although there is a slight bias towards Roman Britain (six chapters) and in the later chapters towards Rome (five chapters); but other areas ranging from France to Asia Minor are well represented. This gives the rare opportunity to access in the English language what is being researched, where, and how.

The diversity of approaches, subject matter, and geographic range reflect the dynamic nature of such conferences, but represent some organizational problems when transferred to volume form. The editors are honest about the challenges, acknowledging that the volume contains different types of scholarship and different national traditions of study. In compiling the volume a 'liberal line' was taken on subject matter and this has perhaps led to a 'more diverse volume than might have been desired' (p. viii). Nevertheless there are valiant attempts to give the volume structure and to make it easy to use. The initial abstracts, provided in two languages, entail user-friendly summaries. The papers are then divided into five sections, each of which is provided with a brief overview of the contents and themes of the papers it contains. A strong first chapter by Pearce and an 'afterword' by Reece also go some way to tying the volume together. However, the diversity is also inevitably a weakness; some sections

© Oxford University Press, 2002

https://doi.org/10.1093/cr/52.2.346 Published online by Cambridge University Press