(*On the Dancers*). It is lost, but we have a great deal of information about it from Libanius *Orat.* 64, where we hear, for example, that Aristides mockingly invoked the corrupting influence of Homer on the Greek world (§73). He disapproved of the dancers and what they did with Homer, although we know his admiring view of the poet himself. Surely this kind of dissonance has a place in a study of second-century visions of Homer. Zeitlin tells us something about Homeric revisionism in the *Heroikos* of Philostratus, which has rightly become a fashionable topic of late: it has recently received a seriously flawed translation and commentary from Ellen Aitken. (A much better one, in German, is forthcoming from Peter Grossardt.) But there is not a word in Zeitlin's paper about the Homeric revisionism of Dares of Phrygia and Dictys of Crete.

This volume would have been much better if it had been shorter. One has the feeling that the authors of most of the articles are ebulliently sharing with the reader the thrill of discovering some interesting texts. But this thrill should properly accompany the preparation of an article rather than the writing of it, in which the discovery should be distilled and interpreted. Much that is here could have been drastically cut back, and much that is not could have been brought in for comparative purposes. Attention to the rudiments of Greek grammar would have cleared out some embarrassing lapses (such as *archetypon mimēmenē* for *pros to archetypon memimēmenē* on p. 228). The most disciplined and therefore the most authoritative of the papers in this volume are those by Whitmarsh and van Nijf. The former has set up a good problem (discourses on exile) and probed it within the framework of circumambient Hellenic culture. The latter worked largely with epigraphy, and in that realm it is impossible to find a literary crutch upon which to lean.

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ANCIENT TECHNICAL LITERATURE

B. MEISSNER: *Die technologische Fachliteratur der Antike. Struktur, Überlieferung und Wirkung technischen Wissens in der Antike (ca. 400 v. Chr.–ca. 500 n. Chr.)*. Pp. 419. Berlin: Akademie Verlag, 1999. Cased. ISBN: 3-05-003194-8.

From historiography, M. turned to ancient technology for his *Habilitationsschrift*, submitted at Halle in 1996, of which this densely printed book is a revised and shortened version. In what he offers as the first survey of all the technical treatises that have survived from antiquity he sets himself two questions: did ancient technology ignore the twin principles of economic rationality, namely achieving a given output with the least possible input and achieving the greatest possible output with a given input? And were technological innovations in antiquity confined to the Hellenistic period? His answer to both questions is 'no'. On the way to reaching it, he develops a third contention, that technical literature encouraged technical progress by spreading awareness of the concept.

Among the τέχναι recognized in antiquity, M. discusses some of those that many writers called 'practical' but none of those that they called 'verbal'. Despite citing Galen's remark that recipes in verse are easier to remember, he also leaves out didactic poems, even when they deal with subjects that he includes, such as pharmacology; and it never emerges how he classifies, for instance, music, hunting, astrology, magic, or

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cooking (Apicius is 'unfruitful' for his purposes), let alone *ars amatoria*, which lurks in a footnote that touches on the Greek novel. There is nothing on the circulation of technical manuscripts and not much more, all of it in passing, on how scribes balanced fidelity against utility in copying them, for instance the 'Redaktor' who augmented a geometrical work by Pappus with excerpts from works on mechanics and drawings to match. Not only does the book fall short of comprehensiveness in these ways, but M. ends his introduction with a concession that reduces the scope for answering his first question: as medical and military treatises deal with matters of life and death, they cannot be expected to set a high value on economic rationality.

Another gap, however, is even more disappointing. In the works that he does include M. limits himself to content, with the excuse that many of them have not been adequately edited and so the available wording cannot be trusted; but though the *Mulomedicinae* of both Chiron and Vegetius are poorly transmitted (on the whole, inadequate manuscripts create more obstacles than inadequate editions), one does not need Vegetius himself to tell one that they differ sharply in stylistic pretensions. Faced with educational systems that favoured the verbal *τέχναι* and a body of literature that tackled such imposing questions as how life should be lived, writers on technical subjects, who had already taken a decision to compete, usually competed by exalting their subject, some of them, especially in the early Empire, to implausible heights: for Vitruvius and Galen, proper architects or doctors were experts on everything; among the options for a career, *res rustica* scored best with Columella as *proxima et quasi consanguinea sapientiae*; and Vegetius described *ars militaris* as the one *sine qua aliae artes esse non possunt*. Not even grand claims, however, required elaborate language, and whether technical writers employed or eschewed it, and why, seems relevant to *Überlieferung und Wirkung technischen Wissens*.

Nevertheless, it is an impressive achievement to have digested so many works ancient and modern on subjects as diverse as farming, medicine, architecture, surveying, and artillery, and to have conducted with so little repetition an inquiry divided into two parts: a synchronic one, better suited to answering M.'s first question, and a diachronic one, better suited to answering his second. In the synchronic section he examines various kinds of consideration stated or presupposed by his authors; the last and longest chapter tackles his first question directly, and other chapters deal, for instance, with the common good, control over chance and the environment, status and fame, mystification, the right of technology to a place in education, and elegance as a desirable property of machines. The diachronic section in turn has two parts: a shorter, in which he discusses the transmission of technical knowledge outside literature, and a longer, in which he goes through technical treatises by period and subject, asking above all whether their authors acknowledge progress in the past and expect it, or even see themselves as contributing to it, in the future.

M.'s answer to his first question seems convincing. Harder to accept is not so much his answer to his second as his evidence for it. Like most books that Europeans have been reading for over a millennium, M.'s takes the form of a codex, not a Hellenistic invention; and when my concentration flagged, I looked out into the garden through glass panes, listed by Seneca among things that human *sagacitas* rather than *sapientia* had invented in his own lifetime (*Ep.* 90.25). The evidence for these inventions does not come from technical treatises, and indeed I am not sure that M. anywhere names the *τέχνη* that produced the codex. Furthermore, he assumes that anything regarded in the imperial period as an innovation, even in medicine, supports a positive answer to his modern question about the innovativeness of the imperial period. From epitomes, for instance, he infers that the volume of innovation must have grown for them to become

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necessary or useful. More persuasively, he sees in some treatises, such as Frontinus's on the aqueducts of Rome, an attempt by the governing classes to recover control from technical experts of lower status, who were acquiring it through an expansion of specialized knowledge.

It remains equally debatable how far technical literature affected technical progress. Vegetius is surely blowing his own trumpet when he alleges that the Romans of old surmounted military disasters by going back to books (*Epit.* 3.10.17–18). Book or no book, the Phoenician way of digging ditches (Hdt. 7.23) will soon catch on. When I first mended punctures, no one had told me that if I tried to put the tyre back with the tyre levers I ran the risk of nipping the tube and having another puncture to mend; but I learnt my lesson without reading a history of the bicycle or a repair manual, and I have passed it on by word of mouth. M. says that technical literature bulked larger in classical antiquity than in any earlier or contemporary culture, but far from maintaining that technical innovation also bulked larger, he leaves uncontested, in the two pages of his introduction that he devotes to cross-cultural comparisons, a view expressed in the 1950s that the West did not outstrip the Far East until after 1500. Such comparisons have now been given a much broader framework by Jared Diamond in *Guns, Germs and Steel: The Fates of Human Societies* (London, 1997).

However they judge the force of M.'s arguments, most readers will learn a great deal from the book, whether about *αὐτόματα*, measuring the speed of an arrow, putting hens off eating their own eggs, or pagan and Christian attitudes to the treatment of incurable patients; and how many students of Augustan literature or even Augustan history know that Marcellus was the dedicatee of an extant treatise on war machines?

For several reasons, unfortunately, the book is not easy either to read or to consult. The twenty-seven-page introduction has no subdivisions, and the train of thought is taxing to follow; definitions seem finished by p. 13, but they reappear on p. 15, and surely modern law on patents did not deserve two pages, however important it may be to ask what difference it makes whether or not the state intervenes. There are many passages of what struck this foreign reader as clumsy German, and the problems are aggravated by frequent slips or misprints, especially in endings. Footnotes often read like jottings, and several direct one to 'n.?'. Some of the abbreviations used for titles may be standard among specialists but will defeat non-specialists, and one work discussed receives no title at all (p. 256). Insufficient thought has been given to an index that includes 'Kontingenz' and 'Selbständigkeit' but not 'Illustrationen', and Nemesianus squeezes into a footnote but not into the index or the list of sources.

When little of any treatise is cited either in the original or in translation, one's trust in M.'s accounts is weakened by such things as *φανεῖν* for *φαίνεσθαι* (p. 93), the confused remarks on his second page about various occurrences of *τεχνικός* in the feminine singular, or the first entry in his bibliography, which credits Schwartz with *Acta concilium oeconomicorum*. That Frontinus claimed to be the first writer in Latin on *militaris scientia* (p. 185) will be accepted by anyone who does not know that M. has in mind the first sentence of the *Strategemata* and is rendering *unus*, not the same as *solus* or *primus*. Before Athenaeus Mechanicus dedicates his work to Marcellus (p. 192), it is probably Hadrianic (p. 39), and the Hippocratic lexicon that Erotian compiles (p. 62) turns into a commentary that someone later recasts as a lexicon (p. 208).

C. Nicolet's volume 'Littératures techniques', *Entretiens Hardt* XLII (1996), evidently appeared too late for M., and other recent works that his readers may wish to consult include Marie-Claire Amouretti and G. Comet, *La transmission des connaissances techniques* (Aix-en-Provence, 1995); several volumes by G. Argoud and

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others published in the *Mémoires* of the Centre Jean Palerne, Saint-Étienne; M. Formisano, *Tecnica e scrittura: le letterature tecnico-scientifiche nello spazio letterario tardolatino* (Rome, 2001); and Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore, 2001). J. W. Humphrey, J. P. Oleson, and A. N. Sherwood have compiled a sourcebook of translations: *Greek and Roman Technology: a Sourcebook* (London and New York, 1998). In *Titel und Text* (Berlin and New York, 1999) Bianca Schröder shows how new devices of presentation made technical works more accessible. Anyone who shares my interest in transmission will miss Bischoff's article of 1971 'Die Überlieferung der technischen Literatur', reprinted in his *Mittelalterliche Studien* III (Stuttgart, 1981), pp. 277–97.

In short, this is an ambitious book that will be hard to ignore but less hard to challenge either in outline or in detail.

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DIOCLES OF CARYSTUS

P. J. VAN DER EIJK: *Diocles of Carystus. A Collection of the Fragments with Translation and Commentary. Volume One: Text and Translation.* (Studies in Ancient Medicine 22.) Pp. xxxiv + 497. Leiden, Boston, and Cologne: Brill, 2000. Cased, €107. ISBN: 90-04-10265-5. *Volume Two: Commentary.* (Studies in Ancient Medicine 23.) Pp. xlii + 489. Leiden, Boston, and Cologne: Brill, 2001. Cased, €89. ISBN: 90-04-12012-2.

Although Diocles of Carystus (fourth century B.C.E.) was one of the most celebrated doctors and medical writers of antiquity, until recently he had not been the object of much scholarly effort. The main reason for this lack of interest may be that not one of his original writings has survived in its entirety, or even in sizeable sections. Today we can only approach Diocles obliquely, through quotations or general mentions in much later authors, e.g. Celsus, Galen, Soranus, Caelius Aurelianus, or the Anonymus Parisinus. There had been only two attempts at producing collections of these fragments: by Fränkel in 1840 and, more importantly, by Wellmann in 1901. Appearing nearly a century after the latter (and exactly a century, in the case of the commentary), the present two volumes represent the first comprehensive collection of the fragments of Diocles—containing over fifty more than its predecessor—with a translation in a modern language.

Some of the fragments were not available to Wellmann because either new MS evidence for existing sources or altogether new sources have come to light only in the century between the two editions. However, in part, the discrepancy in numbers arises also from the fact that Wellmann included only passages in which Diocles is mentioned by name. The present collection, on the other hand, contains also 'unnamed' material—marked as such—where the statements demonstrably refer to Diocles as one of a group of people, mentioned either by name or by general terms such as 'the ancient doctors'. Two concordances at the end of vol. I make it clear which fragments have been added and where, e.g., Wellmann had split fragments to suit his pattern.

The two editions differ also in the arrangement of the fragments: Wellmann ordered

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