

modern roads and walls (purple and blue): multi-colouration gives clarity to a complex, layered reality.

The 12 chapters begin with an Introduction, by Hutson and Dahlin, to the history of Chunchucmil research and why the site is both different and tantalising as a focus for studying pre-Hispanic market dynamics. Once the layout and chronology of the community have been established in Chapters 2–4, there is a discussion of urban population structure. The site centre embraces 15 large quadrangle complexes, best interpreted as mansions of the elite, which are linked by a set of radial *sacbeob* (raised and paved causeways) to the surrounding residential zone of house-compounds, itself divided between a denser core and a more loosely organised periphery. Beyond that again is a hinterland with an overall population probably equalling that of urban Chunchucmil; a precipitous drop in residential density around 5km from the centre matches the limits we found at La Milpa in north-western Belize (Everson 2003)—perhaps the governance of Maya cities had a natural limiting range. More samples are needed to examine this phenomenon, something that airborne LiDAR will facilitate.

Three chapters on environmental heterogeneity, hydrology and soils show the background to Chunchucmil's prosperity. While the farmland was not good, with subsistence staples such as maize necessarily brought in from the east, the seasonal and permanent wetlands westward to the coast had a rich variety of natural resources that could be exploited and traded. Most of these were perishable, as Dahlin *et al.*'s Chapter 10 explains, and so do not show up in occupation deposits subjected to tropical climate. As a result, such products have been consistently underestimated and undervalued as part of the Maya economy by many scholars.

Two final chapters deal with marketing within Chunchucmil and commercial connections beyond it. Distributional, contextual and configurational approaches were used to argue for the existence of, and pin down a location for, a central market. 'Area D', within the core of large quadrangles, adjacent to the ballcourt, and enclosed by several *sacbeob*, fitted the criteria best, including strong soil chemistry signatures (iron, phosphorus, zinc) for the presence of plant and animal products. Imported goods included obsidian from the El Chayal source near Guatemala City, supporting the model of an overland network north to the Usumacinta drainage and then downstream to the coastal trade route.

Overall, Hutson's judgement that "Chunchucmil's growth and urban development were driven by long-distance trade" (p. 312), the success of which led to its population outgrowing local carrying capacity and stimulating "a burgeoning market economy in staple supplies [that] compensated for food deficits" (p. 312) is justified by the evidence. This book documents settlement, environmental and economic archaeologies, and is well integrated and well executed, a worthy tribute to Bruce Dahlin's imaginative scholarship.

References

EVERSON, G.E. 2003. Terminal Classic Maya settlement patterns at La Milpa, Belize. Unpublished PhD dissertation, Tulane University.

NORMAN HAMMOND

McDonald Institute for Archaeological Research,
University of Cambridge, UK
(Email: ndch@bu.edu)

JASON O'DONOUGHUE. *Water from stone: archaeology and conservation at Florida's springs*. 2017. Gainesville: University Press of Florida; 978-1-6834-0009-7 \$74.95.

There are more than 1000 artesian springs in Florida, the largest concentration in the world of this



natural phenomenon. As Jason O'Donoghue points out, however, from the very beginning, although springs are natural geological and hydrological features, they are also heavily modified by humans in the past and the present; he thus asks, "Is there a more 'cultural' place?" (p. 8). Not only is the landscaped modified by dredging, channelling and much more (and threatened by pollution and groundwater extraction), but the springs are invested with meaning—and, which is the main theme of this book, the locations have acted as nodes structuring societies throughout the millennia, as evidenced by rich archaeological remains.

With this as the point of departure, O'Donoghue embarks on what he calls 'Florida springs archaeology'. His aim is not only to write the archaeological (pre)history of springs in Florida, but also to put forward approaches and ways in which archaeology

© Antiquity Publications Ltd, 2018

can play a central part in the conservation and heritage of the springs for the future. O'Donoghue points out the inherent paradox in natural/cultural features such as springs, with conservation practices seeking to restore an alleged pristine condition, which "often elide[s] the thousands of years of transformations that preceded it" (p. 8). While wilderness protection emphasises the primeval character without permanent improvements and human habitation, springs have always had a deep history of human entanglements. Moreover, annually, more than two million people visit Florida's springs, and hence one of the aims of the book is to explore how "archaeology can contribute in meaningful, substantive ways to spring conservation efforts and [recognise] that the historical value of springs is key to their future preservation" (p. 13).

Given the limits on space, I will not focus on the archaeological interpretations as such, but the ways that O'Donoghue situates archaeology not only in a broader landscape perspective, but more actively engages archaeology in the intricate and complex interplay of nature and culture through geological and human history. Hence, Chapter 2 is about the geology of springs and aquifers, how they are formed and how they can be defined and understood. The chapter includes a useful basic geological and hydrological history of Florida. This natural science background provides the backbone for understanding human modifications of the springs in the successive chapters, including the groundwater withdrawals that have resulted in the death of springs.

One characteristic of this book is the subtle and sophisticated way that theoretical approaches are introduced and used in the narrative. The structure and methodological procedure is empirical; meticulous archaeological material and natural data are presented and discussed, and when it becomes necessary to broaden the horizon of understanding to proceed with the analysis, a few 'drops' of carefully selected theories are included. A good example is found in the concept of events and non-events because "these distinctions, then, of event/non-event and experimental/analytical events help disentangle events that may be recognizable at the geological time-scale from those recognizable at the human perceptual scale" (p. 73). As another example, Ian Hodder's entanglement theory is introduced in the last chapter and only 19 pages before the book ends. As such, the book reads well and flows naturally and continuously like the springs themselves, which

also seem to have influenced the author's way of writing.

The Silver Glen spring, one of the largest in Florida, features heavily in the narrative, and the 8000-years history of the organisation and use of its surrounding landscape is discussed, including the development of huge shell mounds, gatherings for mortuary rites and communal integration. Chapter 4, 'Sacred spring', builds up an argument that Silver Glen was potentially a sacred spring, due in part to the exceptionally clear water, as well as because of the human uses and attachments to the place, which is also central to O'Donoghue's broader conclusions about conservation practices. While it is of course difficult to say anything with certainty about the sacredness of water many thousands of years ago, the argument is convincing. In this chapter I would, however, have preferred a more detailed ethnography of springs in general, and in particular the springs in Florida. Only a few pages (pp. 100–105) are devoted to the ethnography of sacred springs, and the discussion is quite general, only briefly referring to indigenous perceptions. This somehow creates a gap in the narrative between the ancient archaeological past and the modern uses of today, and the conclusions and the forward-looking perspectives would have been even stronger if this recent past was further elaborated.

In any event, in the last chapter, 'Springs eternal', O'Donoghue concludes with a novel approach regarding the future conservation of springs, where archaeology has a central role. Throughout the book he has shown that there is no such thing as a pristine spring; they are always used and modified, and herein also lies a solution. By actively engaging with the springs in the present, they might be then conserved, such that the "argument is not that springs will cease to exist without human intervention—although their water quality and flow may be impaired—but rather that they cannot continue to exist in *the ways that people want them to* without care" (p. 197). Furthermore, "Continued recreation, then, is a key to mobilizing public sentiment for springs' protection and conservation. Through recreational gathering at springs, people can continue to develop relationships with these places that are necessary for their ongoing cultural valuation" (p. 199).

Thus, throughout the book, O'Donoghue balances many levels of analyses: geological, hydrological, archaeological, historical and contemporary parameters are woven together, and by including natural features

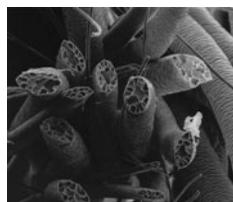
in general, and springs in particular, the past becomes even more social and cultural. These archaeological narratives may have important future roles in creating new interpretations and understanding, resulting in further means of conservation. As such, O'Donoghue has opened an interesting and new avenue for other archaeological studies.

TERJE OESTIGAARD

The Nordic Africa Institute, Uppsala Department of Archaeology and Ancient History, Uppsala University, Sweden;
Department of Geography, University of Bergen, Norway
(Email: terje.ostigard@arkeologi.uu.se)

ANNETTE RAST-EICHER. *Fibres: microscopy of archaeological textiles and furs*. 2016. Budapest: Archaeolingua Alapítvány; 978-963-9911-78-9 €54.

Any textile researcher, scientist or conservator who has spent long hours peering down a microscope or



viewing fibre images generated by scanning electron microscopy will welcome additional resources to aid in the often challenging task of identifying archaeo-

logical fibres. Antoinette Rast-Eicher's stated aim in this impressive and literally weighty volume (over 3kg thanks to the heavy paper stock necessary for good quality image reproduction) is to "report on the kinds of fibres employed in Europe for the manufacture of textiles and furs" (p. 9), including both native and imported materials. Rast-Eicher argues that accurate fibre identification is an essential first step in the full understanding of textiles and dress. Although this is not made explicit in the preface, she brings both wide experience and great expertise to this task. As an associate of the Institut für Archäologische Wissenschaften, Universität Bern, Rast-Eicher has published widely in this specialised field, often co-authoring the results of detailed research with other well-known textile experts.

The first and abiding impression is the extraordinary range and quality of the fibre images that form a truly comprehensive fibre atlas, including not only mainstream cellulosic and proteinaceous fibres, but also much less common fibres such as willow and oak bast. Animal fibres range from moles

and rodents through to foxes, wolves and bears, woolly mammoth, camels, deer, goats, human hair and silk, including the marine 'sea-silk'. The fibre images are drawn from a range of European sources including the Eidgenössische Materialprüfungsanstalt (St Gallen, Switzerland), the Naturhistorisches Museums of Vienna and Bern and the Liechtenstein Landesmuseum. Many fibres are shown both longitudinally and as cross-sections, easing the task of identification. Critically, fibres are also shown in a variety of magnifications and states. The exemplary series of images for linen show the fibre with starch and wax coatings together with examples of fibres recovered from artefacts. This not only provides insights into different approaches to processing and using the fibres, but also helps with the identification of degraded fibres.

The book is, however, much more than a series of images, invaluable as these are. They are underpinned by an introduction to the structure of proteinaceous and animal fibres along with a description of the routes for their preservation and degradation. Fibres are classed by type and then described in terms of habitat and history, which can include a survey of use as well as historical and anthropological evidence for social attitudes to different fibres, and, briefly, production methods. This survey is followed by specific details of fibre properties and a review of their appearance in the European archaeological record. The structured format for providing artefactual and textual evidence to enhance understanding of the visual evidence provided by the images is underpinned by copious citations marking the path to further detailed research. A brief survey of the content and approaches of some earlier fibre atlases provides a pertinent reminder of the value of earlier research and publications.

Practitioners are provided with technical information on sampling and, critically, armed with the questions to guide their visual examination of a fibre as they progress from inspection under a stereomicroscope to a light microscope, and possibly then on to scanning electron and transmission electron microscopy. Very simple methods are not discounted, as in the clear instructions given for preparing a temporary cross-section using a drilled metal plate. This section is prefaced by an interesting mini history of approaches to fibre analysis and the development of wool measurement. The account of the impact of past conservation techniques for fragile archaeological fibres, supported by a sequence of images, is both