

Reviews

New Book Chronicle

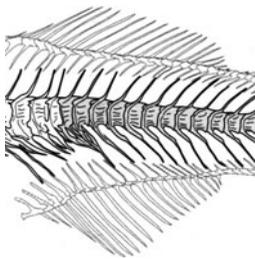
Robert Witcher

The books reviewed in this edition of NBC are loosely linked by the theme of animals and how they interact with humans—as sources of meat, wool, bone and manure; as the basis of economic livelihoods and social status; and for transport, protection and companionship. We will see shellfish collected from the foreshore, and cod and herring fished from the seas; we will witness how ecosystems and physical landscapes are transformed by the eradication of wild species and by the management of domesticated ones. And we will see animals, as a source of ritual power, sacrificed and buried, and of muscle power, carrying cargoes of salt into the mountains and turning millstones to grind grain.

Fishy business

TODD J. BRAJE. *Shellfish for the Celestial Empire: the rise and fall of commercial abalone fishing in California*. 2016. xiv+242 pages, several b&w illustrations, 5 tables. Salt Lake City: University of Utah Press; 978-1-60781-496-2 paperback £33.95.

JAMES BARRETT & DAVID ORTON (ed.). *Cod and herring: the archaeology and history of medieval sea fishing*. 2016. ix+272 pages, numerous colour and b&w illustrations, and tables. Oxford & Philadelphia (PA): Oxbow; 978-1-78570-239-6 paperback £48.



We start with a fascinating blend of archaeology and historical ecology by TODD BRAJE: *Shellfish for the Celestial Empire: the rise and fall of commercial abalone fishing in California*. The

book documents the development of California's abalone fishing industry by immigrant Chinese workers during the later nineteenth century. It is a story of resourcefulness, discrimination, sustainability and collapse, concluding with an agenda for returning the

regional ecosystem to health and the integral role of archaeology to that end.

A century and half ago, abalone (*Haliotis* spp.) was rarely consumed by the Euro-American population of California. But one group, Chinese immigrant workers, pushed out of other social and economic opportunities such as gold mining, saw the potential of harvesting these shellfish and exporting them overseas. The industry grew rapidly, and within a few decades the consumption of abalone caught on amongst Euro-Americans and the industry was wrested from Chinese control. The massive expansion of the industry soon led to overfishing and abalone populations declined steeply, leading to increasingly strict legislation to preserve stocks. As is often the case, however, legal protection came too late, requiring massive ongoing conservation efforts; Braje observes the irony: "It will take continued manipulation by the predator that brought [abalone] to the brink of extinction (us) to save them" (p. 21).

Abalone had been gathered by Native Americans for over 12 000 years, and for much longer still by sea otters. The arrival of European settlers and traders led to significant change in this food web. First, the Chumash and other Native American populations were massively reduced by diseases introduced by the Spanish; second, the sea otter was hunted to near extinction by Russian traders. Thus the two main predators of abalone—humans and otters—were removed from the system. As a result, from the mid eighteenth to mid nineteenth centuries, abalone grew in size and number. It was the economic potential of these abundant shellfish resources that was recognised by Chinese immigrants who developed a new industry along the southern California coast by boiling and drying black abalone (*H. cracherodii*) and exporting them to China.

Chapter 2 clears away accumulated confusions about the nature of contact between China and the west coast of America, including "An increasingly popular myth [that] proposes that a massive fleet of Chinese mariners arrived on the shores of North America's Pacific coast well before Columbus [...] I separate the real from the imagined and the scientists from

the charlatans" (p. 24). Chapters 3 and 4 outline the context for the migration of workers by looking first at China and then at the experiences of the 'Chinese immigrants in the Wild West' of America. Chapter 5 turns to 'The archaeology of Chinese abalone fishing in southern California'. If, as Braje observes, the newspaper reports that document the presence of Chinese fishermen are sparse and hostile, the archaeological evidence presents its own challenges. Fishing camps appear to have been occupied briefly and lightly; very little specialist equipment was needed as the abalone were transported elsewhere for processing. The bulk of the evidence takes the form of shell middens, but even here the picture is uneven; as the price of shell rose to match or even exceed that of abalone meat, the shells were also exported. Combined with erosion and development, the archaeological record of Chinese abalone fishing is slight and elusive.

Braje's fieldwork has documented fishing activity across the Southern Channel Islands. Most of the sites were "highly specialized logistical fishing locations" (p. 132); the smaller number of sites with more substantial artefactual and structural evidence, including storage vessels, tablewares and 'hairpin-shaped' hearths for boiling, were probably more permanent basecamps. But even in the absence of artefacts, these Chinese sites are easy to differentiate from Native American sites; the former consist almost exclusively of black abalone shells, and mean shell size is notably higher than in the mixed middens of Native American sites.

Chapter 6 focuses on two particular sites: Johnsons Lee (Santa Rosa Island) and Point Bennett (San Miguel Island), the latter producing varied nineteenth-century artefacts: stoneware pottery and a ginger jar, rice bowls (including celadon and one with a double-happiness design; "powerful symbols of identity and personhood", p. 152); and glass bottles. There is also evidence for post-Chinese occupation during the early twentieth century, perhaps "fishermen, smugglers, rumrunners, and eccentric hermits" (p. 148).

Chapter 7 examines the decline of the industry and considers whether the introduction of environmental laws was driven by concerns for sustainability or by racism, making a case for the latter. Also in this chapter, Braje uses the mean size of abalone shells over thousands of years to demonstrate that they peaked during the period of Chinese exploitation. This, he suggests, could either mean that the Chinese

concentrated on the largest, most valuable and easily collected specimens, or that the Chinese actively managed abalone stocks by taking only fully grown specimens, leaving the immature shellfish to develop. Braje favours the second interpretation, arguing that the Chinese had learnt the need for careful management from the collapse of abalone fisheries in China. It is not clear, however, why this should be the preferred interpretation. Why were the Chinese able to learn from their earlier ecological mistakes in a way that most other modern societies have repeatedly failed to replicate? The fact that the industry rapidly collapsed once taken over by Euro-Americans does not in itself demonstrate that it had previously been guided by a deliberate strategy of sustainability. The real difference was presumably scale: the Chinese industry may have been sustainable, but it was size rather than ecological principles that kept it on track.

Regardless, this does not undermine the case for using historical data to inform conservation efforts, the subject of Chapter 8. Too many studies, Braje argues, assume degraded baselines are 'natural' because they have not looked back far enough to see what populations looked like in the past, and how they varied over time and as a result of human exploitation; hence, "Only with such long-term data can we develop baselines and protocols for future policy and effective action in environmental management, conservation, and restoration" (p. 186). He provides case studies drawing on his own research to show how archaeological data might contribute to restoring and protecting fisheries, for example, by showing how red abalone (*H. rufescens*) have been able to survive changes in sea temperatures by retreating to and expanding from a key 'nursery ground' around San Miguel; this area therefore needs particular protection. To make use of these datasets however, ecologists must "sacrifice precision for generality" (p. 200). They need to recognise that the deep data needed for establishing meaningful baselines are disparate and scrappy.

Braje sums up by observing that "we cannot expect to feed a global abalone meat and shell market. Instead, our goal should be to rebuild and rebalance ecosystems, to re-establish wild abalone communities, and to repair degraded kelp forest ecosystems" (p. 201). This is archaeology with a purpose, committed not only to documenting the decline of an ecosystem, but also contributing to its restoration and to communicating this mission with wider academic and public audiences. This is a call

to arms, addressing historical wrongs and mapping a sustainable future; it is fascinating, highly readable and recommended.

Also on the archaeology of fishing, and the possibility of historical overfishing, is *Cod and herring: the archaeology and history of medieval sea fishing*, edited by BARRETT and ORTON. This collection brings together research on the North, Irish and Baltic Seas and the North Atlantic Ocean, to explore the evolution of fishing and fish consumption from c. AD 500 to c. 1500. Most of the chapters present case studies based on individual countries or sites, with a few chapters addressing wider regions. Barrett provides both an introduction and a substantial concluding chapter.

The authors draw on a variety of archaeological and documentary evidence, and, as with Braje (above), Barrett observes that the material is “diverse, complex, unevenly distributed through time and generally low in both precision and accuracy” (p. 3). The tone, however, is positive. Barrett’s introduction outlines overarching research questions including: was early medieval sea fishing linked to urbanisation? When did the long-distance, large-scale trade in salted herring and dried cod begin and how did it evolve? And could these activities have overfished species such as cod and herring during the High Middle Ages? Most of the contributors are concerned with dried cod—unsalted (stockfish) or salted (*klippfisk*)—and with gutted herring pickled in brine. Cod and herring were both commercialised, but the very different natures of these fish, particularly in relation to their fat content, presented different possibilities for exploitation and marketing, and required different processing and transport solutions. Much of the research stems from simple assumptions that allow more sophisticated techniques to come into play; for example, because cod heads are usually removed during processing, assemblages of cranial bones are likely to represent local catches. Stable carbon and nitrogen isotope analysis of these bones can then be used as a control on vertebrae and other bones typically left in dried fish, in order to identify whether or not they were local or imported.

The papers are grouped in two broad sections: ‘Perspectives from history and settlement archaeology’ (nine papers) and ‘Perspectives from zooarchaeology and stable isotope analysis’ (ten papers); only a sample can be discussed here. Contributors in the first section include Sørheim who draws on long-term fieldwork at the medieval town of Borgund on

one of the richest fishing grounds in Norway. From the eleventh century AD, the settlement grew into a centre for the production of stockfish, and excavation has identified warehouses and significant evidence for fishing tackle including hooks and line weights; Sørheim compares fishbone assemblages with these artefacts to suggest various fishing strategies. Even during its heyday, however, fishing was only a part-time activity alongside farming at Borgund, as it was at many other places (see below); the opening up of fishing grounds to foreign boats, and the effects of the Black Death, spelt the end of the town’s fishing industry and its prosperity.

Also in this section, Nedkvitne draws on documentary sources to assess the sustainability of marine fishing. Ball-park calculations suggest that Norwegian north-eastern Arctic cod catches were in the region of 5000–25 000 tonnes of raw fish per year during the fourteenth to early seventeenth centuries, compared to over 900 000 tonnes for some years during the mid twentieth century: “a difference so considerable that one can claim with certainty that medieval fishermen were nowhere near to overfishing the Norwegian cod stock” (p. 57). Nedkvitne concludes that fisher-farmers “cultivated and took care of the soil within the boundaries of their farms, and each peasant saw to it that the exploitation of it was sustainable. Sea-fish, in contrast, could have been regarded as a resource without limits, and from a medieval perspective this was correct” (p. 57). In other words, a ‘tragedy of the commons’ was averted only by the relative abundance of the resource compared to its exploitation (cf. abalone fishing above).

The second group of papers focus on the zooarchaeological evidence. Harland *et al.* explore the fish bone evidence from York, an unprecedented sequence extending across two millennia. They document a clear and rapid shift from freshwater to marine species—the so-called ‘fish event horizon’—between the mid tenth and mid eleventh centuries. Multiple lines of investigation point to the local (North Sea) provenance of York’s cod, haddock and herring—and initially, fish appear to have arrived fresh, with preserved cod only gaining ground in the thirteenth century. This pattern echoes that of London, the subject of the following paper by Orton *et al.*, who develop their 2014 *Antiquity* article on the supply and consumption of fish in medieval London, and, for example, the shift from Norwegian stockfish in the thirteenth and fourteenth centuries to salted

dried fish from an increasingly wide geographic area including Iceland and Newfoundland by the sixteenth century.

Müldner provides a critical overview of the human skeletal isotope evidence for the consumption of marine fish in medieval England and southern Scotland. Is the ‘fish event horizon’ visible in isotope signatures? The marked difference between early and later medieval populations is clear in this regard (as it is in other European countries), but social and cultural subtleties affect the timing, for example, in relation to religious *vs* lay populations and urban *vs* rural communities. Müldner observes a consistent lag between the zooarchaeological evidence for the consumption of fish and its isotopic visibility in human bone. This is to be explained both by the requirement for a significant dietary intake of marine fish before it can be discerned isotopically and by the fact that, as herring is lower down the food chain than cod, it is necessary to consume relatively more herring to influence isotope values.

Barrett provides a substantial concluding chapter, ‘Chronology, causes and consequences’, that summarises changing patterns over time. He starts with the relatively limited consumption of marine fish in most areas outside Scandinavia during the fifth to seventh centuries AD. The situation began to change in England, France, Belgium and Netherlands during the “long eighth century” (p. 251), with the re-emergence of urban centres. Consumption picked up during the ‘fish event horizon’ (c. AD 850–1050) with a definitive shift from fresh to marine fish consumption linked to the supply of growing urban populations.

During the High Middle Ages (AD 1050–1350), sea fishing grew in importance through regional specialisation (‘globalisation’) during the twelfth century, which led to the decline of some small fisheries. Thus, “What began as a modest trade, of importance to northern producers but perhaps less so to southern consumers, rapidly expanded in the middle decades of the thirteenth century” (p. 260). After a peak in activity by c. AD 1300, the challenges of the fourteenth century led to significant changes. It is suggested, for example, that the decline of the North Sea herring trade on the east coast of England was due to a combination of the silting of ports, the introduction of new barrelling techniques and even the rising cost of salt production. By the end of this period, the salted herring and dried stockfish trade was well established and largely monopolised

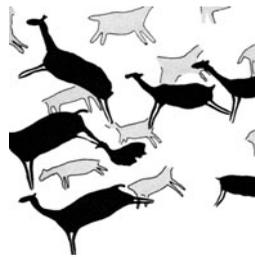
by the Hanseatic League under Lübeck; indeed, the League was one of the major beneficiaries of the fish trade (although it was not directly involved with fishing itself). Summing up, Barrett identifies “A self-perpetuating drive for more fish from more distant waters” (p. 266). The resulting effects—greater wealth, extensive trade networks, interdependency of regional economies, vulnerability to domination and disease—echo those of contemporary globalisation.

Whereas Braje (above) presents a sustained and impassioned account of how archaeology might be used to improve conservation, this collection is rather more muted on the subject. Hence, Barrett notes that the otherwise thankless task of counting cod vertebrae produces results that are “far from esoteric” (p. 6), and he concludes that medieval fishing was probably sustainable, but that “overall, it is too soon to make generalisations regarding the possible impact of medieval sea fishing on cod and herring” (p. 265).

Meat and manure

LEE BRODERICK (ed.). *People with animals: perspectives and studies in ethnozoarchaeology*. 2016. vi+119 pages, numerous b&w illustrations. Oxford & Havertown (PA): Oxbow; 978-1-78570-247-1 paperback £38.

JOSÉ M. CAPRILES & NICHOLAS TRIPCEVICH (ed.). *The archaeology of Andean pastoralism*. 2016. 280 pages, numerous b&w illustrations, 25 tables. Albuquerque: University of New Mexico Press; 978-0-8263-5702-1 hardback \$85.



Out next book also offers chapters on fish, but broadens out to consider a wider menagerie of animals including dogs, horses, cattle and sheep. It also shifts from a single geographic and

chronological focus to a methodological theme: ethnozoarchaeology. *People with animals: perspectives and studies in ethnozoarchaeology*, edited by LEE BRODERICK, is a diverse collection. Indeed, in his concluding comments, O’Connor notes that “A common theme is elusive” (p. 116), and the editor himself makes no claim for any strong coherence

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beyond the value of analogy and generalisation in the use of ethnoarchaeological knowledge.

The papers fall into three main sections: 'Thinking', 'Living' and 'Subsisting with animals'. Some of the papers are 'standard' ethnoarchaeological studies undertaken to inform the interpretation of zooarchaeological assemblages. For example, Bendrey *et al.* present the results of a study of a Kurdish village in Iraq, and Arnold and Lyons document the slaughter and butchery of cattle at a Sudanese abattoir. There is a sense that the opportunities for such work are dwindling and, hence, that their importance is growing.

In their paper, Broderick and Wallace make the case for 'Manure: valued by farmers, undervalued by zooarchaeologists'. They present fieldwork in highland Ethiopia concerned with the system through which households loan their cattle to family members and neighbours who stall or 'foster' the animals, but who have no right to the meat or secondary products, other than manure. The latter is used for fertilising intensively managed garden plots, and for the fosterers this product is the primary reason for looking after these animals. This is an example, the authors conclude, that does not fit neatly into standard archaeological interpretations and is illustrative of the way in which the importance of manure has been overlooked by zooarchaeologists, presumably as it leaves no skeletal signature. Archaeobotanists, however, will not need convincing (see *Andean pastoralism* below), and nor will landscape archaeologists. Still, their conclusion remains valid—most models seek to distinguish between animal husbandry for meat, dairy, wool or traction; manure should be added to that list, something that requires zooarchaeologists to work with other specialists. Another paper which uses ethnographic and zooarchaeological approaches to question standard interpretative categories is Houle's investigation of mobility in Bronze Age Mongolia. His analysis indicates a localised type of mobility, moving between seasonal campsites just a few kilometres apart, leading him to question simple oppositions, such as settled *vs* mobile, and to call for greater precision in relation to terms such as a 'nomadic pastoralism'.

The range of material on offer in this volume is highlighted by papers as diverse as Collins's exploration of the limits of understanding Neanderthal behaviour using models based on anatomically modern humans and Love's consideration of a series of large dog skulls

from a Hellenistic hilltop site in Italy. The latter suggests that the size and unusual dental pathology of these dogs indicates that they were bred to guard sheep and would have resembled the modern Maremmano-Abruzzese sheepdog. (I can personally vouch for the effectiveness of these sheepdogs having found one attached to my trouser leg during a trek on Mount Etna.) Love is rightly cautious about directly tracing back this modern breed to Hellenistic times, especially without genetic evidence, but is able to point to a more or less contemporaneous description by Varro of the ideal guard dog, closely matching the Maremmano. If these dogs are not ancestral, Love observes, the development of morphologically similar breeds suggests parallel cultural processes, perhaps linked to transhumant pastoralism.

A particularly fascinating paper is Argent's study of the Pazyryk horse sacrifices that accompanied human burials of the fifth to third centuries BC in the Altai Mountains. Argent draws on anthropological and post-humanist theory including 'human-animal studies' to rethink human-horse relations. She outlines an approach, supported by both scientific studies and her personal equine experience, based on emotional and empathetic relations between humans and horses. She then works through the experience of the horse sacrifices from both human and equine perspectives. This final section is undeniably subjective, but her reconstruction, prefaced with careful discussion of theory and clearly presented examples, is powerful and emotive. It relies on 'human' concepts such as loyalty and might therefore be seen as anthropomorphising—after all, how can we know an animal's emotions in its own terms?—but the reconstruction, and the paper as a whole, are highly thought-provoking.

O'Connor's concluding reflections are rich in insight. For example, he emphasises the need to understand how animal behaviours, or cultures, can vary within species at a population level. This is well documented for primates, but, he suggests, should also be considered in relation to how populations of prey animals responded to human hunters. He also flags up gene-culture co-evolution as a future research avenue. More generally, he perceives the need, and desire, to approach animals in ways that do not treat them as resources: passive objects to be tamed, domesticated and exploited; he also outlines considerable challenges to such an objective. This volume certainly does not have all the answers, but it does raise some interesting questions.

The next book, *The archaeology of Andean pastoralism* edited by CAPRILES and TRIPCEVICH, narrows the geographic frame to focus on human-animal relations in the Andes. The papers therein focus on prehispanic camelid (alpaca and llama) pastoralism. In a landscape where cultivation is unreliable, the mobility permitted by pastoralism was used to manage ecological risk. But such strategies also had effects on social organisation, and the contributors echo O'Connor's call (above), by approaching pastoralism as more than a purely economic activity, stressing the associated social, political and cultural aspects. Here, as usual, a sample of the contributions must suffice.

Moore provides an overview of the domestication of camelids, drawing out the similarities and differences from Old World domesticates and examining physical and behavioural changes as wild guanaco and vicuña were transformed into llama and alpaca. The evidence suggests multiple centres of domestication, c. 1000 BC, for meat, wool and transport. Moore observes that, with a generation of research, "the general state of this topic has shifted from being enigmatic to being enigmatic and complicated, similar to the situation with animal domestication in Eurasia" (p. 31).

A substantial contribution, drawing on fieldwork results from the Lake Suches region of southern Peru, is provided by Vining. He concentrates on a marked dislocation of settlement and economy between the Middle to Late Formative Periods (c. 800 BC–AD 500) and the Middle Horizon (AD 500–1100). The former was characterised by village communities; the latter by dispersed hamlets located on *bofedales* (alpine wetlands). This fissioning of settlement massively increased the amount of available pasture and hence the number of animals that could be supported, but the human population appears to have declined. Vining interprets this in relation to increased external market demand connected with the rise of the Tiwanaku state. The effect of this pressure was to atomise corporate social relations, with collective herd management replaced by families with individual access to grazing. Greater connectivity to Tiwanaku was coupled with reduced social connectivity within the Lake Suches region.

Lane and Grant provide another example of how pastoralists could expand the area of available pasture. They reverse the standard narrative of agriculturalists terracing their fields ever higher up the mountain slopes, by presenting evidence for "a push downward

[...] to accommodate greater camelid numbers" (p. 143). During the Late Intermediate Period (AD 1000–1450), the traditional high-altitude *puna* grazing lands were extended down into the montane steppe or *suní* (3600–3900m). The opening up of land traditionally considered too low for grazing was achieved by the construction of water channels and silt dams to create artificial pastures in the form of irrigated meadows. The authors observe that the logic of this situation is that "the dominant political-ecology narrative would seem to be pastoralist in nature" (p. 152) rather than agriculturalist. This inverts the traditional "post-conquest European agrocentrism" (p. 139), which views pastoralism as a marginal economic activity subordinate to the agricultural lowlands.

A particular feature of the high Andean landscape is the lack of trees; camelid dung was therefore an important source of fuel (see also *People and animals*, above). Bruno and Hastorf consider 'Gifts from the camelids: archaeobotanical insights into camelid pastoralism through the study of dung'. Comparison of two dung samples suggests that one group of animals was grazed locally around the Taraco peninsula on Lake Wiñaymarka, while the other sample, from Tiwanaku, indicates higher than expected consumption of wetland Cyperaceae plants, suggesting either that these animals were moved to the lake to graze, or that wetland plants were collected and used as fodder at Tiwanaku. Either way, Bruno and Hastorf argue for the impact of the state on the organisation of pastoralism.

Turning to the ritual significance of animals, two papers focus on camelid sacrifices. Kent *et al.* present evidence from an agropastoral site, Santa Rita B, on the north coast of Peru where excavation has uncovered a series of human and camelid sacrifices of successive periods. Here, the authors focus on a group of camelids dated to the Late Intermediate (Moche) period (AD 400–750). Nine animals, some with blunt force trauma, were buried with their heads aligned to the east—pointing towards the highlands—presumably as part of a dedicatory ritual. The authors suggest that the ritual may have been linked to attempts to integrate pastoralists into the new Moche economy. Goepfert and Prieto also consider Late Intermediate Period human-camelid burials/sacrifices on the north coast of Peru, at Gramalote A-Huanchaquito. Excavation has revealed over 150 camelids and more than 100 humans, buried in various combinations. All the individuals,

human and camelid, were young: the humans between 6 and 15 years and the camelids (probably llamas) mostly between 3 and 9 months. The humans had all had their hearts removed, although the evidence for similar treatment of the animals is less clear. The excellent conditions at the site have preserved the ropes used to lead the animals and to tie their legs, and even their fleeces, with a potentially significant preference for brown and beige animals. The authors tentatively link these sacrifices to a crisis event, perhaps connected with rain or the ocean.

In a contribution that would be equally at home in the *People and animals* volume, Tricepovich presents 'The ethnoarchaeology of a Cotahuasi salt caravan' in which he joins four *caravaneros* and their 28 llamas to undertake a two-week return journey of around 200km to fetch a cargo of salt. Tricepovich documents daily routines and route decisions, and considers their potential archaeological significance; for example, the preferred locations of layovers. A particularly interesting discussion concerns the tendency of llamas to travel, where possible, in a wedge-shaped formation, allowing them to move much faster. This, Tripceovich suggests, may account for the width (around 6m) of Inca roads, which are often considered as unusually wide and costly to construct. He concludes with the observation that "Studies of fast-moving, mobile groups that discard few material items challenge the spatial basis of archaeological research that relies predominantly on stratified sites and regular events of deposition" (p. 227).

The collection as a whole concludes with a detailed paper-by-paper commentary from Browman, summarising individual contributions and drawing out strengths and weaknesses, interlaced with details from his own experience of ethnoarchaeology in the Andes. Although the volume presents twice as many papers as *People with animals*, they form a more cohesive set, reiterating common themes such as the active management of the landscape, especially by individual families, and the "deeply social" (p. 7) ties between humans and camelids.

The daily grind

TIMOTHY J. ANDERSON. *Turning stone to bread: a diachronic study of millstone making in southern Spain*. 2016. xvii+322 pages, numerous b&w illustrations (Southampton Monographs in Archaeology New

Series 5). Southampton: Highfield; 978-0-9926336-5-3 paperback £45.



After all that meat and fish, we conclude our meal with something for the vegetarians, *Turning stone to bread: a diachronic study of millstone making in southern Spain* by TIMOTHY

ANDERSON. This book is a substantially modified version of Anderson's Grenoble PhD thesis and is published by Highfield, the latest in a series of millstone-related volumes. His aim is to integrate millstone production into the *chaîne opératoire* of cereal cultivation and processing from the Neolithic through to the twentieth century. To this end, he collates the evidence for millstone quarries across his chosen study area of southern Spain. Prior to his research, the map of quarry sites in this region consisted of just two locations; Anderson extends this to 138—a figure that he still believes to be an underestimate. There is no clearly stated rationale for the selection of the southern Spain study area, although it quickly becomes clear that Anderson's work fits into a much wider network of European 'molinological' studies extending from Portugal to Norway.

Anderson starts with issues of terminology. These can be problematic; Spanish, for example, does not differentiate between small hand querns, large mechanised millstones and everything in between. There is also growing evidence that these stones were used to grind a variety of materials, not only grain for human consumption but also acorns, olives, fish, metal ores and animal feed.

Chapter 3 deals with 'Millstone quarry products and milling installations'. Although Anderson describes this material as "a slight 'departure' from the principal subject of quarries" (p. 256), it is a substantial and integral chapter. His types extend from Neolithic saddle querns (c. 3000 BC) through rotary querns (starting in the late Iron Age) and (more rarely) Pompeian-style millstones driven by animals, to large millstones driven by wind and water during the medieval and contemporary periods. Particularly interesting are the similarities and differences when set alongside other regions. Anderson notes, for example, that although the evidence for

Roman-period watermills has grown significantly in other provinces, there are no known watermills during this period in Spain. And windmills were similarly less common than Cervantes' *Don Quixote* might suggest, even though they were logically concentrated in dry regions lacking fast-flowing rivers.

Anderson uses museum collections to build a typology of millstones and to isolate the local and regional production centres. Chapter 4 discusses the nine main rock types exploited including sedimentary, metamorphic and igneous geologies. The specific qualities of these stones satisfied changing user requirements; for example, volcanic rock was favoured during the Roman period, as it was elsewhere in Europe. Chapter 5 considers extraction techniques and their development over time. The increasing standardisation of products during the Roman period, reflected in extraction procedures, may point to the development of millstone quarrying as a specialist job at this time.

The locations of quarries are identified from a variety of sources including geographic dictionaries, historical documents and toponyms, but Anderson states that systematic archival work still needs to be done. Fifty-three sites were visited by the author, yet many more proved impossible to locate or to access. Anderson's visits were relatively brief, allowing basic documentation, but not systematic survey or excavation. On the basis of this work, he builds a classification of quarry types, differentiating on the basis of the type of stone and the extraction technique; for example, blocks levered off with wedges, or 'columns' removed by chiselling ('true extractive millstone quarries'), the latter an innovation of the Roman period, leaving particularly distinctive tubular quarry faces. Subterranean quarries are, however, rare even though a tradition of underground mining for metal ores was long established in the region. The results are summarised in a series of smart tabulated infographics.

Anderson also considers the associated infrastructure required to maintain these quarries—the tools, the management of waste and the need to provide shelter for workers—the evidence from Spain is, however, negligible and his discussion is informed by work from other parts of Europe. Chapter 11 turns to chronology. Dating quarries is challenging at the best of times and here Anderson draws on rock type and the size of millstones and extraction hollows to assign provisional dates. Chapter 12 considers millstone distribution, noting that the long-distance trade in

millstones (over 100km) only developed during the Roman period and that the late completion of railways in the region meant that mills were locally and regionally supplied right through to the late nineteenth century. In turn, these railways opened up an "invasion" (p. 243) of French burrstones from the Paris Basin, which, although more costly, were easier to maintain and produced a whiter flour. Anderson notes that "the advantage of grinding with these bright, white rocks was not the absence of stone dust in the flour, but the perception of its absence" (p. 282)—the first bite is with the eye!

Although aware of the incompleteness of his evidence and cautious not to press it too far, Anderson has provided a valuable addition to the current slew of molinological studies. The book is not driven by a very specific set of research questions—there is no section dedicated to aims—but rather by an attempt to address the subject holistically. The book itself is neatly and generously laid out, with abundant illustrations: crisp and informative diagrams and well-reproduced photographs.

All this has brought us a long way from where we began, gathering abalone on the coast of California. Meat, fish and bread alone do not form a balanced diet, but they do make for a tasty and nutritious meal.

Reference

- ORTON, D.C., J. MORRIS, A. LOCKER & J.H. BARRETT. 2014. Fish for the city: meta-analysis of archaeological cod remains and the growth of London's northern trade. *Antiquity* 88: 516–30. <https://doi.org/10.1017/S0003598X00101152>

Books received

This list includes all books received between 1 November 2016 and 31 December 2016. Those featuring at the beginning of and throughout New Book Chronicle have, however, not been duplicated in this list. The listing of a book in this chronicle does not preclude its subsequent review in *Antiquity*.

General

- STEFANO BIAGETTI & FRANCESCA LUGLI (ed.). *The intangible elements of culture in ethnoarchaeological research*. 2016. xx+323 pages, numerous colour and b&w illustrations. Cham: Springer; 978-3-319-23152-5 hardback £104.50.

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