

heartily recommend this publication to anybody interested in plants, their use in past and present non-agrarian societies, and the methodologies required to study them.

REFERENCES

- Balasse, M., Tresset, A. & Ambrose, S. 2006. Stable Isotope Evidence ($\delta^{13}\text{C}$, $\delta^{18}\text{O}$) for Winter Feeding on Seaweed by Neolithic Sheep of Scotland. *Journal of Zoology*, 270 (1): 170–76. doi:10.1111/j.1469-7998.2006.00104.x
- Brain, C. & Sillett, A. 1988. Evidence from the Swartkrans Cave for the Earliest Use of Fire. *Nature*, 336(6198): 464–6. doi:10.1038/336464a0
- Cao, Y., Wu, S.-H. & Dai, Y.-C. 2012. Species Clarification of the Prize Medicinal Ganoderma Mushroom ‘Lingzhi’. *Fungal Diversity*, 56(1): 49–62. doi:10.1007/s13225-012-0178-5
- McCarty, T. 2010. Mushrooms: Industry and Trade Summary (United States International Trade Commission). Office of Industries Publication ITS-07 [accessed December 5, 2016]. Available at: <https://www.usitc.gov/publications/332/ITS_7.pdf>
- O’Regan, H., Lamb, A. & Wilkinson, D. 2016. The Missing Mushrooms: Searching for Fungi in Ancient Human Dietary Analysis. *Journal of Archaeological Science*, 75: 139–43. doi:10.1016/j.jas.2016.09.009
- Powell, J. 1976. Ethnobotany. In: K. Pajmans, ed. *New Guinea Vegetation*. Canberra: Australian National University Press, pp. 106–83.
- Power, R., Salazar-García, D., Straus, L., Morales, M. & Henry, A. 2015. Microremains from El Mirón Cave Human Dental Calculus Suggest a Mixed Plant-Animal Subsistence Economy during the Magdalenian in Northern Iberia. *Journal of Archaeological Science*, 60: 39–46. doi:10.1016/j.jas.2015.04.003
- Snir, A., Nadel, D., Groman-Yaroslavski, I., Melamed, Y., Sternberg, M., Bar-Yosef, O. & Weiss, E. 2015a. The Origin of Cultivation and Proto-Weeds, Long before Neolithic Farming. *PLoS ONE*, 10(7), e0131422. doi:10.1371/journal.pone.0131422
- Snir, A., Nadel, D. & Weiss, E. 2015b. Plant-Food Preparation on Two Consecutive Floors at Upper Paleolithic Ohalo II, Israel. *Journal of Archaeological Science*, 53: 61–71. doi:10.1016/j.jas.2014.09.023

GIEDRE MOTUZAITĖ MATUZEVICIUTE
*Lithuanian Institute of History, Vilnius,
 Lithuania — Department of Archaeology,
 Vilnius University, Lithuania*

Emily Lena Jones. *In Search of the Broad Spectrum Revolution in Paleolithic Southwest Europe* (Springers Briefs in Archaeology. Cham, Heidelberg, New York, Dordrecht & London: Springer, 2016, 91pp., 17 figs, 15 tables, pbk, ISBN 978-3-319-22350-6, eBook, ISBN 978-3-319-22351-3, DOI 10.1007/978-3-319-22351-3)

Almost fifty years after the seminal works of Binford (1968) and Flannery (1969) there is still much debate regarding the validity of applying the traditional perspective of the so-called Broad Spectrum Revolution (BSR) model to archaeological contexts around the globe.

In fact, in recent years, a growing number of studies have tried to demonstrate that diet breadth amplification and resource intensification can no longer be

thought to have suddenly appeared at the beginning of the Holocene, but that they have a much greater time depth within the history of human evolution (Stiner, 2001). In Iberia, for example, while the traditional tardiglacial paradigm of resource intensification was easily adopted by some authors (Aura et al., 1998), others have pushed it back to c. 18,000 years ago, with the increase in fish and shellfish consumption during the

Solutrean (Clark & Straus, 1986), and, more recently, to late Middle Paleolithic times (Bicho & Haws, 2008), possibly as far back as *c.* 150,000 years ago (Cortés-Sánchez et al., 2011).

This volume by Emily L. Jones is yet another important contribution with this background, encapsulating close to ten years of research by the author (e.g. Jones, 2007, 2015), with the aim of testing the applicability of the BSR model to Palaeolithic hunter-gatherers in southwestern Europe. Despite the generic title, it is important to note that the study only addresses the final Late Pleistocene/ Early Holocene sequence, using data from the Gravettian, Solutrean, Magdalenian, and Epipaleolithic techno-complexes.

The volume is organized in six chapters that can be systematized into two large sections: one consisting of a rather well-structured snapshot of the body of theory and methods used to inform the study; the other presenting the results of a series of analyses on site location and the archaeofaunal record from a very significant set of sites located in the Iberian Peninsula and southern France. Being a short-format volume, the book is well documented and illustrated with a total of thirty-two figures and tables. A bibliography is presented at the end of each chapter and a convenient glossary section is offered at the end of the book, where fifty-one simplified definitions of several core concepts (e.g. ANOVA, Patchiness, Younger Dryas) used throughout the text are presented.

I must say that this was my first contact with a Springer Briefs in Archaeology series volume and it was, in general, a fairly good surprise. The way chapters are structured and the simplicity used in concept explanations and overall language are remarkable. For this and the nature of Jones' study, I believe this specific volume will become an important student text book over the next years. The light, but

still scientific, approach used in the explanation of most theoretical and methodological concepts makes this a really good first-contact volume for young archaeologists who may be interested in studying not only Palaeolithic subsistence but hunter-gatherer adaptations in general. In this sense, I feel and hope that it will allow the gap to be bridged between the overwhelming array of pure data-based publications and the more theory-oriented works. This is not to say, however, that the book is not valuable for more experienced researchers, because it certainly is all we could expect from a well-structured, hypothesis-driven, analytical study, addressing a rather relevant issue in human evolution.

In Chapter 1, 'Paleolithic People, Paleolithic Landscapes', the reader is introduced to the rationale behind the choice of theme, particularly to the importance of zooarchaeology in the task of better understanding human-environment interactions in the past, and to why southwestern Europe is the perfect fertile testing ground for this and other studies. The latter line of reasoning is mostly based on the biogeographic and bioclimatic diversity of Iberia and southern France, and on the rather long history of archaeological research in those regions.

This chapter also sets a very personal writing tone that is more or less continued throughout the volume. This is evident not only in the way the author addresses the reader but also in the use of her very own experience, in the modern southwestern United States, to illustrate how experienced landscapes shape(d) human perception and decisions.

Chapter 2, 'Big Game, Small Game: Why it Matters', is dedicated to the definition of theoretical concepts that are important for a complete grasp of the volume's main ideas and outcomes. Through, for example, the explanation of the 'dark age' notion once used to

classify the Mesolithic, the author contextualizes the historical emergence of the BSR theory, in the wake of Graham Clark's focus on human adaptations to climate change. Other concepts explored in this chapter include models based on evolutionary ecology perspectives and Optimal Foraging Theory, such as the prey choice model and the use of prey body-size as a favorite traditional proxy within the BSR. Some alternative perspectives to the traditional approaches to the model are also described, particularly focusing on how diverse factors such as prey mobility, energetic return, human innovation, and niche construction behaviors can all interfere with interpretations when applying the prey choice model.

One additional point that the author could have included, and that would have, in my opinion, enriched the chapter, would have been a mention of some of the alternative perspectives to the energy-dependent models of Optimal Foraging Theory. This is the case with the Nutritional Ecology model (Hockett & Haws, 2003), which has a more flexible position and incorporates variables that reflect the use of a diverse set of nutritional elements necessary for the sustenance and growth of a human group.

In the third chapter, 'Climate and Environment in Late Paleolithic Southwest Europe', a review of the palaeoclimate and palaeoenvironmental records for Late Paleolithic southwest Europe is presented. In the first section, the author refers to how past climate can be studied through oxygen isotopes in ice and marine cores, and how regional environments are reconstructed using the fossil pollen record. In the second part, a very broad environmental characterization of Iberia, the Pyrenees, and southern France, during the timeframe of *c.* 29 ka BP to *c.* 10 ka BP, is presented. The main point of this chapter is to clarify that, based on palaeoenvironmental data, the region under

study can be organized into three major palaeobioclimatic areas with different responses of flora, fauna, and humans to the same overall Late Pleistocene climatic events.

Chapter 4, 'Human Subsistence and the Archaeofaunal Record of Late Paleolithic Southwest Europe', is the first to deal with data analysis, exploring two lines of evidence—site location and archaeofaunal assemblages—to shed light on how humans adapt in each region through time and on whether there is evidence to support a BSR in any of the studied areas. The reasoning behind using site location as a valid variable for reconstructing mobility patterns and, from there, to track subsistence change is, in my opinion, very well-articulated. The author argues that, under the well-known residential/logistical continuum, hunter-gatherers frequently use elevation gradients to maximize access to different resource patches. Thus, the analysis of elevation variance across the three regions under study can inform on the existence (or not) of different subsistence strategies and its relationship with environmental changes. I think this approach is particularly interesting and refreshing in opposition to the traditional use of site counts as a proxy for population density increase used in previous studies.

Using a well-justified set of statistical tests, the author concludes that the three regions were home to hunter-gatherers with distinct mobility and subsistence patterns and that, with the exception of southern France during the Epipaleolithic, climate change did not significantly impact mobility patterns over time.

Regarding the archaeofaunal analysis, the author uses data from 141 discrete archaeological contexts from eighty-five sites to check for similarities in ungulate and lagomorph taxonomic distribution between the three biogeographic regions. It is noteworthy that most of the faunal

data used in the study were not directly acquired by Jones, but rather obtained from a large number of publications. Typically, researchers should be rather cautious when dealing with data coming from such a diverse set of specialists. Nevertheless, the author seems to be perfectly aware of these problems, excluding from the study, for example, all assemblages containing lagomorphs that did not have a proper taphonomic investigation.

Both cluster analysis and non-metric multidimensional scaling were used to conclude, again, that subsistence choices were strongly resilient in each region through time, thus not attesting the existence of a 'revolution' of any kind. The exception seems to be southern France, where hunting practices likely suffered some transformations during the Epipaleolithic.

For this reason, Chapter 5, 'Archaeofaunal Diversity and Broad Spectrum Diets in Late Paleolithic Southwest Europe', takes the analysis further and presents the results of the various methods used to verify changes in the diversity of the species present in the sampled sites. The results of measures of richness and evenness are first presented, suggesting that differences detected in southern France during the Epipaleolithic are likely not due to an expansion of diet breadth but to a climate change-driven faunal turnover. To test this hypothesis, the author uses subsequently a 'nestedness approach' (using the metric called NODF, i.e. incidence-based nestedness by overlap and decreasing fills) to reach the same conclusion: French Epipaleolithic assemblages are unnested and, thus, BSR cannot be suggested, even for this region/phase.

The final Chapter 6, 'Was there a Broad Spectrum Revolution in Southwest Europe?', presents a summary of the main outcomes of the study, including a general characterization of each of the biogeographic areas addressed. Here, the author makes clear that, since subsistence changes

seem not to have been driven by independent human demographic pressure but by episodes of environmental change and the alterations that these provoked in the physiography and biology of each region, the application of the traditional definition of the BSR model to southwestern Europe at the end of the Paleolithic is not viable.

While this is the core hypothesis for the volume and the results constitute a significant development for the Late Palaeolithic archaeology of these regions, I should say that, from a very personal point of view, those are not the most important outcomes for future research. Instead, I would rather emphasize the fact that all data analyzed by the author suggest that 'hunter-gatherers responded to [...] changes regionally, developing a mosaic of adaptations to climate variability rather than following a unilinear trajectory' (p. 83). Although not completely new, the suggestion that southwestern Europe was structured in discrete territories during the Upper Palaeolithic, sometimes relatively isolated from each other—forming what Schmidt et al. (2012) have called a 'leopard-coat' pattern—is an important factor for further studies on how the adaptive systems of these populations have worked at different scales. When conjugated with the technological idiosyncrasies separating regions as showed by, for example, Cascalheira (2013) for Iberia, a very different perspective on the homogeneity of each techno-complex and on the set of human ecodynamics by which they are traditionally defined should be revealed.

REFERENCES

- Aura, J.E., Villaverde, V., González Morales, M., González Sainz, C., Zilhão, J. & Straus, L.G., 1998. The Pleistocene–Holocene Transition in the

- Iberian Peninsula: Continuity and Change in Human Adaptations. *Quaternary International*, 49–50: 87–103. doi: 10.1016/S1040-6182(97)00055-4
- Bicho, N. & Haws, J. 2008. At the Land's End: Marine Resources and the Importance of Fluctuations in the Coastline in the Prehistoric Hunter-Gatherer Economy of Portugal. *Quaternary Science Reviews*, 27(23–24): 2166–75. doi:10.1016/j.quascirev.2008.08.011
- Binford, L.R. 1968. Post-Pleistocene Adaptations. In: L. Binford & S. Binford, eds. *New Perspectives in Archeology*. Chicago: Aldine, pp. 313–41.
- Cascalheira, J. 2013. A influência mediterrânica nas redes sociais do Solutrense final peninsular (unpublished PhD thesis, University of Algarve, Faro).
- Clark, G. & Straus, L. 1986. Synthesis and Conclusions—Part I: Upper Paleolithic and Mesolithic Hunter-Gatherer Subsistence in Northern Spain. *La Riera Cave: Stone Age Hunter-Gatherer Adaptations in Northern Spain* (Anthropological Research Papers 36). Tempe: Arizona State University, pp. 351–65.
- Cortés-Sánchez, M., Morales-Muñiz, A., Simón-Vallejo, M.D., Lozano-Francisco, M.C., Vera-Peláez, J.L., Finlayson, C., Rodríguez-Vidal, J., Delgado-Huertas, A., Jiménez-Espejo, F. J., Martínez-Ruiz, F., Martínez-Aguirre, M.A., Pascual-Granged, A.J., Bergadà-Zapata, M.M., Gibaja-Bao, J.F., Riquelme-Cantal, J.A., López-Sáez, J.A., Rodrigo-Gámiz, M., Sakai, S., Sugisaki, S., Finlayson, G., Fa, D.A. & Bicho, N.F. 2011. Earliest Known Use of Marine Resources by Neanderthals. *PloS ONE*, 6: e24026. doi: 10.1371/journal.pone.0024026
- Flannery, K.V. 1969. Origins and Ecological Effects of Early Domestication in Iran and the Near East. In: P. Ucko & G. Dimbleby, eds. *The Domestication and Exploitation of Plants and Animals*. Chicago: Aldine, pp. 73–100.
- Hockett, B. & Haws, J. 2003. Nutritional Ecology and Diachronic Trends in Paleolithic Diet and Health. *Evolutionary Anthropology: Issues, News, and Reviews*, 12: 211–16. doi: 10.1002/evan.10116
- Jones, E.L. 2007. Subsistence Change, Landscape Use, and Changing Site Elevation at the Pleistocene–Holocene Transition in the Dordogne of Southwestern France. *Journal of Archaeological Science*, 34: 344–53. doi: 10.1016/j.jas.2006.05.005
- Jones, E.L. 2015. Archaeofaunal Evidence of Human Adaptation to Climate Change in Upper Paleolithic Iberia. *Journal of Archaeological Science: Reports*, 2: 257–63. doi:10.1016/j.jasrep.2015.02.008
- Schmidt, I., Bradtmöller, M., Kehl, M., Pastoors, A., Tafelmaier, Y., Weninger, B. & Weniger, G.-C. 2012. Rapid Climate Change and Variability of Settlement Patterns in Iberia during the Late Pleistocene. *Quaternary International*, 274: 179–204. doi: 10.1016/j.quaint.2012.01.018
- Stiner, M.C. 2001. Thirty Years on the 'Broad Spectrum Revolution' and Paleolithic Demography. *Proceedings of the National Academy of Sciences of the United States of America*, 98: 6993–96. doi: 10.1073/pnas.121176198

JOÃO CASCALHEIRA
*Interdisciplinary Centre for Archaeology and
 Evolution of Human Behaviour
 (ICArEHB), University of Algarve,
 Portugal*

doi:10.1017/ea.2017.8

Paul G. Bahn. *Images of the Ice Age* (Oxford: Oxford University Press, 2016, third revised edition, xxiv and 480pp., 267 colour and 48 b/w figs, 4 maps, hbk, ISBN 978-0-19968-600-1)

Prehistoric art is today the focus of continued interest, as shown by the several

books, papers, conferences, and projects each year devoted to the subject—and,