Journal of Anthropological Archaeology 32 (2013) 275–279

Contents lists available at SciVerse ScienceDirect

Journal of Anthropological Archaeology

journal homepage: www.elsevier.com/locate/jaa

Human bioarchaeology: Group identity and individual life histories – Introduction

Marek Zvelebil [a], Andrzej W. Weber [b,*]

[a] Department of Archaeology, University of Sheffield, Sheffield S1 4ET, UK
[b] Department of Anthropology, University of Alberta, Canada T6G 2H4

ARTICLE INFO

Article history:
Available online 30 January 2012

Keywords:
Human bioarchaeology
Individual life histories
Evolutionary archaeology

ABSTRACT

The approach of *individual life histories* has been facilitated by a rapid growth in the area of bio- and archaeological sciences, and in human osteology. Concurrent improvements to radiocarbon dating and focus on high resolution paleoenvironmental reconstructions have moved the new research to the annual or decadal scale of analysis. Together, this new approach allows us: (1) to reconstruct long segments of individual life histories from birth to death; (2) to assess variation in prehistoric human behaviour; and (3) to place this behaviour in the context of dynamic interactions with the natural environment. The emphasis on individuals rather than groups or cultures feeds naturally into the modern scientific-evolutionary archaeology, a school of thought which focuses on mechanisms generating human cultural diversity. While it is the populations that evolve, it is the variation generated at the individual level that is necessary to set this process in motion. To an evolutionary archaeologist and anthropologist it is the behavioural variability that is of primary research interest. Hence the paramount importance of documenting and understanding what people do on a daily basis and how they differ from each other in their needs, preferences, choices, decisions, and strategies developed and employed to satisfy them.

Biological aspects

Humans are both, biological and cultural creatures. These two aspects of their existence interact, of course, and influence one another. They play a major role in their survival and procreation. Archaeology, partly because of analytical methods available, concentrated on cultural and biological conditions of large groups of people, rather than individuals. Such focus tended to combine collectively biology and culture. Yet there is a major variation between conditions of existence among individuals.

Such approach has also promoted ethnically focussed concept of archaeological culture that has dominated much of archaeological thinking for the last 100 years. Our approach, presented in this special issue, tries to analyse and identify biological condition and cultural circumstances of individuals or small groups, socially defined, and in so doing questions the whole concept of archaeological culture.

The approach to which we refer as *bioarchaeology of individual life histories* has been facilitated by a rapid growth, over the last 10–15 years, in the area of bio- and archaeological sciences, and in human osteology (Meiklejohn and Zvelebil, 1991). These fields combined, now offer a suite of methods, too numerous to mention them all here, that can provide considerable insights into the variation of past human behaviour at the individual level. For example, the carbon and nitrogen stable isotope technique has become the most direct and reliable measure of human diets and subsistence and, indirectly, of mobility, migrations, and social differentiation and kinship organisation (e.g., Haak et al., 2008; Katzenberg, 2008; Schulting and Richards, 2001; Schulting, 2010). The method also allows assessment of the age of weaning in children and the timing of the adoption of a fully adult diet, both important demographic and social variables. Strontium isotope tests on enamel of an early-forming human tooth (ca.1–3 years of age) and comparison with the spatial distribution of the background signatures of biologically available strontium in plants, water, and various fauna, permit examination of long-distance migrations, mobility patterns, and insights into group formation and organisation (Bentley, 2006; Price et al., 2002). Testing enamel of the second and third molar, which represent middle (ca. 3.5–7 years) and late childhood (ca. 9–13 years), respectively (Hilson, 1996), extends the insights provided by strontium values over additional ~10 years of the person's life. If methods of obtaining biogenic strontium signals from archaeological bones are developed, the last 10–20 years of life can be gleaned into as well. Coeval examination of trace elements provides additional spatial resolution particularly in cases when the background strontium signatures are similar (Cucina et al., 2005, 2007; Scharlotta et al., in press). Ongoing experiments

* Corresponding author. Fax: +1 780 492 5273.
E-mail address: aweber@ualberta.ca (A.W. Weber).

0278-4165/$ - see front matter © 2012 Elsevier Inc. All rights reserved.
doi:10.1016/j.jaa.2012.01.003

with micro-sampling of tooth enamel and bone tissue may lead to a substantial increase in the temporal resolution of the various geochemical signatures of human past behaviour. Continuous improvements to the ancient DNA methodology facilitate examination of genetic affinities along both the female (mitochondrial DNA – mtDNA) and male (Y-chromosome) lines (Stone, 2008; Stone et al., 1996), and genetic sexing using the amelogenine gene is possible too, practical in cases where ostoeological sex markers are lacking or ambiguous. Furthermore, the micro- and macro-scopic non-destructive examination methods of human osteological remains yield information that enhances the value of the laboratory tests: sex, biological age, pathological lesions, health, interpersonal violence, intensity and kind of physical activities (Katzenberg and Saunders, 2008). These techniques have all become a mainstream of human bioarchaeological research, and when entire cemeteries are analyzed in this manner we gain insights into population dynamics, interaction patterns, migrations, subsistence practices, and health and demography of the communities that generated the spatio-temporal variation in the archaeological record.

Cultural aspects

Other kinds of data provide additional context for the interpretation and understanding of the individual life histories. Cemeteries inform about the locations where individuals spent at least the last portion of their lives and offer insights into population size and distribution. Characteristics of mortuary protocols (grave architecture and associated objects, body position and treatment, and spatial patterning etc.) inform about world views, social organisation, and concepts relating to death. Together these different lines of evidence permit examination of additional aspects of individual life histories, including their social positions, symbolic systems, and interactions with their social and natural environment, and their own biological condition.

Dating and environment

An important role in this approach is played by extensive radiocarbon dating programs. First, direct dating of human remains provides the most secure temporal placement of the biological and behavioural characteristics of specific individuals and all other information associated with them. Second, large series of dates allow for identification of temporal variation and patterns in the data that are otherwise invisible or obliterated by typological dating, the Baikal region providing a telling example of such confusion (Weber, 1995; Weber et al., 2010). Third, large numbers of AMS ^{14}C determinations make it possible to employ quantitative methods (Ramsey, 2009a, 2009b; Weber, in press; Weber et al., 2005) to measure the impact of stochastic effects on the distribution of calibrated radiocarbon dates which, in turn, allows improved assessment of the tempo of culture change. None of this can be achieved with small sets of dates.

Although not a specific focus of this special issue, methods of archaeological science as applied to dwelling sites play an essential role in this approach too. Even though actions of individual persons are less traceable in materials from habitation contexts, such sites supply invaluable data on subsistence and diet, including seasonality, procurement techniques, food processing, diet breadth and prey choices, and insights into settlement patterns, socio-economic differentiation, and ritual life; all directly pertinent to the implementation of the life history approach and all complementing and contextualizing the individual life history data in the most meaningful and necessary ways.

Lastly, recent trends in paleoenvironmental research focus on high resolution records and reconstructions. Rather than operating at the scale of thousands or hundreds of years, at best, the new research has moved to the annual or decadal scale of analysis. This new work has the capacity to produce predictive and reconstructive models, mathematical or proxy based, of climate and environmental change that have much better control over such critical variables as seasonal variation in temperature and insolation, precipitation and snow cover, etc. (Brauer et al., 2008; Nakagawa et al., 2003; Stebich et al., 2009; Tarasov et al., 2009; Wanner et al., 2008). Furthermore, these parameters allow modelling of biome types and tree cover (Kleinen et al., 2011; Prentice et al., 1996), changes in their distribution as well as corresponding changes in abundance and distribution of food resources (mostly fauna) important for past people. These developments are important for at least the following two reasons. First, humans adapt to changes that are perceptible from the individual perspective, namely those that take place within the lifetime of one person, not ones that span several or more generations. And second, the adaptation process involves decision making and behavioural changes also at the level of an individual, both an explicit focus of the individual life history approach.

Human behavioural ecology, cultural transmission and individual life histories

Together, these new techniques allow us, on one side, to reconstruct long segments of individual life histories from birth to death and to assess variation in prehistoric human behaviour and, on the other, to place this behaviour in the context of dynamic interactions with the natural environment. In archaeology, opportunities for this level of detail and insight were never available before.

Although, clearly, the development of the *bioarchaeology of individual life histories* approach has been largely driven by the technological growth in many fields of science, the true epistemic value of the approach arises not from the success in the lab, but from the parallel developments in theory, particularly the growth of the modern (Darwinian) scientific-evolutionary approaches in anthropology in general, and in archaeology in specific. The scientific-evolutionary approach differs from the usual anthropological perspectives mainly in its focus on key mechanisms generating human cultural diversity, and the emphasis on the roles and strategies of individuals rather than groups or cultures. Thus, the scientific-evolutionary approach is fully compatible with the individual life history approach.

The literature too large and too diverse to be sampled extensively here, the scientific-evolutionary approach is a vibrant school of thought growing dynamically since its inception in the 1980s (e.g., Bettinger, 1991; Dunnell, 1980; O'Brien, 1996; O'Brien and Lyman, 2000; Shennan, 2002, 2008; Winterhalder and Smith, 1981) and finding a rapidly expanding number of successful applications in many subfields of anthropology and archaeology (e.g., Steele et al., 2010). Of its several strands, we will mention only two here and both very briefly. The first is *human behavioural ecology* (e.g., Bird and O'Connell, 2006; Cronk, 1991; Krebs and Davies, 1981; Smith and Winterhalder, 1992; Winterhalder and Smith, 2000), which broadly examines how populations adapt to changing environments and focuses on the strategies pursued by individuals to satisfy their requirements such as subsistence and reproduction, both of which contribute to larger scale patterns of community health and demography or survival in general. The second strand is *cultural transmission theory* which examines how cultural behaviours – for example making stone tools or pottery, subsistence activities or mortuary ritual – are acquired through social learning and then passed on within and between groups and generations of people resulting in distinct patterns of spatio-temporal cultural variation (Boyd and Richerson, 1985; Cavalli-Sforza and Feldman, 1981; Collard and Shennan, 2008; Durham, 1991; Eerkens and

Lipo, 2005, 2007; Henrich, 2004; Jordan and Shennan, 2009; Lipo et al., 2006; Mesoudi et al., 2006; O'Brien, 2008).

Furthermore, archaeologists have also absorbed certain sociological concepts that highlight collective identities and the acquisition of cultural knowledge (i.e., Shennan, 1989; Zvelebil, 2004). For the most part, this kind of research has been carried out at a population or a group level, addressing human condition and identity of social groups bounded by gender, age, social position, food procurement strategies and dietary patterns or either communal or territorial coherence.

At the same time, and crucially, each of us, in the present or in the past, holds not one but several identities and occupies a number of roles that are socially constructed and often relate to our gender and age. Through life, we symbolise these social roles and identities strategically, in relation to a broader changing social situation; in death, our social roles and identities can be symbolised in the burial rite as signatures of our life biographies. The individual life history approach, designed to tell us as much as we can know about the individual as a real person, has the potential to address a number of important and rather specific questions about past peoples. For example: What their ancestry was? Where people were born and where they came from? What their diet was at different times of their lives? What their health was like, their lifestyle, and activity patterns? How much did they work? And, eventually, how did they die? Further insights about how these people interacted with each other are provided by cross-linking this information with individuals' social status, roles and identities and group membership based on the analyses of mortuary rite, burial goods, and cemetery spatial organisation. In this way, the identity and life history of a person long dead comes alive once again after millennia of dormancy.

The empirical and theoretical focus on the individual is thus a logical and obvious necessity. As Mayr (1959) observed "All organisms and organic phenomena are composed of unique features and can be described collectively only in statistical terms. Individuals, or any kind of organic entities, form populations of which we can determine the arithmetic mean and the statistics of variation. Averages are merely statistical abstractions, only the individuals of which the populations are composed, have reality". Consequently, although it is the populations that evolve, it is the variation generated at the individual level that is a *sine qua non* condition to set this process in motion. Speaking bluntly, the important point is that if there is no variation at the individual level, there is no evolution either, the latter defined as a change in population characteristics (biological or behavioural) over time. When the matter is about humans, it is the behavioural variability that is of primary interest to an evolutionary archaeologist and anthropologist. Hence the paramount importance of documenting and understanding what people do on a daily basis and how they differ from each other in their needs, preferences, choices, decisions, and strategies developed and employed to satisfy them.

In sum, the importance and implications of reconstructing individual life histories as markers of social identity and social standing within community, as signatures of ancestry, population mobility and partner exchange, and as indicators of individual and collective patterns of health, disease and demography cannot be overestimated. Humans as individuals form, after all, the individually diverse constituents of broader social groups, spatially defined communities, self-aware identity units (ethnicities), and broader populations. With the new advances in scientific methods, located mainly within the biochemical and genetic (both ancient and modern DNA) analyses, we can now apprehend and reconstruct in substantial details life histories of individuals within their historical and ancestral context. This is of fundamental importance for our understanding of the patterns of cultural transmission, the composition of individual settlements, communities, and groups, as well as for the constitution and the meaning of archaeological culture. Papers by contributors to this special issue examine the extent to which the scope of analyses allows us to reconstruct individual life histories, within the broader context of biosocial archaeology.

The field is growing to the extent that a number of archaeological projects have made examination of individual life biographies their focal point. This special issue of the Journal of Anthropological Archaeology focuses rather on the empirical side of the approach than on the theoretical one. We present several different ways of practicing the individual life history approach and trace the progress of this new sub-field of archaeology from physical anthropological approaches towards more bioarchaeological perspectives, more directly informed by cultural anthropology and social theory, and from a focus on populations to smaller social units, and ultimately to the reconstruction of individual life histories. As argued earlier, these are not mutually exclusive approaches, quite the opposite, they are complimentary. Most of the studies are situated within post-glacial hunter–gatherer or early farming cultural settings within the geographical context of temperate and northern Eurasia.

The paper by Niinimäki and co-authors utilises observations from physical anthropology, palaeopathology, and biomechanics to infer human physical activity levels and changes over time. Contributions by Bentley, Le Bras-Goude, Eriksson and Lidén, and Weber and Goriunova concentrate on geochemical analyses of skeletal remains within their respective regions of research. They consider communal identity and group signatures of food consumption and compare those with individual variation in life-long mobility and migrations, and individual variation in lifetime food consumption patterns. Trough such comparative approaches, the heterogeneous role of individuals as contributing members of different social groups begins to emerge. As Eriksson and Lidén note:

> *"The very fact that diet has such a strong cultural component makes it ideal for tracing individual practice. The deep-rooted norms concerning what is considered edible, and when, where, how and by whom particular foodstuffs and dishes should be consumed, means that any deviation from these norms are important clues to how culture is enacted at the individual level." (this volume, p. xx)*

At the same time, different contributions come to different conclusions on other matters. For example, Eriksson and Lidén's observation that in the Baltic region of Europe "the cultural norm was then so strong that the location was without importance" (p. xx) contrasts in an interesting way with Weber and Goriunova's conclusion that among the Early Bronze Age hunter–gatherers of the Cis-Baikal area in Eastern Siberia "the area of origin was an important cultural variable well marked in the various spatial arrangements such as the rows, sectors, and groups of graves" and that "all locals subsisted on the GFS [game-fish-seal] diet, while the non-locals featured a mix of individuals with either GFS or GF [game-fish] diet." (p. xx).

Finally, the paper by Zvelebil and Pettitt (this volume and 2008) makes perhaps the most explicit attempt to consider individual life biographies through a wide combination of approaches, integrating an (all too limited) ancient mtDNA analyses, stable isotope and trace elemental tests, gross morphology, palaopathology and dental microwear, and material culture studies of extensively radiocarbon-dated human skeletal remains from the LBK site of Vedrovice in the Czech Republic. Individual variation, linked to individual age and gender, social position and lifelong history of mobility, is identified by comparison to group-specific patterns.

Conclusion

All papers in this volume share one important characteristic of the approach. Namely, that the potential for further examination and additional insights is enormous. Each study clearly shows that the data can be taken in many other directions from local to regional scales of analysis, from addressing specific archaeological questions (e.g., the tempo of culture change) to examining matters of general relevance (e.g., the development of social inequality), and to integrating even more lines of evidence.

It is our opinion that it is exactly through such integration of biological and archaeological examination of human skeletal remains and associated cultural deposits that we can apprehend personal life histories as never before, and gain more accurate and advanced understanding of the identities of individuals and social groups, patterns of culture change and many other nagging questions about human prehistory. This new approach provides a fascinating picture of the past, and has broader implications for understanding of the formation and meaning of material culture and of human society.

Post scriptum

This project precipitated from the session organized by Marek and me at the annual meeting of the European Association of Archaeologists held in Malta in September 2008. Unfortunately, its progress and completion have been substantially delayed by Marek's illness and his passing in July 2011. In this context, we all view this special issue as our recognition of Marek's life and of his lasting contribution to archaeology. While I had known of Marek for many years, I did not meet him in person until spring 2007 at a conference in Irkutsk, Russia. I was thrilled to learn that he knew of me too and that he actually had red some of my work on Baikal middle Holocene hunter–gatherers. Friendship was struck quickly, perhaps also because of the very similar 'individual life histories', and common archaeological interests and views. This is how we decided to organize the session in Malta and to follow up with a special issue. I deeply regret that I did not have the opportunity and pleasure to meet Marek earlier and to know him for longer.

I will miss you dearly, Marek.

Andrzej

References

Bentley, R.A., 2006. Strontium isotopes from the earth to the archaeological skeleton: a review. Journal of Archaeological Method and Theory 13, 135–187.

Bettinger, R.L., 1991. Hunter-Gatherers: Archaeological and Evolutionary Theory. Plenum Press, New York.

Bird, D.W., O'Connell, J.F., 2006. Behavioral ecology and archaeology. JAR 14, 143–188.

Boyd, R., Richerson, P.J., 1985. Culture and the Evolutionary Process. University of Chicago Press, Chicago.

Brauer, A., Haug, G.H., Dulski, P., Sigman, D.M., Negendank, J.F.W., 2008. An abrupt wind shift in western Europe at the onset of the Younger Dryas cold period. Nature Geoscience 1, 520–523.

Cavalli-Sforza, L.L., Feldman, M.W., 1981. Cultural Transmission and Evolution: A quantitative approach. Princeton University Press, Princeton.

Collard, M., Shennan, S.J., 2008. Patterns, processes, and parsimony: studying cultural evolution with analytical techniques from evolutionary biology. In: Stark, M.T., Bowser, B.J., Horne, L. (Eds.), Cultural Transmission and Material Culture: Breaking Down Boundaries. University of Arizona Press, Tucson, pp. 17–33.

Cronk, L., 1991. Human behavioural ecology. Annual Review of Anthropology 10, 25–53.

Cucina, A., Dudgeon, J., Neff, H., 2007. Methodological strategy for the analysis of human dental enamel by LA-ICP-MS. JAS 34 (11), 1884–1888.

Cucina, A., Neff, H., Tiesler, V., 2005. Provenance of African-born individuals from the colonial cemetery of Campeche (Mexico) by means of trace-element analysis. Dental Anthropology 17, 65–69.

Dunnell, R.C., 1980. Evolutionary theory and archaeology. Advances in Archaeological Method and Theory 3, 35–99.

Durham, W.H., 1991. Coevolution: Genes, Culture and Human Diversity. Stanford University Press, Stanford.

Eerkens, J.W., Lipo, C.P., 2005. Cultural transmission, copying errors, and the generation of variation in material culture in the archaeological record. JAA 24, 316–334.

Eerkens, J.W., Lipo, C.P., 2007. Cultural transmission theory and the archaeological record: providing context to understanding variation and temporal changes in material culture. JAR 15, 239–274.

Haak, W., Brandt, G., de Jong, H.N., Meyer, C., Ganslmeier, R., Heyd, V., Hawkesworth, C., Pike, A.W.G., Meller, H., Alt, K.W., 2008. Ancient DNA, strontium isotopes, and osteological analyses shed light on social and kinship organization of the Later Stone Age. Proceedings of the National Academy Science U.S.A 105, 18226–18231.

Henrich, J., 2004. Demography and cultural evolution: how adaptive cultural processes can produce maladaptive. American Antiquity 69 (2), 197–214.

Hilson, S., 1996. Dental Anthropology. Cambridge University Press, Cambridge.

Jordan, P., Shennan, S.J., 2009. Diversity in hunter–gatherer technological traditions: mapping trajectories of cultural 'descent with modification' in Northeast California. Journal of Anthropological Archaeology 28 (3), 342–365.

Katzenberg, M.A., Saunders, S.R. (Eds.), 2008. Biological Anthropology of the Human Skeleton. Wiley-Liss, Hoboken.

Katzenberg, M.A., 2008. Chemical and genetic analyses of hard tissues: Stable isotope analysis, a tool for studying past diet, demography, and life history. In: Katzenberg, M.A., Saunders, S.R. (Eds.), Biological Anthropology of the Human Skeleton. Wiley-Liss, Hoboken, pp. 413–442.

Kleinen, T., Tarasov, P., Brovkin, V., Andreev, A., Stebich, M., 2011. Comparison of modeled and reconstructed changes in forest cover through the past 8000 years: Eurasian perspective. The Holocene 21, 723–734.

Krebs, J.R., Davies, N.B., 1981. An Introduction to Behavioural Ecology. Blackwell, Oxford.

Lipo, C.P., O'Brien, M.J., Collard, M., Shennan, S.J. (Eds.), 2006. Mapping Our Ancestors: Phylogenetic Approaches in Anthropology and Prehistory. AldineTransaction, New Brunswick, NJ.

Mayr, E., 1959. Darwin and the evolutionary theory in biology. In: Evolution and Anthropology: A Centennial Appraisal. Washington D.C.: Anthropological Society of America, pp. 1–10.

Meiklejohn, C., Zvelebil, M., 1991. Health status of European populations at the agricultural transition and the implications for the adoption of farming. In: Bush, H., Zvelebil, M. (Eds.), Health in Past Societies. Biocultural Interpretations of Human Skeletal Remains in Archaeological Contexts. British Archaeological Reports, International Series, vol. 567, Oxford, pp. 129–145.

Mesoudi, A., Whiten, A., Laland, K.N., 2006. Towards a unified science of cultural evolution. Behavioral and Brain Sciences 29, 329–383.

Nakagawa, T., Kitagawa, H., Yasuda, Y., Tarasov, P.E., Kotoba, N., Gotanda, K., Sawai, Y., Yangtze River Civilization Program, 2003. Asynchronous climate changes in the North Atlantic and Japan during the Last Termination. Science 299, 688–691.

O'Brien, M.J., 1996. Evolutionary Archaeology: Theory and Application. University of Utah Press, Salt Lake City.

O'Brien, M.J., Lyman, R.L., 2000. Applying Evolutionary Archaeology. Kluwer Academic, New York.

O'Brien, M.J. (Ed.), 2008. Cultural Transmission and Archaeology: Issues and Case Studies. Society for American Archaeology, Washington, DC.

Prentice, I.C., Guiot, J., Huntley, B., Jolly, D., Cheddadi, R., 1996. Reconstructing biomes from palaeoecological data: a general method and its application to European pollen data at 0 and 6 ka. Climate Dynamics 12 (3), 185–194.

Price, T.D., Burton, J.H., Bentley, R.A., 2002. The characterization of biologically available strontium isotope ratios for the study of prehistoric migration. Archaeometry 44, 117–135.

Ramsey, C.B., 2009a. Bayesian analysis of radiocarbon dates. Radiocarbon 51, 337–360.

Ramsey, C.B., 2009b. Dealing with outliers and offsets in radiocarbon dating. Radiocarbon 51 (3), 1023–1045.

Scharlotta, I., Weber, A., Dufrane, A., Goriunova, O.I., Creaser, R., in press. Assessing hunter-gatherer mobility in Cis-Baikal, Siberia using LA-ICP-MS: methodological correction for laser interactions with calcium phosphate matrices and the potential for integrated LA-ICP-MS sampling of archaeological skeletal materials. In: Black, Sharon E. (Ed.), Laser Ablation: Effects and Applications. Nova Publishers.

Schulting, R.J., 2010. Staying home for dinner: an isotopic approach to regionality in Mesolithic Atlantic Europe. In: Barndon, I.R., Engevik, A., Øye, I. (Eds.), The Archaeology of Regional Technologies: Case Studies from the Palaeolithic to the Age of the Vikings. Edwin Mellen Press, Lewiston, pp. 69–88.

Schulting, R.J., Richards, M.P., 2001. Dating women and becoming farmers: New palaeodietary and AMS dating evidence from the Breton Mesolithic cemeteries of Téviec and Hoëdic. Journal of Anthropological Archaeology 20 (3), 314–344.

Shennan, S. (Ed.), 1989. Archaeological Approaches to Cultural Identity. Unwin Hyman, London.

Shennan, S., 2002. Genes, Memes and Human History: Darwinian Archaeology and Cultural Evolution. Thames and Hudson, London.

Shennan, S., 2008. Evolution in archaeology. Annual Reviews in Anthropology 37, 75–91.

Smith, E.A., Winterhalder, B. (Eds.), 1992. Evolutionary Ecology and Human Behaviour. Aldeine de Gruyter, New York.

Stebich, M., Mingram, J., Han, J., Liu, J., 2009. Late Pleistocene spread of (cool-) temperate forests in Northeast China and climate changes synchronous with the North Atlantic region. Global and Planetary Change 65, 56–70.

Steele, J., Jordan, P., Cochrane, E. (Eds.), 2010. Cultural and Linguistic Diversity: Evolutionary Approaches. Philosophical Transactions of the Royal Society B: Biological Sciences, Theme issue, vol. 365, No. 1559.

Stone, A., 2008. DNA analysis of archaeological remains. In: Katzenberg, M.A., Saunders, S.R. (Eds.), Biological Anthropology of the Human Skeleton. Wiley-Liss, Hoboken, pp. 461–484.

Stone, A.C., Milner, G.R., Pääbo, S., Stoneking, M., 1996. Sex determination of ancient human skeletons using DNA. American Journal of Physical Anthropology 99, 231–238.

Tarasov, P.E., Bezrukova, E.V., Krivonogov, S.K., 2009. Late glacial and Holocene changes in vegetation cover and climate in southern Siberia derived from a 15 kyr long pollen record from Lake Kotokel. Climate of the Past 5, 73–84.

Wanner, H., Beer, J., Bütikofer, J., Crowley, T.J., Cubasch, U., Flückiger, J., Goosse, H., Grosjean, M., Joos, F., Kaplan, J.O., Küttel, M., Müller, S.A., Prentice, I.C., Solomina, O., Stocker, T.F., Tarasov, P., Wagner, M., Widmann, M., 2008. Mid- to late Holocene climate change – an overview. Quaternary Science Reviews 27 (19–20), 1791–1828.

Weber, A.W., 1995. The Neolithic and Early Bronze Age of the Lake Baikal region, Siberia: a review of recent research. Journal of World Prehistory 9 (1), 99–165.

Weber, A.W., in press. Patterns of cemetery use at Kurma XI: Bayesian approach to the examination of radiocarbon dates. In: Weber, A.W., Goriunova, O.I., McKenzie, H.G., Lieverse, A.R. (Eds.), *Kurma XI, a Middle Holocene Hunter-Gatherer Cemetery on Lake Baikal, Siberia*. Northern Hunter-Gatherers Research Series, vol. 6. Edmonton: Canadian Circumpolar Institute Press, University of Alberta.

Weber, A.W., McKenzie, H.G., Beukens, R., 2010. Radiocarbon dating of Middle Holocene culture history in the Cis-Baikal. In: Weber, A.W., Katzenberg, M.A., Schurr, T.G. (Eds.), Prehistoric Hunter-Gatherers of the Baikal Region, Siberia: Bioarchaeological Studies of Past Lifeways. University of Pennsylvania Museum of Archaeology and Anthropology Press, Philadelphia, pp. 27–49.

Weber, A.W., McKenzie, H.G., Beukens, R., 2005. Evaluation of radiocarbon dates from the Middle Holocene hunter-gatherer cemetery Khuzhir-Nuge XIV, Lake Baikal, Siberia. JAS 32, 1481–1500.

Winterhalder, B., Smith, E.A., 1981. Hunter-Gatherer Foraging Strategies: Ethnographic and Archaeological Analyses. University of Chicago Press, Chicago.

Winterhalder, B., Smith, E.A., 2000. Analyzing adaptive strategies: human behavioral archaeology at twenty-five. Evolutionary Anthropology 9, 51–72.

Zvelebil, M., 2004. Who were we 6000 years ago? In search of prehistoric identities. In: Jones, M. (Ed.), Traces of Ancestry: Studies in Honour of Colin Renfrew. McDonald Institute for Archaeological Research, Cambridge, pp. 41–60.

Zvelebil, M., Pettitt, P., 2008. Human condition, life, and death ot an Early Neolithic settlement: Bioarchaeological analyses of the Vedrovice cemetery and their biosocial implications for the spread of agriculture in Central Europe. Antropologie 46 (2–3), 195–218.