

## Book Reviews

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LATE PLEISTOCENE REINDEER POPULATIONS IN MIDDLE AND WESTERN EUROPE. AN OSTEOMETRICAL STUDY OF *RANGIFER TARANDUS*. BioArchaeologica 3. Mo Vince Verlag, Tübingen, 307 pp., ISBN 3-934400-02-7. Jacobo Weinstock 2000.

This volume represents the published form of Jacobo Weinstock's PhD thesis completed in 1998 at the University of Tübingen and details the archaeological significance of a pan-European Pleistocene temporal biometrical study of the reindeer *Rangifer tarandus*. As such this study was long overdue as the reindeer is probably the commonest prey item of humans in the Late Pleistocene.

The structure of the book is logical and ordered from first principles, with an early chapter on 'The Biology of Body Size' to the ultimate aims of the work where some crucial archaeological questions are addressed.

The chapter on taxonomy, geographical distribution and biology (Chapter 2) gives a thorough introduction to the animal at hand. The clear polytypic nature of the reindeer today, with nine subspecies, immediately gives a uniformitarian warning regarding the osteometric possibilities in the past. This is particularly the case if even more geography and hence geographic variation was open to the species in the Late Pleistocene.

The next chapter on the biology of body size (Chapter 3) is particularly important as it introduces the variables which should be borne in mind when interpreting osteometric data for a fossil population of reindeer. These variables are relevant to all other mammals and indeed to birds. The main factors considered are age, sex, local temperature, seasonal temperature variation, population density and whether a population has recently colonised an area. Predation pressure is also considered from this perspective although dismissed as non-significant. One variable not considered in this chapter, that comes to mind as of possible importance, is ecological competition from other related taxa that could cause character displacement

(*sensu* Brown and Wilson, 1956). There were many more herbivores living sympatrically in the Late Pleistocene than do today in the reindeer's geographic range, and variations in their composition may have been important in influencing past sizes of this cervid. Such phenomenon has been noted, for instance, in modern populations of shrews of the genus *Sorex* where sizes appear to differ according to whether one or more species co-occur (Malmquist, 1985). The other factor not covered is the discussion regarding the ecological conditions of the Late Pleistocene Steppe Tundra and its probable high carrying capacity which presumably varied across space and appears to have been one of the reasons for the great species variability recorded during this period (Guthrie, 1990).

Chapter 4 details the temporal backdrop of the study and describes the variations in climate and environment throughout the Late Pleistocene. While this chapter is thorough in its coverage of the literature, there is, alas, no discussion of the disagreements between the palynologists and the mammalian palaeontologists regarding the different ecologies during this period (Guthrie, 1990).

The materials and methods section (Chapter 5) is impressive indeed, particularly from the point of view of the material covered. Clearly a great deal of work has been done. The geographical coverage includes sites in Spain, France, England, Germany, Belgium and Switzerland. The methods are also meticulous and logically explained. The Variability Size Index (VSI) method of Uerpmann (1979) is described. The use of the VSI enabled the maximum amount of data to be used in establishing the body size of a population by including all measurable skeletal elements. A problem with this method is, however, that it places an overemphasis on body size thus causing metric shape characters, such as limb proportions, to be forgotten.

Chapter 6 is the intermediary stage between the analysis of the reindeer fossils proper and the methods section. This chapter establishes the demographic breakdown of a reindeer population by reference to a fossil sample from the Ahrensburgian layer at Stellmoor in Germany. Uniformitarian principles dictate that a modern population of known age and sex proportions should be used for such a purpose and one can only suppose that such

a population was not available. Still, the use of a fossil population is not totally unreasonable given the fact that for sheep such a population had to be bred especially for that purpose (Davis, 1996).

The next two chapters detail the changes between the different archaeological reindeer populations through time and space (Chapters 7 and 8, respectively). Changes in size through time have been demonstrated in all the areas studied. Larger body size appears to correlate positively with more wooded habitats which, in turn, are more related to relative humidity than temperature. This deduction is not made without reservation as various possible biases in the fossil record, such as hunting strategies and taphonomy, are discussed. A particular problem is how to cope with small samples when as few as 2 or 3 individuals may be present. The geographical variation seen in Europe in Late Pleistocene reindeer is clearly quite pronounced with trends existing both from West to East as well as North to South. The two trends in size, getting larger from West to East and from South to North, are not thought, however, to be due to the same mechanism. The East-West cline is thought to represent the effects of a continentality gradient which causes more deaths in winter allowing the surviving animals to grow larger due to a lack of competition (the "winter bottleneck" effect). The North-South size variation, on the other hand, is thought to represent differing degrees of sexual dimorphism. This difference being due to southern females conserving calories for reproductive purposes rather than for growth due to poor relative summer plant growth.

Finally, the archaeological significance of the reindeer osteometric survey is detailed (Chapter 9). Three specific archaeological questions are addressed here: (1) The difference in reindeer exploitation between Middle and Upper Palaeolithic hominids; (2) the patterns of reindeer migration during the Late Glacial; and (3) whether reindeer were controlled or even domesticated during the Late Glacial. The answers to these questions should be left for the prospective readers as this reviewer does not want to excuse them from reading the book!

Another, not inconsiderable, value held by this book are the appendices. Appendix A details, in

the manner of Driesch (1976) (i.e., with drawings), the measurements taken on the various reindeer bones. This will prove to be an important tool that will hopefully help standardize metrical analyses for this species. Appendix B details the raw data of the study, namely, the results of the measurements taken on the fossil reindeer bones. These will allow other workers to make further comparisons with the data presented here. The publication of the raw data is commendable for such a practice is becoming less common in science in general. This is not a good situation as the size of the reindeer bones is less likely to change than any interpretation based upon them.

All in all this volume is an important and valuable contribution to Palaeolithic (and later) zooarchaeology. All practitioners should own a copy.

## REFERENCES

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