BOOK REVIEW

Book: Charles Turner, ed. 1996 - The early Middle Pleistocene in Europe. Proceedings of the SEQS Cromer Symposium, Norwich, UK, 3-7 September 1990. Published by A.A. Balkema, Rotterdam/Brookfield, xi + 329 pp. ISBN 90 5410 600 X. Hardback Hfl 160.00 / US$ 95.00 / UK£ 65.00

Once upon a time things were easy: the Pleistocene was to be subdivided into a handful of glaciations (ice ages) separated by interglaciations (warmer periods). Glaciations and interglaciations were defined in different parts of the Eurasian continent with different stratigraphies. There are thus British, Dutch, Central European, Russian, and other stratigraphies for the Pleistocene, that were mostly well correlatable. The British Ipswichian, the Dutch Eemian, the C.European Riss/Würm Interglacial all denote the same period. Partly such stratigraphies are based on pollen records, but they can also be based on mammals or molluscs, and also on lithology. This is a recipe for problems, as evidently different taxonomical groups behave differently, react differently to a changing environment and therefore leave different traces in the fossil record. Nowadays correlations can be made with the isotope record of marine microfossils, with other data that can be related to astronomical forcing, and with the magnetostratigraphy. But, as is the case with most fields in natural science, the more data we get, the more questions arise.

The Cromerian was originally defined as an interglacial within the British Pleistocene stratigraphical framework, based on the work by Clement Reid in the late 19th century. Reid described the sediments of the so-called Cromer Forest-Bed Formation, exposed in sections at the Norfolk and Suffolk coasts. The term "Cromerian" came into use for denoting a temperate period. It soon turned out that this was too easy a notion: there appeared several climatic fluctuations within the Cromerian. The term "Cromerian" was replaced by the more cryptic "Cromerian Complex", indicating a period of time lasting from approximately 775.000 to 450.000 years ago. In fact, the Cromerian Complex consists of four interglacials, with three cold periods in between these four temperate periods. The interglacials are now commonly referred to as Cromerian Interglacials I, II, III, and IV. In the Netherlands, sediments from these four periods with their respective pollen floras have been studied from borings, as is described in a chapter by Waldo Zagwijn of the former Dutch Geological Survey. Thijs van Kolfschoten and Elaine Turner describe mammalian faunas from the German Neuwied Basin that reflect the different climatic fluctuations, and that can also be correlated to the four interglacials. In them, the transition from the rooted vole *Mimomys savini* to the rootless *Arvicola cantiana* is found; this important biostratigraphic marker event is situated between the interglacials II and III. The sediments in the Neuwied basin are also interesting for the presence of tuffaceous layers: the basin is close to the now extinct volcanic area in the Eifel that was active throughout the Pleistocene. In fact, the last eruption occurred only some 11.000 years ago, creating the Laacher Lake in the resulting crater. The ashes and pumices can be dated with the Argon/Argon method and give a fine chronological framework for the mammalian faunas. Other papers deal with mammalian faunas from France, Italy, Russia, with palynology and other paleobotanical data, with malacological remains or with terrace formations. Although the emphasis is clearly on mammals, the book is thus a truly interdisciplinary work. Of course some inconsistencies are to be found, which comes as no surprise in a multi-authored

and multi-disciplinary work as this one. The last chapter, by G.M. Richmond, proposes to place the Lower-Middle Pleistocene boundary at the Matuyama/Brunhes geomagnetic reversal. This seems a good idea, as several other boundaries have also been defined in correlation to the magnetostratigraphic framework. What is the date of this reversal? Charles Turner, in his pivotal chapter "A brief survey of the early Middle Pleistocene in Europe", cites a recent reference (1994) that provided an age of 775.000 $^{+}/_{-}$ 10.000 years. Van Kolfschoten & Turner in their chapter base their correlations partly on a date of "about 730.000 years", for which they cite a reference from as long ago as 1976. When they make statements like "Remarkable is the occurrence of *Mammuthus (M.) trogontherii* in deposits below the Matuyama/Brunhes boundary, whereas *Mammuthus (A.) meridionalis*, a more primitive form of the *Mammuthus (A.) meridionalis* - *Mammuthus (M.) trogontherii* lineage, has been recorded from above the Matuyama/Brunhes boundary, it is thus not clear what date they have in mind. A period of some 45.000 years can make quite a difference in such reasonings. We need to keep in mind that the Cromerian Complex lasted for about 325.000 years, and included four interglacials and three glacials: a total of seven different periods that had an average life-span of 325.000 : 7 = 46.000 years.

The volume took quite some time to be published. In fact, it is the proceedings volume of a conference held in the cradle of the Cromerian (Norwich, United Kingdom) in September 1990. Yet the editor and the publisher are to be complimented for their endurance and with the result of it. This collection of papers is a must for anyone working on the Pleistocene.

Jelle W.F. Reumer