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The evolution of coastal East Anglia

Brian Funnell

The Pre-glacial Pleistocene of the Norfolk and Suffolk Coasts. By R.G. West. Pp. 300. (Cambridge University Press: 1980.) £40, \$84.

ANYONE who has looked down an East Anglian estuary, or across the East Anglian tidal flats and marshes of the present day, will readily appreciate the variety of environments represented there. Assume these environments to have been destroyed and re-created three or four times, under alternately cold and temperate climates, at almost identical topographic levels, and you have some idea of the complexity of the deposits which record the history of the pre-glacial coastlands of East Anglia.

The first comprehensive attempt to interpret these deposits was made by Clement Reid, an officer of the Geological Survey of England and Wales, towards the end of the nineteenth century. For half-a-century afterwards little significant further work was carried out on them until P. Thomson applied modern pollen analytical techniques to the West Runton Freshwater Bed. S. L. Duigan's doctoral thesis of 1954 confirmed Thomson's conclusion that the peat bed at West Runton represented an almost entire interglacial cycle, and at the same time revealed the difficulties that would be encountered by anyone attempting a full interpretation of the whole sequence of Cromer Forest Bed deposits. In 1958 Dr, now Professor, R. G. West started work on a full pollen analytical and environmental interpretation of the Cromer Forest Bed Series and his marathon studies are enshrined in this comprehensive monograph.

The book records for posterity, with faithful care, all the problems, difficulties and complexities of the Cromer Forest Bed deposits as they have revealed themselves to one persistent observer over a period of years. Although it is accompanied by a thorough commentary and separate discussion of some general aspects, such as sea-level changes and environmental interpretation, there are no over-slick summaries that would enable a casual reader to raid the book for quick answers on vertebrate or plant community evolution, stratigraphical correlation or sea-level changes. Each piece of evidence is carefully weighed, considered and recorded, but never forced into a simple framework for the sake of easy conclusions. It thus stands as a record of work that is both complete and still in progress.

Most readers would be well advised to arm themselves with a liberal supply of bookmarks to facilitate cross-reference between the text and the numerous tables,

plates and figures (the latter conveniently provided as a separate booklet in a back pocket to the book), as these need to be continuously referred to as the text is read. It is indeed one of the attractions of this book that it is not just a presentation of the author's conclusions but also a complete do-it-yourself kit that will enable readers to reassess and reinterpret the basic data which have been so assiduously collated.

Overall Professor West concludes that the Cromer Forest Bed Formation has accumulated during four main pollen stages. The story starts with an account of the last marine transgression of the Norwich Crag Formation, which extended over the Chalk of north-east Norfolk during the initial substage 'a' of the cool Pre-Pastonian. (There is some reference to the earlier pre-glacial marine deposits of the Ludhamian, Thurnian, Antian and Baventian stages in the text, but only to complete the description of a particular section or borehole or to round off comparisons of floras from later stages.)

The Cromer Forest Bed proper begins with the main Pre-Pastonian (sub-stages 'b' to 'd'), which is represented by freshwater and fluvial deposits containing cool floras occurring at between -3 and +5m OD. It is followed by the Pastonian stage, containing temperate pollen, sometimes starting and ending with freshwater deposition, but including a substantial coastal marine phase, at levels between -9 and +8m OD. The succeeding Beestonian stage is again cold, with evidence of frozen-ground conditions, but is also in part coastal-marine in origin. Its deposits occur at between +2 and +8m OD in a limited area in north Norfolk. Finally the Cromerian stage *sensu stricto* is temperate, substantially freshwater, but with a significant mid-Cromerian marine or estuarine phase, and occurs at levels of between -7 and +8m OD over a wide area. The sequence concludes with early Anglian arctic peaty muds which are sealed in immediately under the first true glacial deposits on the East Anglian coast.

Correlation of the East Anglian stages with comparable stages identified in the contemporary deposits of the Netherlands is still uncertain, probably owing to the close similarity of successive temperate floras at this period in the Quaternary and to the strong influence of local environments on pollen spectra on both sides of the North Sea at that time. The absence of a definitive correlation does not however detract from the intrinsic interest of the detailed ecological and geographical changes which occurred along the East Anglian coast before the arrival of glaciers.

Professor West is to be congratulated on a major work of scholarship, which certainly matches the contribution of Reid and will undoubtedly become a classic in its own right. □

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