Glossary

Amstelian former term named after the small Dutch river Amstel marine beds of this Pliocene stage were first discovered in a borehole near Amsterdam

Argillaceous term applied to rocks which comprise grain-sized sediments less than 0.0625 mm (0.0025 in) in diameter; they include over 50 % of sedimentary rocks with most having substantial clay mineral content

Boulder-clay fine-grained glacial deposit formed by the grinding action of ice over a land surface

Butleyan Crag the Red Crag of the Butley region of Suffolk

Cannon-shot gravel deposit comprising bands of large nodules of hard, dark grey, argillaceous gritstone

Casterlien Pliocene sandstone deposit found in Belgium

Chillesford Crag deposit of the Icenian Crag beds

Contorted drift glacial deposit in East Anglian cliffs especially near Cromer; former ice sheet movements resulted in the enclosed deposits being strongly folded and when the ice eventually melted this material remained deformed in situ

Coralline Crag Pliocene deposit lowest of the East Anglian Crags

Crag Sea great gulf between Britain and mainland Europe during the Pliocene

Crags of East Anglia shelly sandstone strata divided stratigraphical (from early to late) into the Coralline Crag, Red Crag and Norwich Crag

Cretaceous third and most recent of the three Periods comprising the Mesozoic Era (146–65.5 million years ago)

Cromer Forest Beds Series estuarine and fresh-water deposits found in the Norfolk coast inferred past climatic conditions varied from cold to temperate

Cromer Till boulder-clay deposit containing Scandinavian erratics

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Diestien Beds Pliocene sandstone deposits found in Belgium comparable to Lenham Beds on the English side of the Dover Straight

Diluvium term applied during the early 19th century to extensive superficial deposits supposed to have been due to a biblical deluge such as Noah's Flood. These deposits are now known to be mostly glacial drift

Dip inclination of a rock stratum at right angles to the strike

Drift sediment deposited or related to glacial ice activity

East Anglian Crags comprising three deposits: the Coralline Crag, Red Crag and Norwich Crag. Although formerly all three were put in the Pliocene Epoch only the Coralline Crag is so placed today (the other two Crags are classed as Pleistocene)

Erratic glacially transported rock whose lithology shows that it could not have been eroded from local rock. Glacial erratics found in East Anglia include rock types from Scandinavia

Gasteropoda class of mollusc with locomotive organ placed ventrally

Icenian Crag comprises the Norwich Crag, Chillesford Beds and Weybourne Crag, shallow-water marine and estuarine deposits

Jurassic one of the three Periods comprising the Mesozoic Era (199.6–146 million years ago)

Kettle hole depression in the surface of glacial drift, resulting from the melting of an included ice mass

Kimmeridge Clay deposit of the Kimmeridgian stage of the upper Jurassic (156–151 million years ago)

Lenham Beds Pliocene sandstone deposits comparable to the Diestien Beds on the French side of the Dover Strait

Miocene one of the four epochs comprising the Tertiary Period (23–5.3 million years ago)

Mollusca (molluscs) a very diverse phylum (major division) of invertebrates which have a common body plan modified in various ways

Moraine rock material carried, or having been carried and deposited, by a glacier

Newbournian formation the Red Crag in the Newbourne region of Suffolk

Norwich Crag third lowest deposit of the East Anglian Crags contains temperate climate marine fauna

Oolitic rock composed entirely or largely of small sub-spherical sand-sized carbonate particles ooliths (ooids)

Ordovician one of the six Periods comprising the Primary Era (488–444 million years ago)

Palaeometeorology study of past weather conditions

Pleistocene first of the two epochs of the Quaternary Period (1.8 million years ago to about 11,500 years ago)

Pliocene one of the four epochs comprising the Tertiary Period (5.3–1.8 million years ago)

Polyzoa phylum of minute marine animals with a calcareous skeleton, forming compound colonies

Pro-glacial lake glacial water body immediately in front or around the margin of an ice sheet

Quartzose rock mainly or entirely composed of quartz

Quaternary Period comprising the Pleistocene and Holocene Epochs (1–2 million years ago to present)

Red Crag second lowest deposit of the East Anglian Crags contains cool temperate type marine fauna including the first remains of horses and elephants

Scaldisien Pliocene deposit of Belgium; the equivalent of the Waltonian Crag

Strike horizontal line at right-angles to the slope

Tertiary Period 63–1.5 million years ago

Varve banded layer of silt and sand deposited annually in lakes, especially near to ice sheets; the coarser paler material is deposited in summer, the finer, darker material in winter; one varve comprises one light band and one dark band

Waltonian Crag lowest division of the Red Crag found in Essex

Weybourne Crag division of the Icenian Crag

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About the Author

Born in London, 1930, John A. Kington joined the U.K. Meteorological Office in 1947 gaining experience in synoptic meteorology as a weather observer and forecaster both at home and abroad. In 1958, he obtained his first degree, B.Sc. in Geography, at the University of London, studying under Professor Gordon Manley and in 1959 passed the Advanced Forecasting Course of the Meteorological Office. After gaining his M.Sc. in Meteorology in 1969 he began his academic career with the study of Climatic Change and Historical Climatology, first at the University College of Swansea and, since 1971, with Professor Hubert Lamb at the Climatic Research Unit, School of Environmental Sciences, University of East Anglia in Norwich, where he is Visiting Fellow. In 1999, he was awarded the Jehuda Neumann Memorial Prize of the Royal Meteorological Society.

Among his major research interests are: *Historical Climatology*: *The Weather of the 1780s over Europe*, Cambridge University Press, 1988; digitally printed version, 2009; *The Weather Journals of a Rutland Squire: Thomas Barker of Lyndon Hall*, Rutland Record Society, 1988; *Climate and Weather*, Collins New Naturalist Library, HarperCollins, London, 2010. *Synoptic Meteorology*: *The Weather Book,* Michael Joseph, 1982; *Even The Birds Were Walking: The Story of Wartime Meteorological Reconnaissance*, Tempus, Stroud UK and Charleston, USA, 2000; *WEKUSTA: Luftwaffe Meteorological Reconnaissance Units & Operations 1938–1945*, Flight Recorder Publications, 2007; *Research Projects: Atlantis der Nordsee* [Atlantis of the North Sea], A film by Gabriele Wengler, ECO Media TV-Produktion GmbH, Hamburg 2010; An Oral history of British Science: John Kington: Meteorologist-Climatologist (interview by Paul Merchant), National Life Stories, British Library Sound Archive, London, October 2010–February 2011. A list of his over fifty articles published in various scientific journals can be found in the website of this book at: http://afes-press-books.de/html/SpringerBriefs_ESDP_Harmer.htm.

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About the Book

Comprising the first definitive account of the geological and palaeometeorological studies made by Frederic W. Harmer (1835–1924), this book contributes a previously missing chapter to the history of science. The main objective of the author is to ensure that the scientific work of Harmer, which unfortunately has been widely neglected or forgotten, becomes more generally known and acknowledged. The balance of this deficiency will be redressed by bringing to light in this volume his contributions to the history of science to an audience of academic and lay readers of the current literature.

Harmer was one of the pioneers in the field of East Anglian geology as well as one of the last members of a distinguished group of amateur geologists who had been responsible for making major advances in the science during the Victorian era and early years of the 20th century. In particular, he played a key role in elucidating the Pliocene and Pleistocene stratigraphy in the east of England by developing the use of mollusca for biostratigraphic correlation within the Crags of East Anglia.

He was certainly a well-respected scientist in his day, being awarded Hon. M.A. Cantab., elected F.G.S. and F.R.Met.S., and a Membre Hon. de la Société Belge de Géologie et de Paléontologie. From an early age he had been an active member of the Geological Society of Norwich. In 1902 he was awarded the Murchison Medal for that year in recognition of his work on the Pliocene and Pleistocene deposits of East Anglia. A leading exponent of 19th-century geological literature, Horace B. Woodward, F.R.S., F.G.S., included Harmer in a group of geologists who 'have added greatly to our knowledge of the structure of the [East Anglian Crag] deposits'.

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