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The stratigraphy of the Gault Formation (Early Cretaceous, Albian) in East Anglia and south-east England

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ABSTRACT

The mudstones of the Gault Formation, divided into Lower and Upper Gault Members, have been proved in boreholes to underlie the Chalk throughout south east England in all but the northern part of East Anglia. The formation outcrops along the western edge of the London Platform and the foot of the Chalk escarpments in the Weald and Wessex Basins. Lower Gault is present except in London north of the River Thames, and parts of Essex, Hertfordshire and Suffolk where early Late Albian fault reactivation led to its removal by erosion. The Upper Gault has a more continuous subcrop resting on an eroded surface ranging from Silurian to older Cretaceous rocks: it is the first Mesozoic deposit to cover the whole of the London Platform. In the western Weald and the parts of the Wessex Basin including the Isle of Wight, eastern Hampshire and Oxfordshire, the Upper Gault interdigitates with and passes laterally into the Upper Greensand Formation. Three principal classifications of the Gault currently exist: (1) the English type section at Folkestone extending to the Ashford, Kent and the Kent Coalfield subcrop (Beds I-XIII); (2) the Northern Weald in West Kent, Surrey and the subcrop beneath south London (Divisions 1–11); (3) the outcrop and subcrop in East Anglia (G1-19). The object of the present paper is to correlate these three schemes and to suggest how they might be combined into a single common seven-unit Gault classification (GE1-7). The Gault succession in the Stowlangtoft Borehole is described in an appendix.

1. Introduction

The Lower Cretaceous Gault Formation is of Albian age; a stage estimated to have lasted *c.* 12.5 Ma (Cohen et al., 2014). The formation has a narrow outcrop that runs from Norfolk to the Dorset coast and around the Weald, and an extensive subcrop that underlies the Chalk in East Anglia and southern England (Fig. 1). It comprises relatively poorly lithified mudstones and calcareous mudstones that weather to weak clays giving rise to extensive landslides throughout the inland and coastal outcrops. As a result, there are few good natural exposures even where the formation crops out on the coast. In the 19th and early part of the 20th century, the formation was worked for brick making and/or agricultural purposes in a large number of small pits, most of which showed sections that were weathered or partly weathered and which made lithological correlation difficult. In more recent times, the availability of large excavations for brick making and road works together with cored boreholes drilled for site-investigation, mineral-exploration or research purposes, has allowed the full thickness of the formation to be studied in its unweathered state at many localities and provided lithological and fossil data for accurate correlation.

Correlations between the Gault successions in East Anglia, the Weald and Wessex Basins depend on a combination of the lithological and biostratigraphical characters. The continuously cored boreholes, particularly in East Anglia, are a key element in the interpretations here, despite core losses and the small (mostly <100 mm) diameter of the cores. This reduces their biostratigraphical value with respect to macrofossils, but this is supplemented by microfossil occurrences.

The type section of the English Gault Formation exposed at Copt Point, Folkestone [TR 2420 3640] and the adjacent East Wear Bay, has been well described in the literature during the last 150 years (e.g. Rance, 1868; Price, 1874, 1875, 1879; Topley, 1875; Spath, 1923a,b, 1923–43; Owen, 1971a, 1976; Young et al., 2010 among others) and was referred to as such by d'Orbigny (1842) when establishing the Albian Stage. The succession comprises c. 40 m of mudstones with variable amounts of quartz silt and sand,

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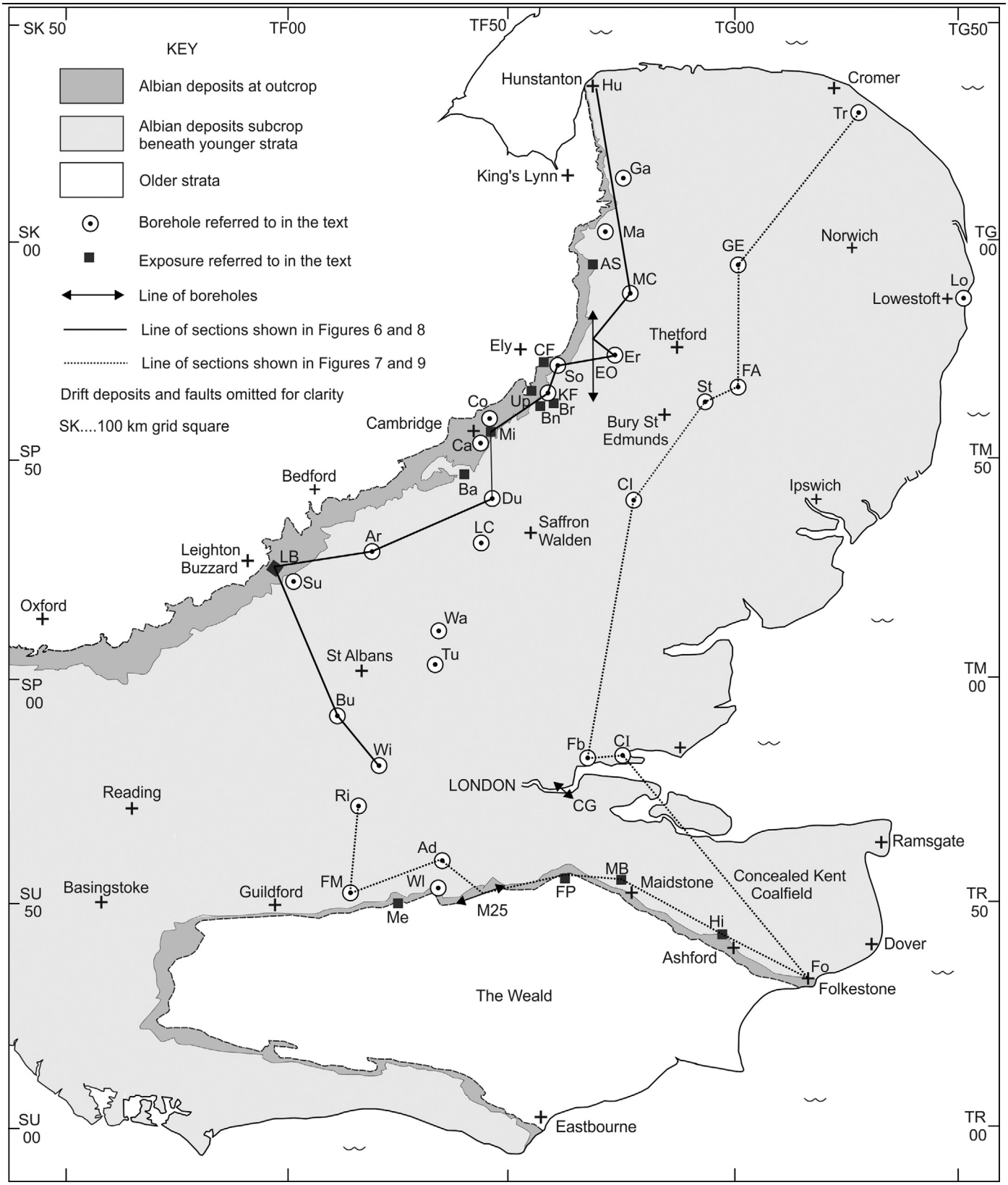

Fig. 1. Geological sketch map of the Albian deposits outcrop and subcrop in south east England showing the locations of boreholes and outcrop sections referred to in the text and in Figs. 6–9. The following abbreviations refer to boreholes (Bh) and surface sections (S). These are detailed in Appendix 1. Norfolk Hu = Hunstanton Cliff and Borehole; AS = Abbey Station S; MC = Mundford C Bh; GE = Great Ellingham Bh; Tr = Trunch Bh. Suffolk EO = Ely-Ouse Bhs 1–23; Er = Eriswell Bh; Cl = Clare Bh; FA = Four Ashes Bh; Lo = Lowestoft Bh; St = Stowlangtoft Bh; Cambridgeshire So = Soham Bh; CF = Castle Farm S; Up = Upware S; KF= Klondyke Farm Bh; Br= Burwell S and Bh; Bn = Barnwell S; Co = Cottenham Well; Mi = Milton Borrow Pit S; Du = Duxford Bh; Ba = Barrington Cement Works S; LC = Little Chishill Bh; Bedfordshire Ar = Arlesey Bh and S; LB = Leighton Buzzard pits S; Su = Sundon Bh; Hertfordshire Bu = Bushey Bh; Tu = Turnford (Cheshunt) Bh; Wa = Ware Bh; Greater London Wi = Willesden Bh; Surrey Ri = Richmond; FM = Fetcham Mill Bh; Ad = Addington Bh; Me = Merstham S; Wl = Warlingham Bh; Surrey/Kent M25 = M25 motorway and adjacent pits to Sevenoaks S; Kent FP = Ford Place S; MB = Maidstone Bypass M20 S; Hi = Hinxhill S; Fo = Folkestone S; CG = Cliffe Group (part) Bh; Essex Cl = Canvey Island Bh; Fb = Fobbing Bh.