



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

A contribution to the Sheet Explanation of the Ipswich district (Sheet 207): Cretaceous

Integrated Geosurveys (Southern England) Programme

Internal Report IR/05/007

BRITISH GEOLOGICAL SURVEY

INTEGRATED GEOSURVEYS (SOUTHERN ENGLAND) PROGRAMME

INTERNAL REPORT IR/05/007

A contribution to the Sheet Explanation of the Ipswich district (Sheet 207): Cretaceous

M A Woods

The National Grid and other Ordnance Survey data are used with the permission of the Controller of Her Majesty's Stationery Office. Ordnance Survey licence number Licence No:100017897/2004.

Keywords

Cretaceous, Gault Formation, Chalk Group, Lithostratigraphy, Biostratigraphy, Chronostratigraphy.

Bibliographical reference

WOODS, M A. 2004. A contribution to the Sheet Explanation of the Ipswich district (Sheet 207): Cretaceous. *British Geological Survey Internal Report*, IR/05/007. 10pp.

Copyright in materials derived from the British Geological Survey's work is owned by the Natural Environment Research Council (NERC) and/or the authority that commissioned the work. You may not copy or adapt this publication without first obtaining permission. Contact the BGS Intellectual Property Rights Section, British Geological Survey, Keyworth, e-mail ipr@bgs.ac.uk You may quote extracts of a reasonable length without prior permission, provided a full acknowledgement is given of the source of the extract.

© NERC 2004. All rights reserved

Keyworth, Nottingham British Geological Survey 2004

BRITISH GEOLOGICAL SURVEY

The full range of Survey publications is available from the BGS Sales Desks at Nottingham, Edinburgh and London; see contact details below or shop online at www.geologyshop.com

The London Information Office also maintains a reference collection of BGS publications including maps for consultation.

The Survey publishes an annual catalogue of its maps and other publications; this catalogue is available from any of the BGS Sales Desks.

The British Geological Survey carries out the geological survey of Great Britain and Northern Ireland (the latter as an agency service for the government of Northern Ireland), and of the surrounding continental shelf, as well as its basic research projects. It also undertakes programmes of British technical aid in geology in developing countries as arranged by the Department for International Development and other agencies.

The British Geological Survey is a component body of the Natural Environment Research Council.

British Geological Survey offices

Keyworth, Nottingham NG12 5GG

☎ 0115-936 3241 Fax 0115-936 3488

e-mail: sales@bgs.ac.uk

www.bgs.ac.uk

Shop online at: www.geologyshop.com

Murchison House, West Mains Road, Edinburgh EH9 3LA

☎ 0131-667 1000 Fax 0131-668 2683

e-mail: scotsales@bgs.ac.uk

London Information Office at the Natural History Museum (Earth Galleries), Exhibition Road, South Kensington, London SW7 2DE

☎ 020-7589 4090 Fax 020-7584 8270

☎ 020-7942 5344/45 email: bgs london@bgs.ac.uk

Forde House, Park Five Business Centre, Harrier Way, Sowton, Exeter, Devon EX2 7HU

☎ 01392-445271 Fax 01392-445371

Geological Survey of Northern Ireland, Colby House, Stranmillis Court, Belfast, BT9 5BF

☎ 028-9038 8462 Fax 028-9038 8461

Maclea Building, Crowmarsh Gifford, Wallingford, Oxfordshire OX10 8BB

☎ 01491-838800 Fax 01491-692345

Sophia House, 28 Cathedral Road, Cardiff, CF11 9LJ

☎ 029-2066 0147 Fax 029-2066 0159

Parent Body

Natural Environment Research Council, Polaris House, North Star Avenue, Swindon, Wiltshire SN2 1EU

☎ 01793-411500 Fax 01793-411501

www.nerc.ac.uk

Foreword

This report constitutes a contribution to the Sheet Explanation of the Ipswich district (Sheet 207).

Acknowledgements

Anglian Water and A F Howland Associates generously provided site investigation data on the Chalk of the Ipswich district. C J Wood and T. Wright provided data and advice on the biostratigraphical and lithostratigraphical classification of the Chalk of the Ipswich district.

Contents

Foreword	i
Acknowledgements	i
Contents	ii
Summary	iii
1 Cretaceous	1
References	3

FIGURES

- FIGURE 1. The exposed and probable concealed Chalk Group stratigraphy of the Ipswich district.
- FIGURE 2. The stratigraphical ranges of key Chalk Group outcrops in the Ipswich district (not to scale).

Summary

This report describes the Cretaceous stratigraphy of the Ipswich district (Sheet 207), and forms a contribution to the Sheet Explanation of Sheet 207.

1 Cretaceous

For much of the Mesozoic the Ipswich district formed part of the Anglo-Brabant Landmass, covering large parts of East Anglia, the London area and extending eastwards into continental Europe. The oldest Mesozoic strata in the Ipswich district are the mudstones of the **Gault Formation**, which represent the flooding of this landmass by a marine transgression at the end of the Lower Albian. The Gault does not crop out in the Ipswich district, but occurs at depth in a borehole at Combs [TM 0427 5625], where 3.35 m were proved. Deeper boreholes at Harwich [TM 260 329] and Weeley [TM 148 218], in the adjacent Colchester district, show 6.7 m and c. 23 m of Gault respectively above Palaeozoic strata.

In the Upper Cretaceous, large rises in sea level allowed marine deposition to extend across nearly the whole of the UK, represented by the deposits of the Chalk Group. The group underlies the whole of the Ipswich district, but only crops out in the flanks of the Gipping Valley north of Bramford, in the small tributary valley between Needham Lake and Coddenham, and in two small areas near Offton and Somersham. Across much of the district the Chalk is concealed by Palaeogene and Quaternary deposits, but data from boreholes and sporadic outcrops permit investigation of its stratigraphy. At least 250 m of Chalk were proved in the Combs Borehole, and to this can perhaps be added a further 45 m based on outcrops in the Gipping Valley and site investigation boreholes beneath Ipswich town (Figure 1).

Chalk is typically a very fine-grained, white limestone, predominantly composed of the disaggregated skeletal remains (coccoliths) of tiny planktonic algae that flourished in the seas of the Upper Cretaceous. The Chalk Group is composed of almost pure calcium carbonate in the form of low magnesian calcite, except the lower part, which contains up to 30% clay. Flints, clay-rich horizons (marls), beds of indurated, mineralised chalk (hardgrounds), and coarsely bioclastic chalk horizons also occur, and some of these are geographically extensive marker-horizons and have been recognised on the resistivity log of the Stowlangtoft Borehole [TL 9475 6882] in the adjacent Bury St. Edmunds district (Bristow, 1990; Figure 1).

Traditionally, a tripartite classification has been applied to the Chalk Group (Lower, Middle and Upper Chalk), based on the development of feature-forming beds of hard chalk. In southern England this classification is now superseded by that of Rawson, Allen & Gale (2001), which recognises two subgroups and up to nine formations within the Chalk Group. East Anglia belongs to the so-called 'Transitional Province', recognising that the Chalk of this region shows features that are intermediate between the distinct Chalk Group stratigraphies of southern and northern England (Mortimore, Wood & Gallois, 2001; Rawson et al., 2001). The extent to which southern England Chalk Group nomenclature can be applied to East Anglia is still unclear. In the Ipswich district, it seems likely that the stratigraphy of the concealed succession and some of the exposed succession is analogous to southern England. However, there are lithostratigraphical differences in part of the exposed succession that warrant a modified nomenclature (Figure 1; see below).

The probable stratigraphy of the unexposed part of the Chalk Group can largely be determined from the BGS Stowlangtoft Borehole. This borehole is about 12 km NNW of the north-west corner of Sheet 207, and many features of its core and resistivity log can be compared with logs from boreholes in southern England. On this basis, it seems likely that the Ipswich district is underlain by representatives of the following formations (in ascending stratigraphical order): West Melbury Marly Chalk, Zig Zag Chalk, Holywell Nodular Chalk, New Pit Chalk, Lewes Nodular Chalk and Seaford Chalk (Figure 1).

Outcrops in the Gipping Valley show that the exposed part of the Chalk Group can be divided into two formations, the **Newhaven Chalk** overlain by the **Culver Chalk**. The Newhaven Chalk forms the bulk of the outcrop succession (Figure 2), and mainly consists of very poorly flinty chalk, lacking conspicuous marl seams. Macrofossils are generally rare, except for occasional specimens of the belemnite *Goniotoothis*, and an oyster-rich bed with abundant *Pseudoperna boucheroni* (Woods *non* Coquand, 1859) and inoceramid shell fragments (*Platyceramus* and *Sphenoceramus*) seen near the bases of the successions at Needham Quarry [TM 0940 5395] and in one of the two pits at Little Blakenham [TM 1086 4910]. Outcrops in the Gipping Valley mainly belong to the *O. pilula* and basal *G. quadrata* zones (Figure 2) (Wilkinson, 2004), but in Ipswich, site investigation boreholes proved up to 55 m of the formation, including the *U. socialis* and *M. testudinarius* zones. Because the Newhaven Chalk of the Ipswich district appears so distinct from the typical flinty and marl-bearing Newhaven Chalk of southern England, it is herein named the Blakenham Member, with its stratotype section in the large quarry at Great Blakenham [TM 1161 4986]. The member is similar to the Margate Member of Robinson (1986), but much less flinty, and future work in East Anglia might justify designation of formational status.

The Culver Chalk forms the top of the succession at Claydon Quarry [TM 1363 4966] and in many of the Ipswich town site investigation boreholes. The formation contains regularly developed medium and large nodular flints with moderately common remains of the echinoid *Echinocorys*. In the Ipswich boreholes, the formation is associated with the belemnite *Belemnitella*, also recorded in historical accounts of outcrops at Coe's Pit, Bramford [TM 12917 48141] and Claydon [TM 1319 4943] (Boswell, 1927). The locally abundant record of *Belemnitella* was the basis for the historical identification of *B. mucronata* Zone chalk in the Ipswich district (Boswell, 1927), but new biostratigraphical data shows that these occurrences of *Belemnitella* are within the lower part of the *G. quadrata* Zone, and are most probably correlative with the local abundance of this belemnite at the base of the Culver Chalk Formation in southern England (e.g. Bailey, Gale, Mortimore, Swiecicki & Wood, 1983, fig. 3; Mortimore, 1986, fig. 20).

References

Most of the references listed below are held in the Library of the British Geological Survey at Keyworth, Nottingham. Copies of the references may be purchased from the Library subject to the current copyright legislation.

BAILEY, H W, GALE, A S, MORTIMORE, R N, SWIECICKI, A & WOOD, C J. 1983. The Coniacian-Maastrichtian stages of the United Kingdom, with particular reference to southern England. *Newsletters on Stratigraphy*, **12**, 29-42.

BRISTOW, C. R. 1990. Geology of the country around Bury St Edmunds. *Memoir of the British Geological Survey*, England & Wales (Sheet 189).

BOSWELL, P G H. 1927. The Geology of the country around Ipswich. *Memoirs of the Geological Survey*. Sheet 207 (England & Wales).

MORTIMORE, R N. 1986. Stratigraphy of the Upper Cretaceous White Chalk of Sussex. *Proceedings of the Geologists' Association*, **97**, 97-139.

MORTIMORE, R N, WOOD, C J & GALLOIS, R W. 2001. *British Upper Cretaceous Stratigraphy*, Geological Conservation Review Series, No. 23, Joint Nature Conservation Committee, Peterborough.

RAWSON, P F, ALLEN, P & GALE, A S. 2001. The Chalk Group - a revised lithostratigraphy. *Geoscientist*, **11**, 21.

ROBINSON, N D. 1986. Lithostratigraphy of the Chalk Group of the North Downs, southeast England. *Proceedings of the Geologists' Association*, **97**, 141-170.

WILKINSON, I P. 2000. A preliminary foraminiferal biozonation of the Chalk Group (In preparation for the Holostrat Project: Upper Cretaceous). *British Geological Survey Internal Report*, IR/00/13, 21pp.

WILKINSON, I P. 2004. Foraminifera from the Chalk of the Gipping Valley, Ipswich. *British Geological Survey Internal Report*, IR/04/077.

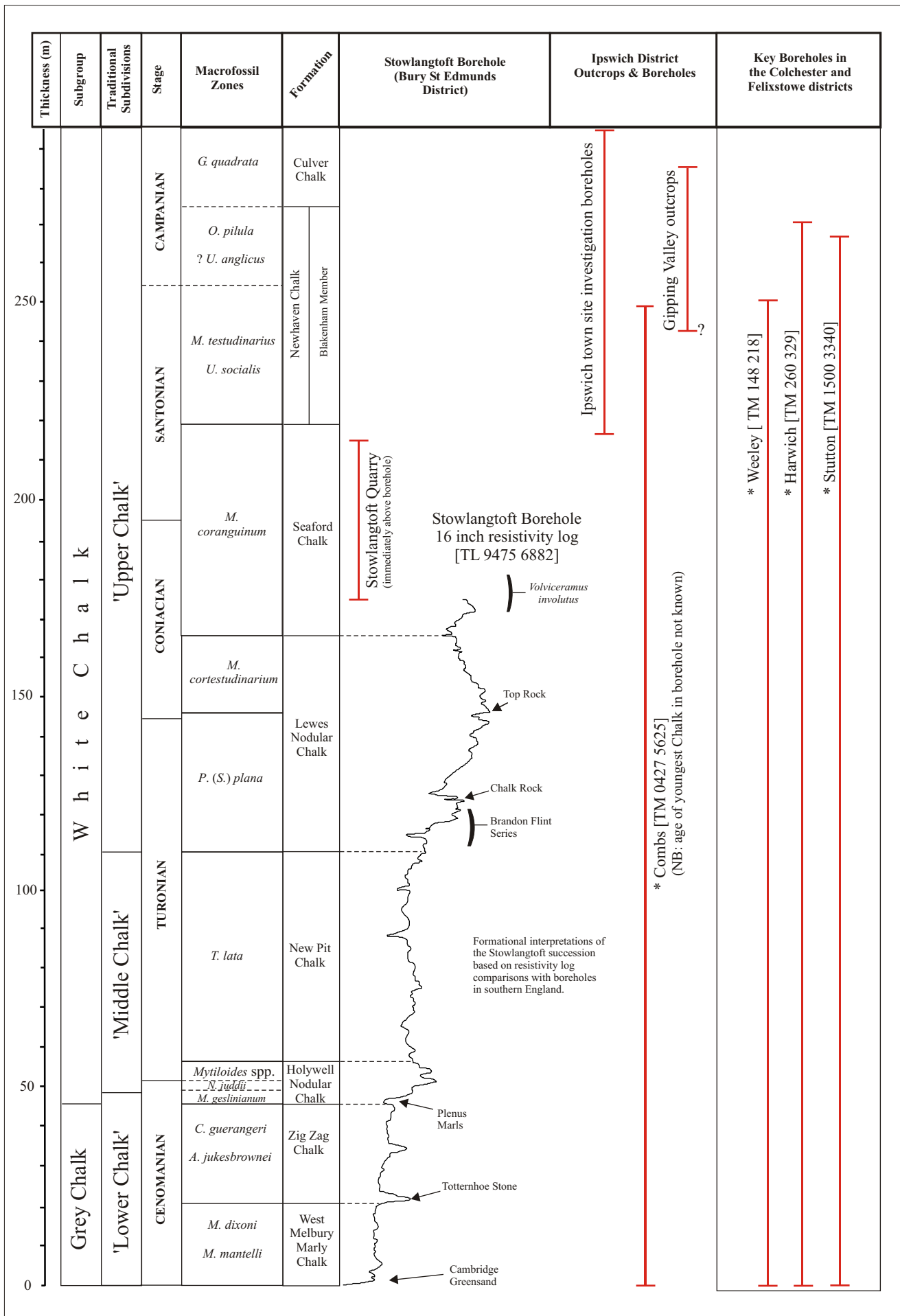


FIGURE 1. The exposed and probable concealed Chalk Group stratigraphy of the Ipswich district.
 (*: no precise correlation with the Stowlangtoft Borehole is implied)

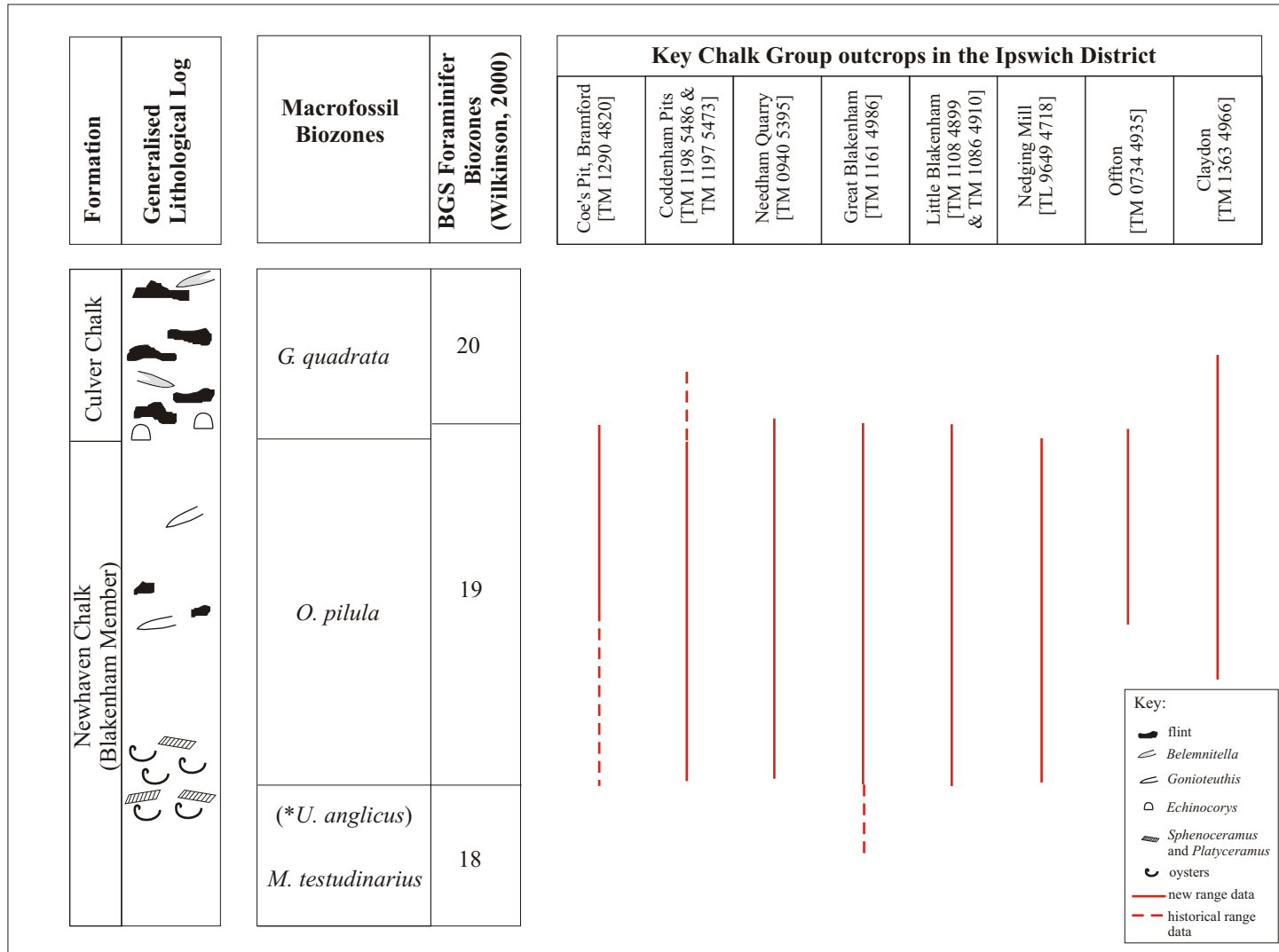


FIGURE 2. The stratigraphical ranges of key Chalk Group outcrops in the Ipswich district (not to scale).
 *: *U. anglicus* Zone not proved in the Ipswich district