

**MEMOIRS OF THE GEOLOGICAL
SURVEY. ENGLAND AND WALES.
THE GEOLOGY OF THE COUNTRY
AROUND EAST DEREHAM**

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Memoirs of the Geological Survey. England and Wales. The Geology of the country around East Dereham by J. H. Blake

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J. H. BLAKE

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MEMOIRS OF THE GEOLOGICAL SURVEY.

ENGLAND AND WALES.

THE GEOLOGY OF
THE COUNTRY AROUND
E A S T D E R E H A M.

(EXPLANATION OF QUARTER-SHEET 66 N.W.)

BY

J. H. BLAKE, F.G.S., ASSOC. M. INST. C.E.

(PARTS BY H. B. WOODWARD, F.G.S., AND F. J. BENNETT, F.G.S.)

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NOTICE.

THE greater part of the area described in the following Memoir was surveyed by MR. J. H. BLAKE, under the superintendence of MESSRS. W. WHITAKER and H. B. WOODWARD; but small parts in the north-west and north-east corners of the Map were surveyed by MR. WOODWARD, and other parts near the south-west and south-east corners were surveyed by MR. F. J. BENNETT.

The Memoir, which has been edited by MR. WHITAKER, was written by MR. BLAKE, with the assistance of such notes as have been supplied by MESSRS. WOODWARD and BENNETT for the areas surveyed by them. The lists of fossils have been revised by MESSRS. G. SHARMAN and E. T. NEWTON.

Only one edition of the Map is published, that showing the drift, as well as the solid rocks, where the latter are not obscured by overlying superficial deposits.

H. W. BRISTOW,
Senior Director.

Geological Survey Office,
28, Jermyn Street, S.W.,
30th June 1888.

CONTENTS

	Page
NOTICE, by the Senior Director - - - - -	ii
CHAPTER I. INTRODUCTION. Area. Rivers. Geological Formations. Form of the Ground and its Origin - - - - -	1
CHAPTER II. CHALK. General Remarks. Local Details (Northern Side of the Wensum Valley. Southern Side of the Wensum Valley. Western and Southern Tracts). List of Fossils - - -	5
CHAPTER III. PEBBLY SERIES. General Remarks. Local Details	14
CHAPTER IV. GLACIAL DRIFT. LOAM WITH BOULDERS. (LOWER BOULDER CLAY.) General Remarks. Local Details (Northern Side of the Wensum Valley). Local Details (Southern Side of the Wensum Valley). Local Details (Southern Tract) - - -	18
CHAPTER V. GLACIAL DRIFT (<i>continued</i>). SAND AND GRAVEL. (MIDDLE GLACIAL OF WOOD.) General Remarks. Local Details (North of the Wensum). Local Details (West and South of the Wensum). Local Details (Southern Tract, and around East Dereham) - - - - -	22
CHAPTER VI. GLACIAL DRIFT (<i>continued</i>). UPPER BOULDER CLAY. General Remarks. Local Details (North of the Wensum Valley). Local Details (West and South of the Wensum Valley) - - - - -	29
CHAPTER VII. POST-GLACIAL BEDS. GRAVEL, SAND, AND LOAM. (PLATEAU DRIFT.) General Remarks. Local Details - - -	39
CHAPTER VIII. POST-GLACIAL BEDS (<i>continued</i>). VALLEY GRAVEL. General Remarks. Local Details. Ouse System (Valley of the Nar or Setchy. Valley of the Wissey or Stoke). Local Details. Yare System (Valley of the Yare. Valley of the Wensum). ALLUVIUM. General Remarks. Local Details (Valley of the Wensum. Valley of the Nar or Setchy) - - -	46
CHAPTER IX. ECONOMIC RESOURCES. Building-stones. Whitening and Lime. Road-metal. Brickearths and Sand. Manures. Water - - - - -	50
APPENDIX. WELL-SECTIONS - - - - -	54
INDEX - - - - -	57

LIST OF ILLUSTRATIONS.

	PAGE
Fig. 1. Section in the Chalk Pit S. of Sparham Church	6
Fig. 2. Section at the Lime-kiln half a mile N. of Swanton Morley Church	9
Fig. 3. Section at the Lime-kiln S.E. of Lyng Church	9
Fig. 4. Section in a Pit just S.W. of Ringland Church	16
Fig. 5. Section in a Pit N.W. by W. of Elsing Church	21
Fig. 6. Section in a Pit in Bylaugh Park, N.E. of the Church	32
Fig. 7. Section in a Pit a mile N.E. by N. of North Elmham Church	42
Fig. 8. Section in a Pit E.S.E. of Colton Church	44

THE GEOLOGY OF
THE COUNTRY AROUND
E A S T D E R E H A M.

CHAPTER I. INTRODUCTION.

AREA.

THE district treated of in this Memoir occupies the central portion of Norfolk, and embraces an area of about 205 square miles. It includes the towns of East Dereham, Litcham, and Reepham; and North Elmham (once a city and the seat of the Bishops of Norfolk from A.D. 673 to A.D. 1075), and the villages of Necton, Shipdham, Mattishall, Ringland, Lyng, Swanton Morley, Tittleshall, and others of smaller size.

RIVERS.

1. The *Wensum* enters the area a little north of North Elmham, and after following a very serpentine course in a south-easterly direction, leaves the district a short distance south-east of Ringland; whence it flows through Norwich to its outlet to the North Sea at Gorleston (south of Yarmouth).

It receives, in the area under consideration, three important tributary streams. One, on the southern side, rises at Fransham, and flows eastwards to Rush Meadow, near East Dereham, then northwards by Gressenhall to its junction at Worthing, south of North Elmham. One, on the northern side, flows southwards by Reepham and Whitwell Common to its junction at Lenwade; and another, also on the northern side, flows southwards from Brandiston Common, by Swannington (another stream uniting with it there) and Alderford to Morton Warren, near Attlebridge, where it unites with the main river. There are also other smaller streams which flow into some of these tributaries, or directly into the main channel of the *Wensum*.

Another important tributary rises south of East Dereham, and flows eastwards by North Tuddenham, Honingham, and Easton, where it leaves our area, and continues its course in the same direction to Hellesdon, about 2 miles W.N.W. of Norwich, where it falls into the main river.

2. The *Yare*, or that portion of it known as the *Blackwater*, rises near Shipdham, and flows in a circuitous course by Cranworth, Southburgh, and Reymerstone to near Hardingham Mills, where it is joined on the northern side by a stream coming in a south-easterly direction from Whinburgh through Thuxton. These united streams form the Yare, which continues an easterly course by Runhall, Barnham Broom, Bickerstone, Marlingford (near where a tributary enters) to Bauburgh, where it leaves the district, and, flowing past Earham and Cringleford, joins the Wensum near Trowse, S.E. of Norwich.

3. The *Nar* or *Setchy* rises at Mileham, and flows westwards to Litcham, where it is joined by a stream on the southern side coming from Great Dunham and Beeston: it then continues its westerly course, leaves the district south of Lexham Hall, and eventually enters the Eau Brink Cut of the Great Ouse River at Lynn.

4. The *Wissey* or *Stoke* rises at East Bradenham, and flows westwards by West Bradenham and Holm Hale, to Ernesford, where it leaves the district, having received in its irregular course several smaller streams. It then continues its westerly course to Stoke Ferry, and finally enters the Great Ouse between Denver and Hilgay.

GEOLOGICAL FORMATIONS.

The following Table exhibits the various formations that occur in the district, and which are shown by distinctive colours on the Geological Survey Map:—

Recent	-	Alluvium.
Post-Glacial Drift	-	{ Valley Gravel, Gravel, Sand, and Loam. [Plateau Gravel, &c.] Boulder Clay (Upper).
Glacial Drift	-	{ Sand and Gravel. [Middle Glacial of Mr. Wood.] Loam, with Boulders. [Lower Glacial.]
Pebble Series	-	Gravel and Sand. [Bure Valley Beds of Mr. Wood.]
Cretaceous	-	Chalk.

The order of superposition or relative geological age and succession of the formations, as given in the above table, are clearly demonstrated in this district by the geological mapping of the Wensum Valley, and by the well-boring at East Dereham.

All the five Drift-deposits (including the Pebbly Series) are present in the eastern and northern parts of the district, and also in the central, with the exception of the Pebbly Series, which is absent beneath East Dereham, the Lower Glacial Loam there resting on the Chalk. In the westward portion of the district, each of the different Glacial deposits seems to repose successively upon the Chalk, thus corresponding with what has been observed in Suffolk, in the neighbourhood of Bury St. Edmunds and elsewhere, where the Glacial gravels (overlain by the Boulder Clay) are to be seen reposing upon the Chalk, whilst farther west the Boulder Clay takes that position.

The same order of superposition of these five deposits is to be seen in vertical succession in the cliff on the coast at Corton, in Suffolk.* The lowermost, the Pebbly Series, there, however, instead of resting on the Chalk, rests on the Pliocene "Rootlet-bed" or so-called "Forest-bed." That this sequence extends from the Norfolk and Suffolk coast to this central portion of Norfolk seems evident. All the formations, however, are not always present, owing to local denudation or otherwise. Here and there, also, local modifications and variations in the formations are to be observed.

FORM OF THE GROUND, AND ITS ORIGIN.

With regard to the physical features of the district, and their origin, a glance at the Geological Survey Map will convey a better impression to the mind than any mere verbal description could do.

In order to account for the present form of the ground, for the various soils and sub-soils, and for their mode of occurrence, a knowledge of the formations entering into its underground structure is essential. If we could remove the whole of the Recent and Drift deposits we should probably see an inclined plane of Chalk, with a very irregular surface, and sloping more or less in an easterly or south-easterly direction. On this inclined plane (not then necessarily at its present angle, for it has since been upheaved, in all probability) the Drift formations were deposited in the order given in the table, commencing with the Pebbly Series, not, however, over the whole area, but only over the eastern and north-eastern portions. Then succeeded the Lower Glacial Stony Loam, which spread over a larger area, going further westward up the incline; this was followed by the Glacial sands and gravels, spreading out still further in the same direction; and these were succeeded by the Upper Boulder Clay, which spread over the whole district. All this may possibly have taken place during or after subsidence of the land, and in a shallow sea, with glacial conditions existing during the deposition of the two Boulder Clays of different origin, and with perhaps a warmer period during the deposition of the sands and gravels.† The breaking up of the intense glacial conditions was apparently accompanied by an upheaval of the Glacial Drift, and the distribution of the coarse Plateau Gravels by powerful currents of water. During or about this period the Boulder Clay received a thin covering of loam and sand in places, resulting probably from a natural process of "warping" or subsidence from muddy waters. It was at this period also that a considerable quantity of the Boulder Clay was apparently denuded or washed away, and that the general form of the ground, to a large extent as it now appears, was carved out.

* See "Sections of the Suffolk Cliffs at Kessingland and Pakefield, and at Corton." *Geological Survey Horizontal Sections*, Sheet 128.

† See H. B. Woodward, *Proc. Geol. Assoc.*, vol. ix., no. 3, p. 113 (1885).