

**MEMOIRS OF THE GEOLOGICAL
SURVEY. ENGLAND AND WALES.
THE GEOLOGY OF HOLDERNESS,
AND THE ADJOINING PARTS OF
YORKSHIRE AND LINCOLNSHIRE**

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Memoirs of the Geological Survey. England and Wales. The Geology of Holderness, and the Adjoining Parts of Yorkshire and Lincolnshire by Clement Reid

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CLEMENT REID

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BY

CLEMENT REID, F.G.S.

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N O T I C E.

The present Memoir is essentially a contribution to our knowledge of the Glacial geology of Britain. It deals with a remarkable area comprised in the old district of Holderness and in adjoining parts of the Yorkshire and Lincolnshire coasts. Flamborough Head limits this area on the north, and the chalk downs stretch thence for some way southwards as its western boundary. Against these uplands and in the depression to the east and south of them a series of glacial, interglacial and post-glacial deposits has been accumulated to a depth of about 100 feet. The almost continuous range of coast-cliffs from Flamborough Head to the Mouth of the Humber exposes interesting sections of the boulder-clays with transported stones from remote and widely separated sources, among which are Cumberland, the Cheviot Hills, and the mountains of Scandinavia. Besides these erratic blocks the same deposits furnish also pieces of sand and clay (Bridlington Crag) which, containing an intensely arctic fauna, have evidently been torn away and transported from some submarine accumulation of the same period. The interglacial beds, which cover considerable spaces, have yielded mammalian bones and a marine fauna indicating a climate that seems to have been little if at all colder than that of the same region at present.

Another interesting feature of the ground, described in the following pages, is the rapid encroachment of the sea and the serious loss of land along this coast-line within historic times. The average rate of advance of the sea has been about $2\frac{1}{4}$ yards a year for the last 200 years. The map, Sheet 85, affords melancholy evidence of this change; it was originally published in 1824, and on the Geological Survey edition of it the difference is shown between the coast-line in that year and in 1881 when the Geological Survey of the ground was made. While these shores are being wasted, considerable tracts of land have been gained in the Humber estuary. The account here given of the changes in that district is taken mainly from published sources.

ARCH. GEIKIE,

Director General.

Geological Survey Office,
28 Jermyn Street, London,
10th June, 1885.

NOTICE.

THIS Memoir describes the Glacial and Post-glacial Deposits of Holderness and the adjoining parts of Yorkshire and Lincolnshire. It refers to Sheets 85, 94 S.E. and N.E., and also to considerable areas in 85, 94 S.W. and N.W. Of this area the northern and north-western portions were mapped by Mr. Dakyns, who in conjunction with Mr. Fox-Strangways has written an explanation of Sheet 94 N.E. A portion of Sheet 86, near Hull and Hessle, was mapped by Mr. Cameron. The rest of the area was surveyed by Mr. Clement Reid, who also has personal knowledge of the whole. In the description of the Bridlington Crag and the Glacial Beds near Bridlington much use has been made of Mr. Lamplugh's published papers. The thanks of the Geological Survey are also due to him, as well as to the Council of the Yorkshire Geological Society, for permission to use several illustrations which have appeared in the Proceedings of that Society. To Mr. Mortimer of Driffield and to Mr. Cordeaux the Survey is also indebted for their contributions of valuable notes.

Geological Survey Office,
28 Jermyn Street, S.W.,
10 June 1885.

H. W. BRISTOW,
Senior Director.

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CHAPTER I.

ORIGIN AND PHYSICAL FEATURES OF
HOLDERNESS.

THE great hardness of the Lower Chalk of Yorkshire causes it to wear less rapidly than the softer beds on either side. Thus by the denudation of Filey and Bridlington Bays the bold headland has been left which now projects into the sea at Flamborough. This head forms the northern boundary both of Bridlington Bay and of the low-lying district of Holderness.

Inland a continuation of the same high Chalk Wolds, trending southward, defines the Holderness plain, and marks by its abrupt eastern margin the position of an ancient buried and degraded sea cliff. This cliff passes through Bridlington, Driffeld, Beverley, and Cottingham, to Hessele, where it is broken through by the Humber. South of the Humber it turns to the south-east, through Thornton, Ulceby, Keelby, Laceby, Hawerby, and Ludborough; its position being still marked by a more or less sharp rise of the Chalk from beneath the Boulder Clay. South of Ludborough it stretches south-eastward beyond the district described in this Memoir.

Though the southern boundary of this old bay is somewhat indefinite, yet practically Donna Nook and Ludborough form a very convenient limit; for the Boulder Clay flat has there dwindled to a narrow strip, in which sections are extremely rare.

Geologically, Holderness is the district between the ancient cliff and the sea, though the legal division (the "Seigniorship of Holderness"), comprising merely the portion of Yorkshire east of the River Hull, is considerably smaller.

Besides the old Bay of Holderness this Memoir describes the outlying patches of Drift which, though properly belonging to Holderness, occur at various heights on the Chalk Wolds. Few of these are found at a greater height than 200 feet, except near Flamborough. Above that level there is usually a high-lying tract of bare Chalk, extending to the edge of the escarpment.