

**MEMOIRS OF THE GEOLOGICAL
SURVEY OF ENGLAND AND WALES;
THE SUPERFICIAL GEOLOGY OF THE
COUNTRY ADJOINING THE COASTS
OF SOUTH-WEST LANCASHIRE**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649646487

Memoirs of the Geological Survey of England and Wales; The Superficial Geology of the Country Adjoining the Coasts of South-West Lancashire by C. E. de Rance

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

www.triestepublishing.com

C. E. DE RANCE

**MEMOIRS OF THE GEOLOGICAL
SURVEY OF ENGLAND AND WALES;
THE SUPERFICIAL GEOLOGY OF THE
COUNTRY ADJOINING THE COASTS
OF SOUTH-WEST LANCASHIRE**

65-ES-6

MAR 23 1934

S. 2590.75.11

MEMOIRS OF THE GEOLOGICAL SURVEY

64019^a

OF

ENGLAND AND WALES.



2

THE

SUPERFICIAL GEOLOGY

OF THE

COUNTRY ADJOINING THE COASTS OF SOUTH-WEST LANCASHIRE,

COMPRISED IN SHEET 80, QUARTERSHEET 91 S.W., PARTS OF 88 N.W. AND S.W., 79 N.E., AND 91 S.E., OF THE 1-INCH GEOLOGICAL SURVEY MAP OF ENGLAND AND WALES.

BY

C. E. DE RANCE, F.G.S.

THE LISTS OF FOSSILS REVISED BY R. ETHERIDGE, F.R.S.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.

LONDON:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE.

PUBLISHED BY

LONGMANS & Co.

AND BY

EDWARD STANFORD, CHARING CROSS, S.W.

1877.

[Price Seventeen Shillings.]

THE GEOLOGICAL MAPS OF ENGLAND AND WALES.

On the scale of one inch to a mile.

(With explanatory Horizontal and Vertical Sections, and Memoirs.)

COMPLETED COUNTIES.

For further particulars see the detailed List of the separate Sheets in the Survey Catalogue.

The sheets marked * have Descriptive Memoirs.
Those marked † are illustrated by general Memoirs.

- ANGLESEY**,—sheets 77 (N), 78. Horizontal Sections, sheet 40.
BEDFORDSHIRE,—sheets 45 (N.W. NE, SW†, & SE†), 52 (N.W. NE, SW, & SE).
BERKSHIRE,—sheets 7*, 5†, 12*, 13*, 34*, 45 (SW*). Horizontal sections, sheets 59, 71, 72, 80.
BERKSHOCKSHIRE,—sheets 36, 41, 42, 56 (NW & SW), 57 (NE & SE). Horizontal Sections, sheets 4, 5, 6, 11; and Vertical Sections, sheets 4 and 10.
BUCKINGHAMSHIRE,—7*, 13*, 45* (NE, SE), 46 (NW, SW†), 53 (SW). Horizontal Sections 74, 79.
CAMBERGESHIRE,—37, 38, 40, 4†, 42 (NW & SW), 56 (SW), 57 (SW & SE). Horizontal Sections 2, 3, 4, 7, 8, 9; and Vertical Sections 3, 4, 5, 6, 13, 14.
CARNARVONSHIRE,—74 (NW), 75, 76, 77 (N), 78, 79 (NW & SW). Horizontal Sections 23, 31, 40.
CARDIGANSHIRE,—40, 41, 66 (NW), 57, 59, 59 (SE), 60 (SW). Horizontal Sections 4, 5, 6.
CHEESHIRE, 73 (NE & NW), 73 (NE & SE), 80, 81 (NW* & SW*), 88 (SW). Horizontal Sections 18, 43, 44, 60, 64, 65, 67, 70.
CORNWALL,—24†, 25†, 26†, 27†, 28†, 31†, 32†, & 33†.
DEVON,—75 (NW), 74, 75 (NE), 78 (NE & SE), 79 (NW, SW, & SE), 80 (SW). Horizontal Sections 31, 35, 38, 39, 43, 44; and Vertical Sections, sheet 24.
DERRYSHIRE,—62 (NE), 63 (NW), 71 (NW, SW, & SE), 72 (NE, SE), 81, 82, 83 (SW, SE). Horizontal Sections 18, 40, 60, 61, 63, 70.
DEVONSHIRE,—20†, 21†, 22†, 23†, 24†, 25†, 26†, & 27†. Horizontal Sections, sheet 19.
† The Geology of the Counties of Cornwall and Devon is fully illustrated by Sir H. De la Beche's "Report," 8vo. 14s.
DORSETSHIRE,—15, 16, 17, 18, 21, 22. Horizontal Sections, sheets 19, 20, 21, 22, 56; Vertical Sections, sheet 23.
FLINTSHIRE,—74 (NE), 79. Horizontal Sections, sheet 43.
GLAMORGANSHIRE,—20, 36, 37, 41 & 42 (SE & SW). Horizontal Sections, sheets 7, 8, 9, 10, 11; and Vertical Sections, sheets 2, 4, 5, 6, 7, 9, 10, 42.
GLOUCESTERSHIRE,—19, 56*, 35, 43 (N.E. SW, & SE), 44*. Horizontal Sections 12, 13, 14, 15, 59; and Vertical Sections 7, 11, 12, 46, 47, 48, 49, 50, 51.
HAMPSHIRE,—3†, 9, 10*, 11, 12*, 14, 15, 16. Horizontal Section, sheet 80.
HEREFORDSHIRE,—42 (NE & SE), 43, 55, 55 (NE & SE). Horizontal Sections 5, 13, 27, 30, 34; and Vertical Sections, sheet 15.
KENT,—1† (SW & SE), 2†, 3†, 4*, 5, 8†. Horizontal Sections, sheets 77 and 73.
MERIONETHSHIRE,—59 (NE & SE), 60 (NW), 74, 75 (NE & SE). Horizontal Sections, sheets 26, 28, 29, 31, 32, 33, 37, 38, 39.
MIDDLESEX,—1† (NW & SW), 7*, 3†. Horizontal Sections, sheet 79.
MONMOUTHSHIRE,—35, 36, 42 (SE & NE), 43 (SW). Horizontal Sections, sheets 5 and 12; and Vertical Sections, sheets 8, 9, 10, 12.
MONTGOMERYSHIRE,—50 (NW), 50 (NE & SE), 60, 74 (SW & SE). Horizontal Sections, sheets 25, 27, 29, 30, 32, 34, 35, 36, 36, 107.
NORTHAMPTONSHIRE, 64, 45 (NW and NE), 46 (NW), 52 (NW, NE, & SW), 53 (NE, SW, & SE), 63 (SE), 64.
OXFORDSHIRE,—7*, 12*, 34*, 44*, 45*, 53 (SE & SW). Horizontal Sections, sheets 71, 72, 81, 82.
PIMBOROUGHSHIRE,—33, 39, 40, 41, 53. Horizontal Sections, sheets 1 and 2; and Vertical Sections, sheets 12 and 13.
RADNORSHIRE,—40 (NW & NE), 56, 60 (SW & SE). Horizontal Sections, sheets 5, 6, 27.
RUTLANDSHIRE,—this county is included in sheet 64.
SHERIFFSHIRE,—55 (NW, NE), 56 (NE), 60 (NE, SE), 61, 62 (NW), 73, 74 (NE, SE). Horizontal Sections, sheets 24, 25, 30, 33, 34, 35, 41, 44, 45, 53, 54, 53; and Vertical Sections, sheets 23, 24.
SOMERSETSHIRE,—19, 19, 20, 21, 27, 35. Horizontal Sections, sheets 13, 15, 17, 20, 21, 22, 103, 104, & 105; and Vertical Sections, sheets 12, 46, 47, 48, 49, 50, & 51.
STAFFORDSHIRE,—54 (NW), 55 (NE), 61 (NE, SE), 62, 63 (NW), 71 (SW), 72, 73 (NE, SE), 81 (SE, SW). Horizontal Sections 15, 23, 24, 25, 41, 42, 43, 49, 54, 57, 58, 60; and Vertical Sections 16, 17, 18, 19, 20, 21, 23, 26.
SURREY,—1 (SW†), 6†, 7*, 5†, 9. Horizontal Sections, sheets 74, 75, 76, & 78.
SUSSEX,—4*, 5, 6, 8, 9, 11. Horizontal Sections, sheets 73, 75, 76, 77, 73.
WARWICKSHIRE,—44*, 45 (NW), 53*, 54, 62 (NE, SW, & SE), 63 (NW, SW, & SE). Horizontal Sections, sheets 23, 46, 49, 50, 51, 52, 33; and Vertical Sections, sheet 21.
WILTSHIRE,—12*, 13*, 14, 15, 18, 19, 34*, & 35. Horizontal Sections, sheets 15 & 52.
WORCESTERSHIRE,—43 (NE), 44*, 54, 55, 62 (SW & SE), 61 (SE). Horizontal Sections 13, 23, 25, 50, & 59; and Vertical Section 15.

FRONTISPIECE.

Fig. 18.



Submerged Forest, at the Mouth of the River Alt (*see* p. 64).

a. River Alt.

b. Old Light-house.

c. Sand Dunes.

d. Forest with trunks of trees.

e. Grey clay.

MEMOIRS OF THE GEOLOGICAL SURVEY
OF
ENGLAND AND WALES.

THE
SUPERFICIAL GEOLOGY

OF THE
COUNTRY ADJOINING THE COASTS OF
SOUTH-WEST LANCASHIRE,

COMPRISED IN SHEET 90, QUARTER SHEET 91 S.W., PARTS OF 89 N.W. AND S.W.,
79 N.E., AND 91 S.E., OF THE 1-INCH GEOLOGICAL SURVEY MAP OF
ENGLAND AND WALES.

BY
C. E. DE RANCE, F.G.S.

THE LISTS OF FOSSILS REVISED BY R. ETHERIDGE, F.R.S.

~~~~~  
PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF HER MAJESTY'S TREASURY.  
~~~~~

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE.

PUBLISHED BY
LONGMANS & Co.

AND BY
EDWARD STANFORD, CHARING CROSS, S.W.

1877.

[*Price Seventeen Shillings.*]

Pierce fund
CONTENTS.

	Page
CHAPTER I. Physical Geography, &c. of the Country, and on the Rock Surface beneath the Drift - - -	1
GLACIAL DEPOSITS :—	
Till, Lower Boulder Clay - - -	7
Middle Sand and Gravel - - -	12
CHAPTER II. GLACIAL DEPOSITS continued :—	
Upper Boulder Clay :— - - -	31
Esker Drift - - - - -	44
On the Glaciated Rock Surfaces of Western Lancashire, and their Geological date -	44
Glacial Drift of the Country around Manchester, Bolton, Bury, and Stockport - - -	50
CHAPTER III. POST-GLACIAL DEPOSITS :—	
High-Level Alluvium - - -	57
Shirley Hill Sand and Presall Shingle - - -	58
Lower Scrobicularia and Cyclas Clays - - -	61
Ancient Low-Level Fluvial Alluvium - - -	67
CHAPTER IV. POST-GLACIAL DEPOSITS continued :—	
Peat - - - - -	69
Recent Alluvium :—	
Tidal - - - - -	86
Fluvial - - - - -	90
CHAPTER V. Roman Antiquities, &c: in connection with Geo- logical Changes in South-West Lancashire - - -	92
Agricultural Geology of the district - - -	95
Economic Geology of the Superficial Deposits of South-West Lancashire - - -	100
Relation of the Superficial Deposits to Local Water Supply and the Sanitary Condition of the District - - - - -	104
CHAPTER VI. Modern Marine Deposits - - -	107
APPENDIX. List of Fossils - - - - -	127
INDEX - - - - -	133

THE following Memoir by Mr. C. E. De Rance is specially devoted to the Superficial Deposits of that part of Lancashire that lies between the Mersey and the Ribble, though in the introductory chapter some useful notices are introduced of adjoining districts as far north as the country east and north of Morecambe Bay, and as far south as the estuary of the Dee.

In the two first chapters the various members of the Glacial Deposits are described, and the remainder of the Memoir is chiefly devoted to the description of the Post-Glacial Deposits.

Availing himself of the work of preceding writers, in addition to his own minute knowledge of the country, the Author has been able to produce a more complete account of its Superficial Geology than has heretofore been given in any single Memoir. The list of fossils at the end forms a valuable table of reference, all the more so that at a glance the reader can see where and in what divisions of the Glacial Deposits the species have been found.

ANDREW C. RAMSAY,

8th September 1876.

Director General.