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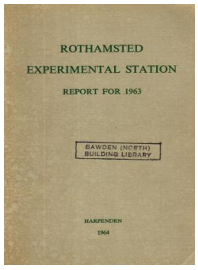

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D. A. Osmond

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SOIL SURVEY OF ENGLAND AND WALES

D. A. OSMOND

The vacancy at the Derby centre was filled by A. J. Thomasson, D. Mackney transferred to Harpenden and J. L. Nowland was appointed. H. H. Le Riche transferred to the Pedology Department of Rothamsted Experimental Station. W. M. Corbett was seconded to Eastern Nigeria for soil survey work and P. Bullock was awarded a graduate assistantship to work at Cornell University, U.S.A. D. A. Osmond attended the meeting of the Working Party on Soil Classification and Survey at Lisbon and the Soil Correlation Committee meeting at Ghent. C. C. Rudeforth spent a period at Braunschweig studying soil micromorphology.

Talks, demonstrations and courses of lectures on soils and soil surveying were given by several surveyors. The Proline Soil Corer was involved in a road accident which curtailed its use towards the end of the year. Three surveyors from the Scottish survey each spent a month working in the English survey; several other visitors spent various periods with surveyors. The Cartographic Section drew numerous maps and diagrams for papers while continuing the production of seven soil maps, on 3rd edition sheets. A hand-coloured soil map at the scale of 2½ in. to 1 mile of 300 sq miles of Yorkshire was prepared for exhibition at the Great Yorkshire Show.

Reconnaissance survey has covered some 1,200 sq miles and a further 300 sq miles were mapped at various scales, mainly for special purposes.

Of the staff of the Colonial Pool of Soil Surveyors, A. O. Ballantyne continued working in Northern Rhodesia and P. D. Jungerius, having completed his term of service in Eastern Nigeria, resigned to take up an academic post in The Netherlands. A. R. Stobbs ended his attachment to the Directorate of Overseas Surveys, including a period in Bechuanaland Protectorate, and was seconded to Nyasaland. After a year in Barbados, D. M. Carroll returned to work at the Directorate of Overseas Surveys and in the Road Research Laboratory, and J. R. F. Hansell completed his training and was assigned to duties in Tobago.

Northumberland

Sheet 77, 7th Series (Hexham). Further survey at the scale of 6 in. to 1 mile in the Northumbrian Plain revealed several new soil series and the fluvio-glacial deposits, presumed to be of lacustrine origin (*Rothamsted Report* for 1961, p. 210; for 1962, p. 227), were examined in more detail. The deposits range from loose sand to tenaceous silty clay and sometimes display a rhythmic sequence of deposition. The soil profiles have unusually large amounts of sodium chloride and contain comminuted shells but, although pieces up to ¼ in. diameter are occasionally found, it has not yet

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been possible to identify them. Identification will help to decide whether their habitat was fresh or brackish water.

The soils are tentatively grouped with calcareous, ground-water gley soils with, in many situations, a thin, superficial layer of peat; even where this has been removed, there is evidence of its former existence. It seems fairly certain that the deposits originated in shallow water because large accumulations of leaves, roots, etc., often only slightly decomposed, occur at various depths in the mineral material.

On the upper flanks of the North Tyne Valley, podzols with thin iron pan at 2–3 in. frequently occur under acid heath vegetation on clay loam soil. As much of the land is in ridge and furrow, the profile cannot be of any great age.

In New Zealand where parent materials and other soil-forming factors are reasonably uniform in hilly land, a gradation of soil properties is usually correlated with the angle of slope and the soils can be arranged in a toposequence. It has, however, proved impracticable, so far, to apply this concept here because of the variability of the drift mantle and its presence or absence.

Climatic peat was not recorded and blanket bog, 14 ft thick, only once in a depressed site. The increase in artificial drainage and afforestation makes conditions now unsuitable for the growth of peat, and its area is decreasing. Consequently, the rapid run-off after heavy rain causes some erosion in the hills and flooding in the lower reaches of the main rivers. (Ashley and Nowland)

Yorkshire

Sheet 90, 7th Series (Wensleydale). Survey was continued and about 50 sq miles were mapped mainly around Grassington.

Sheet 97, 7th Series (York). The area mapped adjoins the previously surveyed 3rd edition Sheet 71 (Selby) and about 90 sq miles, mainly of land under intense arable cropping, were covered. The drifts in the Vale of York lie against the solid deposits forming the Chalk escarpment of the Yorkshire Wolds and the Jurassic sandstone and limestones of the Howardian Hills, and mapping was extended on to these formations.

The Chalk outcrop is characterised by very deep and steep-sided, dry valleys with a very sharp change of slope to the comparatively flat top of the Wolds. Most of the soils on the Chalk have a thin, friable, brown subsoil, but, sporadically on the flat parts, deeper soils occur with a weakly developed, leached horizon between the top-soil and a heavier-textured horizon showing clear signs of clay accumulation. It is hoped to study this soil as being a possible relic of the older soils of the Wolds. Cobbles and pebbles, which would suggest a former cover of glacial drift, are exceedingly rare.

The Lower Lias Clay usually forms the slopes of the Wold escarpment, the beds between it and the Chalk having very narrow outcrops. It gives soils of heavy texture, sometimes with flint and chalk fragments in the surface, and slumping is common where the slopes are steep.

Other extensive parent materials are the Keuper Marl, more or less covered with flinty and chalky superficial deposits, and drifts in part

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derived from Jurassic rocks and including numerous oolitic fragments. In addition, the mixed deposits of the York moraine extend in a broad arc through Dunnington, Sheriff Hutton and Stillington enclosing water-deposited and wind-blown sands. (Crompton, Bullock and Matthews)

Lancashire

Sheets 95, 7th Series (Blackburn and Burnley) and 101, 7th Series (Manchester). Work was concentrated in the Rossendale district between Blackburn, Burnley, Bolton and Rochdale, where about 160 sq miles were surveyed. The Rossendale anticline is a westward extension of the Pennine Hills and is composed of sandstones, shales and grits of the Coal Measures and Millstone Grit formations over which are extensive spreads of boulder clay.

Hill peat usually occurs on the flat hill tops above 1,000 ft. Podzols with iron pan (Bowland group) are found on steep slopes, but on less stable slopes, such as occur on the sides of the deeply incised valleys, strong-brown-coloured soils of the Gillsbrook group are associated with areas of soil creep. Below the scarp slopes, heavy-textured boulder clay and locally derived drift occur, and zones of peaty gley soils (Wingate group) and of gley soils (Aspull group) were separated.

Sheets 94, 7th Series (Preston) and 89, 7th Series (Lancaster and Kendal). Detailed mapping was undertaken around Gressingham to establish mapping units, and the reconnaissance survey was continued northwards from the Lune valley to Arnside and Kirby Lonsdale, about 90 sq miles being covered. In this district Carboniferous Limestone forms upstanding hills such as Clawthorpe Fell, Warton Crag and Arnside Knott, and exposed surfaces weather to form clints and grikes. Shallow rendzinas dominate the Warton group, which includes freely drained brown earths on flat sites occupied by drift of non-calcareous, reddish brown, silt loam containing grits from Silurian rocks. Drift covers the land between the hills and moraines and drumlins occur frequently. The Burton group includes the stony, freely drained brown earths covering the moraines derived from Silurian grits and Carboniferous limestone, and the imperfectly drained soils, which occupy most of the hollows, although some are filled with calcareous clay thinly covered with peat. Extensive areas of woody fen peat, e.g., Hale Moss, Holme Moss and Warton Moss, were delimited.

East of Hutton Roof and Halton, boulder clay replaces sands and gravel, although the morainic features of the Burton group persist into the Lune valley. The boulder clay overlies the Millstone Grit, and most of the soils are gleyed. Extensive growth of rushes, even on the steep slopes of drumlins, indicates poor natural drainage and peaty gley soils occupy the hollows. (Hall and Folland)

Leicestershire

Preliminary survey revealed several well-defined soil associations related to the main geological formations. The sequence of sedimentary rocks passes from Keuper Marl around Nottingham, through the Liassic rocks

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to limestones of the Inferior Oolite east of Oakham and Grantham. Much of the higher land is covered with drift, which includes material derived from the Lias, Keuper Marl and Chalk. About 20 sq miles were surveyed in areas of boulder clay. Around Waltham-on-the-Wolds many fine-textured soils are sufficiently calcareous to be correlated with the Hanslope series common in East Anglia. Farther west, around Sixhills and Wymeswold, in soils of similar texture the calcareous horizon is commonly more than 24 in. below the surface and on level terrain the subsoil is strongly gleyed. To the north and west the content of Triassic material in the boulder clay increases considerably but chalk particles are usually present within 30 in. of the surface. (Thomasson)

Cambridgeshire

Sheet 135, 7th Series (Cambridge and Ely). With the mapping of 100 sq miles, a reconnaissance survey of the soils of this sheet is now complete. Further work was done on the Downholland complex around Welney, March, Chatteris and Somersham, and the courses of most of the roddons are now well known.

Survey was continued mainly in the south-west and along the eastern margin, southwards from Methwold. The distribution pattern of the soils in the latter area is complicated by the proximity of the Fens to the Breckland, but previously described mapping units were found to be adequate. It is becoming clear, however, that a variant of the Moulton series observed during the survey of the 3rd edition Sheet 188 (Cambridge) and also at Broom's Barn Experimental Station is more extensive than previously thought. The soil has a thick, red-brown, sandy clay loam or sandy clay horizon where clay has accumulated and typically occurs where soils developed on drift over Chalk (Swaffham Prior and Moulton series) adjoin those on heavy boulder clay (Stretham and Ashley series). (Hodge and Seale)

Cardiganshire

Sheet 127, 7th Series (Aberystwyth). A further 150 sq miles were surveyed in the mountainous northern part of the county, and the soils recorded mainly correspond with those previously described.

The survey included Borth Bog, where 7,000 acres were mapped in detail as being of special interest to agriculturists and naturalists. This roughly triangular area, mainly below 25 ft O.D., is bounded by the sea and the Dovey estuary to the west and north-west and, on the landward side, by steep hills. Peat is extensive, but is covered by, and locally interstratified with, gleyed alluvial deposits, mainly of fine texture, deposited by streams from the high land. The deposition of sand along the seaward edge and near the mouth of the Dovey has provided material for the formation of sand dunes. Blown sand overlies peat east of the shingle spit north of Borth, and where the sand is stabilised by a continuous vegetation cover soil profiles are developing under the influence of ground-water and podzolisation processes. (Rudeforth)

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Monmouth and Brecknockshire

A reconnaissance survey was completed with the survey of the plain between the eastern edge of the South Wales Coalfield and the Wye. The reconnaissance was also extended into south Brecknockshire on the high land of Fforest Fawr. The area of 490 sq miles surveyed thus includes a large part of the most elevated land in South Wales.

Rocks of the Old Red Sandstone formation are dominant, the lithology varying from marl to sandstone. Marl crops out in the central lowland around Raglan, Monmouthshire, and Brecon, but a thin mantle of glacial drift covers much of the gently sloping land and occupies many of the shallow depressions. Sandstones are more extensive along the eastern Monmouthshire border, forming high land in which the Wye is deeply incised as well as that around the Black Mountains and the Brecon Beacons.

Podzolised soils, podzols and gley soils were mapped in areas of high elevation. Surrounding the uplands and extending into the lowlands is a zone of thick drift deposits on which *sols bruns acides*, brown earths and gley soils are found. *Sols bruns acides* and gley soils are associated with the inlier of rocks of the Silurian formation at Usk. (Crampton)

Berkshire

Sheet 268, 3rd Edn. (Reading). The field work was completed with the survey of the remaining 30 sq miles at the 1 : 10,560 scale; some revision of earlier work is necessary before writing the memoir.

Sheet 158, 7th Series (Oxford and Newbury). Preliminary work involved mapping some 12 sq miles in detail. The Vale of the White Horse, which was the subject of a pioneer survey by F. F. Kay in 1934, is included, and the work to date is largely an extension of that survey. Some 3 sq miles were mapped north-west of Wantage, where soils on Kimmeridge Clay are surface-water gley soils.

A second area of 9 sq miles was mapped around Abingdon, where three geological deposits determine the pattern of soil distribution. The Corallian outcrop consists of Coral Rag limestone, and only the shallow, heavier-textured brown calcimorphic soils of the Charney series occur. A tongue of Kimmeridge Clay, extending north from Abingdon towards Boars Hill, gives rise to surface-water gley soils on slopes, but elsewhere it is largely masked by superficial gravelly deposits. North-west of Abingdon, river terraces associated with the Thames are largely occupied by brown calcimorphic soils of the Sutton series. (R. A. Jarvis and M. G. Jarvis)

Gloucestershire

Sheet 156, 7th Series (Bristol and Stroud). A further 35 sq miles mapped covered part of the Vale of Berkeley between Berkeley, Frocester and Whitminster. Extensive deposits of Head overlie the Lower Lias Clay in the Vale, particularly where the Frome and Cam issue from the Cotswold scarp. Around Frampton-on-Severn, thick gravels are worked and other

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spreads lie between Slimbridge and Low Cam at more than one level. The shallow, stony soils are mapped as the Badsey series.

Elsewhere, particularly between Frocester and Cambridge, thin gravelly deposits are covered by 1–3 ft of stoneless Head, the texture of which varies sporadically, being micaceous and silty near the scarp but somewhat sandy at lower levels nearer the river, presumably by the incorporation of material from a different source. Similar soils are mapped as Podimore series (Somerset) and Honeybourne series (Worcestershire).

Soils derived from Liassic clays and mudstones were mapped as two associations, one of which, usually at the scarp-foot and extending into the Vale north of Berkeley Road, consists mainly of poorly drained gley soils. Gleyed calcareous soils of the Evesham series dominate the other association, in which, however, gley soils or well-drained gravelly soils occupy small areas.

West of Berkeley Road, acid, gleyed soils, derived from Cambrian and Silurian shales, have not yet been correlated with soils elsewhere. (Findlay)

Devon

Sheet 176, 7th Series (Exeter). A further 90 sq miles were mapped around Exeter and Newton Abbot. On the Culm Measures shales north and north-west of Exeter well-drained soils of the Dunsford series are interspersed with surface-water gley soils of the Halstow and Tedburn series on gentler slopes. The soils on the belt of Permian breccia and sandstone extending west from Killerton to Crediton are similar to those in the Exe valley (*Rothamsted Report* for 1962, p. 234).

In the south-west the survey was extended to the margins of the 3rd edition Sheet 339 (Teignmouth). The country around Newton Abbot is geologically complex, and several new associations were introduced based mainly on parent material characteristics. Numerous outcrops of intrusive dolerite, giving soils akin to those of the Trusham series, occur among the Devonian slates, which develop shallow, freely drained clay loams—the whole forming an extensive group dominated by brown earths. Red-stained Devonian limestone is extensive around Ogwell, Denbury and Kingskerswell, where the soils range from shallow soils with only an A horizon resting on the rock to those with thick subsoils of red clay.

Soils of the Moretonhampstead series occupy much of the south-west corner of the Dartmoor granite and are flanked by a group of freely drained loams and clay loams on the varied rocks of the Lower Culm Measures around Hennock and Ilsington. (Clayden and Manley)

Sussex

Mapping was continued at the 6 in. to 1 mile scale, and 32 sq miles were surveyed between Worthing and the Arun; most of the soils have been described previously. A series, not yet named, occurs on the exhumed sub-Eocene surface, north of a small east–west scarp which forms the northern limit of the main outcrop of Eocene rocks between Crossbush and Castle Goring. It is a surface-water gley soil developed on thin, flinty, silty drift

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over disturbed remnants of Reading Beds clay overlying Chalk at no great depth.

The Winchester series is widespread, but occurs only on the evenly sloping Chalk surface south of the secondary Chalk escarpment where this soil reaches much lower altitudes than in the west of the district. In places it is closely associated with remnants of Reading Beds, and the Chalk surface may be the northern extension of the sub-Eocene surface. From field evidence, it appears that the Winchester series here may be the result of soil-forming processes on remnants of Reading Beds, and studies of thin sections of soils and of the mineralogy are being made.

The tops of the ridges north of the secondary escarpment usually have only a thin mantle of drift, but small summits, as at Annington Hill and Findon Park, are capped by thicker, flinty, silty drift giving soils related to the Charity series, which are more typically found on lower valley slopes. (Hodgson)

Other Work

1. Investigations of areas as requested by the National Agricultural Advisory Service, the Agricultural Land Service, the Forestry Commission and the Nature Conservancy necessitated the survey of about 280 sq miles.

2. Several surveyors took part in describing soils at the sites of various field trials.

3. Meetings of the Regional Land Restoration Committee and the Opencast Coal Survey Panel were attended. (Ashley, Hall and Crompton)

4. In connection with the Congress of the International Geographical Union to be held in 1964, surveys were made of 20 sq miles around Leith Hill and of 50 sq miles around Dorking; considerable assistance was given in the preparation of an excursion brochure. (Green)

5. Courses of lectures were given at Field Studies Centres at Preston Montford and Juniper Hall, Dorking. (Burnham and Green)

6. A soil map and report were prepared of the permanent show ground of the Royal Agricultural Society at Stoneleigh, Warwickshire. (Mackney and Burnham)

7. The soils of farms in south-west Wales visited by members of the British Grassland Society's Conference were described and soil monoliths exhibited. (Rudeforth)

8. Exhibits, including soil maps and monoliths, were prepared for the Royal Agricultural Show, the Great Yorkshire Show, the Lancashire County Institute of Agriculture and the Royal Lancashire Agricultural Show. The Warwick County Museum accepted five monoliths for display.

9. A new system of classification of British soils was described at the meeting of the British Society of Soil Science at Oxford. The system is being tested, and it is hoped that it will aid the production of a generally acceptable classification. (Avery and J. Muir)

10. Field tours and discussions were arranged at Malham Tarn on Upland Soils, at Cambridge on Peat Soils and at Harpenden on Soils of the Chilterns (Bullock, Hodge and Avery)

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