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SOIL SURVEY OF ENGLAND AND WALES

D. A. OSMOND

B. Plummer was appointed to the staff and C. A. H. Hodge returned from Iraq. S. Harris was seconded from Messrs. Hunting to assist in the Soil Survey for a short time. A. O. Ballantyne, of the Colonial Pool of Soil Surveyors, completed his tour in Northern Rhodesia and is now in the British Solomon Islands; P. D. Jungerius is working in Ghana; the remaining members of the Pool are continuing the surveys in the countries to which they were seconded.

A. Muir was Chairman at a Seminar of a Baghdad Pact Working Party on Soil Classification; later he visited Russia to discuss the legend and draft soil map of E. Europe. He was also Chairman of the successful meeting of the F.A.O. Working Party on Soil Classification and Survey at Oxford, at which the first draft of the Soils Map of Western Europe was presented; a field trip was also arranged. D. A. Osmond compiled a second draft of the map at Ghent. Field excursions were arranged for the meeting of the British Soil Science Society at Sutton Bonington. A course of study of soils in the field was conducted at Juniper Hall Field Centre, Dorking, by B. W. Avery.

To hasten the work, detailed soil surveying was replaced by reconnaissance mapping; some detailed work to be published on the 3rd Edition maps of the Ordnance Survey is being completed, and areas surveyed on the new basis will be compiled on the 7th series maps.

NORTHUMBERLAND

Sheet 19 (Hexham)

Reconnaissance mapping was continued, and over two-thirds of the area is complete. Heather burning appears to inhibit peat growth on the flatter tops of Spitalshield, Eshells, and Burntridge Moors, thick peat being found only in the naturally poorly drained hollows. Elsewhere the coarse-textured Carboniferous till carries a thin black amorphous peat 4–12 inches thick which overlies a strongly gleyed, sometimes humus-stained A₁-horizon above a thin iron pan; in the B-horizon most of the stones weather to mineral grain aggregations. On slopes of 6°–12° medium-textured soils have gleyed A₂-horizons at an almost constant depth, apparently due to water flowing above the underlying solid strata. "Lateral gleying" is suggested as a name for this phenomenon.

Large well-dissected spreads of glacial sands and gravels are prominent along the South Tyne valley, forming freely drained, good arable soils, but around Whinnetly–Lipper Edge surface-water gleying is common. North of and adjacent to these sands brown earths develop where thin Carboniferous till overlies sandstone.

The Middle Limestone Group and the Calciferous Sandstone Series of the Lower Carboniferous formation produce striking escarpments of limited extent. Their presence, however, affects the

base status and drainage of the soils on the thin overlying Carboniferous till. (Ashley and Rudeforth.)

YORKSHIRE

Sheet 71 (Selby)

During the very dry weather work was resumed on the Mountain Limestone, north of Settle. Detailed survey was confined to the eastern side of Sheet 71, chiefly covered by Post-glacial sands, where 20 sq. miles were mapped. South of Holme-upon-Spalding-Moor, where the sands mainly overlie lacustrine clay, the water-table is close enough to the surface for both horticultural and farm crops to be grown. To the north, however, where they overlie Keuper Marl or glacial drifts and have a finer texture, wind-blowing is a problem; in the east the sands contain more flints and become a flint gravel in places.

The soil pattern is a sequence from iron-humus podzol to peaty gley soils and ferruginous deposits occur in the zone of fluctuation of the ground-water, their distribution suggesting lateral transport. Wind-blowing, marling and deep ploughing have obscured many morphological details.

In the same area a hill of Trias rocks, surrounded by the superficial deposits of the Vale of York, provides soils of the Worcester and Bridgnorth series. Gravels, derived from Carboniferous Sandstone, cap the hill and are slightly podzolised.

Attempts were made to use air-photo interpretation as an aid in mapping, but, as all the cultivated soils in the Vale appear similar on the photographs, the method was not helpful. On the Mountain Limestone they were useful in delimiting limestone pavements and soil boundaries marked by a definite vegetation change; they also helped in finding changes in parent material. (Crompton and Harris.)

LANCASHIRE

Sheets 74 (Southport) and 83 (Formby)

During the early part of the field season forty-seven profile pits were examined and sampled for further data to include in the memoir.

Sheet 94, 7th series (Blackpool)

Reconnaissance mapping at 1 : 25,000 was started and 122 sq. miles surveyed; all the soils had been described previously, and suitable mapping units were chosen. Between Wesham and Garstang soils are developed on fresh water and estuarine alluvium and peat. The lack of prominent features necessitated more detailed work than was expected and slowed the rate of progress. Around Goosnargh on the Lancashire Plain the relief is undulating and gley soils on reddish coloured till, mainly of Triassic origin, are common. Small areas of steeper gradient and local patches of fluvio-glacial sand and gravel give rise to brown earths with more or less gleying.

Most of the horticultural land in W. Lancashire was mapped on Sheet 74, and the survey was completed by mapping 5 sq. miles in detail around Marton.

Among the *ad hoc* surveys was one of all the glass sand deposits in South-West Lancashire; this enabled the total glass sand reserves to be estimated and their suitability for different purposes to be assessed. First- and second-quality sands are associated with the Sollom and Crannymoor series. (Hall and Montgomery.)

DERBYSHIRE

Sheet 125 (Derby)

Classifying and mapping soils was continued, and 39 sq. miles were completed, mainly in the east between the Erewash and Leen. Soils on Carboniferous, Permian and Trias strata were correlated with similar soils in Yorkshire. Much of the Coal Measures formation is disturbed by opencast mining, but the alternate sandstone and shale beds give freely or imperfectly drained sandy loams over weathering sandstone and grey clay loam overlying strongly mottled clay with impeded drainage respectively.

The scarp face of Permian strata gives rise to a complex of soils, but on the crest and dip slope the pattern is simpler and the soils of the Aberford and Micklefield series, first described from Yorkshire, are more suited to arable farming than are the gley soils of the Coal Measures. The Bridgnorth series occurred on steep, north-facing slopes of Bunter Sandstone, but on the Lower Mottled Sandstone both Bridgnorth and Newport soils occur, though difficult to map. Soils of the Mercaston or Hulland Ward series occurred on small drift-covered areas depending on its character. (Bridges.)

SHROPSHIRE

Sheet 166 (Church Stretton)

Field work is completed with the mapping of 30 sq. miles in Corve Dale and the Church Stretton valley; the soils on alluvial deposits in Corve Dale vary greatly. Time was spent studying whether the number of mapping units could be decreased, and a draft legend was produced. Mapping was done at both 1 : 25,000 and 1 : 10,560 scales, and a fair copy of the field maps at 1 : 25,000 was made. (Mackney and Burnham.)

CAMBRIDGESHIRE

Sheets 173 (Ely) and 174 (Thetford)

With the change from detailed to reconnaissance mapping, the area surveyed increased to 150 sq. miles. Most of this land is Fenland, where an upper and lower basin or low moor peat are separated by a continuous but not uniformly thick bed of "fen clay" of variable texture, deposited in creeks or reed beds. After the fens were drained, the upper peat largely disappeared, the fen clay is close to the surface and there is a widespread soil-sequence on low ridges and in depressions. Slightly raised, former river beds form meandering ridges (roddons) of silty, highly calcareous, prominently mottled soils.

In 1958 it was decided to survey Sheet 174, which covers most of the Brecklands and the 4,000-acre Thetford Forest. Apart from

the Fenland-Upland junction, the area is almost featureless. Reconnaissance excluding the Fenland showed that most of the Upland is underlain by Gipping Till—a chalk and sand mixture which on weathering produces the sandy material that is the parent material of most of the Breckland soils. Small areas of sands, gravels, Chalk and chalky clay occur in the north-east and south-east.

A few soils cover large areas, 50% or more of the sheet being covered by the Worlington series, which resembles the sol lessivé described by French pedologists. Other brown earths recognised are the Freckenham, Redlodge and Moulton soils.

About 10–15% of the Upland is occupied by brown, slightly calcareous sandy soils without a textural B-horizon over the till, and small areas of the Swaffham Prior series occur at the edge of the Fens. North and south of Thetford humus podzols develop on deep sand over either Gipping Till or gravels. Rendzinas (Wantage and Newmarket series) are of small extent adjacent to the Fens and on the steeper slopes of the plateau edge. (Seale, Hodge and Corbett.)

BEDFORDSHIRE AND HERTFORDSHIRE

Sheet 147, 7th series (Bedford and Luton)

A reconnaissance survey of Sheet 147, which includes parts of the previously surveyed 3rd Edition Sheets 238 (Aylesbury), 239 (Hertford) and 220 (Leighton Buzzard), was started, and in the southern part about 100 sq. miles were surveyed. The mapping unit is the association defined as a group of topographically related soils and named after the most prominent member; nine associations were described.

Batcombe—naturally acid brown earths and gleyed brown earths on the drifts on the Chiltern Plateau. Soils: Batcombe, Berkhamsted and Winchester.

Icknield—rendzinas in the Chiltern Scarp zone. Soils: Icknield, Wantage and Coombe series, Steepland complex.

Halton—gleyed calcareous soils on chalky flinty Head over Chalk Marl in the Vale. Soils: Halton, Burwell and Wantage series, Ford End complex.

Coombe—brown calcareous soils on chalky flinty Head over Chalk on the platform in the Middle Chalk and upper part of the Lower Chalk. Soils: Coombe, Icknield and Charity.

Wicken—surface-water gley soils on reworked Gault and associated drifts in gently undulating, low-lying ground. Soils: Wicken series, Challow complex.

Hanslope—associated with Chalky-Jurassic Boulder Clay at various sites. Soils: Hanslope and unnamed soils.

Woburn—brown earths of low base status on resorted Lower Greensand and associated sandy drifts. Soils: Woburn and unnamed soils.

Flitwick—poorly drained soils on thin, sandy or gravelly drift over Jurassic clays on low-lying land. Soils: Flitwick, Denchworth and unnamed series.

Denchworth—surface-water gley soils on resorted Jurassic clays and associated drifts on low-lying sites. Soils: Denchworth and unnamed series. (King.)

HERTFORDSHIRE AND ESSEX

Sheet 148, 7th series (Saffron Walden)

About 80 sq. miles were mapped in a reconnaissance survey.

The area is divided by the low Chalk escarpment between Royston and Newmarket, and most of the soils occurring north of it, developed on Lower Chalk, Gault and drifts associated with the Cam, are already described. They are Wicken, Burwell, Landbeach, Aldreth and Wantage series on lower ground and Newmarket, Icknield and Swaffham Prior series and Moulton complex on higher ground.

Over the scarp the pattern changes, and on the undulating dissected plateau of Chalky Boulder Clay the Hanslope and Streatham series are extensive. Glacial gravels mixed with till or brickearth-like material give flinty, well-drained brown earths of variable thickness of the Bengeo association. Glacial deposits overlying Eocene beds (mainly London Clay) yield Hanslope and Streatham soils, but soils on lower slopes, associated with gravels, are subject to lateral seepage over the London Clay surface. (Thomasson.)

GLAMORGAN

Sheet 154, 7th series (Cardiff)

Two hundred sq. miles were mapped on a reconnaissance basis in the Vale of Glamorgan using established series where possible after comparing the soils with possible correlatives elsewhere, thus keeping the number of new series to a minimum. East of Cardiff, Ludlow and Wenlock shales give soils of the Stanway and possibly Sannon series. On Devonian sandstones in an area with pronounced relief around the coalfield north of Cardiff the Eardiston series is dominant; on the marls the Bromyard and Middleton series and the Tanyard complex occur. Carboniferous shales yield poorly drained soils, resembling the Alton and Windley series, and the limestone produces Gower and Lulsgate series, the Lulsgate with and Gower without rock outcrops; plateau surfaces carry the Nordrach series. South-east of Cardiff on Trias rocks the Worcester series occurs on red marls, whereas the green marls give the Cogan series (freely drained) or Caerau series (poorly drained), all of which are fine-textured.

The narrow outcrop of Rhaetic strata yield the Ashton, Charlton Bank and Sand Hall series. Lias limestones are fairly extensive; the shallower soils are the Ston Easton series, and the deeper ones the Llanmaes series. Where drift influences the liassic clay, the poorly drained Dyffnan series is mapped on the northern part of the outcrops. The coalfield is bounded by glacial sandy and gravelly drift, which provides loamy soils of the Lisvane series (freely drained) or Pendoylan series (poorly drained). (Crampton.)

BERKSHIRE

Sheet 268 (Reading)

Forty-two sq. miles were surveyed, forming an almost complete section of the geology of the northern half of the London Basin, in which all but six of the sixteen series mapped were previously named.

North of Twyford-Reading-Theale the south-dipping Upper Chalk emerging beneath the Eocene beds dominates the landscape. It has little influence on the soils, but its gradient makes the Eocene strata thin rapidly northwards, and their disintegration and erosion by the Thames have produced more relief here than to the south. Steep slopes, a variety of parent rocks of differing composition and extensive solifluction produce a complicated soil pattern.

South of the line, the London Clay forms an undulating plain broken by gravel-capped plateaux and, in the south-east, by the higher ground of the overlying Bagshot Beds. Considerable areas are covered either by level fluvial gravels at different levels or by inclined surfaces of gravelly Head.

Of the soils mapped, 7 are brown earths, 2 podzolised soils, 2 calcareous soils and 5 are gley soils subdivided into calcareous or non-calcareous and dominated by either surface- or ground-water. (Jarvis.)

GLOUCESTERSHIRE AND WILTSHIRE

Sheet 156, 7th series (Bristol)

Three areas on the Cotswolds were mapped in detail to establish mapping units on the Forest Marble and Great Oolite rocks and on the more complicated scarpland in the west; an area was also selected in the Avon valley between Chippenham and Melksham. The scarp is an important feature, particularly around Stroud and Bath, where there is much steeply sloping land. The lower slopes are dominated by freely drained, weakly acid, silty and fine sandy soils on steep slopes and by less-well-drained soils where the subsoils are fine-textured (Atrim, Martock and Long Load series). On the upper slopes imperfectly drained, coarse-structured soils (Trip series) occur with fine-textured, usually calcareous soils (Sherborne series) that are stony where flat and stoneless on slopes. The Sherborne series also occurs on the dip slope, where the Forest Marble, extending up to about 500 feet, comprises hard, flaggy limestones, calcareous grey clay and fine sands. The differences between the physical character of the Oolitic Limestone and Forest Marble are reflected in the more variable textures of the soils on the latter. The calcareous clays produce soils comparable to the Chickerell series.

In the Avon valley river terraces at 130, 140 and 170 feet and flinty loamy drift up to about 200 feet cover much of the Oxford Clay on which the Denchworth series occurs; the soils on the terraces and loamy drift require further investigation. (Findlay.)

DEVONSHIRE

Sheet 176, 7th series (Exeter)

A new centre was opened at the National Agricultural Advisory Service substation, Starcross, and about one-half of the 40 sq. miles covered by the Nuffield Farm Project was surveyed. The project is an attempt to study methods of bringing information to farmers, and the survey is needed to assess the extent to which results from the many field experiments can be applied. The area extends from

near Great Haldon on to Dartmoor and from Chudleigh and the Bovey Basin to Crediton, and the soils are derived mainly from granite or the Culm Measures.

On the granite, soils are freely drained except in the well-defined basins and valley floors where gley and peaty gley soils occur. The Middle Culm consists of dark grey shales with sandstone bands, but the Basement Culm includes hard mudstones, cherts, shales and sandstones with many diabase intrusions. Shallow brown earths occur on steep slopes of Culm shales, imperfectly drained soils on gentle slopes and on the small area of slopes less than 5° the soils are poorly drained. (Clayden.)

SUSSEX

Sheet 332 (Bognor)

The survey started in 1954 was resumed, and 30 sq. miles, mainly on the agriculturally important, but not easily distinguishable, Brickearth and Coombe Rock, were surveyed. In addition to the sequence of Hamble, Hook and Park Gate series, others were recognised in which the Brickearth is either incompletely decalcified or overlies Coombe gravel or raised beaches. The soil units are closely related to the landscape and amount of dissection, and can usually be mapped despite the very irregular junction between the Brick-earth and the underlying deposits.

The raised beaches on the sides of valleys are incompletely delimited, and their lithology varies, but most of the soils are gley soils of the Calcetto series. The very variable alluvial deposits will be mapped as complexes. (Hodgson.)

KENT

Sheet 305 (Folkestone)

Primary survey of Romney Marsh was ended, and the final revision is almost finished. The memoir is being written and more profiles were described. Ground-water levels in representative soils were measured during this exceptionally dry season, and water samples were collected. Special studies of sub-surface porosity were continued using plaster of Paris and latex as infiltration media. The maximum expression of the pore-system occurred between 18 and 36 inches, but continued to at least 5 feet; some of the porosity is undoubtedly connected with the presence of the numerous *Lumbricus terrestris* observed. (Green and P. Askew.)

OTHER WORK

In addition to preparing figures, etc., for memoirs, eleven soil maps are being drawn in the Cartographic Department. Many drawings and diagrams were made for several departments of Rothamsted Experimental Station.

Many areas were examined in detail and maps prepared from existing information. The sites investigated include horticultural and glass-house sites, experimental farms and fields and town-planning areas. Field trips were arranged for the meeting of the British Soil Science Society and for the F.A.O. Working Party.