EXCURSION TO SOUTH BEDFORDSHIRE

Leader : A. Ludford

Sunday, 8th September 1968

(Notes on the geology of the M.1. by F.M. Taylor and R.E. Elliott)

Introduction

Members of the Society left Nottingham by coach at 9.00 a.m. and, after collecting other members at Derby, joined the M.1. at Kegworth for the journey southwards to Toddington. The geology of the route down the M.1. was described by F.M. Taylor and R.E. Elliott. Dr. Taylor dealt with the part of the route from Nottingham to the Rhaetic escarpment, southeast of Leicester. Much of this geology has already been published in the "Mercian Geologist" (Taylor, 1964, 1966) and is therefore only summarised here, in the map (Text-fig.1) and in the tables below. The route south of the Rhaetic escarpment was described by Mr. Elliott and the salient points are also shown in the tables.

The Geology of the M.1.

Road intersections, Service Station or other reference points.	Locality	Geology
From A 52 to A 6. (Exit Nos. 25 and 24)	Wilsthorpe Grange	High ground overlooking the R. Trent Valley is made up of Keuper Marl.
	River Trent and River Soar	Alluvial gravel deposits. Numerous excavations for gravels. A new reservoir was being constructed near Breaston.
		Note the Radcliffe-on-Soar Power Station built on Keuper Marl at the horizon of the Tutbury Gypsum.
		An East-West fault crosses the M.1. at about the Lockington roundabout, introducing older rocks.
From A 6 to A 512 (Exits Nos. 24 and 23)	Lockington roundabout and cutting to the south	Waterstones initially, succeeded by the lower beds of the Keuper Marl.
	Kegworth and the top of the rise south of the Lockington roundabout	Lowest Skerry beds. Equivalent of the Mapperley Plains Skerry ?
	B 5901 over M.1. near Long Whatton.	Occurrence of a higher skerry which compares with the Cotgrave Skerry of the Nottingham area.

Road intersections, Service Station or other reference points	Locality	Geology
A 6 to A 512 (continued)	B 5324 under M.1.	Wooded ridge of chalky boulder clay with much local material.
	B 588 under M.1. Shepshed	View of Charnwood Forest.
From A 512 to A 50 (Exits Nos. 23 and 22)	Charnwood Forest	Pre-Cambrian volcanics, intrusions and altered sediments protruding through Keuper Marl or Boulder Clay.
	Exposures south of A 512	Syenite, volcanics, hornstones and gritstones.
	Copt Oak (B. 5350)	Felsitic Agglomerate and hornstones
	N. of A 50 intersection	Slate Agglomerate.
From A 50 to A 46 (Exits Nos. 22 and 21)	A 50 roundabout	View of Pre-Cambrian rocks trending to the south-east, mainly Brand Series and Markfieldite. Cliffe Hill Quarry can be seen to the west of the M.1. (Markfieldite)
	Markfield and Ratby	Little can be seen of the Markfield (Markfieldite) quarries; the Groby Quarry, however, can be seen if weather is clear.
	Kirkby Muxloe	The Pre-Cambrian outcrops have now ended and the topographical features are now controlled by boulder clays overlying Keuper Marl.
Service Station	Leicester Forest East	As above. There is no clear indication of the age of the Keuper Marl.
From A 46 to A 4114 (Exits Nos. 21 and 20)	Narborough for Enderby.	Quarry in quartz diorite surrounded by Keuper Marl.
	Blaby and Whetstone	Keuper Marl with some gypsum.
A426 over M.1.	Cosby	Rhaetic escarpment to the south east. (The Rhaetic escarpment includes also the lowest beds of the Lias).
	Misterton and Lutterworth	Lower Lias.

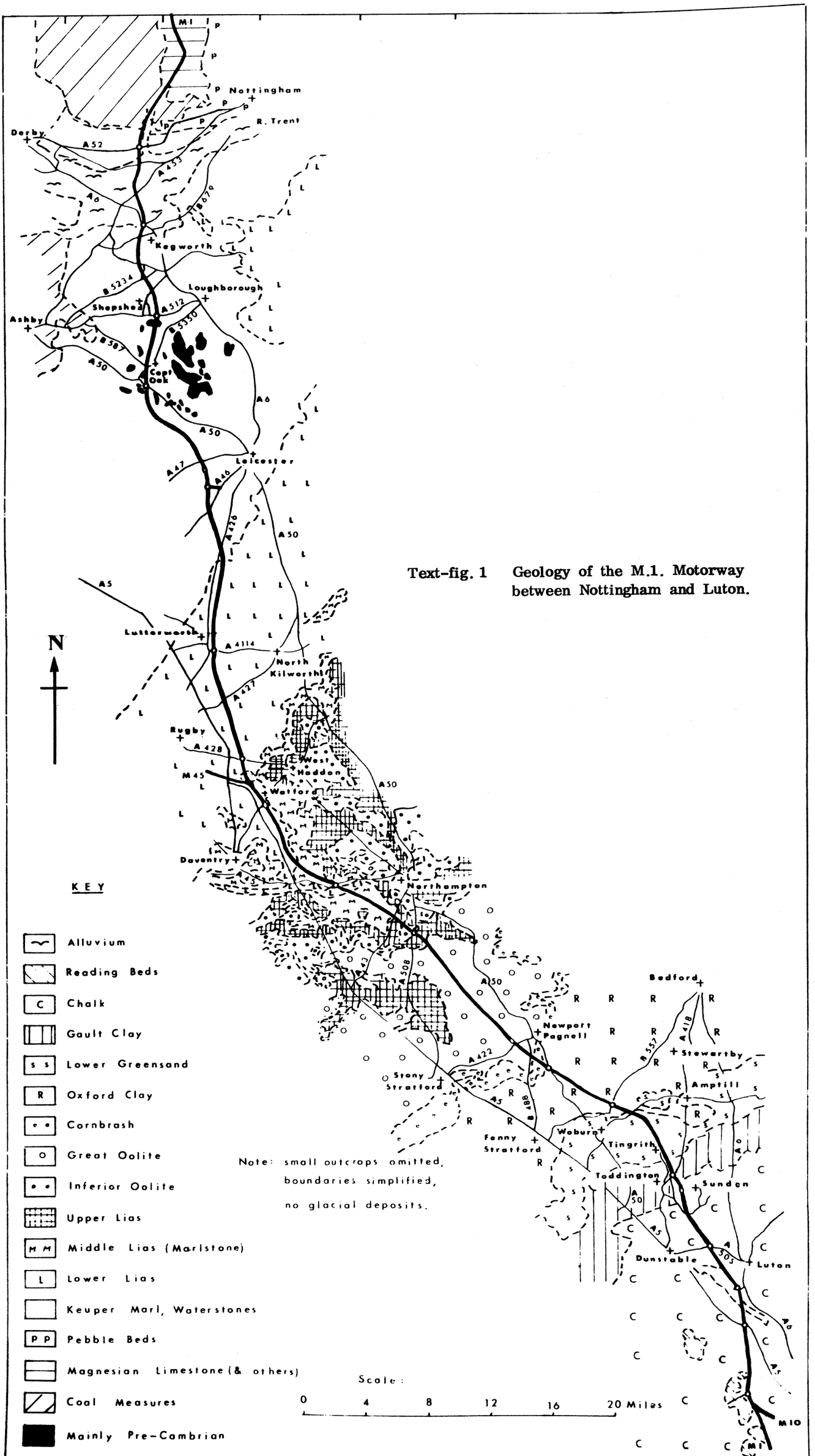
Road intersections, Service Station or other reference points	Locality	Geology
From A 4114 to A 428 (Exits Nos. 20 and 18)	Lutterworth - Lilbourne - Crick	Lower Lias
Exit 19.	M.5.	Middle Lias (Marlstone) escarpment can be seen to the east.
From A 428 to A 45 (Exits Nos. 18 and 16)	Crick	The long hill beyond Crick cuts through the upper zones of the Upper Lias. The top of the hill may be capped with Marstone or drift. The M.1. descends into the Watford Gap, passing exit 17.
Service Station	Watford Gap	Surrounding hills mainly marlstone, with Lower Lias in the valley floors. Note electric railway. A 5 is just beyond and also a canal.
As the M.1. diverges from the railway and A 5.	Weedon	Marlstone ironstone is at road level.
From A 45 to A 508	River Nene, just beyond the junction.	Valley floor cut through the Middle Lias down into Lower Lias.
Railway and canal under and A 43 over M.1.	New Blisworth	Marlstone hill, thin Upper Lias and Inferior Oolite (Estuarines) at the top of the hills.
From A 508 to A 50 (Exits Nos.15 and 14)	A 508 intersection	Outlier of Inferior Oolite, mainly Estuarines. Northampton Sands very thin between Northampton and Banbury. Lincolnshire limestones not developed here.
	Beyond the junction	Clay vale of Upper Lias.
Minor Road under	1 miles S. of A 508.	Great Oolite escarpment lying here directly on Upper Lias. Inferior Oolite missing.
	s. to Newport Pagnell	Long drive along the Great Oolite limestone outcrop.
Service Station	Newport Pagnell	Great Oolite Limestone.

Road intersections, Service Station or other reference points	Locality	Geology
A 422 under M.1.		Blisworth Clay (Great Oolite Clay), a few feet thick, caps the Great Oolite: it produces a small clay vale, which probably includes superficial deposits.
	A 50 intersection	Note climb onto the Cornbrash. Local gravel deposits seen to the east.
From A 50 to B 557 (Exits Nos. 14 and 13)		Oxford Clay forms strike vale in front of the Woburn Sands escarpment.
	Just before B 557 intersection	Note the brickworks to the east.
		About 1 mile ahead is the escarpment of the Woburn Sands. (Lower Greensands).
From B 557 to A 418 (Exits Nos. 13 and 12)		The M.1. quickly begins to climb onto the Woburn Sands, here about 200 feet thick. The Lower Cretaceous sands are resting on the Oxford Clay [the highest Oxfordian (Corallian), Kimmeridgian, and Portlandian (including Purbeck Beds) being absent] .
		Note the vegetation change from that of the Middle and Upper Jurassic.
	Tingrith Manor Farm.	Quarries on both sides of the M.1. in the Woburn Sands.
	2 miles further S.	Clay vale in front of the Chalk escarpment commences - Gault Clays.

After meeting Mr. Ludford and a few people from Luton College of Technology at Exit 12, close to the Toddington Service Station, the coach took the side roads to Sundon. These roads (B 579) traverse the Gault outcrop and, beyond Charlton, climb the chalk escarpment. From the bridge over the motorway, the extensive Gault Clay vale could be seen and also the lower beds of the Chalk in the L.M. & S.R. cutting just after the motorway. The Chiltern Hills in this area form two scarps close together. The lower one was just visible as far as Dunstable; the upper scarp (Chalk Rock) lies behind the village of Sundon.

Associated Portland Cement Company's quarry at Sundon. (TL 0427)

Entering the A.P.C.C. pit, the party first examined the fluvioglacial deposits which cap the chalk both here (TL 042276) and at several other places along the escarpment. These orange coloured gravels were current bedded and small faults could be detected. Occasional masses of



Text-fig. 1 Geology of the M.1. Motorway between Nottingham and Luton.

sticky blue clay, evidently derived from the local Oxford Clay, were probably deposited from floating masses of ice within a glacial lake. The most common pebbles found in the gravels proved to be flints; but more distant erratics included Bunter Pebbles and rare igneous rock from Charnwood Forest, Leicestershire. From the floor of the quarry, the irregular, channelled base of the gravels was clearly seen.

Below the gravels the uppermost ten feet of the chalk had been affected by the freeze-thaw conditions during the Pleistocene and was broken to form a coombe rock. Beneath was the undisturbed Chalk belonging to the Schloenbachia Varians Zone.

The first section to be examined (TL 038275) consisted of some ten feet of Totternhoe Stone, underlain by about the same thickness of Chalk Marl. Much of the latter at this point was obscured by talus from the overlying Totternhoe Stone. In the short distance of four miles from the quarries at Totternhoe itself, the Stone has lost its freestone characteristics and now is made up of a series of hard bands, coarse to the touch and containing numerous phosphatic nodules. Although fossils were rather uncommon, most of the party were able to obtain some specimens of 'Rhynchonella', 'Terebratula', and Inceramus and other lamellibranchs. Nodules of radiating iron pyrites proved to be relatively common.

A deeper excavation into the Chalk Marl was next examined and a good haul of ammonites was obtained from the soft, grey rock, 'cheese-like' in texture. Ammonites included the zone fossil Schloenbachia varians and various species of Turrilites. In all cases the shell had been replaced with a limonitic smear, so that the extraction of good complete specimens was difficult. Such was the enthusiasm of the party here that extra time would have been most welcome; but some distance had to be covered before the afternoon session.

The London Brick Company's Quarry, Stewartby.

From Sundon the party returned north along the M.1. to join the B 557 to the Stewarby works of the London Brick Co. (TL 018421). Here they were welcomed by Messrs. Horrell and Baker. representatives of the firm. Mr. Horrell gave a short account of the use of the Oxford Clay in the making of Fletton bricks before the party moved to the top of the pit (TL 020415) where Mr. Baker pointed out the salient features of the geology exposed in the faces. The top few feet of Oxford Clay is exposed here is placed in the Athleta Zone (Callovian) with the main working faces belonging to the lower Coronatum and Jason Zones overlying the Kellaways Rock: all these zones are within the Callovian Stage. The presence of a fault zone at the south end of the pit was demonstrated by an increase of dip due to the drag of the beds along the fault plane and the breaking and polishing of the shales.

Descending into the pit, the party was unable to see the contact between the Oxford Clay and the underlying Kellaways Beds owing to rainwater at the foot of the working face. The clays of the Jason Zone were examined in detail, together with those of the overlying Obductum Subzone. Although ammonites (Kosmoceras sp.) were relatively common, few good specimens were collected because of the way they were preserved in iron pyrites. Several good examples of Gryphaea and belemnites were found in the spoil. Large calcareous nodules contained lamellibranchs and ammonites whose shell substance was now converted to a powdery white mass, so that specimens obtained consisted of interior and exterior moulds.

The presence of lignite in these lower zones of the Oxford Clay was demonstrated and some very large fragments, several feet across, were seen. It is the presence of this material which enables Fletton Bricks to be produced relatively cheaply, as it greatly reduces the amount of fuel needed during baking; this is the reason why the upper part of the Oxford Clay is largely ignored

for brick manufacture. Finally the party moved to the top of the pit to gather crystals of selenite from the uppermost callow (any unwanted material above the worked beds is referred to as callow).

Lower Greensand near Millbrook.

A temporary exposure (TL 010382) near the village of Millbrook (TL 012385) which revealed the Lower Greensand (Woburn Sands) resting unconformably on strata of Corallian age (Upper Oxfordian) was visited next. No exposure of this nature has been visible for many years and the party was fortunate to be shown around by Mr. Baker (Luton College of Science and Technology), who is carrying out research on these rocks.

Recent grading had partly obliterated the finer details of the exposure, but members could see the bright coloured reddish sands of the Lower Greensand (Woburn Sands) and collect derived ammonites from the basal conglomeratic bed. Where the work of the scrapers had obscured the Cretaceous/Jurassic boundary, this was still indicated by a line of seepage along the contact of sand and clay. The uppermost few feet of these clays are tentatively placed as Ampthill Clay, despite the fact that as yet no diagnostic fossils have been found. Underlying this are some twenty-five feet of Oakley Beds, consisting of alternations of creamy limestone and dark shales. These yielded many specimens of bored and encrusted Gryphaea from the underlying Oxford Clay. The uppermost zones of the Oxford Clay, exhibiting a similar lithology, could only be distinguished on fossil evidence.

The Lower Cretaceous is therefore here resting on the Callovian, the Portlandian, Kimmeridgian and the Oxfordian having been eroded away prior to deposition of the Woburn Sands.

Few will forget the grand finale when over thirty gigantic yellow earthmovers roared towards the party, only to wheel away in formation at the last moment.

A vote of thanks to Mr. Ludford and Mr. Baker was expressed by Mr. Elliott and members of the Society, who then returned to Derby and Nottingham along the M.1.

A.L., F.M.T., and
R.E.E.