EXCURSION TO THE NUNEATON AREA, WARWICKSHIRE

Leader : W.A. Cummins — Saturday, 15th June 1968

The object of the excursion was to examine the Pre-Cambrian and Cambrian rocks of the Nuneaton area and to consider their relationships with the adjacent outcrops of Carboniferous and Triassic strata. A party of about 40 members and friends assembled for the beginning of the excursion at the entrance to Judkin's Quarry (SP 346929). Most had travelled by coach from Nottingham and Derby: some had arrived by car. The Quarry Manager greeted the party and then guided the coach along the quarry road, down through a narrow cutting, and onto the quarry floor. Here the leader of the excursion gave an outline of the stratigraphy and structure of the area and an account of the history of its geological investigation. The sequence of strata is set out below:-

TREMADOCIAN		Merevale Shales
UPPER CAMBRIAN	(	Monk's Park Shales
	(	Moor Wood Flags
	(	Outwoods Shales
MIDDLE CAMBRIAN	(	Abbey Shales
	(	Upper Purley Shales
LOWER CAMBRIAN	(	Lower Purley Shales
	(	Camp Hill Quartzite
	(	Tuttle Hill Quartzite
	(	Park Hill Quartzite
PRE-CAMBRIAN		Caldecote Volcanic Series

The Nuneaton Inlier of Pre-Cambrian and Cambrian rocks appears as a narrow strip, nowhere much more than a mile wide, along the north-eastern margin of the Warwickshire Coalfield. The Pre-Cambrian volcanic rocks dip to the south-west at angles ranging from 20^{o} to 40^{o}. To the south-west, these are unconformably overlain by the more steeply dipping Cambrian strata (dips up to 60^{o}). The Cambrian rocks are intruded by frequent sills of microdiorite. The ancient rocks of the inlier are flanked to the south-west by the unconformable Middle Coal Measures, which dip gently away in that direction, and to the north-east by the relatively flat-lying Keuper Marl. A strip of Upper Old Red Sandstone has recently been identified, separating the Coal Measures from the Cambrian shales in the northern part of the area (Kellaway et al., 1966, p.47). The basal conglomerate and sandstones of the Keuper rest unconformably on the Pre-Cambrian, Cambrian and Carboniferous rocks, but the north-eastern boundary of the inlier is in part controlled by a post-Keuper fault with a throw of several hundred feet to the north-east.

The history of investigation of the Cambrian rocks (Eastwood et al., 1923, p.22) is interesting. In 1822, the Cambrian quartzite and shales were referred to by W.D. Conybeare and W. Phillips as Millstone Grit and Coal Shale. J. Yates, in 1829, considered that the intrusive sills indicated a Lower Palaeozoic age for these rocks. But thirty years later they were still retained in the Carboniferous System by the Geological Survey: the junction with the overlying Productive Coal

Measures was apparently conformable and there were no fossils. The first Cambrian fossils were found by Professor C. Lapworth in 1882. A few years later, detailed mapping of the Cambrian shales by Dr. (later Sir) A. Strahan revealed the unconformable overstep at the base of the Carboniferous strata.

After this introductory talk, the excursion proceeded as recorded below.

1. Judkin's Quarry (entrance at SP 346929) extends for nearly half a mile along the strike in a north-west - south-east direction. Quarrying has been considerably extended since the area was mapped by J.R.L. Allen (1957, Plate 1; 1968, Figure 3) : Pre-Cambrian rocks are now exposed along the whole length of the north-eastern face. The party proceeded along the north-eastern face of the quarry on the upper level of working. Here the Welded Tuff division of the Caldecote Volcanic Series is exposed. The rock is a massive, unstratified, coarse crystal lithic tuff. The crystals are mainly of feldspar and the rock fragments of fine green volcanic material, often flattened so as to give the rock a streaky appearance and its only indication of stratification. Members who had been on the previous Society excursion commented on the occurrence of small blobs and veins of malachite in these tuffs.

Towards the northern end of the quarry an intrusion of markfieldite is exposed. A few years ago the basal Cambrian conglomerate, with large rounded boulders, was to be seen resting on a smooth surface of this markfieldite; but this contact has since been quarried away. The importance of this contact, first recorded by Wills and Shotton (1934), was that the Pre-Cambrian age thus demonstrated might also apply for the similar intrusive markfieldites of Charnwood Forest, whose age was not obvious from stratigraphical evidence. Time did not permit a detailed examination of the contacts between the markfieldite and the surrounding tuffs.

The base of the Cambrian is exposed in the short north-western face of the quarry. The contact with the underlying tuffs is disturbed by faulting, running mainly parallel to the Cambrian bedding. Some stratification was seen in the tuffs just below the Cambrian, and the angular discordance between these and the overlying quartzites was noted. The quartzites in this part of the quarry, the Park Hill Quartzite, contain much volcanic detritus eroded from the underlying Pre-Cambrian volcanic rocks.

Two shale partings, each several feet thick, can be seen in the quartzites of the north-western face of the quarry. A quartzite bed in the lower shale parting displayed a very fine drag fold. The upper shale parting was intensely brecciated. These observations show how, in a succession of competent strata, movements may be concentrated in a few relatively incompetent layers. The faulting along the junction between the Cambrian quartzites and the Pre-Cambrian volcanics is probably another example of the same phenomenon.

The quartzites above the upper shale parting, the Tuttle Hill Quartzite, can be seen along the length of the south-western face of the quarry. The party proceeded quickly along this face, noting ripple marks on the bedding planes and thin sills of microdiorite intruded into the quartzites.

The party then visited the lower level of the quarry at the south-eastern end, overshadowed by the large spoil heap. Here the base of the Cambrian was again examined. The angular discordance between the Cambrian and Pre-Cambrian is very clear, as bedding is well displayed in the fine laminated tuffs of the Pre-Cambrian; but the actual junction is occupied by a post-Cambrian intrusion of microdiorite.

Beneath the Cambrian at this lower level, the Bedded Tuff division of the Caldecote Volcanic Series was examined. The beds varied in thickness from a few inches to several feet and the

lithology from fine laminated tuff to crystal tuff and coarse lithic tuff with few crystals. To see such a variety of Pre-Cambrian volcanic rock types freshly exposed by quarrying is a treat not often enjoyed by geologists in the East Midlands.

The party then gathered in the cutting at the eastern end of the quarry, where the road leads down onto the working levels. Here, on both sides of the cutting, the cross-bedded Keuper Sandstone is exposed, with a basal conglomerate unconformably resting on the Pre-Cambrian volcanic rocks. The pebbles in the conglomerate, of various shape and sizes, are of quartzite and volcanic and intrusive igneous rock types, such as the party had been examining in the quarry.

Some members of the party examined the base of the Cambrian at the north-western end of the lower level of the quarry, where quarrying is being extended northwards into the older higher level floor. Here the unconformity is unmarred by faulting or intrusion; the quartz has a basal conglomerate with large rounded boulders up to 18 inches across resting directly on the underlying Pre-Cambrian volcanic rocks.

By this time, thirst and hunger were making themselves felt and the party left Judkin's Quarry with regret, mingled with some anxiety about closing time at the next stop. Three Cambrian - Pre-Cambrian contacts had been examined, one faulted, one intruded and one unconformable; also the unconformity at the base of the Trias.

2. The Stag and Pheasant (SP 324927) has spacious accommodation inside and also seats outside facing onto the green at Hartshill. The party stopped here for lunch and, when suitably refreshed, left the coach and proceeded on foot for the second half of the excursion, which consisted of a traverse across part of the Cambrian succession.

3. Woodlands Quarry (SP 324948) is a small quarry in the upper part of the Cambrian quartzite, the Camp Hill Quartzite. It was still being worked in 1923 (Eastwood et al. 1923, p.26) but has not been used for a long time now. It is filled with water, surrounded by a new barbed wire fence and watched over by a spirited lady in a bungalow which overlooks it. Conditions were not ideal, but some members of the party went in at the top end of the quarry (north-east) to examine the shale and limestone parting near the base of the quartzites in this quarry. The limestone beds are each less than a foot thick and the rock is purple and, in places, sandy and micaceous. This is the lowest fossiliferous horizon in the local Cambrian succession; members were pleased to find abundant specimens of the pteropod Hyolithes and one example of the brachiopod Kutorgina. Although the quartzites overlying the Hyolithes Limestone are glauconitic, they are purple-coloured as a result of the abundance of small grains of purple shale in them.

Above the Camp Hill Quartzite, and well exposed along the south-western edge of the quarry, are the Purley Shales. These shales are bright red or maroon and have the green spots so often found in sediments of this colour. The question of the primary or secondary origin of the red colour was discussed, the primary origin being favoured because of the abundance of grey and black shales higher in the succession which should have been equally susceptible to reddening.

4. Hartshill Hayes (SP 323942), just to the west of the remains of the Abbey and Castle of Hartshill, is the site of Illing's (1915) excavations in the Abbey Shales. The party marched through dense undergrowth and woodland and some time later arrived, in varying stages of exhaustion, streaming with sweat and covered in spiders and insects, at the remains of Illing's trenches. Some members expressed surprise that they had apparently reached their intended destination. After recovering, the party settled down to look for fossils, but without much success - a few unidentifiable inarticulate brachiopods and a few trace fossils, but not a sign of a trilobite. Five weeks previously a student on a University excursion from Nottingham collected a perfect and complete specimen of the Middle Cambrian trilobite Agnostus rex here.

5. Moor Wood (SP 317939) is the site of old quarries, extending for nearly a quarter of a mile along the strike, in a microdiorite sill intruded into the Outwoods Shales. The intrusive rock is leucocratic, relatively coarse in the middle and distinctly finer towards the upper contact (the lower contact is not visible). The shales away from the intrusion are soft and black, but near the contact they are bleached and baked, spotted slate being produced as a result of contact metamorphism. No fossils were found at this quarry.

6. A small cutting (SP 317940) a little higher up in Moor Wood, crosses the outcrop of a lower sill in the Outwoods Shales. Here the sill is seen in its weathered state and shows well-developed spheroidal weathering.

Just south of Moor Wood, the Middle Coal Measures rest on the Outwoods Shales. Further to the north-west, progressively younger shales in the Cambrian succession appear beneath the overlying Coal Measures.

7. The Stag and Pheasant (SP 324927) was open again by the time the party returned to the coach after a long afternoon in the hot sun and marching through the local jungle. We refreshed ourselves once again and set off for home.

Acknowledgement

I am grateful to Mr. G. Walton for drawing my attention to the presence of the Upper Old Red Sandstone in the Nuneaton area.

W.A.C.

REFERENCES

ALLEN, J.R.L. 1957. The Pre-Cambrian geology of Caldecote and Hartshill, Warwickshire. Trans. Leics. Lit. Phil. Soc. Vol.51, pp.16 - 31.

1968. The Nuneaton District in P.C. Sylvester-Bradley and T.D. FORD, 1968, pp.15 - 19.

EASTWOOD, T., GIBSON, W., CANTRILL, T.C., and WHITEHEAD, T.H. 1923. The Geology of the Country around Coventry. Mem. Geol. Surv. G.B., 149 pp.

ILLING, V.C. 1915. The Paradoxidian fauna of the Stockingford Shales. Quart. Journ. Geol. Soc. Lond. Vol.71, pp.386 - 450.

KELLAWAY, G.A. et al. 1966. Atherstone (155) and adjacent Sheets. Inst. Geol. Sci. Ann. Rept. for 1965, p.47.

SYLVESTER-BRADLEY, P.C. and FORD, T.D. 1968. The Geology of the East Midlands. Leicester University Press, 400 pp.

WILLS, L.J. and SHOTTON, F.W. 1934. New sections showing the junction of the Cambrian and Pre-Cambrian at Nuneaton. Geol. Mag. Vol.71 pp.512 - 521.