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Evening Field Excursion to Criggion Quarry, led by Mr. German, with Notes by Mr. Lawrence Crump

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JONES, G. (1984). Evening Field Excursion to Criggion Quarry, led by Mr. German, with Notes by Mr. Lawrence Crump. *Proceedings of the Shropshire Geological Society*, **4**, 24-26. A guided tour of Criggion Quarry.

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Some 36 members and guests of the Society met at Criggion Quarry for the annual evening field excursion, this year's being a guided tour of the quarry from top to bottom.

A brief explanatory talk by the Quarry Manager Mr. German gave us a very good insight into the history of the quarry. Stone has traditionally been removed for local building from the natural slope of the hillside. Indeed, until 1967 the face was worked by gangs of men descending from the top on ropes, to plant explosives to bring down the rock. Limitations on the use of quarrying were imposed by the nearby World War II Aerial Complex having its aerials anchored on the hill. With 1967 came a new aerial with only one anchor to the hillside, enabling better access to the rock.

A hazardous haul road, 1½ miles long and sometimes as steep as 1 in 4, leads to the top - it is not difficult to imagine the problems of bringing the loads of stone down the haul road, especially in bad weather. As part of the improvements to the quarry, a 6 ft diameter shaft some 700 ft deep was bored from the quarry downwards, at an angle of 70° from the vertical. A tunnel 120 yards into the rock face meets this vertical shaft. After bringing down rock from the worked face, it is crushed in a plant on top of the face and then conveyed to the shaft where it falls under gravity to the lower level. It is then crushed to whatever size is required, its main uses being in road-stone and for ready mixed concrete.

The geology of Criggion was explained to us by Mr. Lawrence Crump, who supplied the following notes and map (Fig. 25).

Criggion Quarry is located on the western flank of Breidden Hill, close to the Powys/Shropshire boundary some 14 miles south-west of Shrewsbury. The rock type quarried, an albitised olivine dolerite of Lower Caradocian (Upper Ordovician) age, is intruded into shales and volcanics (mainly tuffs) of the Breidden Hill inlier (Ordovician).

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The on-site geology is summarised as follows:

- Exposures of shales and volcanics which occur close to the intrusive contact near the western base of the hill along the quarry haul road, dip consistently at steep angles westwards.
- Presence of a zone of block faulting along the western margin of the intrusion (faults trending approximately perpendicular to the margin).
- Existence of a major zone of faulting between the old abandoned quarry and the main part of the hill - here two NW trending faults have upfaulted shales and dolerite.

Additional outcrops of dolerite beneath shale can be seen along the Criggion-Trewern road. Here the contact appears to dip at a flat angle to the south east. This apparent reversal of dip is interpreted as a remnant synformal pocket of shales overlying the dolerite between the main igneous mass and isolated outcrops to the west.

Drilling has failed to intersect the base of the dolerite which has a proved thickness of around 900 ft (274 m).

The rock is a remarkably uniform, typically green, porphyritic dolerite of slightly variable grain size and colour. (A plug-shaped form could explain the absence of significant mineral layering within the rock, the body having been diapirically emplaced in a partly molten state).

Mineralogically, the rock basically comprises plagioclase feldspar, epidote, olivine, clinopyroxene, chlorite, leucoxene, iron ore and accessory amounts of quartz, clinozoisite and allanite.

The main mineral plagioclase feldspar (35% to 60% of the rock) occurs as small divergent laths (oligoclase/andesine) and as large phenocrysts which are often completely altered and replaced by epidote, calcite, chlorite, etc.. Epidote (15% of the bulk) occurs as distinct crystals or as groups which appear to have replaced clinopyroxene. Chlorite (10% to 15%) occurs interstitially and associated with epidote as a replacement mineral. Olivirie (0% to 10%) where present, occurs as veined phenocrysts, sub-rounded and mostly very altered. Clinopyroxene (0% to 10%) forms smaller phenocrysts than olivine and shows various stages of alteration to epidote and chlorite. The accessory quartz, etc., occurs as fine grained interstitial aggregates often closely associated with chlorite.

The mineralogy of the rock indicates that is has suffered a degree of metasomatism (change of composition due to reactions between original minerals and migrating fluids and/or gases). The unusual feldspar composition implies a process of 'albitisation' (soda metasomatism), hence the descriptive name of the rock.

Table 1 shows the results of tests on samples of chippings determined in accordance with BS 812:1975.

[Editor's Note: A group on a Birmingham Extramural Dept. Petrology Course, tutor Peter Toghill, has recently (October 1984) examined thin sections of rocks collected from the middle and lower quarries on this field trip. These showed that the rock from the higher quarry is richer in quartz while the lower level is richer in olivine, although this is more altered than in the higher level rock. On the basis of this analysis, Dr. Toghill considers that the rock could correctly be referred to as an olivine gabbro.]

The party then split into three for the trip around the quarry and squeezed our way into a number of Land Rovers. To cries of "you're squashing us" from people at the back of the Land Rover, we ascended the haul road to the top of the quarry. We were able to see the enormous amount of material discarded due to it being rendered of little use through weathering. Looking down, the size of the quarry floor became obvious and one could see the way the quarry was being worked in steps.

Our next stop was on the quarry floor to see the immediate past chairman sprinting to regain a wind blown hard hat and to see the crushing plant and also the top of the rock pass to the lower level. At the lower level, we walked into the tunnel to see the machinery installed to convey the rock from the bottom of the rock pass to the final crushing plant. The rock pass is, as previously stated, steeply inclined, it is also offset from the main tunnel such that the inertia of the rock plummeting down the pass is dissipated before it hits the conveying machinery.

At this point we curtailed our visit because of lack of time. Our thanks go to the quarry staff who made us very welcome and to the fact that it didn't rain all evening. Though it was rather dusty, it did give a few of us an excuse to wet our whistles at a nearby hostelry.

G. Jones

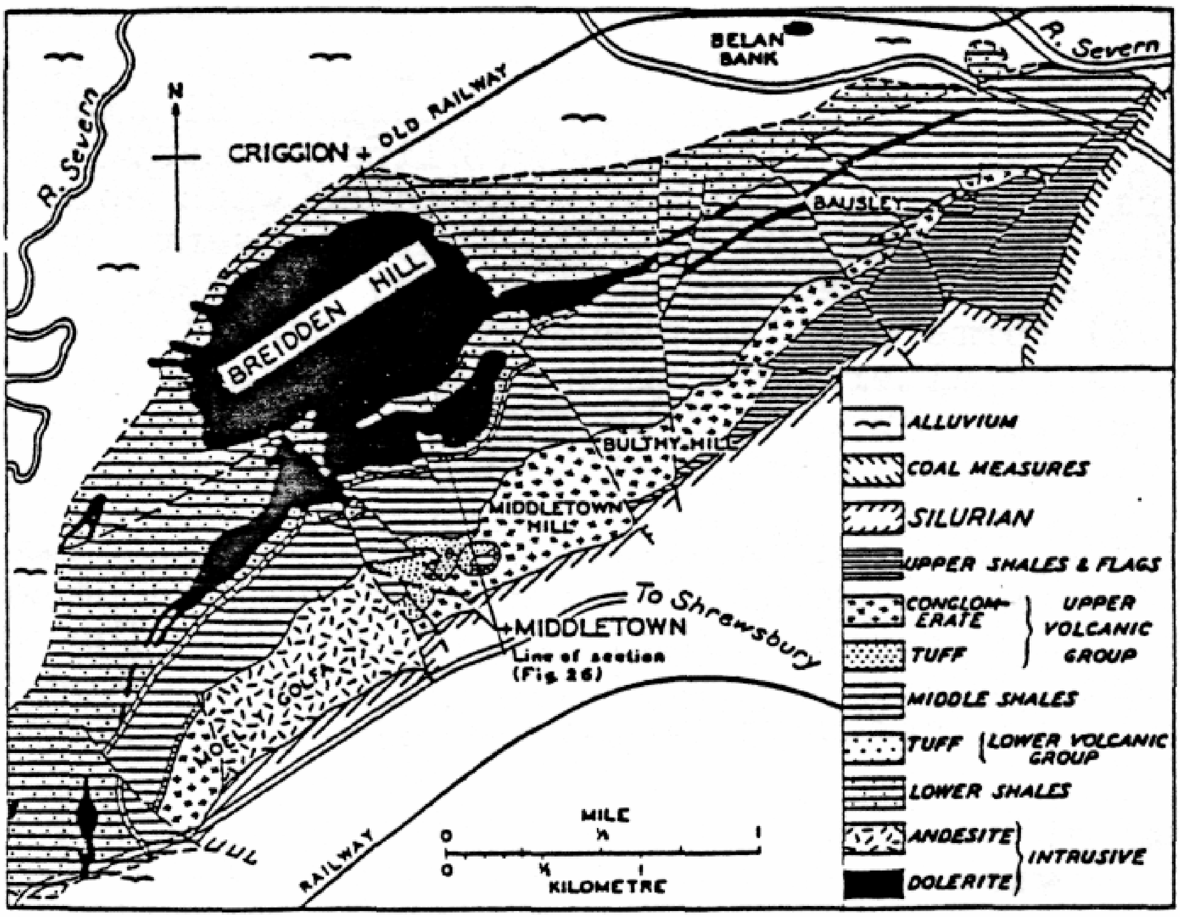

FIG. 25. ***Map of the Ordovician rocks of the Breidden Hills***
(After Watts 1925; Wedd and others 1932.)

Table 1: Results of tests on samples of chippings determined in accordance with BS 812:1975.

Physical properties		Chemical analysis	%
Relative density (oven dried)	2.73	SiO_2	50.36
Relative density (saturated surface dry)	2.76	Al_2O_3	18.76
Relative density (apparent)	2.82	Fe_2O_3	1.65
Water absorption	1.11	FeO	6.18
Aggregate crushing value	16	TiO_2	Trace
Aggregate impact value	15	CaO	7.74
Aggregate abrasion value	6.7	MnO	Trace
10% fines value	240 kN	MgO	6.13
Polished stone value (according to table 3 BS.812: Part 3:1975)	·62	K_2O	0.66
		Na_2O	2.32
		P_2O_5	Trace
		Loss on ignition	5.55
			100.00