EAST MIDLANDS GEOLOGICAL SOCIETY
EXCURSION REPORTS, 1969

WEEKEND EXCURSION TO SHROPSHIRE

Leaders: Dr. I.D. Sutton & Dr. W.A.S. Sarjeant — Fri. 2nd - Sun. 4th May, 1969

The county of Shropshire is of exceptional geological interest for the wide variety of strata to be seen at outcrop. Its rocks range in age from Pre-Cambrian to Lower Jurassic and in character through the whole gamut of sediment types, plus a wide variety of igneous rocks. Its tectonic history has been complex. At least four major phases of earth movements have affected the region - in descending order, Armorican (Carboniferous - Permian), Caledonian (Silurian - Devonian), Taconian (Ordovician) and one or more phases of movement in the Pre-Cambrian.

The effects of the Caledonian phase of movements have been the most striking. They have imposed a strong N.E. - S.W. trend to the geology of the county, as a result of compression from west and north against the Pre-Cambrian basement. The county is thus divisible into three broad structural regions. The northern area forms part of the Cheshire - North Shropshire Basin, a broad syncline (the Prees Syncline) modified by two N.E. - S.W. faults (the Hodnet and Ercall Mill Faults) and bounded to the southeast by the great Church Stretton Fault and its northward continuation, the Brockton Fault. On the southern margins of this basin lie three minor coalfields: the Oswestry, Shrewsbury and Leebotwood Coalfields. All these fields have been productive in the past, though mining has now generally ceased.

The southern part of the county presents a less straightforward structural picture. Two broad divisions are recognisable: the Long Mynd - Wrekin anticlinal uplift to the west, separated by the Church Stretton fault axis from the East Shropshire-West Staffordshire Syncline to the east. However, the structure of each of these areas is complicated by further faults and folds, producing lesser structural divisions which obscure the broad, general picture. The Long Mynd - Wrekin area consists, in its northern part, of a succession of synclines and anticlines, each with a N.E. - S.W. axis: the Long Mountain Syncline, the Shelve Anticline, the Ritton Castle Syncline and the fault-bounded anticlinal Longmyndian Massif and Wrekin area. The southwestern part consists of a general syncline, the Clun Forest Basin. The southeastern region of the county, the Clee Hills Basin, forms part of the overall East Shropshire - West Staffordshire syncline. It is bounded on its western margin by the irregular line of the Stretton Hills, Pre-Cambrian basement brought to the surface by movements along the Church Stretton Fault, and its structure is complicated by the Ludlow Anticline, whose trend swings in an arc from south to west, separating the Brown Clee Syncline from the Titterstone Clee Basin. Faulting on a general east - west line further complicates the picture in the southernmost part of the county.

The area was intensively glaciated during the Pleistocene, but the ice was largely confined to the valleys and was stagnant or slow-flowing. As a consequence, its action was rather depositional than erosional. There are considerable spreads of boulder clay and fluvio-glacial deposits and many features of glaciated lowland topography - kettle-holes, moraines, kames and perhaps eskers - can be recognised.

The drainage pattern, as would be expected in a region of such structural and lithologic variety, is complex. This is a watershed region, the rivers of north Shropshire flowing north to the Irish Sea by way of the Dee and Mersey estuaries, while those of central and south

Shropshire are collected by the Severn and poured into the Bristol Channel.

The resultant landscape is one of great variety and scenic interest, to the tourist as well as to the geologist. The area of the Wrekin was the subject of an earlier Society one-day excursion. On this occasion, the party was based at the Denehurst Hotel, Church Stretton, and, after arriving on the Friday evening, spent two days in visiting areas of south and west Shropshire. 29 members and friends attended.

SATURDAY 3rd MAY

The Onny River Region

Having left Headquarters the party made their way south along the main A.49 road to a point about one mile north of Craven Arms. Here the Bishop's Castle road (A.489) branches off to the northwest, and just over a quarter of a mile along the road we disembarked at a road junction called Cross Way.

During the visit to the Onny River area the party were able to examine rocks of Silurian (Wenlockian and Llandoverian) and Ordovician (Caradocian) age.

The rocks were examined in a descending stratigraphical order and the first exposure was in the lane 100 yards or so northeast of Cross Way. Here in the bank on the eastern side of the lane (431853) was a small outcrop of the Wenlock Shales. The lithology consisted of very weathered, decalcified, yellowish-brown siltstones with mudstones. Fossils were relatively abundant and members collected fragments, particularly pygidia, of trilobites (Dalmanites caudatus), and also graptolites (Monograptus sp.) and ostracods (Beyrichia sp.).

The party then retraced their steps, crossed over the Bishop's Castle road and took the path down to the footbridge over the Onny River. 350 yards upstream from the bridge is an excellent cliff section (426853) on the left bank of the river, displaying the unconformable junction between the U. Llandovery (the Hughley or Purple Shales) and the youngest of the Caradocian rocks in the Onny River, the Onny Shales (Trinucleus Shales). It proved very difficult to trace the unconformity, as the angular discordance between the Ordovician and Silurian at this particular horizon is small. From the southeast end of the cliff section the Hughley Shales could be seen to consist of green and purple shales but nearer to the junction with the Ordovician they have a much browner tinge, similar in fact to the weathered Onny Shales, thus making the unconformity even more difficult to detect. Although little time was spent collecting from the Hughley Shales, as the party was going to see more productive beds later in the excursion, a number of small brachiopods typical of the Hughley Shales were found.

The Onny Shales underlying the Hughley Shales were found to be a series of weathered greenish-brown micaceous shales and siltstones, although in the river bed the lower part of the section exposed blue-grey mudstones and siltstones. Most members of the party were able to collect specimens of the trinucleid trilobite, Onnia sp., the brachiopod Onniella sp. and a number of indistinguishable fragments of other trilobites and graptolites.

200 yards or so further upstream, just past the tributary stream, Batch Gutter, is a small, poor exposure of the Acton Scott Beds (423854). The lithology was found to be largely of grey, rubbly micaceous mudstones and siltstones. A number of shell fragments of brachiopods, especially Onniella sp., were found.

The party then crossed to the south side of the river and slightly further upstream from

the previous exposure another small outcrop revealed the uppermost beds of the Longville Flags (422855). Specimens of the brachiopods Kjerulfina sp. and Wattsella sp., typical of this horizon, were collected from the weathered yellow sandstones. To the south of the old Bishop's Castle railway, at the north end of Burrells Coppice (421855), a much larger and better outcrop of the Longville Flags was examined. The beds here are exposed in an old river cliff, and at certain levels were found to be particularly fossiliferous. The brachiopods Kjaerina sp., Dolerorthis duftonensis and the large lamellibranch Modiolopsis obliqua were particularly abundant, while certain bedding planes were found to be crowded with Tentaculites sp. (incertae sedis, but referred by some people to the Scaphopoda).

Having spent some time at the latter exposure the party walked along the old railway cutting where in one or two places (especially at 418857) the base of the U. Longville Flags, in the form of the Alternata Limestone, was found. The Alternata Limestone is a bed consisting of thin lenticular grey limestones packed with specimens of Heterorthis alternata and Sowerbyella sericea, separated by greenish siltstones and calcareous mudstones.

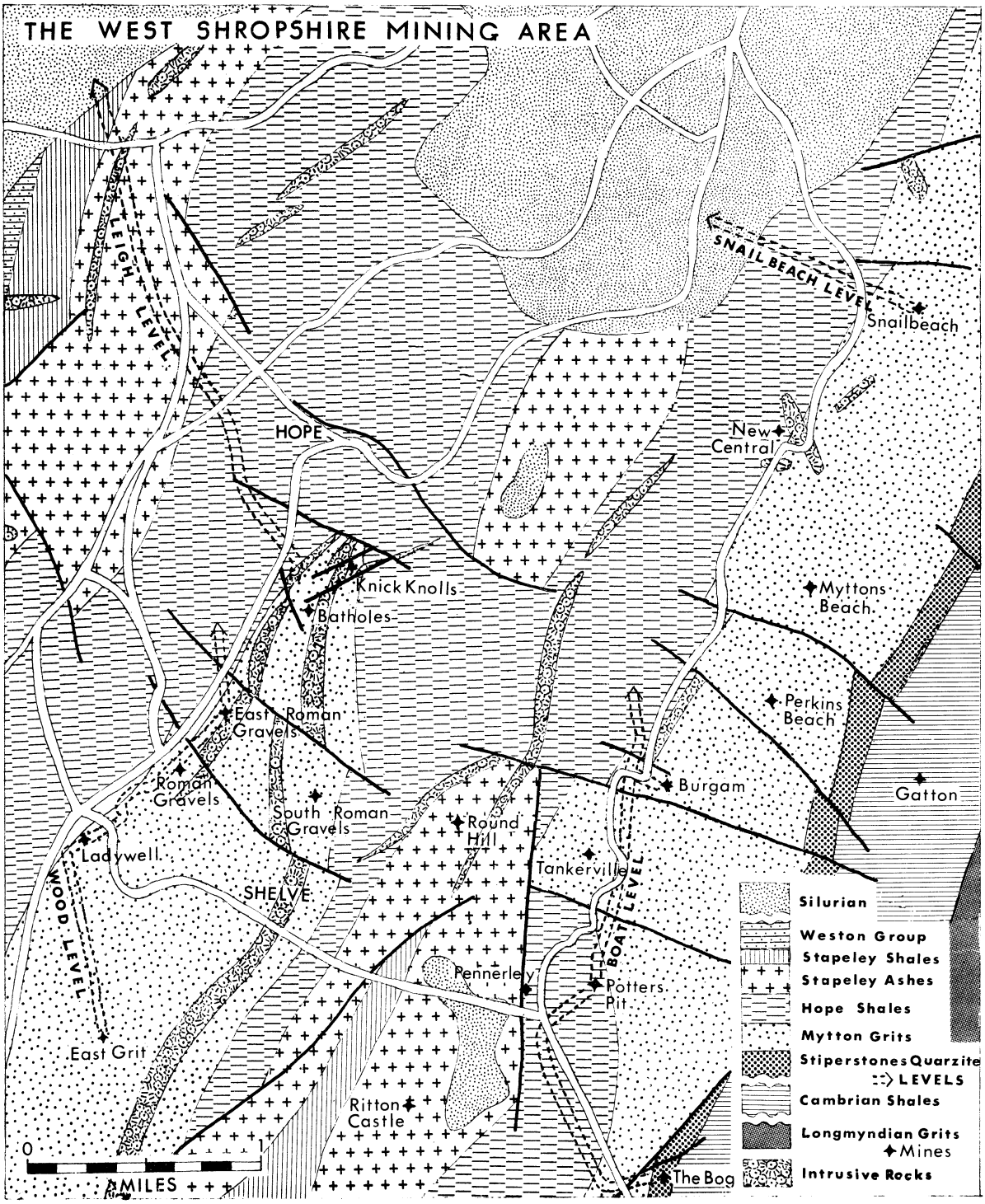
The best exposure of the next beds in the sequence, the Horderley Sandstone (= the Chatwall Sandstone), is found in the large disused quarry on the north side of the Bishop's Castle road and the party crossed the road up to this locality (415859). The sandstones dip very gently to the east and show colourful variations of green and purple banding. The banding enabled members to see quite clearly the excellent current bedding structures. At one or two levels thin bands of shelly limestone occur. Surface weathering has decalcified these shelly bands, which contain a variety of brachiopods but predominantly Sowerbyella sericea, Wattsella horderleyensis, Resserella sp. and Kjaerina jonesi. It was rather fortunate that another small road-side quarry in the sandstone about 100 yards northwest of the larger quarry was so completely overgrown to make access impossible. In this quarry the dip of the strata is nearly vertical, due to the close proximity of the most easterly of the main faults of the Church Stretton disturbance.

The last sub-division of the Ordovician sequence in the Onny River section is the Hoar Edge Grit and this was examined in the small quarry (419861) on the south side of the river near to Rock Cottage. The buff, coarse-grained gritstones are inclined very steeply and on the western side of the quarry is the junction with the Wentnor Series (Longmyndian). Much discussion has been aroused as to the nature of the junction. Whittard (1958, p.16) has suggested a fault junction but Mitchell (in Greig et al., 1968, p.119) infers an unconformable junction with a possible movement along the unconformity. Although a search for fossils proved fruitless the members were able to inspect the cavernous weathering at various places in the gritstone, which has been suggested as a result of the solution of bryozoan colonies. On the extreme eastern part of the section a small outcrop of the overlying Harnage Shales was seen.

After a morning of warm sunshine the party retreated to the Red Lion at Horderley for lunch.

The West Shropshire Mining Region (Text-fig. 1).

Lead mining in west Shropshire has a history spanning around two thousand years. The finding of pigs of lead bearing the stamp of the Emperior Hadrian (A.D. 117-138) in workings on Roman Vein at Roman Gravels Mine testifies to working of the mines during the Roman occupation of Britain and strongly suggests still earlier working, since the Romans seem never to have initiated mining in Britain, but always to have taken over control of existing mines. Active working of this mine and also of Snailbeach, Tankerville and East Grit Mines is known to have been taking place in the 12th and 13th Centuries and mining appears to have continued intermittently throughout the ensuing centuries, though records are remarkably sparse. In the early 19th Century,



TEXT-FIG. 1 The West Shropshire mining area. (Sketchmap based on Smith, 1922, but utilising additional information from Adams, 1963–4).

nine mines are known to have been working - Batholes, Roman Gravels, East Roman Gravels, East Grit, White Grit, Snailbeach, Ladywell, Pennerley and The Bog - and mining reached its peak during the fifty years that followed, a maximum of 7932 tons of lead in 1875. The working of zinc commenced about 1858, the record year for production being 1882 (914 tons); and working of barytes commenced at about the same time. Water problems were encountered in some mines and a number of drainage levels were driven: the largest of these were the Wood, Boat and Leigh Levels. The Wood and Boat Levels each drained several mines: their history is obscure. The Leigh Level was begun about 1825 and designed to drain the East Roman Gravels Mine. Work was abandoned in 1835, restarted almost a century later, in 1920, but abandoned again in 1923 without ever achieving its purpose (see Adams, 1963, p.107). A decline had begun to set in by around 1900, as a result of falling world prices and the exhaustion of the more accessible deposits. The great Roman Gravels Mine closed in 1912, after some nineteen centuries of intermittent working and, by 1913, only 3 mines (Snailbeach, East Roman Gravels and Perkins Beach) were working on any significant scale. The First World War brought a brief revival and some mines (e.g. Rorrington, The Bog and Burgam) reopened briefly but this proved ephemeral. Ridge Hill Mine (off map) was opened for barytes in 1919 and remained open until 1931. This was the only new mine in the postwar period, working generally ceasing around 1920, though Burgam Mine was intermittently worked, on a very small scale, until as late as 1961. The total output, considered even on a national scale, is not especially impressive: 235,650 tons of lead were produced between 1845 and 1913; 18,994 tons of zinc, between 1858 and 1913; and 271,397 tons of barytes, between 1860 and 1913.

The mineral deposits of this region occur within Ordovician rocks; the general sequence is as follows (Dines, 1958, p.3):

Whittery Shales (with some grits)		900 ft.
Whittery Volcanic Group (tuffs)		
Hagley Shales		800 ft.
Hagley Volcanic Group (tuffs)		
Aldress Shales		700 ft.
Spy Wood Grit		175 ft.
Rorrington Shales		400 ft.
Meadowtown Shales (with flags and limestones)		800 ft.
Betton Shales and Flags		200 ft.
Upper Weston Grit		
Weston Shales	Weston Group	500 ft.
Lower Weston Grit		
Stapeley Shales		
Stapeley Volcanic Group (andesites interbedded with tuffs, grits and shales.)		900 ft.
Hope Shales		800 ft.
Mytton Grits (flags with shales)		1,500 ft.
Stiperstones Quartzite		250 ft.

The ore-bearing solutions, rising from below, were generally prevented from upward migration in the Shelve anticline by the Hope Shales, which would expand as a result of the effects of moisture to close up fault planes. The greatest concentration of minerals is thus in the Mytton Grits. To the west of the region covered by the sketch map (Text-fig. 1), however, a through-passage was found. Workable veins of lead and barytes occur at Rorrington in the Upper Weston Grit, of barytes at Ridge Hill in the Hagley Volcanic Group and at Wollerton as high as the Whittery Volcanic Group, the overlying Whittery Shales preventing further upward migration. The distribution of ore minerals suggests an arrangement into primary depth zones, related to temperature of precipitation from solution, so

familiar in other ore fields, with zinc lowest, lead next, and barytes penetrating highest. There is no true copper zone and most records of copper minerals in Shropshire mining literature appear to have resulted from misidentifications of the green lead ore, pyromorphite (see Sarjeant, 1967).

After lunch, the party travelled west along A489, following the valley of the River Onny to Eaton, at which point we turned along a secondary road following the valley of the East Onny northwards through Wentnor. Good views were obtained of the western flanks of the Long Mynd, a rolling plateau formed by late Pre-Cambrian sediments (sandstones, silts and mudstones). We left this valley about a mile southwest of Bridges, following a second minor road through the hamlets of Kinnerton and Coldyeld and across the southern flanks of the STIPERSTONES, a striking ridge formed of Ordovician quartzites weathered into bizarre shapes (approx. SO/368987). A brief pause was made for photographs.

As we descended the hill, we passed the ruins and tipheaps of THE BOG MINE (SO/357977), originally worked for lead and later for zinc and barytes, opening before 1845 and being intermittently worked until about 1915. The road then swung northward along the western flanks of the Stiperstones. The engine house of the NEW CENTRAL (or SOUTH SNAILBEACH) MINE (SJ/369016) was noted. Little is known of this mine which only worked lead and closed about 1872.

The first stop was made at the SNAILBEACH MINE (SJ/375022). This was one of the largest mines in Shropshire. A pig of lead of Roman date has been found here, but this was not found in the workings, so that Roman working cannot be considered proven. However, it appears to have been in operation during the 12th, 18th and 19th centuries, eventually closing around 1920. Ore was conveyed by narrow-gauge railway, the Snailbeach District Railway, to the main line at Pontesbury; the tracks of the old light railway are still to be seen.

"Beach" or "batch" are Shropshire terms for small valleys on the flanks of hills and the Snailbeach Mine occupies such a valley. The ore deposits occur in a series of east-west fissures in the Mytton Grits, a series of beds consisting of hard flags or grits with interbedded shales. There are three main veins (Main, Black Tom, and South), worked from four shafts. Extensive spoilheaps now conceal one of these (Old Shaft), but Black Tom Shaft, marked by a derelict headgear on the north side of the valley, close to some mine cottages, and Engine Shaft, with its crumbling engine house hidden among trees on the south side of the valley, were both seen, and Chapel Shaft, covered over by concrete slabs, can still be found near the head of the valley.

Tubs full of lead ore (galena) have been left under a shelter near to the mine reservoir. The tips yielded good specimens of galena, blende, calcite and barytes; specimens of bitumen, in part in pseudocrystalline form (asphaltum), witherite, pyromorphite, fluorspar and quartz were also found.

We then returned south along the same road to visit two further mines. BURGAM MINE (SO/358996) is now marked only by a spoilheap, with a derelict level and run-in shaft. It was working in 1867 for lead, subsequently also for zinc and later still for barytes. Working for the latter mineral continued intermittently until about 1961. The apple-green lead ore, pyromorphite, occurs in quantity here and was said to be "abundant underground" (see Sarjeant, 1967, p.175) but it was mistaken for copper and never worked. Small specimens of this mineral were collected by most members.

A nearby exposure of the Hope Shales (SO/357997) situated alongside a fault and containing a dolerite intrusion, was briefly examined.

We then followed a track for about quarter of a mile on the west side of the road to visit the TANKERVILLE MINE (SO/355995), where a fine array of mine buildings survive. Working here was taking place in the 12th and 13th centuries, but the most recent phase of activity was between about 1865 and 1894; together with the neighbouring Potters Pit and Pennerley mines, this formed a group known as "Tankerville Great Consols"; it yielded some 17,948 tons of galena, 3,049 tons of zinc blende, 1,157 tons of barytes and 10 tons of witherite during this period. All these minerals were found on the tips; especially excellent specimens of blende and barytes were collected. In addition, calcite, pyrite, chalcopyrite, fluorspar and quartz were obtained.

Back to the cars and south to the road junction near where overgrown tips mark the site of the PENNERLEY MINE (SO/353988). Then west along another minor road, to visit the classic fossiliferous exposure in the Mytton Flags beside the church at SHELVE (SO/336990). Here, a rich fauna of dendroid and extensiform graptolites, including Dictyonema, Clonograptus and Glyptograptus, was collected before rain drove us from the outcrop.

We continued west to join the main north-south road (A.488). Here an engine-house marks the site of the LADYWELL MINE (SO/327994), which closed around 1880. A fine prospect of Corndon Hill, just over the Welsh border into Montgomeryshire, could be seen at this point. This prominent landmark is a dolerite laccolith. We turned north past the extensive spoil heaps and crumbling buildings of the ROMAN GRAVELS (SO/333999) and EAST ROMAN GRAVELS (SJ/334002) MINES. Working here has proceeded intermittently since Roman times, ceasing in 1912 and 1901 respectively. Shortly after, we left the main road and travelled by a series of minor roads to MEADOWTOWN.

At Meadowtown is the type locality of the Meadowtown Beds (Llandeilo Series) in a small quarry (311013) in the village. At one time this quarry was famous for the fossils it contained, especially specimens of Ogygia sp., but recently little of note has been found there. Due to the atrocious weather conditions members did not spend any time at this locality, but made their way along the Rorrington road to the point where the Lower Wood Brook crosses the road. In the stream section on the north side of the road the black shales of the Meadowtown Beds were found to be very prolific in trilobites (Ogygia sp.) and, despite the torrential rain in the heart of a thunderstorm, most of the party were able to collect good specimens.

SUNDAY 4th MAY

The Lawley - Wenlock Edge District

In this region, the general succession is as follows (thicknesses based on Dean, 1960; Greig, et al., 1968; and on mapping by the authors):

		thickness in feet,
PLEISTOCENE	Boulder clay, fluvoglacial deposits, etc.	variable
	~~unconformity~~	
CARBONIFEROUS	Upper Coal Measures (Coed-Yr-Allt Group)	c.100 to 200

	~~ unconformity ~~	
SILURIAN LUDLOW	Upper Ludlow Shales (siltstones with occasional thin limestones)	100 to 400
	Aymestry Limestone: nodular limestone with siltstone bands.	80 to 210
	Lower Ludlow Shales (mudstones and siltstones with occasional thin limestones)	600 to 850
WENLOCK	Wenlock Limestone	0 to 140
	Tickwood Beds (alternating argillaceous limestones and calcareous siltstones)	50 to 180
	Wenlock Shales (siltstones and silty mudstones, in part calcareous)	1000
LLANDOVERY	Hughley Shales	0 to 250
	Pentamerus Beds (siltstones and mudstones, with some thin shelly limestones and sandstones)	0 to 225
	Kenley Grits (coarse sandstones, grits and conglomerates)	0 to 75
ORDOVICIAN CARADOCIAN	Onny Shales	up to 400
	Acton Scott Beds (mudstones with impure limestones and sandstones locally)	200 to 500
	Cheney Longville Flags (flaggy sandstones and shales)	300 to 750
	Alternata Limestone (thin shelly limestones intercalated into sandstone/shale sequence: mapped with Chatwall Sandstone in Text-fig. 2)	20 to 30
	Chatwall Sandstone	c. 25 to 40
	Chatwall Flags (with some shale bonds)	? 300 to 500
	Harnage Shales (mudstones with thin sandstones)	? 600 to 1,000
	Hoar Edge Grit (coarse sandstone and conglomerate, with thin limestones locally)	300 to 400
	~~ unconformity ~~	
TREMADOCIAN	Shineton Shales	? 1,000
CAMBRIAN UPPER	Black Shales	? 10
	Orusia (Grey) Shales	? 10

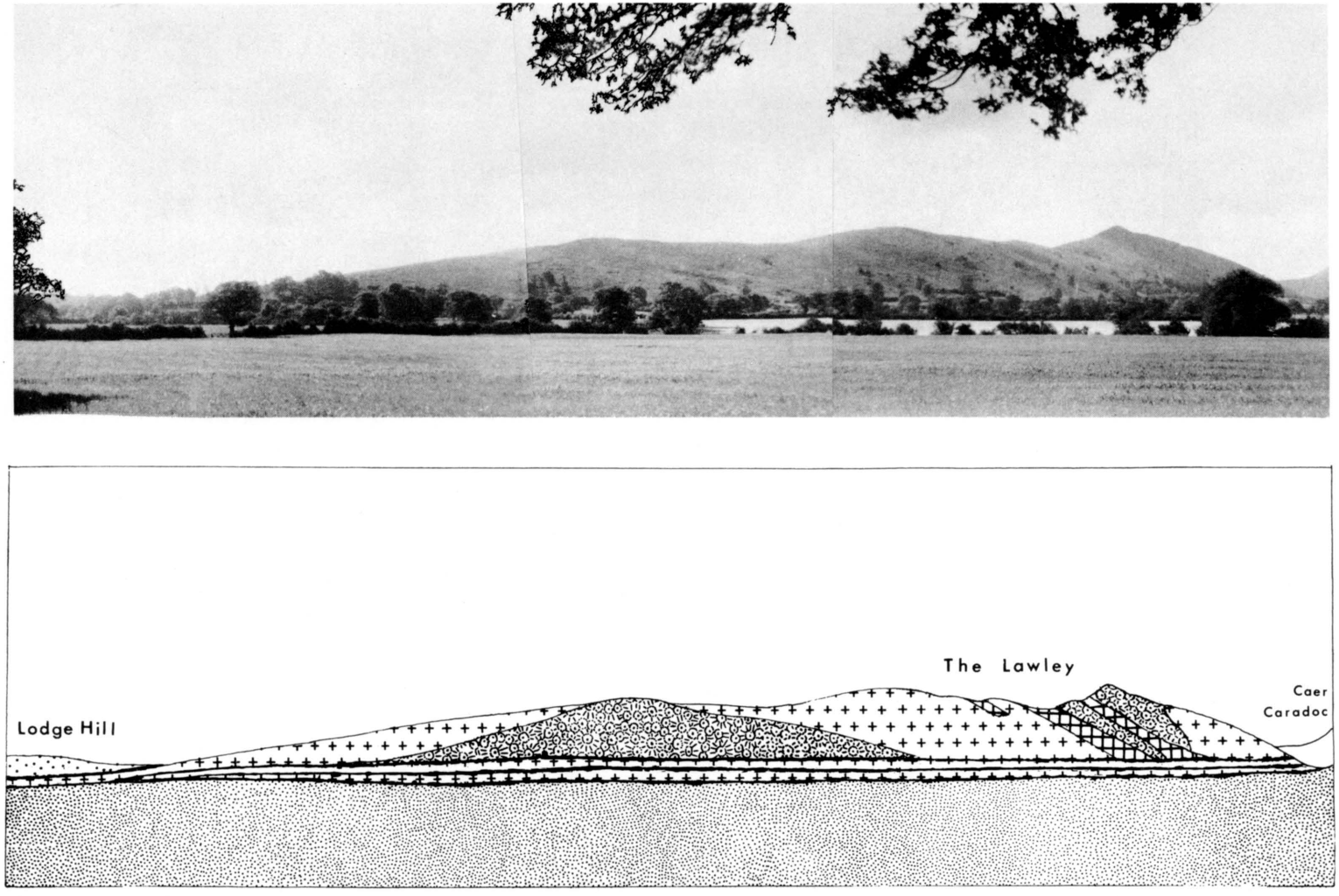


PLATE 24. The Lawley, Shropshire, viewed from a point 1½ miles N.E. of Leebotwood. Photograph, accompanied by an interpretative geological sketch with shading as in Text-fig. 3. (Photo. and sketch: W.A.S. Sarjeant).

	~~ unconformity ~~	
MIDDLE	Upper Comley Series (sandstones with some shales)	300 +
LOWER	Lower Comley Series	
	Comley Limestone	0 to 6
	Lower Comley Sandstone	500
	Wrekin Quartzite	150
	~~ unconformity ~~	
PRE-CAMBRIAN URICONIAN	Dolerites (locally intrusive)	0 to c.750
	Andesites, rhyolites and tuffs	1,000 +

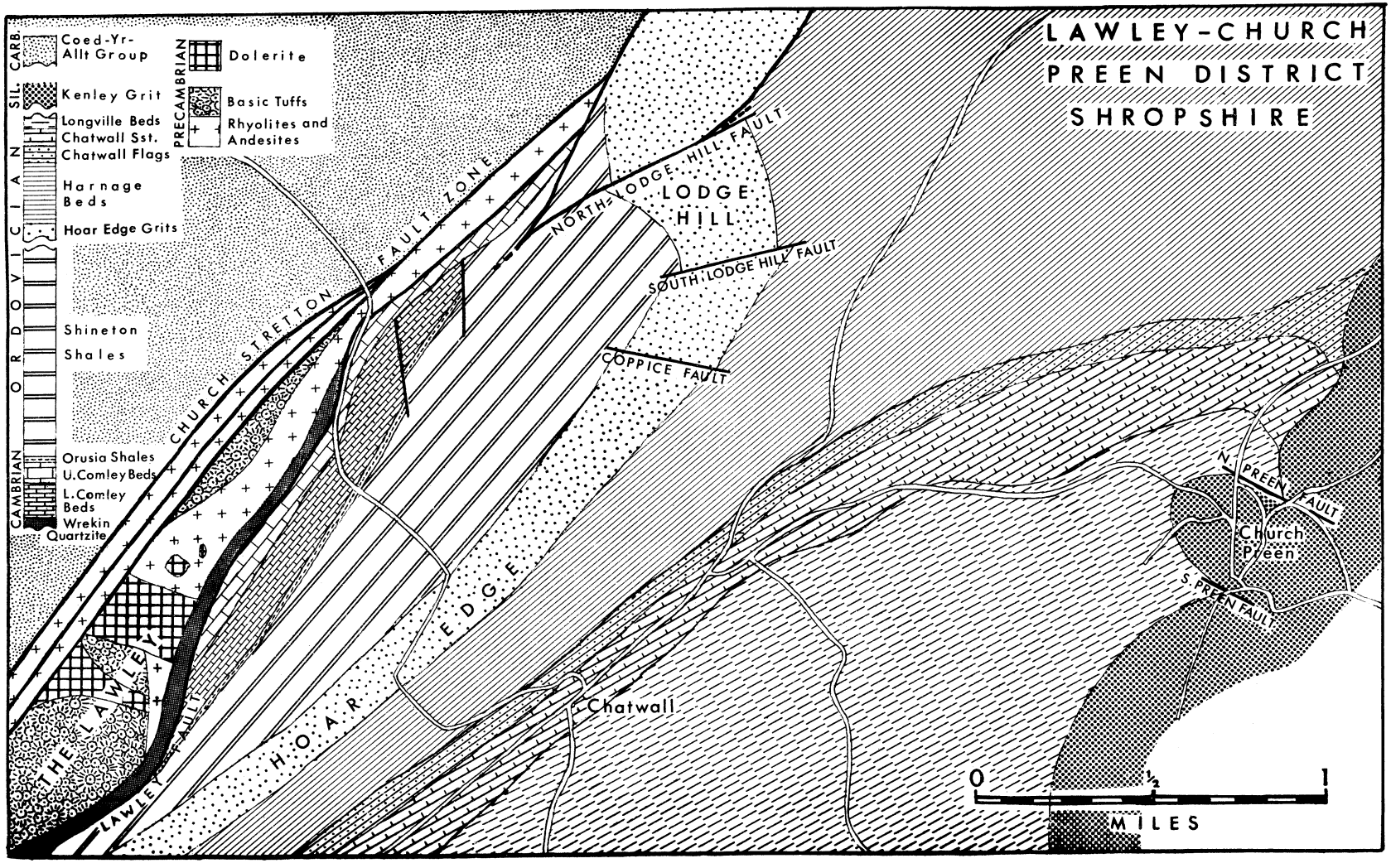
After heavy overnight rain, Shropshire was enshrouded in thick, wet mist when we left the hotel. We travelled northeast from Church Stretton, initially on the A.49, then along an old Roman road and through two very wet fords, leaving this at Longnorgreen and stopping at a point about $1\frac{1}{2}$ miles northeast of Leebotwood (SO/0997). Under normal conditions, this affords an excellent view of The Lawley, the topography of the hill accurately mirroring variations in rock types. However, this view was spoined and our halt was brief. (In belated compensation, it is illustrated in Plate 24 .

At the northern end of The Lawley, the Church Stretton fault complex throws Uriconian against the Coed-Yr-Allt Series (Upper Coal Measures). Unfortunately, the point (SO/506992) at which the LAWLEY BROOK crosses the fault corresponds to the position of a road-bridge, and the stream bed has been cemented, obscuring the fault plane from view. However, massive yellow sandstones of the Coed-Yr-Allt Group, almost horizontal, are exposed in the stream bed to the west of the bridge and, to the east, a good exposure is afforded of the Uriconian beds, to a total width of about 100 yards. Nearest to the bridge, purplish fine-grained tuffs are seen, overlying a coarser, brownish-grey tuff of more rhyolitic character. These in turn overlie fine-grained, grey tuffs, of probably andesitic character. The brownish tuffs then reappear, suggesting an anticlinal structure. (Such a structure is eminently possible, since the Church Stretton faults, bordering The Lawley on its western flanks, and the Lawley faults, bordering its eastern flank, are here converging).

G.H. Mitchell (in Greig et al., 1968) has interpreted the sequence at the southern end of The Lawley as comprising:

Basic Tuffs
Upper Andesites
Rhyolite
Lower Andesite

However, in terms of the exposures in the northern end of the hill, it is considered that a more complex sequence of events must be envisaged. Rhyolitic tuffs are certainly present. One of the authors (W.A.S.S.) has collected a typical, spindle-shaped volcanic bomb from the downfaulted rhyolitic tuffs on The Lawley's western flanks. Although this was not in situ, it strongly indicates the local presence of coarser, agglomeratic material and the proximity of a vent.



TEXT-FIG. 2 The geology of The Lawley - Church Preen district, Shropshire. (Based on mapping by W.A.S. Sarjeant)

The party then followed the road over the northernmost tip of The Lawley and down its eastern flanks, examining roadside exposures of rhyolites and rhyolitic tuffs en route. As we descended the hill, we crossed onto the lowest Cambrian unit, the Wrekin Quartzite, a greyish-white sediment consisting of coarse quartz grains set in a cement that is typically siliceous, in part ferruginous. It is very poorly exposed in the road verges (SO/506988). The Lawley Fault follows the junction between the Wrekin Quartzite and the Lower Comley Series. The former horizon is faulted out within a few yards of the exposure, so that the Lower Comley Beds are thrown against the Uriconian. Exposures of the Lower Comley Beds are equally poor. Medium grained, glauconitic sandstones in a roadside bank near Blackhurst (SO/504985), probably represent a sandy horizon in the lower part of the Comley Limestone. No fossils were noted.

The Wrekin Quartzite forms a well-marked bench along the western flank of The Lawley. Two further features, much less well marked, were noted on its lower flanks, marking the top of the Comley Limestone and of the Upper Comley Beds, overlain by shales. Unfortunately, no outcrop of the Upper Comley Beds could conveniently be visited and the three shale units that follow are largely concealed beneath drift, not being exposed in the valley of the Lawley Brook. We therefore crossed the valley by car, the next stop being made at some abandoned quarries at BIRCH COPPICE (SO/509978), near the foot of Hoar Edge.

Hoar Edge is a cuesta formed by the Hoar Edge Grits, the lowest division of the Caradocian (Ordovician). At its northern end, it is affected by three faults (here named the Coppice and South and North Lodge Hill faults). The first two of these alter the trend of the ridge and reduce its dip, the third obliterates it, so that the Grits form lowlying ground north of Lodge Hill. Lithologically, they typically consist of coarse to medium grained, yellowish sandstones with occasional conglomeratic horizons, containing pebbles of quartz and of Uriconian volcanic rocks. False-bedded horizons are present and the fossil foraging tracks of invertebrates were noted on some bedding planes; poorly-preserved moulds of brachiopods were collected, but Harknessella, typical of these beds, was not recognised with certainty.

We then crossed Hoar Edge and the drift-filled Causewaywood valley, floored by the Harnage Shales. These are poorly exposed in a roadside bank on the south flank of the valley, but, since the outcrop appears entirely unfossiliferous (one of the authors, W.A.S.S., having spent four days in an unsuccessful search), no stop was made here. Instead we proceeded directly to CHATWALL HALL (SO/514975), where the upper Chatwall Flags and lower Chatwall Sandstone are exposed in roadside banks and a small abandoned quarry. A full account of the stratigraphy and palaeontology of these beds has been given by Dean (1958, 1960). Fossils collected included crinoid ossicles (Rhaphanocrinus sp.) and brachiopods (Dinorthis aff. flabellulum, Rafinesquina expansa, Sowerbyella soudleyensis, Horderleyella corrugata, etc.) graptolites (Orthograptus sp.), trilobites (Broeggerolithus sp. plur., Brongniartella sp.) and bryozoa (Diploclema sp.).

We next drove northeast, following the Chatwall Beds cuesta, noting a roadside outcrop of the Alternata Limestone (SO/522981), then descended the dip slope to cross the valley formed by the Cheney Longville Flags to CHURCH PREEN (SO/542979), to visit a small quarry exposing the Kenley Grits (Silurian), which inconformably overlie the Ordovician. The line of the unconformity is locally modified by two small faults (here named the North and South Preen Faults) of uncertain throw. Lithologically these are a sequence of pebble conglomerates and coarse sandstones, interbedded with lenticular sandstones and sandy mudstones. Their colour is generally a rich brown, indicating a high ferruginous content. False-bedding, indicating derivation from the west or southwest, was noted.

To the northeast of the Kenley Grits, stretching to the base of the Wenlock Edge escarpment, is the low-lying area occupied by the argillaceous sediment of the U.Llandovery and

Wenlock Shales, both of which are largely obscured by a covering of drift. However, in a few of the strike streams running across this area a limited number of exposures can be found.

After having had lunch in the village of Longville in the Dale members drove to the hamlet of HUGHLEY. To the west of the bridge crossing Hughley Brook in the village the party found an exposure of the Hughley Shales in the left bank of the stream (564978), and also in a small left bank tributary a few yards further upstream. Despite the inclement weather and the necessity of wading in the stream to get at the exposure, members spent a considerable and worthwhile time at this locality. The beds consist of greenish and purplish shales with a few thin limestone bands and are extremely fossiliferous. Among the fossils collected were the corals Heliolites sp., Halysites sps., Favosites sps., Calostylis sp., Cantrillia prisca, Phaulactis sp.; the brachiopods Atrypa reticularis, Dicoelosia biloba, Camarotoechia sp., Cyrtia exporrecta, Pentamerus sp., Plectodonta spp., Strophonella sp.; the trilobites, Encrinurus sp., Phacops sp.; and also Tentaculites sp. and numerous crinoids and bryozoans. In some of the shales collected from this locality and taken back to Nottingham the denticle of an early Silurian fish was found. This possibly belongs to the genus Birkenia.

From the village of Hughley members were able to get an excellent view of the striking escarpment feature of Wenlock Edge. Two or three irregular knobs of limestone could be seen as upstanding masses on the ridge. These are examples of the reef structures or "ballstones", common features in the Wenlock Limestone.

The next locality to be visited was in the Wenlock Limestone itself. Recent extensive working of the limestone has resulted in a number of old, disused quarries becoming amalgamated with the working ones. The quarry we visited is known as LEA QUARRY (598983) and over the last two or three years this has been extended enormously. Members were able to see excellent examples of the reef structures and their relationship with the normal bedded limestone. The uppermost 15 feet or so of the Wenlock Limestone in the Wenlock area consists of closely bedded, fragmentary crinoidal limestones and these could be seen in the quarry-face at Lea Quarry. One feature of the Wenlock Limestone is that the best fossils can be found in weathered blocks of the limestone and at the above locality members spent a considerable time collecting the diverse fauna. The fossils include the corals Acervularia sp., Kodonophyllum sp., Phaulactis sp., Favosites gothlandicus, Palaeofavosites asper, Heliolites megastoma, H. interstinctus, Propora sp., Halysites catenularius, H. sp., Syringopora fascicularis and Thecia swinderniana; the brachiopods Atrypa reticularis, Camarotoechia sp., Leptaena rhomboidalis, Rhipidomella sp. and Plectodonta sp.

The next exposure visited was in another Wenlock Limestone quarry, this time in SHADWELL QUARRY (626007) just to the north-northeast of Much Wenlock. In this quarry a similar lithological sequence was found and the faunal list for the previous exposure indicates the main fossils.

From Much Wenlock we crossed over the Aymestry Limestone outcrop and down into Corve Dale. Behind the school in the village of BROCKTON (578939) we were able to see a good exposure of the Upper Ludlow Shales, some bands of which were extremely fossiliferous with two brachiopods, Camarotoechia nucula and Protochonetes ludloviensis and also a few fragments of orthoceratid nautiloids. The lithology of the Upper Ludlow Shales at this locality is mainly of buff-coloured siltstones with a few thin, coarser sandstone bands and also a number of clayey partings.

The last exposure of the day was seen in a very quick visit to the sand beds at BUILDWAS (646044). Here the glacial sands, gravels and clays, well described by Wedd (in Pocock et al., 1938, p. 197) were briefly examined.

I.D.S. & W.A.S.S.

REFERENCES

ADAMS, D.R. 1963-4. Survey of the South Shropshire Mining area. Bull Peak District Mines Hist. Soc., Vol. 2 pt. 2, 1963, pp. 105-110, 10 unnum. sketchmaps: Vol. 2 pt. 3, 1964, pp. 111-121, 19 unnum. sketchmaps. (Republished separately as Shropshire Mining Club Account no. 2, with unaltered pagination).

DEAN, W.T. 1958. The faunal succession in the Caradoc Series of South Shropshire. Bull. Brit. Mus. (Nat. Hist.) Geol., Vol. 3 no. 6, pp. 191-231, pls. 24-6, text-figs. 1-4.

1960. The Ordovician rocks of the Chatwall district, Shropshire. Geol. Mag., Vol. 97 no. 2, pp. 163-71, text-figs. 1-2.

DINELEY, D.L. 1960. Shropshire geology: an outline of the tectonic history. Field Studies, Vol. 1 no. 2, 23 pp., 10 text-figs.

DINES, H.G. 1958. The West Shropshire mining region. Bull. Geol. Surv. G.B., no. 14, pp. 1-4, text-figs. 1-5.

GREIG, D.C., WRIGHT, J.E., HAINS, B.A. & MITCHELL, G.H. 1968. Geology of the country around Church Stretton, Craven Arms, Wenlock Edge and Brown Clee. Inst. Geol. Sci. Mem. Geol. Surv. G.B. 379 pp., 13 pls., 23 text-figs.

LAMONT, A. 1945. Excursion to Onny River, Shropshire. Quarry Managers' J., Vol. 29, pp. 118-19, text-fig. 1.

POCOCK, R.W., WHITEHEAD, T.H., WEDD, C.B. & ROBERTSON, T. 1938. Shrewsbury District, including the Hanwood Coalfield. Mem. Geol. Surv. G.B., 297 txxi pp., 8 pls., 33 text-figs.

SARJEANT, W.A.S. 1967. Pyromorphite from the mines of west Shropshire. Bull. Peak District Mines Hist. Soc., Vol. 3 pt. 3, pp. 175-7.

SMITH, B. 1922. Lead and zinc ores in the pre-Carboniferous rocks of west Shropshire and North Wales. 1. West Shropshire. Mem. Geol. Surv. Spec. Repts. Min. Res. G.B., vol. 23, pp. 1-36, text-figs. 1-11.

WHITTARD, W.F. 1958. Geology of some British areas. Geological itineraries for south Shropshire. Geologists' Assoc. Guides, 24 pp., 14 text-figs.