

Farnham

GEOLOGICAL
Society



(A Local Group within the Geologists' Association, London)

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NEWSLETTER - APRIL 1989

For this third edition of the Newsletter we have to thank Colin and Jill Brash for the report on the field trip to S.W. Scotland last autumn, and Charles Ives for a much earlier trip he made to Australia

FIELD TRIP TO SOUTH WEST SCOTLAND

(19th - 26th August 1988)

On August 19th, 18 members of the Farnham Geological Society led by Dave Taylor and armed with his very comprehensive notes set off to look at some of the complicated rocks of S.W. Scotland.

Leaving Farnham at 7.23 a.m. we headed north, stopping at Charnock Richard for lunch. From there we continued to Brough and Appleby to visit some exposures of Permian fluvial and aeolian sediments formed in a half-graben which originated from faulting of the Carboniferous Limestone. Our first site was Belah Bridge where Brockrams (basin margin conglomerates) were exposed. The dolomitised Carboniferous Limestone clasts within a sandy matrix had been deposited on alluvial fans by fast-flowing braided rivers draining nearby high ground. The Brockrams were overlain by fluvially reworked dune sands interdigitating with the conglomerates.

We moved on to George Gill Quarry to see the Penrith Sandstone, a strongly cross-bedded exposure where aeolian origin was shown by the low toe-in angle of the cross-bedding. These are the same age as the sands seen at Belah Bridge. The sandstone is medium to coarse grained and friable (millet seed); very red due to a thin film of ferric oxide around each grain. Finally, our Permian studies finished at Burrells Quarry - a solid wall of Brockrams; here they are coarse breccia and breccio-conglomerate with very little matrix indicating that these Brockrams had been deposited nearer to their source than those at Belah Bridge.

We continued onto the Station Hotel, Penrith. The hotel had been built in the Victorian era, and we felt little had changed since. The food for dinner arrived by dumb waiter from the bowels of the earth, rapidly reaching ambient room temperature. After dinner, most of us took a look around a rather damp Penrith, many sampling the local hostelryes.

The next day we crossed into Scotland, in typical Scottish weather. We stopped near Douglas in the Hagshaw Hills. These hills are an overturned anticlinal inlier of Silurian sediments. At Monksfoot Farm, dressed for the rain, we visited an exposure of basal Devonian Greywacke Conglomerate Fm. deposited from flash floods off the uplifting Southern Uplands. We walked by a lovely valley beside Shiel Burn, a tumbling stream which had risen and widened considerably since Dave had reconnoitered. We found that it was too deep and turbulent to cross, even in wellies, to reach the site on the other bank, said to yield fossil fish!

We were also unlucky in finding fossil fish at the next site, by Glenbuck Loch. The area has been known for its fish fossils since 1882 and fine examples are exhibited in many museums. The fish fossils form a death-assemblage; it is thought that the brackish water lake they lived in had been churned up by storms, so that the lower anoxic water was brought to the surface, killing all life.

Lunch was eaten at the Douglas Arms Hotel in the small town of Douglas. After lunch we returned to the same area, to Parisholm Farm. The Parisholm conglomerate was exposed in a bluff behind the farm. The conglomerates contain pebbles of spillite, quartz-feldspar porphyries, greywackes, red and green chert. These were deposited in an alluvial fan draining a nearby Ordovician source area. Walking along the north bank of Douglas Water the Ree Burn Formation of Wenlock age turbiditic greywacke sandstones were exposed in its banks. Using the sedimentary structures, we were able to demonstrate that the beds were right way up. A more resistant dolerite dyke, exposed in both banks, formed a waterfall.

Continuing up the burn in a gentle drizzle, we came to a place where we had to cross by a narrow plank, suspended some twenty feet above the stream, which many of us found somewhat alarming. We scrambled on with some difficulty and eventually decided to turn back before reaching the site.

The last location of the day was near the village of Lugar, where the Lugar Sill is exposed. This is a Late Carboniferous (Stephanian) sill and is one of a suite of intrusions found in the Midland Valley of Scotland. The central part of the intrusion was a rubbly peridotite seen in an exposure by the road. We then walked across a field to examine the contact with the country rock. Teschenite (titanium-rich dolerite) occurs at the contact, with theralite and picrite separating it from the central peridotite.

The next four nights were at the Roblin Hotel, Ayr for bed and excellent breakfast (especially if you were a man and thus entitled to two eggs!). In the evenings we explored Ayr for different places to eat.

Sunday was a much brighter day. We went north along the Clyde Estuary to Auchengarth foreshore, near Largs, and enjoyed the sea and sun. The Clyde Sandstone Formation, of Tournasian age, is exposed for 500 metres along the beach. Here the deposits of meandering rivers were studied. The finer floodplain silts contained cornstone horizons (a fossil calcrete soil). The Clyde Sandstone outcrop is interrupted by a volcanic vent agglomerate. The vent was oval in shape and contained large blocks of country rock among the basaltic magma and lava bombs. The agglomerate is cut by a Tertiary dyke, and we were able to locate one of the contacts.

We went on to the coast by Knock Castle to look at the Kelly Burn Sandstone Formation, a coarse bedded, red braided stream deposit containing pebbles of vein quartz. These beds belong to the highest strata of the Devonian in the western part of the Midland Valley. Lunch today was at the Lugton Inn where we were given a warm welcome. Most ate our ploughman's lunch or sandwiches in the garden in the sun.

The afternoon was given to searching in two quarries. The first, Trearne Quarry near Beith, is in Carboniferous Limestone (Lower Viséan). There were reefs of both colonial and solitary rugose corals; *Lithostrotion* and *Aulophyllum* were examples of each kind. Many species of brachiopod were found, among them *Semiplanus latissimus* a productid which had long spines to hold it upright on the muddy substrate in which it lived. Two men, amateur geologists from the Paisley Natural History Society who Dave had

met on his reconnaissance of the area, came to talk to us and help us; they lived close by and spent many weekends in the quarries collecting. They went ahead of us to the next location, Loanhead Quarry, to look for and leave some minerals for us.

Loanhead Quarry is in basaltic lavas (Clyde Plateau Lavas) erupted from large strato-volcanoes during the Carboniferous. The lavas were fed along major faults formed during the relaxation phase following the Caledonian Orogeny. A Tertiary dyke intruding these lavas had caused mineralisation of the contact rocks. A wide variety of minerals were found in amygdales in the lavas; radiating clear crystals of thomsonite, green prehnite, grossular and andradite varieties of garnet, stilbite, rhombododecahedra of analcite and chalcopyrite were among the minerals found.

Monday again we were lucky to have sunshine as we went south, this time to the coast just south of Girvan. Scrambling over the rocks at the first locality, Woodland Point, we had lovely views of Ailsa Craig, the riebekite granite lump out to sea. We found we were on the northern side of the Southern Uplands Fault, within the accretionary prism of sediment wedges that had been scraped off the oceanic plate subducting under the northern continent in Ashgill times. As each wedge was scraped off, the earlier wedges were rotated producing a fan of these wedges. We looked for way-up criteria in the turbiditic sandstones and found that the sediments had been rotated beyond the vertical and were now inverted. At low tide unconformable Silurian conglomerates are exposed. They were laid down as a submarine fan in response to a steep, fault-controlled continental shelf.

Continuing south from Girvan, first on foot to Port Cardloch and then by coach to Kilranny Bridge, we saw further exposures of Ordovician (Ashgill) turbidites sandstones and shales. Some had been cut by wrench faults, while at Kilranny the beds were deformed into a cascade of chevron folds. Before arriving for lunch at Ballantrae for lunch we passed a roadside outcrop of conglomerate containing peridotite pebbles derived from the Ballantrae Ophiolite Complex.

Following lunch we returned just north of Ballantrae to see the Ballantrae Ophiolite Complex. This Lower Ordovician ophiolite was thrust into Middle Ordovician sediments. At Bennane Head beach the higher levels of the ophiolite, which had been folded into tight isoclinal folds, comprise red radiolarian chert and deep water graptolitic shales and hyaloclastite breccias. The pillow lavas were more obvious at Slockenray Bay where the pillows of spillitic lava occur within bedded hyaloclastite (material produced by the rapid quenching and shattering of lava erupted into water).

Leaving the beach, we went inland to Byne Hill to see the lower, plutonic levels of the ophiolite complex. We walked through a farm in which there were free-range ducks, geese and hens. Starting off up the hill on a good path, exposures of the early Caradocian age Benan Conglomerate could be seen. We then proceeded across the steep hillside by way of a sheep track. The sheep certainly had daintier feet than the booted geologists! We stopped to admire the view and get our breath back before looking at the contact between the gabbro and underlying serpentinitised peridotite. The gabbro has a finer grained chilled margin, showing that it had intruded into the already cooled peridotite. We carried on up to the top of the hill, noting the gradual change from gabbro to quartz diorite and finally to trondhjemite (a type of granite). When we reached the coach again, some members of the party looked at the beautifully kept cemetery nearby and were interested to discover that the headstones had the husband's name and his wife was given her maiden name.

The next day was a day of rest for Mike, our driver, so the majority of us took the opportunity to visit Glasgow, travelling by train from Ayr. Various museums and art galleries were seen as well as Victoria Park with its preserved stumps of Carboniferous trees. We admired the magnificent Victorian buildings, now cleaned and spruced up. Two of the party stayed in Ayr to have a look around, and Ruth went to the local Flower Show.

Returning to geology on Wednesday we bade farewell to the Roblin Hotel staff and headed to an area inland of Girvan to see the Craighead Inlier, a faulted anticline of Late Ordovician and Early Silurian rocks just to the north of the Southern Uplands Fault. Limestones of Caradocian age laid down on the Iapetus Ocean margin rest unconformably on spillitic lava at Craighead Quarry. At Rough Neuk Quarry the shelfal Llandovery sandstones yielded many specimens of brachiopod, coral and calcareous algae. Our quest was curtailed by a torrential shower. A few hardy souls sheltered beneath trees where both Fred and Wally looked down to find trilobites; Wally's turned out to be a superb specimen. Many of us were extremely wet and the back of the bus became a changing room.

After a protracted lunch break at the Coach House Hotel in Cumloch, we went on to the highest village in Scotland, Wanlockhead in the Leadhills district; beautiful bleak scenery. The Lochnell Lead Mine, now a visitor centre, was established by a Quaker company in 1710 and was taken over by Crawford & Co. in 1756. It was closed down in 1842. The galena extracted contained 60% lead and traces of silver. Going along the mine shaft gave an idea of the appalling working conditions and dangers, with low tunnels lit by tallow candles. The miners were virtually slaves to the company, as they had to buy their own working clothes and candles from the company. This was deducted from their wages so that they were perpetually in debt to the company. After the tour of the mine, we searched for mineral specimens in Glencreif Mine spoil heaps. Galena, baryte, dolomite and bornite were discovered within specimens of the fault breccia along which the mineralisation had taken place.

Our last site was a long drive through the heather covered hills to Dobb's Linn, near Moffat. Here the Ordovician Moffat Shale Group forms an inlier within the Silurian central belt of the Southern Uplands. Dobb's Linn (shepherd's waterfall) was down a hill and across a stream. The shales yielded many varieties of graptolite, including *Climacograptus*, *Glyptograptus*, *Didymograptus* and *Monograptus*. We looked until the light began to fail and then made our way to the Kings Head Hotel, Locherbie, a family-run hotel, which produced a three-course meal at 9 o'clock for those wishing for more than bar snacks.

Our final day of geology was again wet. We went through Dumfries to the Galloway coast along the Solway Firth. We stopped first at Auchenlaire foreshore. The area is south of the Southern Uplands Fault and lies very close to the Iapetus Suture. The sediments are of Wenlockian Hawick Group sandstones and shales, dipping to the north-west and deformed into monoclinial folds. The folds are right way up and show a well developed S1 cleavage which has been crenulated by a later, F2 folding. We were confined to the upper foreshore as the strong onshore wind was keeping the sea over the lower foreshore.

On to Creetown to visit the Gem Rock Museum. We all enjoyed the superb collection of rocks, minerals and fossils. The displays were a little haphazard but the specimens were beautiful. After lunch we headed for Dalbeattie, en route stopping at a new road cutting to look at isoclinally folded Hawick Beds with quartz-filled tension gashes.

We continued to Craignair Quarry, at Dalbeattie. Towards the end of the Caledonian Orogeny, granite was intruded in the Southern Uplands. There are three such intrusions in the Galloway area. Craignair Quarry lies near the margin of the most southerly, Criffel-Dalbeattie Granite. It is zoned from fine-medium crystalline granodiorite to central porphyritic granodiorite, which may be due to separate magma pulses. Many samples were loaded into the coach, which touched bottom going round a tight corner leaving the quarry!

Our final expedition was a very pleasant walk along the coast at Rockcliffe. Hawick Group sandstones have been contact metamorphosed to hornfels by the Criffel-Dalbeattie granite. The rocks are folded into a series of gentle, open folds. The strata have been faulted and subsequently intruded by quartz porphyry dykes radiating out from the granite. We walked on to Castle Point, a small hill with lovely views across the Solway Firth. From this vantage we could see the porphyry dykes running out across the firth. After the walk back to the coach there was a general demand for ice-cream. On most geological trips of our Society, the members need to be sustained at regular intervals by ice-cream. On this trip, places to buy ice-cream had been lacking, so when we stopped at a garage in Dalbeattie nearly everyone indulged themselves!

Friday, we left Locherbie at 8.45 a.m. and, after a good run down the motorways with three stops, we arrived back in Farnham at 5.50 p.m. We enjoyed our Scottish expedition very much and would like to thank Dave Taylor for his excellent leadership and comprehensive notes on the area, and Cath Clemesha, helped by Wally Stedman, for organising the transport and hotels so efficiently. We realise how much work went into this most successful Society trip.

Colin and Jill Brash

Members will be sad to learn of the imminent departure from Farnborough of Rose Wareing-Whittaker. She is moving to Sutton Coldfield, an area well endowed with Geological Societies and museums and incidentally only some 3 miles from her birthplace. A near neighbour will be her niece, who is also an amateur geologist. Rose has already begun to move her extensive collection of rocks and fossils; her main worry is the transfer of a very delicate electronic weighing machine which in no way could be entrusted to Pickfords!

Rose and her late husband John have been staunch supporters of the Society since 1978. Rose would like to say thanks for all those enjoyable years and to say that membership played quite a big part in their life. She hopes to attend some of the future lectures and field trips, not forgetting the Annual Dinner. I am sure all Members will join me in sending Rose our very best wishes.

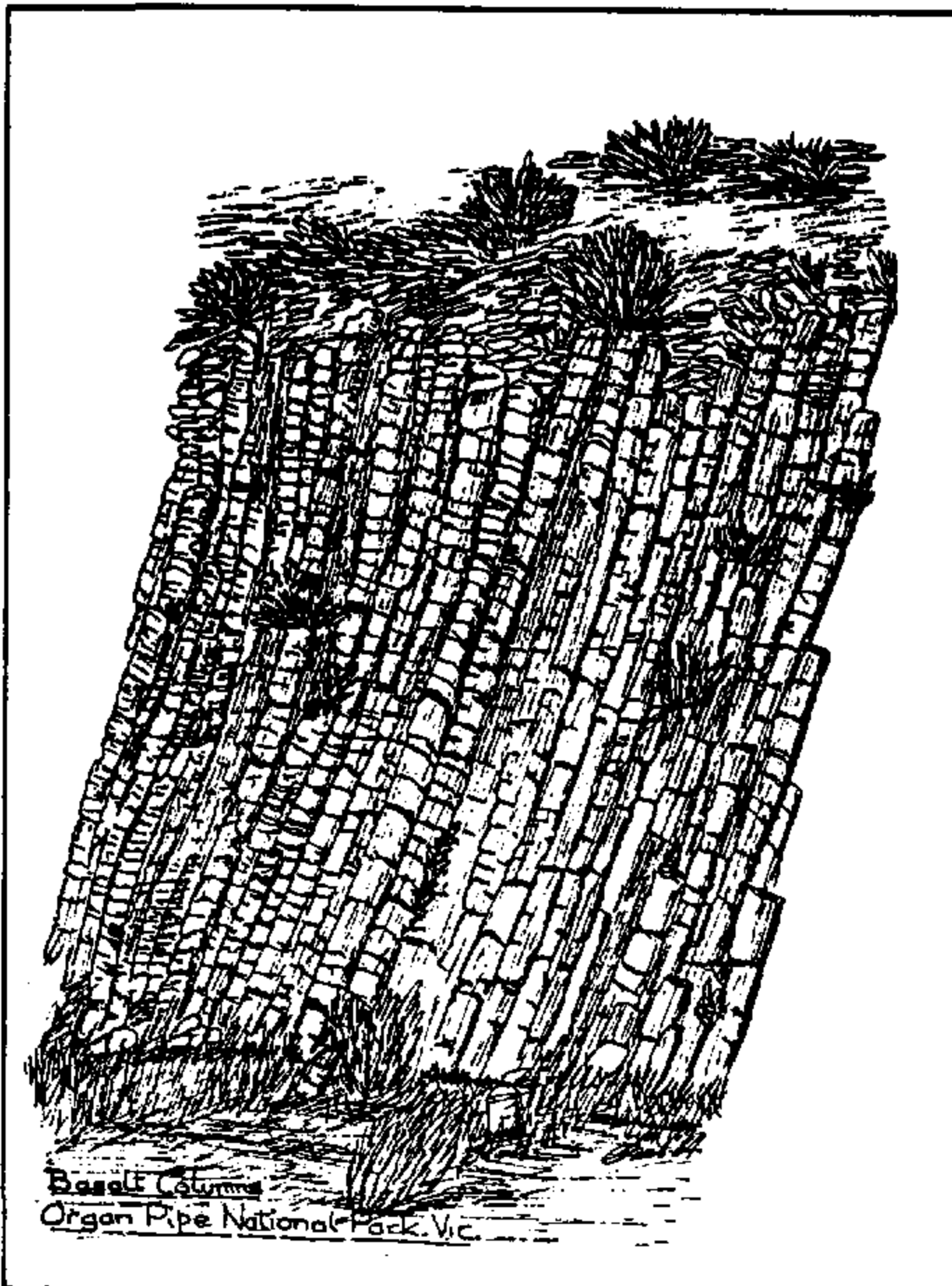
David Caddy

Colin Brash, who recently stepped down as the Society's Secretary after four years in that post, was the deserving recipient of the Wareing-Whittaker Award at the January A.G.M. On accepting the award, Colin commented that the award was a place of pride in his study for the next year.

A TRIP DOWN UNDER

I left Gatwick Airport at 4.45 p.m. on 18th July 1983 and arrived at Melbourne's Tullamarine Airport at 10 a.m. local time on 20th July. The purpose of my visit was to see my daughter, son-in-law and my first granddaughter. Their home is at Greensborough, which is a suburb of Melbourne and about 20 km north-east of the city centre.

The first rocks that I noticed were in the garden wall. I should say that I did have a little knowledge of the geology of Victoria and I wasn't surprised to find that the wall had been constructed from small boulders of vesicular basalt. A visit to a relation of mine at Ivanhoe (another suburb) enabled me to see outcrops of basalt in the local park. Although Greensborough is about the most hilly place one could wish for, most of the countryside to the west and north-west of Melbourne is fairly flat. Under the grass and eucalyptus trees is a large area of lava that originated from the many volcanoes that existed in western Victoria.



Our first trip was to be along the Calder Highway to explore Hanging Rock, that was made famous by the book and film called "Picnic at Hanging Rock". Once on the Calder we made our way first stop at Diggers Rest to visit the Organ Pipe National Park. This national park is quite small and is centred around an exposure of basalt columns. Actually, three rock periods are exposed in the park; Silurian sandstone, Quaternary (Pleistocene) basalt lavas and scoria, and Recent alluvial deposits along Jackson Creek that flows through the park.

Volcanic activity was widespread throughout south-western Victoria for about 20 million years. The lava flow that produced the columns being a recent one of about a million years ago. This lava flow is thought to have filled an ancient river valley, giving a depth of basalt of some 70m. Gradually the water of Jackson Creek has cut down through the rock to expose the basalt columns. The creek provides a good natural barrier to geologists who may be hammer happy; the other deterrent being the warden, Jack Lyale.

He had a great interest in the geology of the area and it was thanks to him that I obtained a teacher's guide to the park that includes information on plants and wildlife as well as the geology of the park. Also exposed in the park was a feature that had been named The Rosette Rock which consists of basalt columns that radiate from a point slightly below the centre. The only part of the columns that were accessible were those that had been planed down by the creek waters to form what is called a tessellated pavement. The car park is situated upon a cinder cone which was active at the same time as the lava flow that produced the columns.



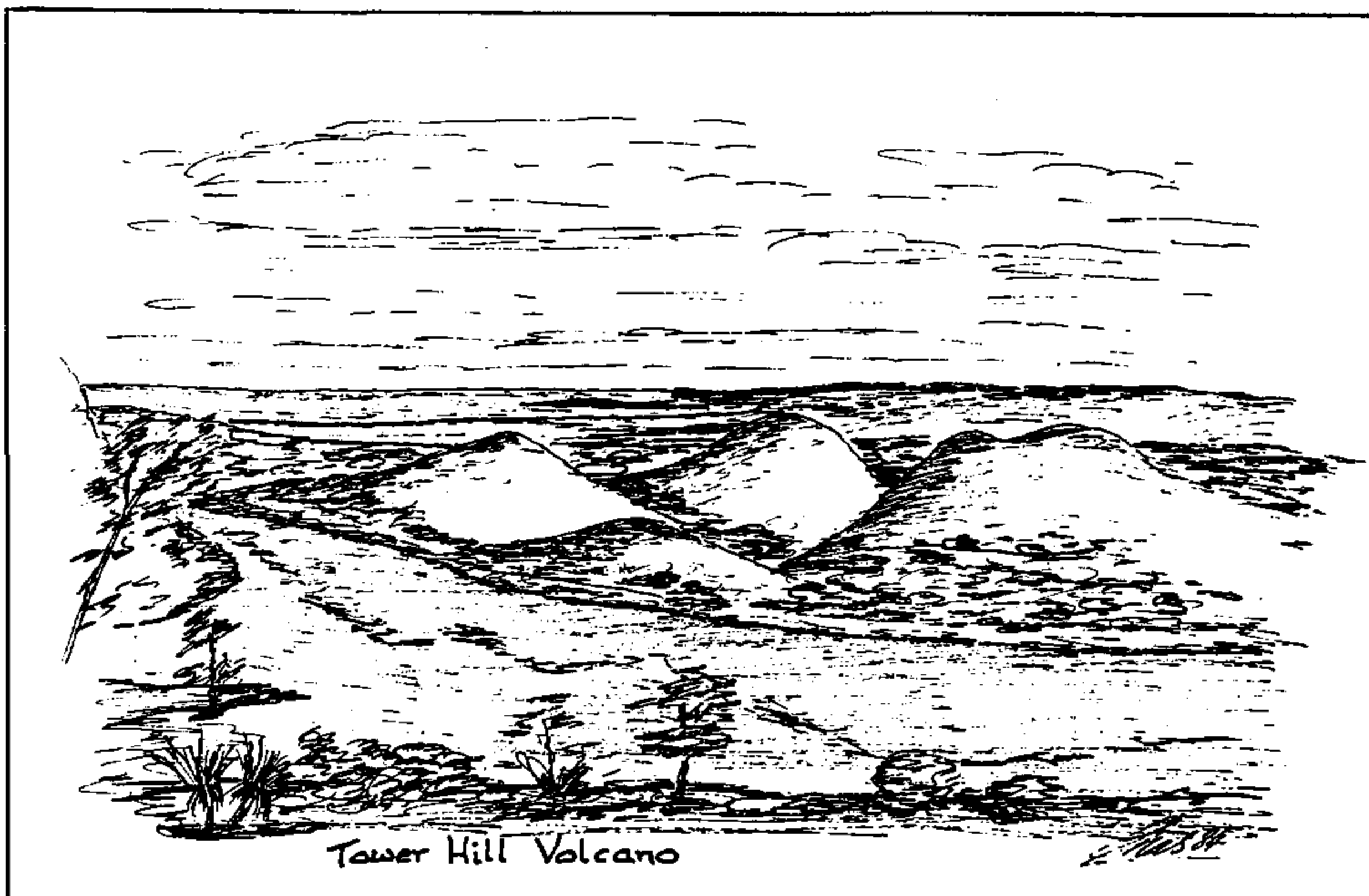
Tessellated Pavement
Organ Pipe National Park, Vic.

Hanging Rock is about 40 km from the Organ Pipe National Park and for 30,000 years was sacred ground for the aboriginals, whilst in more recent times it provided a hideout for the bushrangers who robbed the gold coaches returning to Melbourne. Hanging Rock, an old volcanic plug rises 100m above the surrounding plain and appears to be a series of fingers pointing skywards, partly screened by gum trees. The rock that forms the exposure is called Solvsbergite and is found only at one other place - Solvsberg, Sweden. It is an fact an anorthosite-trachyte and may be a salic differentiate of transitional basalt.



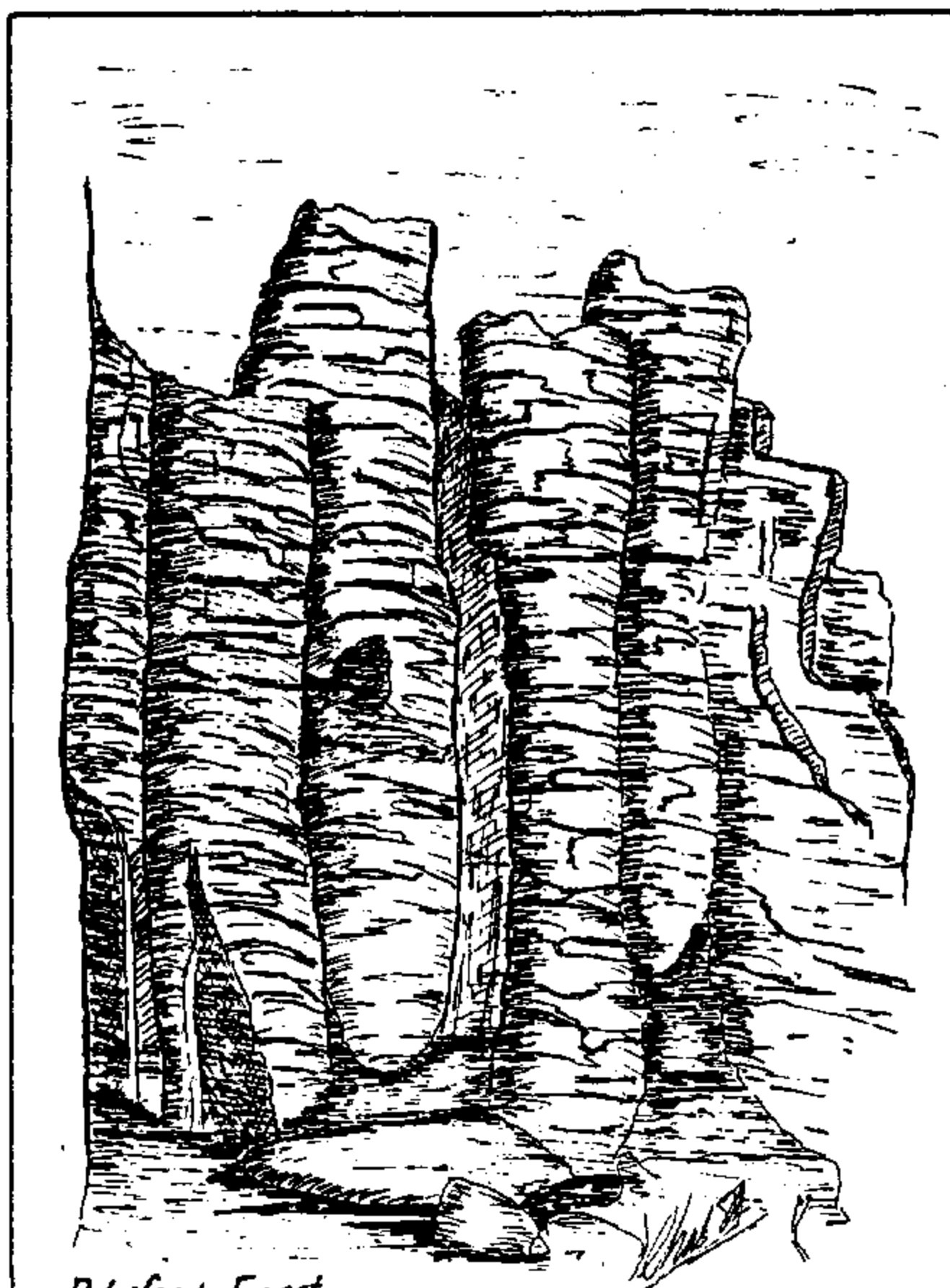
Hanging Rock, Vic.

Our next trip was along the Great Ocean Road to Warrnambool, which is approximately 300 km west of Melbourne. The Great Ocean Road was built by ex-servicemen from the First World War. It is a very scenic route following the coast and hugging cliff faces in many places. From near Torquay through Anglesea to Lorne some 40 km had been burnt in the great bush fires of February 1983. We were there in August and the gum trees were putting out fresh green shoots, but the coniferous plantations were all dead. Houses were remembered only by the remaining chimney and fireplace. At Aireys Inlet a whole hillside that had been covered by trees and houses was just one huge blackened landscape.



Tower Hill Volcano

Close to Warrnambool is an old volcano with the name Tower Hill. It last erupted 7000 years ago and is one of a series of volcanoes that stretch for 120 km across western Victoria between Colac and Port Fairy. The Tower Hill volcano is classified as a 'maar' type and has a crater that is 3 km in diameter. It is thought that basaltic lava rising through the crust encountered a layer of water-containing rock that resulted in the production of high pressure steam. This, in turn, fragmented the lava forcing it upwards and explosively ejecting large blocks of crust along with ash. A series of explosive eruptions produced a thick layer of tuffs around the crater. As the explosive activity ceased the crater was flooded with 200 to 300m of basalt lava. Later less explosive activity produced scoria cones within the crater. Today, these ash cones form islands in the centre of the flooded crater. Extensive restoration work is being carried out, reintroducing native plants, animals and birds. It is now designated as a state game reserve.



Petrified Forest

The last place visited in this area was 85 km west of Warrnambool and was the Petrified Forest at Cape Bridgewater. This large area on top of the high perpendicular cliffs is covered by what at first sight appears to be hundreds of tree trunks, all in their natural standing positions. In height they range from a few centimetres up to 4m or more, and in diameter from 30cm to something in excess of 60cm. Close examination shows the trunks to be calcified shells that had formed around the original trunks. Although I found no trace of wood within the shells that which has been found is similar to existing species of trees.

A further trip was made to East Gippsland to explore the Buchan area and to look for the rocks associated with the Snowy River volcanics but the

description of that must wait until a later date. The Australians that I met were all very friendly and helpful. The Diamond Valley Gem Club made me very welcome. Many of the rocks that I brought back were cut to a convenient size at their club house.

References:-

1. Tower Hill, State Game Reserve. Fisheries and Wildlife Division, Ministry for Conservation, Melbourne.
2. Organ Pipe National Park. National Parks Service Teachers Guide supplied by Jack Lyale, Ranger.
3. Hanging Rock Reserve and Petrified Forest. Geology of Victoria. J.G. Douglas and J.A. Ferguson.

Charles Ives

NEW MEMBERS

We would like to take this opportunity to welcome several new Members to the Farnham Geological Society; Mr D. Davies, Mr George Harrison, Miss Diana Smith, Mr Mike Weaver, and a welcome back to an old friend Mr Bryan Shakespear.

MEMBER'S EVENING (14th July)

A reminder to Members that the July meeting is an opportunity for you to show off some of the slides you have taken on your holidays and trips to places of geological interest. Would anyone who is prepared to put together a short (10-15 minute) slide show please contact Dave Taylor, or another member of the Committee.

BOOK REVIEWS

As amateur geologists we are not always aware of the publication of new geological books and field guides. If any Member buys a new geological book which they think may be of interest to other Members, please write a short review for inclusion in a future Newsletter.

Pioneers of Geology by Douglas A. Robson.

Published as a Special Publication of the Natural History Society of Northumbria, this 73 page softcover book will be of interest to anyone who wants to learn something of the early development of geological ideas and the pioneering characters responsible for them. The book can be divided into two parts. The first deals with the so-called 'Heroic Age of Geology', the early years (1775-1825) of discovery which spanned the work of Hutton, Steno, Smith, Cuvier and Brongniart. The second part covers 'The Golden Age of Geology' (1825-1875) and embraces the studies of Murchison, Sedgwick, Agassiz, Darwin and Lyell. The book is illustrated by photographs or sketches of all the important figures. It contains a wealth of anecdotal material and would be enjoyed by anyone with an interest in the history of the science of geology. The book can be ordered direct from the Natural History Society of Northumbria (£4.75 + p&p), c/o The Hancock Museum, Newcastle Upon Tyne, NE2 4PT. (Dave Taylor)

REFERENCE LIBRARY

Since the last Newsletter, the following books have been received into the Reference Library and are now available to Members for loan. Thanks go out to Marjorie Outlaw, Lyn Linse, Conrad Volkner, Lothar Neubert and Dave Taylor for kind donations to the library. Tony Brown has taken on the role of Librarian. Members wishing to borrow any of the Society's books should contact either Tony or the Secretary, Dave Taylor.

- Geology of the Lake District, Ed. F. Molesy.
- The Volcanic Rocks of the Lake District, by F. Molesy.
- Geological Excursions in the Bristol District, Pub. Univ. of Bristol.
- The Geology of Devon, Pub. Univ of Exeter.
- Geology Explained Around Glasgow and S.W. Scotland, Including Arran.
- Geology Explained in the Severn Vale and Cotswolds.
- The Weald; Geological Field Guide, Pub. Unwin Paperbacks.
- Snowdonia; Geological Field Guide, Pub. Unwin Paperbacks.
- The Peak District; Geological Field Guide, Pub. Unwin Paperbacks.
- The Lake District; Geological Field Guide, Pub. Unwin Paperbacks.
- The Moray Firth Area Geological Studies, Pub. Inverness Field Club.
- An Excursion Guide to the Moine Geology of the Scottish Highlands, Pub. Edinburgh and Glasgow Geological Societies.
- Hunting the Past, by L.B. Halstead.
- B.G.S. Memoir 8 (Ireland) Geology of the country around Ballycastle.
- B.G.S. Memoir 33W/41 (Scotland) Geology of the country around Haddington.
- B.G.S. Classic Areas of British Geology: Capel Curig & Bets-y-Coed.
- B.G.S. The Geology of the Solomon Islands (includes map).
- B.G.S. Geophysical Surveys in the Orkney Islands.
- B.G.S. Bulletin 6, Recent Boreholes in the Carboniferous strata of Gwent.
- B.G.S. Report 17(5), Diffuse Pollution and Groundwater Quality of the Triassic Sandstone Aquifer in South Yorkshire.
- B.G.S. Report 18(6), Permo-Triassic and Dinantian rocks of the Belfast Harbour Borehole
- B.G.S. Geothermal Energy: the Potential in the United Kingdom.
- Earth. by F. Press and R. Siever. (a very good general text book)
- Pembrokeshire Field Trip Notes (15-19th March 1989, led by Paul Olver)