

(A Local Group within the Geologists' Association)

NEWSLETTER SPRING 1996

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Your Newsletter Editor has been disposing of some 20 years of surplus geological field trip material. Much of it went into a mini-skip of 2 cu yard capacity. The back garden and garage look a lot clearer now. With this clear out came the discovery of many prized items which I had forgotten I possessed. These were carefully put on one side. Would that one could dispose of ones surplus pounds avoirdupois so easily!

I have been reminded of an event that occurred in the introduction to the **Spring 95 Newsletter**. In fact the Geological Howlers were the work of Cath Clemesha and only the last one was attributable to Peggy Innes. This was entirely an editorial shortcoming and I should have spotted it before the final printing. So Sorry, Cath and Peggy. Please forgive the Editorial Geological Howler!

We have to thank Tony Brown for a vivid account of a **Trip to Norway**, Cath Clemesha for a **Trip to Iona** and Cliff and Daphne Tarbox for a report on the **Isle of Thanet**. Remembering the recent account by Cyril Dutton of the KT Extinction, the following extract from "The Times" of 18 Dec 95 about the greater Permian extinction, bringing the Palaeozoic to a close, should be of interest.

"After the Big Bang, the Big Belch. Three American scientists have come up with a novel explanation for the most cataclysmic event that ever struck the Earth -- the destruction of 95 per cent of living species 250 million years ago. They reckon it was the global equivalent of what happens when you open a bottle of champagne.

The Permian extinction is well documented in the fossil records, and the best explanation for it until now has been a *massive volcanic eruption that altered the climate*. But nothing lubricates the imagination like a good extinction.

At a recent meeting of the Geological Society of America in New Orleans, Doctors Andrew Knoll of Harvard, Richard Bambach of Virginia Polytechnic Institute, and John Grotzinger of Massachusetts Institute of Technology presented evidence that it was a surge of carbon dioxide that knocked off the trilobites and their companions.

The first clue came from a layer of rock from the late Permian, which the scientists recognised as an inorganic carbonate. Most of the carbonate rocks are formed from the remains of animals, but this one had precipitated directly from sea water, presumably when dissolved carbon dioxide reached a very high level.

The cause, they believe, was a shutdown of ocean circulation towards the end of the Permian. At the time, all the continents grouped together in a super-continent called Panagaea, and the oceans were sluggish because there were no continental ice sheets to chill the surface waters and make them sink to the depths.

At the surface, living things were busily extracting carbon dioxide and adding it to the ocean's store. This thinned the atmosphere of carbon dioxide, cooling it in the obverse of global warming, and eventually leading to an ice age. That would have stirred the oceans at last, releasing the dissolved carbon dioxide with all the frenetic enthusiasm of a grand prix driver on the podium.

Ingenious, but where's the evidence? Apart from the rock, the three pointed to some other straws that hint they may be onto something. There is some evidence of glaciation in the late Permian, and the isotopic composition of carbon in the rocks hints at rapid oceanic turnover.

The pattern of extinctions also fits. The creatures that suffered the greatest losses were the least tolerant of higher carbon dioxide levels; those that did best were marine burrowers which spent their lives in sediments where carbon dioxide levels were already high.

The thesis had a reasonable reception in New Orleans. "It isn't as yet backed up by a tremendous amount of data," the palaeontologist Dr Douglas Erwin of the US National Museum of Natural History told *Science* with masterly understatement. "But I think it's an interesting, even fascinating hypothesis.""

THANKS TO "THE TIMES" SCIENCE EDITOR, NIGEL HAWKES

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A TRIP TO NORWAY June/July 1994

A small group from Farnham joined a West of England Geological Association trip to Norway in the summer of 1994, meeting the main party at Newcastle. Accommodation in Norway was in four berth self-catering camping huts and transport was two mini-buses.

We enjoyed a calm ferry crossing, though our first sight of Norway was through a cold drizzle which persisted for the rest of the day. We arrived at our first camp, some 100 kms inland from Bergen at about 1830, and settled in to the roar of a waterfall at the rear of the site. The rain became torrential; not a good start.

Our first morning in Norway dawned fair and we saw that the site was beautiful, surrounded by snow covered mountains of which we had been quite unaware. We looked at the local rocks - phyllites overlying basement gneisses. Soon after leaving camp we caught the first of many ferries and realised on our trip how much the Norwegians depend on water transport. After the ferry we stopped at Fagernes to look at some basement gneisses which were incredibly contorted. Then we slowly climbed to 1500m meeting driving snow on the plateau where we ate our lunch in the lee of the buses. At Fagernes the group stocked up with bread and milk and then pressed on to our second camp just outside of the town.

The following day took us to Oppdal which was notable for mountain scenery, the clearly indicated levels of snow in the winter and, geologically, for a formation known as the *Bygdn Conglomerate*. This conglomerate consists of pebbles which had been deformed during Caledonian times into rods up to six inches or more long with a section of about half an inch in

diameter. I also heard a new rock name - *sparagmite* - (a Scandinavian arkose sandstone) a huge basin of which fills this part of Norway. In the afternoon we did our first bit of "cultural" visiting, inspecting an old wooden church at Vaga, before continuing to our campsite. It was large site but had small huts which prompted a few grumbles.

Next morning we went back down the main road to a spot called Engan in the sparagmite basin. The size of this basin is shown by the fact that we have been in it since Fagerness, two days ago! Here a part of a large nappe was pushed over the basin from the west and in the Engan area the rocks have been metamorphosed to the greenschist stage. The sparagmite is schistose with the micas well orientated so that it splits readily; it is used locally in thin slabs for flooring. It has also been much deformed and splitting some rocks gives sheets of "corrugated sparagmite" which are very unusual. The area also has an exposure of "augen-gneiss" though the augen were far from obvious. After lunch we had a hurried drive to Storen to see a Trondheimite quarry, pausing to try free samples of fried salmon being given away outside the local supermarket, eventually arriving at the quarry after closing time. The caretaker let us in to look around; it was impressive. The rock was darker than usual containing a higher than normal percentage of biotite.

We arrived late at our camp near Trondheim where we were in "superior" grade huts with all facilities "en suite". A great luxury! After a meal we strolled down to the beach and looked out over the fiord to the west. The sunset was sensational and it was hard to realise that it was nearly midnight.

As we were staying two nights at this site the morning was less rushed and we spent a quiet day driving into Sweden to look for some "garbenschieffer", a chistolite slate, which occurs in a river valley. At lunchtime while looking at some sedimentary sequences to pick out the Bouma series, I suddenly felt incredibly cold and had to retire to the bus. Luckily lunch seemed to warm me up and I was careful to keep warm for the rest of the day which meant taking less interest than I should have in the magnificent views of a skyline clearly showing how nappes had been thrust over the basement rocks. On the way back "home" we were pulled up by the Norwegian police and spent a few hectic minutes getting seat belts fastened before they came into the buses! Our last stop of the day was in Hell!

Before starting our long drive north we returned to Hell to have our passports stamped. After a brief stop at Storvika to look at some blocks of Ordovician age we motored all day to Elvedun camp. Here in the local river were huge boulders showing magnificent folds with all the classic features; one could readily find *S*, *Z*, & *M* folds in sizes ranging from a few centimetres to tens of meters long. It is truly a demonstration site for folds. These were examined again next morning and then some interesting specimens were collected in the river.

However the North was calling and we had another long drive crossing the Arctic circle after lunch. It was sad to find at this supposedly isolated spot a huge tourist complex. Anyway we joined the tourists and as a result got to Fauske where we were to stay for the next four days. As we arrived very late, packing and unpacking could be temporarily forgotten!

Although staying at the one camp we still did a lot of travelling during the next few days. We looked at exposures of the Oynes Conglomerate; similar to the Bygdin conglomerate but with the added interest that folding subsequent to deformation of the pebbles into rods deformed these. "Fauske Marble" also got attention. This is a beautiful rock, again a deformed conglomerate but with elongated white dolomite pebbles, rose coloured calcite and green actinolite giving the rock

its distinctive appearance. At a small quarry on the coast nearby there was a spectacular exposure of boudins individually outlined in layers of white, black and dark green rock. On a trip down the coast superb specimens of garnetiferous schist, kyanite, enstatite, tourmaline and amphibolite were collected. We also visited Saltstraumen said to be the inspiration for the Edgar Allen Poe story of *The Maelstrom* and took a trip to Bodo one evening to see the midnight sun. It was sensational to motor along a fjord after 2300 and take photographs in "daylight". Over wine and biscuits at a picnic table we watched the sun down to its lowest point before it rose again without ever going below the horizon. At 0030 we had coffee in a luxurious restaurant.

After our brief stop we had to pack again and immediately faced a long trip up to the Lofoten Islands. The weather was poor but it cleared as we came to another ferry though the islands looked cold and hostile. The ferry was interesting, designed to move in either direction it had a circular bridge. It was very comfortable with well appointed lounges and a cafeteria which we patronised. The crossing was mostly spent inside as it was bitterly cold. Having arrived on the islands we motored to our camp on the most westerly one, Lang-Oya.

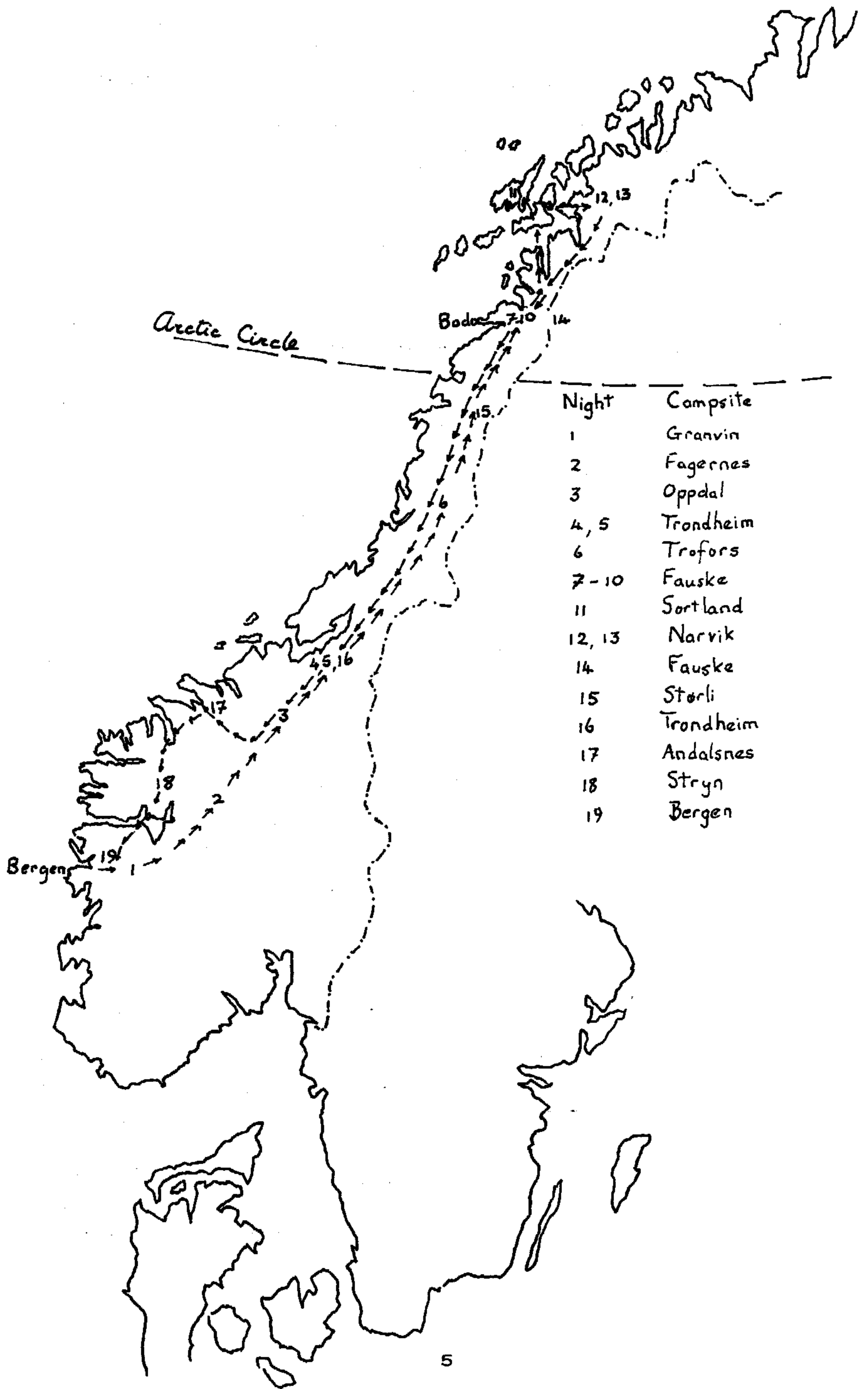
Next morning it was clear that the weather would remain poor and it was decided to simply tour the island. A weak sun came out later and we stopped at a big exposure of almost pure anorthosite. Lunch was taken by a river in a desolate setting with no signs of life except a farm house in the distance and some stone walls. Exploration revealed some interesting rocks. Then a long drive through typical Norwegian country took us to the next camp site just outside Narvik. This camp was on the main road to Sweden with a magnificent view out over a fjord. A short way down the road was a camp of Lapps selling souvenirs.

At last the weather took a turn for the better and we spent Sunday morning in a deserted Narvik in glorious sunshine. We couldn't even get a cup of coffee, but fortunately the museums were open. We left at midday and went towards Sweden spending an interesting afternoon looking for the edge of the "Rombak window", a contact between ancient basement gneiss and much younger deformed schists. It was a frustrating but interesting exercise; the whole area is covered with erratics which made the search difficult. Eventually after some persuasion we agreed that the contact must lie in a small gully about twenty yards wide.

Back at camp we decided to have another look at the midnight sun having learned there was a well known viewing site at Narvik. Although fine it was bitterly cold and even wearing all I possessed I was none too warm! I spoke a little Italian to a group from Milan, an exercise which gained me a bottle of Italian champagne! The view here was better than at Bodo and I was more convinced that the sun stayed above the horizon.

Another early start, as we had a long drive back to Fauske, stopping again at the Arctic Circle, this time to buy souvenirs. Lunch was taken a bit further south and was remarkable for the local public conveniences. It was a lovely wooden hut with carved corner posts and balconies and furnished inside with style and taste with magazines lying about for the clients to read - not a set-up one could imagine lasting for long at home! Back at Fauske we occupied the same huts as before and were surprised to find some of our discarded specimens where we had left them.

The homeward bound feeling was intensified by the allocation of the morning to shopping in Fauske. There was just enough time to get to our camp at Storli and visit the Svartisen Glacier that day. The camp people thought us mad as we drove in, unloaded all the luggage into two huts and then drove off at high speed.



The approach to the glacier was by boat along a pro-glacial lake, then a hard climb over rough rocks to the pro-glacial lake. There was barely enough time to get to the glacier, turn around and hurry back, but it was well worth while. It was only later that I realised we had been walking over schists with beautiful embedded garnets, rocks I would have collected as specimens only a week ago!

In the evening the mosquitoes were a nuisance and for the only time we were glad of the netting we had brought to seal up the hut for the night.

Our remaining days all involved long journeys with limited geology. we returned on the same road to Dombas but then turned down the Ramsdalen Valley to Andalsnes. The scenery was exceptionally beautiful, even for Norway, and the new campsite was in a magnificent situation. The surrounding mountains were bathed in a wonderful pink light until nearly midnight. The main geology the following day was immediately outside the camp where there were fascinating exposures of migmatites.

Leaving these we wound our way up a hair-raising mountain road to Tollstigen where views were superb. Mist filled the hanging valleys and spilled down the slopes. Over a col we descended a road which was possibly even more hair-raising than the climb and went to catch the ferry at Linge. Then came another incredible climb, a vertiginous descent to Geiranger and another climb. At the top there was a new road that wound its way up to the summit of Dalsnipa, the highest local peak. After some discussion we decided to make the detour even though we would finish the day very late. It was worth it though words fail me for a description of the road. Back on route we passed some beautiful mountain lakes, the ice on which was just melting.

Our last full day was the return to Bergen through lovely country. High spots were an encounter with a Norwegian wedding and a visit to a stave church at Vik. One drawback was the increasing number of tourists as we approached Bergen.

After our last night in a hut we were up early to pack and move into the city and leave Norway. The weather decided to end as it had started. We arrived in Bergen in pouring rain which put paid to any hopes we had of seeing the sights.

We were lucky to have another smooth crossing and took advantage of it to enjoy a fabulous evening meal in the "Monte Carlo" restaurant. Back in the UK we were quickly on the road home arriving the next after a very agreeable stay in Harrogate.

TONY BROWN

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COMING EVENTS

For those members who are not going on the USA trip June/July there is a day trip to a clay pit on 20 July. There is a week long Landscape and Geology course at the Preston-Montford FC from 26 July to 2 August. Contact Peter Luckham for further details. The date has been set for a day trip visit to the new Southampton University Faculty of Geology on 15 November. If enough people sign up a coach will be arranged.

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IONA, MAY 1995

Last year I spent a week on Iona with a group of nine people plus our leader under the auspices of the University of Surrey. The Idea was to get the feel of life on Iona and to study the birds, plants and landscape. Geology to the others was a minor interest but I found out enough to satisfy me. Luckily the proprietress of our hotel had studied the geology of Iona for her PhD and she took us out one day. Our leader filled in other details.

The rocks are similar to those of the Outer Hebrides and North-West Scotland, namely the Lewisian gneisses and Torridonian sediments. They are totally different from those on Mull (a mile away) where they are mainly Tertiary basalt lavas with two fault bounded "slices" of granite and schist in the southwest corner. The reason given for the difference was the existence of the Moine Thrust in the channel between Mull and Iona. There is some doubt as to whether or not the sediments are Torridonian, partly because they do not look like typical Torridonian rocks. They are dark grey in colour and are mainly sandstones and shales with conglomerates at the base, interspersed with thrust zones with epidote in evidence.

I did not have time to hear all the arguments for and against but in the absence of any definite evidence it was decided to stay with the original classification. They are found in the eastern third of the island. The gneisses are very variable in colour and mineralogy (quartz and feldspar, amphibole, garnet, biotite). Some have epidote bands, some are folded, some have pegmatite bands and other variations. We did not study them in detail.

There is an abandoned marble quarry in the south which we visited. Some of the marble is pure white and some has pale green coloration caused by metamorphism of muddy sediments to epidote. It reminded me of Skye marble.

We had a boat trip to Staffa. It was too rough to land so we sailed round the island instead and had a marvellous view of the spectacular columnar basalt. An added bonus for me was seeing puffins in flight quite close to the shore.

We spent a day on Mull driving round the sheets of lava lying on top of each which gave a stepped appearance. If you mentally strip off the vegetation cover you can imagine the lumpy surface of the lava flows.

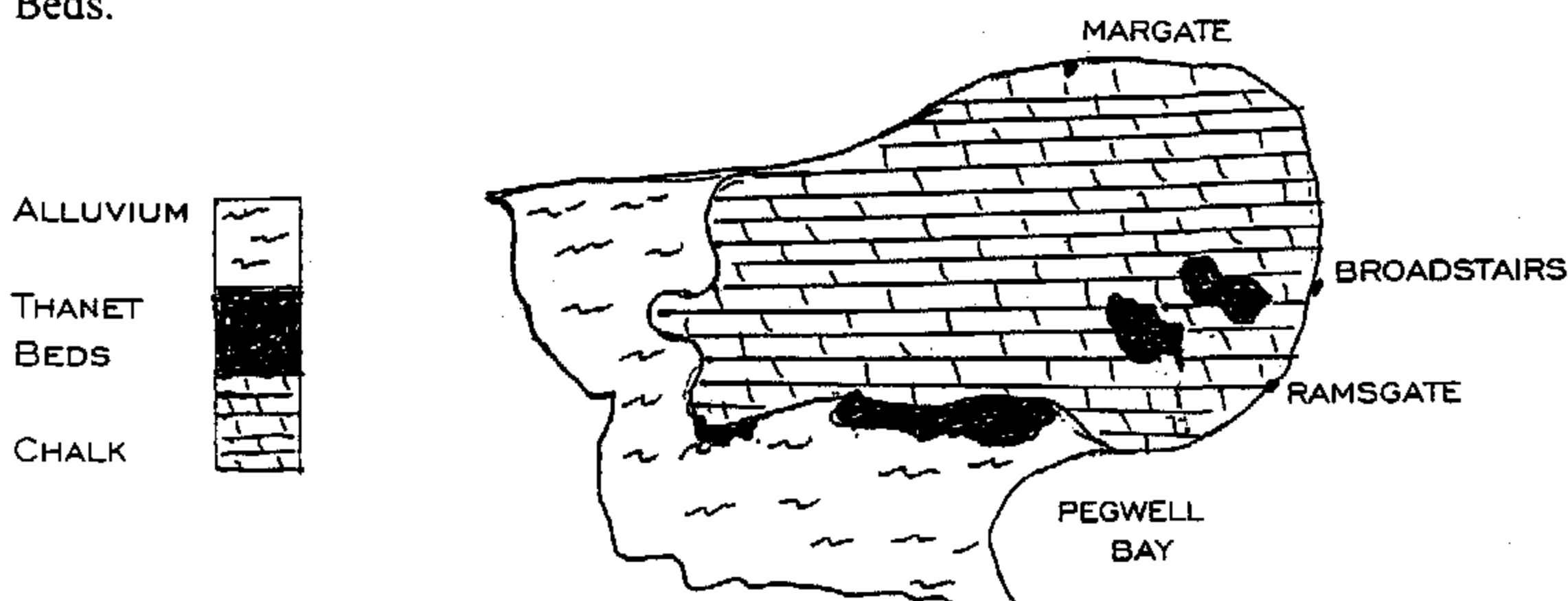
The granite is a rich salmon pink colour because of orthoclase feldspar. The schists are Moinian hornblende schists. One piece was found containing well weathered garnets. Sand in the bay by the schists glitters with mica flakes. In contrast, in the bay near the granites hardly any [granites] have been eroded.

The only cars on Iona belong to the residents so we walked everywhere. The island is only about 3½ by 1½ miles and the highest hill is 300 feet above sea level so even I managed all of it. The weather was typically variable - brilliant sun on our first day, two with light rain and the others dull, dry and very windy. It quickly became fairly obvious that bird watching was the main interest, plus golf and three had come because of their interest in the Abbey and the religious community. Quite a mixture, but it worked out very well!

CATH CLEMESHA

THE ISLE OF THANET

The Isle of Thanet is in N E Kent and is a stretch of land which measures nine miles by 5 miles. It includes Margate, Ramsgate, Broadstairs and Pegwell Bay and is separated from the rest of Kent by the Stour River. Geologically it contains mainly chalk with alluvium and some Thanet Beds.



We had never explored this part of the country so decided to spend a couple of days to look at the geology and of course to collect any fossils.

First we went to Broadstairs to look at the chalk. Then we went north towards Margate and found that the cliffs were about 50 metres high and the upper chalk was hard and very white. At first it appeared to have few fossils.. We were eventually rewarded by finding some echinoids called *Echinocorys scutata*, *Micraster coranguinum*, and *Conulus albogalerus*, most of which were either squashed or incomplete. We also found some spines of *cidaris*, ossicles and shaped heads of the crinoid *Bourgueticrinus elliptius*, coral, sponges, terebratulids, rhynchonellids and a bivalve called *Lima hoperi*. Returning to the town for lunch afterwards we explored the south side of town going towards Ramsgate. Here we found the chalk contained the same kinds of fossils.

On the following day we went down to Pegwell Bay. Here are the remains of the old Hovercraft Port and also a replica of a dragon-prowed Viking longship which was sailed across the Channel by a Danish crew in 1949.

The bay is small and as we walked northwards we could clearly see the extent of the Eocene unconformity upon the chalk. There were few boulders of chalk on the shore for us to look and hammer at but we managed to find similar fossils as were found in Broadstairs apart from a large gastropod called *Bathrotomaria perspectiva*.

We stayed only a short time here as we were on our way home and wanted to visit the remains of Richborough Castle and then on to Deal Castle. One day we will come back and explore the area more thoroughly.

DAPHNE AND CLIFFORD TARBOX



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