electron and ion probe onto the rock sample which can be microscopic in size. Results are recorded automatically with a high degree of accuracy. Also electron probe is now taking the place of the optical microscope and the need to prepare transparent sections on micro slides.

Continued refinement of the mass spectrograph now allows routine determination of the age of igneous rocks with increasing reliability. Especially useful are zircon crystals which retain the uranium disintegration chain of radioactive decay elements. X-ray computed tomography - hitherto applied only to medical diagnosis - can now be used on fossils, images of which can be taken from all angles revealing intricate internal structure, even the growth lines on teeth. Less technical, but of no less importance are the serious efforts now being applied to capture and sustain the interest of the young in the Earth sciences, giving them hands-on experience. Societies like ours, Rockwatch, The British Geological Survey and television are all effectively contributing.

Finally, geology has been important in my own life, not only as a fascinating scientific discipline, but also by the contacts and friendships it generates. I also believe that it has a stabilising influence on one's outlook and demeanour. Not least it takes one into the open air, often in pleasant countryside and demands physical effort.

Most of my collection of rocks, minerals and fossils was passed on to Birmingham University Geology Department in 1975 before leaving for France.

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Photographs and images supplied by Horace Sanders

ROCK BALLS

Bob Mustow

I've been walking the hills for many years now but it is only recently I have noticed a number of balls here and there in the scenery.

The first ones were at Osmington Mills on the Bath Geological Society's field trip in March this year. Obviously I would have noticed the huge ones at the foot of the cliff to the east of Osmington Mills if I had been that way before! (Fig 1). These are not rocks that have been deposited with the sand but have obviously formed in the Bencliff Grit sandstone after the material had been deposited because the strata continue through them. As the sand became sandstone by cementation of the grains by water-borne calcium carbonate, a process known as diagenesis, the calcite preferentially formed around some seed nucleus, such as a decayed ammonite or other material. I imagine this is similar to the way large crystals grow. It is interesting that the balls look 'newer' than the surrounding material: could it be the cementation has better preserved the original deposits?

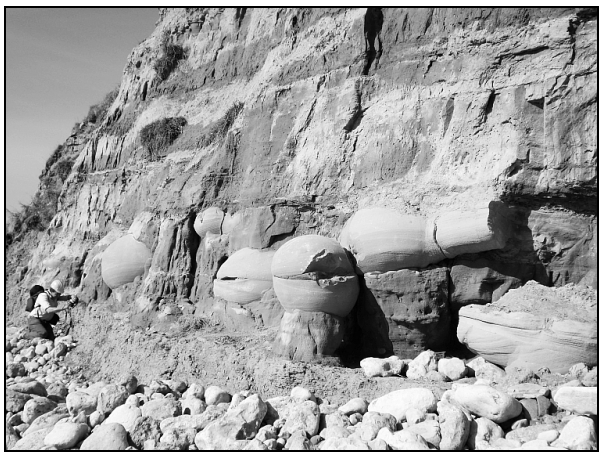

Fig 1: *Doggers near Osmington Mills, Dorset*

The next balls I came across were on Moel Hebog near Beddgelert in North Wales. This was not a complete surprise as I had read about them in an excellent book "Snowdonia Rocky Rambles" by Bryan Lynas (unfortunately out of print) and it was easy to seek them out, but only after I had climbed the 600 metres or so up the hillside. Figure 2 shows the most impressive outcrop with my rucksack (circled) for scale and figure 3 is

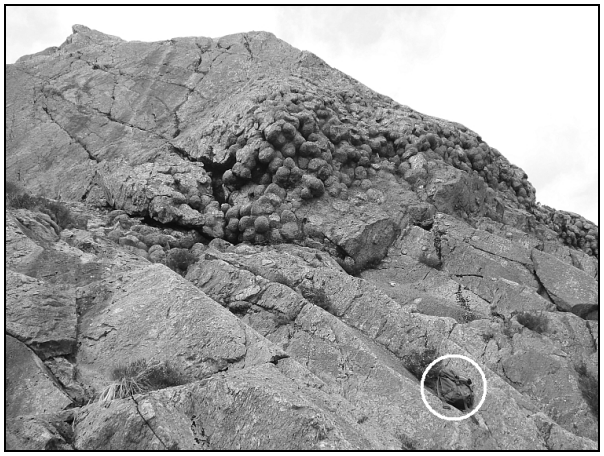

Figure 2: *Outcrop on Moel Hebog near Beddgelert*

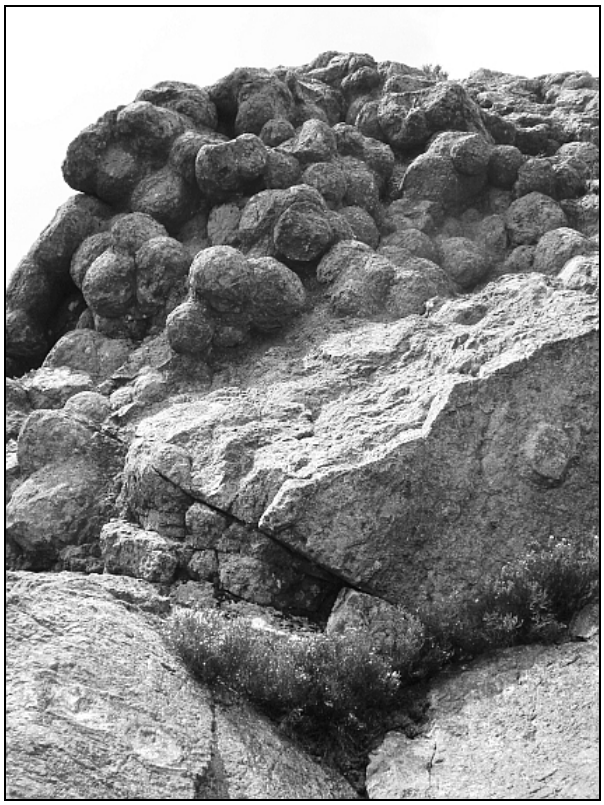

Figure3: *Close-up of the outcrop*

another shot from below. These balls have formed in tuff, so the rock type is completely different from the sandstone at Osmington, and yet curiously the process seems to have been similar. The rock is Pitts Head Tuff, a rock formed from layers of dark basaltic ash which was so hot when it fell that it welded into rock as it settled. In figure 2 you can see the rock below the balls is showing signs of columnar jointing and not far below this, out of shot about 3 or 4 metres below the balls, is a base of sandstone on which the ash was deposited. In this case it is thought that silica-rich fluids permeated the rock and enabled crystallisation around some form of nucleus. In figure 4 you can see that the rock structure (the fiamme) passes right through the balls proving they were formed in situ after the ash settled down and are therefore concretions, not volcanic bombs or pillow lavas.

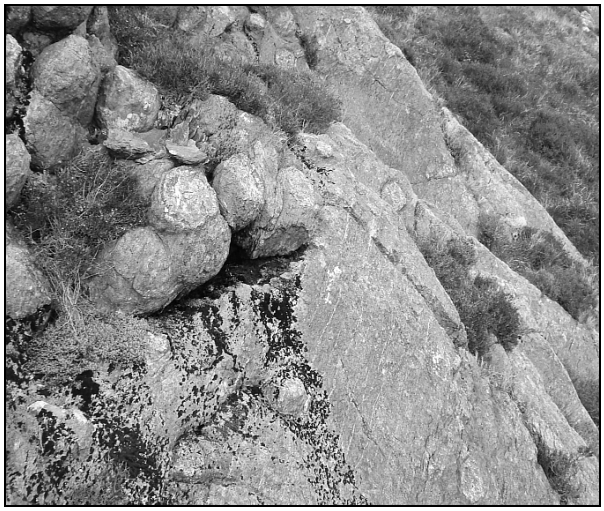

Figure 4: Fractured examples show the rock structure

You can see that the balls have a concentric ring structure and also there are some individual ones dotted here and there in the rocks below the main level. The balls formed in a layer which covers some distance across the face of the crag on Moel Hebog and figure 5 shows the general disposition of the main outcrops and shows where a fault has caused the rock to the left to drop about 20 metres below that on the right.

Figure 5: *Faulting has caused the layer in which the balls are found to drop*

Only a few weeks after visiting Wales I found myself in the Lake District and while rambling from our cottage at Chapel Stile, I came across some smaller balls in the path (figure 6). I estimated these to be at grid reference NY 299079 if you happen to be in the area. The rock here is

Figure 6*: formations found near Chapel Stile in the Lake District*

also a tuff, this time of the Borrowdale Volcanic Series, and the balls seem to be very similar to those of Moel Hebog. Further on, as we ascended the steep path up the north-east side of Pavey Ark, which is the crag overlooking Stickle Tarn, I came across a few larger individual ones, one of which is shown in figure 7 with my son's boot for size.

Figure 7: *A few individual examples on the north-east side of Pavey Ark*

Everywhere I walk now I'm looking for balls!

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Photographs by Bob Mustow

FIELD TRIP TO OSMINGTON MILLS DORSET

MARCH 15th 2009

Elizabeth Devon

On a beautiful, very hot day in March, lots of keen geologists gathered in Smugglers Inn car park in Osmington Mills, Dorset. This was a joint field trip with the Dorset branch of the Geologists' Association and was led by local expert, Alan Holiday. We planned to walk east along the coast from the Smugglers Inn as far as Ringstead. In this section, we were looking at the Upper Jurassic Corallian succession, *Diagram 1*, from the Nothe Clay upwards. These rocks date at about 145 million years ago and were deposited when Britain was in Mediterranean latitudes, about 35°N. The strata dip gently east so it is possible to walk along the whole of the Corallian succession from Nothe Grit to the Ringstead Coral Bed, making this stretch of coastline very popular with geologists.