
Excursion 14: Area around Ard Bheinn

((Figure 18), localities 1 to 40)

The purpose of this excursion is to examine the northwestern part of the Central Ring Complex, mainly around Ard Bheinn and Binnein na h-Uaimh. This area offers a great diversity of rock types and is for the most part fairly well exposed. The route map and the locality descriptions have been contributed by Professor B.C. King who has made a special study of the region (see King, 1954, 1955 and 1959). He regards the masses of sedimentary rocks and basic lavas within the Complex as relics of a block which subsided some 1,000m during the formation of a volcanic caldera. The structure of the block has been complicated by dislocation along a number of internal arcuate and radial faults, as well as by extensive dissection as a result of the emplacement of intrusive agglomerates and breccias.

Further complexity has been introduced by the development of a series of lavas, breccias and agglomerates of andesitic and dacitic composition, together with extensive masses of felsite. These are regarded by Professor King as representing the basal parts of the superstructure of volcanic cones which rose above the caldera floor. The two main volcanic centres corresponded approximately to the positions of the Ard Bheinn and Binnein na h-Uaimh summits, while from the concentric and radial structures shown by the felsites other centres are inferred to the east and northeast.

A study of the two centres referred to is one of the main objects of the excursion. The lithology and the inter-relationships of the various rock formations are, however, extremely complicated and reference should be made to the detailed account of the area given by King (1955). The contours and crag featuring on the map accompanying this detailed account will help greatly in accurately locating particular outcrops.

The excursion, which includes visits to some of the masses of Mesozoic strata incorporated in the vent agglomerates, has been divided into two parts—localities 1–30 and 31–40.

Excursion 14a: Allt nan Dris, Ard Bheinn and Binnein na h-Uaimh

The excursion begins at the bridge over the Allt nan Dris about a quarter of a mile south of the junction of the Dougrie and Shiskine roads.

1. [NR 9320 3352] At this locality, some 230m upstream from the bridge a small quarry provides a convenient exposure of a typical medium-grained granite (Tyrrell 1928, p. 192; King 1955, p. 345).

2. [NR 9338 3344] and 3. [NR 9342 3329] One hundred and fifty metres or so farther upstream, and along the contour at the sharp change of slope, occurs a series of small outcrops of characteristic red and grey Keuper marls. These pass upwards in a small gorge in the main stream at locality 3 into black shales with dark calcareous bands from which fossils of Rhaetic age have been obtained (Gunn 1903, pp. 73–75; Tyrrell 1928, pp. 105–107). The beds in question are considerably disturbed, but fragments of the diagnostic forms *Pteria contorta* and *Pecten valoniensis* have been found on recent excursions.

4. [NR 9356 3330] Examine here outcrops and boulders of the vent agglomerate. These represent the common type of agglomerate in the peripheral zone of the complex, characterised by an abundance of fragments and pebbles of sedimentary and metamorphic rocks set in a pale-weathering siliceous matrix. The agglomerate is formed almost exclusively of pre-existing formations, notably Dalradian and Old Red Sandstone.

5. [NR 9361 3319] Immediately south of locality 4 is the northern extremity of the belt of basalt lavas which extends southeastwards for about 1.5 km parallel to the margin of the complex. Steep craggy slopes define their northern and western limits and the straightness of the margins suggest that they may be tectonic. The basalts undoubtedly represent extrusions (not intrusions) and are closely comparable with the lavas of other Tertiary areas. Some shattering and shearing is often evident and in thin-section the rocks commonly show considerable alteration.

6. [NR 9391 3289] The basalts can be easily followed southeastwards as a steadily rising terrace on which the pattern of outcrops strongly suggests trap featuring. Note how they are bounded to the east by a sharply rising slope with numerous outcrops of pale-coloured felsite, contrasting strongly with the greenish-black and rusty-weathering basalts. The felsites (6) are flinty-textured rocks with small phenocrysts of quartz and felspar; weathered surfaces often suggest that they are brecciated.

7. [NR 9405 3268] Here a narrow band of craignurite is interposed between basalt and felsite and forms a marked topographic step. It is a distinctive rock, pale weathering but on fresh surfaces medium grey with small greenish mafic spots; it presents a fine-grained marginal phase towards the basalt.

8. [NR 9448 3208] This is the locality where Lias fossils were discovered by Gunn (1903, pp. 75–76; Tyrrell 1928, pp. 107–108). In his account he says: "The patch consists of brownish, crumbling, calcareous shale and impure decomposed limestone, in some parts of which fossils are abundant, but mostly in the form of casts. The exact area occupied by this shale cannot be ascertained, but it is probably 90 m in length and nearly 45 m in breadth." Characteristic fossils are easily obtained from the closely-jointed shales which outcrop in a steeply inclined gully.

9. [NR 9457 3220] Here conspicuous crags of a coarse-grained granite-porphry crowded with phenocrysts of quartz and felspar form an obvious landmark. This type of rock is extensively developed on the eastern slopes of Ard Bheinn (King 1955, p. 337).

10. [NR 9459 3227] Examine at this locality outcrops of andesite and andesite breccia, easily recognisable by their dark-grey, almost black colour and paler-weathering crust. On the smooth, gentle slopes above, numerous platy fragments of plagioclase-porphry can be seen. These relationships are typical of the rocks of the summit area of Ard Bheinn, the andesites forming dark, craggy outcrops, generally arcuate and following the contour, the porphyries poorly exposed and occupying the smoother slopes (King 1945, p. 341). Some difficulty may be experienced initially in distinguishing the two types, but the andesites show dark, rough-weathering surfaces and have a granular fracture, whereas the plagioclase-porphry or dacite has a close platy jointing, a medium grey, sometimes black, colour and a flinty, occasionally glassy fracture. The andesites are seldom massive but their real fragmental nature may only be appreciated on weathered surfaces.

11. [NR 9443 3237] At this locality examine exposures of plagioclase-porphry close to the junction with the main belt of felsite. The two rock types are easily distinguished by their colours. Note especially the occurrence near their junction of a crag of andesite. The relations between this and the felsite merit careful examination, for a narrow zone of streaky tuff intervenes in which the two rock types are mechanically mixed in varying proportion, sometimes with plagioclase-porphry in addition (King 1955, p. 339).

12. [NR 9460 3245] At this locality, about 180m east-northeast of locality 11, there is a prominent line of crags composed of andesites, andesitic breccia and andesite-dacite breccia. These show a layered arrangement dipping southeast at 10° to 15°, while the most westerly outcrops consist of a rough block-lava of "aa" type (King 1955, Plate XIII). These outcrops should be carefully examined since they illustrate the evidence on which the writer bases the conclusion that these formations were deposited sub-aerially and belong to the volcanic super-structure.

13. [NR 9468 3276] Here there occurs a small area of quartz-feldspar porphyry surrounded by breccias of very varied composition (andesitic and mixed andesite and dacite). The porphyry differs from the usual felsites in having conspicuous phenocrysts. It is often autobrecciated and its northern margin shows a fine example of a banded tuff contact with andesite.

14. [NR 9466 3268] At this locality a closely mappable and arcuate junction between plagioclase-porphry and andesitic breccia is exposed. The former passes into a dark, glassy, marginal phase with steeply inclined flow-banding and there can be little doubt that it is intrusive into the breccia.

15. [NR 9452 3267] The same glassy marginal phase can be seen here as fragments against crags composed of andesite and andesitic breccia.

16. [NR 9444 3286] Between localities 15 and 16 outcrops of andesite and plagioclase porphyry are bounded on the west by agglomerate containing numerous fragments of basalt and felsite.

17. [NR 9453 3274] Summit cairn. A line of crags extending from locality 16 to the summit shows typical andesite, ash-grey and pale weathering, with numerous amygdales of fine-grained quartz (chalcedony) often streaked by flow. Immediately to the north of the line of crags a junction made by dark glassy plagioclase-porphyry with steeply inclined flow banding is very well seen.

18. [NR 9462 3277] Good examples of typical andesites and andesitic breccia may be examined on the knolls east of the summit. From the summit a good view over the complex can be obtained; northwards lies the Binnein na h-Uaimh centre, while to the northwest the numerous light-weathering crags indicate the abundant development of felsites.

19. [NR 9457 3293] The traverse continues down the gentle slope north of the summit for about 180 m across small exposures and boulders of plagioclase-porphyry succeeded at locality 19 by outcrops of basaltic breccia. These become andesitic westwards and pass into a diversity of andesitic (ash-grey in fracture and pale-weathering) and basaltic (greenish-black in fracture and rusty-weathering) breccias and agglomerates which occupy much of the northeastern slopes of the hill.

20. [NR 9450 3298] At this locality, between the two small outcrops of basaltic rock at localities 19 and 21 (q.v.) occur extensive exposures of agglomerate with conspicuous and often well rounded fragments of felsite.

21. [NR 9436 3298] Massive basalts and basaltic breccias are exposed beside the little loch at this locality.

The rock-types represented at localities 19 and 21 are interpreted by the writer as remnants of the updomed floor on which the Ard Bheinn volcano was built.

22. [NR 9443 3299] Here a dyke-like mass of felsite forms a prominent crag. Along its northwestern margin it shows against the agglomerate a transitional zone of felsite, breccia and tuff in all stages of mechanical mixture with the agglomerate (King 1955, p. 338). The details of the process can of course only be appreciated under the microscope.

23 [NR 9451 3309] and 24. [NR 9447 3317] The traverse down to the hollow just before the ascent to Binnein na h-Uaimh shows agglomerates commonly containing abundant fragments of felsite, often with basalt in addition, and sometimes with sedimentary debris also. At locality 23 a gently dipping layering can be seen, while below felsite forms an elaborate pattern of outcrops, the main mass of which, with highly tortuous boundaries can be traced for about 800m to the east.

25. [NR 9432 3319] Here a ridge just beyond the hollow is seen to consist of basaltic breccias and agglomerates, the fragments including a wide variety of basaltic types—olivine-basalt, tholeiite, and felspathic basalt. Andesites are also represented.

26. [NR 9446 3339] An extensive area of plagioclase-porphyry marks the approach to the summit. It is notable for the fact that locally it is made up of large blocks, often some metres across, although in places the blocky character is recognisable only from the haphazard orientation of the flow-banding.

27 [NR 9438 3349] and 28. [NR 9432 3358] The summit area is occupied by a felsite breccia and a remarkable agglomerate composed of large cobbles of felsite (27), while the steep western slopes show extensive outcrops of a coarse sedimentary agglomerate, resembling a conglomerate; indeed it is very largely made up of pebbles derived directly from Old Red Sandstone conglomerate (28).

29 [NR 9422 3363] and 30. [NR 9427 3366] The lithology and structure of the northwestern spur (29) and lower slopes (30) of the Binnein summit are exceedingly complicated and require lengthy examination. Basaltic breccia and agglomerate, sometimes containing very large blocks of basalt; actual masses of basalt; andesitic breccia; coarse sedimentary "conglomerate"; felsite agglomerate; and all possible variations of and gradations between, these types, show a crude layering inclined at about 20 degrees to northeast—an arrangement best appreciated at a little distance.

Rapid lateral transitions occur between different types of agglomerate, but in places perfectly sharp, steep junctions are seen as at locality 30. Intrusive relations are again suggested by the sheeted mass of plagioclase-porphyry at locality 29. The impression conveyed is that of a diversity of deposits, partly sub-aerial, partly intrusiv (2, varying from strictly volcanic products in origin to the deposits of volcanic landslips, the whole representing the elements of a volcanic superstructure, cut across during its development by intrusive porphyries and agglomerates.

Excursion 14b: Ard Bheinn area (continued)

31. [NR 9404 3357] Here, at the "Pigeon Cave", white crystalline limestone of Cretaceous age is seen passing under basalt, the latter forming the northern extremity of a belt which can be traced for about 400m along the western slopes of Binnein na h-Uaimh. The basalt is normally margined by agglomerate but at or near the lower boundary masses of a fine-grained sandstone occur at localities 32 [NR 9389 3353] and 33 [NR 9404 3360]. Immediately below the latter gabbro is encountered; this is a rather fine-grained rock with a close jointing evidently related to the parallelism of the plagioclase crystals.

34. [NR 9409 3377] Along the southwestern margin of the gabbro is a finer-grained contact phase which proves on sectioning to be a tuff composed of fragmented gabbro (King 1954).

35. [NR 9382 3359] Here a contact with granite should be examined; the granite is obviously later than the gabbro since it veins and acidifies it.

36. [NR 9372 3371] After traversing the marshy depression to the west the margin of the Creag Mhòr granite is reached. Only at this locality can the contact margin be examined. The smoothly arcuate boundary elsewhere suggests that the granite intrudes the agglomerate, but here, careful search revealed a tiny patch in which agglomerate penetrates and fragments the granite. It is easily demonstrable also that the agglomerate contains many fragments of granite in the vicinity of the contact.

37. [NR 9447 3416] To reach this locality the marshy divide should be recrossed and the slope marking the eastern margin of the other granite mass followed. Here, in a series of prominent outcrops, the contact relations between granite and vent-agglomerate are well exposed. The agglomerates are strongly hornfelsed and re-crystallisation of the various fragments is clearly seen; ultimately the fragments become shadowy and indistinct and the matrix resembles a fine-grained granite or granophyre (King 1955, p. 346).

From locality 37 a detour may usefully be made to examine the felsites and their contacts in the area of Leana Cuil and Creag Dubh.

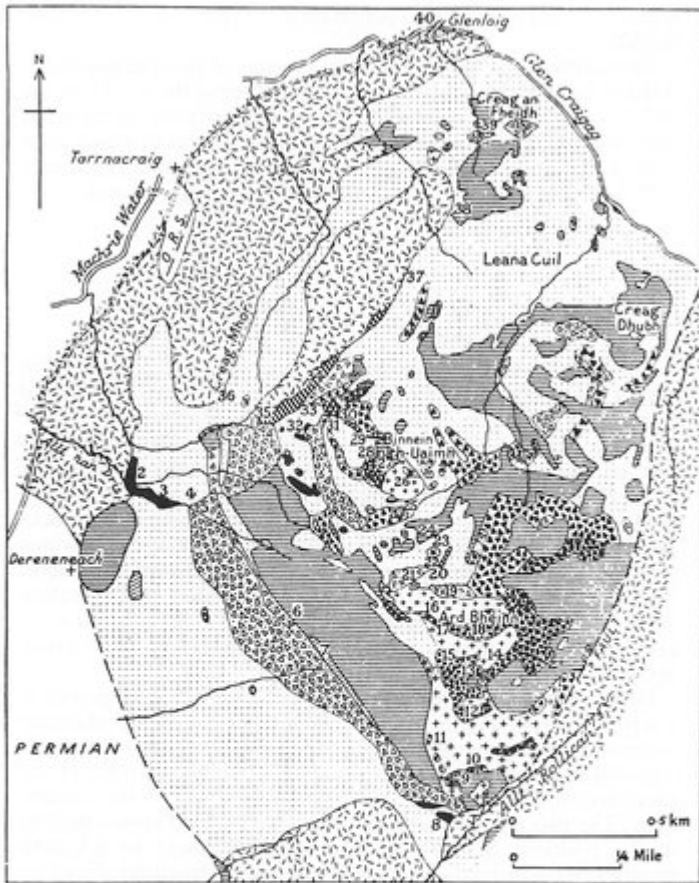
38. [NR 9461 3431] Examine the felsite at this locality; although it is later than the agglomerates it is demonstrable from the examination of thin sections that it was re-crystallised together with the adjacent agglomerates in the granite aureole.

39. [NR 9465 3458] Traverse the felsite until a small stream is reached which makes a rapid descent down a steep gully. Here a second cave, enlarged by quarrying, has been formed in a mass of Cretaceous limestone, again overlain by basalt.

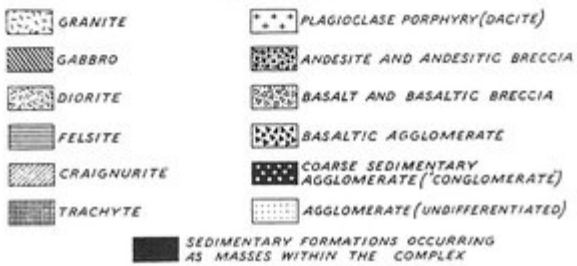
The great diversity of rock types in the vicinity of Creag na Fheidh suggests that it represents a minor volcanic centre.

40. [NR 9445 3493] Descend to Glenloig and just below the bridge examine good exposures of dioritic hybrid rocks, showing rapid variations in texture and composition.

References



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(Figure 18) Geological sketch-map of the area around Ard Bheinn in the Central Ring Complex, to illustrate Excursion 14.