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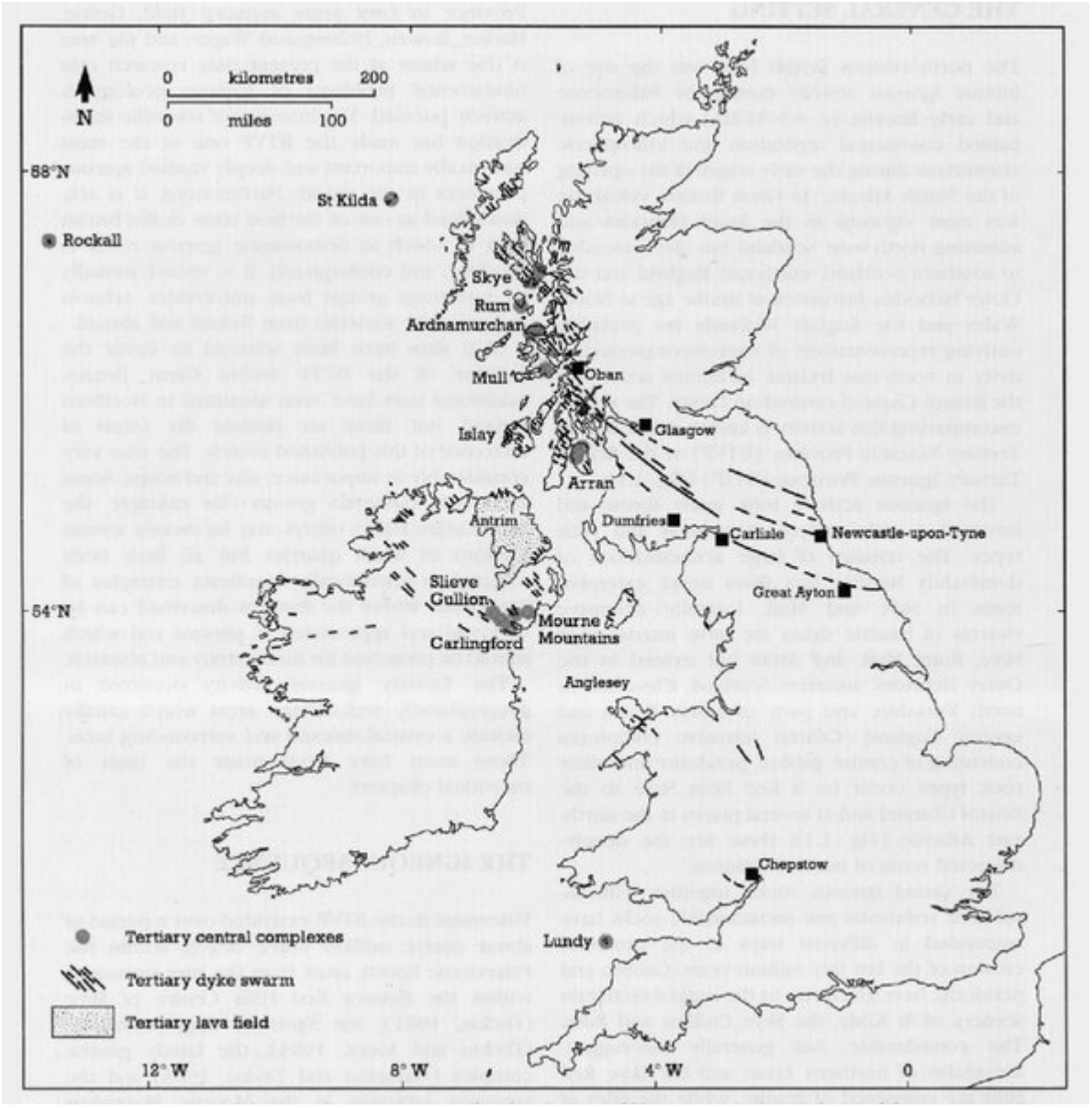

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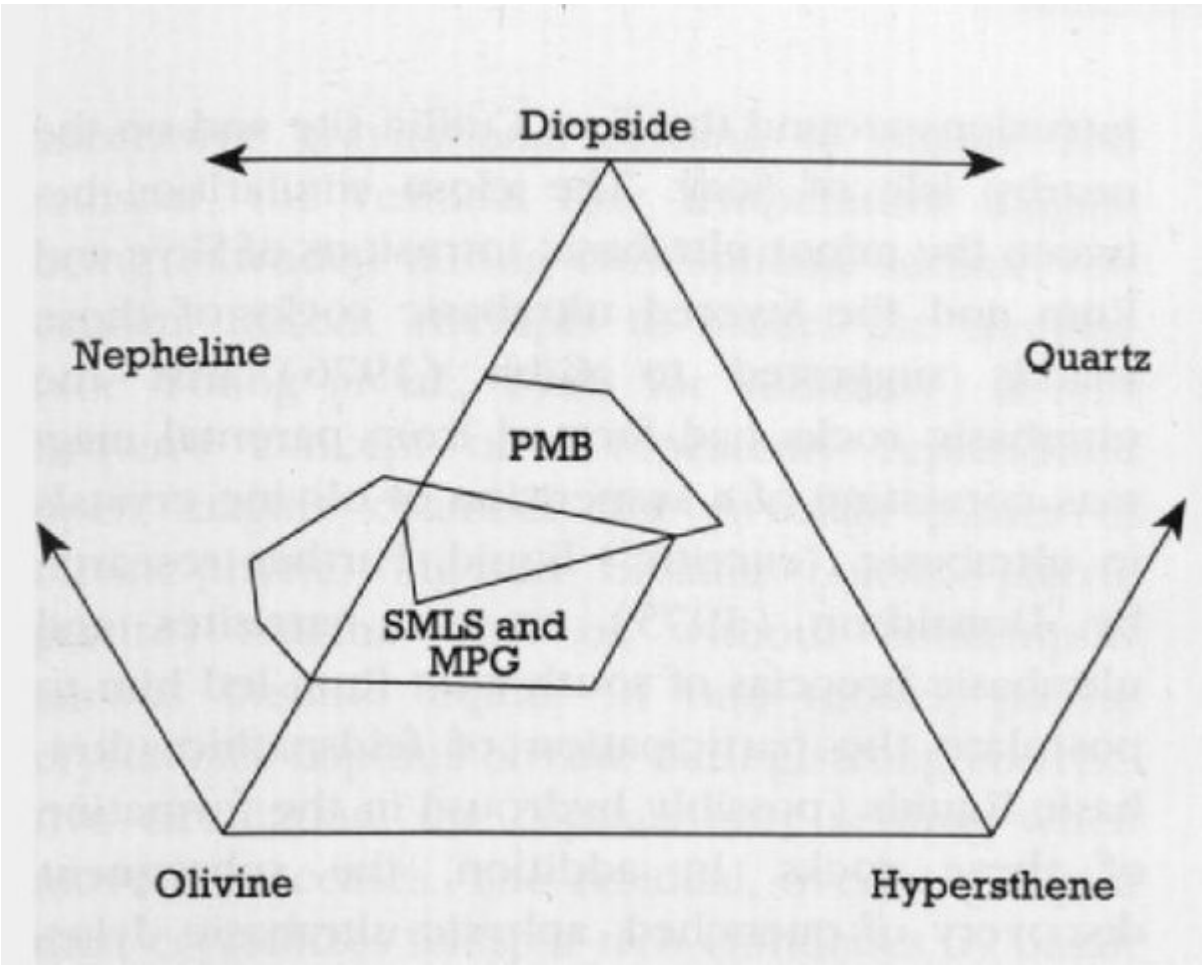

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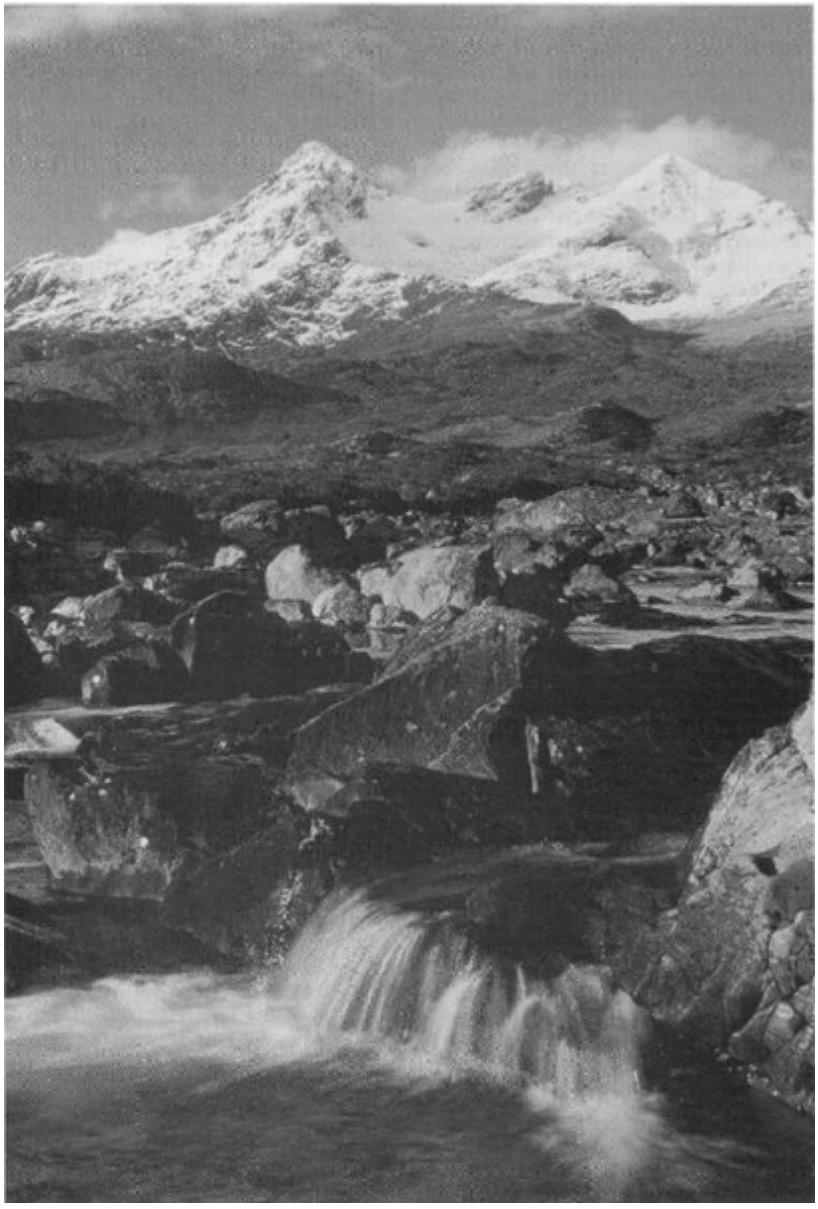

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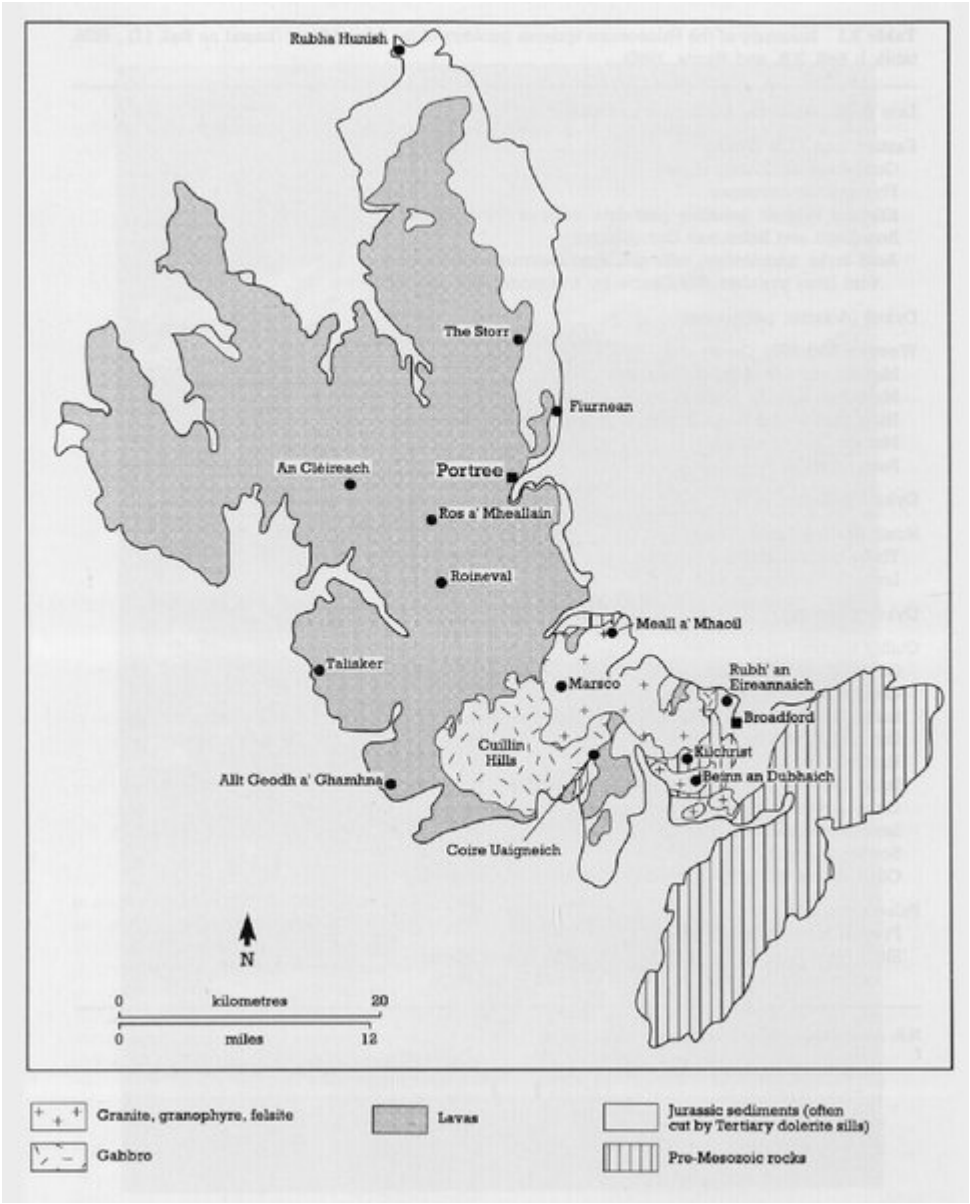

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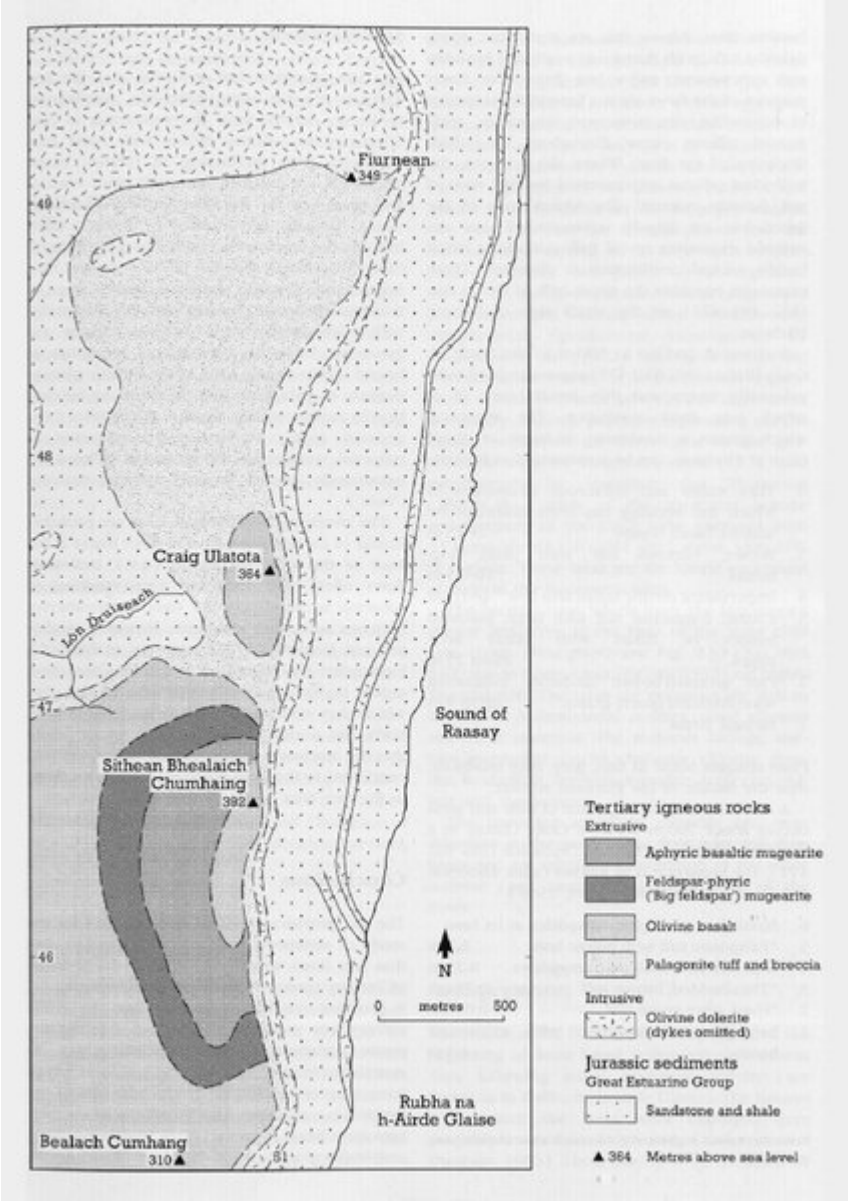

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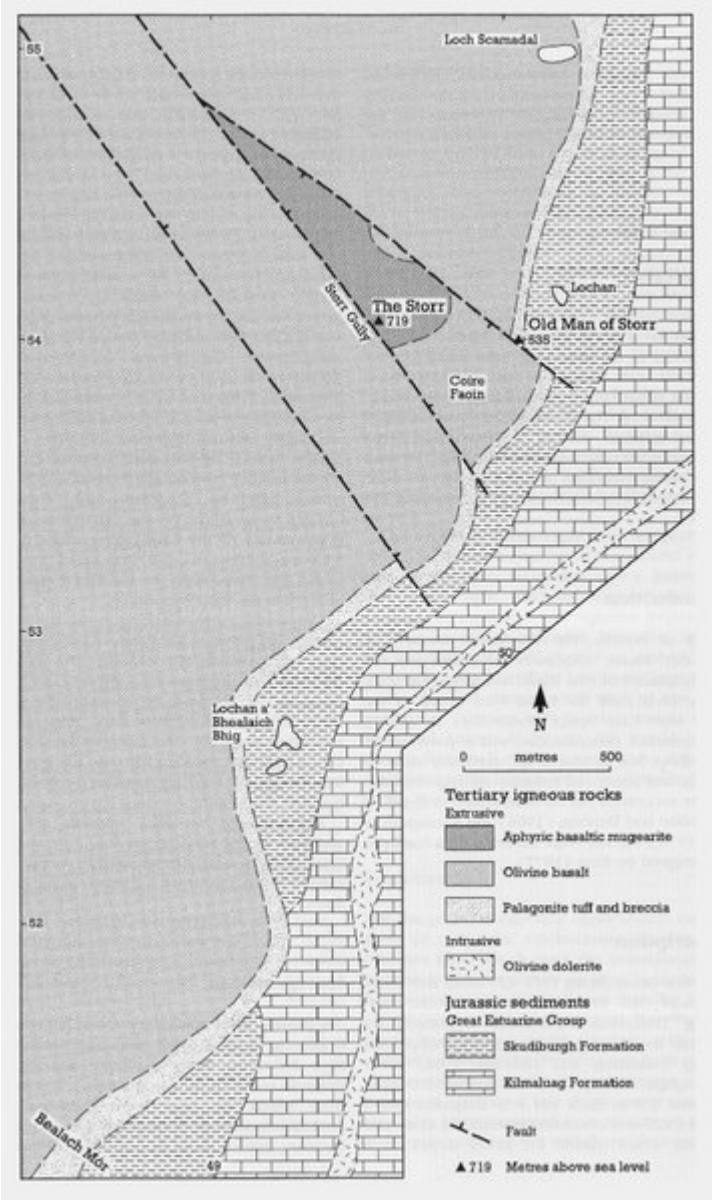

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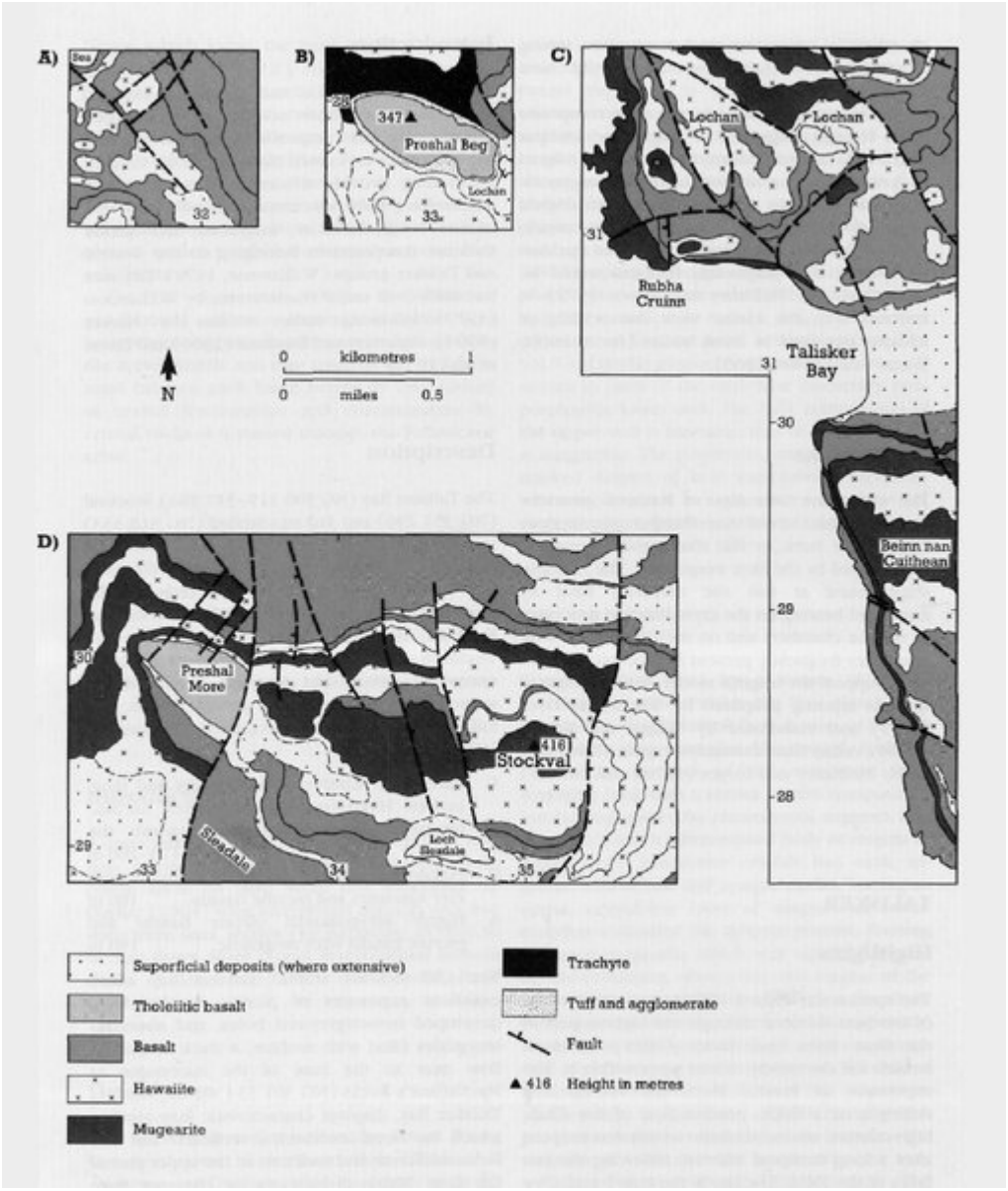

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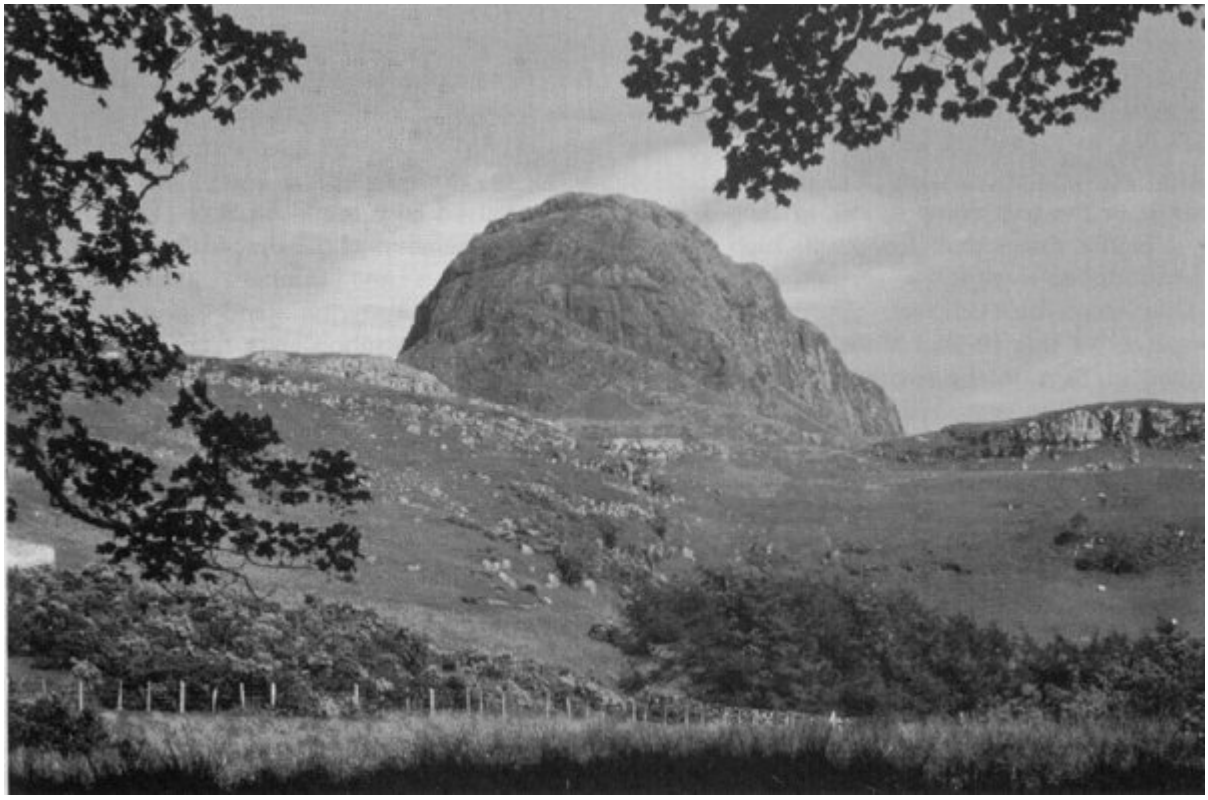

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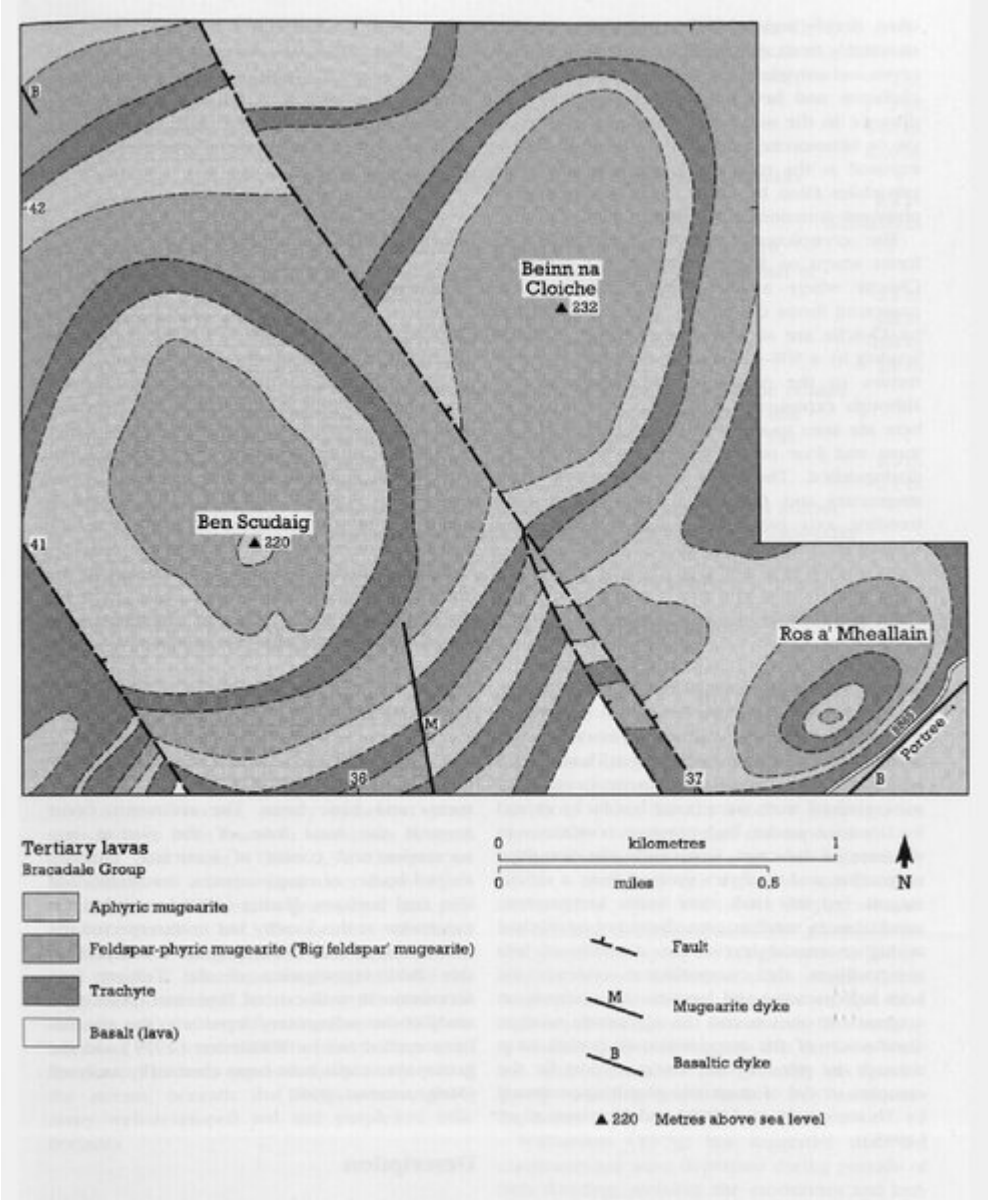

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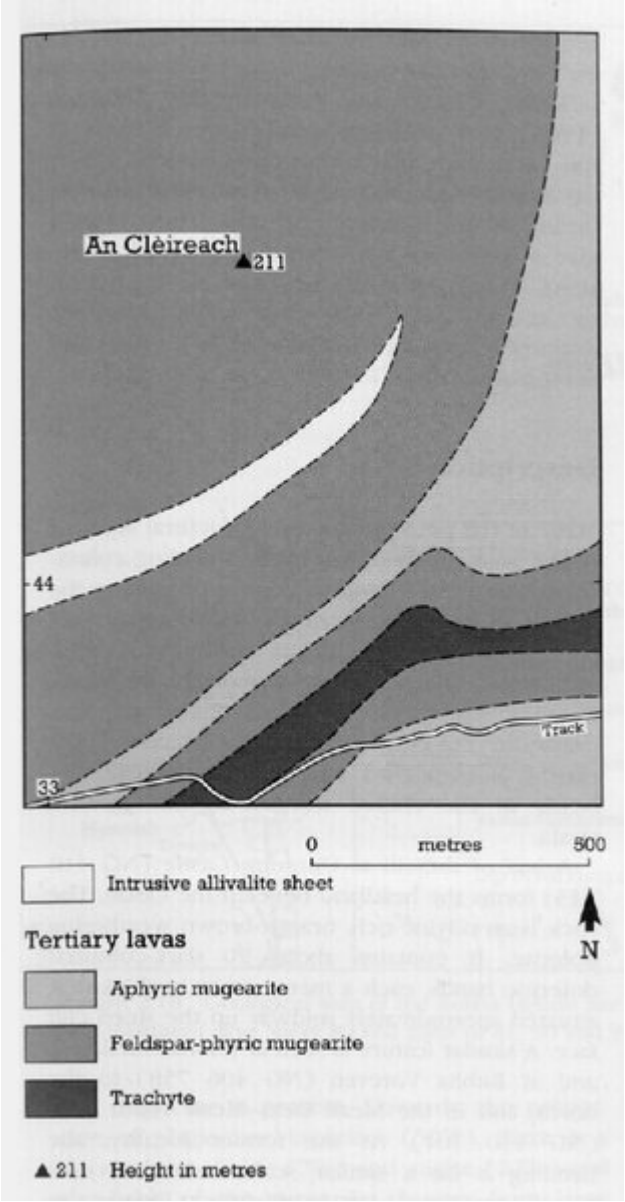

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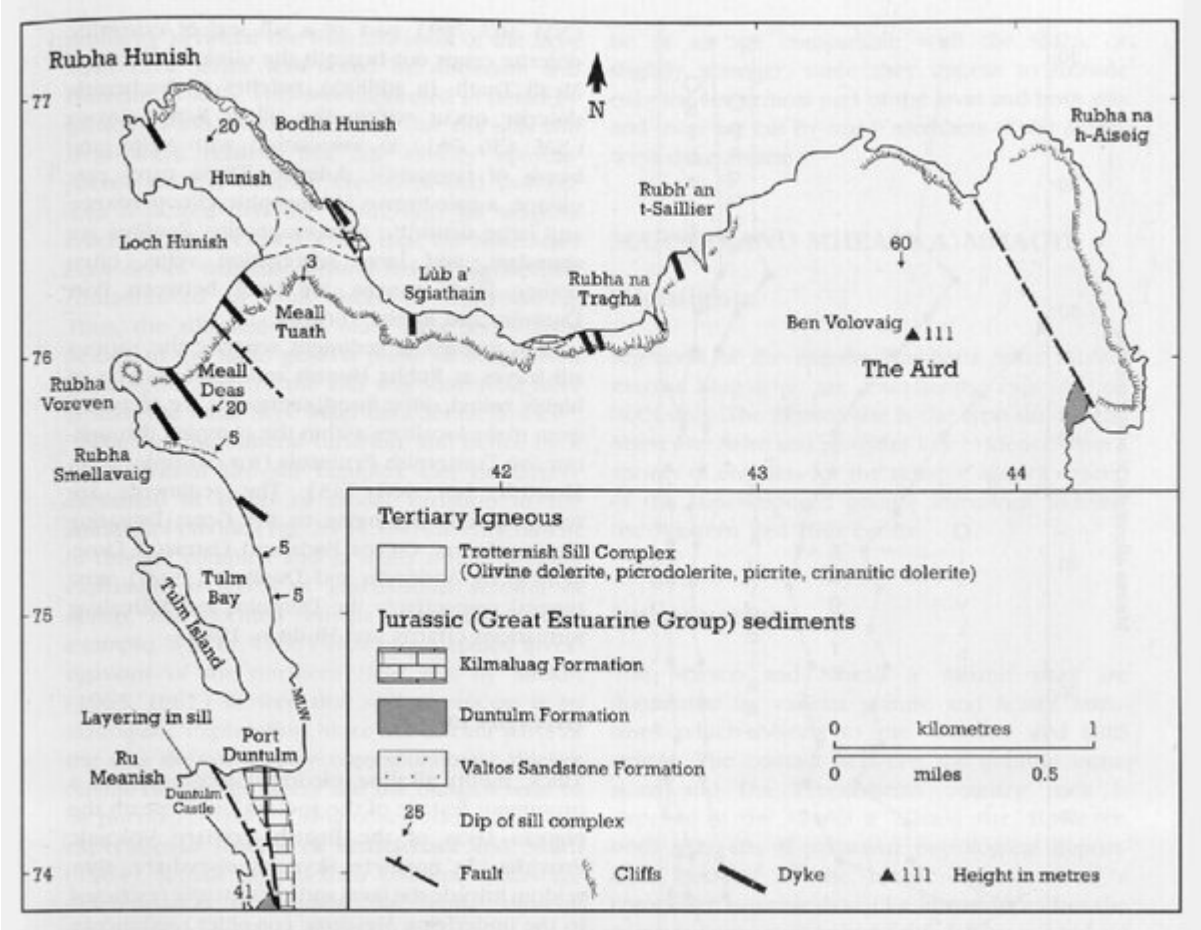

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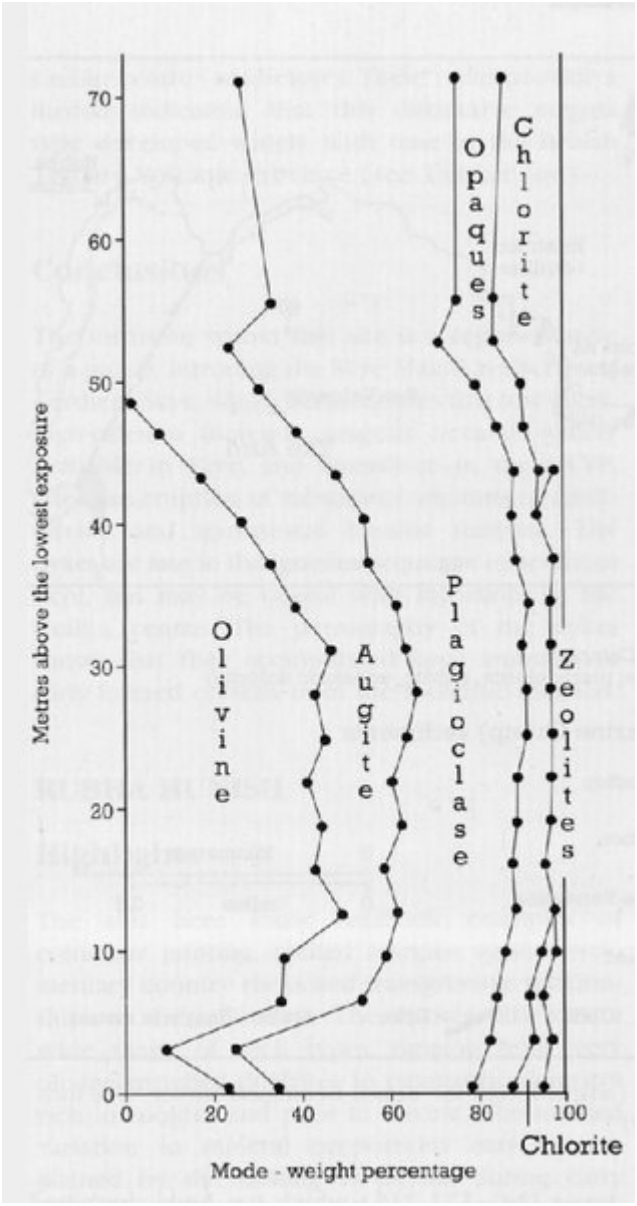

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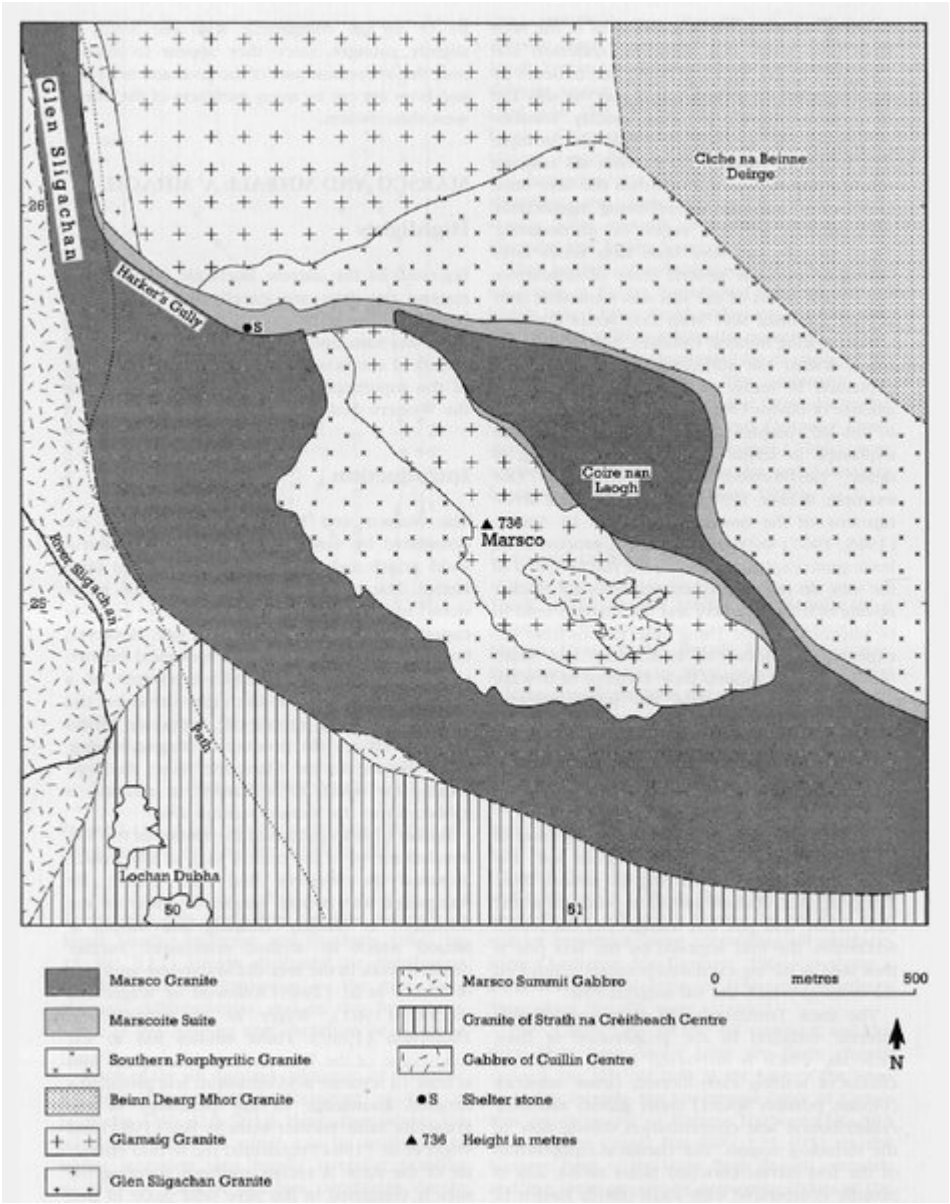

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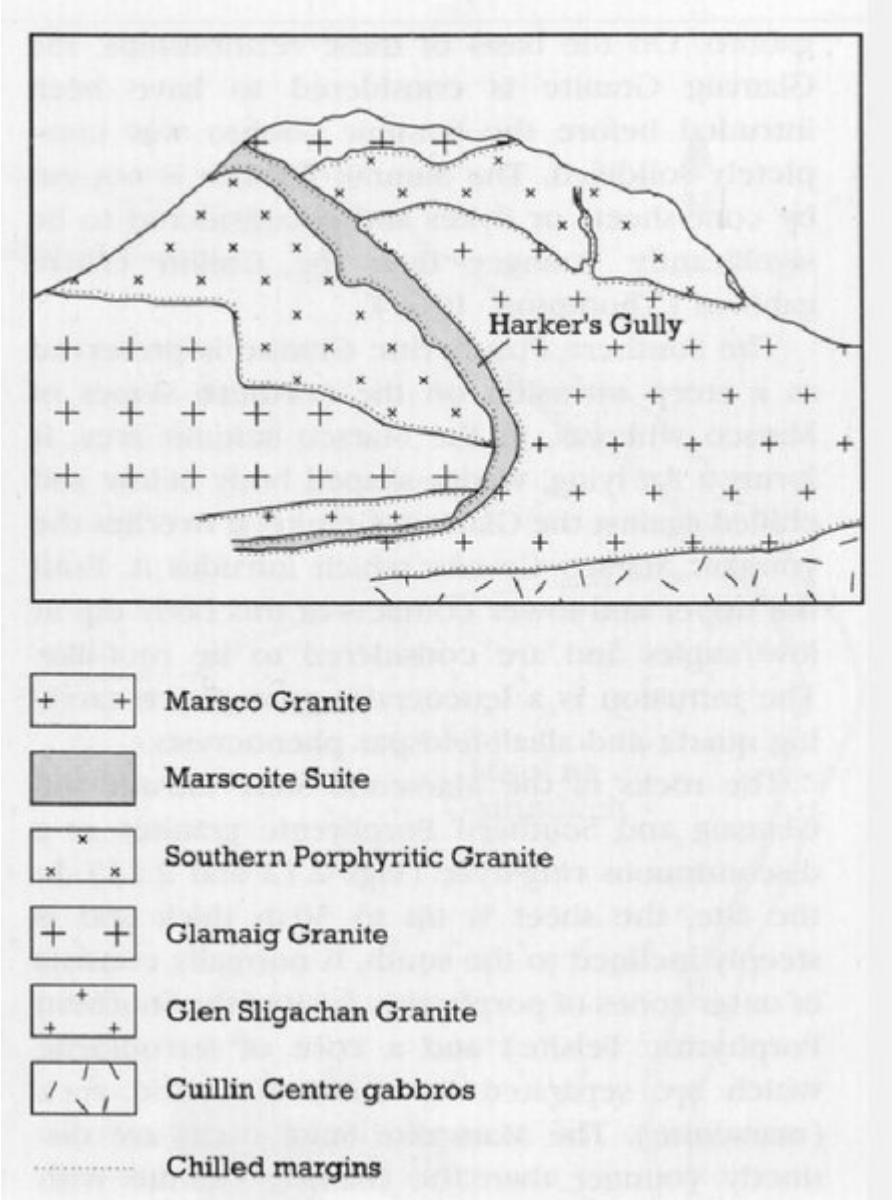

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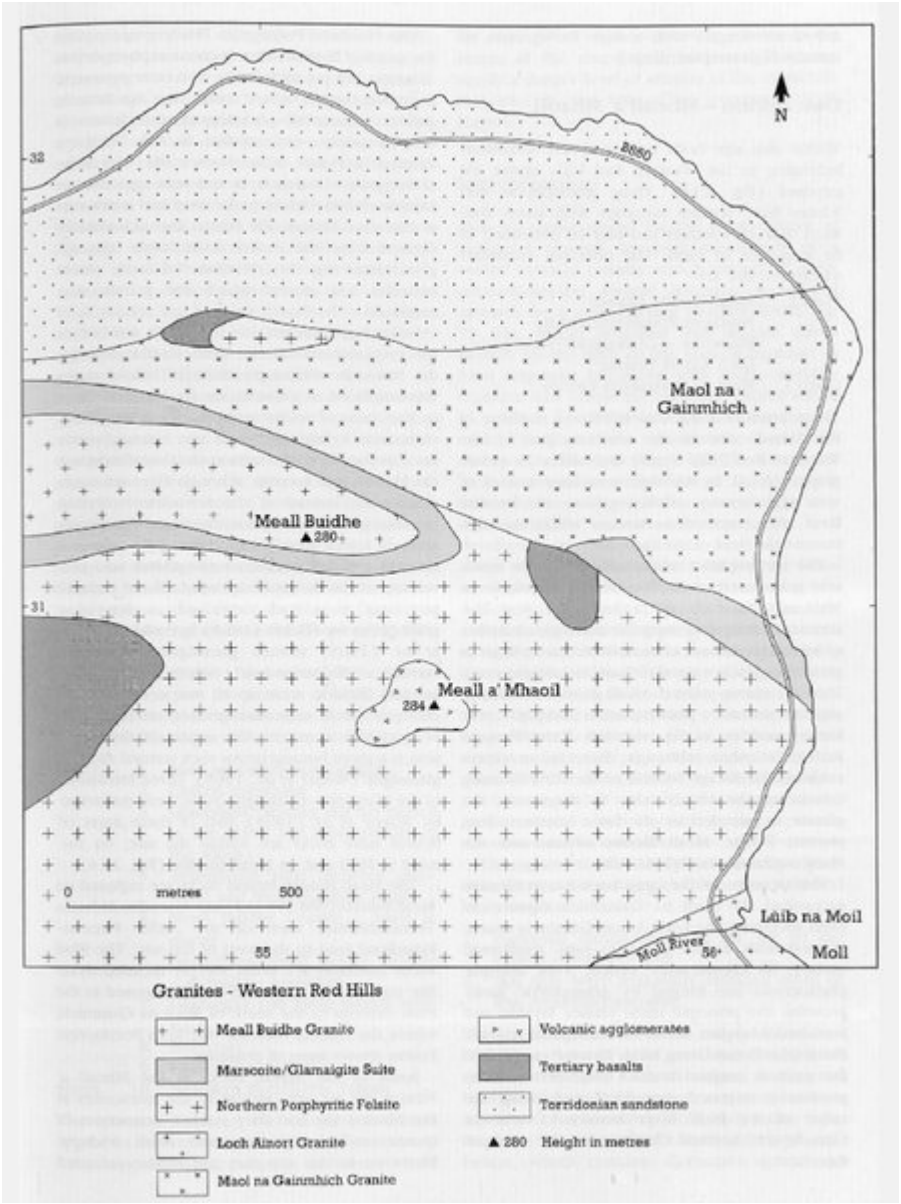

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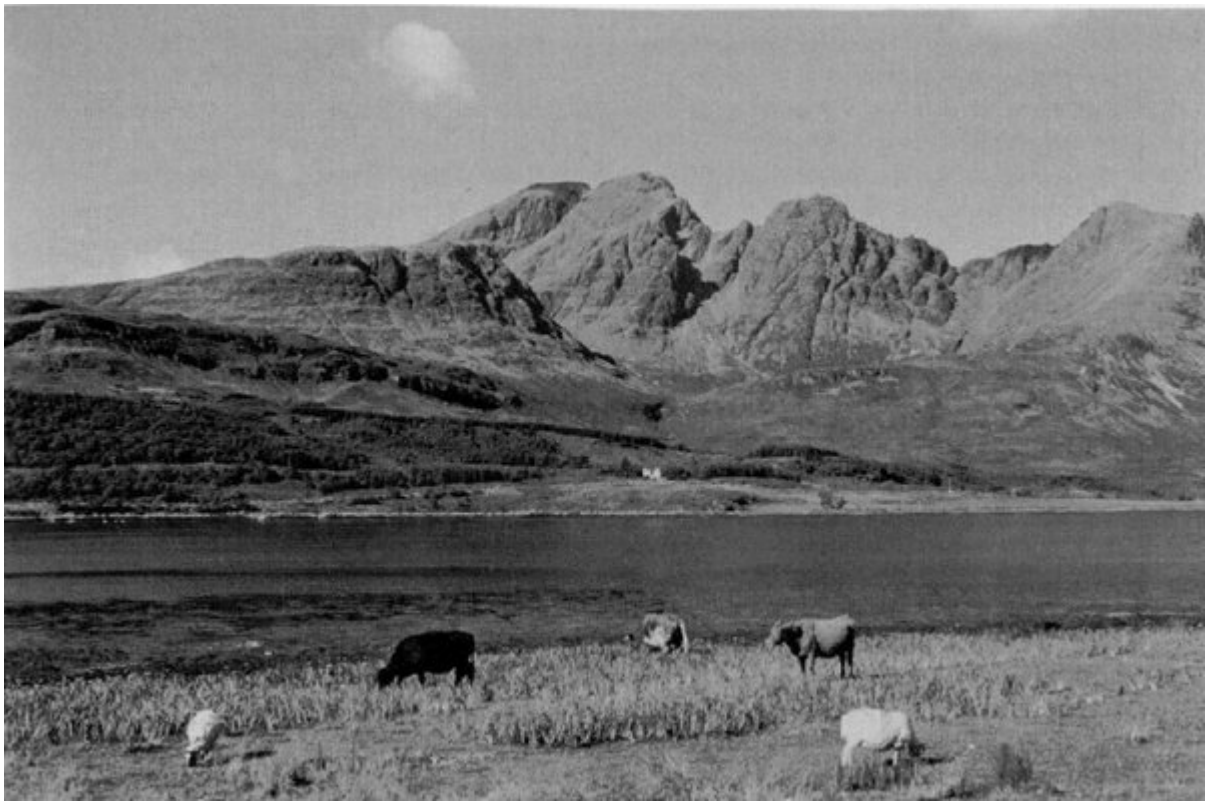
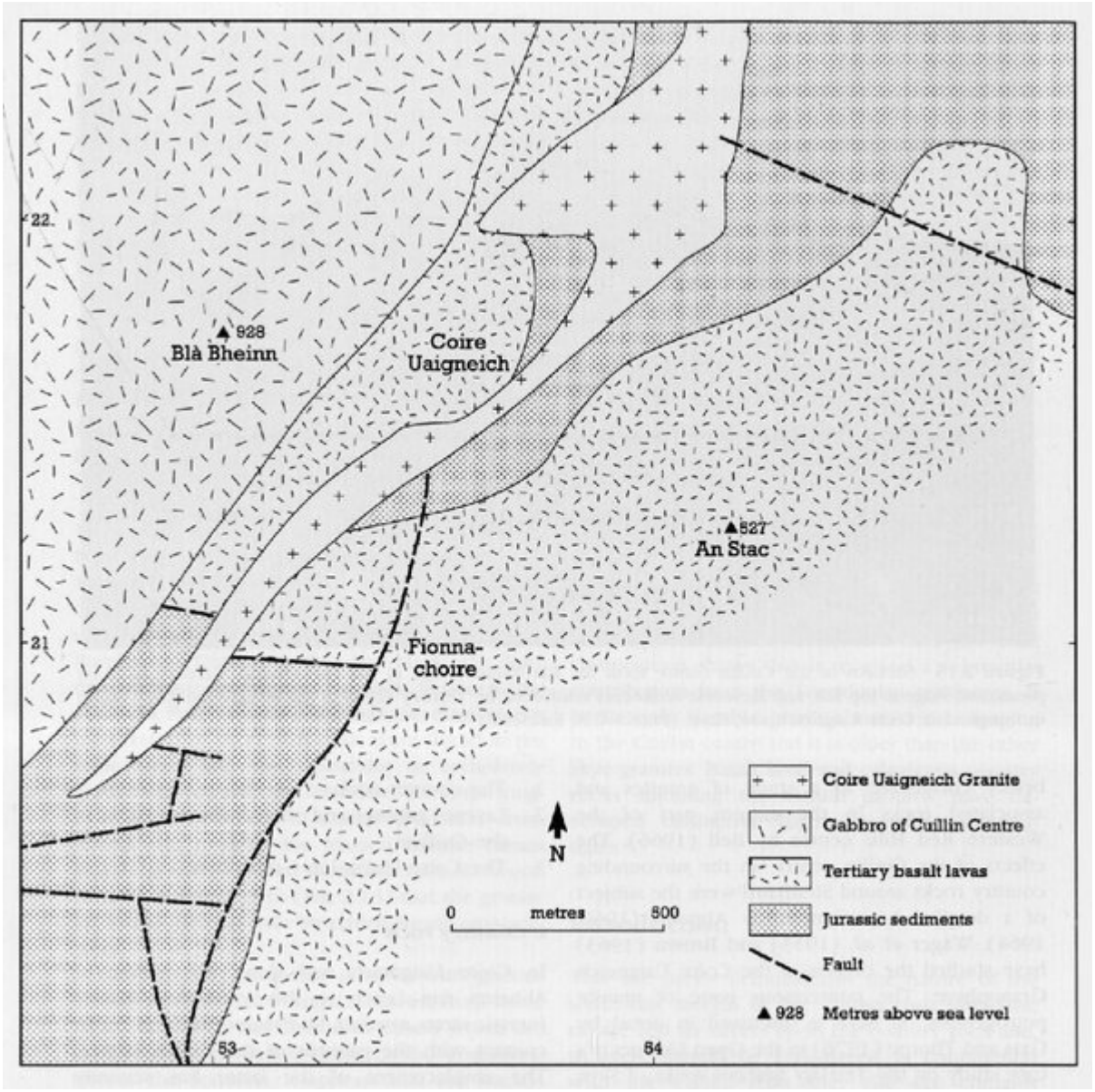
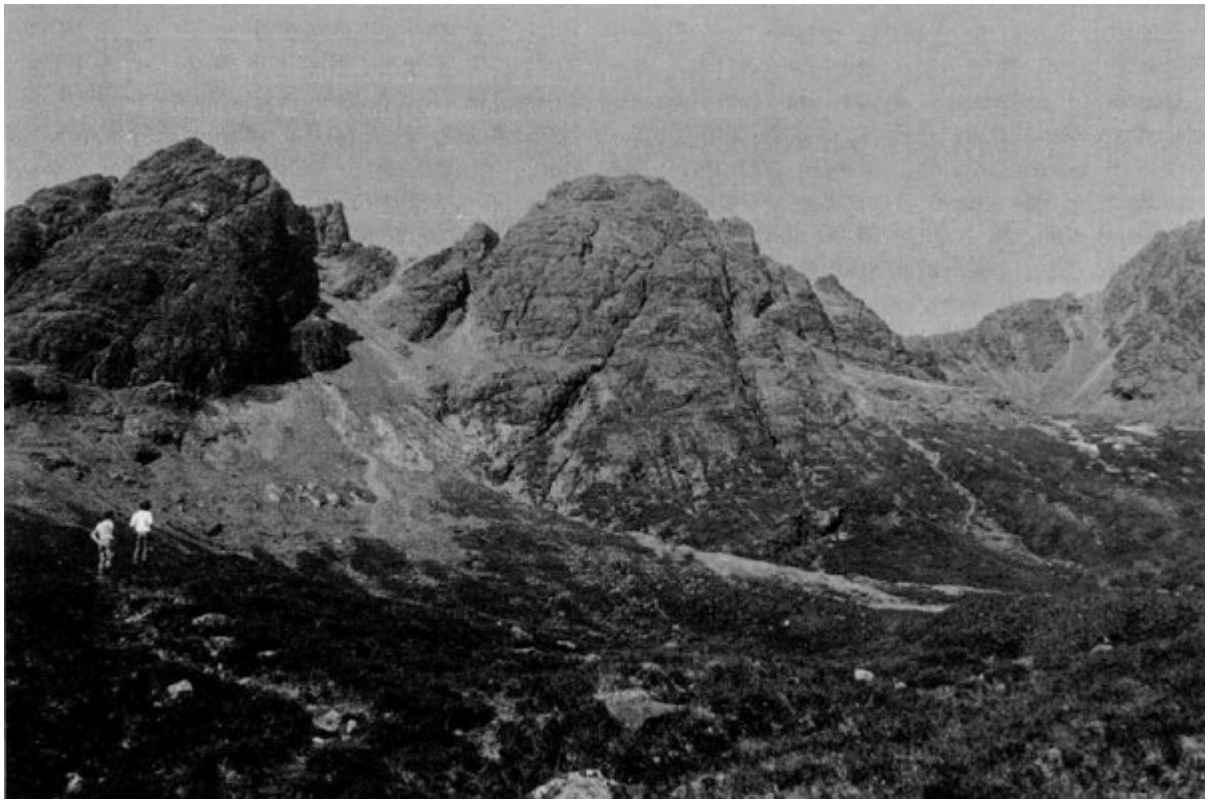


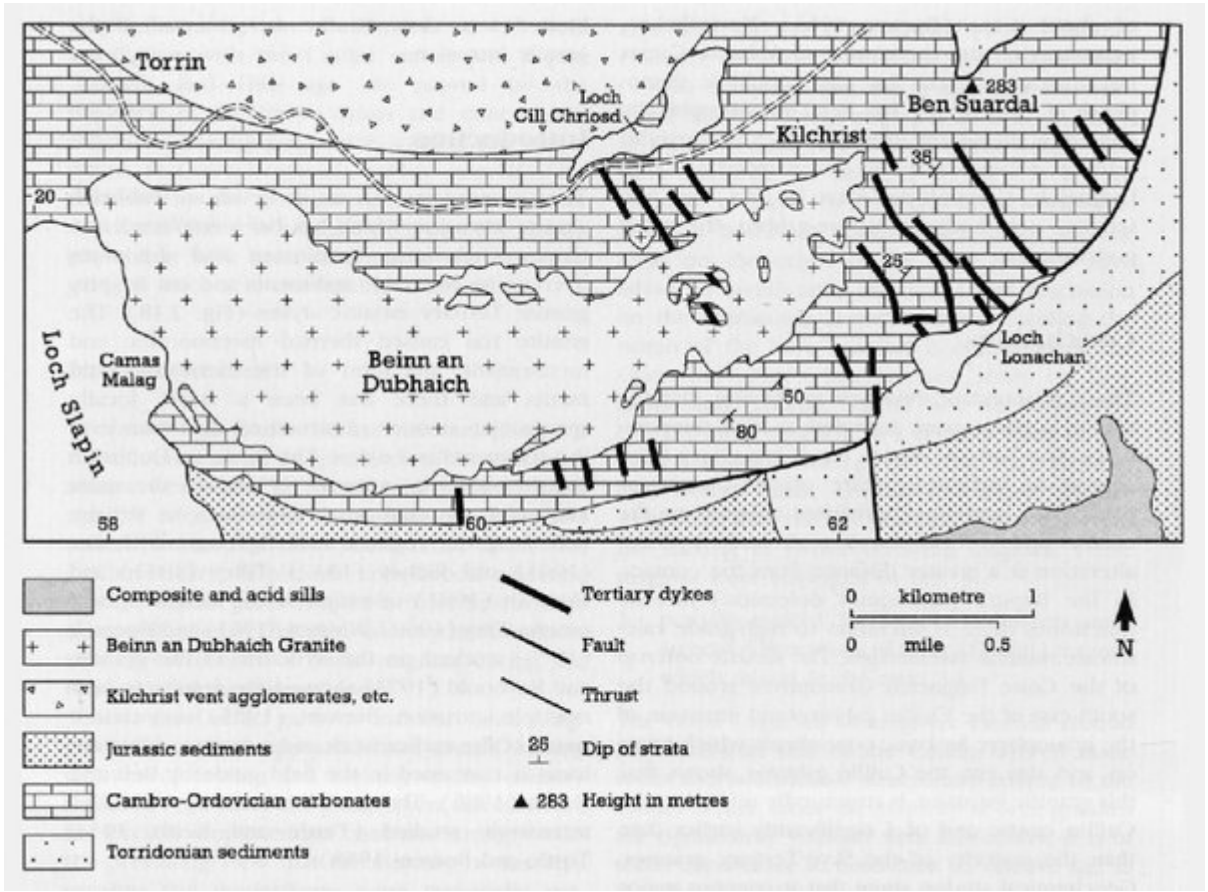
(Figure 2.15) Gabbros of the Cuillin centre form the Bla Bheinn ridge in the background, Tertiary lavas on prominent ridge in top left, and Mesozoic sediments reinforced by Tertiary sill(s) in left foreground. Loch Slapin in foreground. Coire Uaigneich site, Skye. (Photo: C.H. Emeleus.)



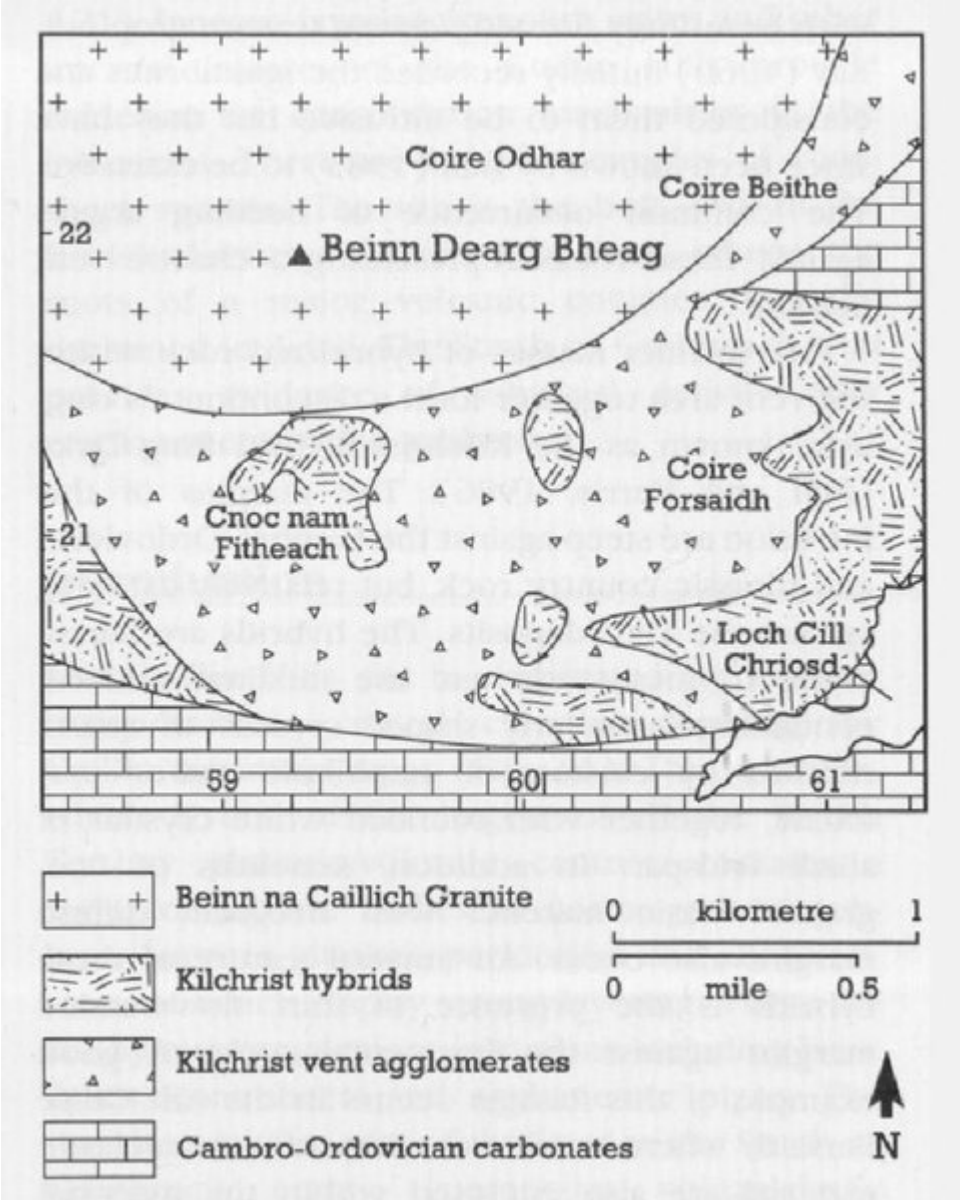
(Figure 2.16) Geological map of the Coire Uaigneich site (after Gass and Thorpe, 1976, figure 6).



(Figure 2.17) East face of Bla Bheinn formed by gabbros cut by later dykes (weathering to give notches) and cone-sheets (forming terraces on faces). Pale rocks at lower levels are the Coire Uaigneich Granite and Mesozoic sediments against the gabbros. Coire Uaigneich site, Skye. (Photo: A.P. McKirdy.)



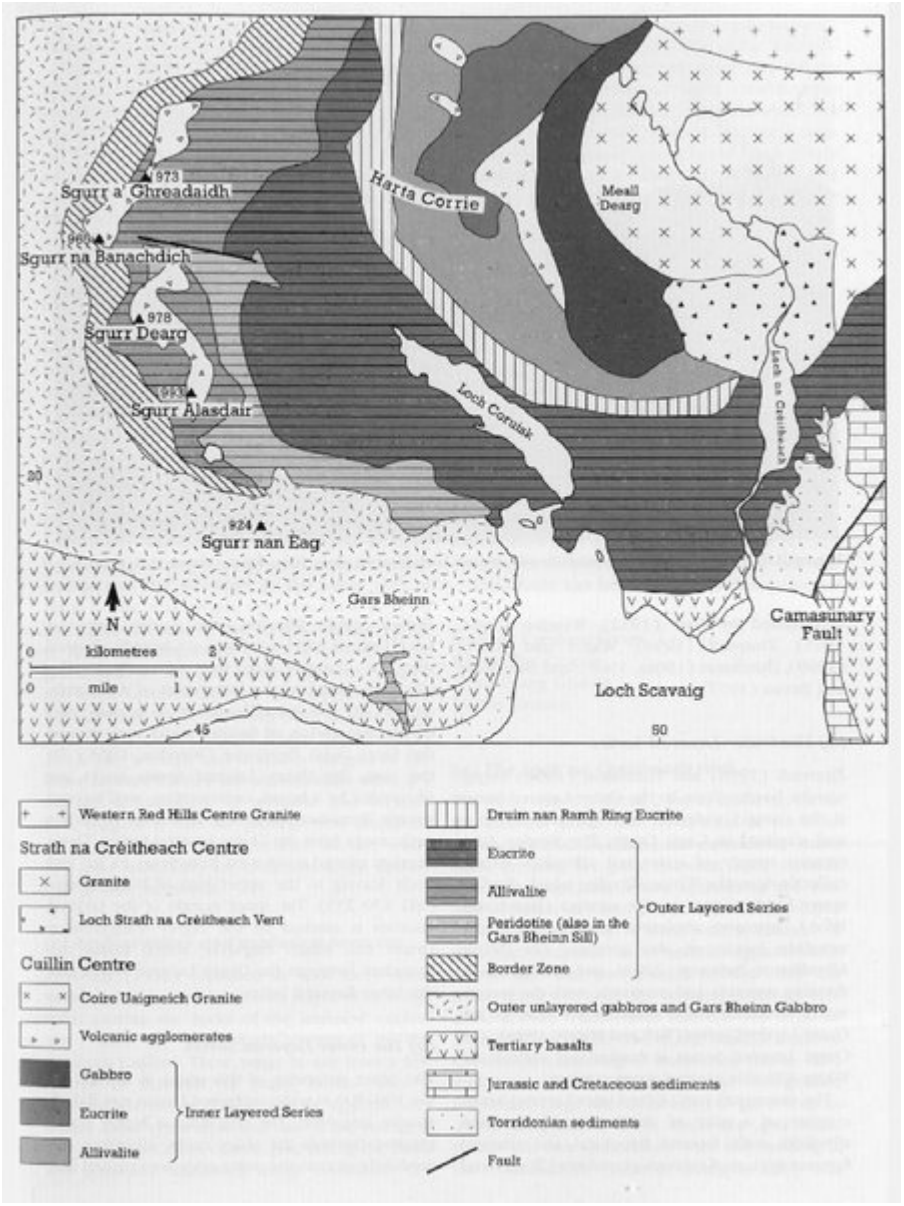
(Figure 2.18) Geological map of the Beinn an Dubhaich site (after Gass and Thorpe, 1976, figure 6).



(Figure 2.19) Geological map of the Kilchrist site (after Gass and Thorpe, 1976, figure 6).

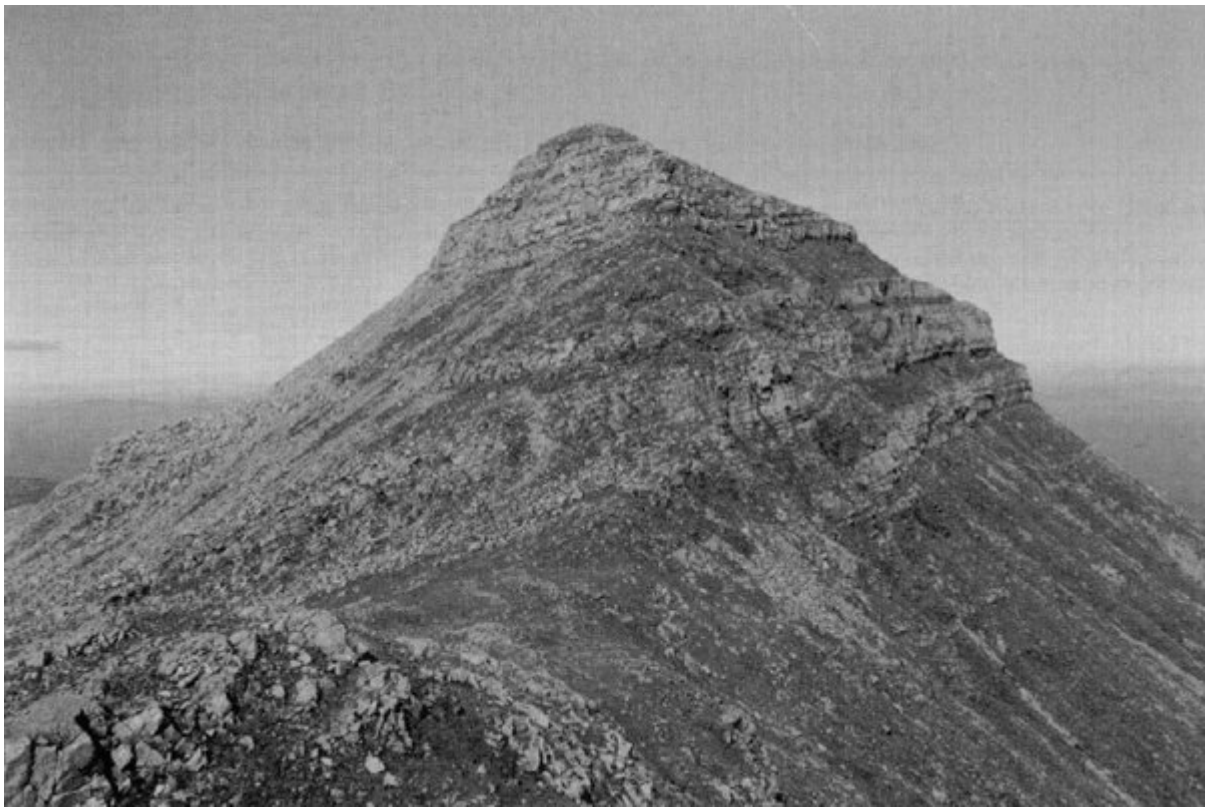
(Figure 2.20) Gabbros of the Cuillin centre form rough ground around Loch na Crèitheach in foreground, gabbro peak of Sgurr nan Gillean on left, and smooth-weathering mass of Marsco (Western Red Hills granites) on right. Cuillin Hills and Marsco sites, Skye. (Photo: C.H. Emeleus.)

(Figure 2.21) Rough-weathering gabbro on Bla Bheinn (right) contrasting with smooth-weathering granites of the Strath na Crèitheach centre (left). Jurassic sediments occupy the right foreground. Cuillin Hills and Marsco sites, Skye. (Photo: C.H. Emeleus.)

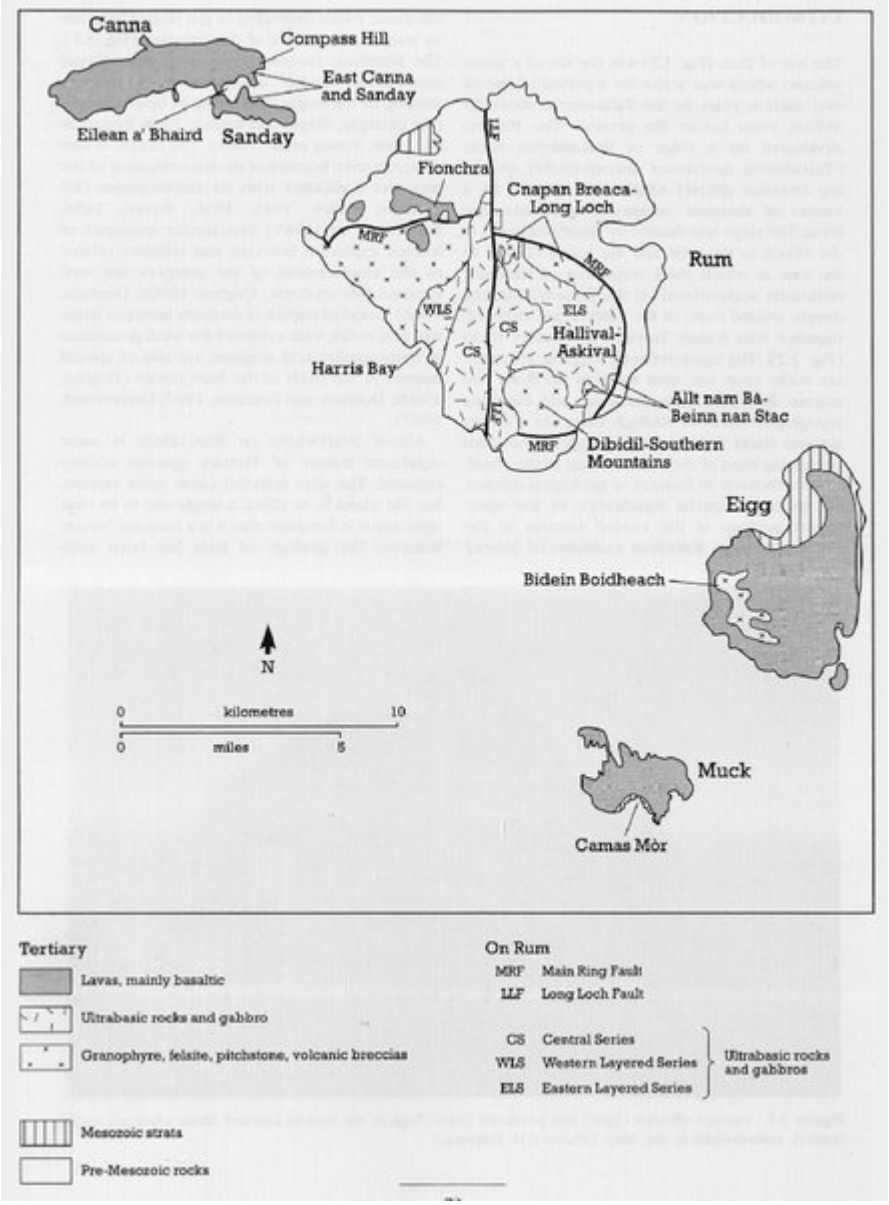


(Figure 2.22) Geological map of the Cuillin Hills site (after Gass and Thorpe, 1976, figure 6).

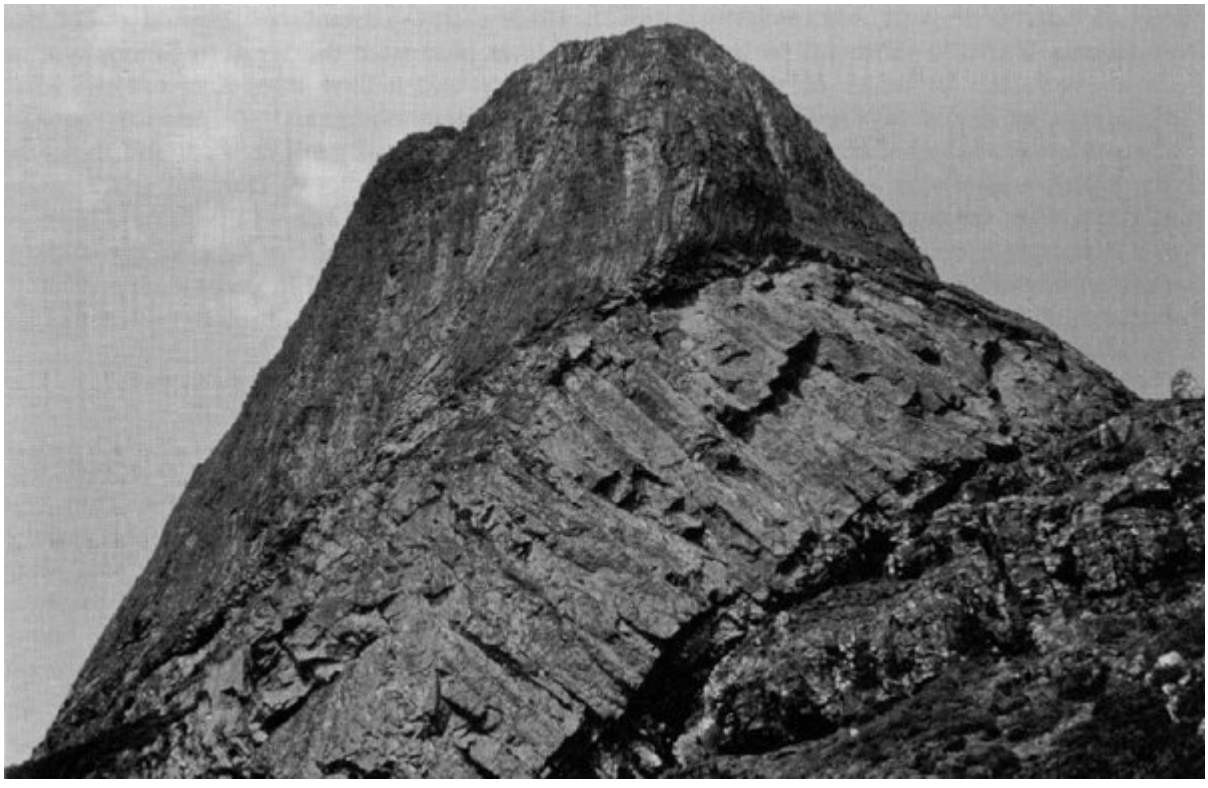
(Figure 2.23) Gabbros of the Cuillin Hills site around Loch Scavaig, Skye. From Elgol. (Photo: C.H. Emeleus.)



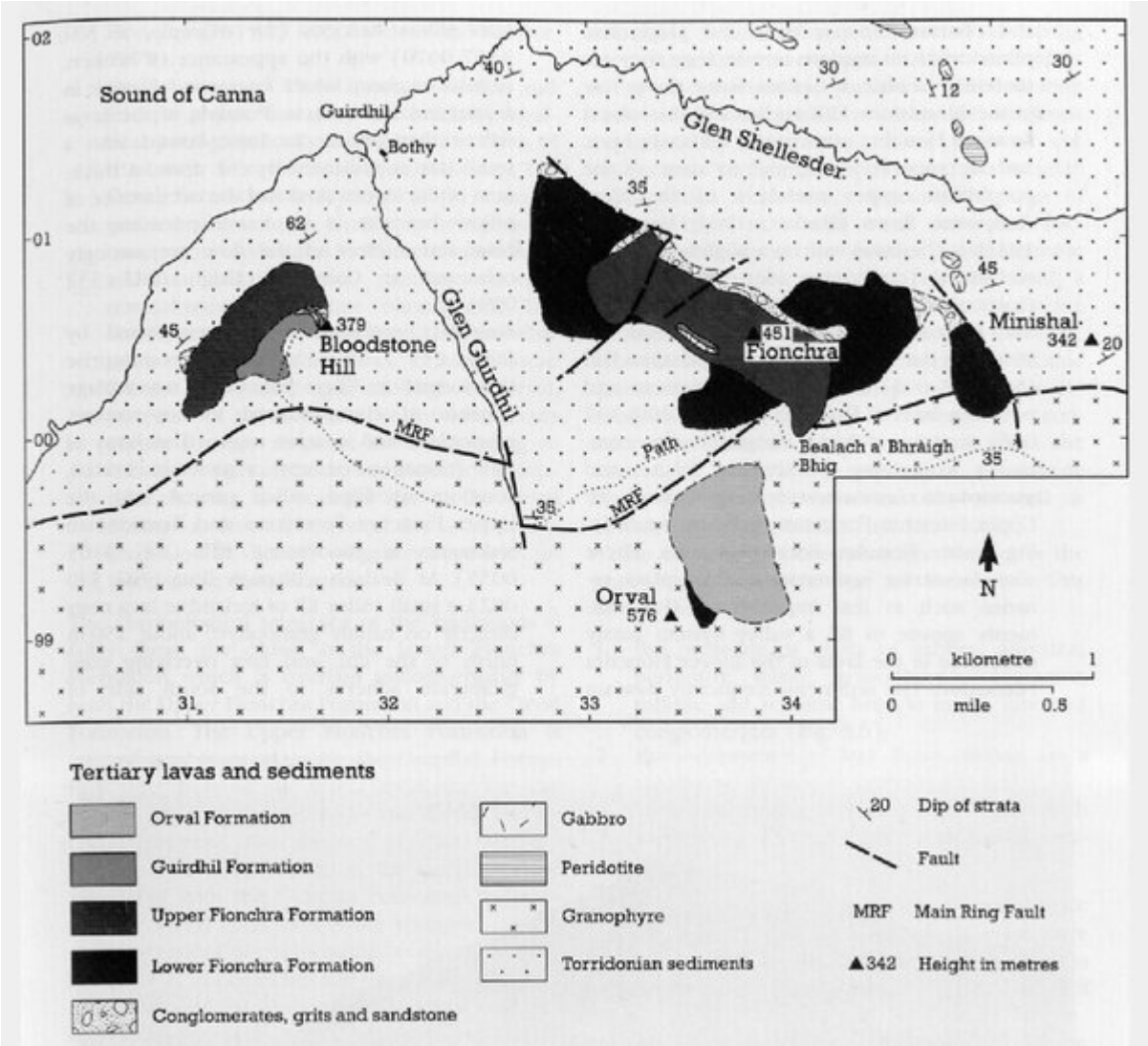
(Figure 3.1) Layered allivalite (light) and peridotite (dark) high in the Eastern Layered Series ultrabasic rocks, Hallival. Askival–Hallival site, Rum. (Photo: C.H. Emeleus.)



(Figure 3.2) Map of the Small Isles showing localities mentioned in the text.



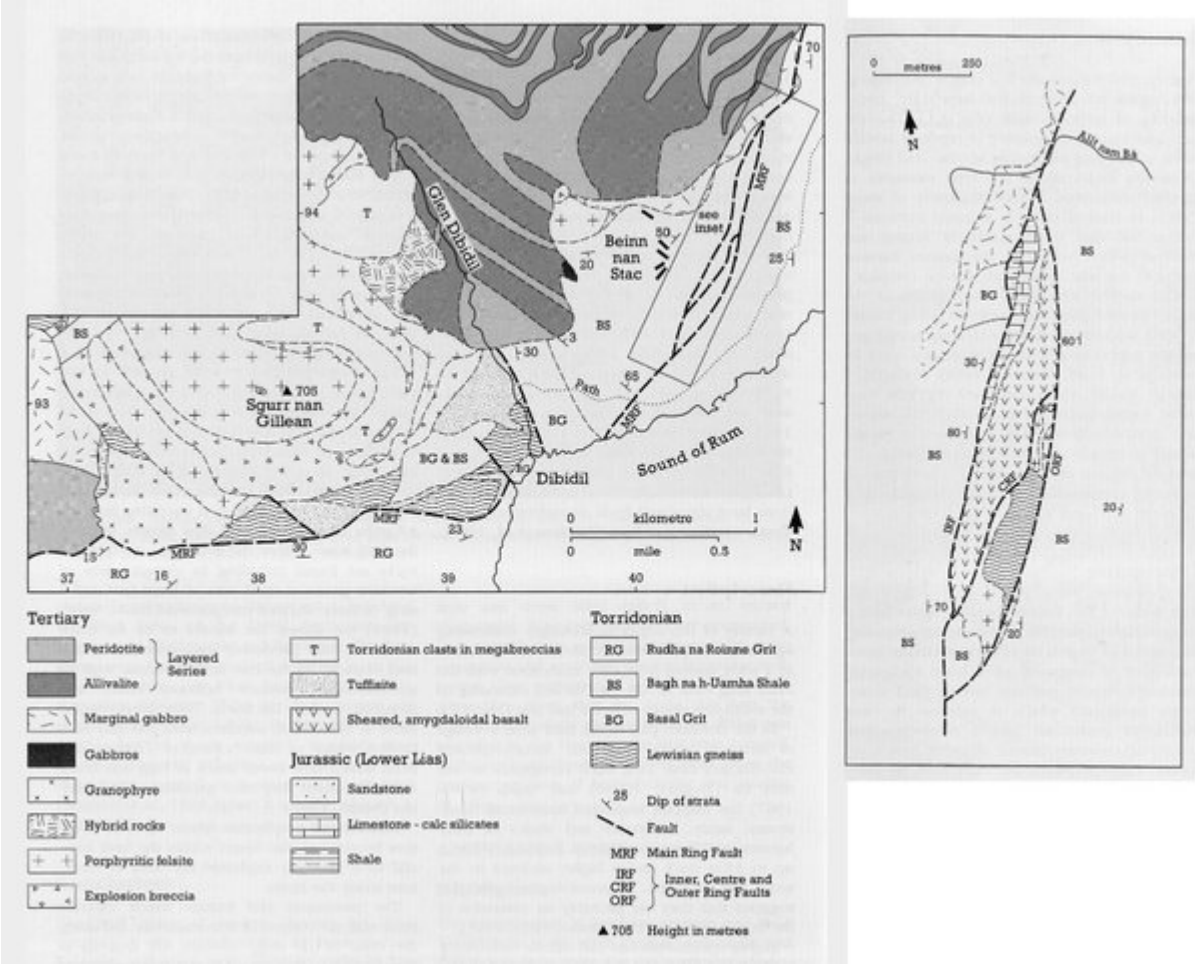
(Figure 3.3) The Nose, east end of Sgùrr of Eigg. Massive Eocene pitchstone flow overlies eroded Palaeocene basalt lavas. The pitchstone fills a steep-sided valley, columnar jointing is developed in the pitchstone perpendicular to the valley side (slopes top right to bottom left), but gives way to fine-scale, near-vertical jointing at higher levels. The individual lava flows cut out against base of pitchstone (bottom right side). South-west Eigg site. (Photo: A.P. McKirdy.)



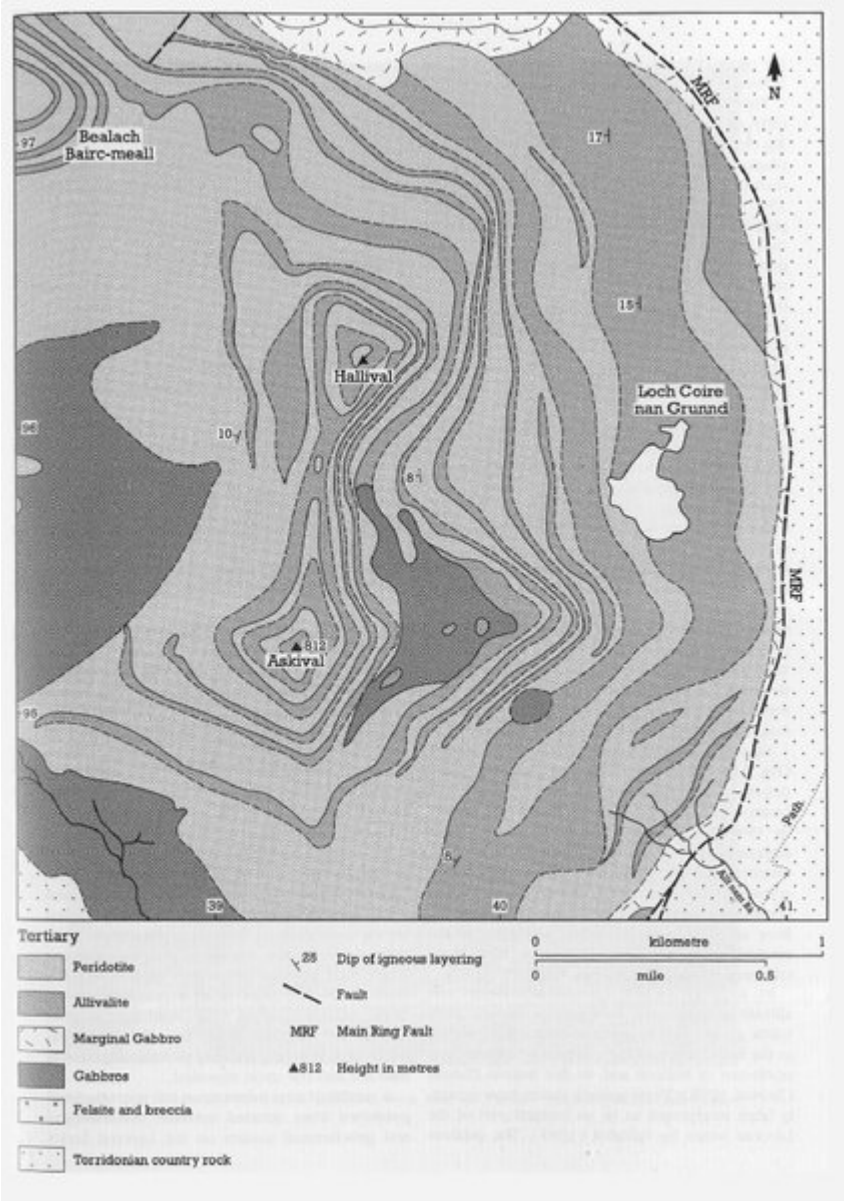
(Figure 3.4) Geological map of the Fionchra site, Rum (after Emeleus, 1980).

(Figure 3.5) Post-Central Complex basic lavas resting on an irregular surface of Torridonian sandstone. Fionchra site, Rum. (Photo: C.H. Emeleus.)

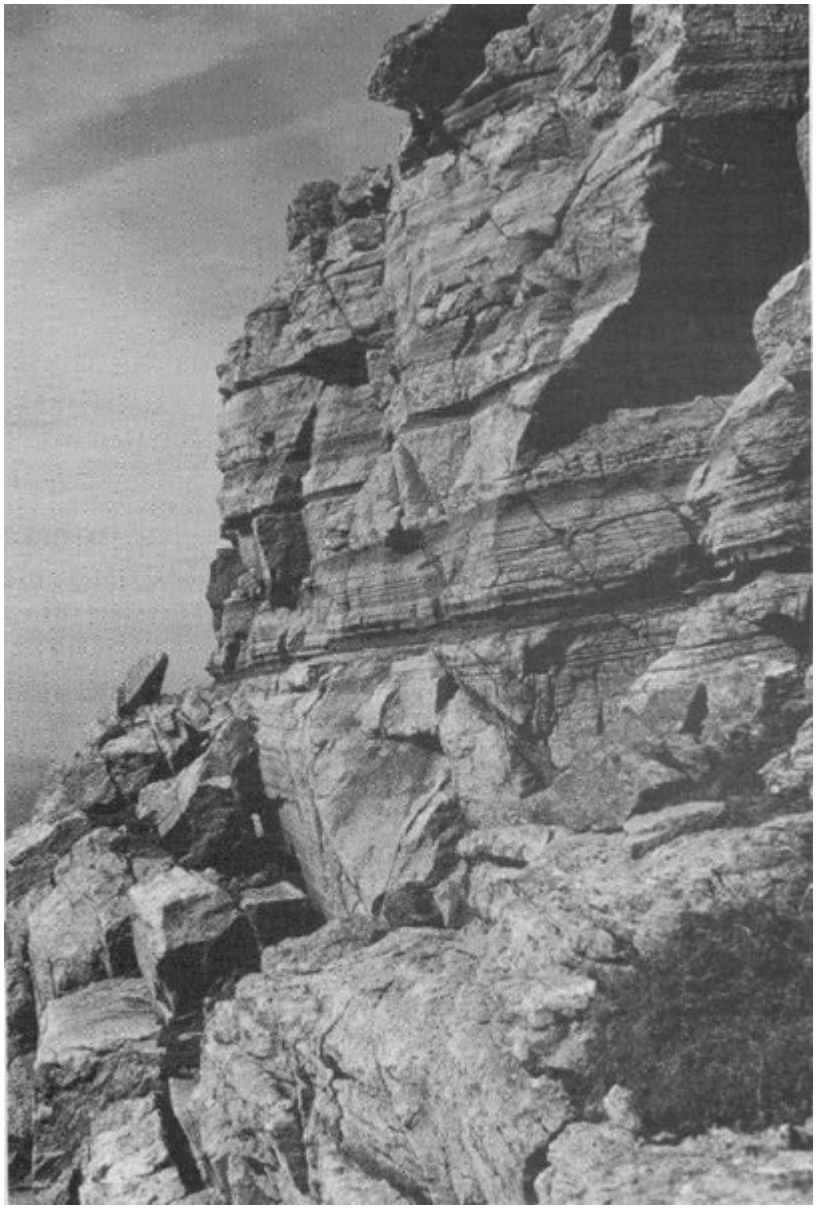
(Figure 3.6) Boulder conglomerate underlying flow-banded icelandite lava flow. The conglomerate contains granophyre, felsite and allivalite clasts derived from the weathering of the Rum Central Complex. South side of Fionchra. Fionchra site, Rum. (Photo: C.H. Emeleus.)



(Figure 3.7) Geological map of the Dibidil–Southern Mountains and Allt nam Ba–Beinn nan Stac sites, Rum. Inset (on opposite page) shows detail to the south of Allt nam Ba. Main figure after Emeleus (1980) with subsequent modifications (Greenwood, 1987). Inset after Smith (1985, fig. 1).

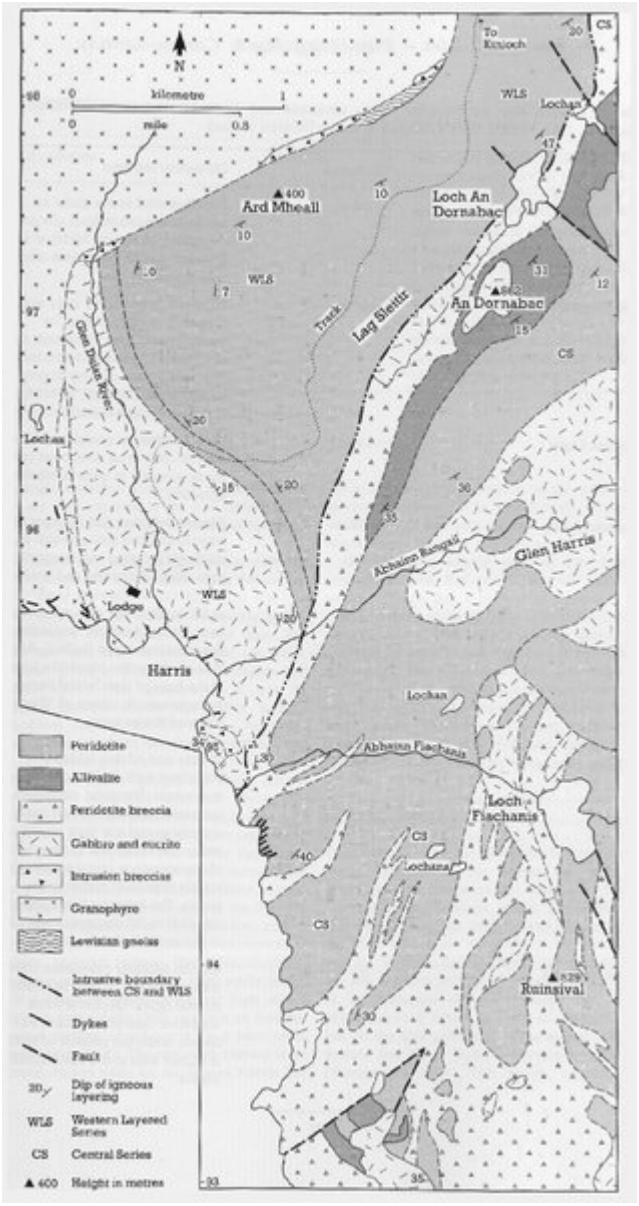


(Figure 3.8) Geological map of the Askival–Hallival site, Rum (after Emeleus, 1980).



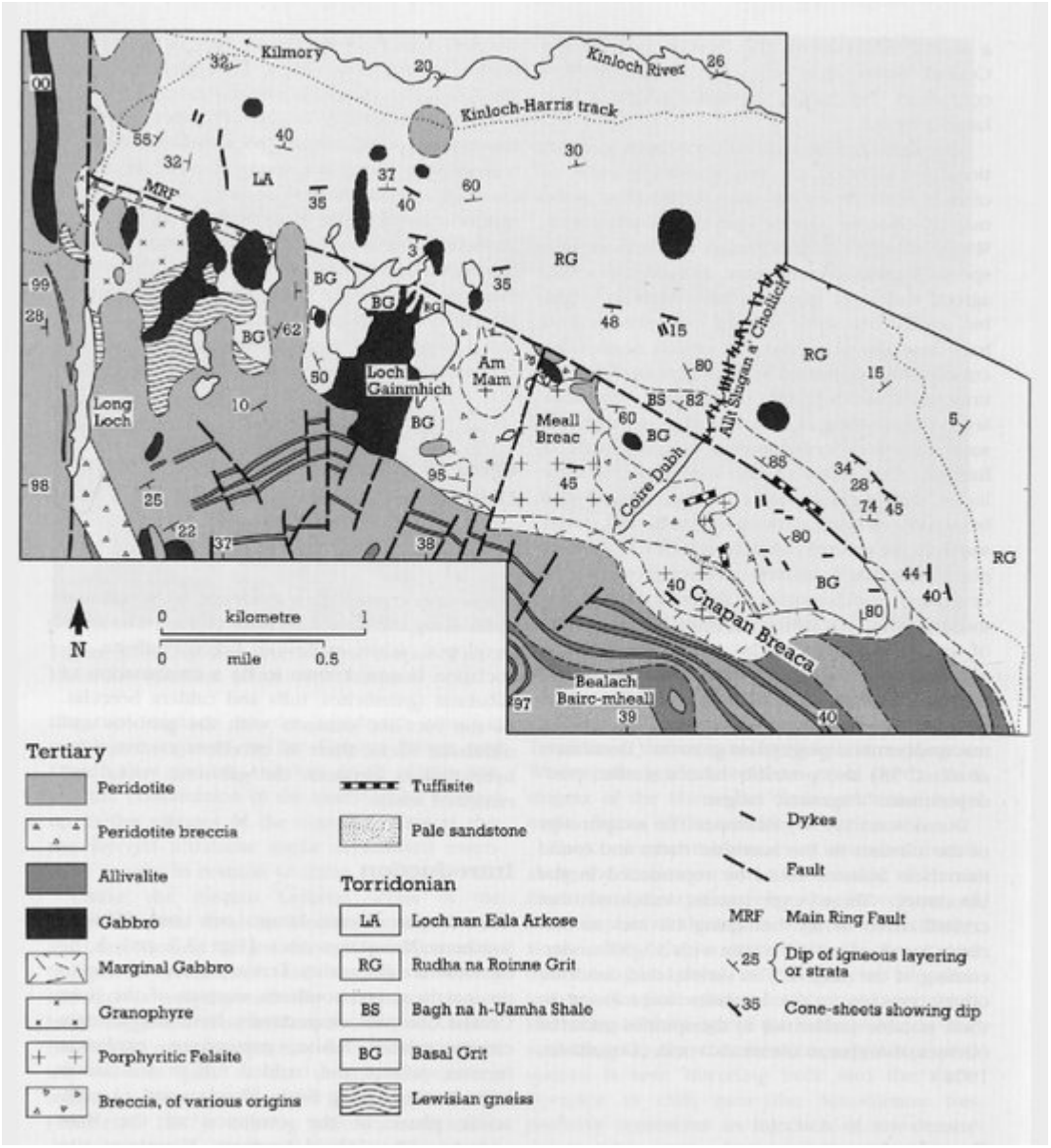
(Figure 3.9) Fine-scale layering in allivalite, west side of Hallival. Askival–Hallival site, Rum. (Photo: A.P. McKirdy.)

(Figure 3.10) Slumped folding in allivalite, near Askival summit, Rum. Askival–Hallival site, Rum. (Photo: A.P. McKirdy.)



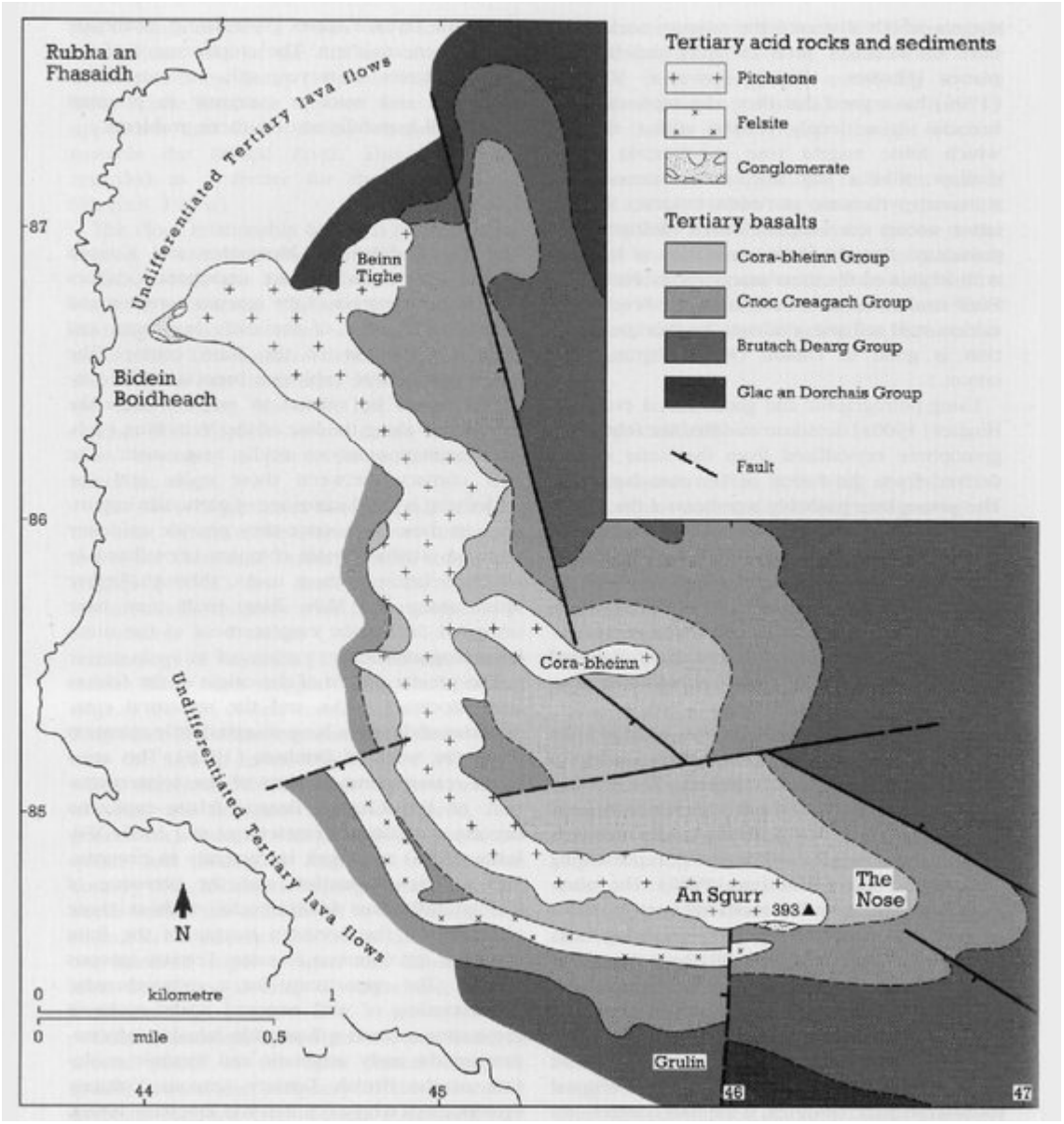
(Figure 3.11) Geological map of the Harris Bay site, Rum (after Wadsworth, 1961, figure 2; Volker, 1983).

(Figure 3.12) Intrusion breccia at the contact of ultrabasic rocks with earlier granite. Eastern end of Harris Bay. Harris Bay site, Rum. (Photo: C.H. Emeleus.)

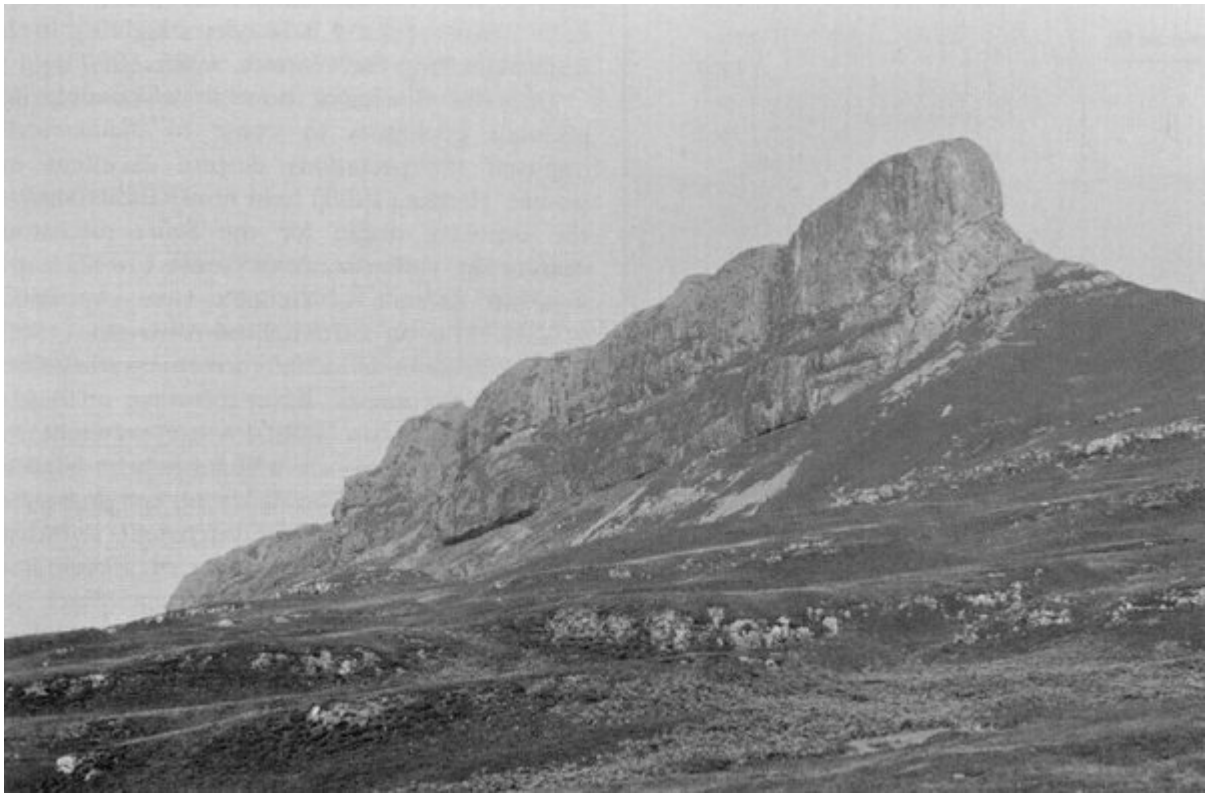


(Figure 3.13) Geological map of the Cnapan Breaca–Long Loch site, Rum (after Emeleus, 1980).

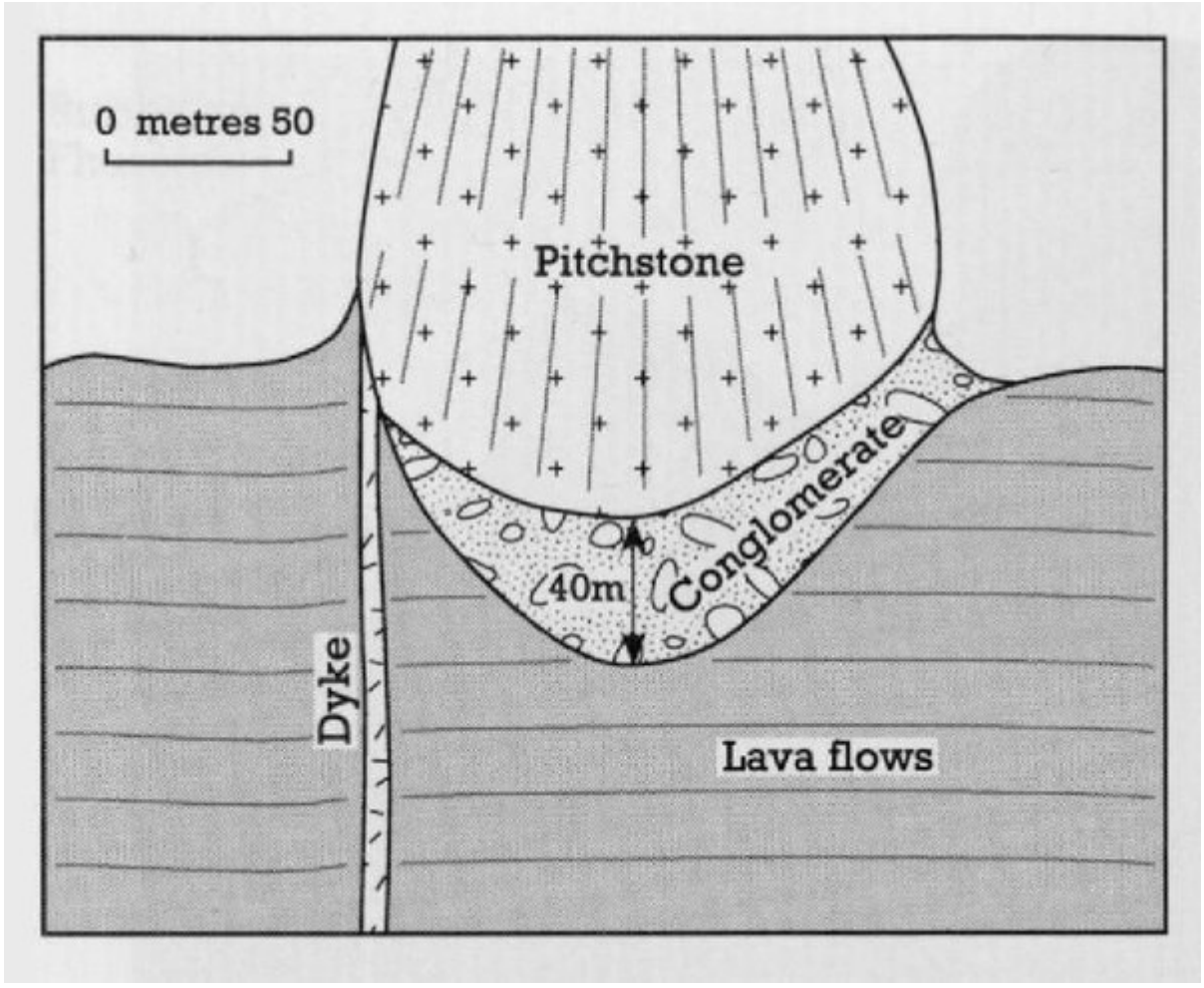
(Figure 3.14) Gravity stratified rhythmic layering in allivalite, west of Long Loch, Rum. (Photo: C.H. Emeleus.)



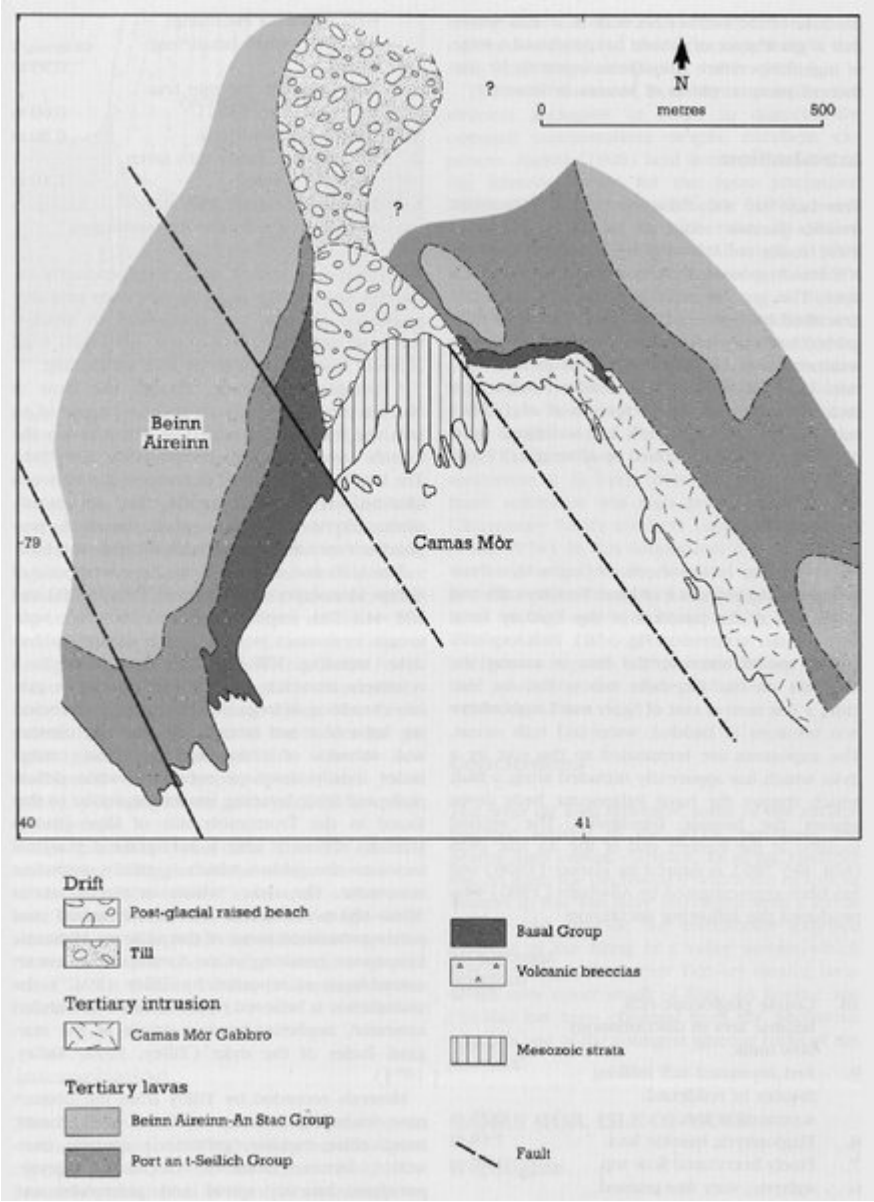
(Figure 3.15) Geological map of south-west Eigg (after Allwright, 1980, fig. 2.3.2).



(Figure 3.16) Ridge of the Sgarr of Eigg, formed by an Eocene pitchstone flow filling a valley eroded from Palaeocene basalt lavas. South-west Eigg site. (Photo: C.H. Emeleus.)

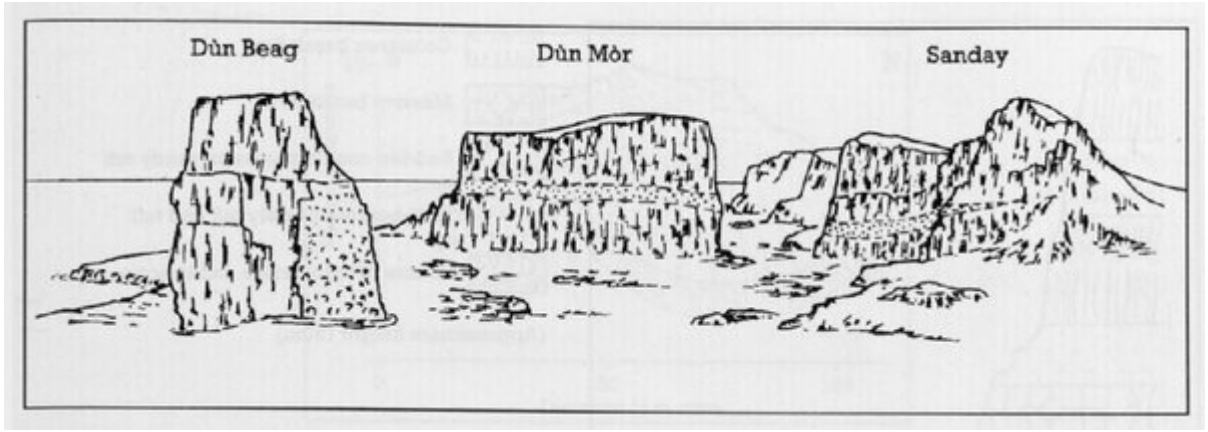


(Figure 3.17) Section through pitchstone and lava flows, near Bidein Boidheach, south-west Eigg (after Allwright, 1980, figure 6.4b).



(Figure 3.18) Geological map of the Camas Mar site, Muck (after Allwright, 1980, fig. 2.2.2).

(Figure 3.19) Stack of Dùn Mòr, Sanday, formed of basalt lavas with interbedded coarse conglomerates. The conglomerates contain rare granite pebbles from the Rum Central Complex. Canna—Sanday vicinity. (Photo: A.P. McKirdy.)



(Figure 3.20) Sketch of Dùn Beag, Dùn Mòr and the cliffs of Sanday (after Harker, 1908, figure 12). Columnar basalt flows with interbedded conglomerate are seen on Dun Mar and the cliffs of Sanday. On Dùn Beag, lavas fill a steep-sided valley eroded in conglomerate.

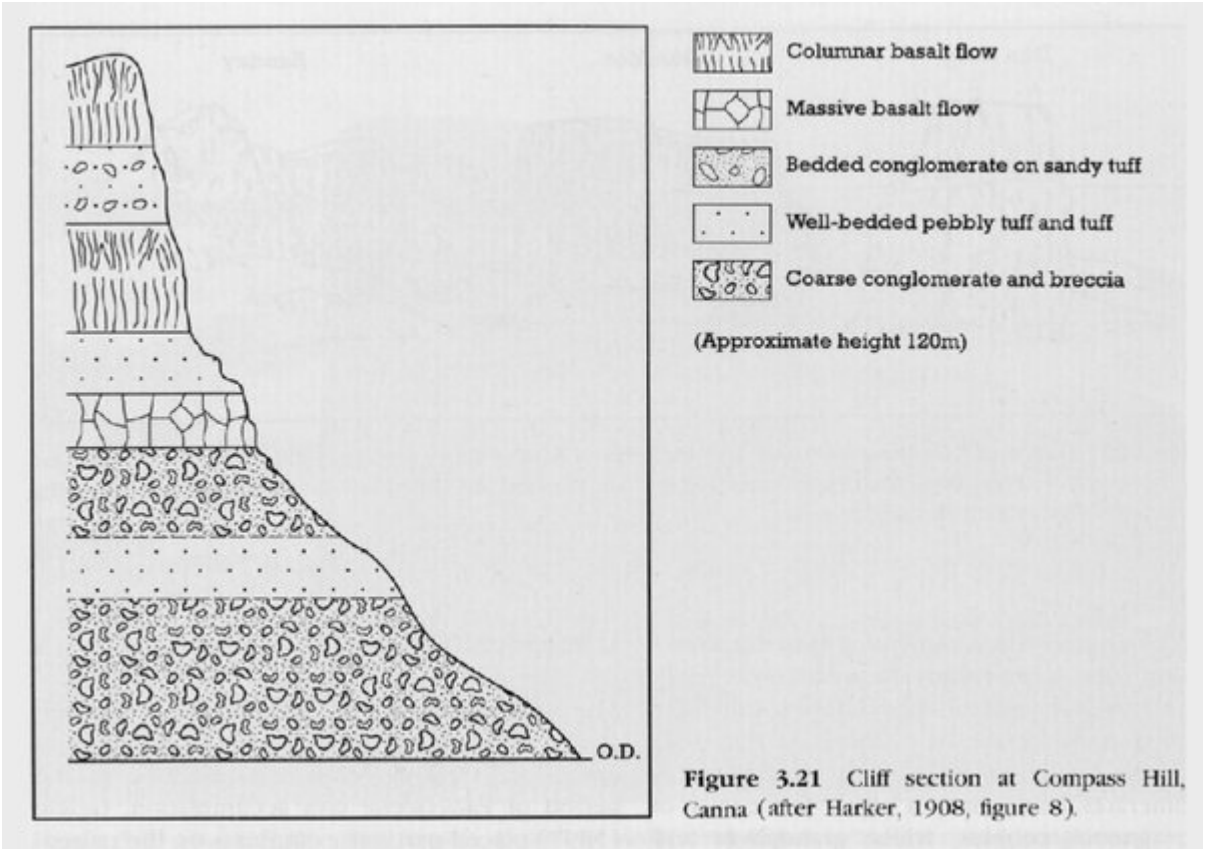
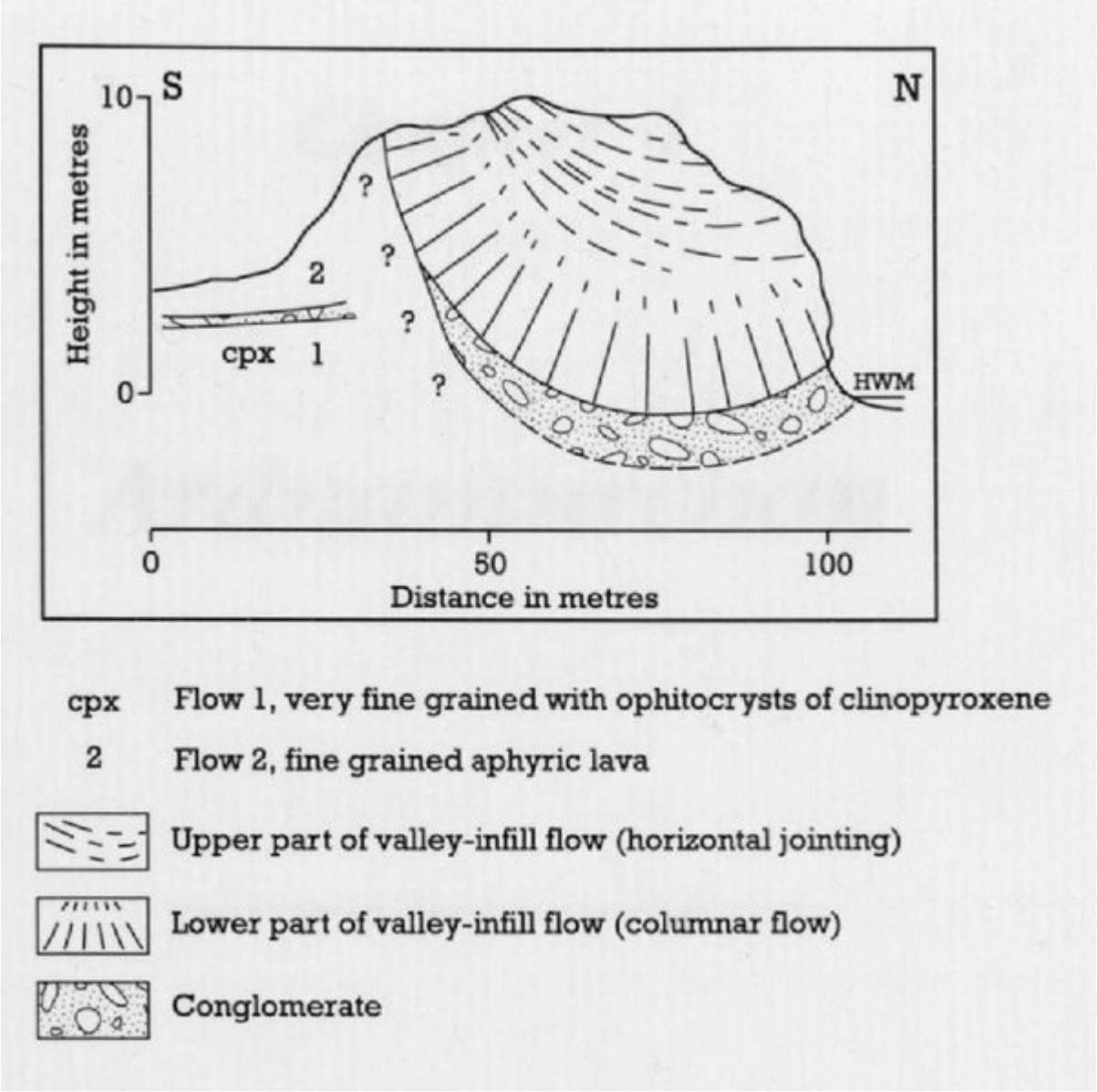
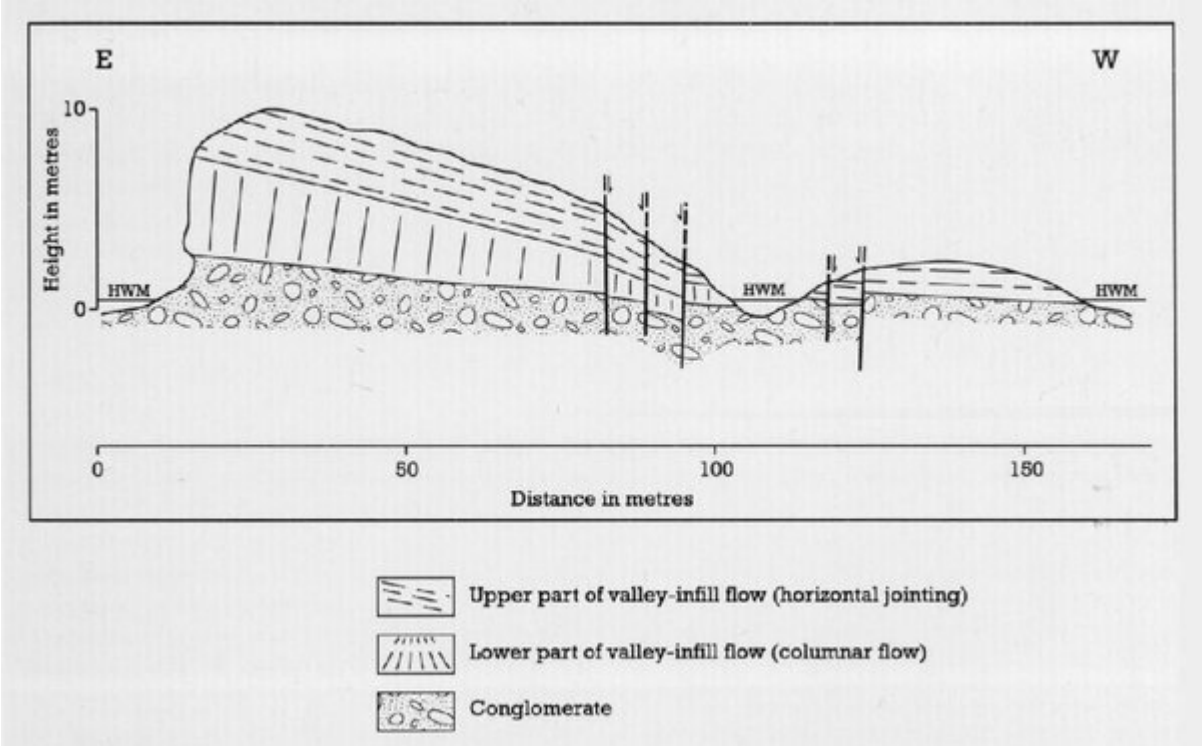


Figure 3.21 Cliff section at Compass Hill, Canna (after Harker, 1908, figure 8).

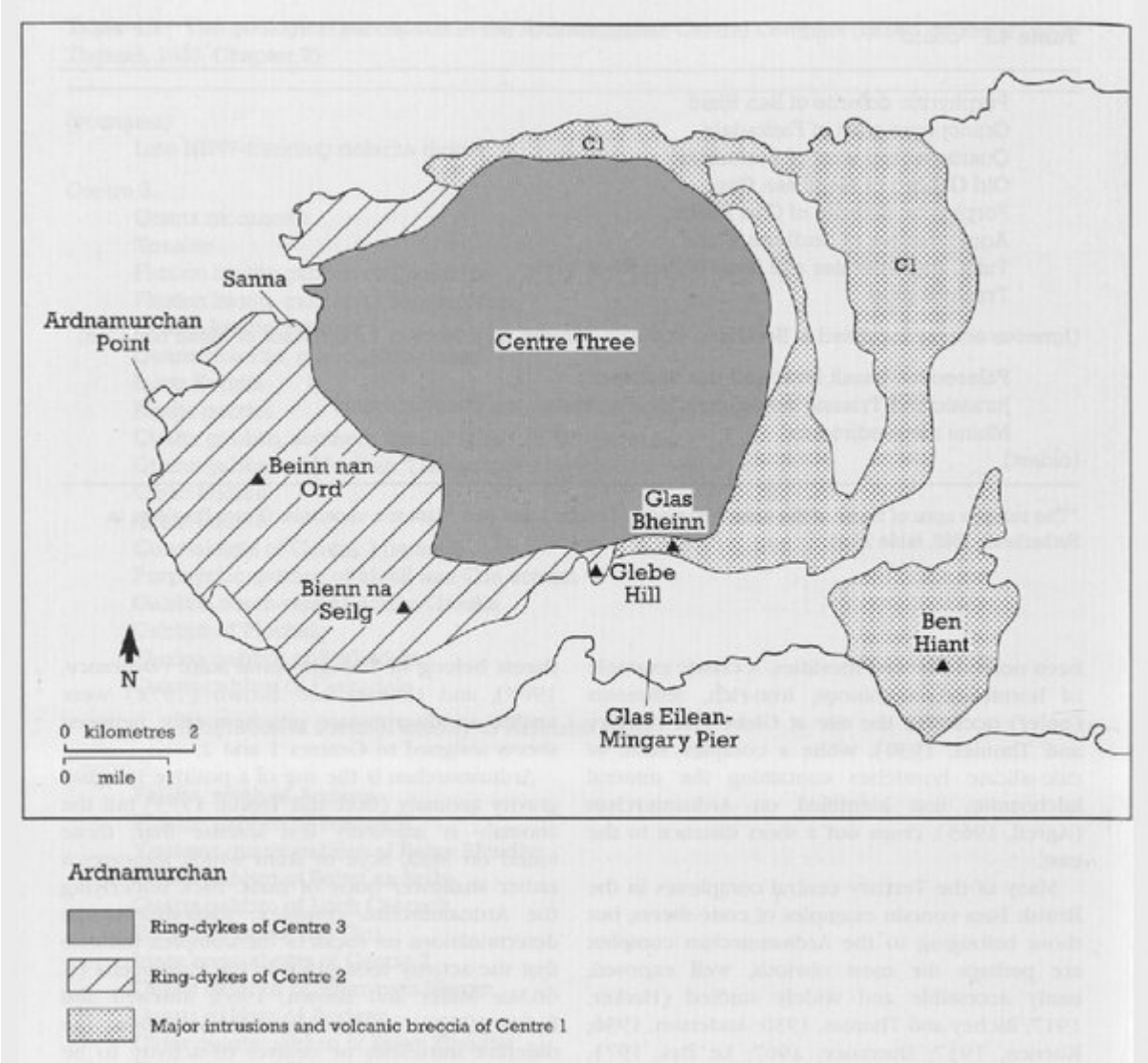
(Figure 3.21) Cliff section at Compass Hill, Canna (after Harker, 1908, figure 8).



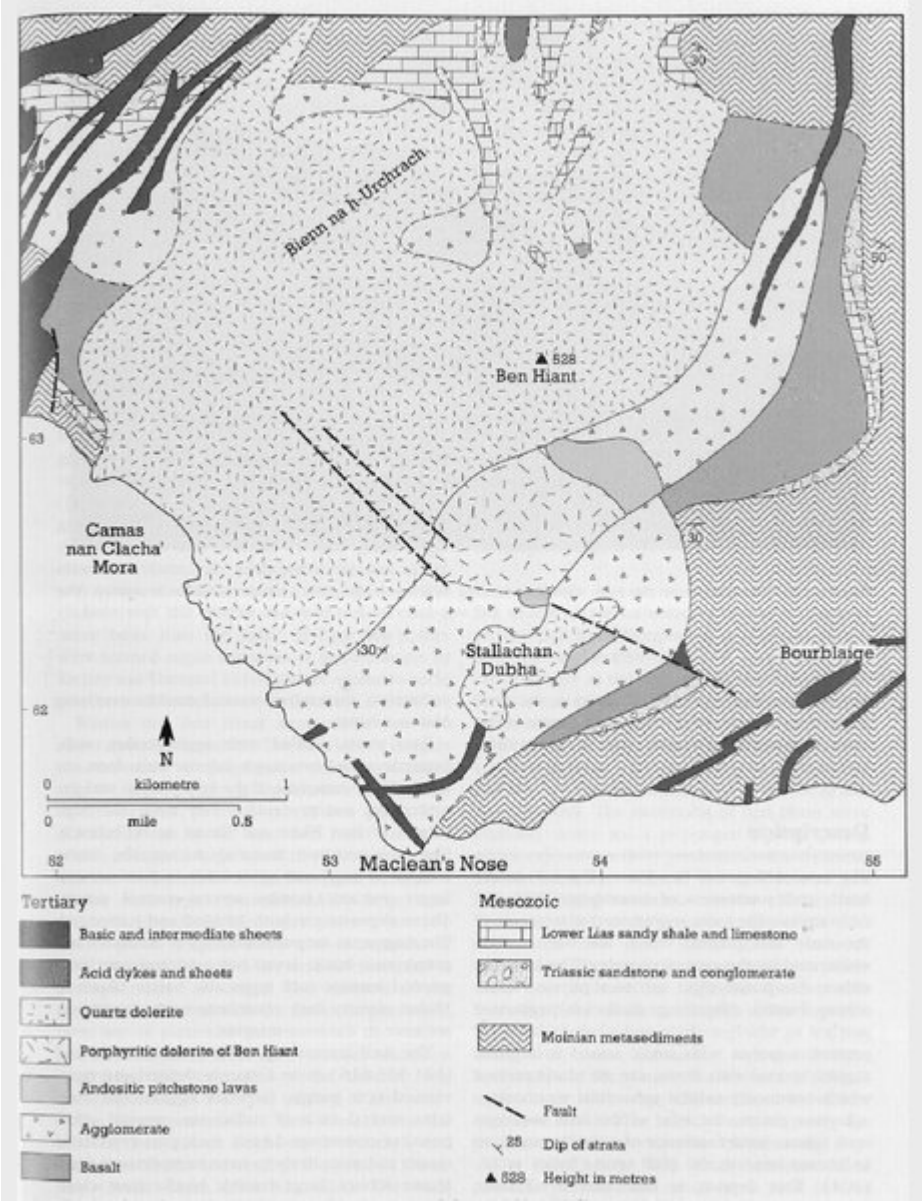
(Figure 3.22) Canna Harbour: Eilean a' Bhaird from the east (after Allwright, 1980, figure 2.4.13).



(Figure 3.23) Canna Harbour: Eilean a' Bhaird from the north (after Allwright, 1980, figure 2.4.14).

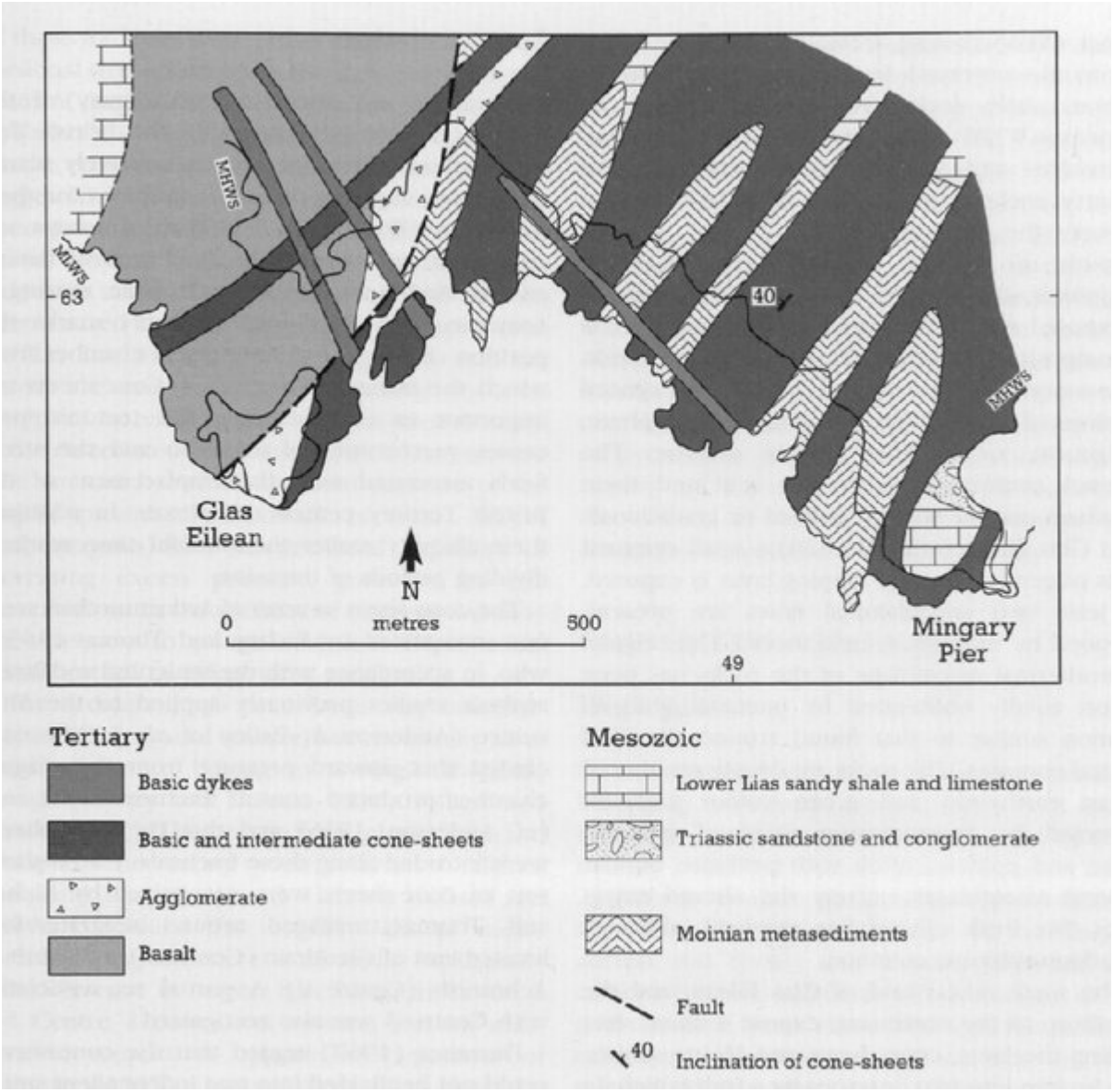


(Figure 4.1) Map of the Ardnamurchan Peninsula showing localities mentioned in the text.

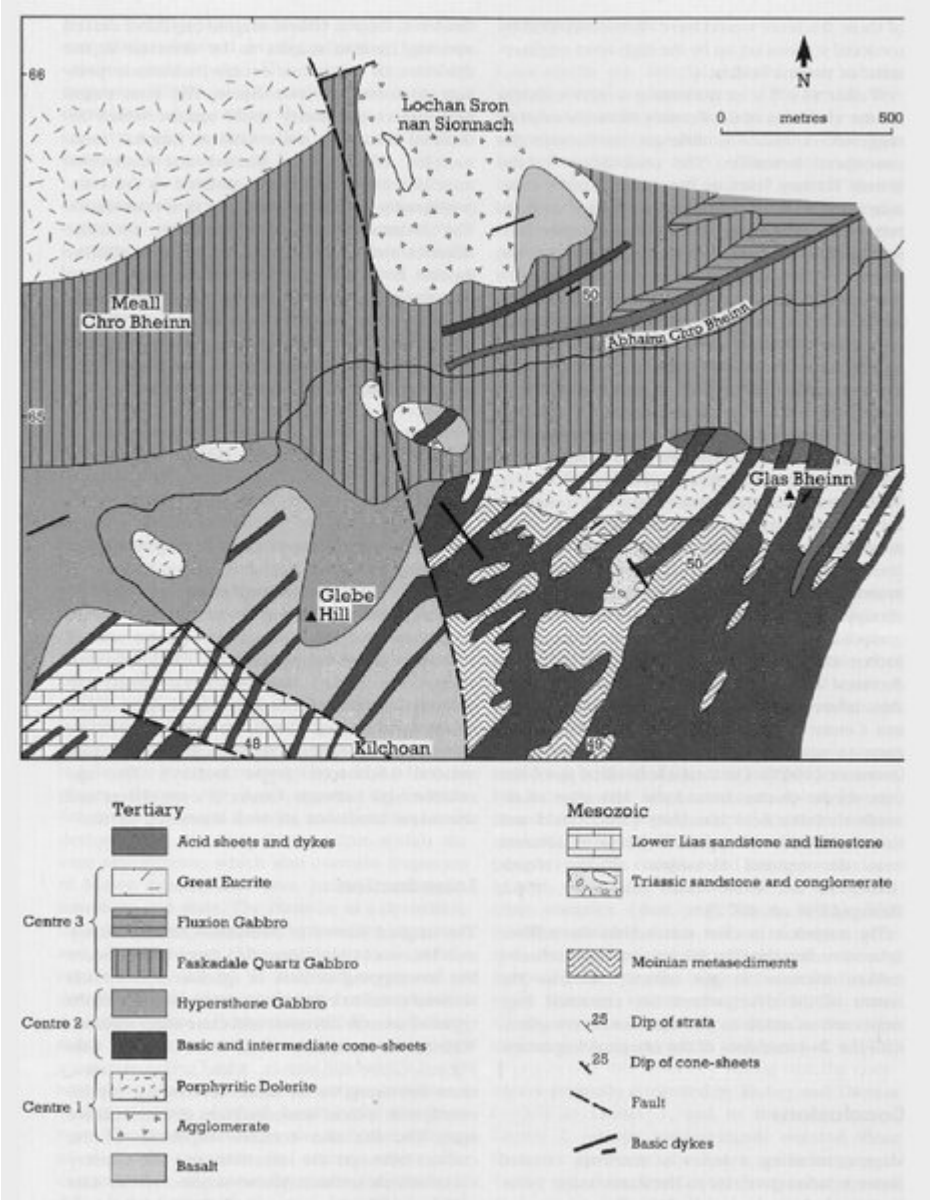


(Figure 4.2) Geological map of the Ben Hiant site (after Dribble, 1976).

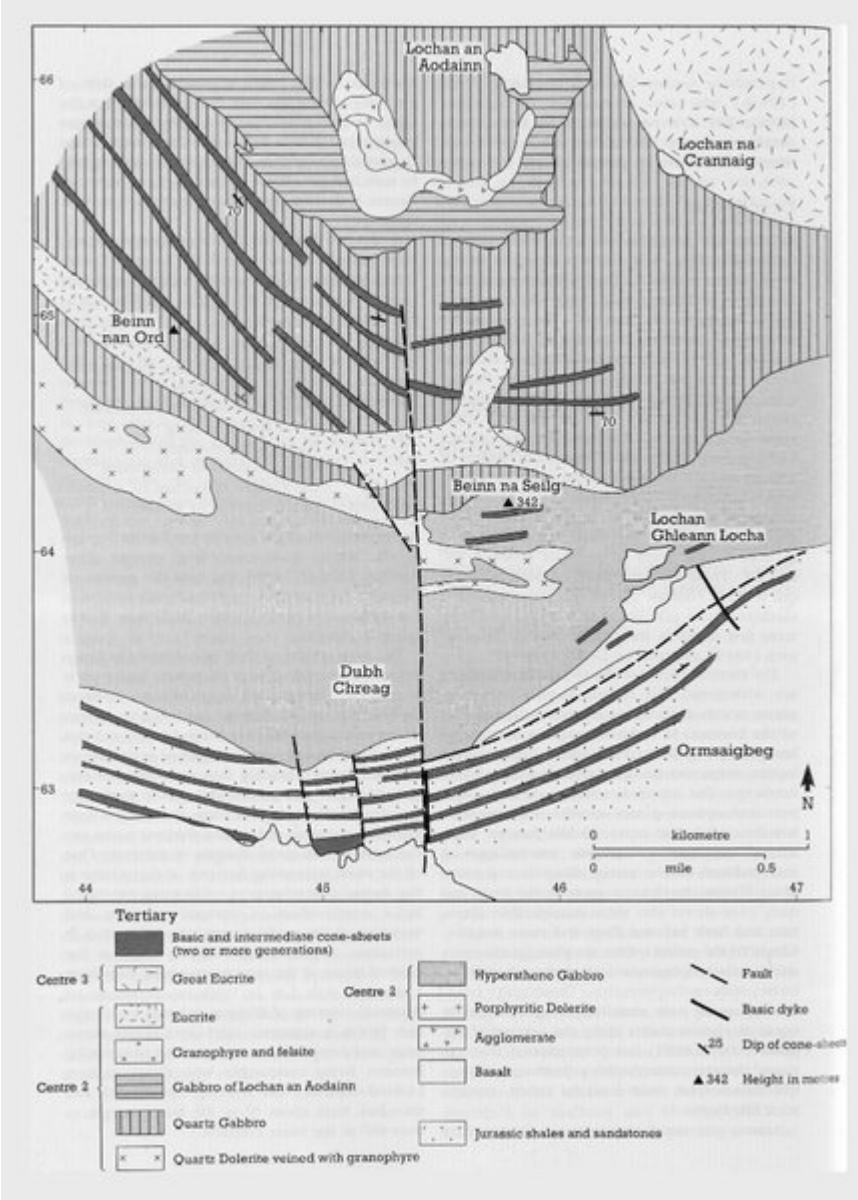
(Figure 4.3) Ben Hiant from the east, showing terracing developed along the location of minor intrusions. The headland to the left is Maclean's Nose, formed by volcanic breccias. Ben Hiant site. (Photo: C.H. Emeleus.)



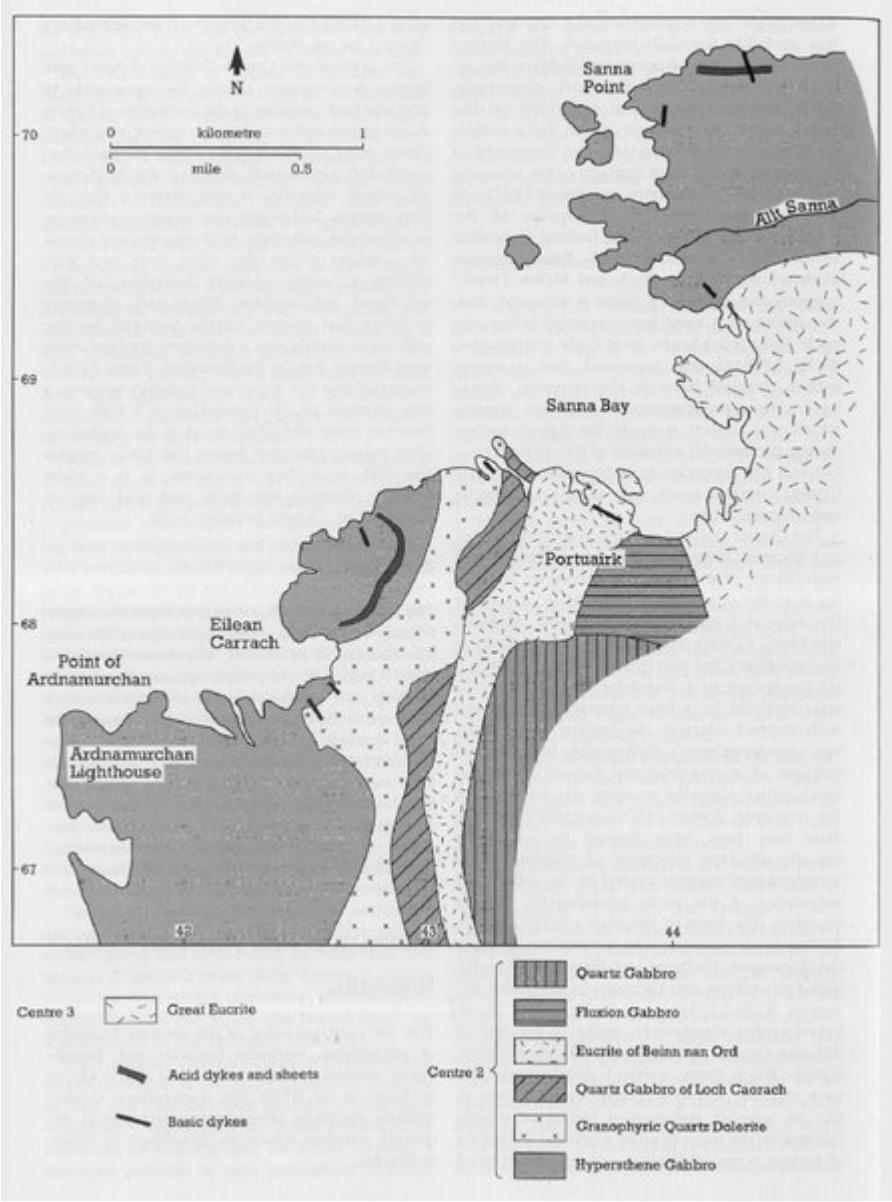
(Figure 4.4) Geological map of the Glas Eilean—Mingary Pier site (after Gribble et al., 1976).



(Figure 4.5) Geological map of the Glas Bheinn—Glebe Hill site (after Gribble et at, 1976).

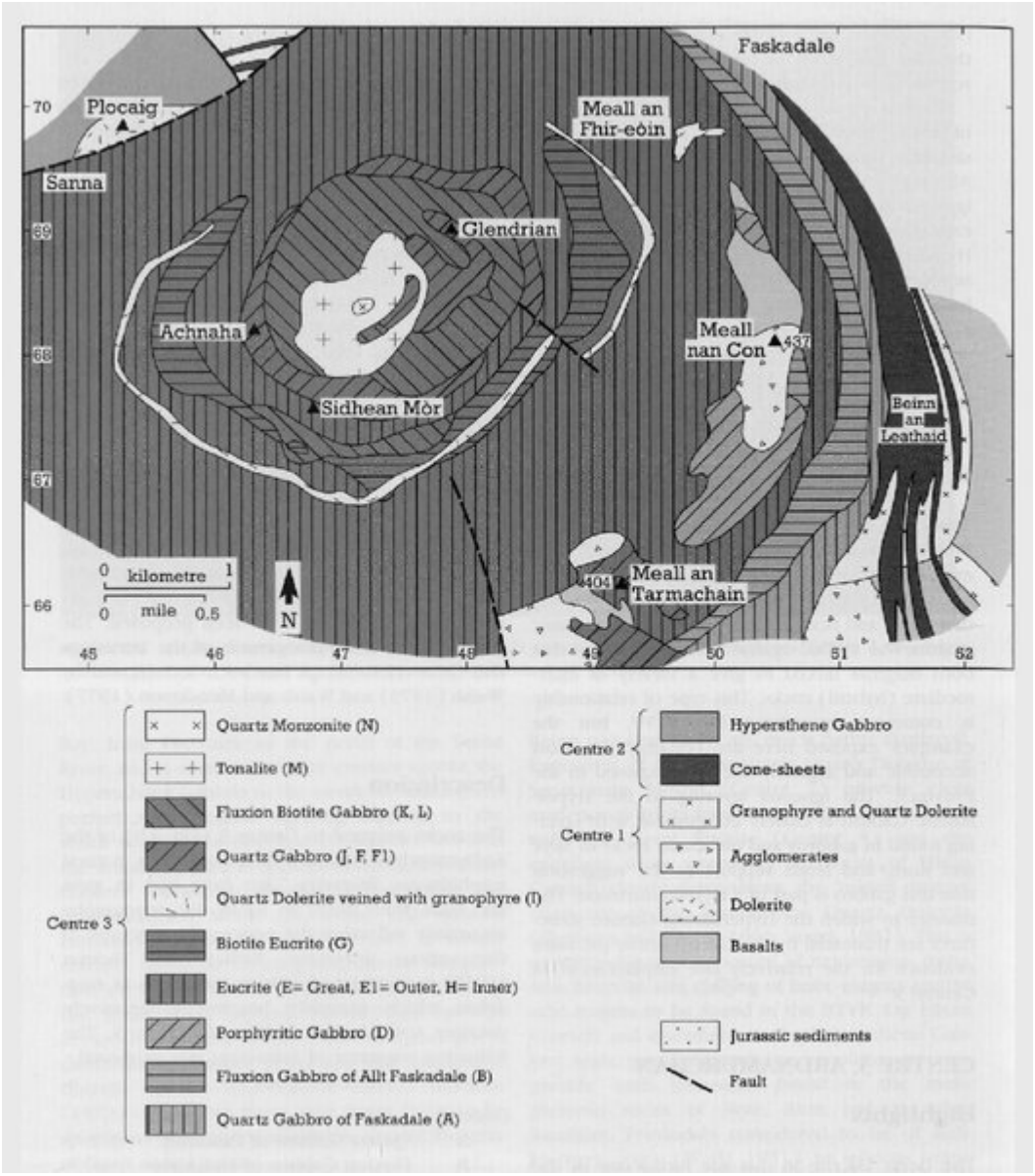


(Figure 4.6) Geological map of the Beinn na Seilg-Beinn nan Ord site (after Gribble et at, 1976).

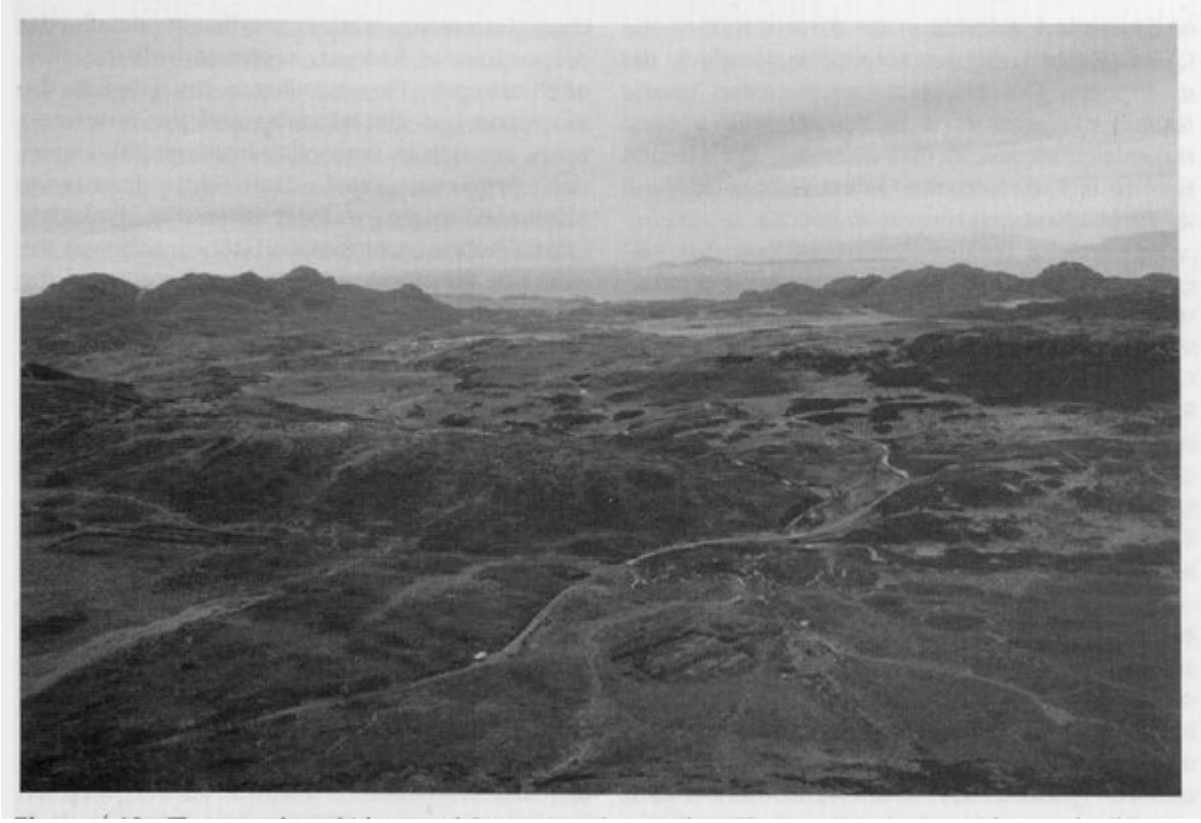


(Figure 4.7) Geological map of the Ardnamurchan Point—Sanna site (after Gribble et al, 1976).

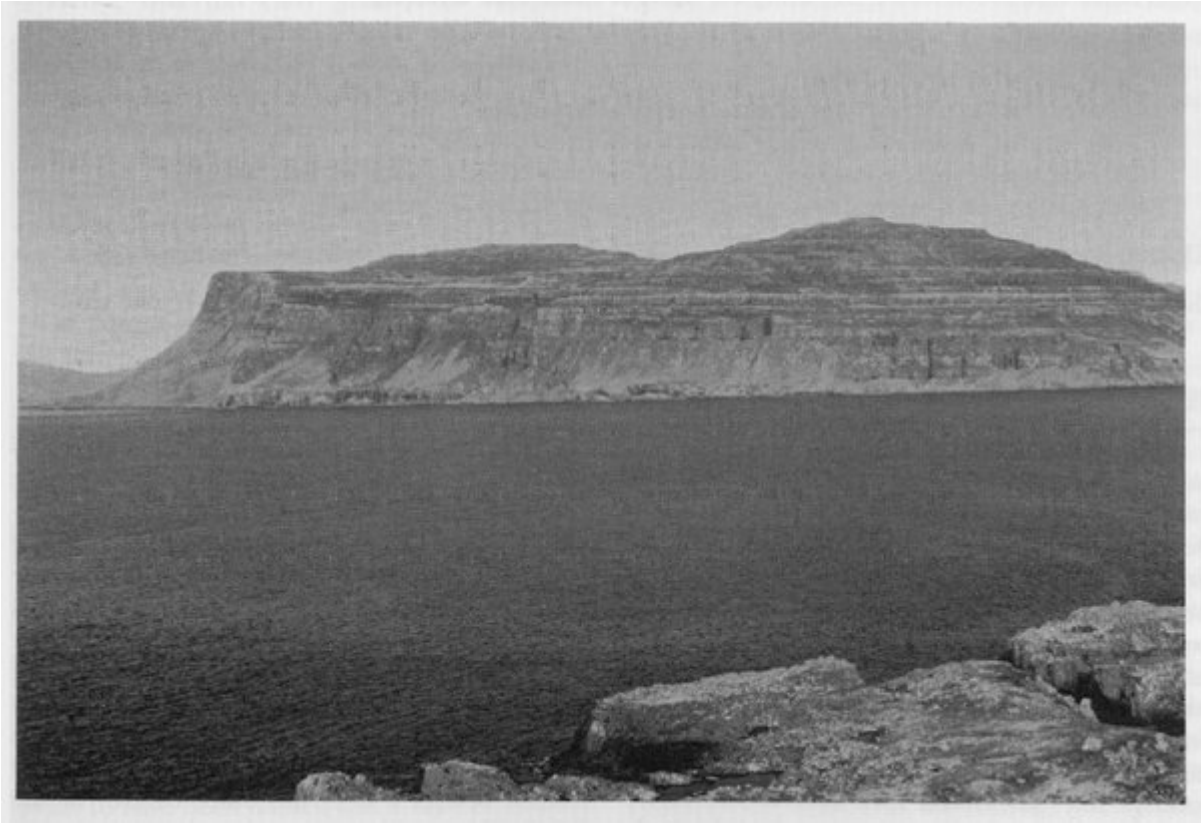
(Figure 4.8) Granitic net-veining and an intrusion breccia of gabbro and dolerite fragments. Centre 2 ring-dykes, near the lighthouse, western tip of Ardnamurchan. (Photo: C.H. Emeleus.)



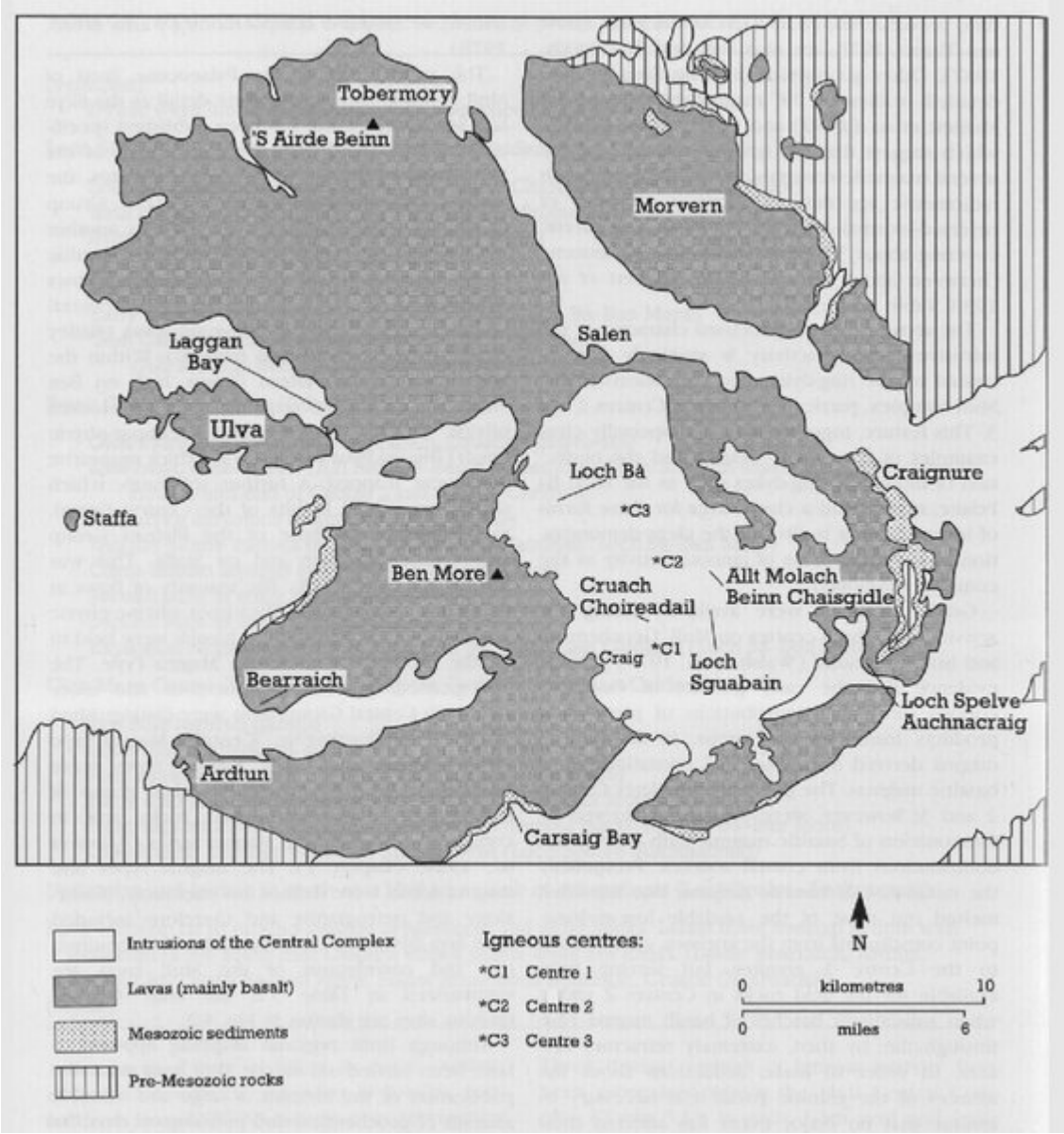
(Figure 4.9) Geological map of Centre 3, Ardnamurchan (after Gribble et al, 1976).



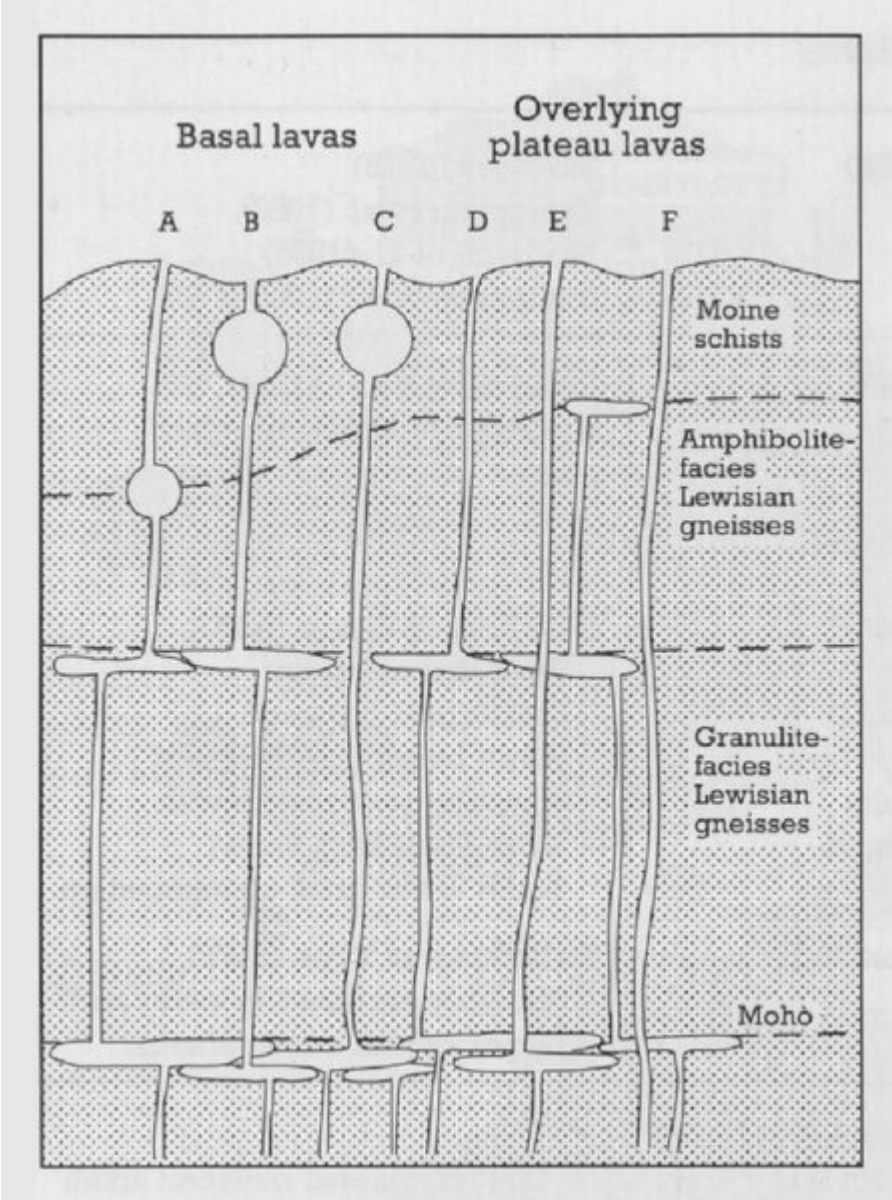
(Figure 4.10) The natural amphitheatre of Centre 3, Ardnamurchan. The imposing arcuate ridges in the distance are formed by the Great Eucrite. (Photo: A.P. McKirdy.)



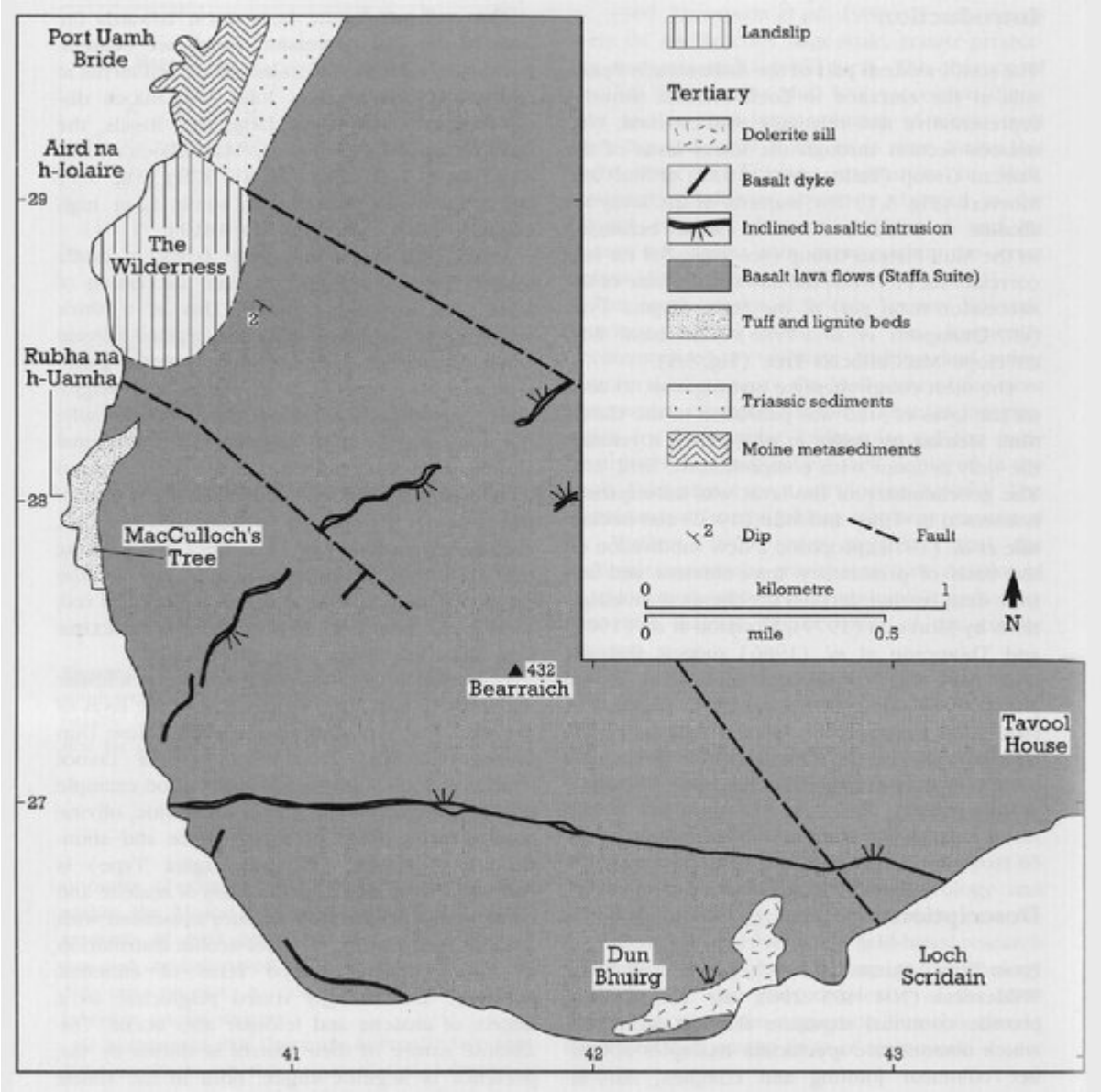
(Figure 5.1) The flat-lying succession of basalt lavas of the Wilderness area, western Mull, give rise to the trap-type topography. Bearraich site, Mull. (Photo: C.H. Emeleus.)



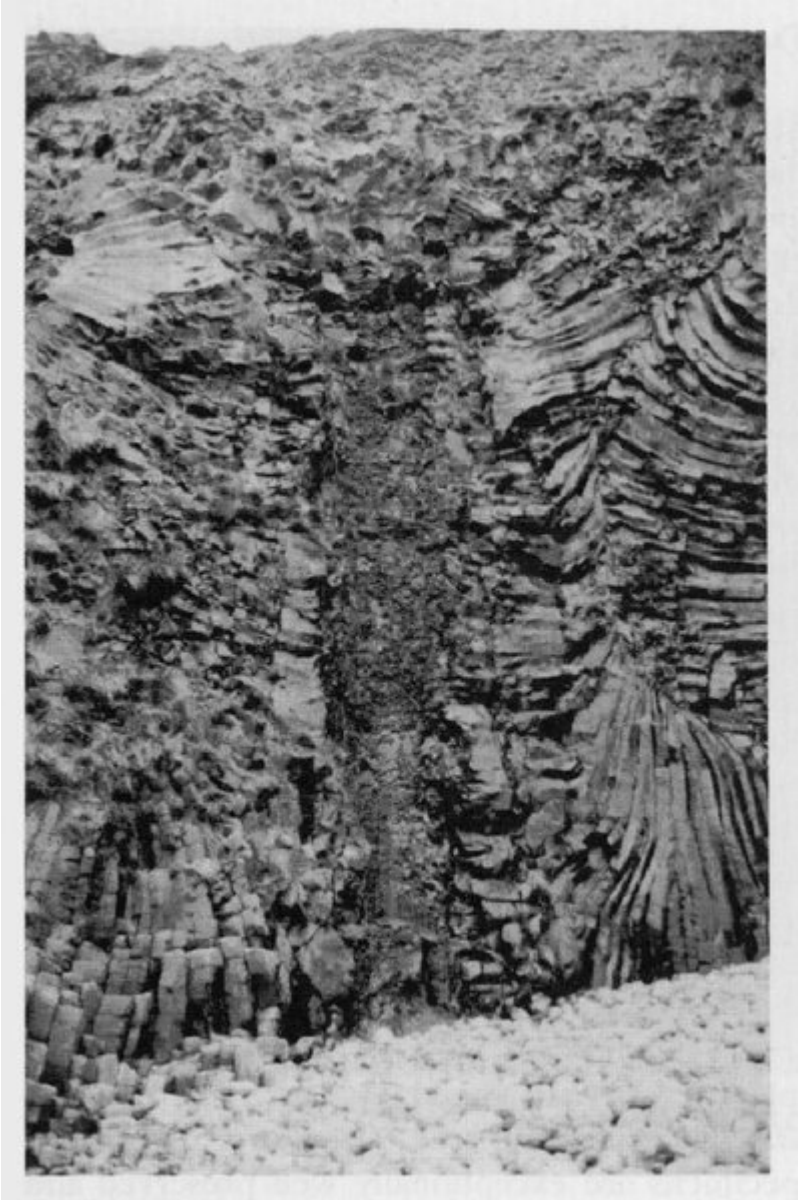
(Figure 5.2) Map of the Isle of Mull, showing localities mentioned in the text.



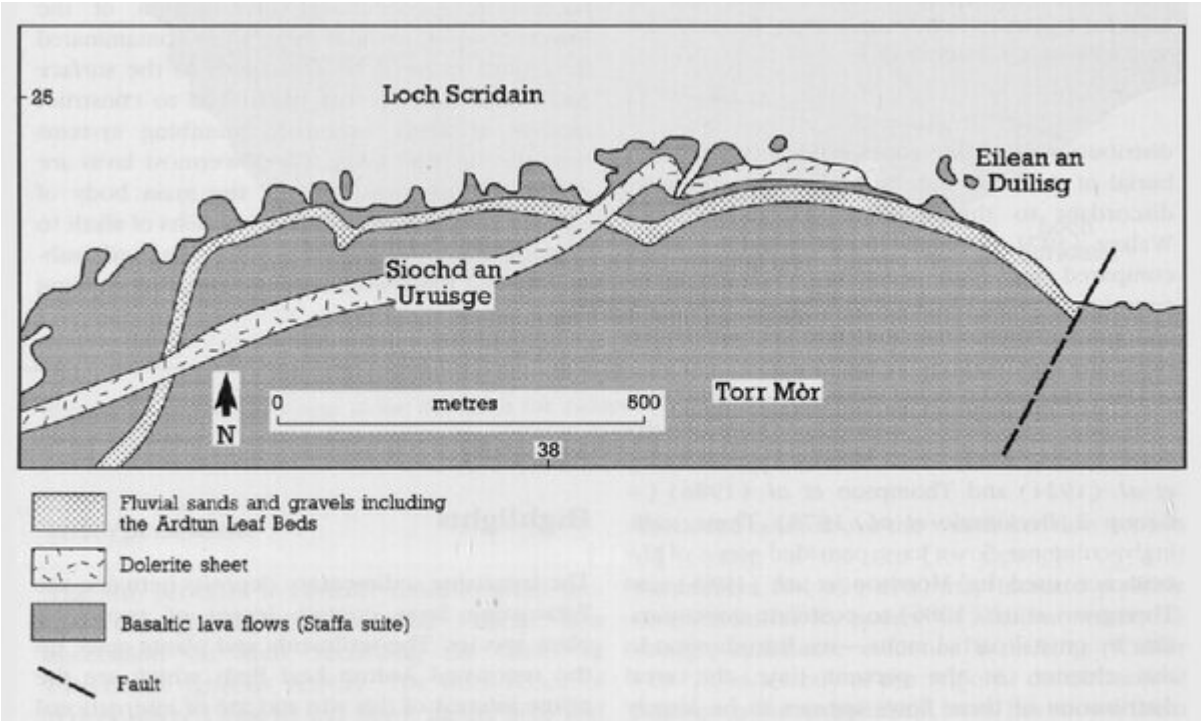
(Figure 5.3) Sketch of the magmatic plumbing beneath south-west Mull during extrusion of the Palaeocene basaltic lavas (after Morrison et al., 1985, fig. 4). See text for explanation.



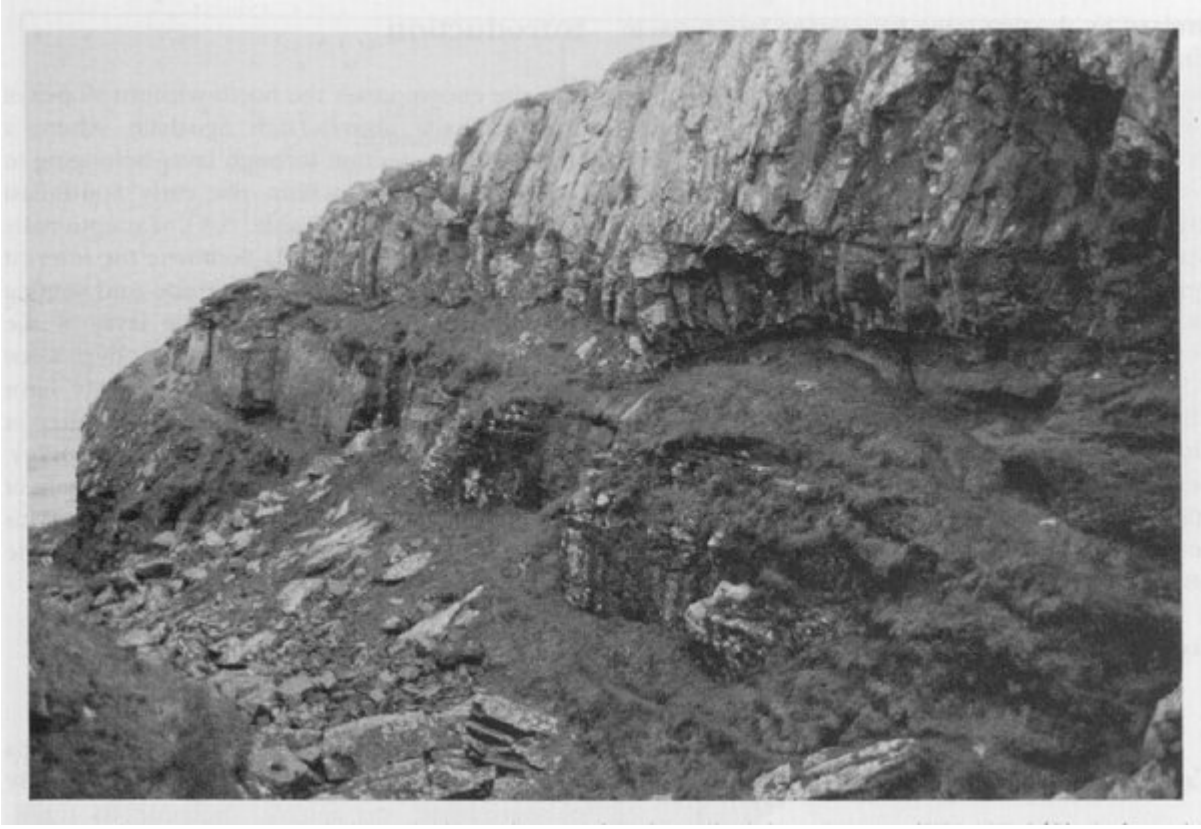
(Figure 5.4) Geological map of the Bearraich site (adapted from the British Geological Survey 'One Inch' map, Sheet 43, Iona).



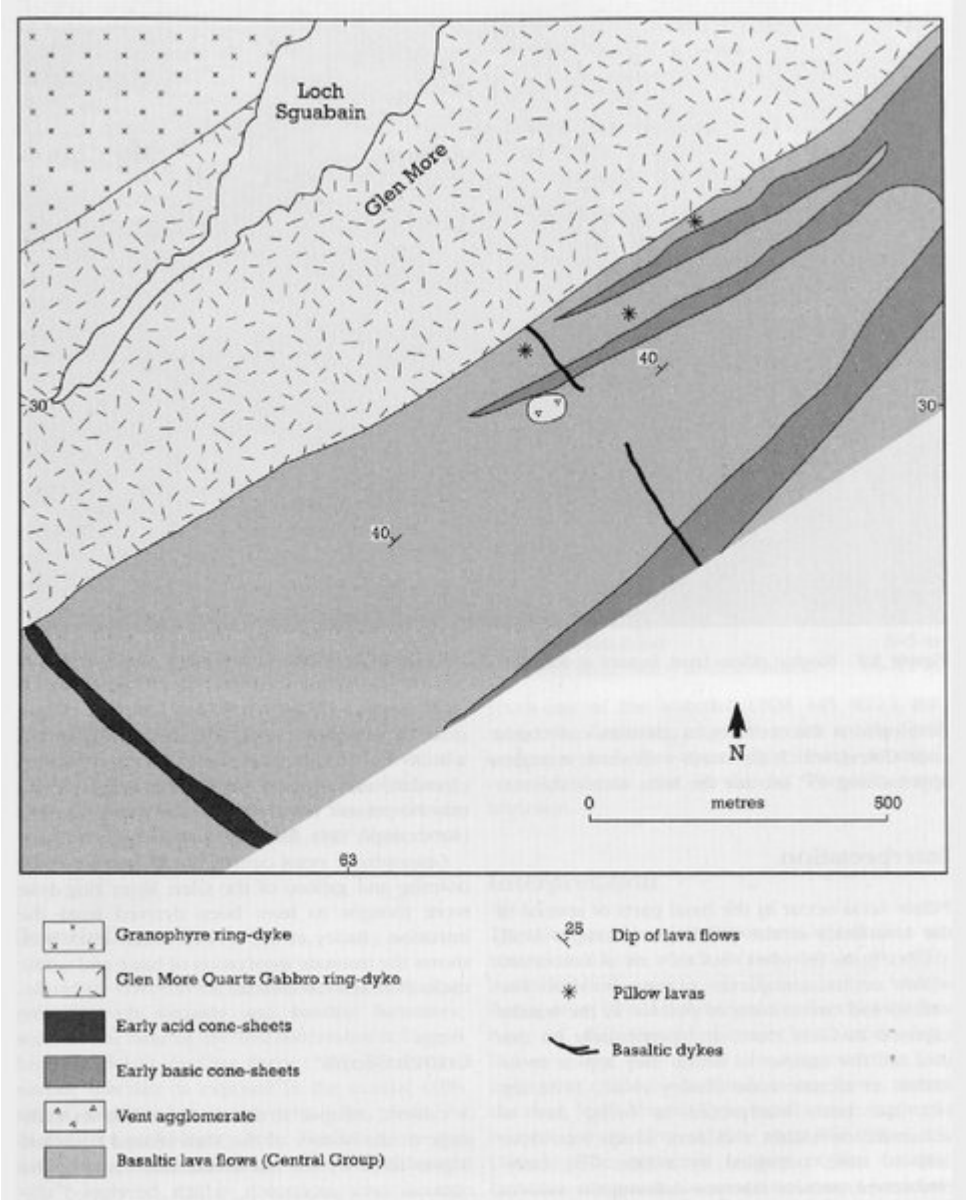
(Figure 5.5) `MacCulloch's Tree' on Rubha na h-Uamha [NM 402 278], an upright coniferous trunk 12 m high engulfed by lava of Staffa Magma Type. Bearraich site, Mull. (Photo: CJ. MacFadyen.)



(Figure 5.6) Geological map of the Ardtun site (adapted from the British Geological Survey 'One Inch' map, Sheet 43, Iona).

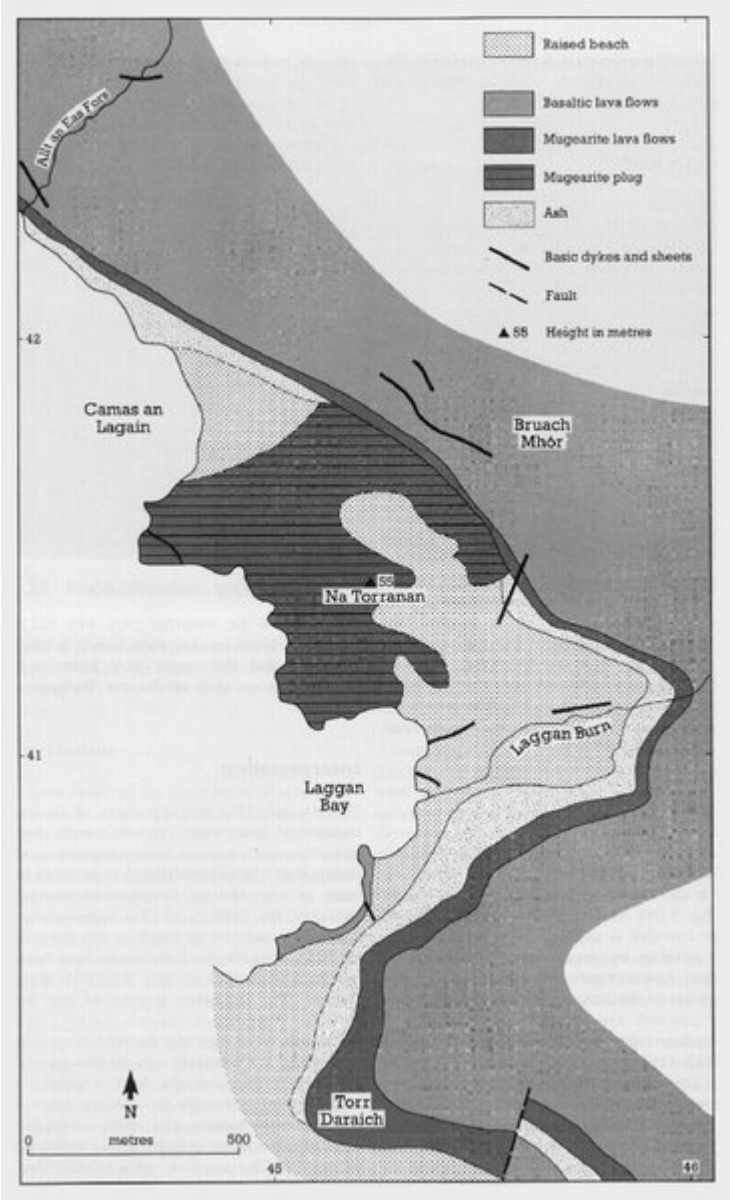


(Figure 5.7) The best section through the Ardtun Leaf Beds at Slochd, an Uruisge [NM 377 248]. Ardtun site, Mull. (Photo: C.J. MacFadyen.)



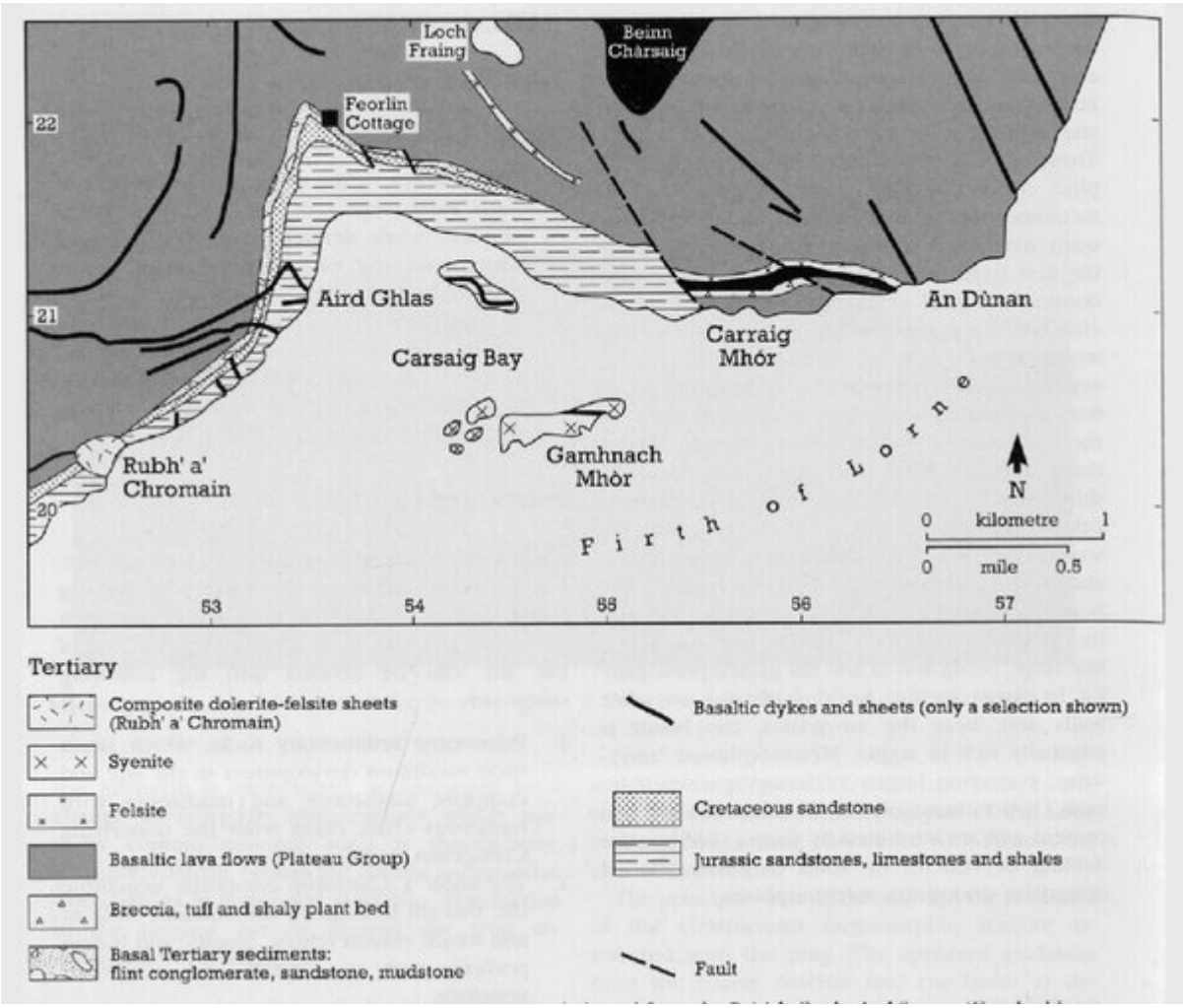
(Figure 5.8) Geological map of the Loch Sguahain site (adapted from the British Geological Survey 'One Inch' map, Sheet 44, Mull).

(Figure 5.9) Basaltic pillow lavas, formed in a caldera lake. Loch Sguabain site, Mull. (Photo: A.P. McKirdy.)

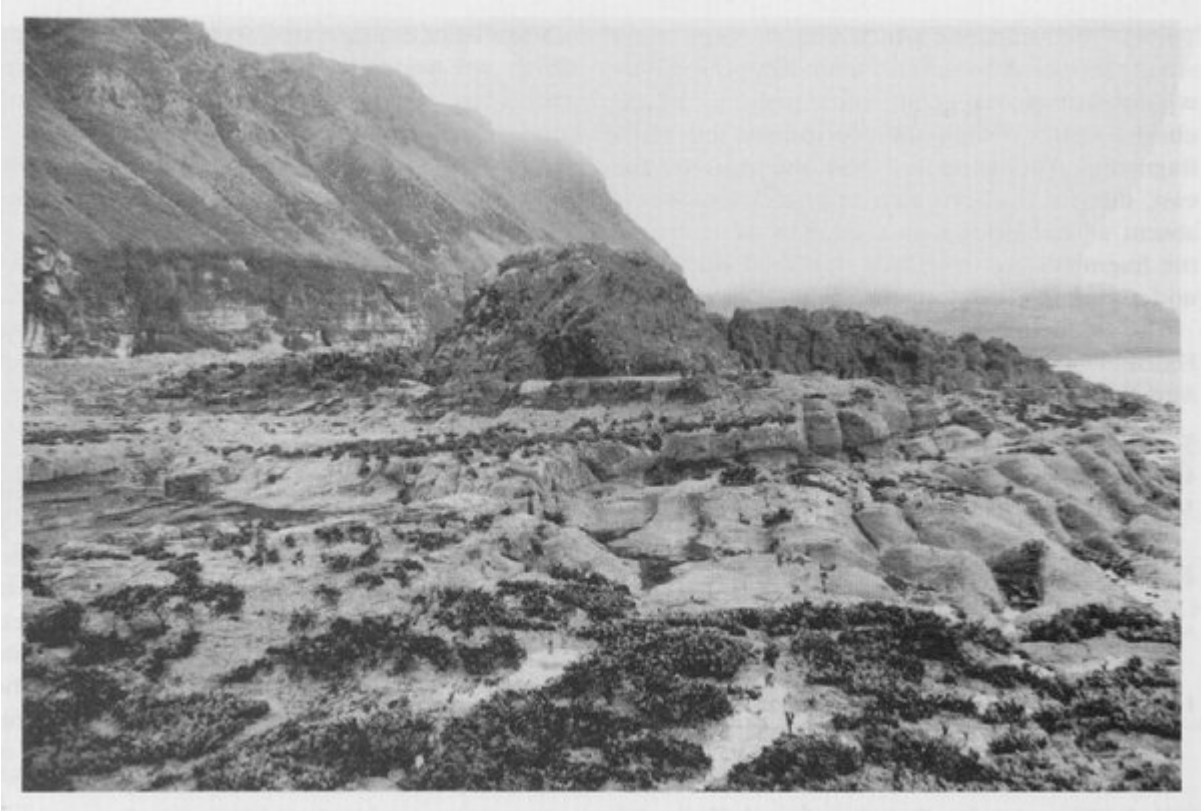


(Figure 5.10) Geological map of the Laggan Bay site (adapted from the British Geological Survey 'One Inch' map, Sheet 43, Iona).

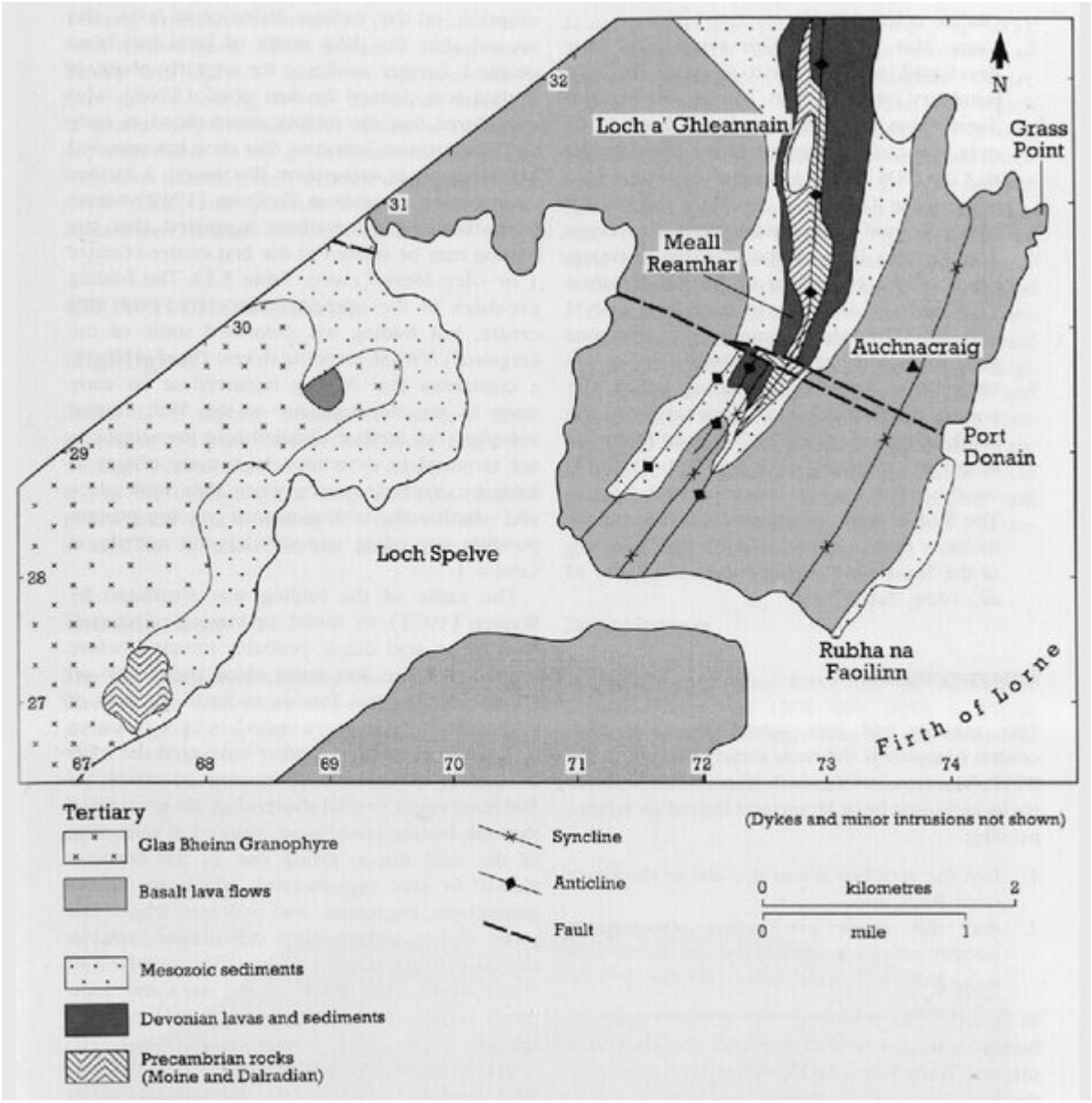
(Figure 5.11) A view of 'S Airde Beinn from the south. 'S Airde Beinn site, Mull. (Photo: CJ. MacFadyen.)



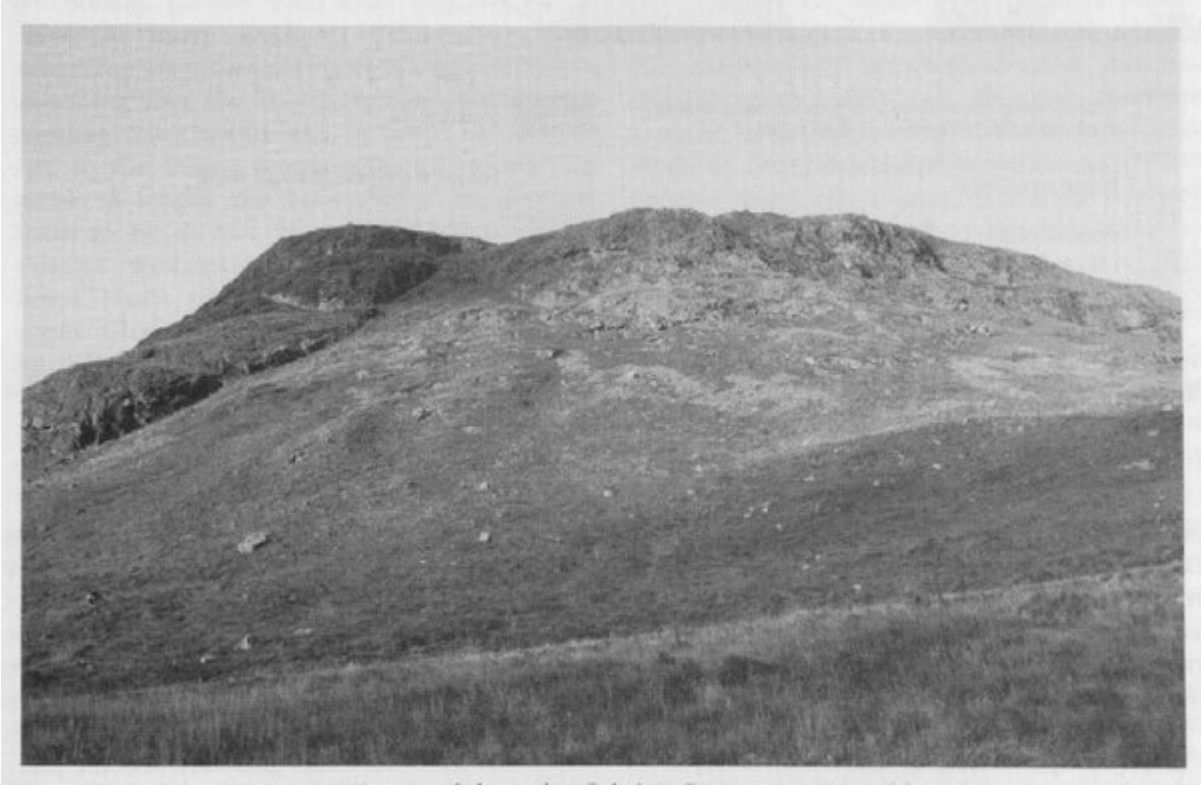
(Figure 5.12) Geological map of the Carsaig Bay site (adapted from the British Geological Survey One Inch' map, Sheet 44, Mull).



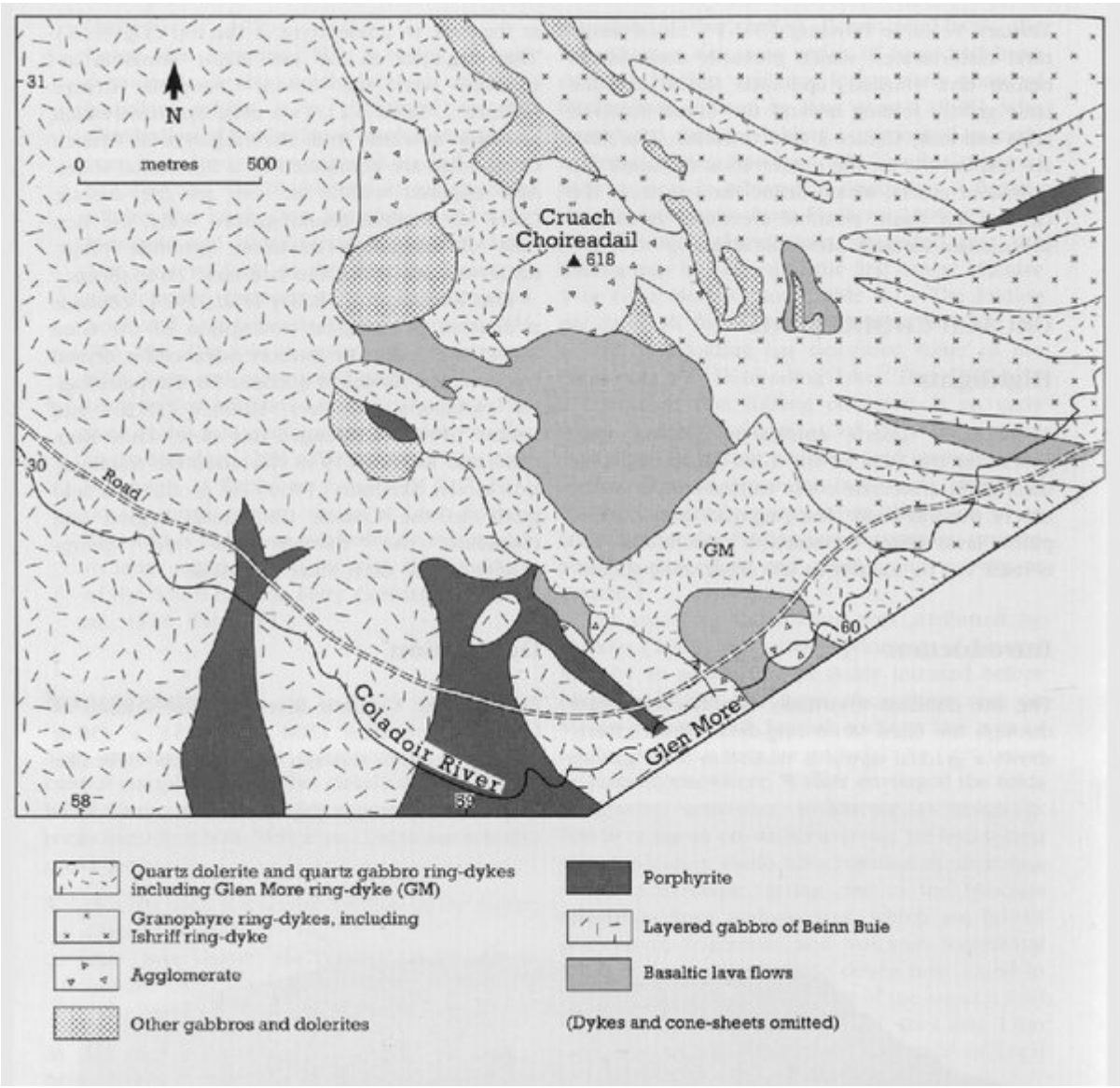
(Figure 5.13) The Rubh' a 'Chromain composite sill exposed at the western edge of the Carsaig Bay site, Mull. (Photo: CJ. MacFadyen.)



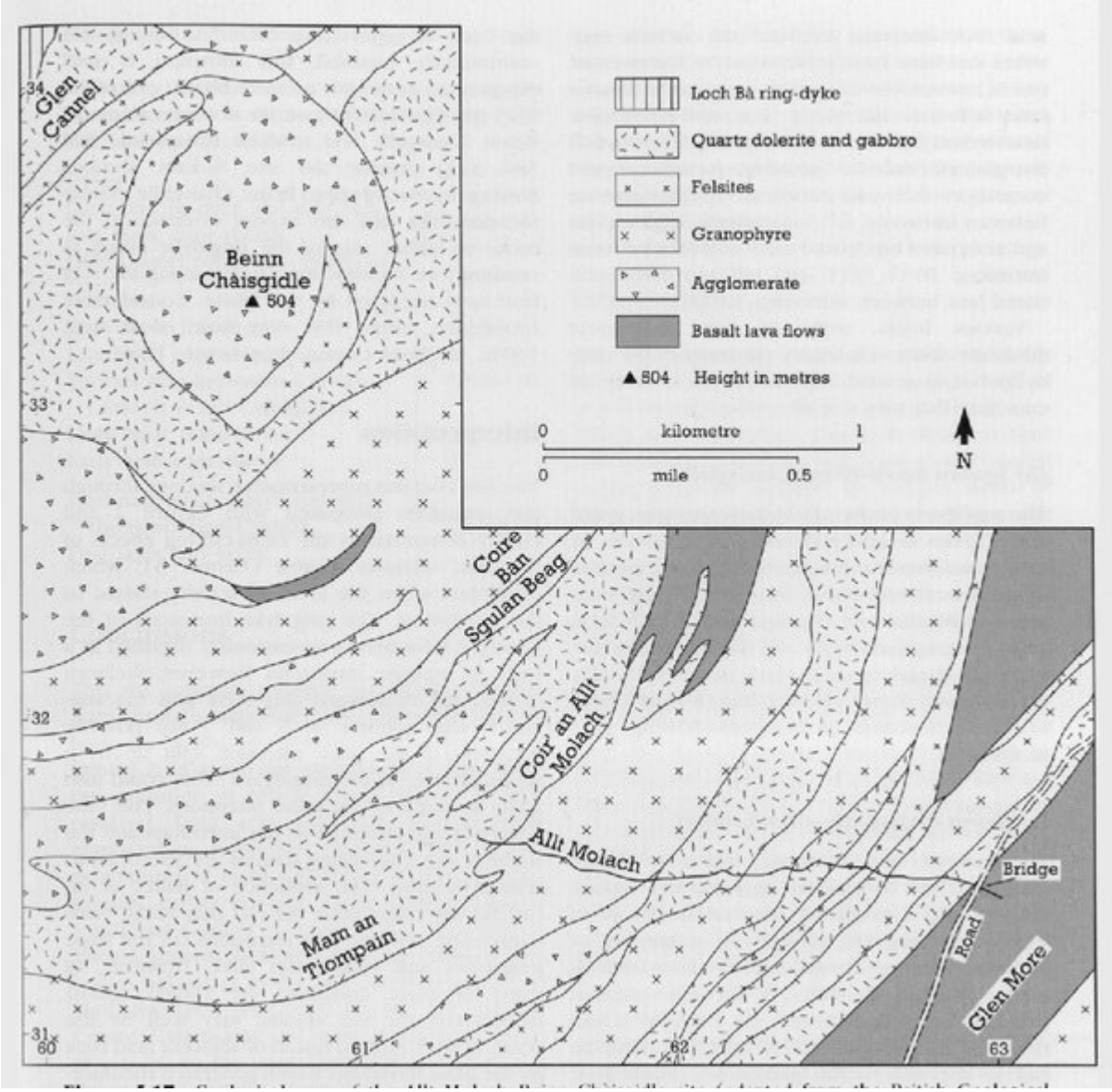
(Figure 5.14) Geological map of the Loch Spelve—Auchnacraig site (adapted from the British Geological Survey 'One Inch' map, Sheet 44, Mull).



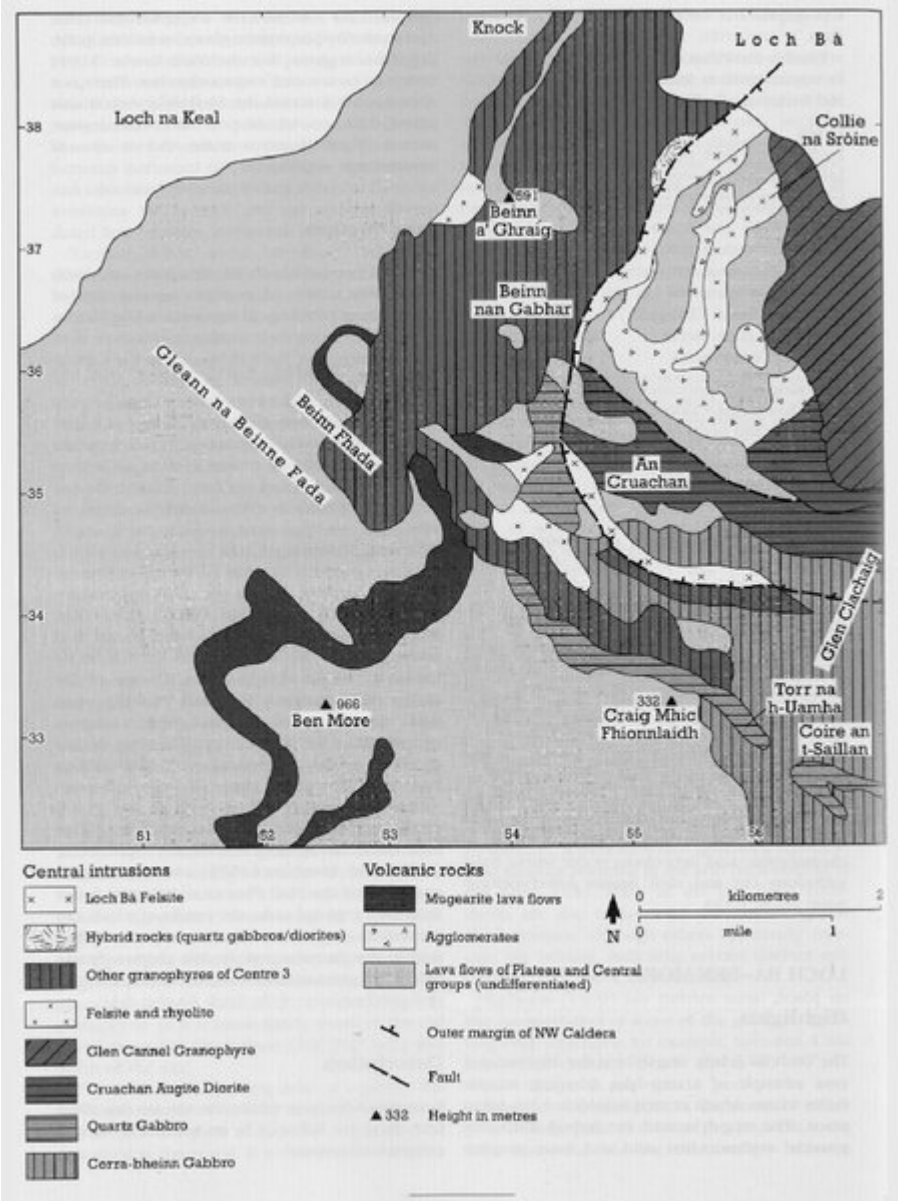
(Figure 5.15) Cruach Choireadail, viewed from the Coladoir River, exposing gabbro/granophyre of the Glen More ring-dyke. Cruach Choireadail site, Mull. (Photo: CJ. MacFadyen.)



(Figure 5.16) Geological map of the Cruach Choireadail site (adapted from the British Geological Survey 'One Inch' map, Sheet 44, Mull).

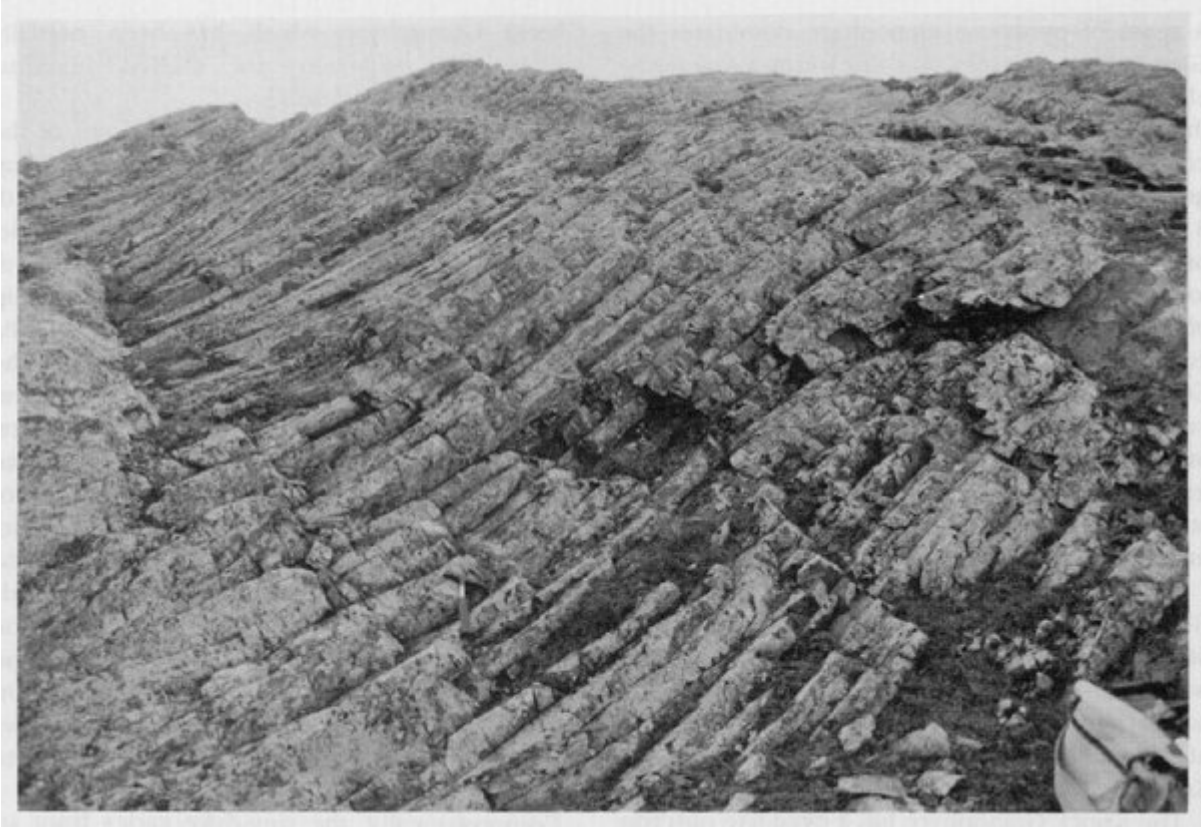


(Figure 5.17) Geological map of the Allt Molach—Beinn Chaisgidle site (adapted from the British Geological Survey 'One Inch' map, Sheet 44, Mull).

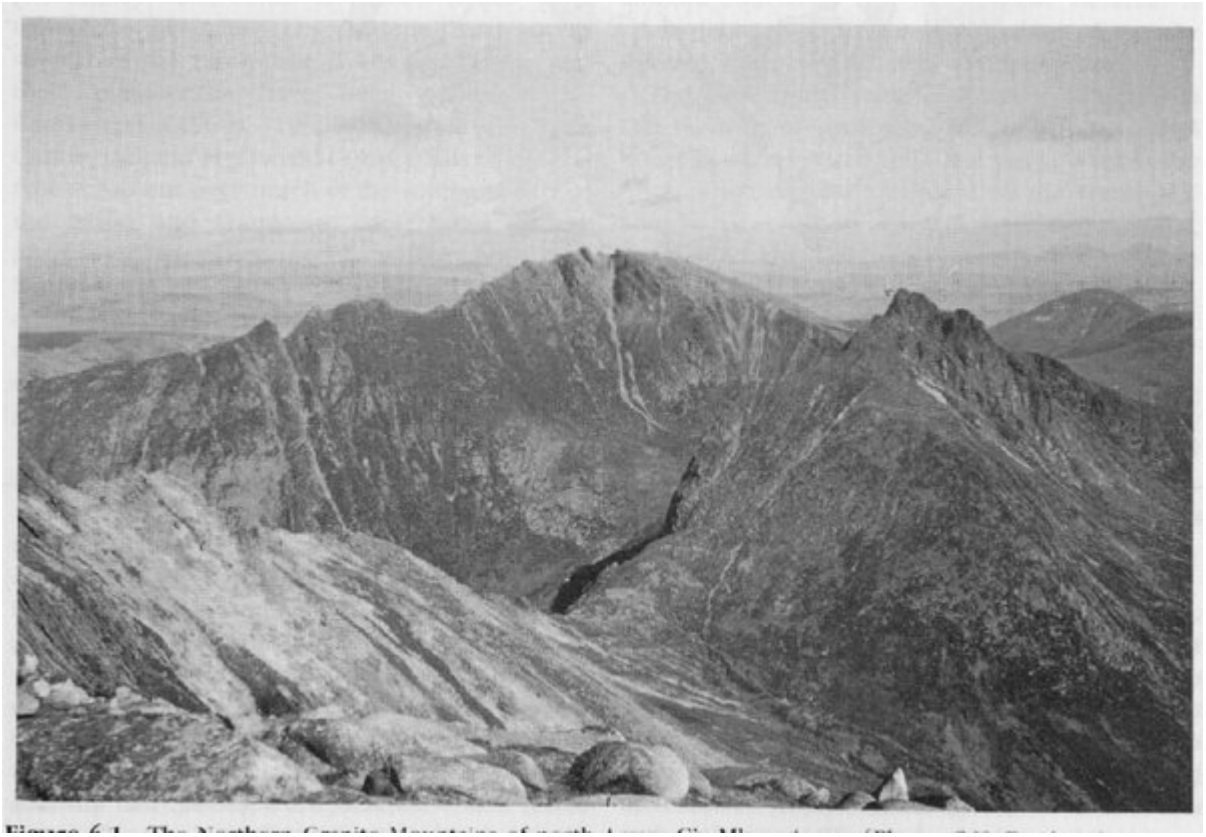


(Figure 5.18) Geological map of the Loch Ba—Ben More site (adapted from the British Geological Survey 'One Inch' map, Sheet 44, Mull).

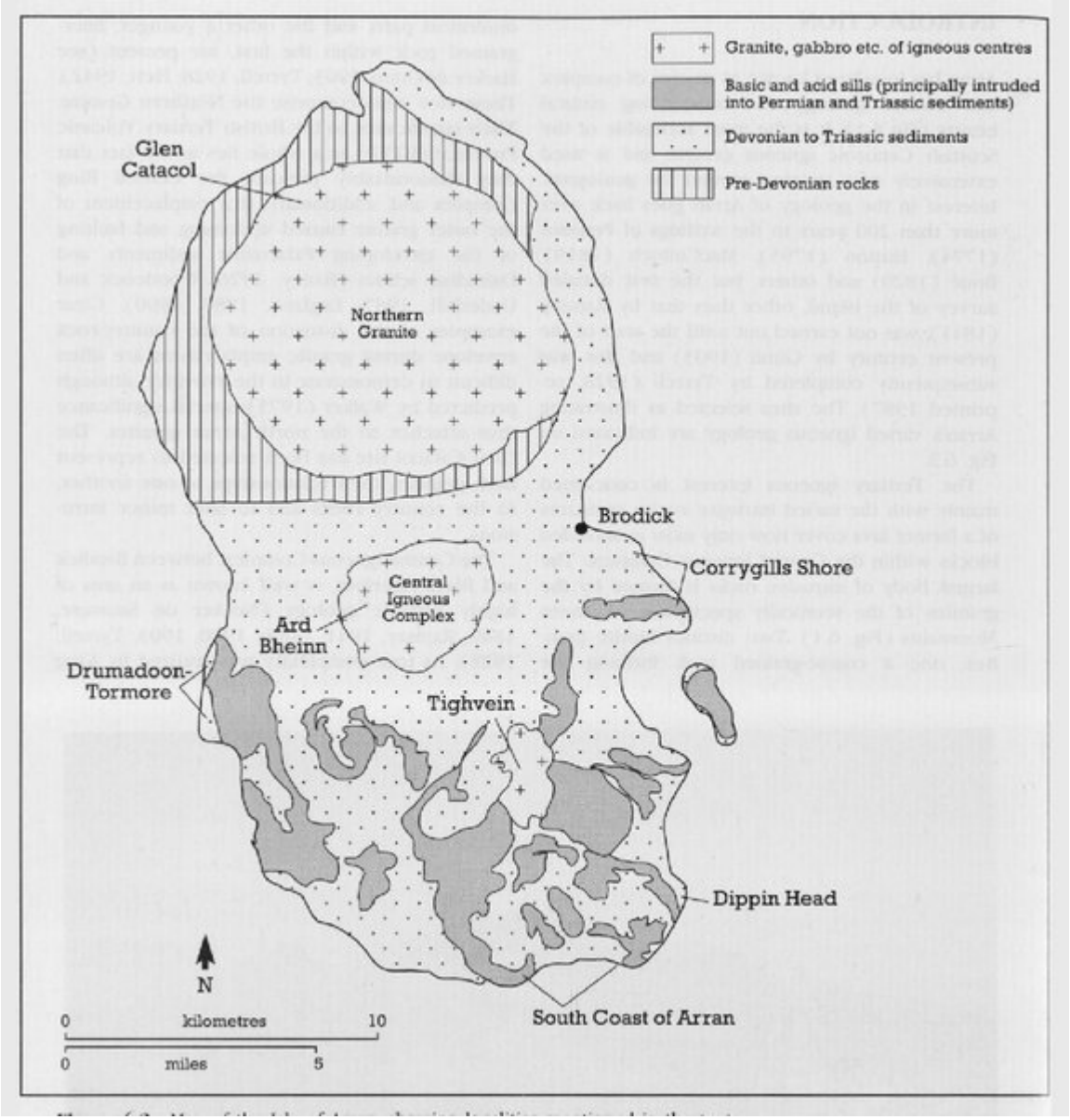
(Figure 5.19) Vent agglomerate containing fragments of Moine gneiss [NM 558 324]. Loch Ba—Ben More site, Mull. (Photo: CJ. MacFadyen.)



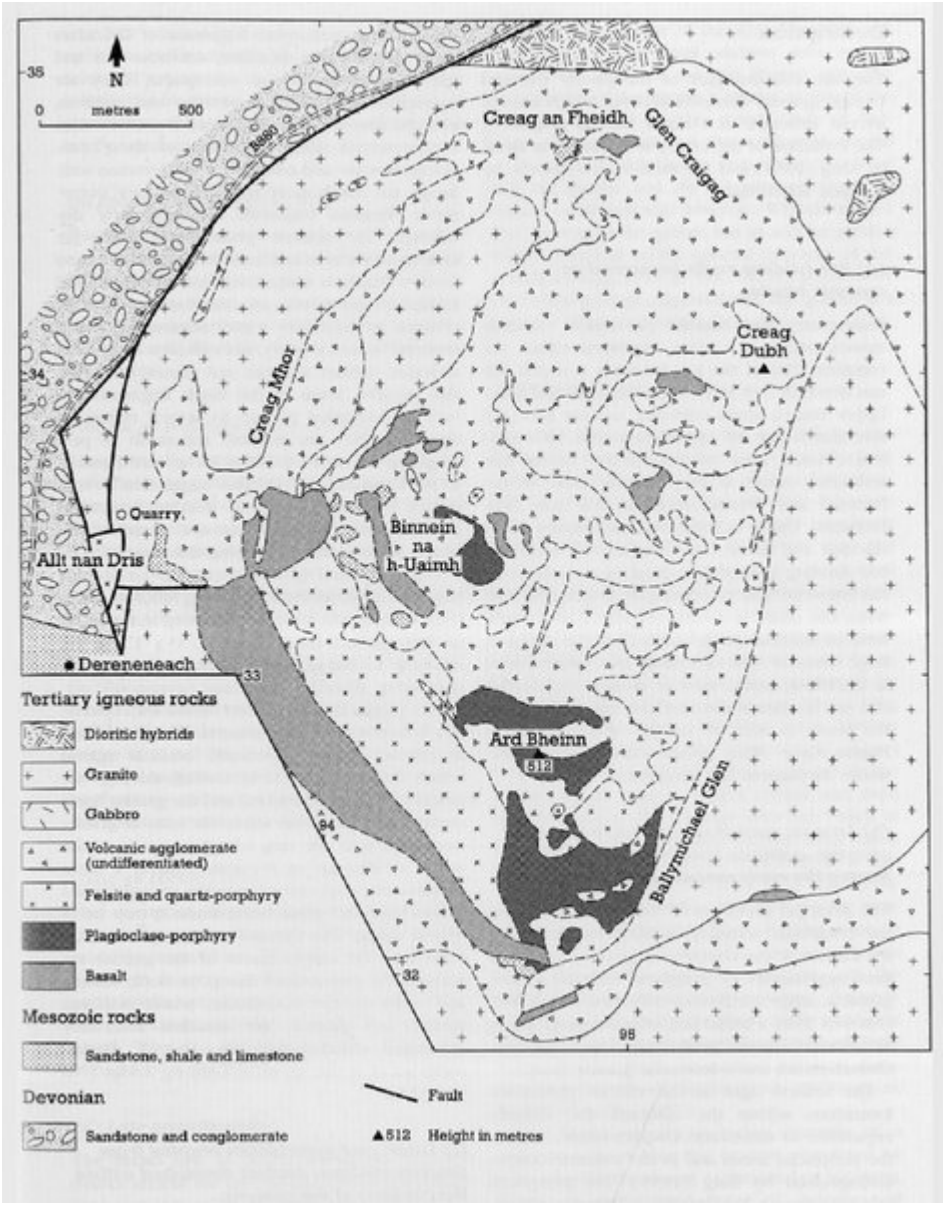
(Figure 5.20) Columnar jointing in the Loch Ba Felsite ring-dyke [NM 552 371]. Loch BA—Ben More site, Mull. (Photo: C.J. MacFadyen.)



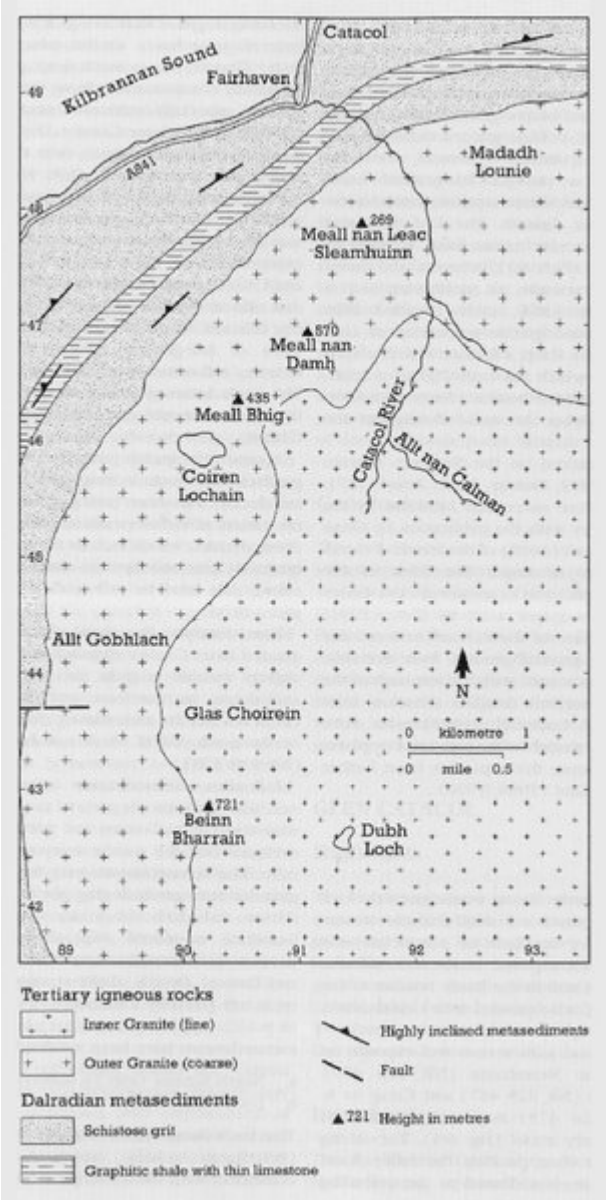
(Figure 6.1) The Northern Granite Mountains of north Arran. Cir Mhor, Arran. (Photo: C.H. Emeleus.) (Figure 6.2) Map of the Isle of Arran, showing localities mentioned in the text.



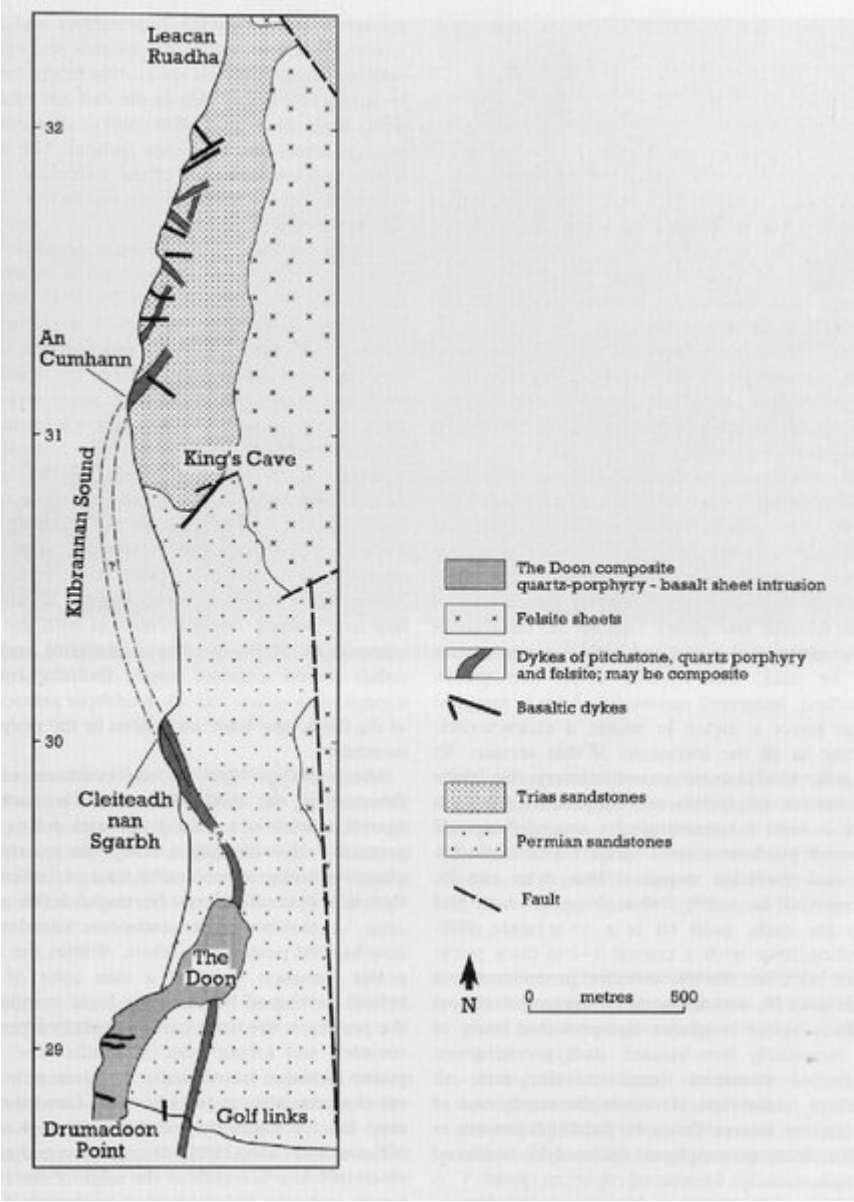
(Figure 6.2) Map of the Isle of Arran, showing localities mentioned in the text.



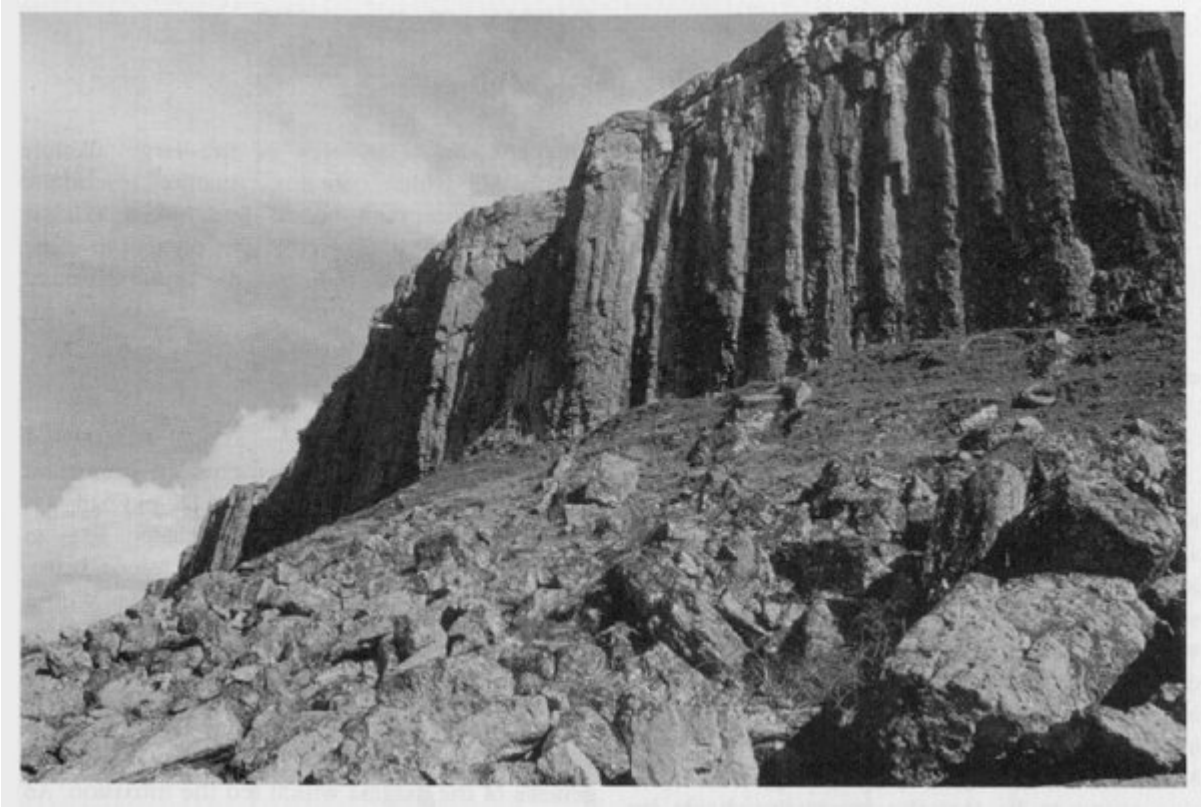
(Figure 6.3) Geological map of the Ard Bheinn site (adapted from King, 1955, plate XVI).



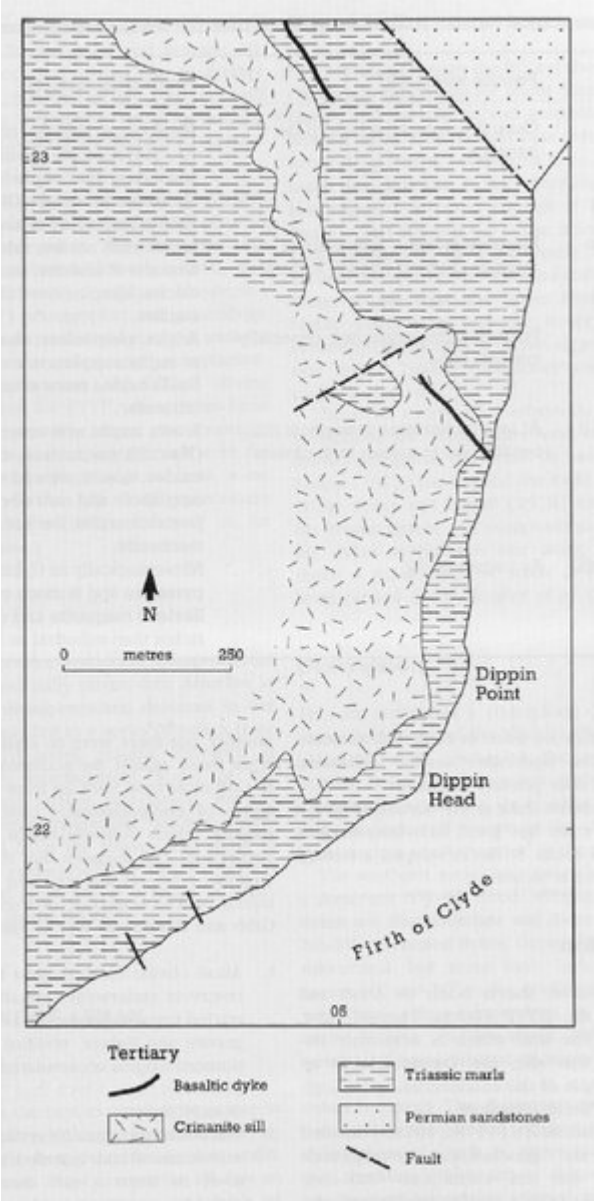
(Figure 6.4) Geological map of the Glen Catacol site (adapted from the British Geological Survey 1:50 000 Special District Sheet, Arran).



(Figure 6.5) Geological map of the Drumadoon—Tormore site (adapted from the British Geological Survey 1:50 000 Special District Sheet, Arran, with additional information from McKerrow and Atkins, 1985, figure I la).

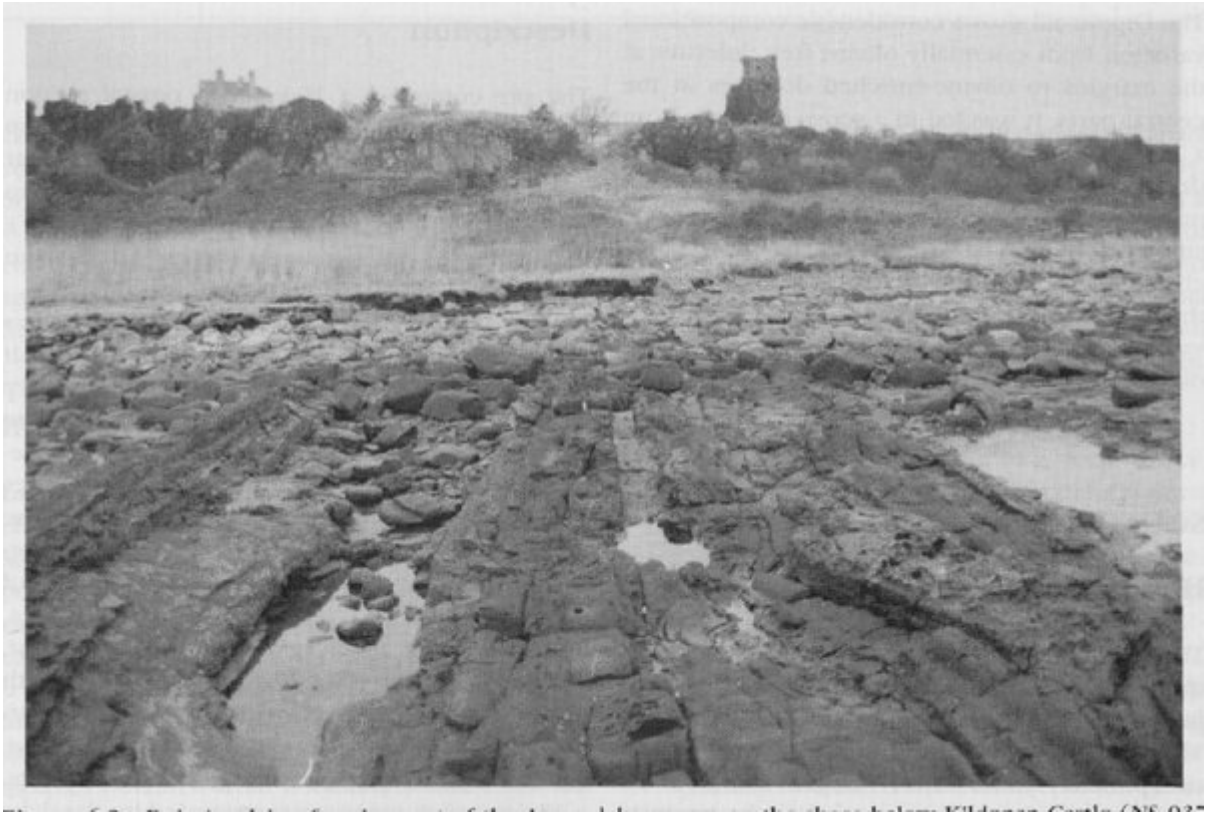


(Figure 6.6) Columnar jointing in the composite sill, The Doon. Drumadoon—Tormore site, Arran. (Photo: A.P. McKirdy.)

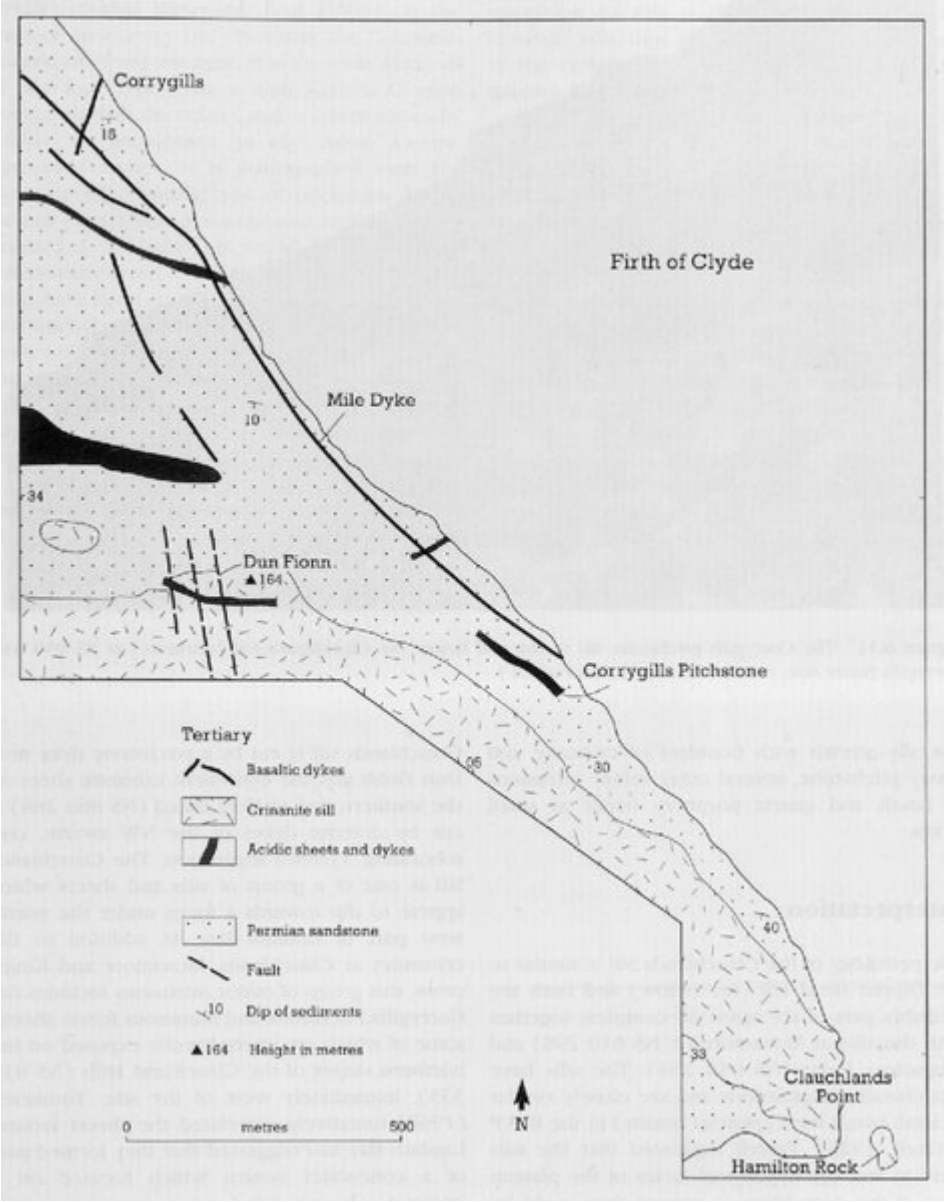


(Figure 6.7) Geological map of the Dippin Head site (adapted from the British Geological Survey I:50 000 Special District Sheet, Arran).

(Figure 6.8) Dyke swarm on the foreshore at Kildonan. The dykes weather out to form reefs; the softer Triassic sandstone in between has been eroded back. South Coast of Arran site, Arran. (Photo: C.H. Emeleus.)

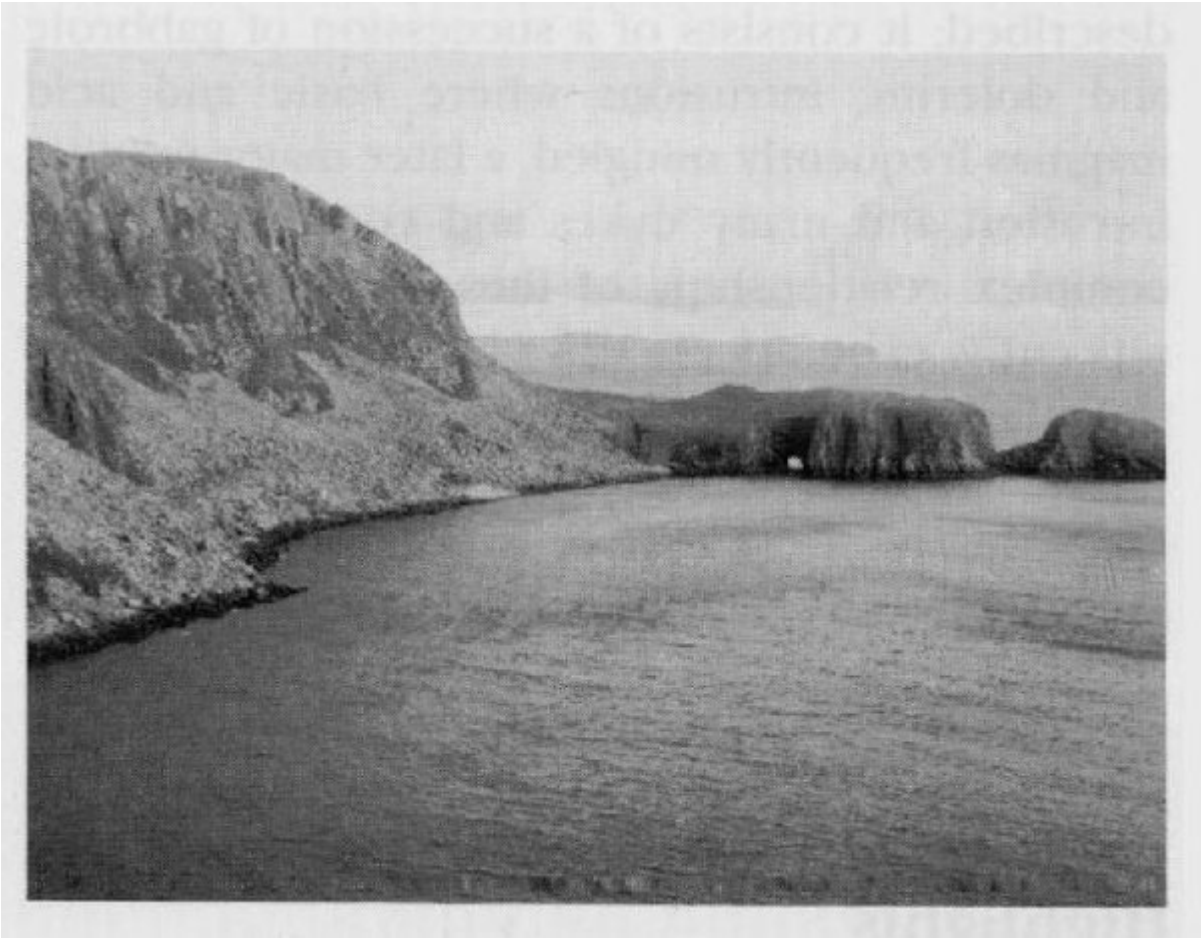


(Figure 6.9) Dolerite dykes forming part of the Arran dyke swarm on the shore below Kildonan Castle [NS 037 209]. South coast of Arran site, Arran. (Photo: C.J. MacFadyen.)

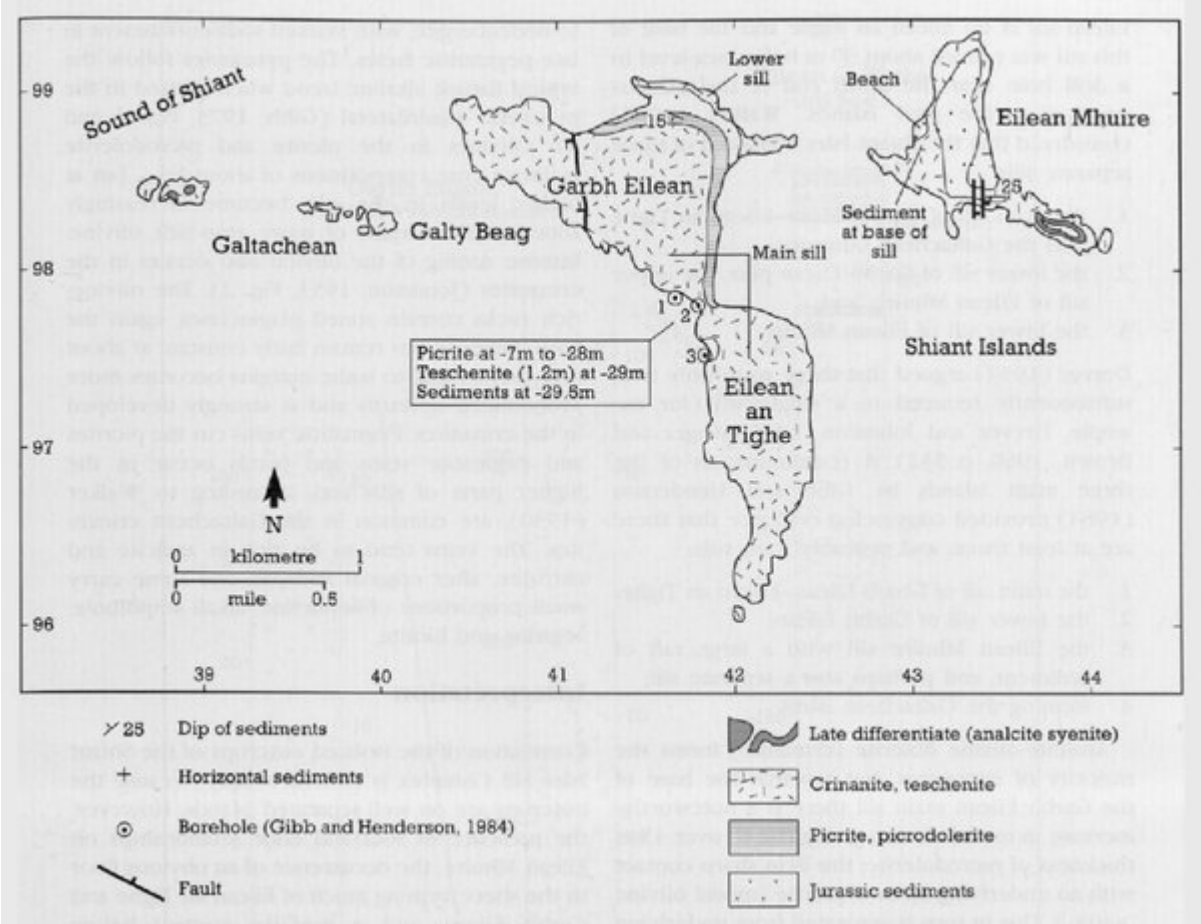


(Figure 6.10) Geological map of the Corrygills Shore site (adapted from the British Geological Survey 1:50,000 Special District Sheet, Arran).

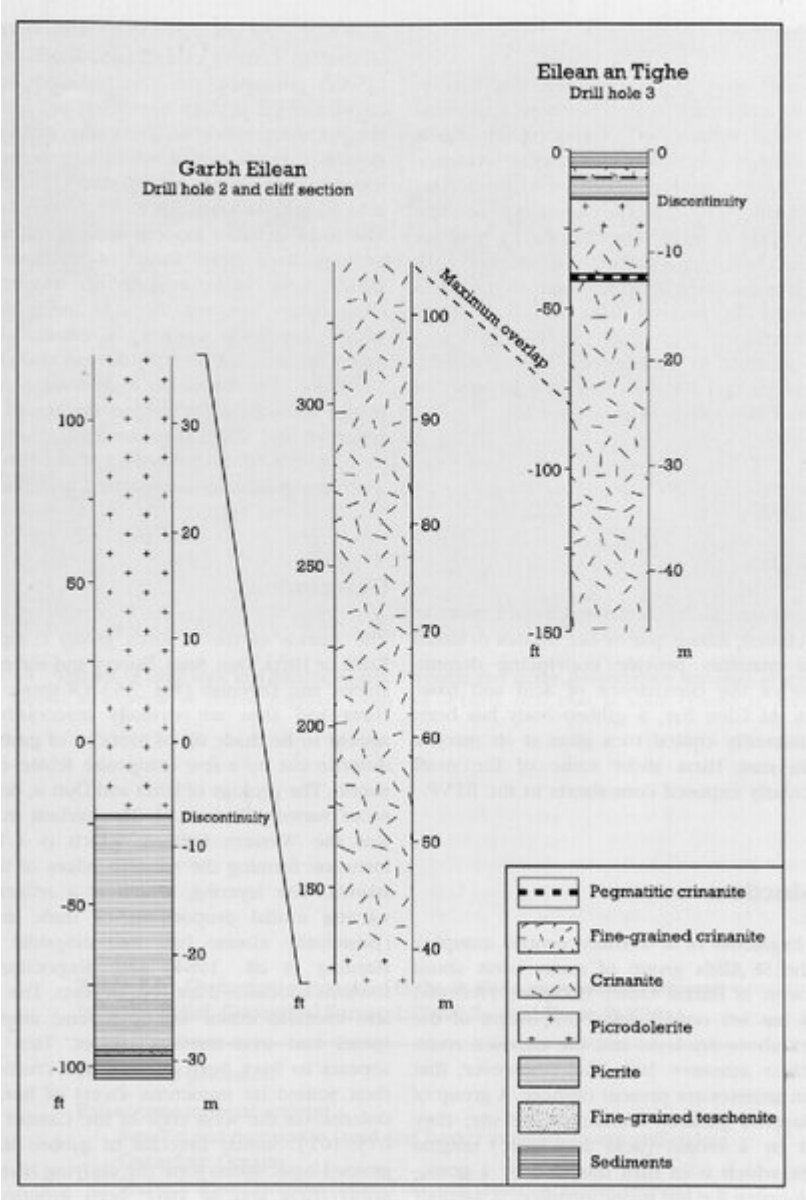
(Figure 6.11) The Corrygills pitchstone sill in the cliff below the Clauchlands Sill (crinanite) at [NS 050 337]. Corrygills Shore site, Arran. (Photo: C.J. MacFadyen.)



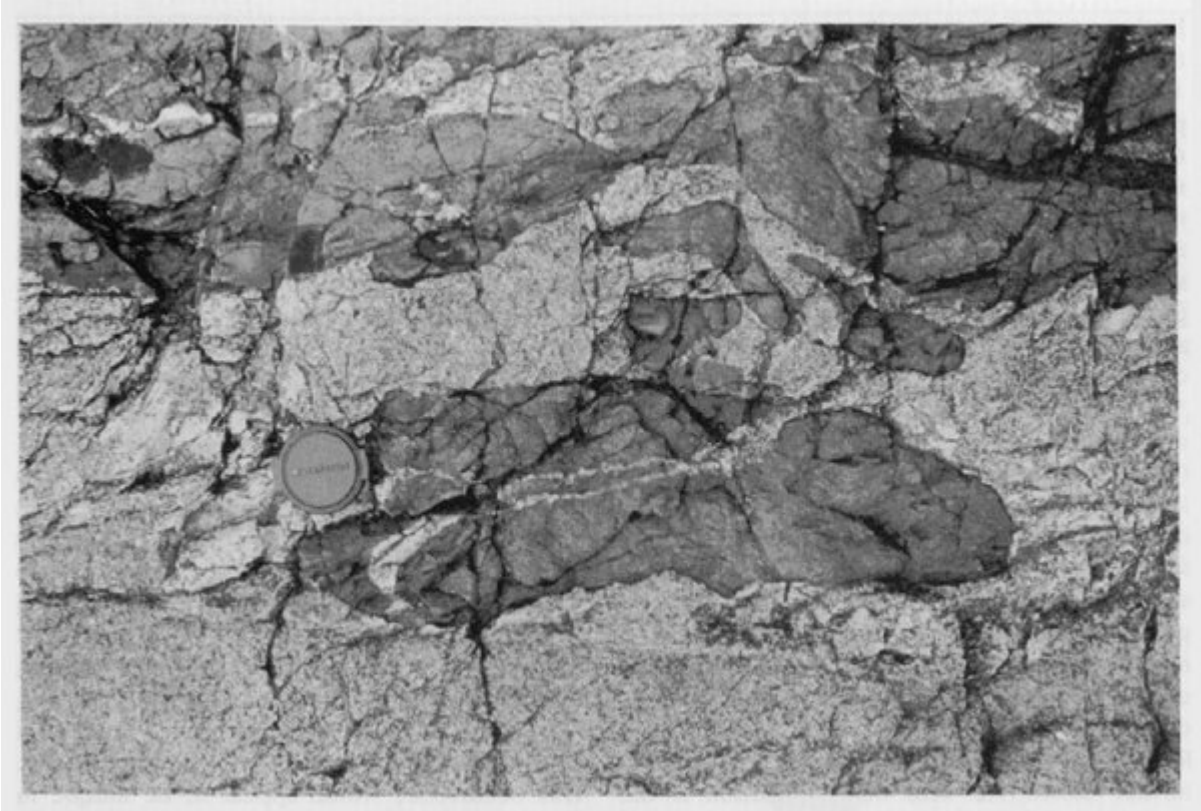
(Figure 7.1) The north-west corner of Garbh Eilean, showing the main sill (left) and the lower sill (with natural arch), Shiant Isles. (Photo: F.G.F. Gibb.)



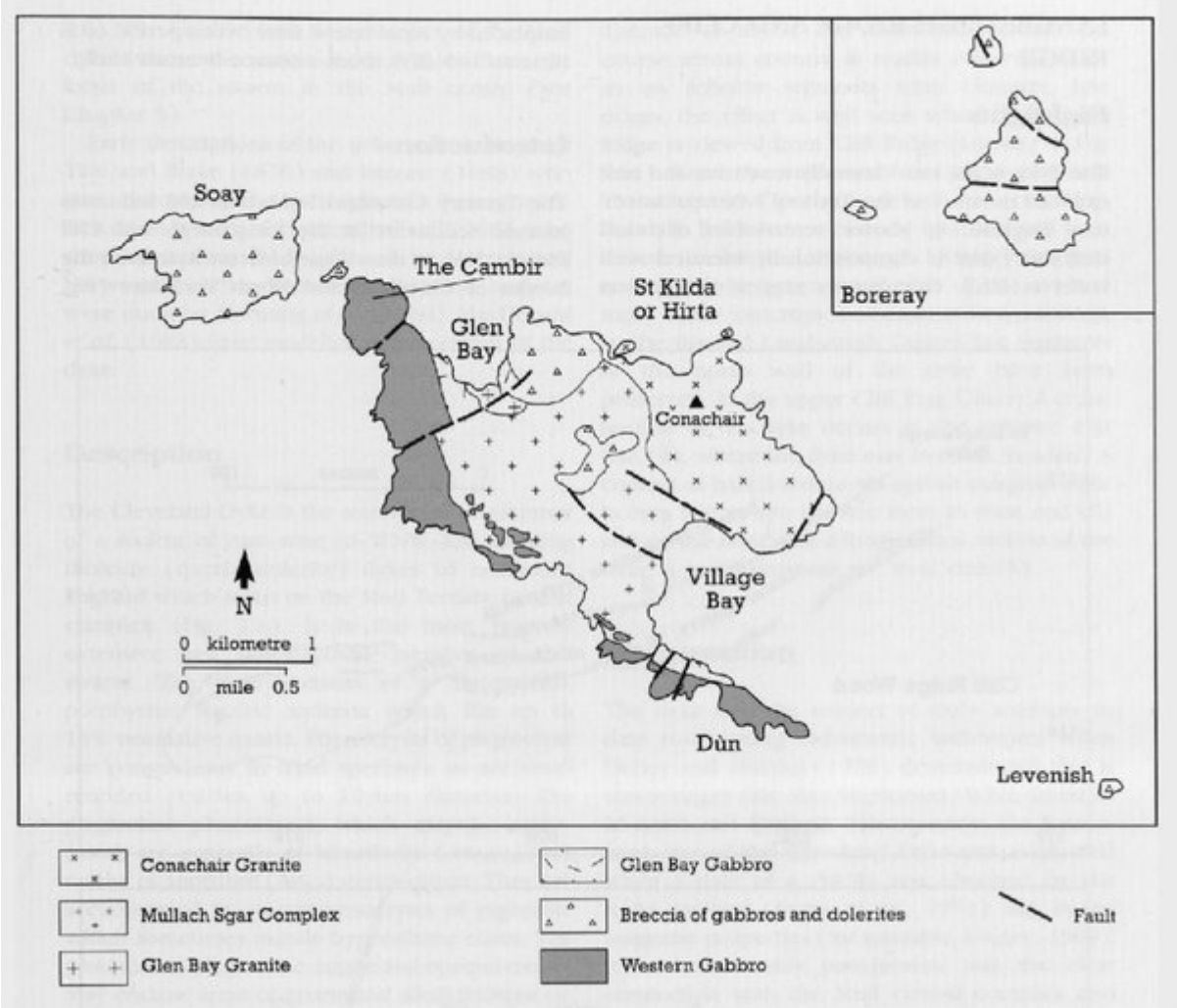
(Figure 7.2) Geological map of the Shiant Isles (after Walker, 1930, plate 36, with additions from Gibb and Henderson, 1984, figure 1).



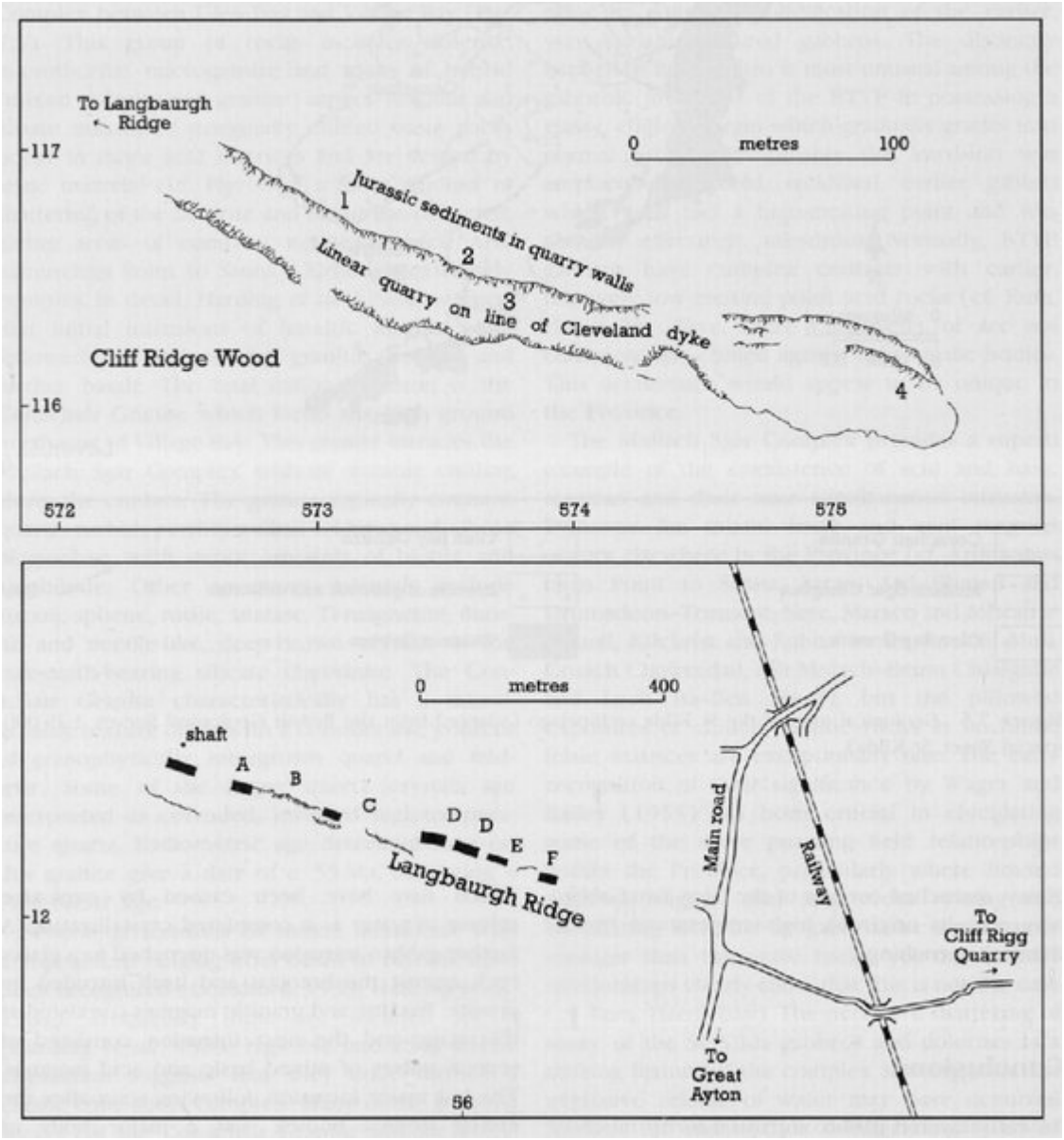
(Figure 7.3) Simplified vertical sections through the main Garbh Eilean—Eilean an Tighe sill, Shiant Isles (after Gibb and Henderson, 1984, figure 2).



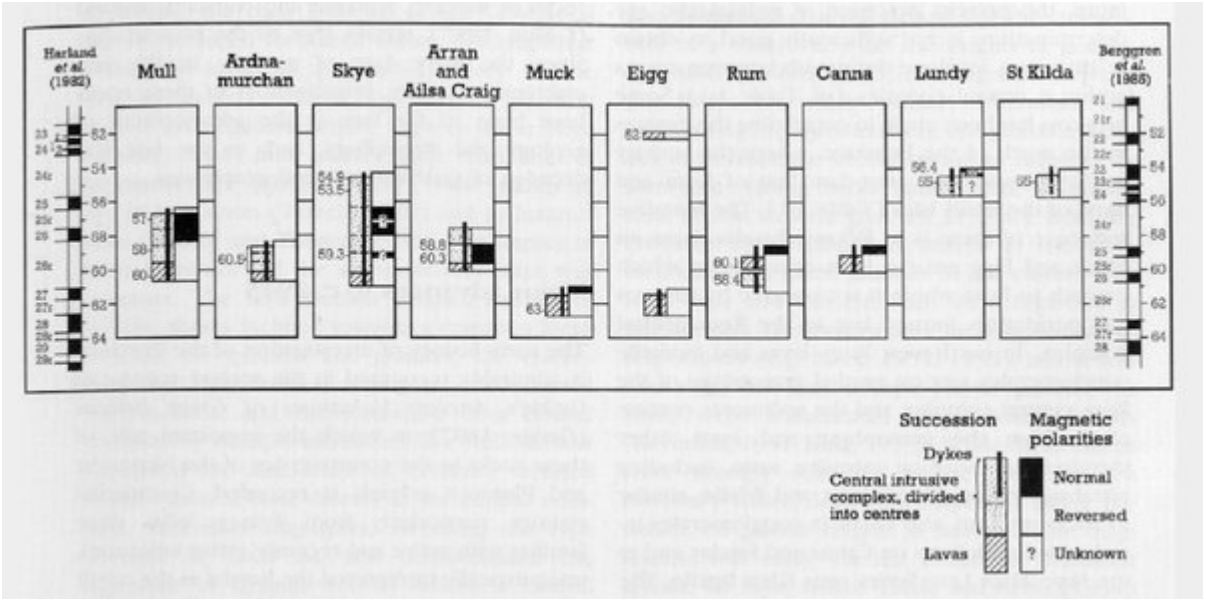
(Figure 7.4) 'Pillows' of basic rock in a granitic matrix. Probably due to the simultaneous intrusion of granitic and basaltic liquids; an example of 'mixed magmas'. South end of Hirta, near Dun, St Kilda. (Photo: H. Armstrong.)



(Figure 7.5) Geological map of the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda).



(Figure 7.6) Sketch maps showing outcrops of the Cleveland Dyke near Great Ayton, North Yorkshire: (lower) Langbaurgh Ridge. Localities A—F refer to points where the north margin of the dyke has been preserved. (upper) Upper part of Cliff Rigg Quarry. For explanation of localities 1–4 see text.



(Table 1.1) British Tertiary Volcanic Province: summary of the geological successions, radiometric ages and magnetic polarities (after Mussett et al., 1988, figure 2)

Late dykes (dolerite, felsite and peridotite)

Eastern Red Hills Centre
- Composite acid/basic sheets
- Five granite intrusions
- Kilchrist hybrids (possibly post-date some of the granites)
- Broadford and Beinn nan Cro gabbros
- Acid lavas, ignimbrites, tuffs and agglomerates of Kilchrist vent (may pre-date this Centre by a considerable amount)

Dykes (dolerite, pitchstone)

Western Red Hills Centre
- Marsco and Meall Buidhe granites
- Marscoite suite of hybrids, etc.
- Nine granite and major felsite intrusions
- Marsco Summit Gabbro
- Belig vent

Dykes (dolerite)

Strath na Crèitheach Centre
- Three granite intrusions
- Loch na Crèitheach vent

Dykes (dolerite)

Cuillin Centre
- Cone-sheets (dolerite)
- Coire Uaigneich Granophyre (but see text)
- Intrusive tholeiites
- Druim na Ramh Eucrite
- Explosive vents (of several ages)
- Inner Layered Series: allivalite, eucrite, gabbro
- Outer Layered Series: allivalite, eucrite, gabbro
- Layered Peridotite Series
- Border Group: gabbro, allivalite
- Cone-sheets and dykes (overlap with many of the above)

Palaeocene lavas
- Preshal More tholeiitic flows
- Skye Main Lava Series (SMLS) flows (with sparse clastic sedimentary horizons, and basal sediments and tuffs)

N.B. Additional details through text.

(Table 2.1) Summary of the Palaeocene igneous geology of the Isle of Skye (based on Bell, J.D., 1976, table 1; Bell, B.R. and Harris, 1986)

NORTHERN SKYE (1) Anderson and Dunham (1966)	WEST-CENTRAL SKYE (2) Williamson (1979)	Based mainly on NORTHERN SKYE (3) Thompson *et al.* (1972)
	7. Talisker Group	Preshal Mhor tholeiitic basalts
5. Osdale Group	6. Loch Dubh Group 5. Arnaval Group	
4. Bracadale Group	4. Tusdale Group	Skye Main Lava Series
3. Beinn Totaig Group	3. Cruachan Group*	Transitional and alkali-olivine basalts, hawaiites, mugearites, benmoreites and trachytes. More fractionated types are more common in the higher groups.
2. Ramascaig Group	2. Bualintur Group	
1. Beinn Edra Group	1. Meacnaish Group	

Individual groups are probably geographically restricted (see, for example, Anderson and Dunham, 1966, figure 13).

* The thick fluviatile conglomerates of the Allt Geodh a' Ghamhna site are at the base of this group.

(Table 2.2) Correlation of the divisions of the Palaeocene lavas of the Isle of Skye (mainly after Williamson, 1979, table 1).

14	Thin, alkali olivine basalts with scoriaceous tops	7 m
13	Massive basaltic lava with pillow structures towards the base	5 m
12	Thin white ash	0.03 m
11	Coal	0.05 m
10	Sandstone with obscure plant remains occurring as diffuse carbonaceous streaks and rootlets, possibly seat earth	0.2 m
9	Coal	0.01–0.05 m
8	Conglomerate with well-packed, rounded pebbles and cobbles of granophyre, quartzite, porphyritic rhyolite and red arkose. Clasts have a maximum diameter of 0.10–0.15 m, and are set in a pale sandy matrix	3.2 m
7	Sandstone with micaceous partings	0.2 m
6	Coal	0.02 m
5	Sandstone with plant remains	1.8 m
4	Conglomerate with a more sandy matrix than Bed 2, and a smaller proportion of acid igneous to arenaceous sediments than Bed 8. Rare pebbles of amygdaloidal and feldspar macroporphyritic basalt. Clast size <0.30 m, averaging 0.10–0.15 m. Thin lenses of white sandstone in lower horizons	2.3 m
3	Fine-grained sandstone, laminated base	1.1 m
2	Massive conglomerate with densely packed, crudely imbricated clasts of red arkose up to 0.30 m in diameter. Contains green siltstones with a sandstone wedge thickening to the north	2.75 m
1	Highly amygdaloidal basaltic lavas forming the top of the cliff at about 125 m elevation	10 m

(Table 2.3) The succession at Allt Geodh a' Ghamhna (after Williamson, 1979, table 2)

Aureole beyond the skarn zones	Skarn zones: Group 1 Primary skarns	Skarn zones: Group 2 Boron–fluorine ore skarns	
Talc	Grossular–andradite*	Magnetite*	Grossular-andradite
Tremolite	Wollastonite solid solutions*	Tremolite	Hydro grossular
Forsterite	Diopside–hedenbergite	Forsterite*	Idocrase
Diopside	Spinel	Diopside*	Bornite
Periclase	Plagioclase	Monticellite*	Chalcosite
Wollastonite	Idocrase	Cuspidine*	Covellite
Spinel	Xanthophyllite	Fluorite	Chalcopyrite
Idocrase	Phlogopite	Chondrodite*	Pyrite
Grossular	Orthite	Humite	Blende
Phlogopite	Clinozoisite–epidote	Clinohumite	Galena
Brucite	Prehnite	Ludwigite	Chessylite
Serpentine	Apophyllite	Fluoborite	Malachite
Chlorite	Pectolite	Szailbelyite	
Hydromagnesite	Xonotlite	Datolite	
		Harkerite	

* most abundant minerals

(Table 2.4) Minerals present in skarn zones (after Tilley, 1951, Table 1)

Granites of the Strath na Crèitheach Centre

Volcaniclastic deposits of Strath na Crèitheach dolerite cone-sheets

Coire Uaigneich Granite

Intrusive tholeiites of the Outer and Main Ridge Complexes

Inner Layered Series
- Inner Layered Gabbros
- (?vent agglomerates in Harta Corrie)
- Inner Layered Eucrites
- Inner Layered Allivalites

Druim nan Ramh Eucrite
- Agglomerates and explosion breccias of diatremes
- Dykes
  - (Gars Bheinn ultrabasic sill?)

Outer Layered Series
- Outer Layered Gabbros
- Outer Layered Eucrites
- Outer Layered Allivalites
- Layered Peridotites

Border Group (including White Allivalite)
- Cone-sheets
- Dykes

Outer Marginal Gabbros and Eucrites

?Early Granites (may pre-date Palaeocene basalts of south-west Skye)

Basalt lavas

Torridonian sediments

(Table 2.5) Succession in the Cuillin Hills site (after Bell and Harris, 1986, pp. 45–6)

Valley-filling pitchstone of the Sgurr of Eigg, and associated conglomerates

Dolerite dykes

Lavas and fluviatile sediments of north-west Rum and Canna–Sanday, olivine basalts, hawaiites, mugearite (on Canna), including also tholeiitic basaltic andesite, icelandite (on Rum)

——— Period of profound erosion during which the Rum central igneous complex was unroofed and eroded ———

The Rum Layered Igneous Complex:

Central Series: feldspathic peridotites, including breccias and some layered allivalites and peridotites

Western Layered Series (WLS): feldspathic peridotites and gabbroic rocks at Harris

Eastern Layered Series (ELS): layered feldspathic peridotite and allivalite, also gabbroic and ultrabasic intrusive bodies
(The WLS and ELS above may be coeval)

Dolerite and basalt dykes (some also post-date the Layered Igneous Complex)

Dolerite and basalt cone-sheets on Rum

Early phase of acid igneous activity:

Western Granite, also granite at Papadil and Long Loch

Porphyritic felsite (ignimbrites, in caldera, and intrusions)

Tuffisites (some may post-date porphyritic felsite)

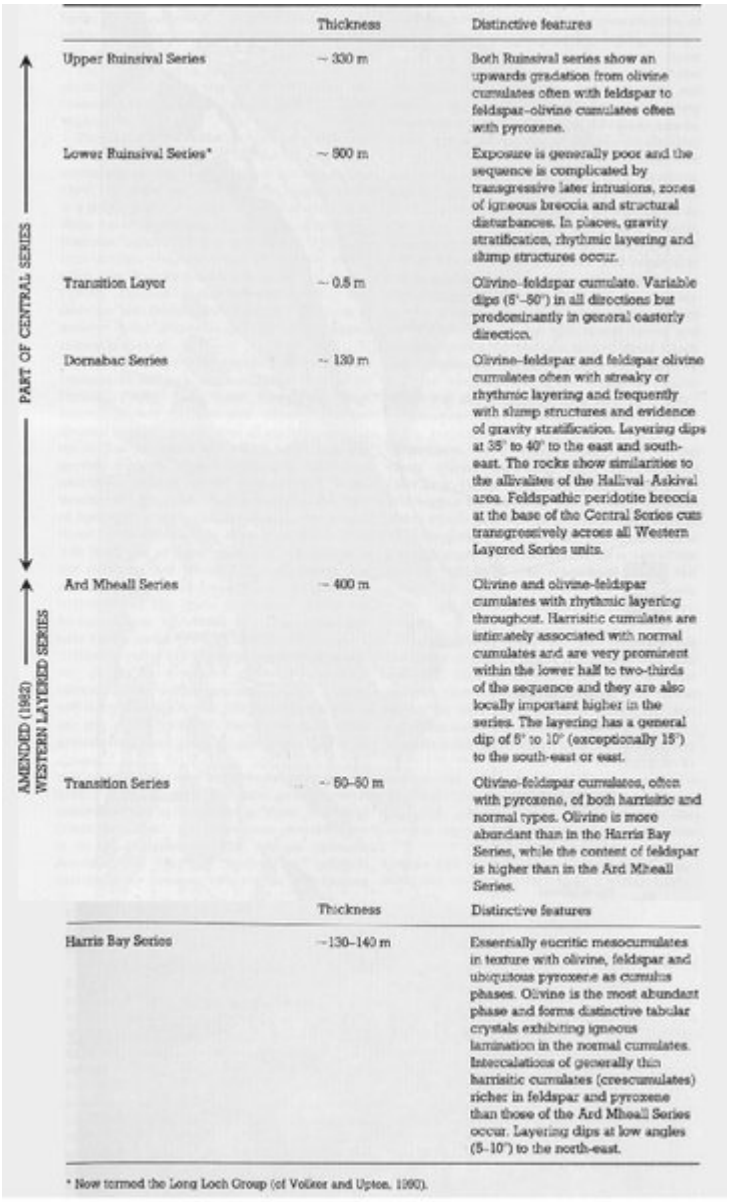
Volcaniclastic breccias – probably a mixture of explosion breccias and breccias formed by caldera wall collapse

Dolerite and basalt dykes (some intruded after breccias and prior to felsites)

Initiation of the Main Ring Fault System: movement on this system of arcuate faults probably continued at least until emplacement of the ELS/WLS and was a major tectonic feature during the early acid phase of igneous activity.

Lavas of Eigg and Muck, and those involved in the Main Ring Fault on Rum. Principally olivine basalts, feldspar-phyric olivine basalts and mugearites on Eigg. The dykes cutting these lavas belong to the main post-felsite and granite phase of dyke intrusion on Rum. Thin sedimentary layers occur in the Eigg and Muck successions.

(Table 3.1) Summary of the Palaeocene igneous geology of Rum and the Small Isles (based on Emeleus and Forster, 1979, table 1, with later amendments)



		Thickness	Distinctive features
PART OF CENTRAL SERIES	Upper Ruinsival Series	~ 330 m	Both Ruinsival series show an upwards gradation from olivine cumulates often with feldspar to feldspar–olivine cumulates often with pyroxene.
	Lower Ruinsival Series*	~ 500 m	Exposure is generally poor and the sequence is complicated by transgressive later intrusions, zones of igneous breccia and structural disturbances. In places, gravity stratification, rhythmic layering and slump structures occur.
	Transition Layer	~ 0.5 m	Olivine–feldspar cumulate. Variable dips (5°–50°) in all directions but predominantly in general easterly direction.
	Dornabac Series	~ 130 m	Olivine–feldspar and feldspar olivine cumulates often with streaky or rhythmic layering and frequently with slump structures and evidence of gravity stratification. Layering dips at 35° to 40° to the east and south-east. The rocks show similarities to the allivalites of the Hallival–Askival area. Feldspathic peridotite breccia at the base of the Central Series cuts transgressively across all Western Layered Series units.
AMENDED (1962) WESTERN LAYERED SERIES	Ard Mheall Series	~ 400 m	Olivine and olivine-feldspar cumulates with rhythmic layering throughout. Harrisitic cumulates are intimately associated with normal cumulates and are very prominent within the lower half to two-thirds of the sequence and they are also locally important higher in the series. The layering has a general dip of 5° to 10° (exceptionally 15°) to the south-east or east.
	Transition Series	~ 60–80 m	Olivine-feldspar cumulates, often with pyroxene, of both harrisitic and normal types. Olivine is more abundant than in the Harris Bay Series, while the content of feldspar is higher than in the Ard Mheall Series.
		Thickness	Distinctive features
	Harris Bay Series	~130–140 m	Essentially eucritic mesocumulates in texture with olivine, feldspar and ubiquitous pyroxene as cumulus phases. Olivine is the most abundant phase and forms distinctive tabular crystals exhibiting igneous lamination in the normal cumulates. Intercalations of generally thin harrisitic cumulates (crescumulates) richer in feldspar and pyroxene than those of the Ard Mheall Series occur. Layering dips at low angles (5–10°) to the north-east.

* Now termed the Long Loch Group (cf Volker and Upton, 1990).

(Table 3.2) Harris Bay: subdivisions of the ultrabasic and basic layered rocks (modified from Wadsworth, 1961, table 1, with amended Western Layered Series).

(youngest)

Late NNW-trending dolerite dykes

Centre 3

- Quartz monzonite
- Toralite
- Fluxion biotite gabbro of Glendrain
- Fluxion biotite gabbro of Sithean Mor
- Quartz-biotite gabbro
- Quartz dolerite, granophyre-veined
- Inner Eucrite
- Biotite eucrite
- Quartz gabbro, southern side of Meall an Tarmachain
- Quartz gabbro of Meall an Tarmachain summit
- Outer Eucrite
- Great Eucrite
- Cone-sheets of Centre 3 (sparse)
- Porphyritic gabbro of Meall nan Con screen
- Gabbro, south-east of Rudha Groulin
- Gabbro of Plockaig
- Fluxion gabbro of Faskadale
- Quartz gabbro of Faskadale

(Migration of focus of activity to Achnaha area)

Centre 2

- Felsite, south of Aodann
- Fluxion gabbro of Portnairk
- Younger quartz gabbro of Beinn Bhuidhe
- Quartz gabbro of Beinn na Seilg
- Quartz gabbro of Loch Caorach
- Eucrite of Beinn nan Ord
- Inner cone-sheets of Centre 2
- Quartz dolerite of Sgurr nam Meann
- Quartz gabbro of Aodann
- Older quartz gabbro of Beinn Bhuidhe
- Granophyre of Grigadale
- Quartz gabbro of Garbh-dhail
- Old Gabbro of Lochan an Aodainn
- Hypersthene gabbro of Ardnamurchan Point
- Glas Eilean vent
- Outer cone-sheets of Centre 2

(Migration of focus of activity to Aodann area [NM 483 664])

Centre 1 and the Ben Hiant vent*

- Cone-sheets of Centre 1 (penecontemporaneous with the quartz dolerite intrusion of Ben Hiant)
- Ben Hiant quartz dolerite
- Composite intrusion of Beinn an Leathaid
- Augite diorite of Camphouse
- Quartz dolerite of Camphouse

- Porphyritic dolerite of Ben Hiant
- Granophyre west of Faskadale
- Quartz gabbro west of Faskadale
- Old Gabbro of Meall nan Con
- Porphyritic dolerite of Glas Bheinn
- Agglomerates of Northern Vents
- Tuffs, agglomerates and lavas of Ben Hiant vents
- Trachyte plug

(Igneous activity localized at Ben Hiant and also centred on a focus c. 1.3 km west of Meall nan Con)

- Palaeocene basalt lavas and thin sediments
- Jurassic and Triassic sandstones, shales, limestones, conglomerates
- Moine metasediments

(oldest)

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*The relative ages of many of the units assigned to Centre 1 and Ben Hiant are uncertain. (From Emeleus, in Sutherland, 1982, table 29.5).

(Table 4.1) The geological succession in the Ardnamurchan Central Complex (based on Richey and Thomas, 1930, Chapter 7)

(youngest)

Dykes were intruded throughout the sequence (Loch Bà–Ben More)

Loch Bà Centre (Centre 3; North-West or Late Caldera)

Loch Bà felsite ring-dyke (Allt Molach–Beinn Chaisgidle, Loch Bà–Ben More)
Hybrid masses of Sron nam Boc and Coille na Sroine (Loch Bà–Ben More)
Beinn a' Ghraig Granophyre (Loch Bà–Ben More)
Knock Granophyre (Loch Bà–Ben More)
Late basic cone-sheets (Loch Bà–Ben More)
Early Beinn a' Ghraig Granophyre and felsite (Loch Bà–Ben More)
Glen Cannel complex and some late basic cone-sheets (Allt Molach–Beinn Chàisgidle, Loch Bà–Ben More)

Beinn Chàisgidle Centre (Centre 2)

Glen More ring-dyke (Loch Sguabain, Cruach Choireadail)
Late basic cone-sheets (Allt Molach–Beinn Chàisgidle), Loch Scridain sheets (intruded towards middle and end of Centre 2 and start of Centre 3)
Ring-dyke intrusions around Beinn Chàisgidle
?Augite diorite masses of An Cruachan and Gaodhail (Loch Bà–Ben More)
Corra-bheinn layered gabbro (Loch Bà–Ben More)
Second suite of early basic cone-sheets
Second suite of early acid cone-sheets
Explosion vents (numerous at margin of the South-East Caldera) (Loch Bà–Ben More)

Glen More Centre (Centre 1; including the Early or South-East Caldera)

Ben Buie layered gabbro
Loch Uisg granophyre-gabbro
First suite of early basic cone-sheets (Loch Bà–Ben More)
Early acid and intermediate cone-sheets (Loch Bà–Ben More)
Acid explosion vents containing porphyritic rhyolite material (Loch Bà–Ben More)
Glas Bheinn and Derrynaculen granophyres (Loch Spelve–Auchnacraig)

Updoming and folding in south-east Mull as a result of rising diapir (Loch Spelve–Auchnacraig).

Lava eruption on to eroded surface of Mesozoic and older rocks. Latest flows overlap in time with formation of the South-East Caldera where pillow lavas are found. (Lavas: Bearraich, Ardtun, Carsaig Bay, Loch Bà–Ben More. Pillow lavas: Loch Sguabain, Cruach Choireadail)

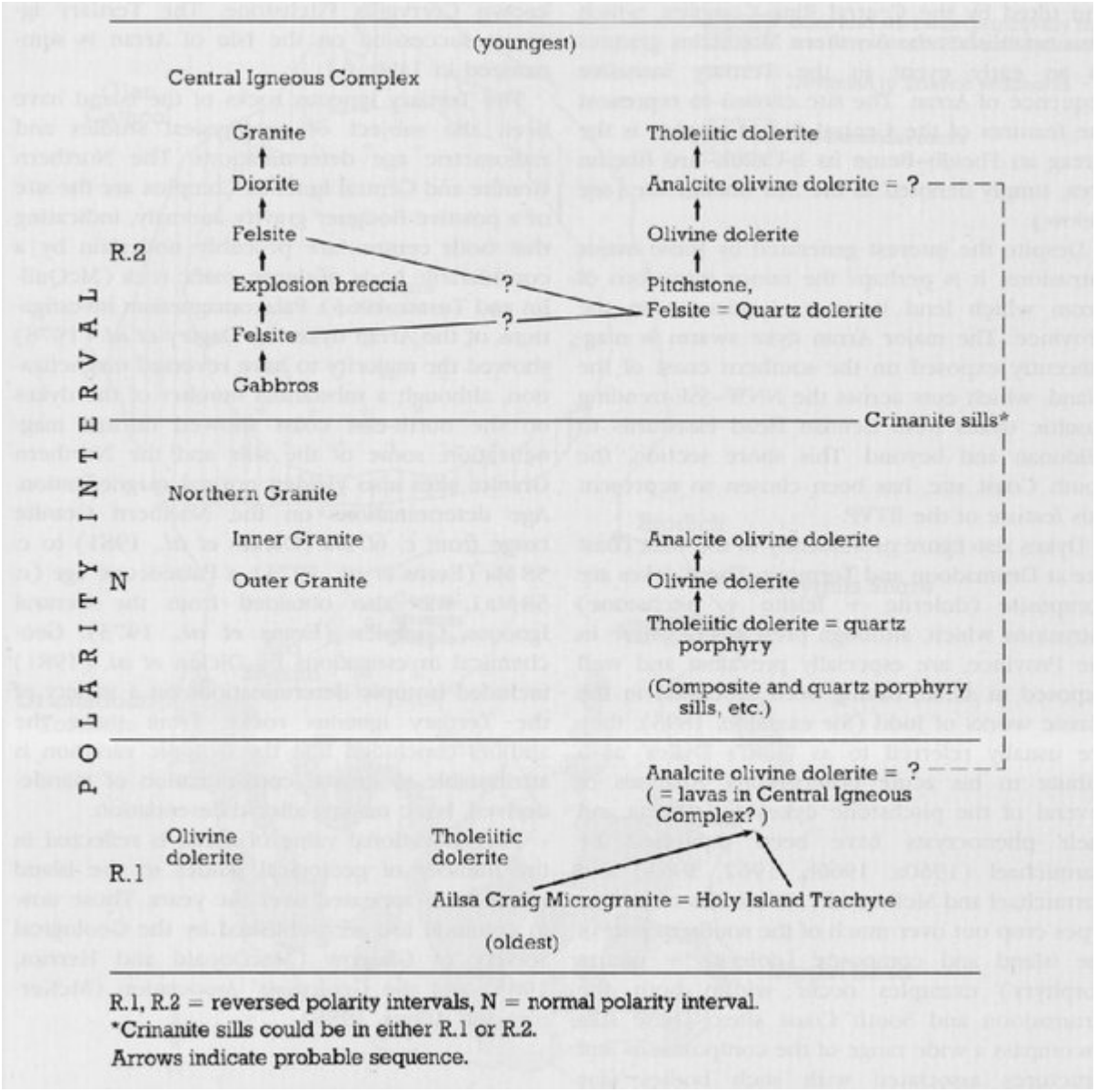
(oldest)

(Table 5.1) The Mull Central Complex: sequence of events (after Skelhorn, 1969, pp. 2–6)

Mull Memoir (Bailey *et al.*, 1924)	Beckinsale *et al.* (1978)	Morrison (1978) Thompson *et al.* (1982) Morrison *et al.* (1985) Thompson *et al.* (1986)
Central Group (= NPCMT) (Includes pillow lavas in central complex)	Not dealt with in detail	Some samples analysed, all zeolitized or hydrothermally altered.
Plateau Group (majority = PMT) Pale Group of Ben More (= PMT) (with interlayered mugearite and Big-Feldspar Basalt)	Group 1 olivine basalts (mainly sampled in north-west Mull) and Group 3 olivine basalts (mainly sampled around Lochaline, Morven)	Mull Plateau Group (MPG) Note that many are transitional between alkali basalt and tholeiite, and compare closely with Skye Main Lava Series. Some lower crust contamination.
(Staffa Type at base = NPCMT)	Group 2 of south-west Mull	Staffa Magma Type (SMT) Variably enriched in lower and upper crustal contaminants.

(NPCMT = Non-Porphyritic Central Magma Type) later = tholeiitic basalt
(PMT = Plateau Magma Type) later = alkali olivine basalt but many flows are in fact transitional between alkali basalt and tholeiite
Total thickness of Mull lavas estimated about 2000 m (Bailey *et al.*, 1924)

(Table 5.2) Classification and correlation of the Mull lavas



(Table 6.1) Tertiary igneous succession in the Isle of Arran (after Hodgson et al., 1990, figure 8)

Rock type	Position within sill	Petrological features
(a) Crinanite	Central = forms the bulk of the intrusion	Plagioclase, analcite, olivine, ophitic Al-, Ti-rich augite. Zeolites. Analcite, secondary after nepheline and of hydrothermal origin. Olivine up to 12 vol.% about 10–15 m above base.
(b) Teschenite	Marginal facies = fine-grained margins showing quench textures	Lacks fresh olivine, substantial amounts of analcite, zeolites and calcite. Margins have skeletal Ti-augites.
(c) Augite teschenite	Patches within crinanites, especially towards base.	Augite, plagioclase, analcite. Alignment of augite suggests cumulate texture. Fe–Ti oxides more abundant than in crinanite.
(d) Pegmatite(i)	At several horizons throughout sill, centimetres to metres in thickness	Brown augite with emerald-green rims (Na-rich), plagioclase, analcite, Fe-oxides, apatite, rare blue riebeckitic amphibole and rare olivine pseudomorphs. Variant of augite teschenite.
(e) Pegmatite (ii)	As pegmatite (i)	Mineralogically as (i) but has less pyroxene and is much coarser grained. Skeletal magnetite and ophitic augite, rather than euhedral as in (i).

(Table 6.2) Petrological variation within the Dippin Sill (based on Gibb and Henderson, 1978b, figure 4)

Table 7.1 Geological succession in the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda)

Pleistocene glaciation

Palaeocene igneous activity

- Basaltic and composite (acid and basic) inclined sheets and dykes
- Conachair Granite
- Mullach Sgar Complex (mixed magma (basic–acid) intrusions)
- Glen Bay Granite
- Glen Bay Gabbro
- Breccias of gabbro and dolerite
- Western Gabbro (layered in places)

No pre-Palaeocene rocks are exposed, but the complex is thought to be intruded into Lewisian gneisses.

(Table 7.1) Geological succession in the St Kilda archipelago (adapted from the British Geological Survey 1:25 000 Special Sheet, St Kilda)