# Appendix Key field localities

The following text and map are provided to help the interested geologist locate and examine key features in the field. They are best used in conjunction with the 1:25 000 scale geological map (British Geological Survey, 2005). UK National Grid references all refer to the 100 km square NN. The brief notes regarding access are for general guidance only.

It is stressed that this appendix is not intended as a field guide. All terrain in the Glencoe area is potentially hazardous and all field visits should be planned accordingly. Much of the terrain is very steep and remote. Serious deterioration in weather conditions can occur with surprising rapidity and streams and rivers can quickly become impassable torrents. Some descent routes are not straightforward and can be long and arduous. No listed locality is perfectly safe and visits to those described in the notes as steep, exposed, or involving a scramble should only be undertaken by persons who are experienced and confident in mountain environments, with due regard for prevailing and predicted weather conditions. Some of the listed localities are unsuitable for large parties and potential leaders are advised to check access in advance, bearing in mind the abilities of likely participants.

Many localities are geological Sites of Special Scientific Interest (SSSIs). The use of hammers and sampling without permission from Scottish Natural Heritage is prohibited by law.

Location map of key field localities (Figure 29).

| Locality | Grid reference | Key features | Relevant page, figure or plate | Notes |
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| 1 | [NN 153 573] | Palaeocanyons in tilted unconformity surface. Conglomerates with boulders over 1 m in diameter include diverse plutonic rocks. Plant remains recovered from siltstone nearby | 31–32; 104<br>(Plate 5) | Exposures along foot of cliffs |
| 2 | [NN 138 563] | Leven Schist Formation constitutes local basement beneath volcanic succession | 22; 87 | Numerous exposures |
| 3 | [NN 1399 5598] | Unconformity. Reddened Leven Schist Formation cut by irregular erosion surface and overlain by schist-breccia, sandstone and andesite of Basal Andesite Sill-complex | 30 | Small exposure beside stream (east bank) |

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| 4 | [NN 1408 5594]–[NN 1402 5591] | Peperitic top of basaltic andesite sill. Overlying sandstones show soft-state convolution and small-scale faulting. Basal part of succeeding sill shows lobate form and peperite in fractures | 33<br><br>(Figure 9) | Steep access down to exposure at upper plunge-pool |
| 5 | [NN 1398 5516] | Coarse peperite and autobreccia forming top of andesite sill | 33<br><br>(Plate 6a)(Plate 6b) | Extensive exposure |
| 6 | [NN 1420 5538] | Peperitic top of uppermost sill unconformably overlain by sandstone and then accretionary-lapilli-bearing Kingshouse Tuffs | 34; 38; 104<br><br>(Plate 7); (Plate 10) | Access traverse is in exposed position |
| 7 | [NN 139 548] | Kingshouse Tuffs and Lower Etive Rhyolite steepen and are restricted at overturned scarp of Southwestern Graben Fault | 27; 49; 87<br><br>(Figure 14a)(Figure 14b) | View, partly in steep cliff face |
| 8 | [NN 142 548] | Lava-like ignimbrite of Lower Etive Rhyolite overlain by Upper Three Sisters Ignimbrite, which is eutaxitic and includes mesobreccia | 69<br><br>(Figure 14); (Figure 21)<br><br>(Plate 19a)(Plate 19b) | Extensive exposures |
| 9 | [NN 1428 5455]–[NN 1434 5420] | Andesitic Church Door Buttress Breccias bury trace of Southwestern Graben Fault. Overlying Bidean nam Bian andesite has columnar joints more than 150 m tall | 73–74; 78; 83<br><br>(Figure 14); (Figure 23) | Steep cliff exposures above scree-lined gully |
| 10 | [NN 1475 5497] | Columnar jointing of Bidean nam Bian andesite; jointing indicates single cooling unit about 200 m thick. Flow-banded domains with diverse orientations locally define solidified lava blocks that foundered into fluid magma | 78–79<br><br>(Plate 22a)(Plate 22b) | Extensive exposures amidst large blocks; steep cliffs to north-east |

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| 11 | [NN 1546 5632] | Palaeocanyon about 15 m deep incised in Basal Andesite Sill-complex along the line of Ossian Fault. Palaeocanyon filled with several metres of coarse heterolithic conglomerate dominated by andesite clasts and overlain by ignimbrite (Kingshouse Tuffs) | 27; 104<br><br>(Plate 4); (Plate 14) | Steep access |
| 12 | [NN 157 561] | Upper Streaky Andesite vent with steeply inclined streaking and local bodies of heterolithic agglomerate and breccia. Adjacent Lower Three Sisters Ignimbrite contains veins of the andesite and evidence of ductile deformation due to reheating | 74; 105<br><br>(Plate 14); (Plate 20) | Access from below is difficult.<br><br>Exposed position |
| 13 | [NN 167 556] | Postglacial catastrophic rock-fall deposits | 109<br><br>(Plate 18) | Access via footpath |
| 14 | [NN 1838 5602]–[NN 1808 5688] | Dykes of Etive Swarm intrude Upper Etive Rhyolite (lava-like ignimbrite) and are cut by post-Caledonian monchiquite dyke. Palaeocanyon is floored by pebbly sandstone and intruded by Upper Streaky Andesite. Upper Etive Rhyolite is restricted against Basal Andesite Sill-complex at overturned scarp of the Northeastern Graben Fault | 27; 53; 57; 100 | Exposures along Allt Lairig Eilde and in the the vicinity of ‘The Study’ |

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| 15 | [NN 2006 5556] | Lower Queen’s Cairn Breccias, including megablocks, rest on Queen’s Cairn Conglomerates that locally occupy steep-sided palaeocanyons cut into Lower Three Sisters Ignimbrite | 64; 66<br>(Figure 17); (Figure 19); (Figure 20) | Steep access |
| 16 | [NN 1875 5704] | Lower Queen’s Cairn Breccias rest on Basal Andesite Sill-complex at degraded scarp of Queen’s Cairn Fault. Overlying Upper Three Sisters Ignimbrite buries several stratigraphical units that were exposed in the footwall of the Northeastern Graben Fault-zone | 66<br>(Figure 17); (Figure 20) | Access steep in places |
| 17 | [NN 2082 5742] | Monzodiorite fault-intrusion; inner contact is a planar fault surface marked by microbreccias, ultracataclasite and pseudotachylite. Outer contact is generally irregular with fault-rocks preserved locally and with pseudo-tachylite lining veins and blocky joint surfaces. Numerous xenoliths in intrusion, including an 8 m-block of ‘granite’. Fault-intrusion along earlier fault at the summit shows brecciation and hydrothermal alteration, with pseudotachylite in veins and along the inner contact | 84; 88–97<br>(Figure 26)<br>(Plate 25)(Plate 25); (Plate 26a) (Plate 26b) (Plate 26c) | Access from top of Devil’s Staircase (path); direct ascent from the main road is farther and more arduous than it looks |

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| 18 | [NN 2285 5455] | Sequence of fluvial conglomerate, sandstone and siltstone rests on irregular unconformity surface; conglomerate shows fracture zones parallel to nearby Northeastern Graben Fault-zone. Plant remains recovered from siltstone. Overlying Kingshouse Breccias are substantially restricted at the scarp of a north-east-trending fault; small fault scarp farther south has scarp-foot talus buried by the breccias | 34; 38; 40<br>(Figure 10)<br>(Plate 8a)(Plate 8b) | Beneath and on the south side of the slabs known as the Waterslide |
| 19 | [NN 2266 5479] | Kingshouse Breccias resting on metamorphic ‘basement’ and succeeded by Kingshouse Tuffs tuff-cone succession, lithic-rich towards base and becoming better bedded, finer grained and with accretionary lapilli-rich layers towards the top | 38; 40–43; 46<br>(Figure 12)<br>(Plate 11a)(Plate 11b) | Slabby outcrops steepen upwards to exposed positions |
| 20 | [NN 211 540] | Extensive Glas Choire sandstones gradually steepen in dip towards the south and south-west, becoming vertical, in response to downsag that accompanied emplacement of the overlying Bidean nam Bian andesites and dacites | 76; 79 | |

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| 21 | [NN 1644 5431]–[NN 1549 5365] | Thick eutaxitic Lower Dalness Ignimbrite is overlain by tuffaceous sandstone and accretionary lapilli-bearing uppermost part of the Coire nan Easan Tuffs. Intrusive andesite sheet forms a topographic outlier and is cut by numerous dykes of the Etive Swarm | 81–82 | Access is steep in places |
| 22 | [NN 1606 5324] | Fine-grained Coire nan Easan Tuffs interstratified with thin ignimbrites and succeeded by eutaxitic Upper Dalness Ignimbrite | 82 | |
| 23 | [NN 1352 5100] | Monzodiorite fault-intrusion with steep contact against volcanotectonic fault, cut by several dykes of Etive Swarm | 86<br>(Figure 25) | Exposures along river |
| 24 | [NN 154 516] | Multiple dyke including porphyritic varieties of microdiorite and microgranite (see Bailey, 1960, p.198) | 100 | Exposure in river bed |
| 25 | [NN 204 512]–[NN 198 507] | Etive Dyke Swarm constitutes approximately one third of outcrop; dykes include porphyritic varieties of microdiorite, quartz-microdiorite and microgranite | 29; 100 | Exposures along River Etive and in stream above Alltchaorunn |

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| 26 | [NN 239 528]–[NN 240 516] | Rhyolite dykes in flaggy quartzite 'basement'. Lacustrine facies Kingshouse Tuffs overlain by Etive rhyolites (lava-like ignimbrites) and eutaxitic Three Sisters ignimbrites. Lowermost parts of Bidean nam Bian Andesite Member show pillow forms with intervening siltstone and peperite, recording shallow intrusion into wet caldera-lake-floor sediments | 46; 79<br>(Figure 11)<br>(Plate 12a)(Plate 12b); (Plate 16a)(Plate 16b); (Plate 17) | Scramble up ridge; steep in places |
| 27 | [NN 247 521] | Rhyolite and rhyolitic tuff with breccias form irregular dykes that mark a zone of discontinuous fractures in the metamorphic 'basement' along the North-eastern Graben Fault-zone | 64<br>(Figure 17)<br>(Plate 17) | |
| 28 | [NN 244 516]–[NN 241 514] | Lower Three Sisters Ignimbrite thickens dramatically across Chasm step-faults where Upper Etive Rhyolite megablocks show downsag-related detachment on underlying Crowberry Ridge Tuffs.<br><br>Glas Choire conglomerates in palaeo-canyon include boulders of metamorphic 'basement' and granite | 60–61; 75–78<br>(Figure 18); (Figure 24)<br>(Plate 17); (Plate 21a)(Plate 21b)(Plate 21c) | |

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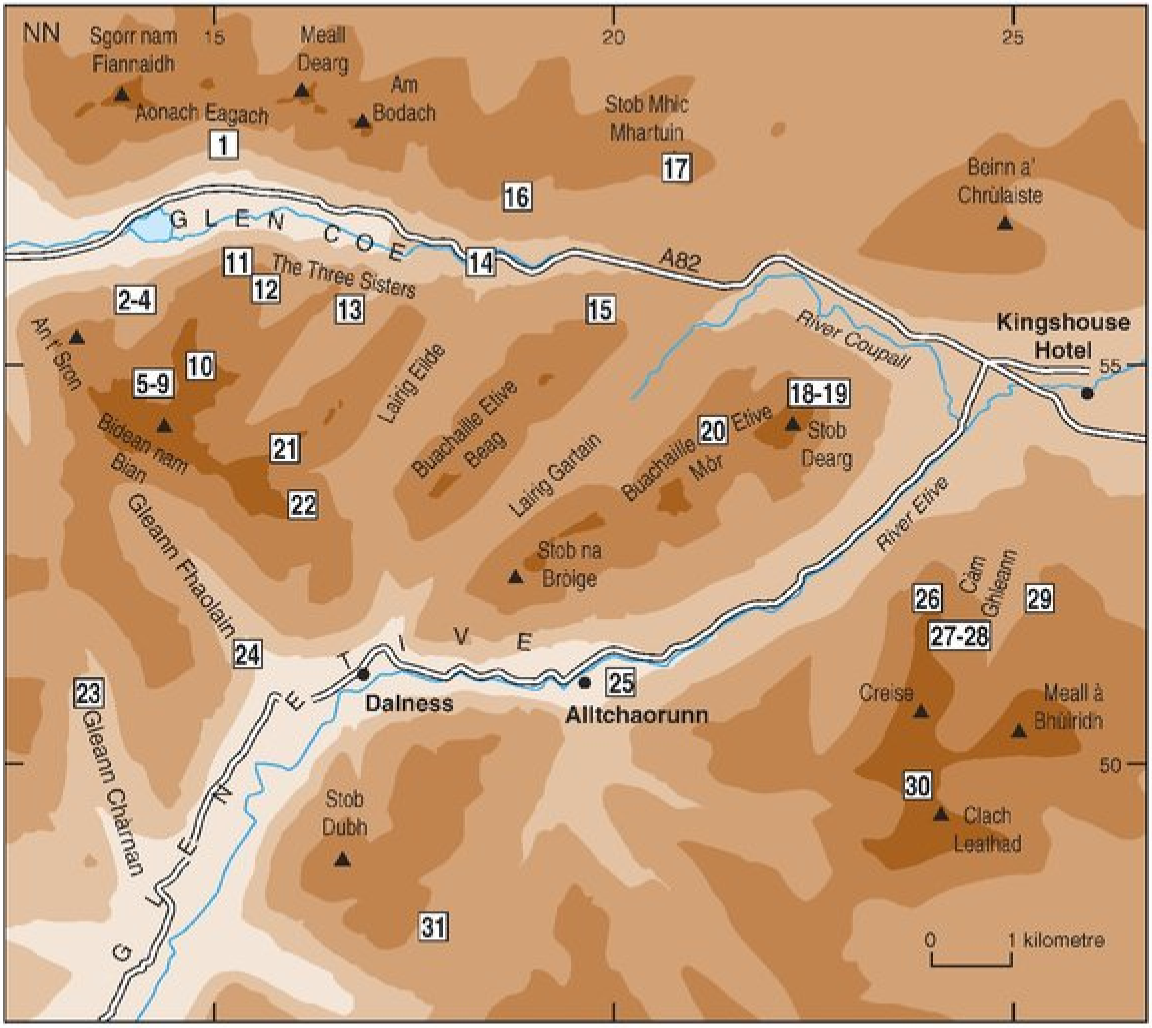
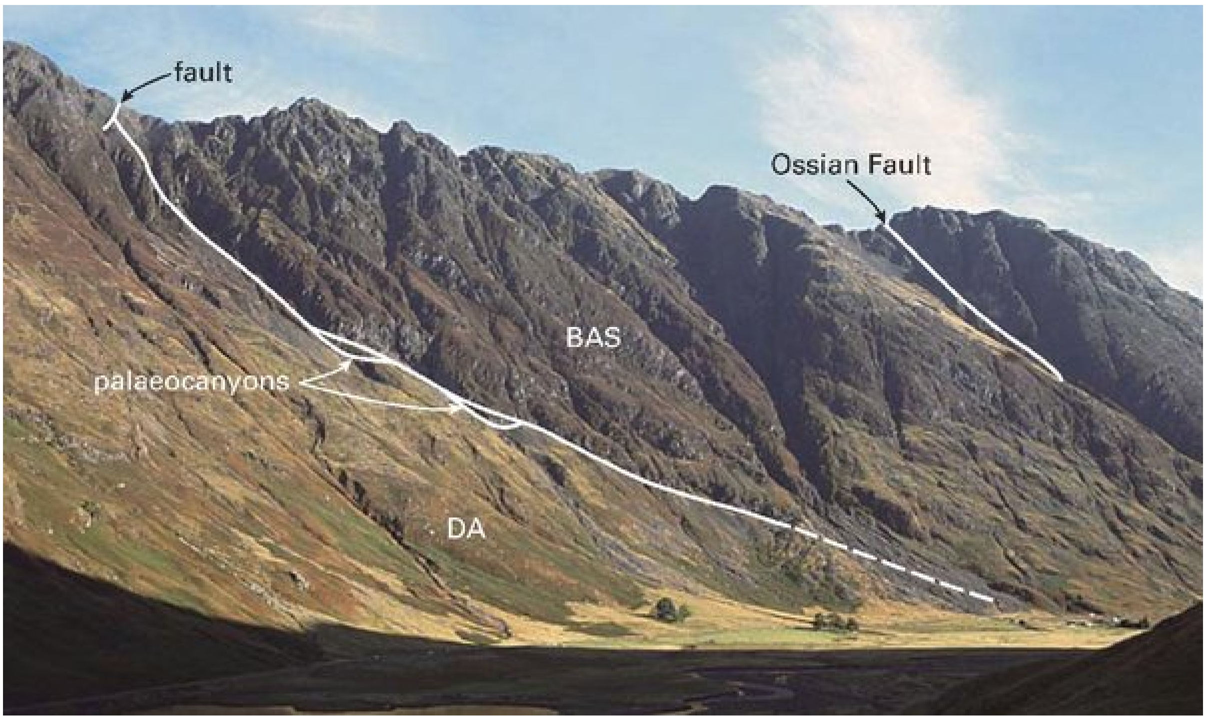
| | | | 62; 64 | |
| 29 | [NN 2506 5168] | Crevasse formed in Northeastern Graben Fault-zone contains megabreccia of metamorphic ‘basement’ with mesobreccia-bearing eutaxitic Lower Three Sisters Ignimbrite in upper levels; eutaxitic fabric locally steep and parallel to crevasse wall. Lower Etive Rhyolite originally restricted at fault-scarp shows downsag towards south-east | (Figure 17); (Figure 18); 48 | |
| 30 | [NN 2386 5001]–[NN 2388 5076] | Clach Leathad hornblende-biotite monzogranite; contacts of pluton with volcanic succession define steep wall and shallow-dipping roof | 98–100 | Magnificent views |
| 31 | [NN 178 477] | Meall Odhar monzogranite cuts and alters dykes of Etive Swarm, gives rise to a micromonzogranitic dyke and is cut by late dykes of Etive Swarm | 98–100 | |

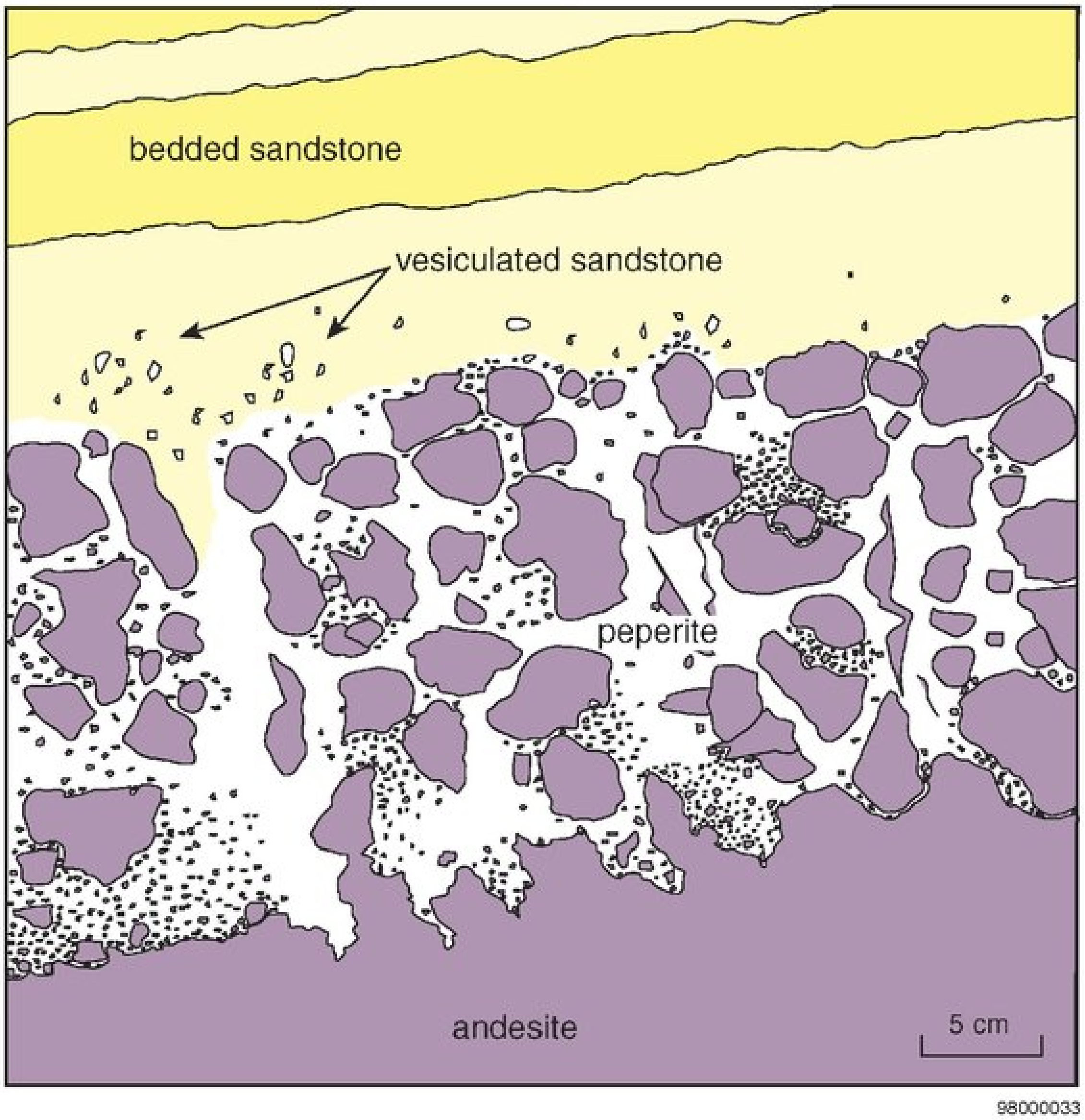
References




(Figure 29) Map showing field localities.



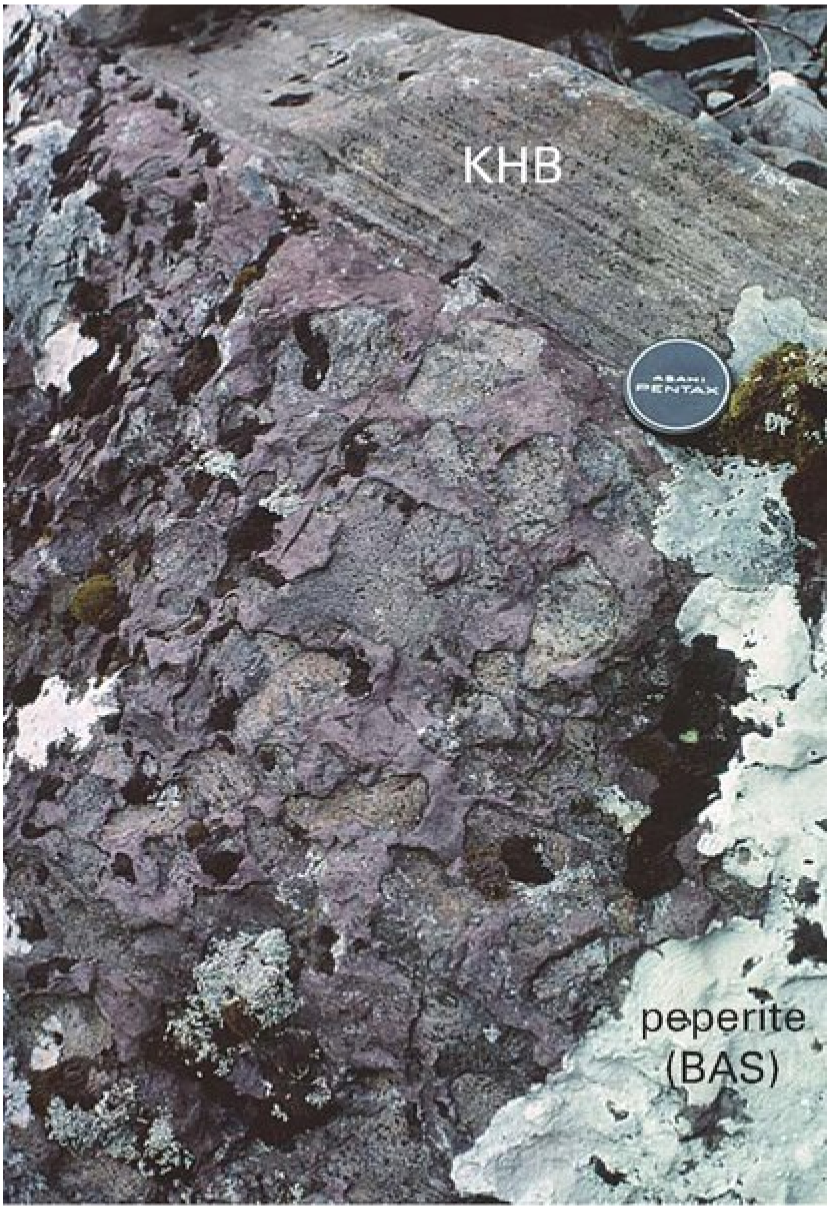

(Plate 5) Basal Andesite Sill-complex (BAS) and unconformity on Dalradian metamorphic basement (DA) including palaeocanyons on north side of Glen Coe [NN 15 57]. The sills and unconformity dip south- wards and are cut by a strand of the ring-fault system across the crest of the Aonach Eagach (serrated ridge at middle left) and beyond it on the north side. This dip away from the fault towards the inside of the caldera-volcano complex, and similar geometry *elsewhere, was originally interpreted as due to subsidence between inward-dipping faults, but is now interpreted as early caldera downsag (see p.87) (P611769).*



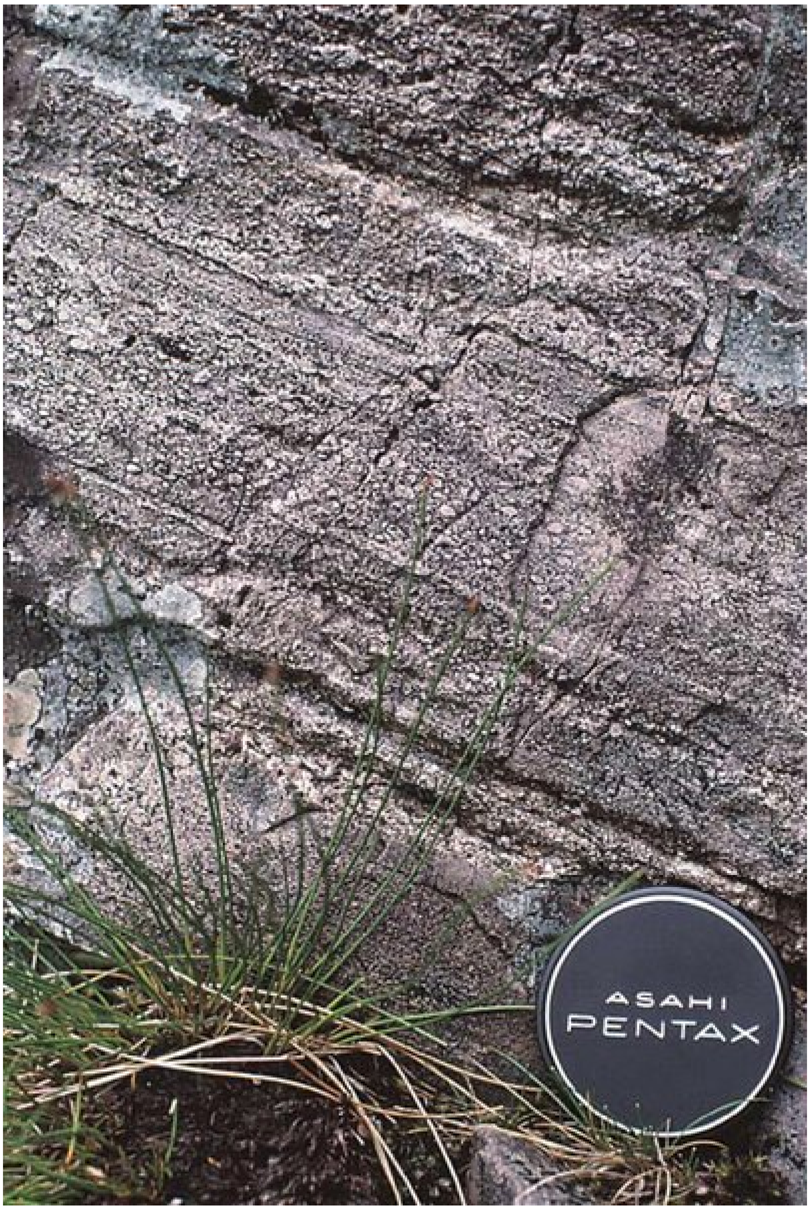

*(Figure 9) Vertical section of the peperitic upper contact of one of the basal andesite sills, below Aonach Dubh [NN 1408 5594]. The vesicles were formed in the sandstone by gen- eration of steam in the original wet sediment, and, together with the in-situ swarms of andesite grains formed by magma-water interaction within the sedimentary host, are evidence that the magma was intrusive.*

(Plate 6a) Basal Andesite Sill-complex in Coire nam Beitheach [NN 139 551]. a. Peperitic and autobrecciated top of a sill near the top of the sill stack (P611770).

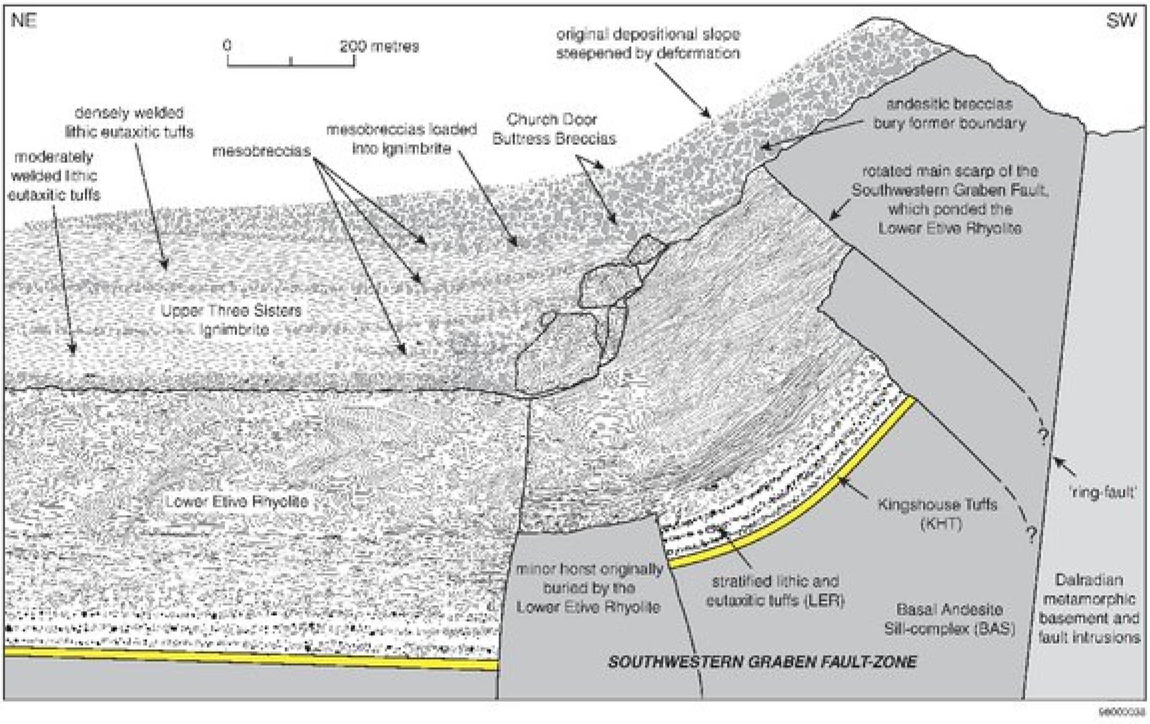
(Plate 6b) Basal Andesite Sill-complex in Coire nam Beitheach [NN 139 551]. b. Detail showing jigsaw fit of andesite fragments, due to in situ brecciation, within a purple, homogeneous fine-grained sandstone host. Drink can is 6 cm in diameter (P611771).



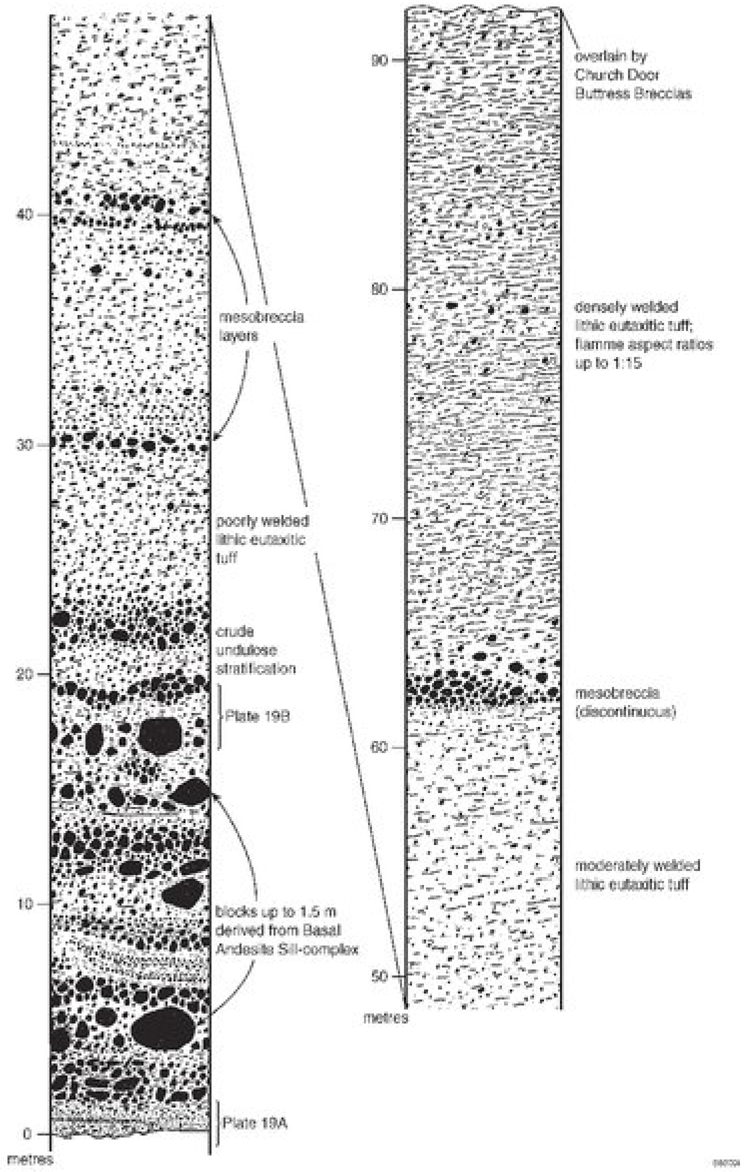

*(Plate 7) Peperitic top of the uppermost sill of the Basal Andesite Sill-complex (BAS), unconformably overlain by thinly bedded sandstone (KHB) that locally forms the base of the Etive Rhyolite Member. This exposure, high on the very steep buttressed slopes north-east of Coire nam Beitheach [NN 142 554], estab- lishes the intrusive nature of the entire succession of andesitic sheets in this vicinity. The absence of coeval andesitic lavas here, together with several other lines of evidence (see text), is taken to indicate that the unconformity could represent a time break of the order of hundreds of thousands of years, or more (P611772).*



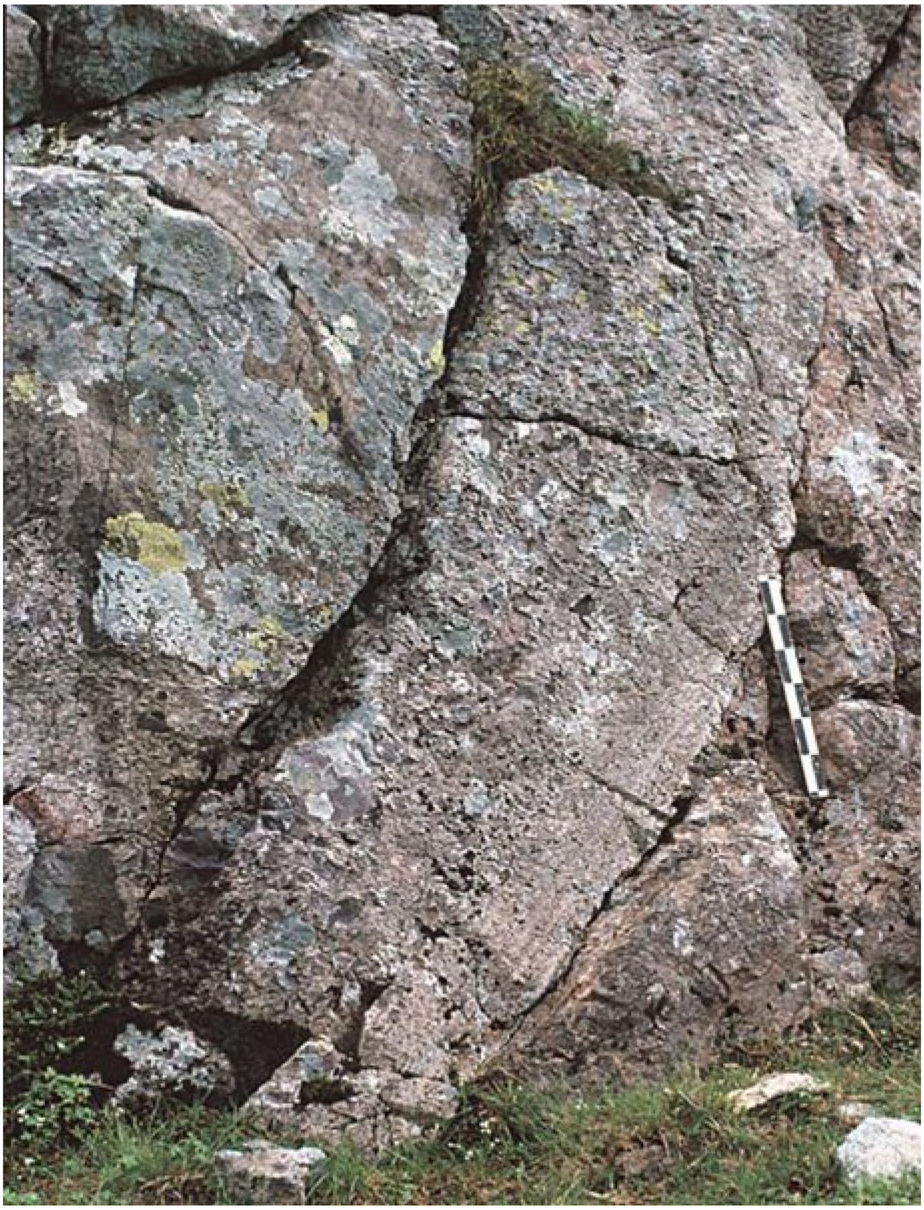

(Plate 10) Parallel-bedded distal Kingshouse Tuffs, 7 km from the vent, showing layers rich in small accretionary lapilli (centre); F Buttress on Aonach Dubh [NN 1432 5550] (P611777).




*(Figure 14) Schematic cross-section illustrating ignimbrites and breccias restricted at and near the Southwestern Graben Fault (zone) in Coire nam Beitheach [NN 139 547], north-west of the Queen's Cairn Fault. Original near-vertical fault scarps that ponded the Lower Etive Rhyolite (LER) have been rotated by downsag towards the Glencoe Graben. Blocks and megablocks of Lower Etive Rhyolite have been incorporated at several horizons within the ponded Upper Three Sisters Ignimbrite. Overlying Church Door Buttress Breccias include mesobreccias that were shed from the Southwestern Graben Fault and show evidence of loading into hot ignimbrite; andesite-dominated breccias higher in the section were shed from scarps cutting the Basal Andesite Sill-complex farther to the south-west.*

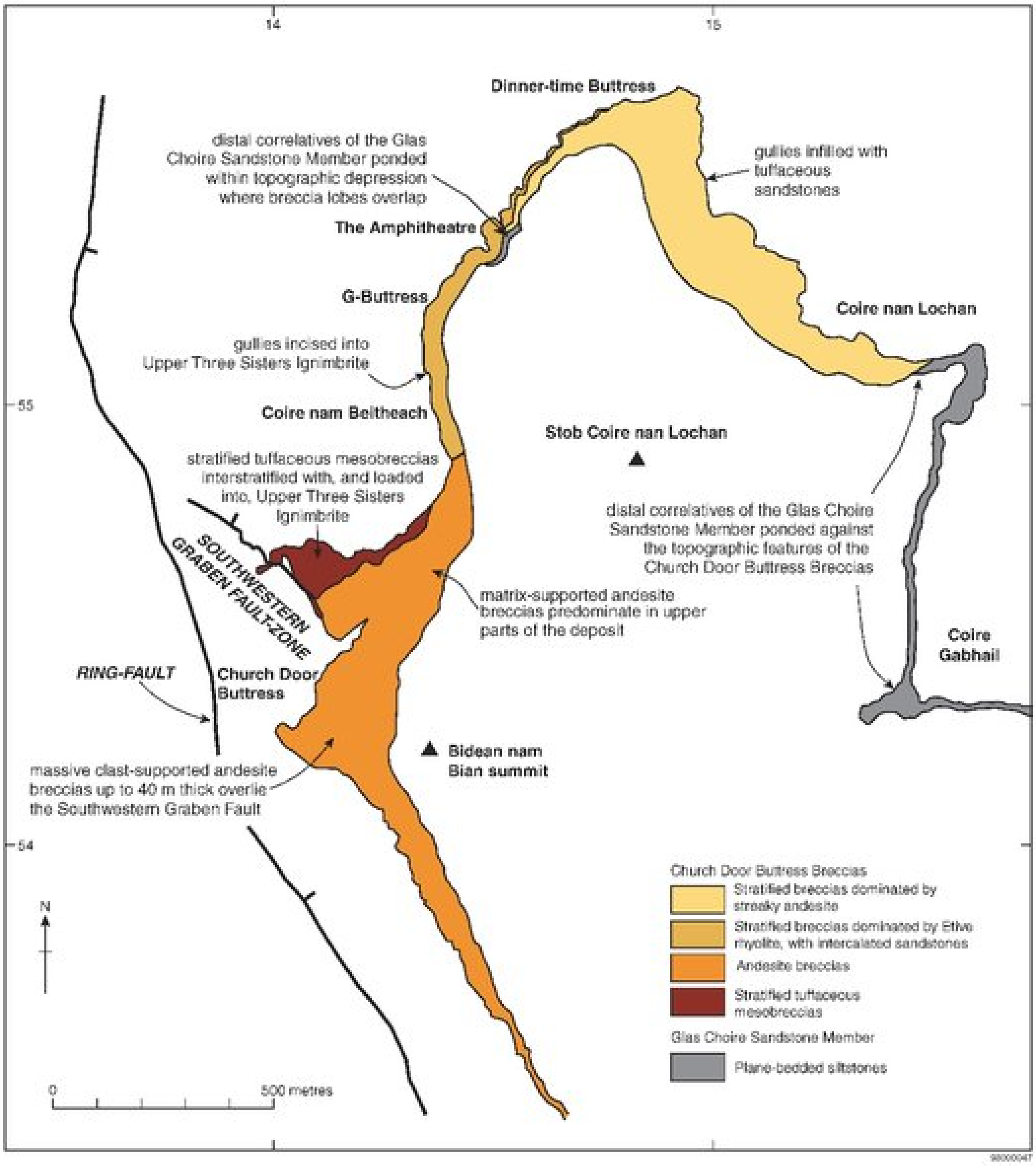



*(Figure 21) Schematic log of the Upper Three Sisters Ignimbrite in Coire nam Beitheach [NN 1414 5473] showing stratified mesobreccias towards the base and, at around 65 m, the characteristic increase from moderate to dense welding picked out by intensification of the eutaxitic fabric (flattening of fiamme). The stratigraphical levels of the ignimbrite shown in Plate 19 are also located.*



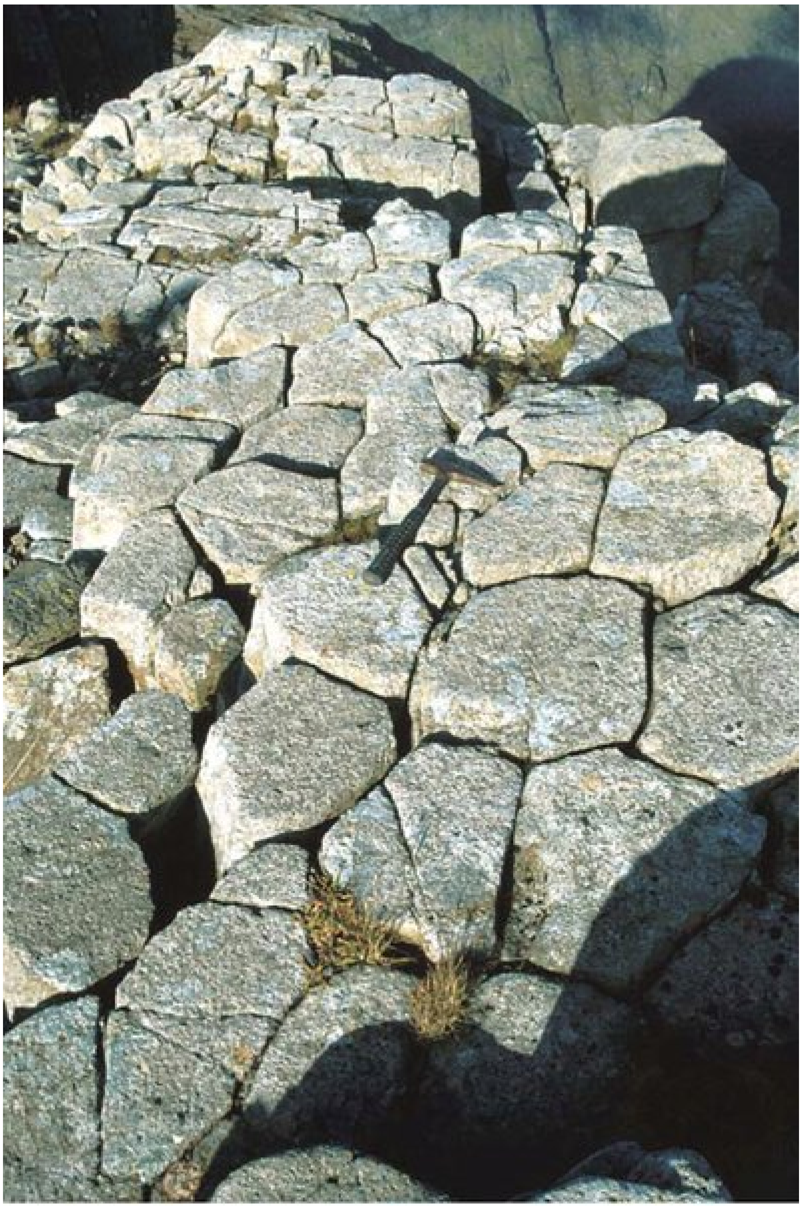
(Plate 19a) Upper Three Sisters Ignimbrite in Coire nam Beitheach [NN 142 548]. a. Stratification and inverse grading of lithic tuff at the base of the ignimbrite; the substrate is Lower Etive Rhyolite (right-hand side). Scale intervals are 5 cm (P611794).

*(Plate 19b) Upper Three Sisters Ignimbrite in Coire nam Beitheach [NN 142 548]. b. Mesobreccia layer including large matrix-supported blocks derived from the Basal Andesite Sill- complex (located with arrows) and Lower Etive Rhyolite. (See also (Figure 14) and (Figure 21)) (P611795).*

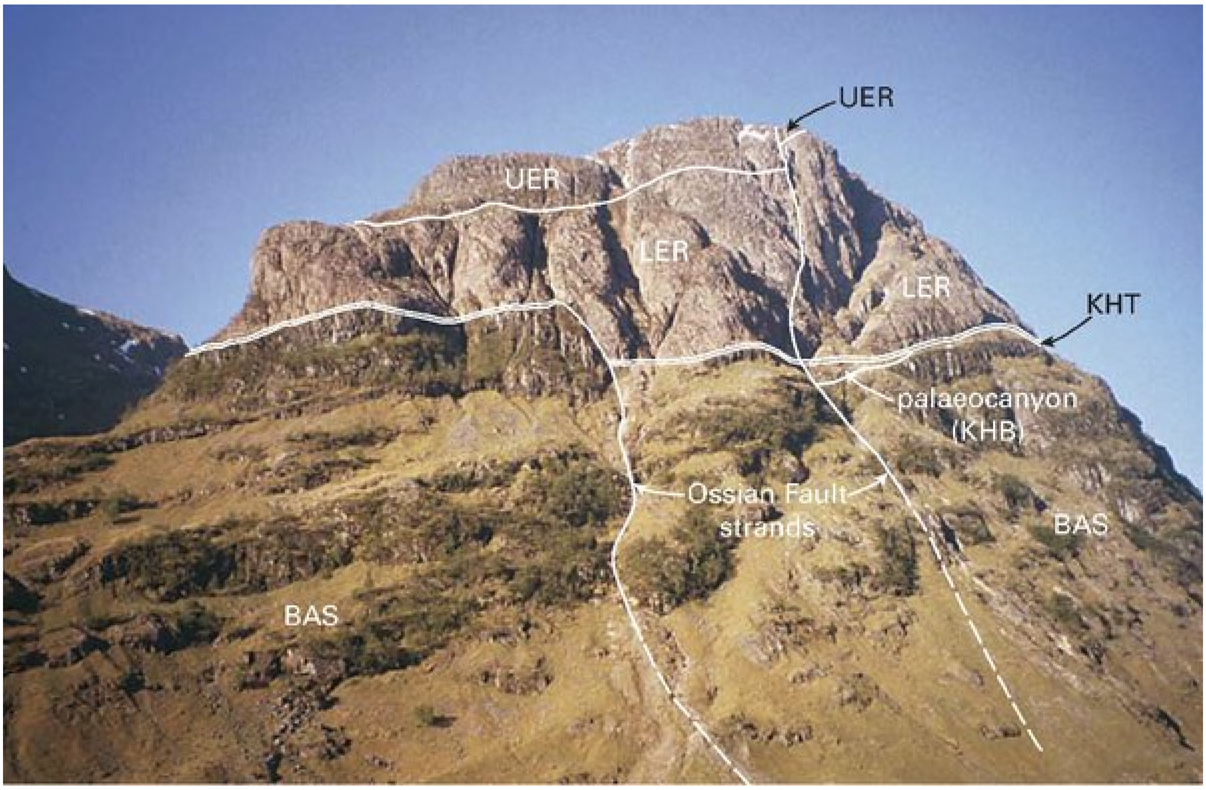



*(Figure 23) Locations and key features of individual elements of the Church Door Buttress Breccias and of the distal Glas Choire alluvial deposits, in the north-west of the caldera-volcano complex see (Figure 14) and (Figure 22).*

*(Plate 22) a and b Bidean nam Bian Andesite Member at Stob Coire nan Lochan [NN 148 549]; this columnar jointing persists through more than 200 m thickness with no apparent discontinuity, so that the sheet appears to be a single cooling unit (P611800) and (P611801).*

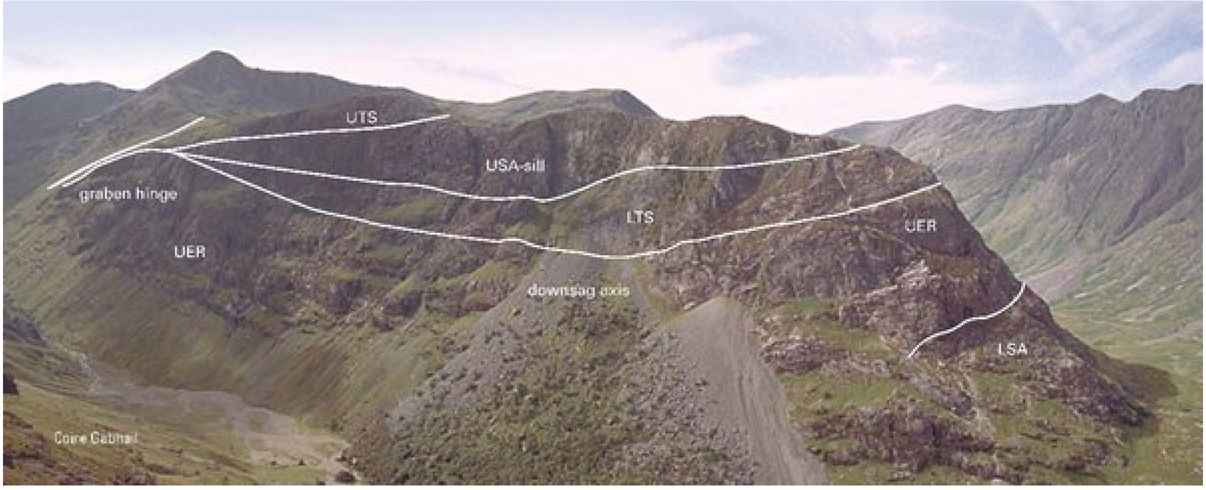


*(Plate 22) a and b Bidean nam Bian Andesite Member at Stob Coire nan Lochan [NN 148 549]; this columnar jointing persists through more than 200 m thickness with no apparent discontinuity, so that the sheet appears to be a single cooling unit (P611800) and (P611801).*

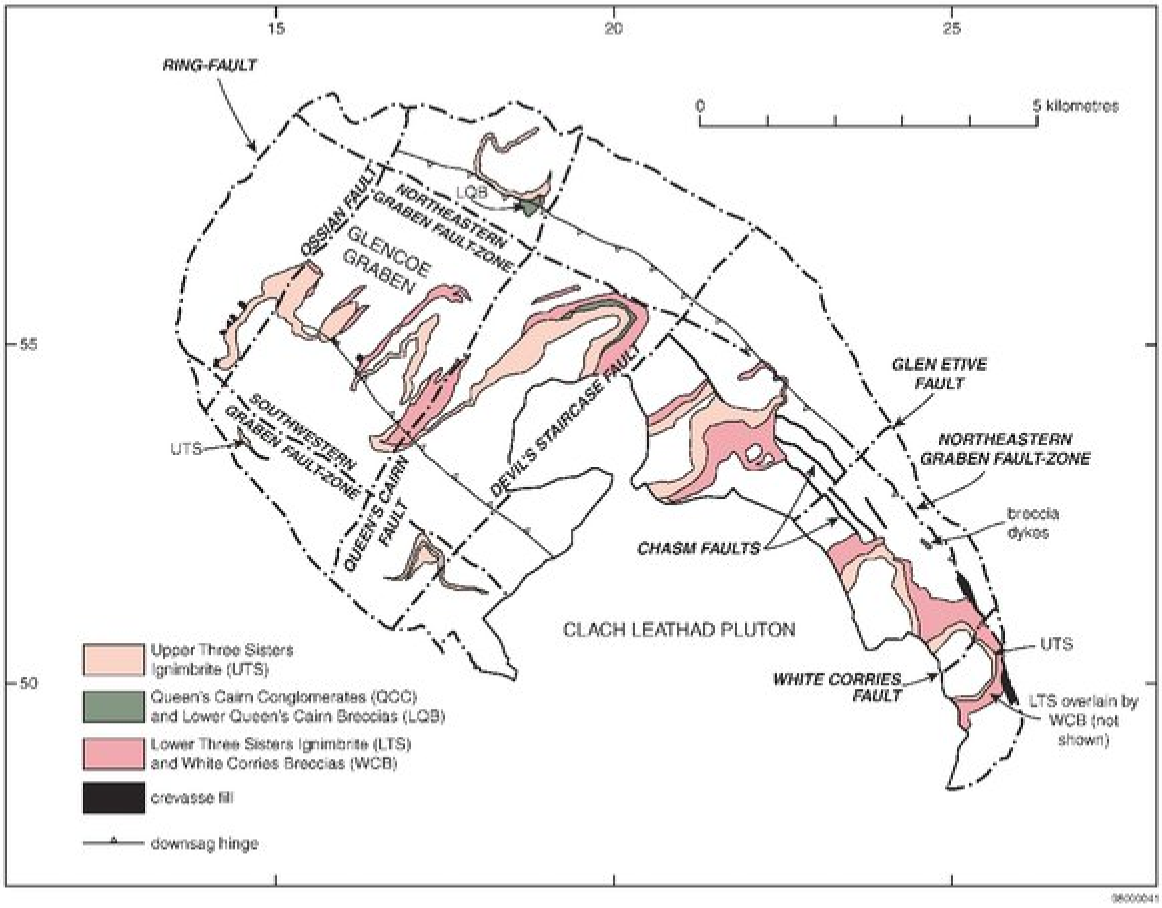



(Plate 4) Basal Andesite Sill-complex, Kingshouse Tuffs and Lower Etive Rhyolite cut by strands of the Ossian Fault in the north face of Aonach Dubh [NN 15 56]. A palaeocanyon filled with conglomerate overlain by ignimbrite is located on the trace of the right-hand fault strand and is part of the extensive unconformity surface that cuts the sill-complex. The Lower Etive Rhyolite thickens considerably to the right (north-west) across both fault strands; the right-hand strand shows reactivation in the opposite sense (down to the south-east) (P611768). BAS Basal Andesite Sill-complex; KHB Kingshouse Breccias; KHT Kingshouse Tuffs; LER Lower Etive Rhyolite; UER Upper Etive Rhyolite.

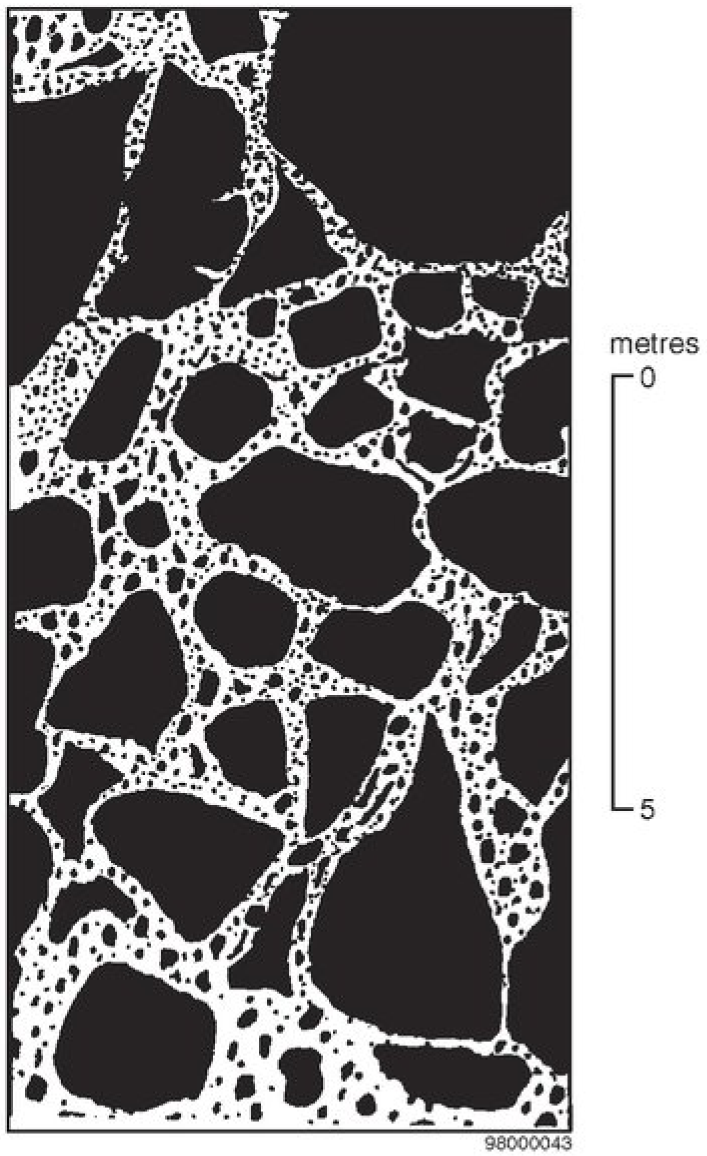

(Plate 20) Upper Streaky Andesites agglomerate forming part of the infill of the vent exposed in the north-eastern shoulder of Aonach Dubh (see Plates 14a and 15b). The various angular lithic fragments are intensely altered (P611796).



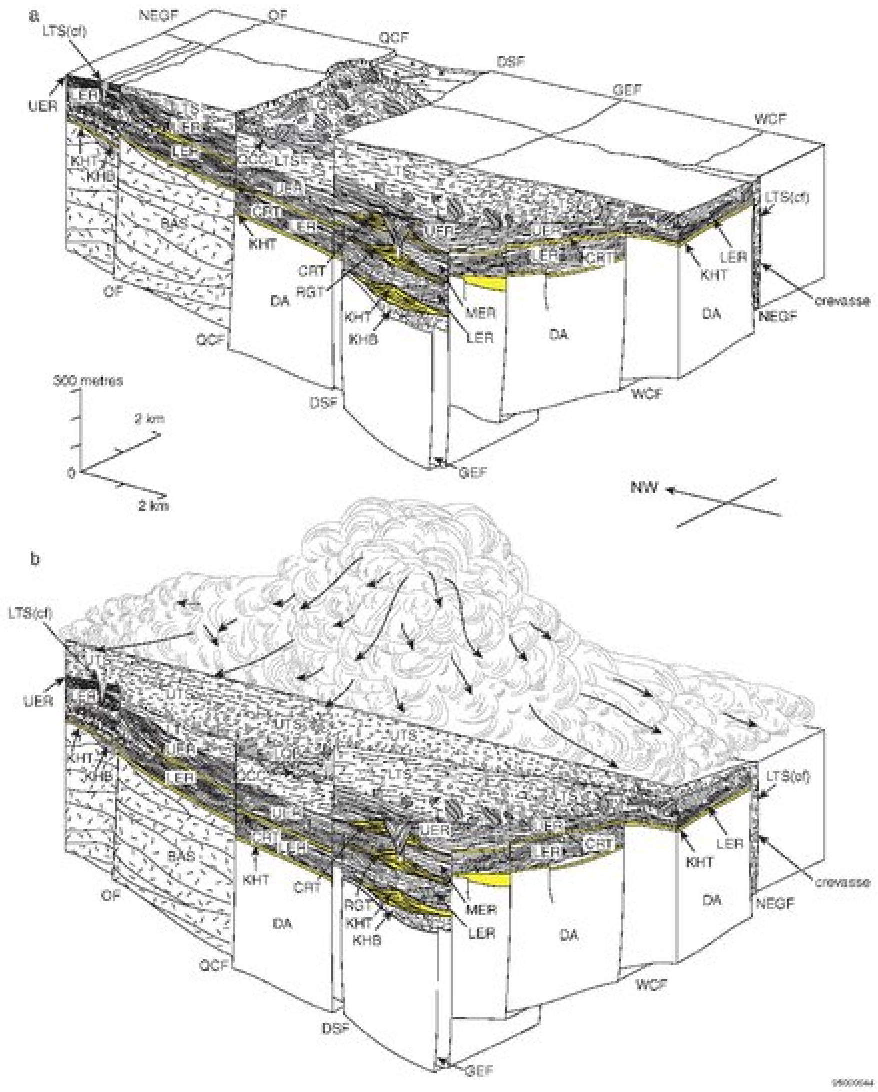

*(Plate 18) Gearr Aonach viewed from the east across Coire Gabhail [NN 16 55] showing ponding of the Lower Three Sisters Ignimbrite (LTS) within a downsag north-west of the Queen's Cairn Fault. The ignimbrite is up to 50 m thick along the downsag axis (which trends north-west along the Glencoe Graben) and it thins progressively towards the south-western graben hinge, as does the overlying sill of the Upper Streaky Andesites (USA). The Upper Three Sisters Ignimbrite (UTS) shows similar thinning relationships, but overlaps the hinge line. The large composite debris cone in the foreground was formed by catastrophic rockfall following deglaciation (see p.109) (P611793). LSA Lower Streaky Andesites; UER Upper Etive Rhyolite.*



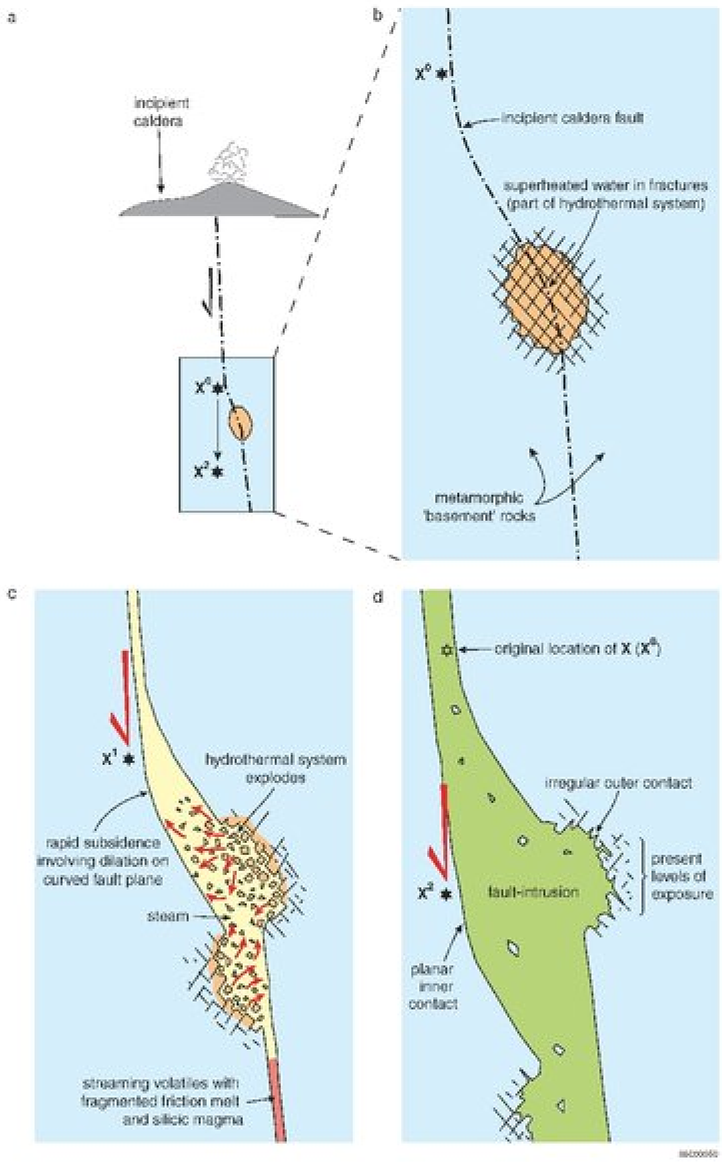

*(Figure 17) Distribution of the Three Sisters ignimbrites, associated sedimentary rocks and contemporary volcanotectonic features. LQB Lower Queen's Cairn Breccias; LTS Lower Three Sisters Ignimbrite; QCC Queen's Cairn Conglomerates; UTS Upper Three Sisters Ignimbrite.*



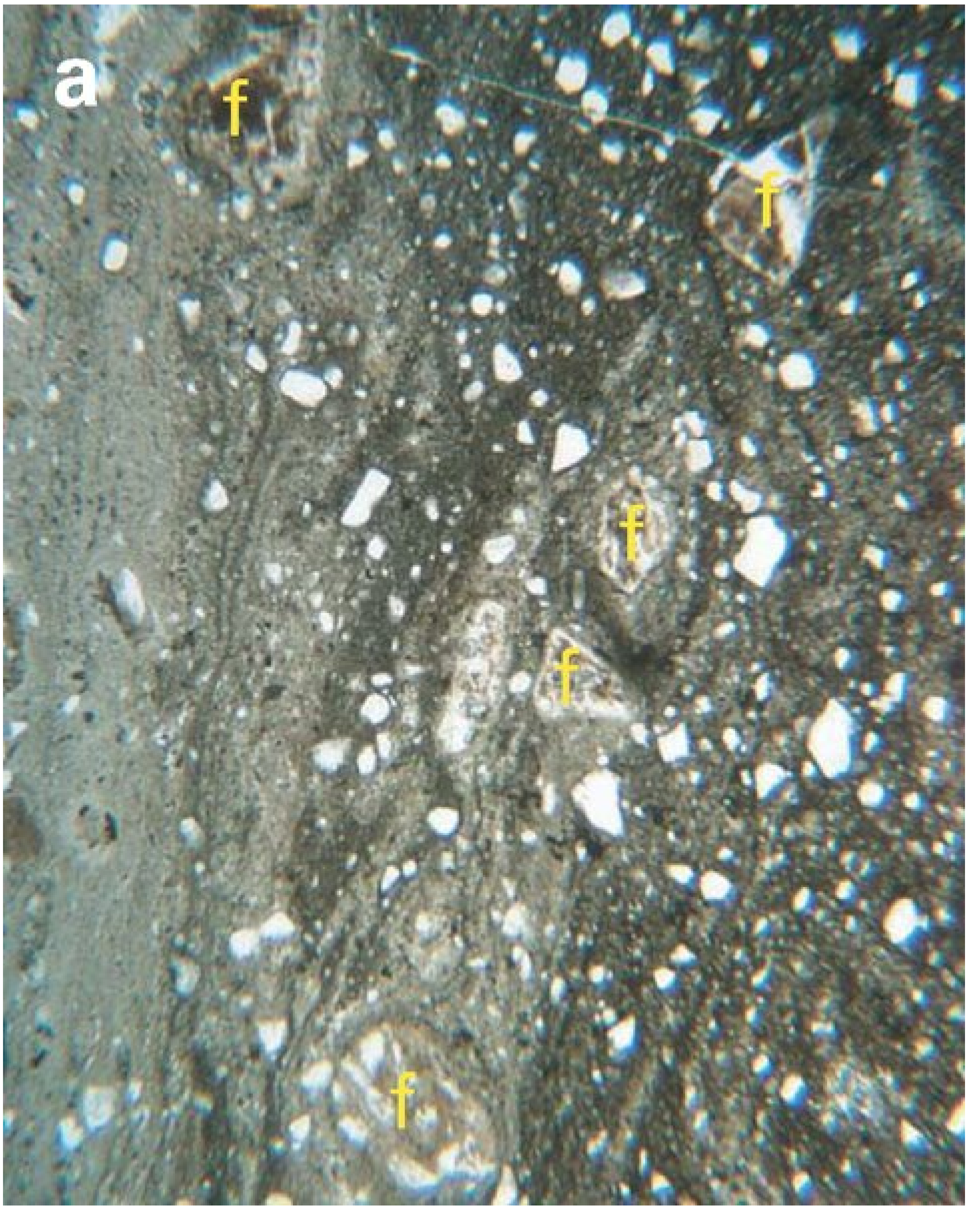

(Figure 19) Texture of coarse-grained lithofacies of the Lower Queen’s Cairn Breccias showing near jigsaw-fitting of clasts and sparse matrix of similar material, which together indicate fragmentation at a late stage of transport. Such textures in sedimentary deposits are characteristically formed in debris avalanches.



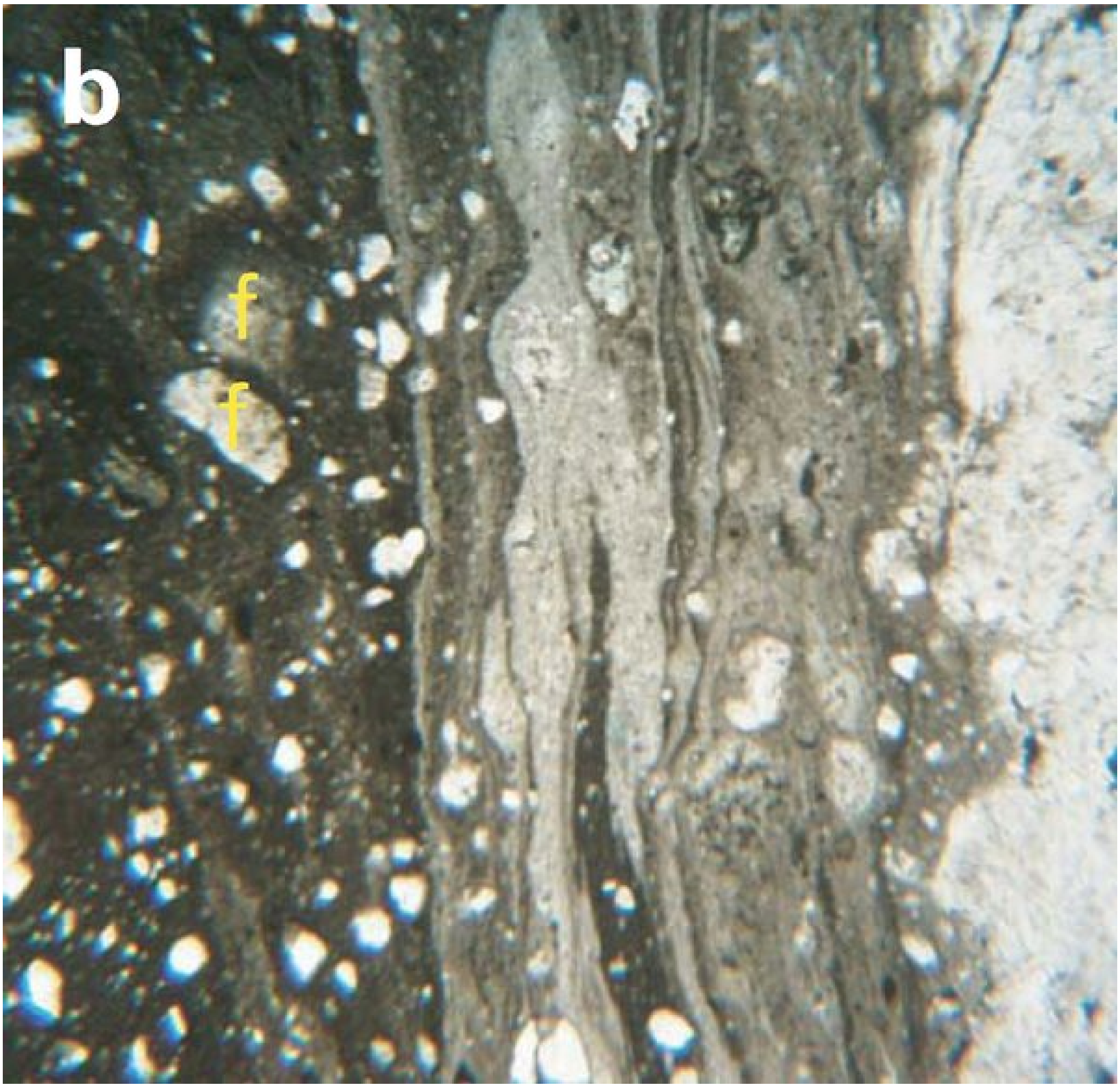

(Figure 20) (right) Schematic sections north-west to south-east parallel to the axis of the Glencoe Graben. a. The tectonic development that led to emplacement of the Lower Queen’s Cairn Breccias (LQB). The breccias are banked against a retrogressively degraded scarp of the Queen’s Cairn Fault and spread to the south and south-east across the alluvial surface formed of Queen’s Cairn conglomerates, sandstones, and siltstones (QCC).b. The ensuing eruption that formed the Upper Three Sisters Ignimbrite (UTS) and led to volcano-tectonic subsidence involving both faulting and downsag. Buoyant-convective ash plumes that would have risen above both the vent and the pyroclastic currents are omitted for clarity.BAS Basal Andesite Sill-complex; CRT Crowberry Ridge Tuffs; DA Dalradian metamorphic basement; DSF Devil’s Staircase Fault; GEF Glen Etive Fault; KHB Kingshouse Breccias; KHT Kingshouse Tuffs; LER Lower Etive Rhyolite; LTS Lower Three Sisters Ignimbrite; NEGF Northeastern Graben Fault; OF Ossian Fault; QCF Queen’s Cairn Fault; RGT Raven’s Gully Tuffs; UER Upper Etive Rhyolite; UTS Upper Three Sisters Ignimbrite; WCF White Corries Fault.



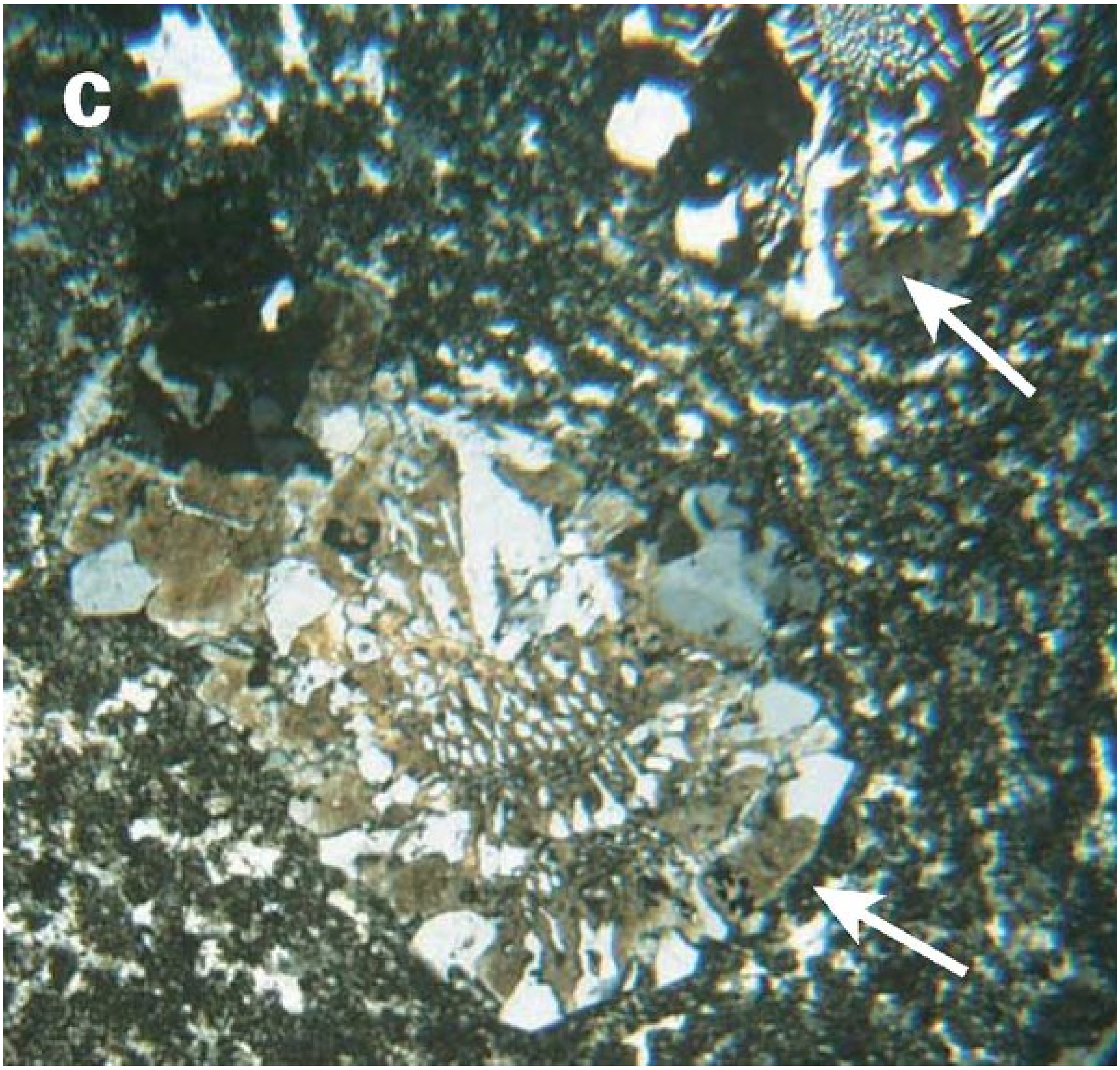

(Figure 26) Simplified conceptual model proposed to explain occurrences at Glen Coe of fault-intrusions with planar inner (caldera-side) contacts and extremely irregular outer contacts (see text). a. This shows the setting of a hypothetical hydrothermal system at considerable depths (at least several hundreds of metres) where it will be intersected by a dilating caldera-fault plane. The figure shows a potential releasing bend in the incipient fault plane, although in reality dilatation may be more general where the fault dips outwards or where it is more irregularly curved and juxtaposes parts with different curvatures. The depicted isolation of the hydrothermal system is a diagrammatic simplification. b. The hydrothermal system is shown here as a localised network of fractures containing superheated water under high confining pressure. In reality such a hydrothermal reservoir would probably have greater vertical extent and be connected to both meteoric and magmatic water sources at depth, and to fumaroles at the surface. X0 is an arbitrary reference point in the block that subsides. c. The proposed immediate effect of rapid subsidence on the caldera fault (X0 to X1): rapid dilatation causes the hydrothermal system to explode, via transformation of superheated liquid water to vapour and vigorous expansion of vapour. Such processes would most probably be followed rapidly by ascent of fragmented melts from depth, these too having been disrupted by volatile exsolution and expansion due to pressure relief. d. The final form of the opposed contacts of the fault-intrusion, as seen at outcrop at Glen Coe: the overall shape and relative dimensions of the intrusion are hypothetical. The vertical distance moved by the reference point (X0 to X2) would be of the order of several hundreds of metres and the duration of that subsidence a matter of only hours or a few days.



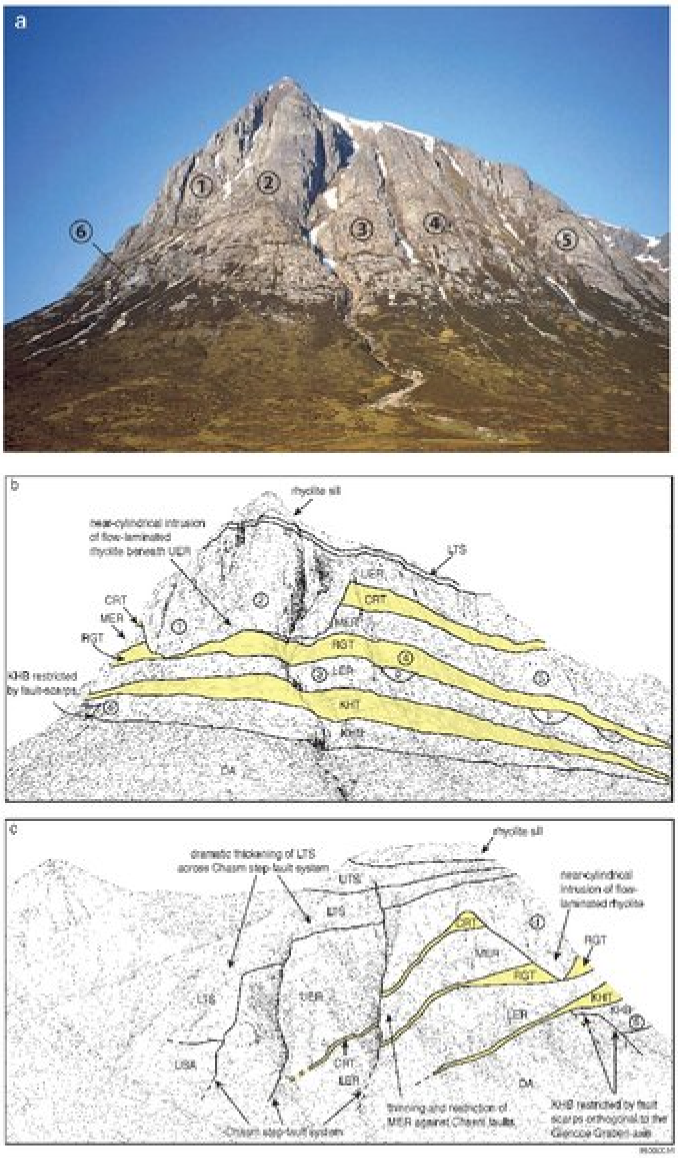

*(Plate 26a) Photomicrographs of polished thin sections of flinty crush-rock and porphyritic rhyolite in the ring-fault zone at Stob Mhic Mhartuin [NN 2082 5742]. Fragments of quartz appear white and feldspar phenocrysts (f) are indicated. a. Textures recording intimate fluid-state interlamination and cross-mixing of solids between melts that formed flinty crush-rock (dark and prevalent on right-hand side) and porphyritic rhyolite (pale and prevalent on left-hand side). Fragments of quartz, appearing white and with smaller grains showing rounding, occur mainly in the crush-rock component but are also embedded in the rhyolite (far left). Feldspar phenocrysts of the rhyolite are heavily altered and broken; an original cluster appears to have been attenuated into the flinty crush-rock by laminar flow (middle). Field of view is 3 mm wide: plane-polarised light (P612385).*



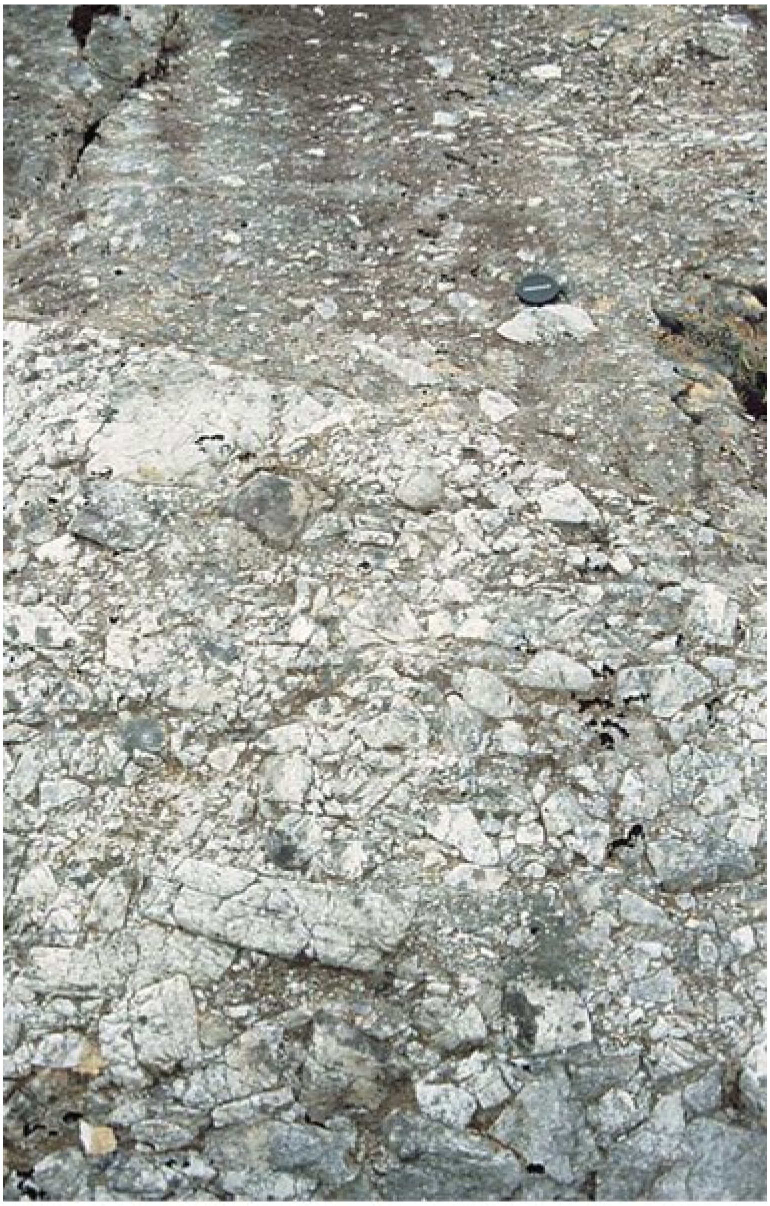

*(Plate 26b) Photomicrographs of polished thin sections of flinty crush-rock and porphyritic rhyolite in the ring-fault zone at Stob Mhic Mhartuin [NN 2082 5742]. Fragments of quartz appear white and feldspar phenocrysts (f) are indicated. b. Textures recording various degrees of mingling of original melts. The flinty crush-rock component predominates on the left-hand side (dark with numerous quartz fragments appearing white) and contains isolated feldspar crystals of uncertain origin. Rhyolite forms the pale streak in the middle, which is flanked by intimately mingled (finely interlaminated) rhyolite and crush-rock. Fragmented quartzite forms the bright band on the right-hand side. Field of view is 3 mm wide: plane-polarised light (P612386).*




*(Plate 26c) Photomicrographs of polished thin sections of flinty crush-rock and porphyritic rhyolite in the ring-fault zone at Stob Mhic Mhartuin [NN 2082 5742]. Fragments of quartz appear white and feldspar phenocrysts (f) are indicated. c Two lithic fragments (arrowed) of granophyric quartzâ€“K-feldspar intergrowths contained in groundmass of (porphyritic) rhyolite; closely similar granophyric textures occur in a nearby xenolith of granite enclosed in the fault-intrusion. Field of view is 3 mm wide: cross-polarised light (P612387).*

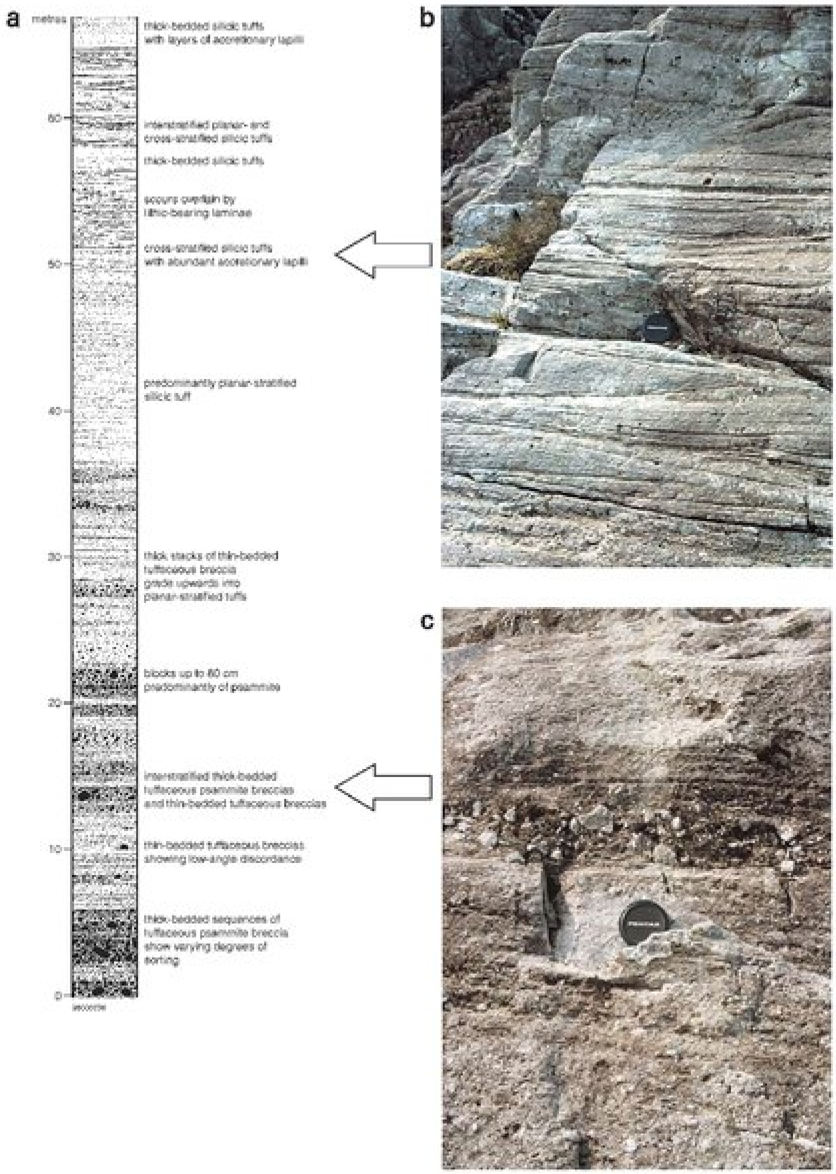



(Figure 10) (right) Stob Dearg [NN 22 54] (original drawings by K Lancaster) (P611773). a and b) Viewed towards the south-west, showing lower elements of the intracaldera stratigraphy and the cross-cutting rhyolite interpreted as infilling the vent from which the Upper Etive Rhyolite was erupted. c. Viewed towards the north-west, showing the rhyolite-filled vent of the Upper Etive Rhyolite and thickening of the Lower Three Sisters Ignimbrite across the Chasm step-fault system. Views b and c both show the restriction of the Kingshouse Breccias at palaeofault scarps that trend north-eastwards, at right angles to the Chasm step-fault system and Glencoe Graben. In view b, three broad V-shaped outcrops of breccia and conglomerate (labelled p) are remnants of a single infilled palaeocanyon that was cut into the Lower Etive Rhyolite parallel to the Glencoe Graben. The outcrops are remnants of the south- west side of the palaeocanyon, which must have trended north-westwards, parallel to the cliff faces (despite their appearance, they are not complete cross-sections of three separate features). 1 Central Buttress; 2 North Buttress; 3 Great Gully Buttress; 4 Broad Buttress; 5 Tulaich Buttress; 6 Waterslide; CRT Crowberry Ridge Tuffs; DA Dalradian metamorphic basement; KHB Kingshouse Breccias; KHT Kingshouse Tuffs; LER Lower Etive Rhyolite; LTS Lower Three Sisters Ignimbrite; MER Middle Etive Rhyolite; RGT Raven’s Gully Tuffs; UER Upper Etive Rhyolite; USA Upper Streaky Andesites; UTS Upper Three Sisters Ignimbrite.

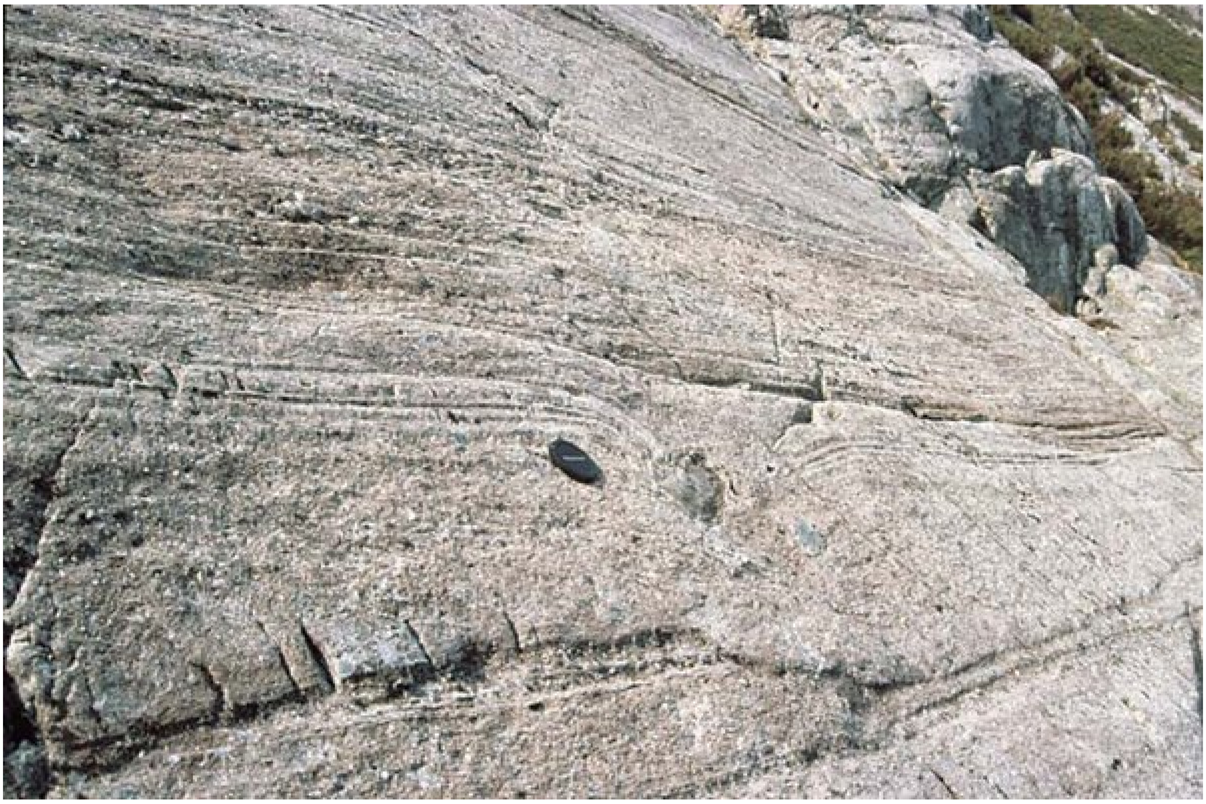


*(Plate 8a) Psammite breccias. a Psammite talus-breccia at the foot of a small fault scarp (out of view to left), overlain by poorly sorted psammite breccias of the Kingshouse Breccias, near the Waterslide on Central Buttress, Stob Dearg [NN 2282 5440] (P611774).*

*(Plate 8b) Psammite breccias. b Massive to weakly stratified psammite breccias with cross- stratified quartzose sandstone infilling a scour in the Kingshouse Breccias, at the Waterslide [NN 2284 5454] (P611775).*

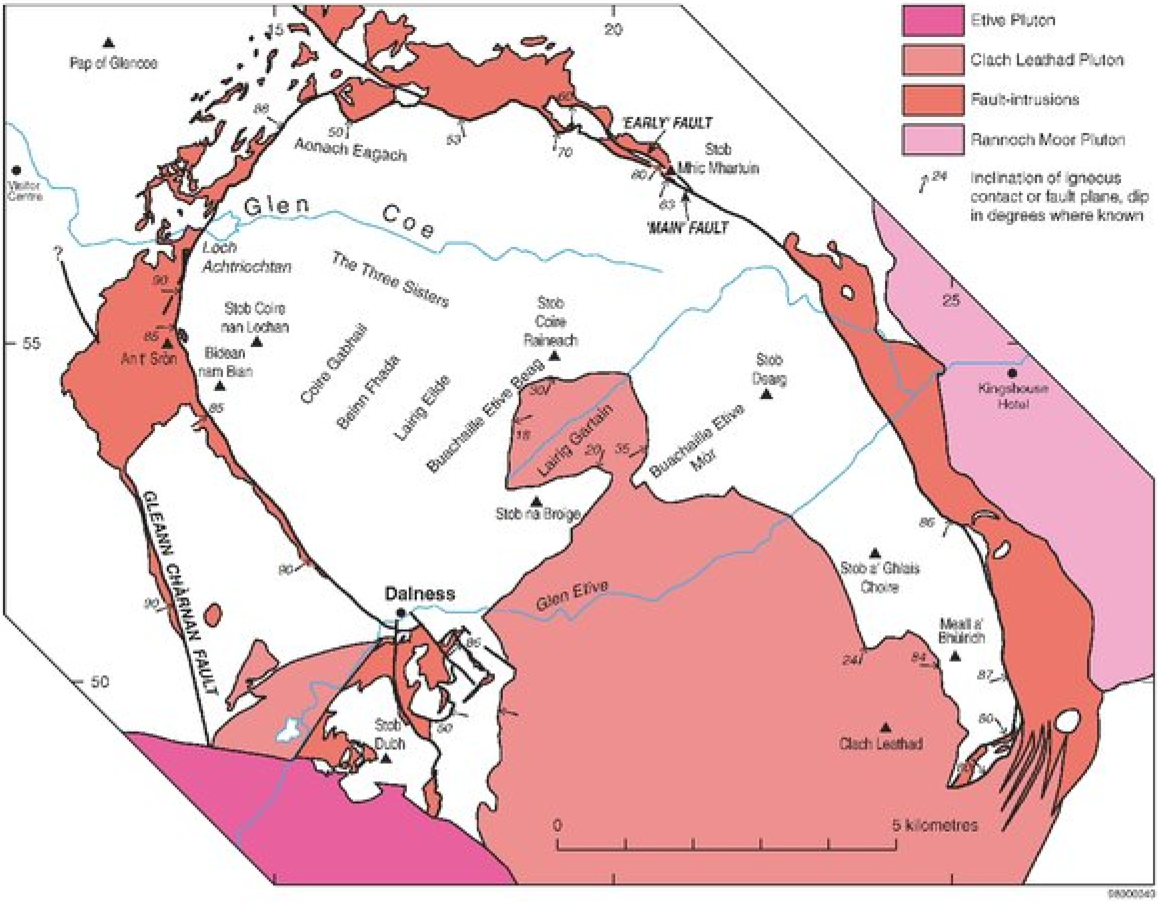



*(Figure 12) (right) Kingshouse Tuffs (KHT) at North Buttress on Stob Dearg [NN 2270 5476]. a. Schematic log of the sequence that is part of the outer flank of a tuff cone. It shows an upward change from predominantly massive breccia with abundant lithic fragments to finer grained tuffs characterised by planar and low-angle cross-stratification with layers rich in accretionary lapilli. This section records phreatomagmatic activity transitional from early vent-clearing explosions to later development of a tall eruption column that produced energetic pyroclastic density currents and substantial ash fall. b Cross-stratified silicic tuffs showing low-amplitude bedforms and low-angle scour surfaces recording the passage of highly unsteady, energetic pyroclastic density currents (P611782). c Massive to weakly bedded tuffaceous lithic breccias and lithic-rich tuff formed from initial, vent-clearing, wet explosions; the lithic fragments are quartzite fragments from the underlying Kingshouse Breccias (P611783).*



*(Plate 11a) Indicators of the position of the vent of the Kingshouse Tuffs (KHT). a. Asymmetrical ballistic-bomb impact sag in bedded and cross-stratified silicic tuffs, indicating that the vent was located to the west or south-west (away from the viewer). The impacted beds lie on a surface scoured by the passage of one or more pyroclastic density currents; Great Gully Buttress, Stob Dearg [NN 226 548] (P611778).*

*(Plate 11b) Indicators of the position of the vent of the Kingshouse Tuffs (KHT). b. Cross-stratified silicic tuffs showing five scour (truncation) surfaces (indicated by arrows); the strata record deposition and migration of low-amplitude ash dunes down-current from the south-west (right to left), alternating with erosion. The uppermost scour surface is locally steep and here was plastered by damp ash, also indicating that the current direction was from the south-west. The dip of the beds, which is towards the south-west, resulted from caldera downsag; Broad Buttress, Stob Dearg [NN 225 549] (P611779).*




(Figure 25) Ring-fault system, associated fault-intrusions and the passively emplaced Clach Leathad Pluton.

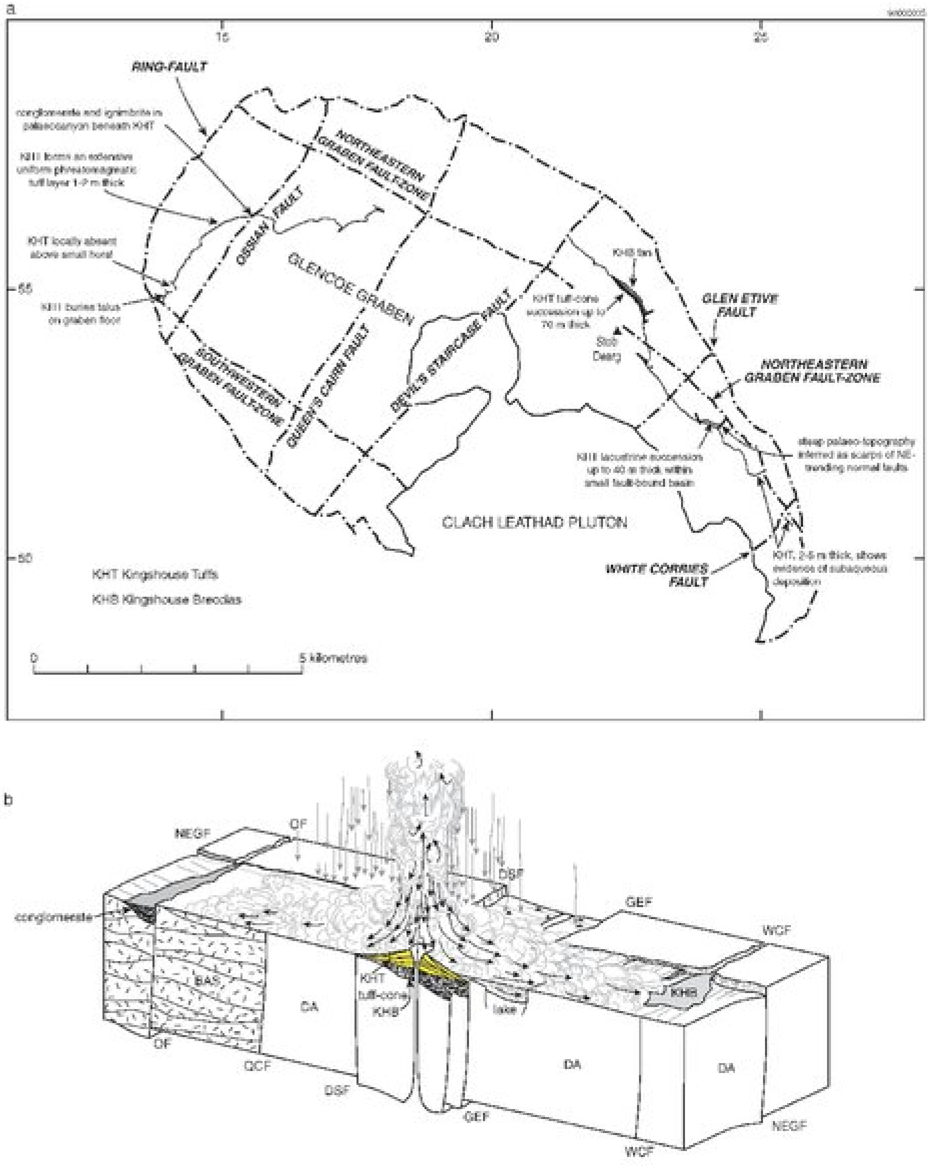
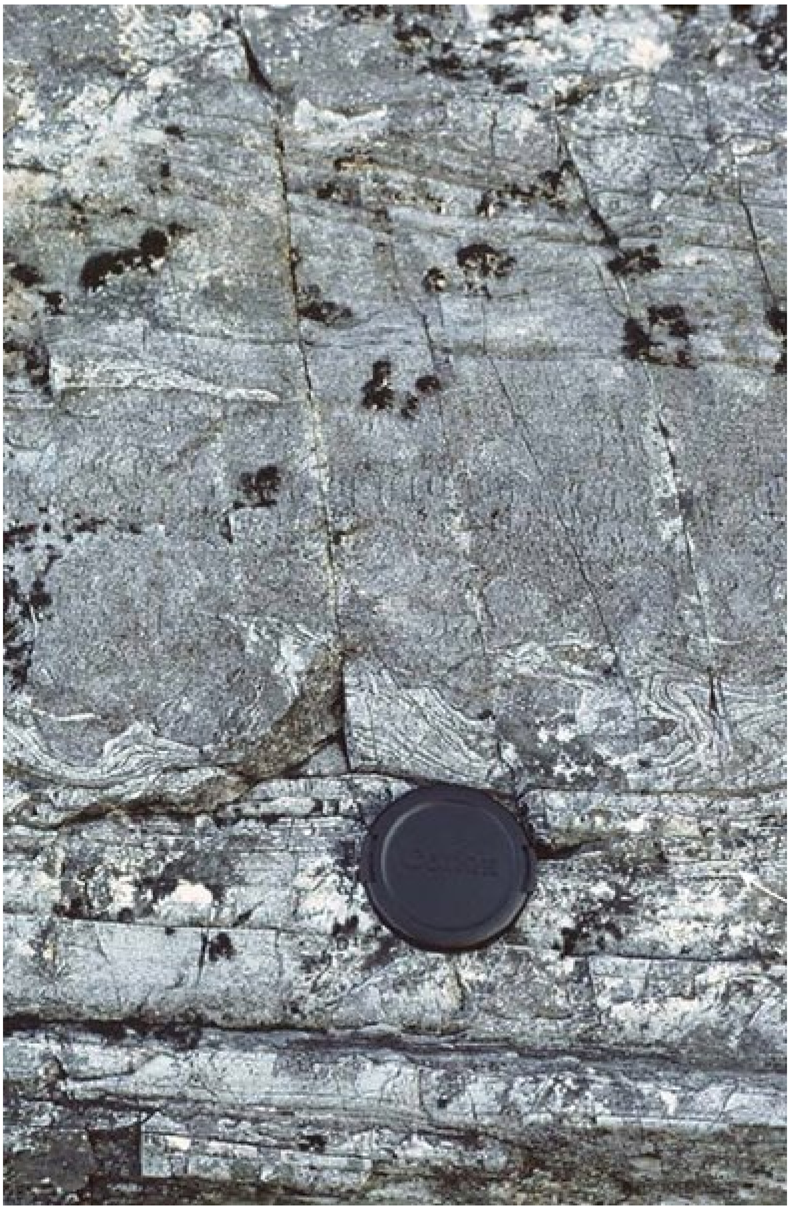



*Figure 11 Kingshouse Tuffs (KHT).*

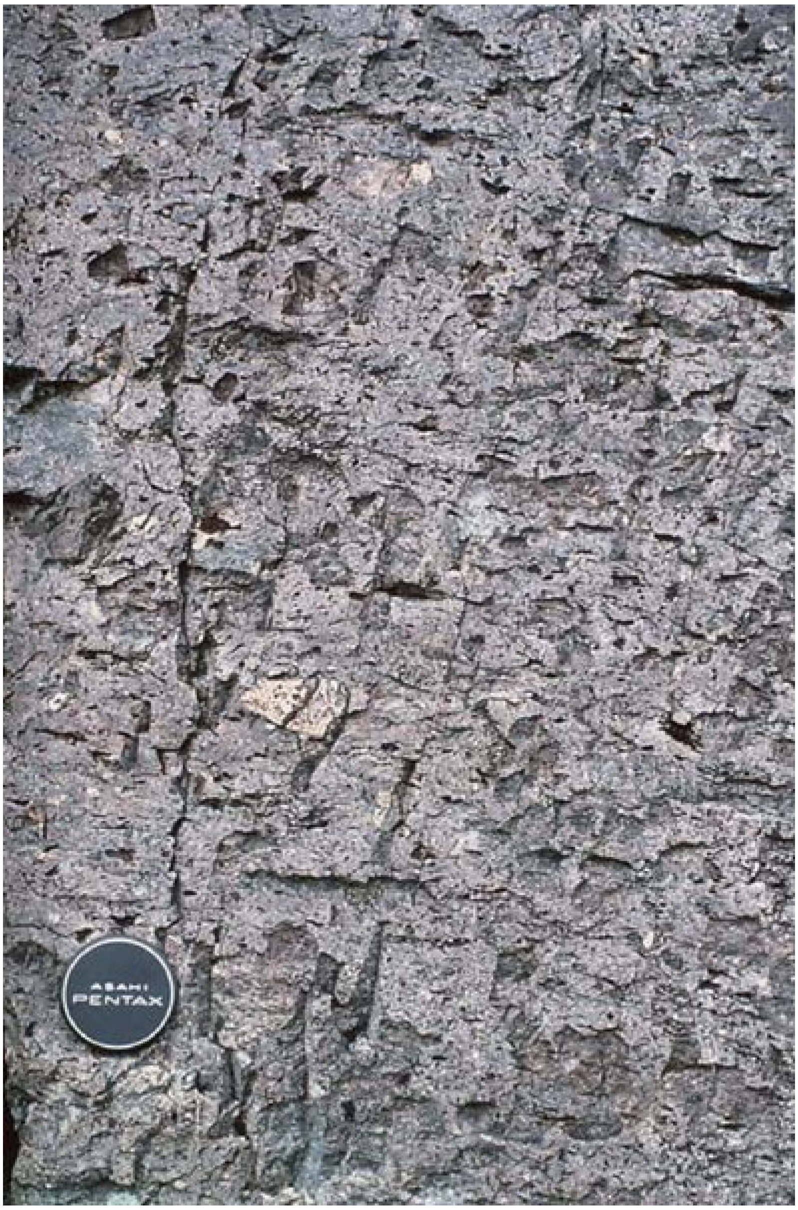
*(Figure 11) Kingshouse Tuffs (KHT). a Distribution. b Schematic diagram showing a north-west section parallel to the axis of the Glencoe Graben, and the setting of the Kingshouse Tuffs eruption and related deposits. This site was located at the intersection of the Glencoe Graben and a cross-graben between the Glen Etive Fault and the Devil's Staircase Fault; thus it was tectonically controlled, as were the alluvial fans of the Kingshouse Breccias (KHB). BAS Basal Andesite Sill-complex; DA Dalradian metamorphic basement; DSF Devil's Staircase Fault; GEF Glen Etive Fault; NEGF Northeastern Graben Fault; OF Ossian Fault; QCF Queen's Cairn Fault; WCF White Corries Fault.*


*(Plate 12a) Aqueous litho- facies of the Kingshouse Tuffs. a. View towards the south-west showing the flanks of Sròn na Creise (buttress on right hand side) and Stob a' Ghlais Choire (middle summit) with an extensive outcrop of the Kingshouse Tuffs, including the thick lacustrine succession formed in a small fault-bounded basin (P611780).*



*(Plate 12b) Aqueous litho- facies of the Kingshouse Tuffs. b. Flame structures and convolute laminations in silicic tuffs deposited from aqueous suspension (parallel-stratified tuffs) and by turbidity currents (mainly massive division showing near-vertical water-escape structures near its middle); Sròn na Creise [NN 241 525] (P611781).*

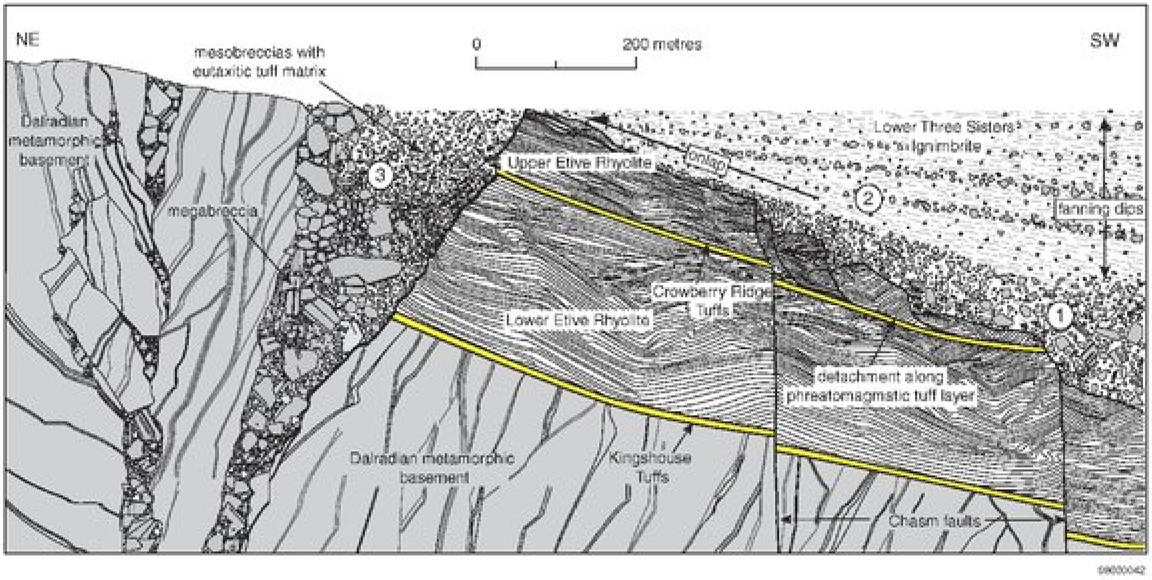
*(Plate 16a) Lower Three Sisters Ignimbrite showing well-developed eutaxitic texture (welding), with moderately abundant fiamme and small lithic clasts. The contrast between the non-silicified matrix (a) and the silicified matrix (P611790) .*



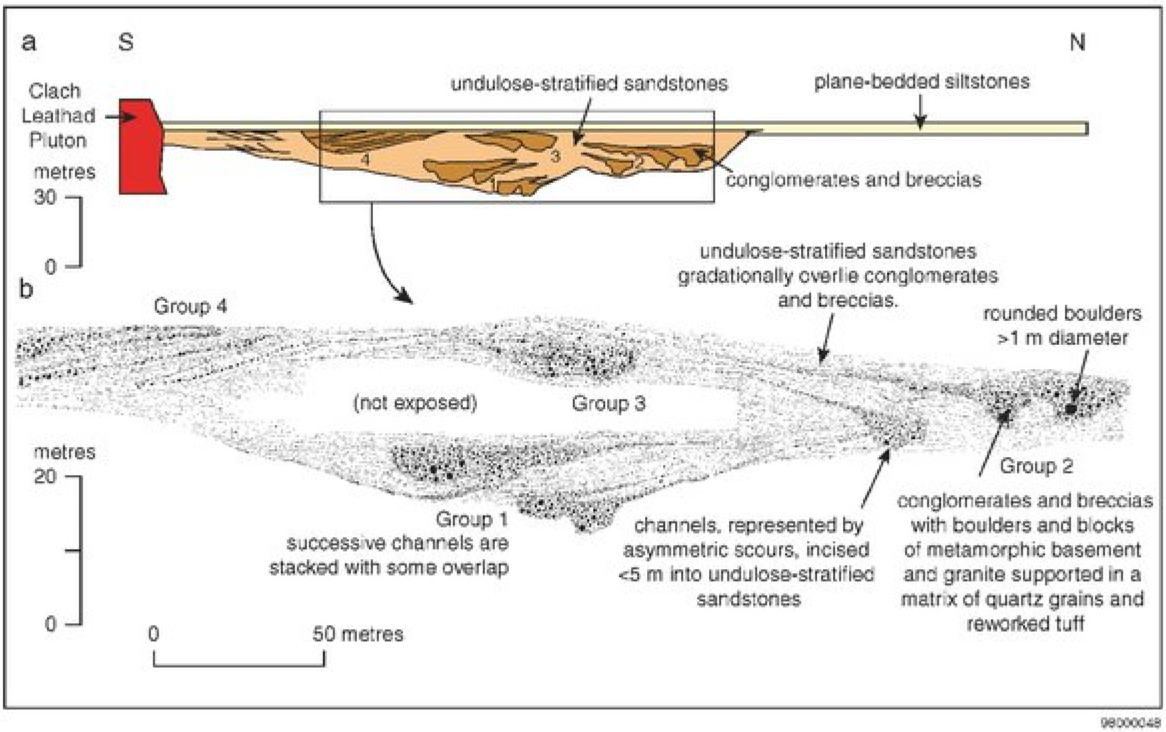

*(Plate 16b) Lower Three Sisters Ignimbrite showing well-developed eutaxitic texture (welding), with moderately abundant fiamme and small lithic clasts. The contrast between the non-silicified matrix (b) records variable hydrothermal alteration; Sròn na Creise [NN 239 521] (P611791).*


*(Plate 17) East flanks of Sròn na Creise and Stob a’ Ghlais Choire showing slumping of the Upper Etive Rhyolite (UER) towards the Chasm step-fault system and related thickening of the Lower Three Sisters Ignimbrite (LTS) towards the axis of the Glencoe Graben. Also shown are breccia dykes in the Dalradian metamorphic basement (DA) along the trace of Northeastern Graben Fault, the faulted margin of the lacustrine facies of the Kingshouse Tuffs (KHT; extreme right), a*

*topographical depression eroded deeply into Lower Etive Rhyolite (LER) and partially draped by Crowberry Ridge Tuffs (CRT), the Glas Choire Sandstone Member (GCS) in the vicinity of its type locality, and the overlying Bidean nam Bian Andesite Member (BBA) (P611792).*

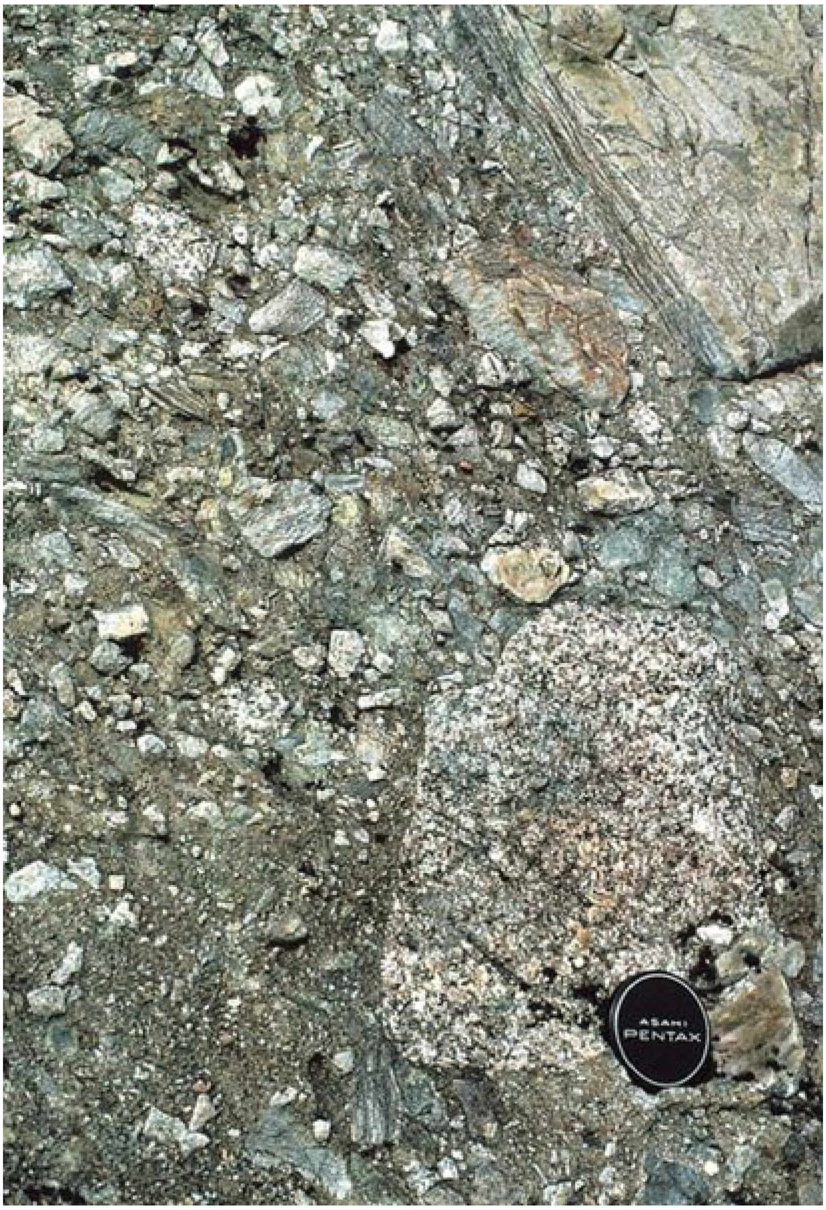



*(Figure 18) Schematic cross-section of the Lower Three Sisters Ignimbrite and its contact relationships transverse to the Glencoe Graben, south-east of the Glen Etive Fault. 1 Mesobreccias and megabreccias shed from fault scarps of the Etive rhyolites during early phases of caldera subsidence in the course of the Lower Three Sisters eruption. 2 Eutaxitic tuff with mesobreccia layers showing onlap and fanning dips that respectively record progressive aggradation of the ignimbrite and progressive downsag during the course of the eruption. 3 Extensional crevasse formed along the Northeastern Graben Fault to accommodate the downsag towards the south-west.*




*(Figure 24) Alluvial architecture of the fill within the Glas Choire palaeocanyon.a. Schematic section of the Glas Choire palaeocanyon fill, showing four groups of stacked and infilled channels, with overbank siltstone that lies on the shoulder of the palaeocanyon. The uppermost siltstones are lacustrine in origin. b. Detail of the alluvial architecture: vertical scale is approximately 2 the horizontal scale.*

*(Plate 21a) Glas Choire palaeocanyon, infills of sandstone and conglomerate, with overbank siltstones. a Undulose-stratified pebbly sandstone within the palaeocanyon [NN 241 514] (P611797).*



*(Plate 21b) Glas Choire palaeocanyon, infills of sandstone and conglomerate, with overbank siltstones. b Cobbles and boulders of metamorphic basement and Rannoch Moor granite in poorly sorted conglomerate that infills channels within the palaeocanyon [NN 241 514] (P611798).*


*(Plate 21c) Glas Choire palaeocanyon, infills of sandstone and conglomerate, with overbank siltstones. c Planar-bedded and laminated siltstone and fine-grained sandstone showing normal grading and loading-related soft-sediment deformation, interpreted as overbank deposits; Stob a' Ghlais Choire [NN 2418 5168] (P611799).*