Figures and plates

Figures

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(Figure 18) Plots of iron-oxide-magnesia ratio and iron oxide-content against silica. Dotted line, Skaergaard liquids (Wager 1960); full line, Hebridean alkaline olivine-basalt suite; dot-dash, average tholeiites (Nockolds 1954); dashes, Cascade volcanics (Osborn 1959)

(Figure 19) Sketch-map showing movement of ice and other glacial features in Skye

(Figure 20) Glacial retreat stages in Trotternish, Isle of Skye. BC, Bealach a'Chaol-reidh; BL, Beinn an Laoigh; BR, Beinn an Righ; BS, Beinn a'Sga; CC, Creag Chragach; CL, Creag an Locha; Gil, Glen Hinnisdal; GU, Glen Uig; RH, River Haultin; RR River Romesdal

(Figure 21) The Bracadale–Edinbain late-Glacial lake system at the 550-ft retreat stage

(Figure 22) Section of the Quirang Landslip

(Figure 23) Section of The Storr Landslip

Plates

(Plate 1) A. The Storr from the south;. part of the Trotternish lava-scarp. Landslipped lavas and Jurassic sediments form the ground to the right of the escarpment. In the foreground a glacially eroded hollow in Jurassic sediments is occupied by the two lochs Fada and Leathan, which supply water for the Bearreraig Hydro-electric Station. (D3173, replaces MN20706); B. Landslip topography south of Flodigarry Hotel. In the foreground slipped masses of Tertiary lava and Jurassic sediments. In the distance the headland of Rubha Garbhaig is of Tertiary dolerite sills in Jurassic sediments.(D3172, replaces MN20704); C. Staffin Bay from the north. On the foreshore are upper Jurassic sediments. In the middle distance Staffin Point (An Corran) is formed by two dolerite sills with Jurassic sediments between them. Behind the storm beach the 25-ft and 50-ft beach flats are well seen and correspond with the rock notches seen in An Corran. (D3171, replaces MN20705) Frontispiece

(Plate 2) A. Bearreraig, six miles north-north-east of Portree. Inferior Oolite sandstone giving rise to waterfall. (C2241) B. Lyndale Point, 100 yd from shore, 1530 yd north-northwest of Lynedale House. Dolerite dyke showing columnar jointing. (C3919)

(Plate 3) A. Bearreraig Bay, 6½ miles north-north-east of Portree. Columnar sill of dolerite overlying Inferior Oolite. (C2244) B. Coast, south of Mealt Waterfall, looking north from Valtos. Great Estuarine Series with intruded sills of dolerite. (C3898)

(Plate 4) The Quirang, looking north-east from Tug road. Escarpment of Tertiary lavas with extensive area of landslipped masses of Tertiary volcanic material. Staffin is on the extreme right. (C3899–3900)

(Table 1) Analyses of palagonite, glass and tuff.

(Table 2) Analyses and norms of sidermelane, pillow lava and tholeiitic basalts.

(Table 3) Lava types in Northern Skye.

(Table 4) Analysis of Hebridean basalt, amygdaloid and bole.

(Table 5) Minerals in lavas exposed at the Storr and Rubha na h-Airde Glaice (One-inch Sheet 80, six-inch Sheet Skye 18 N.W.).

(Table 6) Analyses and norms of Hebridean type basalts, Skye.

(Table 7) Minerals in lavas exposed at Biod a'Ghoill, Score Horan, Vaternish.

(Table 8) Analyses of mugearites and trachyte.

(Table 9) Analysis of porphyritic mugearite.

(Table 10) Analyses of dolerites and related rocks.

(Table 11) Norms and modes of dolerites and related rocks./p>

(Table 12) The dykes of North Skye./p>

(Table 13) Analyses and norms of allivalite and eucrite.

(Table 14) Average Hebridean basalt, mugearite and trachyte.

(Table 15) Calculated compositions of subtracted differentiates.

(Table 16) Calculated assimilation by mugearite and trachyte.

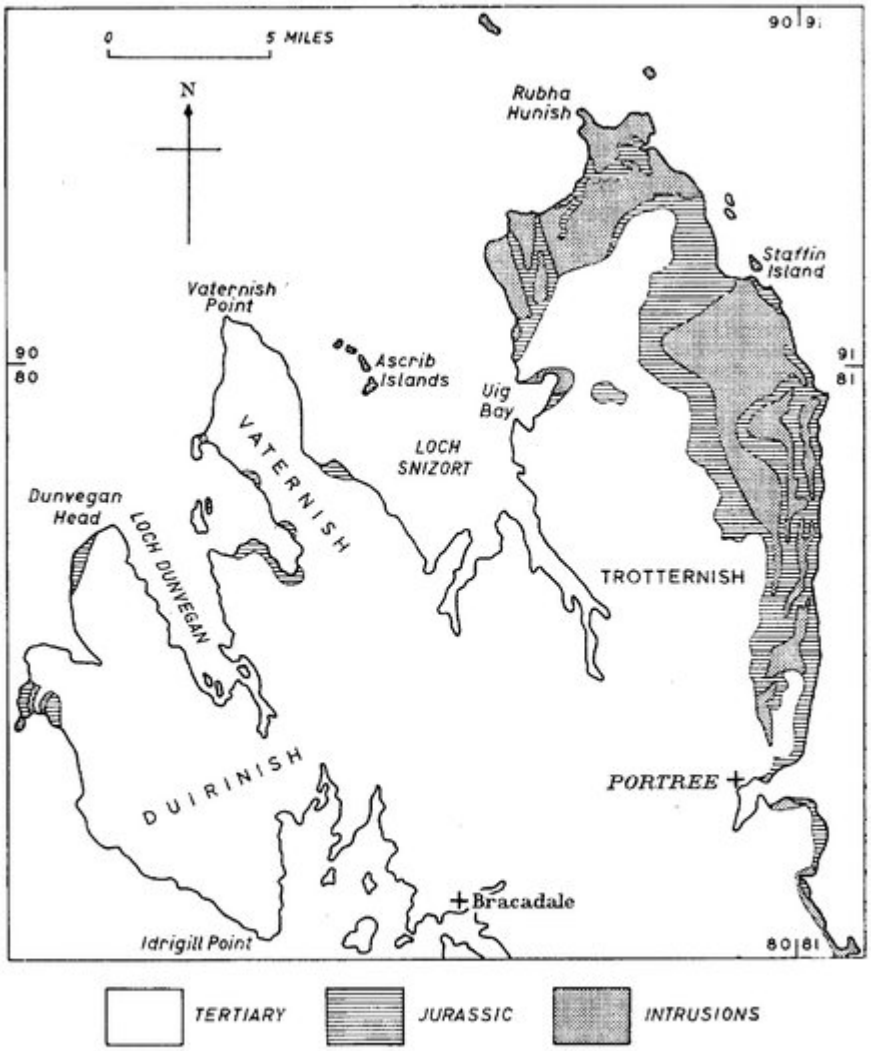

FIG. 1. *Sketch map showing distribution of main groups of rocks in Northern Skye. Figures indicate margins of one-inch sheets*

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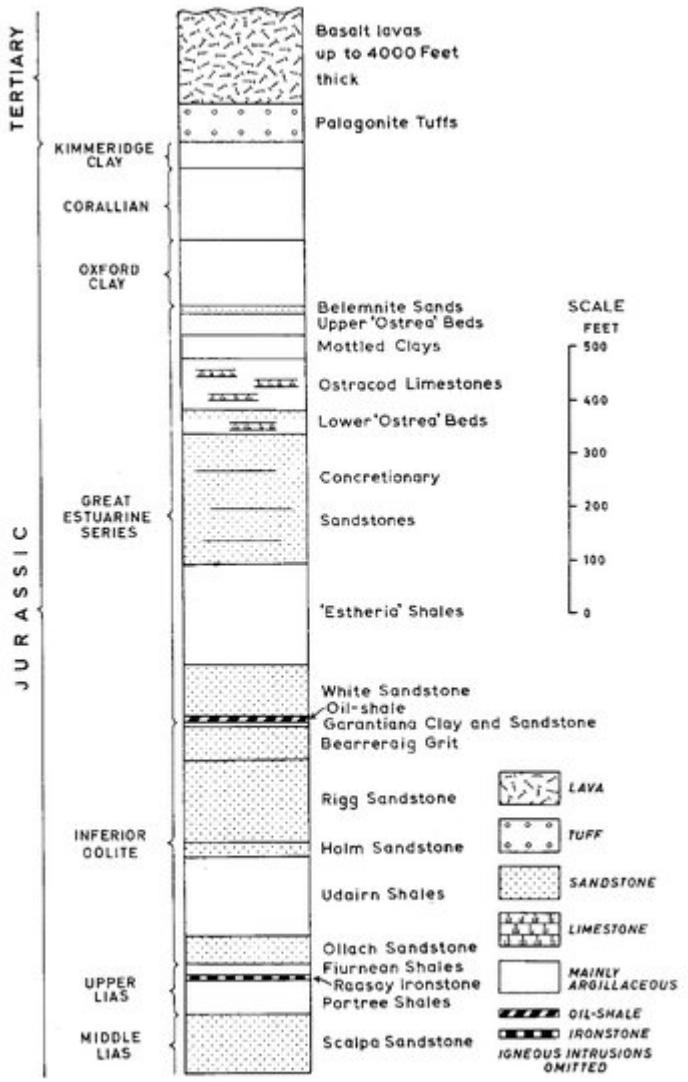

FIG. 2. *Generalized vertical section of sedimentary and volcanic rocks exposed in Northern Skye*

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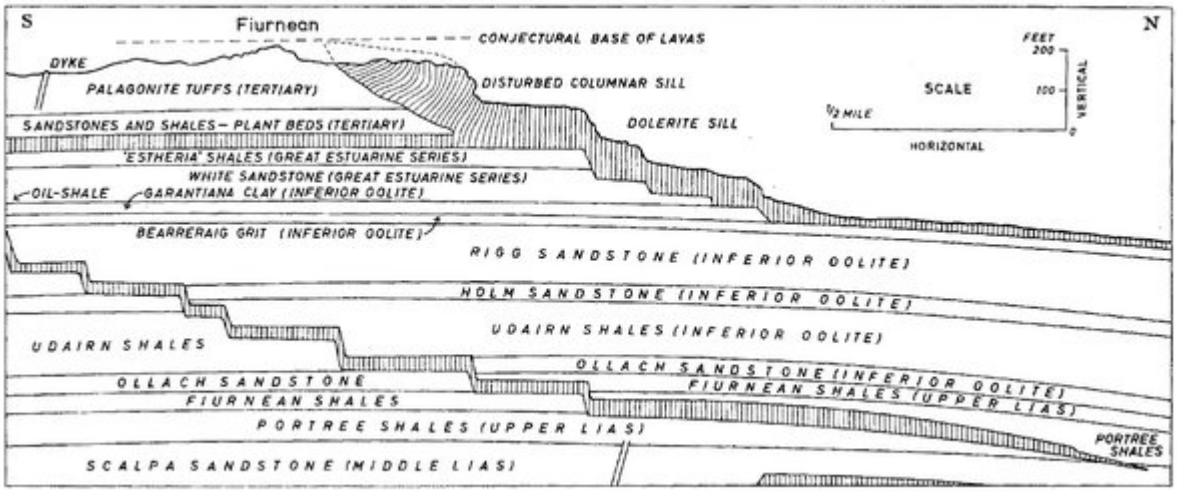

FIG. 3. *Section in sea-cliff at Fiurnean, 4 miles N.N.E. of Portree*

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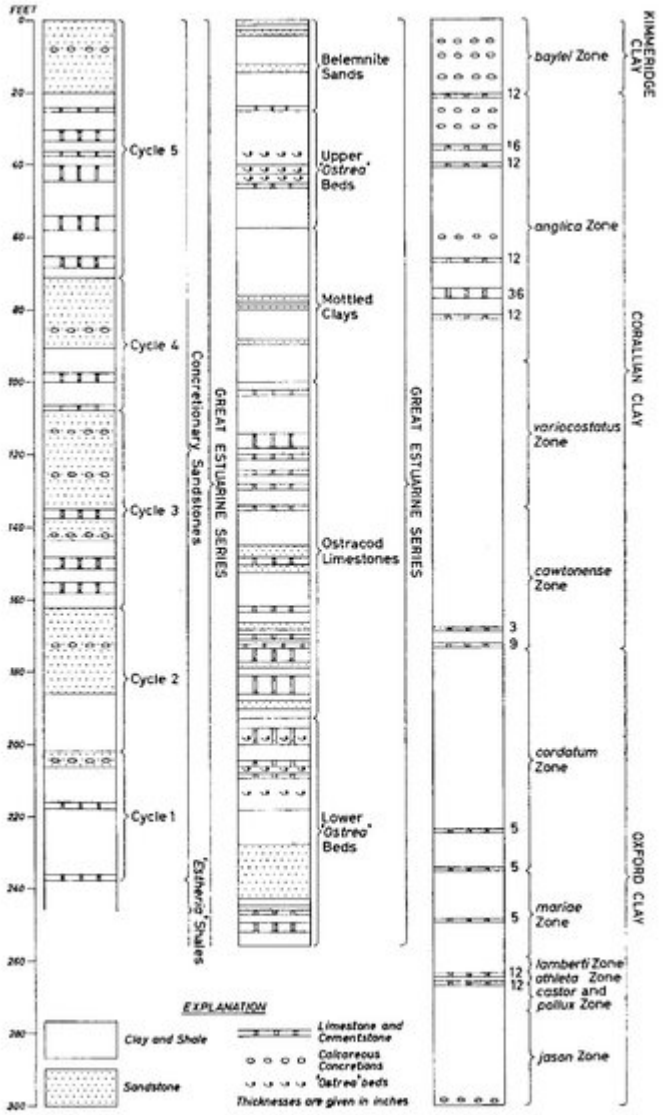

FIG. 4. *Sections showing the sequence of strata in the Concretionary Sandstones, Lower 'Ostrea' Beds, Ostracod Limestones, Mottled Clays, Upper 'Ostrea' Beds, Oxford Clay, Corallian and Kimmeridge Clay*

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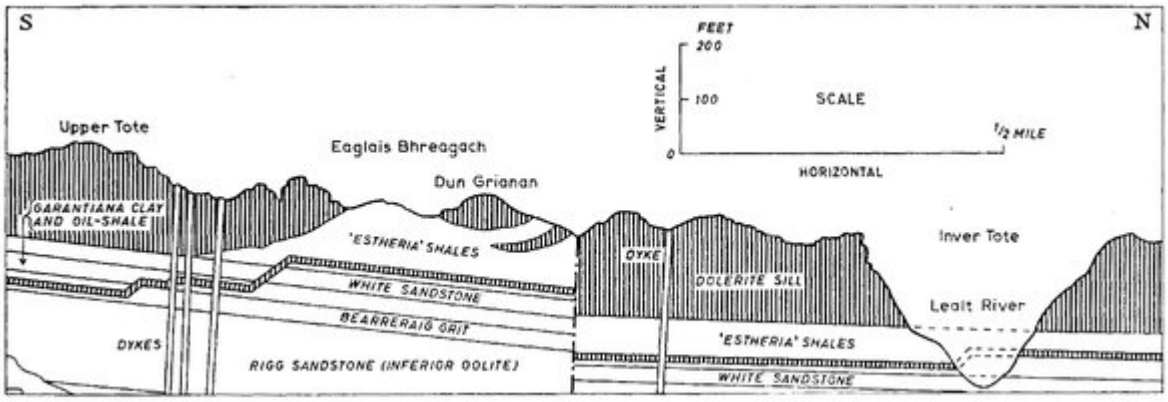

FIG. 6. *Section in sea-cliff between Upper Tote and Inver Tote*

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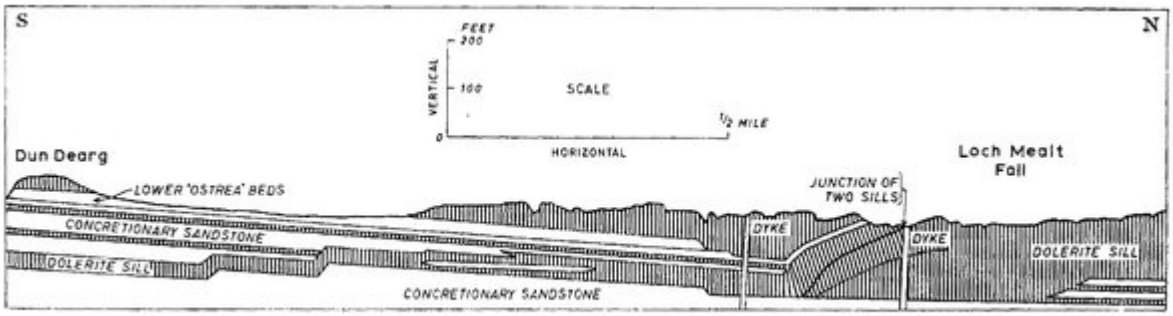

FIG. 7. *Section in sea-cliff between Drum Dearg and Loch Mealt fall*

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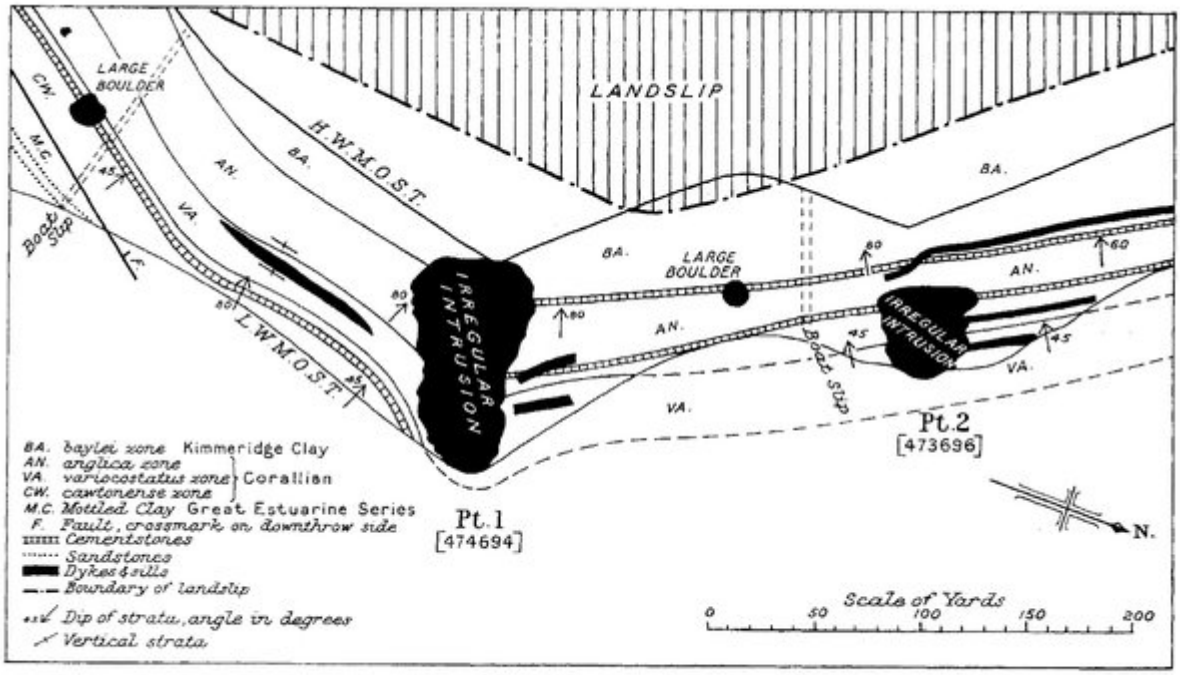


FIG. 8. *Map of Jurassic strata in Staffin Bay, coast east of Digg. Grid references in square brackets*

(Figure 8) Map of Jurassic strata in Staffin Bay, coast east of Bligg. Grid references in square brackets.

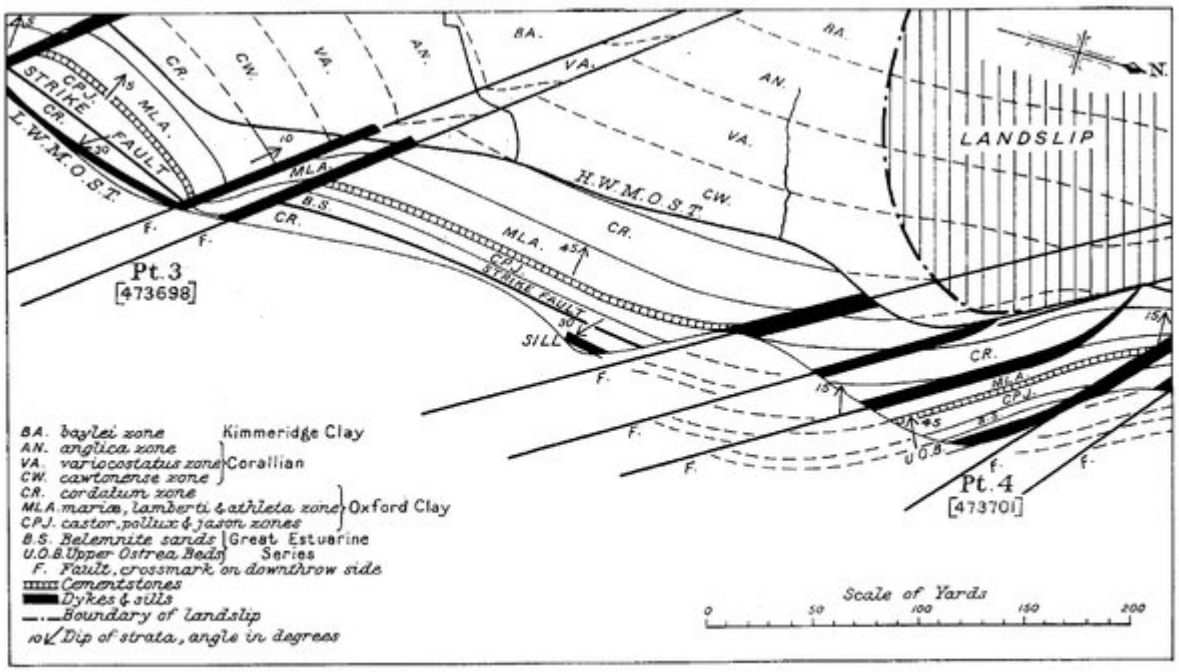
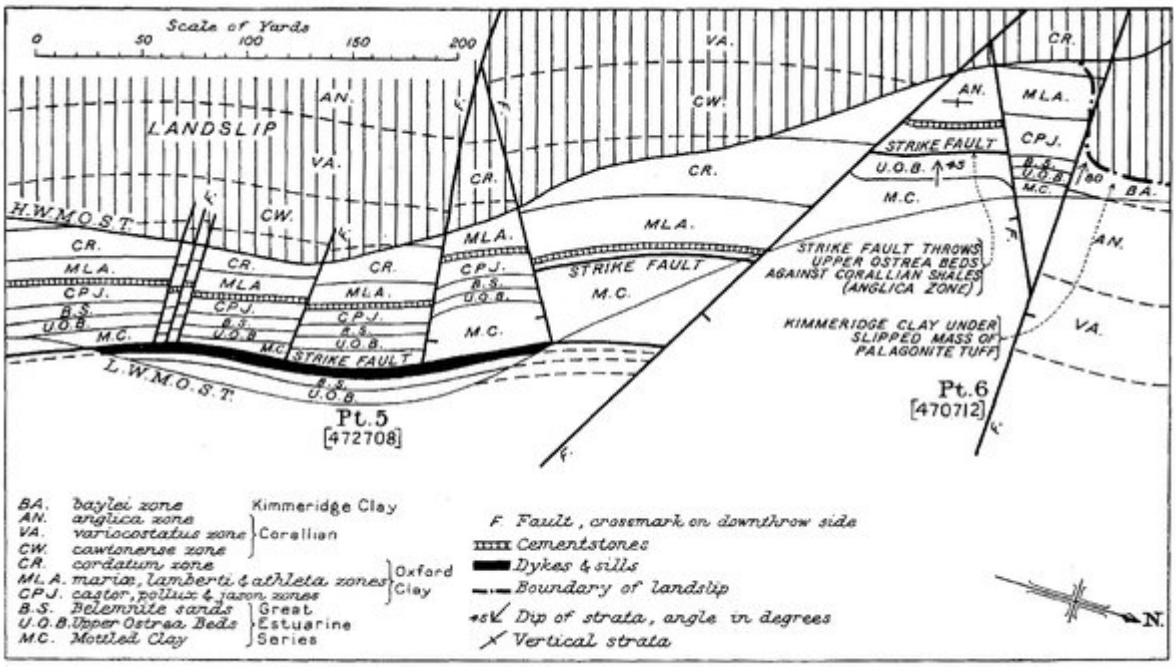


FIG. 9. *Map of Jurassic strata in Staffin Bay, coast east of Loch Leum nam Bradh. Grid references in square brackets*

(Figure 9) Map of Jurassic strata in Staffin Bay, coast east of Loch Learn nam Bradh. Grid references in square brackets.



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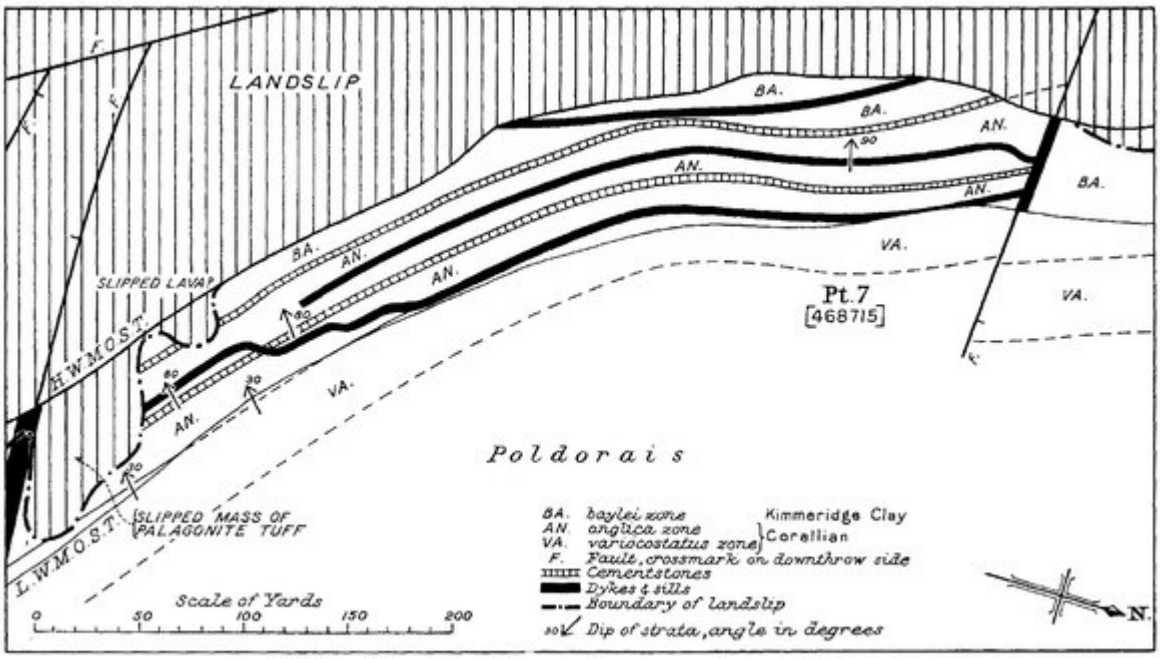

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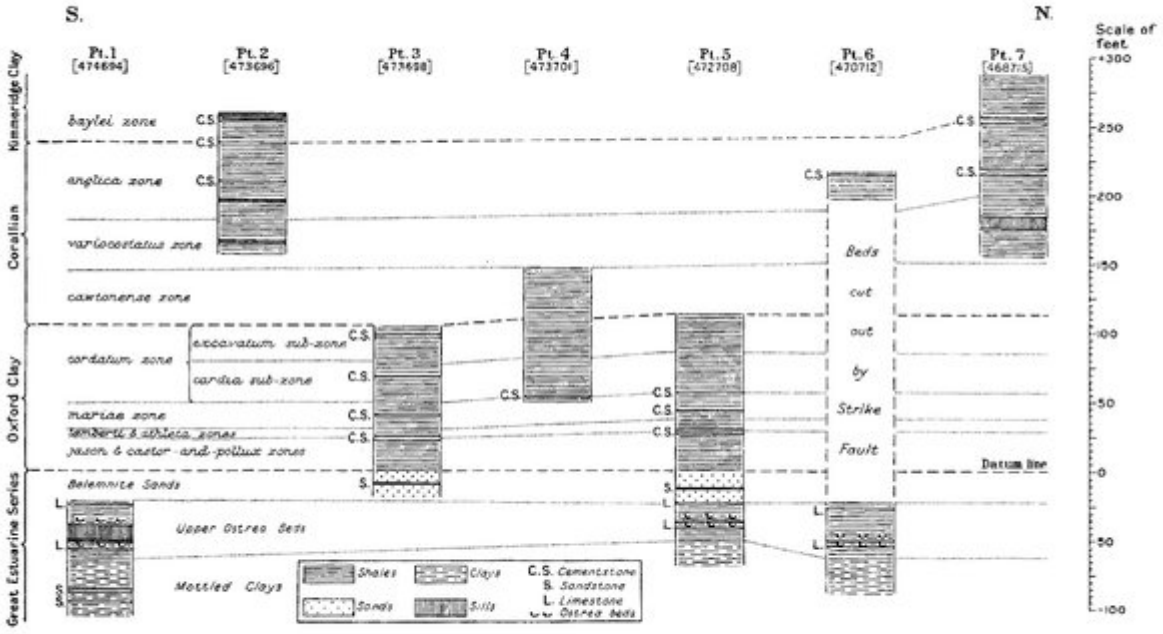

FIG. 12. *Correlation of the Jurassic strata exposed in Staffin Bay. Grid references in square brackets*

(Figure 12) Correlation of the Jurassic strata exposed in Stain Bay. Grid references in square brackets.

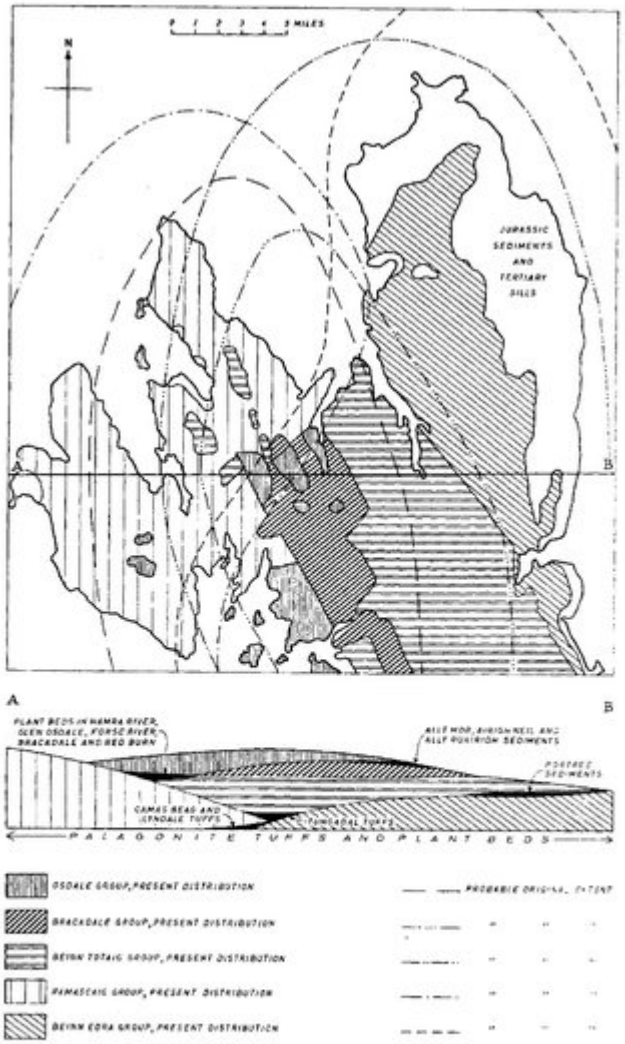

FIG. 13. *Sketch-map showing the outcrops of the main lava-groups and section showing their mutual relationships. The suggested former limits of the groups are projected from the known thickness of the present day remnants. Intervals, between extrusive episodes are represented in many places by plant-bearing sediments and tuffs.*

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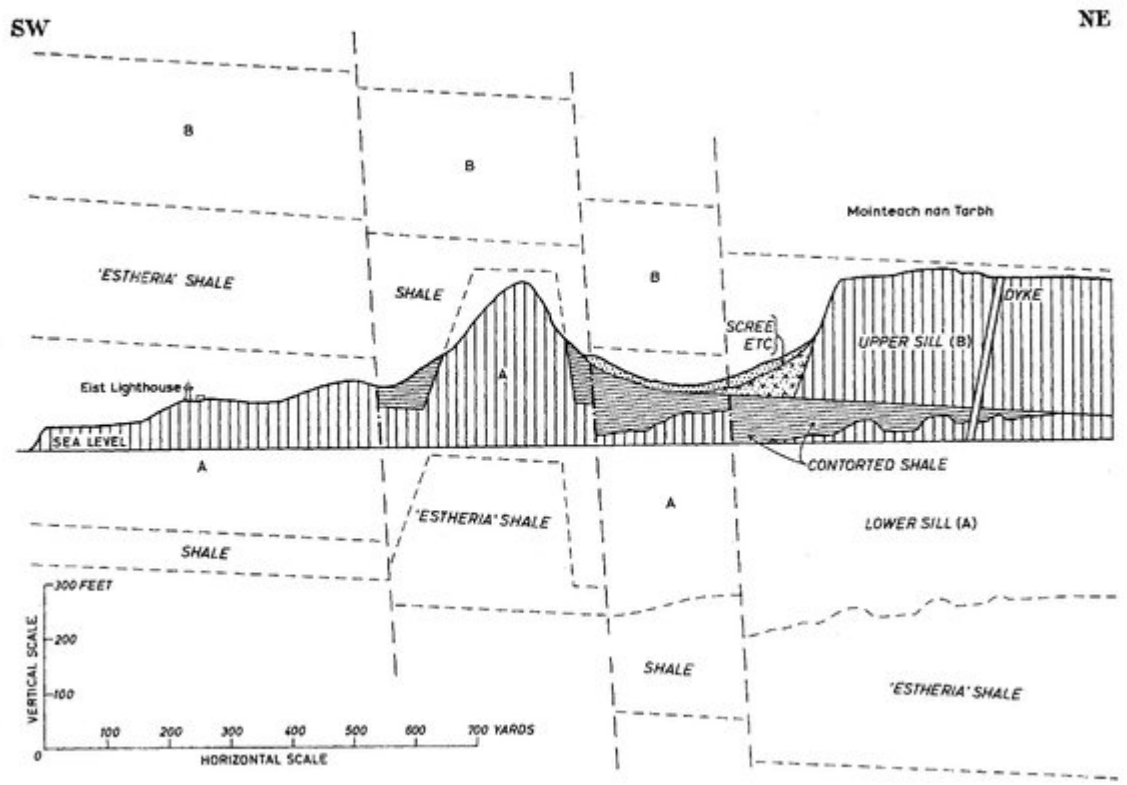

FIG. 14. *Section showing the behaviour of part of the Tertiary sill-complex at Eist*

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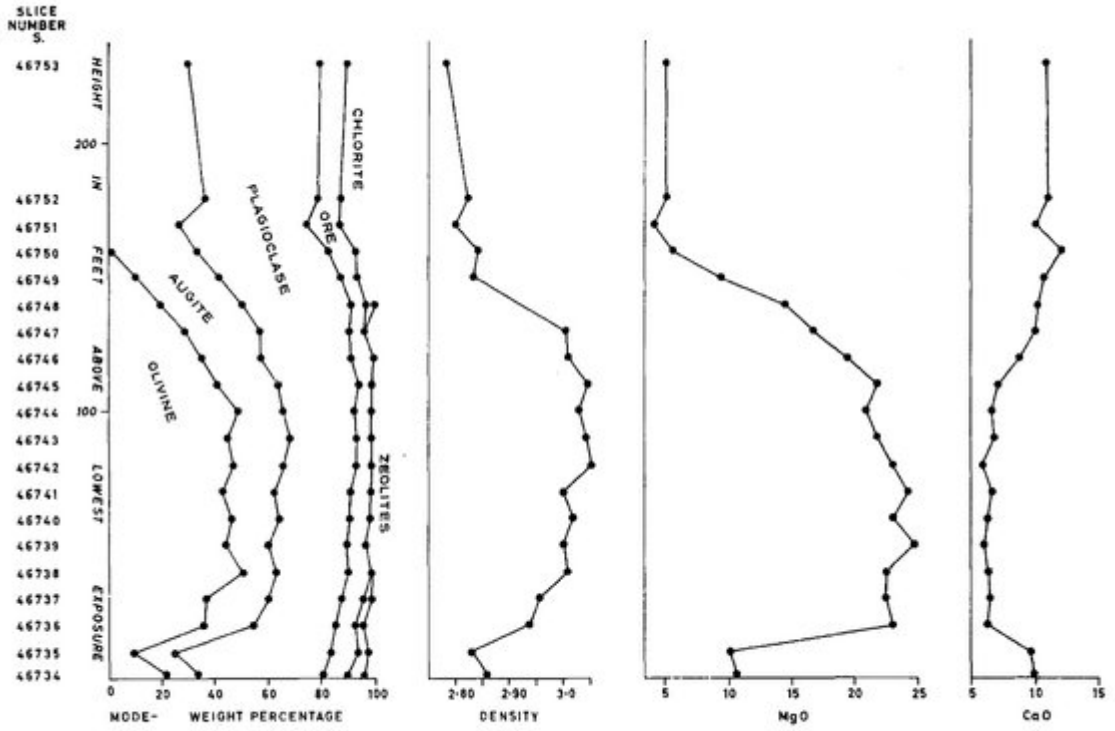

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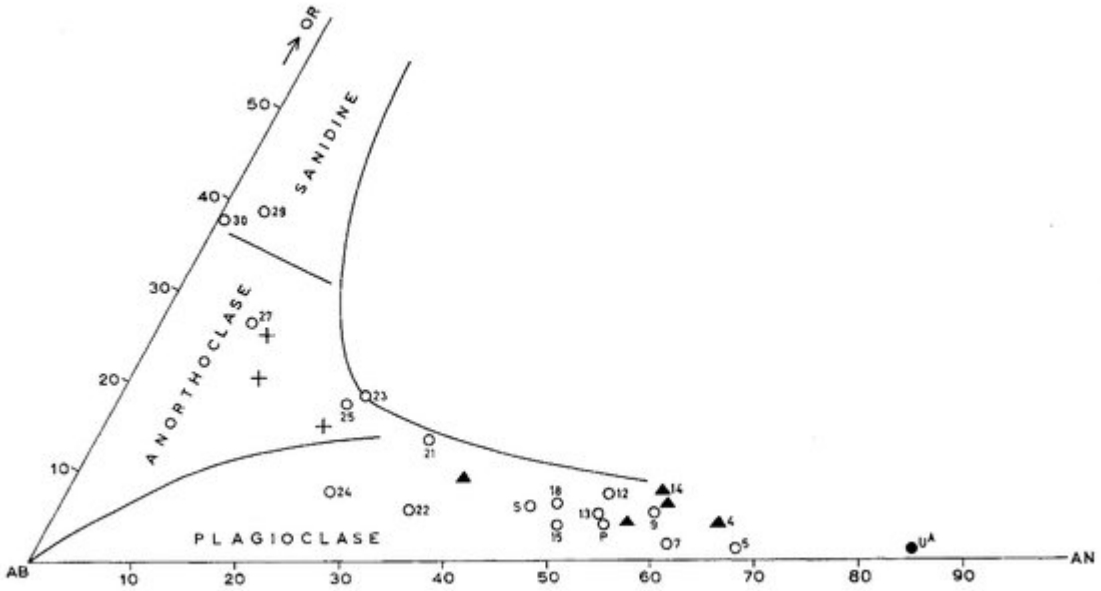

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Circles lavas; triangles, sills; black circle, dyke; crosses, feldspars from Druim na Criche mugearite, analysed by Muir and Tilley 1961. *P, tholeiitic pillow lava; S, normative feldspar in glass from palagonite tuff. Numbers correspond with those for Fig* .17. *U^A, allivalite dyke*

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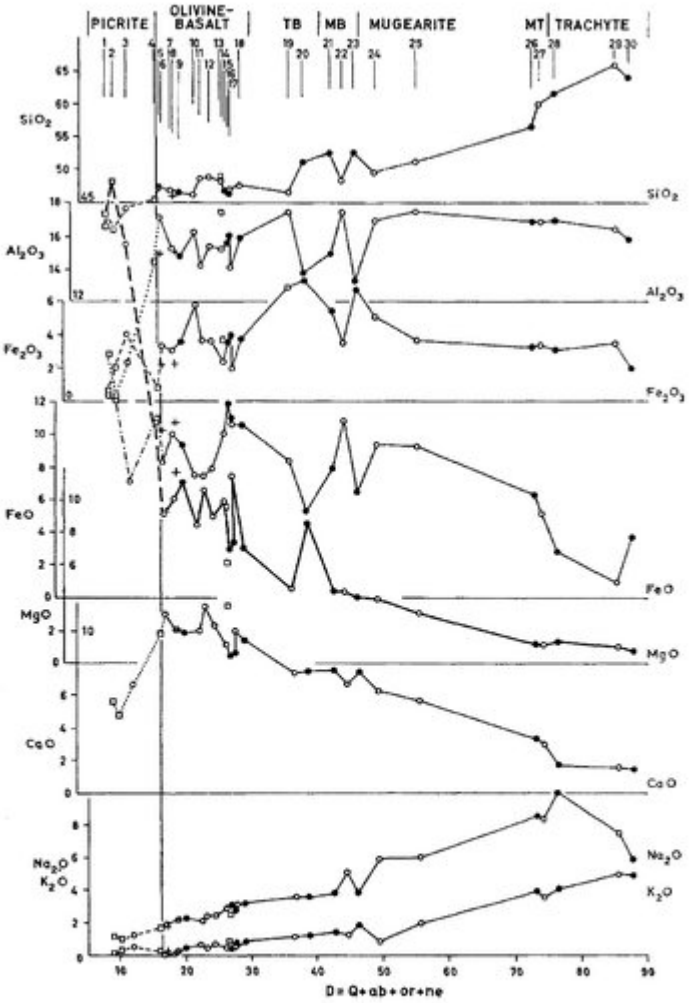

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(Figure 17) Variation diagram for the Alkaline Olivine-basalt lavas and minor intrusions. Black spots, Skye lavas; open circles, other Hebridean lavas; crosses, Antrim plateau basalts; open squares, North Skye and Shiant sills; TB trachybasalt MB mugearite-basalt; MT mugearite-trachyte. Picrite and picrite-basalt fall in a field limited by the line for D = 16–5 and are considered to be accumulative rocks. List of chemical analyses used in Figs. 16 & 17. 1. Picrite, base of cliff S. of Garbh Eilean, Shiant; Walker 1930, p. 371. 2. Picrite, top of cliff W. of Camas Mor, Skye; Walker 1932, p. 246. 3. Picrite-basalt, An Camach, Strathaird, Skye; Almond 1964. 4. Olivine-dolerite, 30 ft above beach, S. face of Garbh Eilean, Shiant; Walker 1930, p. 371. 5. Fine-grained basalt, 100 yd N.W. of Loch Cuil na Creig, Skye; King 1953, p. 365 6. Olivine-basalt, scarp E. of Dunmull Toberdornan Townland, 3 miles S.E. of Portrush, Northern Ireland; Patterson 1955, p. 103. 7. Ophitic basalt, 50 yd W. of Strollamus Quarry, Skye; King 1953, p. 365. 8. Olivine-basalt, scarp S. of County Road, Ballykeel Townland, 1¾ miles E.S.E. Portrush, N. Ireland; Patterson 1955, p. 103. 9. Basalt, E. side Rubha Dearg, 1 mile W. of Loch Aline, Morven; Bailey and others 1924, p. 15. 10. Olivine-dolerite, summit of Ben Lee N.W. of Loch Sligachan; Harker 1904, p. 248. 11. Olivine-basalt, flow 1, Ben Meabost, Skye; Almond 1960. 12. Olivine-basalt, near bridge over Allt Fionnfhiachd, Drynoch, Skye; Harker 1904, p. 31. 13. Olivine-basalt, Creag Mor, Skye; (p. 103). 14. Olivine-dolerite, Loch Mealt, near Waterfall, Skye; Walker 1932, p. 247. 15. Basalt, ■ mile N.N.E. Pennycross House, Mull; Bailey and others 1924, p. 15 16. Basalt, cliff 200 yd W. of Loch Eilean, Morven; Bailey and others 1924, p. 15. 17. Olivine-basalt, Achtalean 2¼ miles N.N.W. of Portree, Skye; Tilley and Muir 1962, p. 212. 18. Basalt, Orval, Rhum; Harker 1908, p. 57. 19. Olivine-dolerite, 500 yd N. of Tam, Broc-bheinn, 4 miles N.N.W. of Sligachan, Skye; Harker 1904, p. 248. 20. Trachybasalt, An Carnach, Strathaird, Skye; Almond 1960. 21. Dolerite-mugearite, S. of Fionn-Chro, Rhum; Harker 1908, p. 130. 22. Mugearite-basalt, River Rha, above Uig, Skye; Muir and Tilley 1961, p. 190. 23. Doleritic mugearite, Eilean a'Bhaird, Canna; Harker 1908, p. 130. 24. Mugearite, cap of Hartaval, Skye; (p. 118). 25. Mugearite, Druim na Criche, near Mugeary, Skye; Muir and Tilley 1961, p. 190. 26. Mugearite (Benmoreite), 290 yd E. of Kinloch

Hotel, Mull; Bailey and others 1924 p. 27. 27. Mugearite-trachyte (Benmorerite), Totardor, Skye; Muir and Tilley 1961, p. 190. 28. Trachyte, Ardnachross Vent, ¼ mile W. Rubha an t-Sean-Chaisteil, Mull; Bailey and others 1924, p. 27. 29. Trachyte, Ros a'Mheallain, Skye; (p. 118). 30. Trachyte, Vent, Braigh a'Choir' Mhoir, W. of Salen, Mull ; Bailey and others 1924, p. 27.

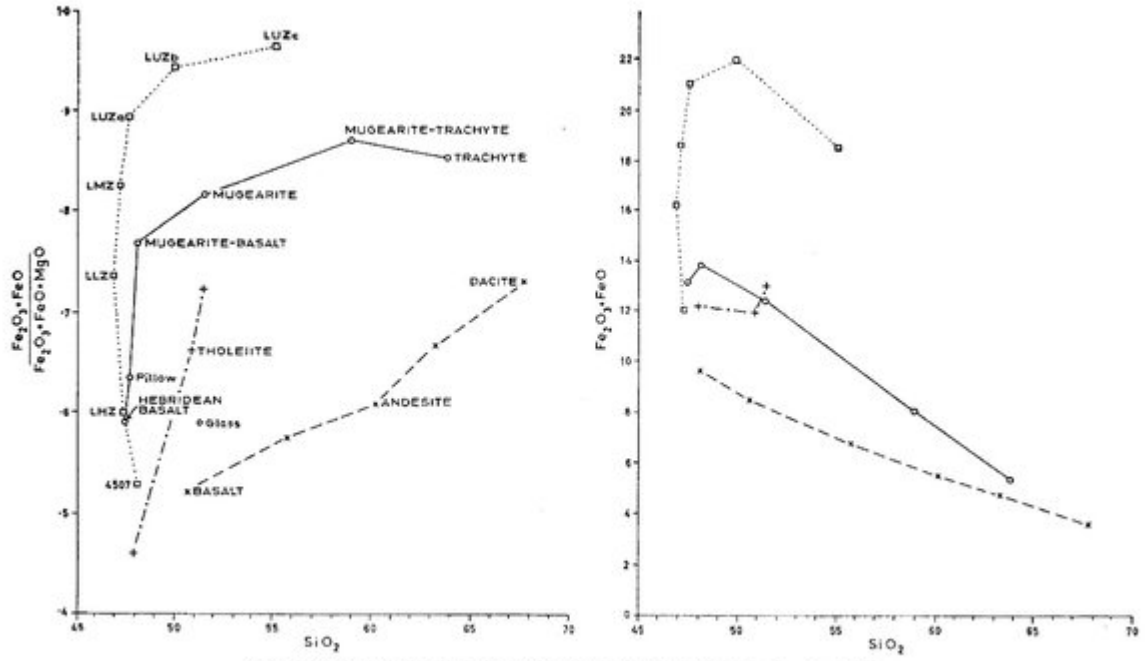


FIG. 18. *Plots of iron-oxide-magnesia ratio and iron oxide-content against silica. Dotted line, Skaergaard liquids (Wager 1960); full line, Hebridean alkaline olivine-basalt suite; dot-dash, average tholeiites (Nockolds 1954); dashes, Cascade volcanics (Osborn 1959)*

(Figure 18) Plots of iron-oxide-magnesia ratio and iron oxide-content against silica. Dotted line, Skaergaard liquids (Wager 1960); full line, Hebridean alkaline olivine-basalt suite; dot-dash, average tholeiites (Nockolds 1954); dashes, Cascade volcanics (Osborn 1959).

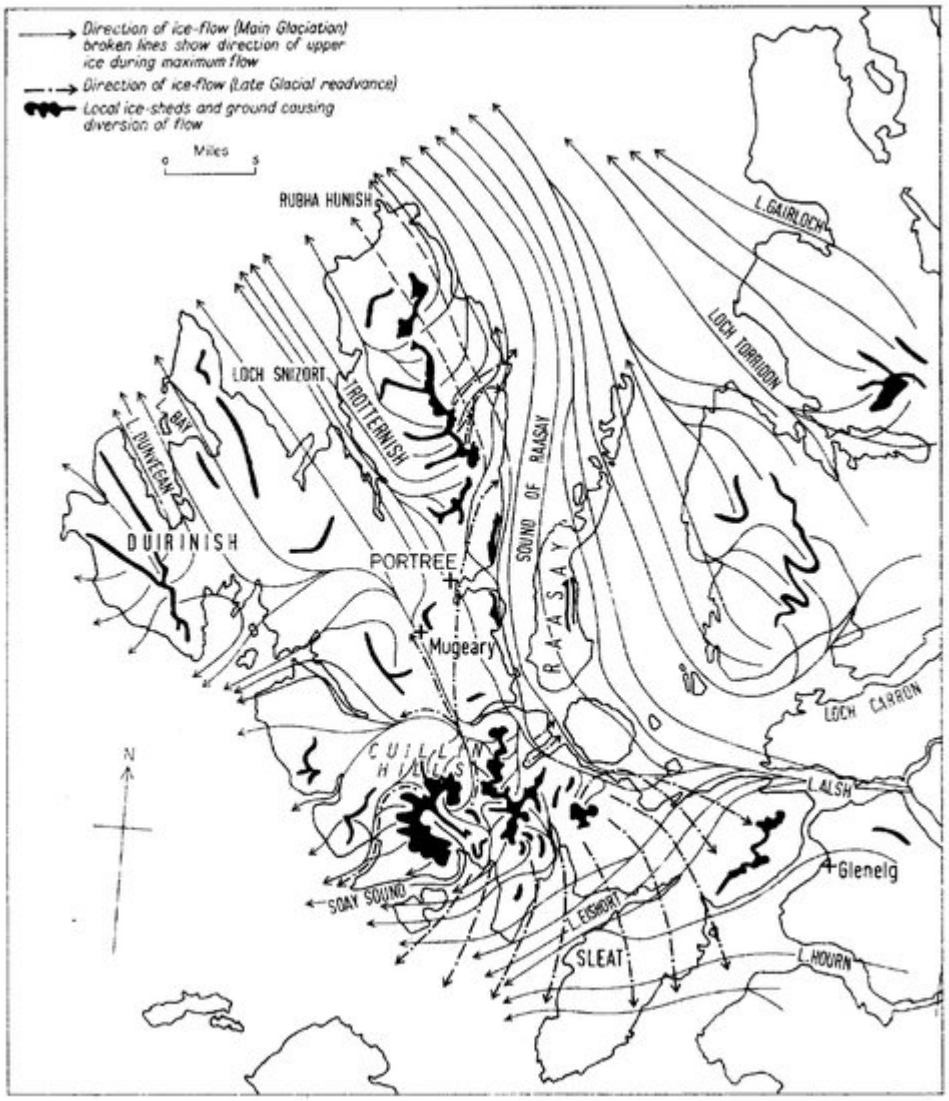


FIG. 19. *Sketch-map showing movement of ice and other glacial features in Skye*

(Figure 19) Sketch-map showing movement of ice and other glacial features in Skye.

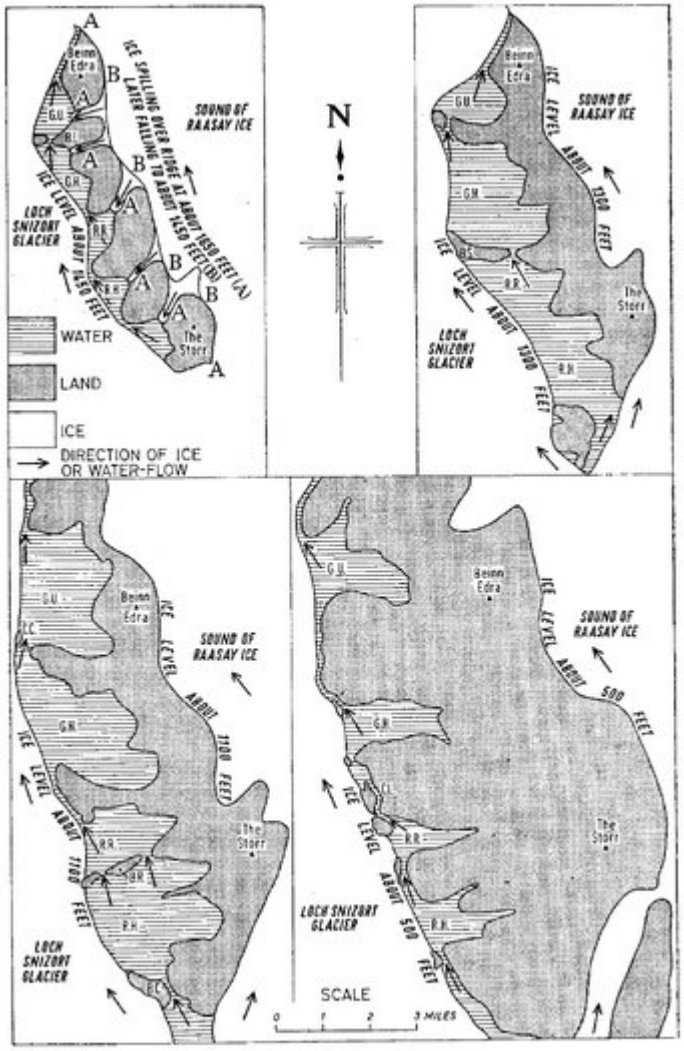


FIG. 20. *Glacial retreat stages in Trotternish, Isle of Skye*
BC, Bealach a'Chaol-reidh; BL, Beinn an Laoigh; BR, Beinn an Righ; BS, Beinn a'Sga; CC, Creag Chragach; CL, Creag an Locha; GH, Glen Hinnisdal; GU, Glen Uig; RH, River Haultin; RR River Romesdal

(Figure 20) Glacial retreat stages in Trotternish, Isle of Skye. BC, Bealach a'Chaol-reidh; BL, Beinn an Laoigh; BR, Beinn an Righ; BS, Beinn a'Sga; CC, Creag Chragach; CL, Creag an Locha; Gil, Glen Hinnisdal; GU, Glen Uig; RH, River Haultin; RR River Romesdal.

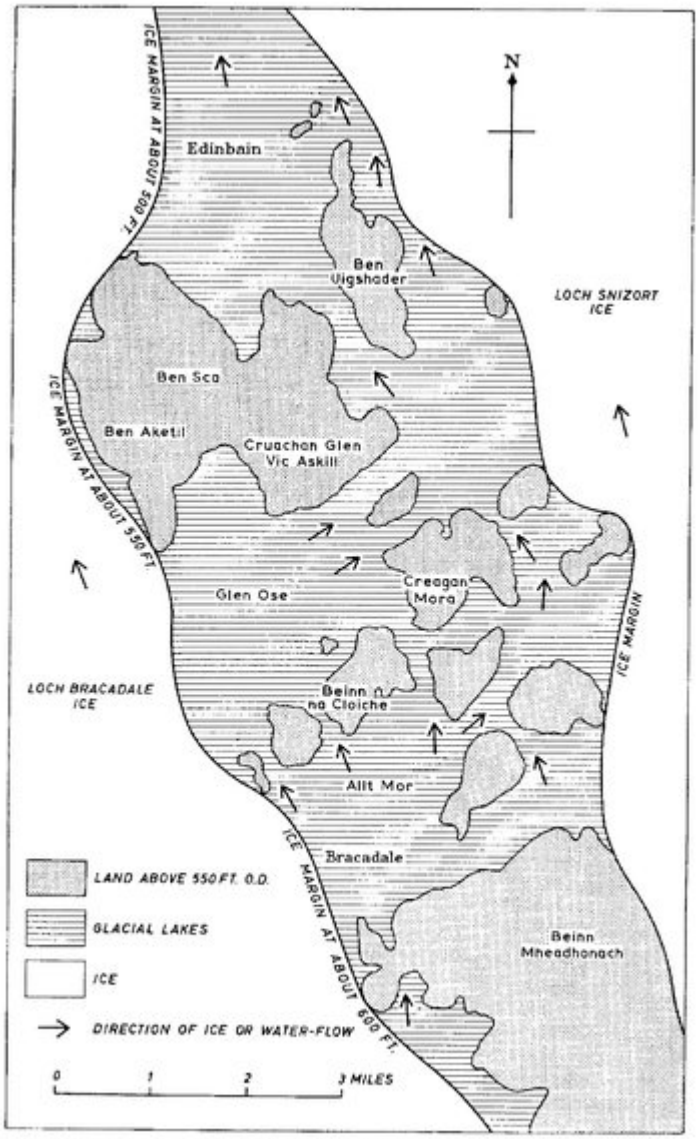


FIG. 21. *The Bracadale-Edinbain late-Glacial lake system at the 550-ft retreat stage*

(Figure 21) The Bracadale–Edinbain late-Glacial lake system at the 550-ft retreat stage.

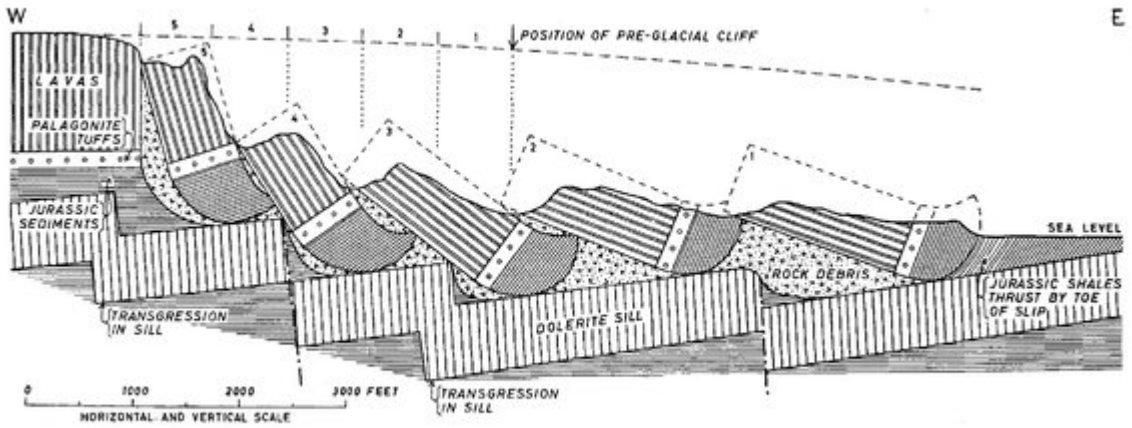


FIG. 22. *Section of the Quirang Landslip*

(Figure 22) Section of the Quirang Landslip.

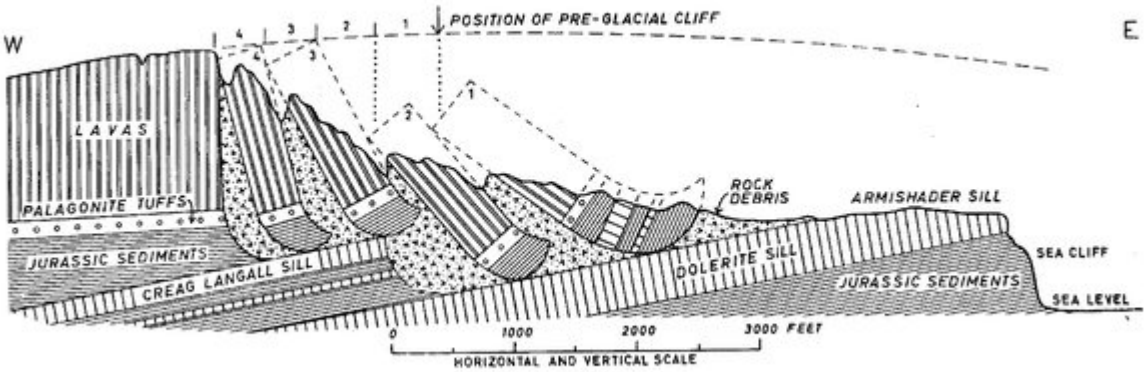


FIG. 23. *Section of The Storr Landslip*

(Figure 23) Section of The Storr Landslip.

Geology of Northern Skye (Mem. Geol. Surv.) PLATE I (*Frontispiece*)

(D3173)

A. THE STORR FROM THE SOUTH; PART OF THE TROTTERNISH LAVA-SCARP

(D3172)

B. LANDSLIP TOPOGRAPHY SOUTH OF FLODIGARRY HOTEL

(D3171)

C. STAFFIN BAY FROM THE NORTH

(Plate 1) A. The Storr from the south;. part of the Trotternish lava-scarp. Landslipped lavas and Jurassic sediments form the ground to the right of the escarpment. In the foreground a glacially eroded hollow in Jurassic sediments is occupied by the two lochs Fada and Leathan, which supply water for the Bearreraig Hydro-electric Station. (D3173, replaces MN20706); B. Landslip topography south of Flodigarry Hotel. In the foreground slipped masses of Tertiary lava and Jurassic sediments. In the distance the headland of Rubha Garbhaig is of Tertiary dolerite sills in Jurassic

sediments.(D3172, replaces MN20704); C. Staffin Bay from the north. On the foreshore are upper Jurassic sediments. In the middle distance Staffin Point (An Corran) is formed by two dolerite sills with Jurassic sediments between them. Behind the storm beach the 25-ft and 50-ft beach flats are well seen and correspond with the rock notches seen in An Corran. (D3171, replaces MN20705) Frontispiece.

(C2241)

A. BEARRERAIG, SIX MILES NORTH-NORTH-EAST OF PORTREE
Inferior Oolite sandstone giving rise to waterfall

(C3919)

B. LYNDALE POINT, 100 YD FROM SHORE, 1530 YD NORTH-NORTH-WEST OF LYNEDALE HOUSE
Dolerite dyke showing columnar jointing

(Plate 2) A. Bearreraig, six miles north-north-east of Portree. Inferior Oolite sandstone giving rise to waterfall. (C2241) B. Lyndale Point, 100 yd from shore, 1530 yd north-northwest of Lynedale House. Dolerite dyke showing columnar jointing. (C3919).

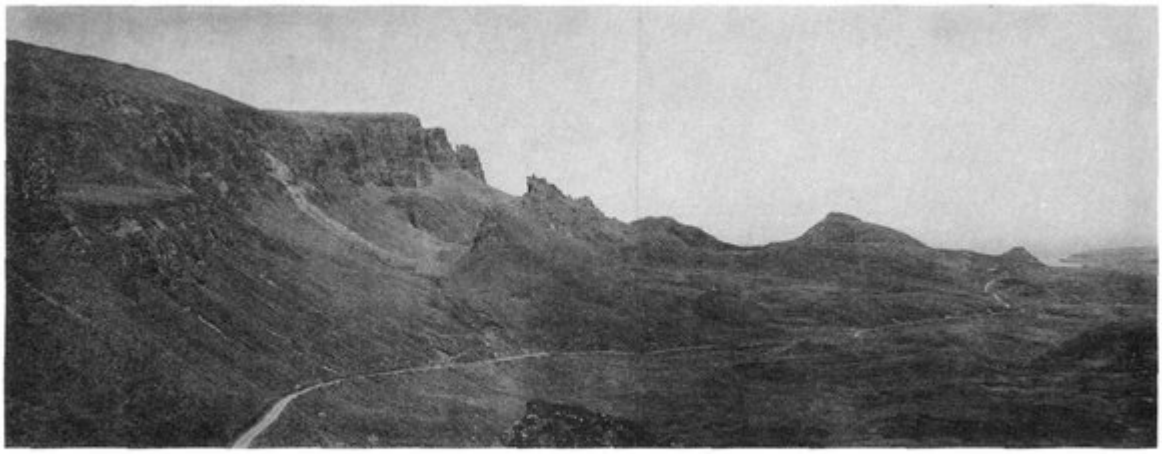
(C2244)

A. BEARREIRAIG BAY, 6¼ MILES NORTH-NORTH-EAST OF PORTREE
Columnar sill of dolerite overlying Inferior Oolite

(C3898)

B. COAST, SOUTH OF MEALT WATERFALL, LOOKING NORTH FROM VALTOS
Great Estuarine Series with intruded sills of dolerite

(Plate 3) A. Bearreraig Bay, 6½ miles north-north-east of Portree. Columnar sill of dolerite overlying Inferior Oolite. (C2244) B. Coast, south of Mealt Waterfall, looking north from Valtos. Great Estuarine Series with intruded sills of dolerite. (C3898).



(C3899-3900)

THE QUIRANG, LOOKING NORTH-EAST FROM UIG ROAD
Escarpment of Tertiary lavas with extensive area of landslipped masses of Tertiary volcanic material. Staffin is on the extreme right

(Plate 4) The Quirang, looking north-east from Tug road. Escarpment of Tertiary lavas with extensive area of landslipped masses of Tertiary volcanic material. Staffin is on the extreme right. (C3899–3900).

TABLE I

ANALYSES OF PALAGONITE, GLASS AND TUFF

	I	II	III	A	IV
SiO_2	51·5	56·0+	43·3+	37·8	33·24
Al_2O_3	15·6	15·8	11·5	13·7	21·53
Total Fe as Fe_2O_3	10·6	1·5	14·7	12·3	3·23
MgO	5·7	1·0	2·1	1·9	0·72
CaO	10·4	2·2	1·6	1·6	2·36
Na_2O	3·2	6·2	8·2	3·8	0·13
K_2O	0·6	2·2	0·8	3·4	0·07
Ignition loss	0·7	14·3	16·4	23·0	35·69
TiO_2	1·7	0·8	1·4	—	2·73
P_2O_5	—	—	—	—	0·25
MnO	tr.	tr.	tr.	2·5	0·09
Cl	—	—	—	—	tr.
S	—	—	—	—	Nil.
Cr_2O_3	—	—	—	—	tr.
BaO	—	—	—	—	0·10
Li_2O	—	—	—	—	tr.
	100·0	100·0	100·0	100·0	100·14

	I	II	III	A	IV
FeO	8·9	tr.	1·4	—	—
H_2O below 105°	0·3	5·0	7·3	—	24·65
CO_2	—	—	—	—	0·22
C	—	—	—	—	0·60

+ by difference

I Yellow glass separated from 'palagonite' tuff, n= 1·595, Creag Mor, Skye

II Colourless glass from 'palagonite' tuff, n = 1·476 Camas Ban

III Brown partly devitrified glass from 'palagonite' tuff, Camas Ban

A Palagonite, 2,350 fathoms Pacific Ocean, lat. 13° 28′ S. long. 149° 30′ W. (Peacock, 1930).

IV Interbasaltic deposit, 10 in thick, in Tertiary lavas, Stream 1500 yd S.E. of Blackhill (Edinbain), Skye.

Analysts: I-III, A. D. Wilson (semi-micro methods), Geological Survey and Museum, Lab. Nos. 1740 (1958), 1712, 1713 (1956); A. Sipöcz, recalculated by Peacock; IV, G. A. Sergeant, Geological Survey and Museum, Lab. No. 1086 (1943); Guppy and Sabine 1956, p. 28.

(Table 1) Analyses of palagonite, glass and tuff.

TABLE II

ANALYSES AND NORMS OF SIDEROMELANE, PILLOW LAVA AND THOLEIITIC BASALTS

Analysis	I	V	VA	B	C
SiO_2	52·0	42·30	47·6	47·35	49·76
Al_2O_3	15·6	14·24	15·8	13·90	14·42
Fe_2O_3	0·7	3·87	4·3	5·87	3·95
FeO	8·9	5·49	6·2	8·96	7·77
MgO	5·7	4·42	5·0	5·97	5·30
CaO	10·4	16·76	12·5	10·65	10·22
Na_2O	3·2	2·40	2·7	2·73	2·49
K_2O	0·6	0·27	0·3	0·54	1·83
H_2O+	0·9	1·22	1·3	1·16	1·03
H_2O-	0·3	1·69	1·9	1·04	2·04
TiO_2	1·7	1·57	1·8	1·75	0·94
P_2O_5	—	0·18	0·2	0·24	0·21
CO_2	—	5·07	—	0·32	0·06
S	—	0·09	—	0·23	—
FeS_2	—	—	—	—	0·04
Cr_2O_3	—	0·04	—	—	—
BaO	—	0·07	—	—	0·04
MnO	tr.	0·24	0·3	0·23	0·20
	100·0	99·92	99·9	100·94	100·30
Norm					
Q	—	1·92	2·1	1·08	0·48
or	3·3	1·67	1·9	2·78	10·56
ab	27·3	20·44	23·1	23·06	20·96
an	26·4	26·97	30·5	24·19	22·80
di- wo	10·6	9·74	11·2	10·67	11·14
di- en	5·4	6·60	7·5	6·50	6·10
di- fs	4·9	2·38	2·7	3·56	4·62
di-	20·9	18·72	21·4	20·73	21·86
hy- en	8·8	4·50	5·1	8·40	7·20
hy- of	8·2	1·85	2·1	4·62	5·28
hy-	17·0	6·35	7·2	13·02	12·48
mt	0·9	5·57	6·3	8·58	5·80
il	3·2	3·04	3·4	3·34	1·67
ap	—	0·34	0·4	0·34	0·34
ca	—	11·50	—	0·70	0·10
py	—	0·30	0·3	0·73	—
rest	1·2	3·02	3·4	2·20	3·15
Feldspar	$Or_6Ab_{48}An_{46}$	$Or_3Ab_{42}An_{55}$		$Or_6Ab_{46}An_{48}$	$Or_{10}Ab_{38}An_{42}$

I Sideromelane from 'Palagonite' Tuff, Camas Ban, Skye
V Pillow lava, Creag Mor, Skye
VA —do—, analysis recalculated free of calcite
B Type Salen tholeiite
C Type Staffa basalt

Analysts: I. A. D. Wilson, Geological Survey Lab. No. 1740 (1958)
V. A. D. Wilson and P. Coombs, Lab. No. 1645 (1954) Guppy and Sabine 1956, p. 28
B. F. R. Ennos, Lab. No. 407 } Bailey and others
C. E. G. Radley, Lab. No. 669 } 1924, p. 17.

(Table 2) Analyses and norms of sidermelane, pillow lava and tholeiitic basalts.

TABLE III

Lava Types in Northern Skye

	Symbol One-inch map	*Slices*
1. *Hebridean Type of olivine-phyric olivine-basalt*, with ophitic or intergranular augite which may be yellow, pale brown, purple, faintly green or colourless in thin section. Composition of the feldspar in the range An_{55} to An_{70}. Mesostasis of zeolites, especially analcime, thomsonite, chabazite, generally present. Feldspars not exceeding 0·5 mm average length.	B^{He}	214
2. *Vaternish Hebridean Type olivine-phyric olivine-dolerite*, composition similar to Hebridean type but plagioclases average over 0·5 mm long.	B^{V}	42
3. *Feldspar-phyric olivine-basalt*, olivine and labradorite phenocrysts generally of microporphyritic dimensions, (i.e. less than 2 mm), in a groundmass of composition similar to the Hebridean type.	fB	44
4. *Mugearite*, dark grey, platy weathering trachybasalt, composed of olivine, oligoclase, orthoclase, clinopyroxene and iron-titanium oxides, normally exhibiting trachytic texture.	W^{M}	69
5. *Big-feldspar mugearite*, macroporphyritic mugearite basalt, with large phenocrysts of labradorite—bytownite in a mugearite groundmass.	fW^{M}	23
6. *Trachyte*, pale grey or white trachyte containing a few alkali-feldspar and ferromagnesian phenocrysts in a groundmass of alkali feldspar laths; shows trachytic texture.	T	14

(Table 3) Lava types in Northern Skye.

TABLE IV

ANALYSIS OF HEBRIDEAN BASALT, AMYGDALOID AND BOLE

	VI	VII	VIII	D	E
SiO_2	45·99	42·40	34·27	46·12	44·15
Al_2O_3	14·65	14·66	19·72	15·46	15·49
Fe_2O_3	2·23	8·82	18·55	3·85	7·57
FeO	9·80	4·92	0·82	6·51	2·57
MgO	9·46	8·33	5·05	10·12	6·36
CaO	8·68	8·40	6·48	10·66	9·08
Na_2O	2·83	2·60	1·70	1·48	2·01
K_2O	0·46	0·30	0·32	0·65	0·31
$H_2O > 105°$	2·34	3·68	6·31	2·38	5·80
$H_2O > 105°$	1·38	3·76	3·51	1·01	4·90
TiO_2	1·90	2·09	2·71	1·37	1·35
P_2O_5	0·20	0·21	0·20	0·06	0·08
MnO	0·19	0·15	0·20	0·21	0·20
CO_2	tr.	tr.	0·01	—	—
S	0·02	0·01	tr.	tr.	—
Cr_2O_3	0·05	0·03	0·03	—	—
NiO	0·01	0·01	0·02	—	—
BaO	0·01	0·01	0·01	—	—
SrO+	0·03	0·03	0·07	—	—
Li_2O	nt. fd.	nt. fd.	nt. fd.	—	—
	100·23	100·41	99·98	99·88	99·87

+ Spectrographic determinations.

VI Massive centre of 2nd Lava, Creag Mor, of Beal Point, Rubha na h'Airde Glaise, Skye.
VII Upper Amygdaloid of 2nd Lava, same locality.
VIII Bole above 2nd Lava, same locality.
D Middle part of lava flow, Island Magee, Antrim.
E Vesicular, zeolitic, upper part of lava flow, Island Magee, Antrim.

Analysts: VI, VII, VIII, W. F. Waters and K. L. H. Murray, Geological Survey Lab. Nos. 1577, 1578, 1579, (1951), Guppy and Sabine 1956, pp. 27, 28. D, E, W. H. and F. Herdsman *in* Tomkeieff, 1934, p. 502.

(Table 4) Analysis of Hebridean basalt, amygdaloid and bole.

TABLE V

MINERALS IN LAVAS EXPOSED AT THE STORR AND RUBHA NA H-AIRDE GLAISE
(One-inch Sheet 80, six-inch Sheet Skye 18 N.W.)

Lava No.	Slice No.	Symbol One-inch map	Olivine % Fa	Plagioclase % An	Mode, Wt % Ol	Py	Pl	Mt	Ch	Z
S										
24	37922	W[M]	32–35	32–20	2	23	48	25	1	—
23	37921	oB	24–30	55–30						
22	37919	oB	19–20	54–48						
21	37918	oB	19–24	68–57						
20	37917	oB	18	69–55						
19	37916	oB	18	66–52						
17	37915	oB	25	64–57						
16	37914	oB	18							
15	37913	Bc		70–62						
14	37912	Bc	20	70–						
13	37911	oB		66–						
12	37909	oB		65–55	5	28	43	7	16	1
11	37908	oB	13–20	66–	24					
10	37907	fB		68–58	1	17	27	8	37	10
9	37906	oB	18–20	70–58	16	31	35	15	2	—
8	37905	oB	16–20	66–	23	29	33	10	3	2
7	37904	oB	19	70–55	13	25	44	11	1	6
6	37903	oB	18–20	67–60	19	25	36	9	11	—
5	37902	fB	19–25	75–65						
4	37900	oB	19–20	67–	14					
3	37899	oB+	19–26	45–20	14					
2	37898	oB	20–25	65–	19	25	40	9	6	—
1	37896	oB	21–25	68–	5	23	53	6	13	—
R										
6	37975	oB	24	56–	17	32	34	6	—	11
5	37974	oB	18–24	64–	14	24	48	10	—	4
4	37973	oB	17–		18	24	39	11	—	8
3	37970	oB	18–21	60–	15	20	48	14	—	3
1	37968	oB	18	55–	20	19	50	5	—	6

R = Cliff section ½ mile N. of Rudha na h'Airde Glaise.
S = Storr; nos. 1-13 in cliff S. of Coire Faoin; nos. 14-24 in southermost gully on main east face.

Under mode the symbols used are as follows (figures in brackets assumed densities): Ol–olivine (3·3); Py–pyroxene (3·3); Pl–plagioclase (2·7); Mt–titanomagnetite (5·0); Ch–chlorite (2·6); Z–zeolites (2·1).

(Table 5) Minerals in lavas exposed at the Storr and Rubha na h-Airde Glaice (One-inch Sheet 80, six-inch Sheet Skye 18 N.W.). .

TABLE VI

ANALYSES AND NORMS OF HEBRIDEAN TYPE BASALTS, SKYE

Analysis	VI	IX	F	G	H
SiO_2	45·99	46·12	46·61	46·38	45·68
Al_2O	14·65	13·94	15·22	16·77	14·66
Fe_2O_3	2·23	1·95	3·49	3·22	2·88
FeO	9·80	10·46	7·71	8·03	9·67
MgO	9·46	11·08	8·66	8·83	9·82
CaO	8·68	9·05	10·08	10·68	9·37
Na_2O	2·83	3·11	2·43	1·94	2·14
K_2O	0·46	0·57	0·67	0·10	0·19
H_2O+	2·34	1·49	2·07	2·46	3·43
H_2O-	1·38	0·40	1·10	0·37	0·36
TiO_2	1·90	1·81	1·81	1·04	1·65
P_2O_5	0·20	0·23	0·10	0·08	0·07
MnO	0·19	0·18	0·13	0·24	0·22
CO_2	tr.	—	tr.	nil	nil
S	0·02	—	—	—	—
Cr_2O_3	0·05	—	tr.	—	—
NiO	0·01	—	tr.	—	—
BaO	0·01	—	—	—	—
SrO	0·03	—	—	—	—
	100·23	100·39	100·08	100·14	100·14
Specific Gravity			2·87	2·84	2·97
Norm					
or	2·8	3·3	3·9	0·6	1·1
ab	23·6	21·0	20·4	16·2	17·7
an	28·8	22·4	28·6	37·0	30·1
ne	—	2·8	—	—	—
di wo	6·8	9·3	8·6	6·4	6·6
di en	4·1 } 13·3	5·7 } 18·0	5·7 } 16·5	4·0 } 12·4	4·1 } 12·8
di fs	2·4	3·0	2·2	2·0	2·1
hy en	3·1 } 5·0	—	6·9 } 9·7	11·8 } 17·6	10·2 } 15·7
hy of	1·9		2·8	5·8	5·5
ol fo	11·5 } 18·6	15·4 } 24·3	6·2 } ·89	4·3 } 6·8	7·1 } 11·2
ol fa	7·1	8·9	2·7	2·5	4·1
mt	3·3	2·9	5·1	4·6	4·2
il	3·5	3·5	3·5	2·0	3·2
ap	0·3	0·3	0·3	0·3	0·2
Feldspar	$Or_5Ab_{43}An_{52}$	$Or_7Ab_{45}An_{48}$	$Or_7Ab_{32}An_{61}$	$Or_1Ab_{30}An_{69}$	$Or_2Ab_{36}An_{62}$

KEY TO TABLE VI

VI Olivine-basalt, Creag Mor, cliff W. of Beal Point, Rubha na h'Airde Glaise, Skye. Analysts: W. F. Waters and K. L. H. Murray, Geological Survey Lab. No. 1577 (1950), Guppy and Sabine 1956, p. 27.

(Table 6) Analyses and norms of Hebridean type basalts, Skye.

TABLE VII

MINERALS IN LAVAS EXPOSED AT BIOD A'GHOILL, SCORE HORAN, VATERNISH

Lava No.	Thickness Ft.	Slice No.	Symbol one-inch map	Mode, Wt per cent ol	py	pl	mt	ch
14		37993	W^M	15	13	53	19	—
13		37992	oB	20				
12		37991	oB	13				
11		37990	oB	26				
9	25	37987	oB	28				
8	28	37986	oB	13				
7	36	37985	oB	19				
6	25	37984	oB	13	35	38	4	10
5	44	37983	fB	11	29	44	13	3
4	24	37982	oB	33				
2	56	37979	oB	17				

(Table 7) Minerals in lavas exposed at Biod a'Ghoill, Score Horan, Vaternish.

TABLE VIII

ANALYSES OF MUGEARITES AND TRACHYTE

Analysis	J	X	K	L	XI
SiO_2	47·51	48·12	49·68	58·64	66·13
Al_2O_3	16·99	16·30	16·99	16·38	16·03
Fe_2O_3	3·31	4·90	3·45	3·05	3·17
FeO	10·60	9·11	8·99	4·91	0·70
MgO	4·23	3·80	2·79	1·06	0·84
CaO	6·48	5·97	5·46	2·90	1·45
Na_2O	5·01	5·69	5·78	6·07	5·34
K_2O	0·70	0·74	1·90	3·49	4·82
H_2O+	1·24	1·01	1·77	0·55	0·36
H_2O-	0·55	0·77	0·34	0·99	0·43
TiO_2	2·85	2·74	2·13	0·89	0·61
P_2O_5	0·53	0·56	0·48	0·66	0·08
MnO	0·20	0·20	0·27	0·18	0·10
CO_2	—	—	—	—	—
F	—	—	0·23	—	—
S	—	tr	—	—	—
Cr_2O_3	—	tr	—	—	—
NiO	—	tr	—	—	—
BaO	—	0·02	0·12	0·13	—
SrO	—	0·05*	—	—	—
Cl	—	—	0·02	—	—
	100·20	99·98	100·40	99·90	99·77

* spectrographical determination.

Specific Gravity

Norm					
Q	—	—	—	2·16	12·12
or	3·89	3·89	11·12	20·94	28·73
ab	38·25	42·97	38·90	51·35	45·06
an	21·96	17·24	14·46	6·95	5·28
ne	2·27	2·56	5·61	—	—
di wo	2·90	3·71	3·25	1·39	0·12
di en	1·35 (5·76)	1·90 (7·33)	1·30 (7·53)	0·40 (2·85)	0·09 (0·22)
di fs	1·51	1·72	1·98	1·06	0·01
hy en	—	—	—	2·20	2·01
hy of	—	—	—	4·36 (6·56)	0·25 (2·26)
Ol fo	6·47	5·32	3·99	—	—
Ol fa	8·41 (14·88)	5·20 (10·52)	6·68 (10·67)	—	—
ac	—	—	—	—	3·20
mt	4·87	7·10	4·98	4·41	1·37
il	5·32	5·17	4·10	1·67	0·67
ap	1·34	1·34	1·34	1·68	—
fl	—	—	0·35	—	—
Normative or	6	6	18	27	37
ab	60	67	60	64	57
feldspar an	34	27	22	9	6

(Table 8) Analyses of mugearites and trachyte.

TABLE IX

Analysis of Porphyritic Mugearite

	M	MK	MD	PC
SiO_2	50·33	49·26	48·5	50
Al_2O_3	19·97	21·42	15·2	18
Fe_2O_3	2·81	4·06	4·2	9
FeO	6·23	4·78	9·4	
MgO	3·24	2·02	4·8	5
CaO	8·03	8·60	6·0	10
Na_2O	4·30	4·40	4·1	2·5
K_2O	1·19	1·40	1·8	0·4
H_2O+	0·99	1·07	1·5	
H_2O-	0·87	0·72	1·3	
TiO_2	1·81	1·22	2·7	
P_2O_5	0·17	0·98	0·3	
MnO	0·17	0·19	0·2	
BaO	0·06	—		
S	nt. fd.			
	100·17			

(Table 9) Analysis of porphyritic mugearite.

TABLE X

ANALYSES OF DOLERITES AND RELATED ROCKS

	N	O	P	Q	R	S	T	U
SiO_2	40·47	40·62	45·07	46·97	47·51	47·83	43·49	50·04
Al_2O_3	5·96	8·93	14·43	15·00	17·28	15·31	14·57	14·27
Fe_2O_3	2·10	0·57	0·80	1·71	3·56	1·15	5·62	3·76
FeO	12·32	12·61	10·69	8·94	5·77	9·22	7·40	6·33
MgO	29·32	26·31	14·61	10·52	5·98	6·60	5·32	5·99
CaO	4·91	5·64	9·74	10·70	11·47	12·38	11·61	12·11
Na_2O	1·18	1·32	1·75	2·18	2·60	2·53	2·92	3·41
K_2O	0·40	0·13	0·34	0·63	0·79	0·40	0·92	0·83
H_2O+	1·12	2·19	1·05	0·38	1·40	1·28	3·58	0·79
H_2O-	0·59	0·61	0·35	0·63	1·30	0·28	1·39	0·40
TiO_2	1·50	0·82	0·83	1·59	1·80	2·86	2·95	1·89
P_2O_5	0·26	0·15	0·10	0·12	0·12	0·16	0·40	0·24
MnO	0·23	0·39	0·33	0·37	0·13	0·36	0·12	0·28
BaO	—	—	0·01	—	—	—	—	—
CoO NiO	—	0·03	0·02	—	—	0·02	—	—
CO_2	—	0·03	0·02	—	—	0·05	—	—
Cl	—	0·01	—	—	—	0·01	—	—
	100·36	100·36	100·14	99·72	99·71	100·44	100·29	100·34

N. Picrite, top of cliff W. of Camas Mor; analyst N. Sahlbom *in* Walker 1932, p. 247.

O. Picrite, S. face of Garbh Eilean, Shiant Is., by the shingle beach; analyst E. G. Radley *in* Walker 1930, pp. 371-2.

P. Olivine-dolerite (picrodolerite of present account), Garbh Eilean 30 ft above the beach; analyst E. G. Radley *in* Walker 1930, pp. 371-2.

Q. Olivine-dolerite (" normal dolerite "), just S. of mid-point of S.W. shore. Fladda-chuain, analyst N. Sahlbom *in* Walker 1931, p. 757.

R. Olivine-dolerite (" normal dolerite "), Loch Mealt near Waterfall, 80 ft above lower contact; analyst, N. Sahlbom *in* Walker 1932, p. 245.

S. Crinanite, Garbh Eilean, 125 ft above the beach; analyst, E. G. Radley, *in* Walker 1930, pp. 371-2.

T. Teschenite, Ben Volovaig, half way up slope; analyst, N. Sahlbom *in* Walker 1932, p. 249.

U. Pegmatitic dolerite, Fladda-chuain, N. end; analyst N. Sahlbom *in* Walker 1931, p. 760.

(Table 10) Analyses of dolerites and related rocks.

TABLE XI

Norms and Modes of Dolerites and Related Rocks

Norms	N	O	P	Q	R	S	T	U
or	2·2	0·6	1·7	3·3	4·5	2·2	5·6	5·0
ab	4·7	3·3	14·7	17·8	22·0	21·0	19·2	28·8
an	10·0	20·8	30·6	29·8	33·4	29·5	23·9	20·9
ne	2·8	4·1	—	—	—	—	2·7	—
di	9·9	5·7	13·5	18·2	18·5	25·4	24·7	29·6
hy	—	—	0·8	5·9	7·8	6·2	—	7·6
ol	62·3	61·5	33·9	17·8	2·2	7·1	4·1	3·3
il	2·9	1·5	1·5	3·0	3·5	5·5	5·6	3·7
mt	3·0	0·6	1·2	2·6	5·1	1·9	8·1	5·3
op	0·7	0·3	0·3	0·3	0·3	0·3	1·0	0·4
Normative Or			4	6	7	4		9
Plagioclase Ab			31	35	37	40		53
An			65	59	56	56		38
Modes								
Olivine	66	59*	31*	18	9½	12*	7½	—
Augite	14	10	17	23	23½	24	22	27½
Plagioclase	17½	26	50	51½	60½	60	46	52½
Titanomagnetite	2½	2	2	6½	5	3	11½	8
Zeolites	—	3	—	1	1½	1	12	12
Apatite	—	—	—	—	—	—	1	—

* It is not certain that these correspond with the analysed specimens though they are from the same localities.

(Table 11) Norms and modes of dolerites and related rocks./p>.

TABLE XII

The Dykes of North Skye

Rock-Type	*On One-inch map*	*No. of Slices*
Normal olivine-dolerite and basalt	K^D	21
Normal crinanitic variants	K^C	43
Picritic dolerite [Picrite on map]	fU°	7
Mugearite, including feldspar-phyric types	X^M	12
Variolite	vK	6
Leidleite	P^L	1
Trachyte	O^T	1
Feldspar-phyric dolerite and basalt, including crinanitic variants [Dolerite, basalt or Tholeite (unclassed)]	K^D	32
Allivalite, olivine-eucrite [E′gabbroic (unclassed)]	U^A, E′	15
Tholeiitic dolerite and basalt	K^T	29
Tholeiitic feldspar-phyric dolerite and basalt	K^T	13

(Table 12) The dykes of North Skye./p>.

TABLE XIII

ANALYSES AND NORMS OF ALLIVALITE AND EUCRITE

	V	XII	Y	Z
SiO_2	47·33	44·95	48·28	47·28
Al_2O_3	20·08	24·02	20·38	21·11
Fe_2O_3	0·55	0·93	1·78	3·52
FeO	3·24	4·07	6·70	3·91
MgO	12·53	9·43	7·93	8·06
CaO	14·47	13·70	11·80	13·42
Na_2O	1·34	1·21	1·75	1·52
K_2O	0·07	0·11	0·14	0·29
H_2O+	0·21	1·27	0·76	0·53
H_2O-	0·14	0·48	0·09	0·13
TiO_2	0·15	0·13	0·23	0·28
P_2O_5	tr	0·02	0·02	tr
MnO	0·08	0·08	0·28	0·15
CO_2	—	tr	0·03	—
S	—	0·01	—	—
Cr_2O_3	0·18	0·05	—	—
NiO	—	0·01	—	—
BaO	—	0·01	—	—
SrO	—	0·02	—	—
Li_2O	—	nt. fd.	—	—
FeS_2	—	—	0·04	—
	100·37	100·50	100·21	100·20

Norms

	or	0·56		0·56		0·56		1·67	
	ab	11·32		9·96		14·67		12·58	
	an	48·93		59·77		47·54		50·04	
	ne	—		—		—		—	
di	wo	9·55	18·09	3·48	6·64	4·52	8·77	6·96	13·32
di	en	7·26		2·50		2·80		5·20	
di	fs	1·28		0·66		1·45		1·06	
hy	en	—		1·80	2·46	12·60	19·46	9·70	12·08
hy	fs	—		0·66		6·86		2·38	
ol	fo	16·70	19·96	13·44	17·52	3·08	5·12	3·64	4·66
ol	fa	3·26		4·08		2·04		1·02	
	mt	0·79		1·39		2·55		5·10	
	il	—		0·24		0·53		0·61	
	ap	—		0·04		0·04		—	
	cr	—		0·06		—		—	
	ca	—		—		0·07		—	
	py	—		·002		0·04		—	

Plagioclase $Or_1Ab_{19}An_{81}$ $Or_1Ab_{14}An_{85}$ $Or_1Ab_{23}An_{76}$ $OR_2Ab_{20}An_{78}$

(Table 13) Analyses and norms of allivalite and eucrite.

TABLE XIV

AVERAGE HEBRIDEAN BASALT, MUGEARITE AND TRACHYTE

	Basalt	*Mugearite*	*Trachyte*
SiO_2	47·2	51·2	63·9
Al_2O_3	15·5	17·6	16·3
Fe_2O_2	3·2	4·9	2·9
FeO	9·9	7·5	2·4
MgO	9·0	2·8	0·9
CaO	9·4	4·9	1·5
Na_2O	2·7	6·4	6·4
K_2O	0·5	1·7	4·8
TiO_2	2·2	2·3	0·6
P_2O_5	0·2	0·5	0·3
MnO	0·2	0·2	—

(Table 14) Average Hebridean basalt, mugearite and trachyte.

TABLE XV

CALCULATED COMPOSITIONS OF SUBTRACTED DIFFERENTIATES

Composition	(1) *Basalt to Mugearite*	(2) *Basalt to Trachyte*	(3) *Mugearite to Trachyte*
SiO_2	45·5	45·3	44·6
Al_2O_3	14·6	15·4	18·3
Fe_2O_3	2·4	3·2	6·0
FeO	10·9	10·7	10·2
MgO	11·6	9·9	3·8
CaO	11·3	10·3	6·6
Na_2O	1·2	2·3	6·4
K_2O	—	—	—
TiO_2	2·2	2·5	3·2
P_2O_5	0·1	0·2	0·2
MnO	0·2	0·2	0·2
Percentage Removed	70	89	66
Norm			
ab	10·0	19·4	34·1
an	34·5	31·8	21·1
ne	—	—	10·8
di wo	8·7	7·8	3·5
di en	5·4	4·7	1·7
di fs	2·8	2·6	1·7
hy en	11·6	4·4	5·5
hy of	5·8	2·4	5·6
ol fo	8·4	11·0	8·8
ol fa	4·7	6·3	6·1
mt	3·5	4·6	1·3
il	4·3	4·7	
ap	0·3	0·3	
Normative Feldspar	An_{78}	An_{62}	

(Table 15) Calculated compositions of subtracted differentiates.

TABLE XVI

Calculated Assimilation by Mugearite and Trachyte

Composition	*Basalt to Mugearite*	*Mugearite to Trachyte*	*Syenite, Eilean Mhuire Shiant*
SiO_2	53·0	68·7	
Al_2O_3	18·5	15·6	
Fe_2O_3	5·7	2·2	
FeO	6·5	0·5	
MgO	—	0·2	
CaO	2·9	0·2	
Na_2O	8·1	6·4	
K_2O	2·2	5·9	
TiO_2	2·3	—	
P_2O_5	0·6	0·2	
MnO	0·2	—	
Percentage Added	69	73	
Norm			
Q	—	10·0	—
or	12·8	35·0	25·6
ab	51·8	47·7	49·8
an	7·5	—	—
ne	9·1	—	4·0
ac	—	5·6	5·1
di wo	1·5	0·1	6·2
di en	—	0·05	
di fs	1·7	0·05	
ol fo	—	0·3	—
ol fa	1·6	0·4	—
mt	8·4	0·5	4·6
il	4·3	—	0·9
ap	1·3	0·3	1·0

(Table 16) Calculated assimilation by mugearite and trachyte.