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Figures

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(Figure 3) Section in An Sgriob Quarry, Corrie. 6. Red sandstone, with plant remains (Coal Measures and Millstone Grit). 5. Thin-bedded red sandy shale with ribs of sandstone, 7½ feet.) 4. Lens of coarse red gritty sandstone, 3¼ feet 3. Limestone with partings of shale, 14 feet. 2. Sandy red limestone, with shale partings thickness uncertain. 1. Red and grey shale, calcareous at top, 17 feet. 1–5 is carboniferous Limestone Series

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(Figure 6) Section along Burn B., one-third of a mile east of Cnoc Mòr, north of Glenashdale Wood 1. Quartz-dolerite and craignurite sills 2. Shales and marls 3. Quartzitic sandstone 4. Chocolate-coloured ferriferous sandstone 5. Thin-bedded red sandstone.

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(Figure 21) Section across North Arran Granite. For explanation of ornaments see Plate 3.

(Figure 22) Geological map of head of Glen (Gleann) Dubh, illustrating the detail of the eastern edge of the Central Ring Complex.

(Figure 23) Section across eastern edge of Central Ring Complex. 1. Lower Old Red Sandstone 2. Gabbro 3. Granite and granophyre, with 3a, veins and dykes 4. Granite-gabbro melanges, hybrid rocks, diorite and quartz-diorite 5. Felsite intrusion 6. Fault, with composite dykes of felsite and basalt.

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(Figure 25) Section along the Struey Water at Bennan Head. 1. Triassic sediments 2. Fine-grained basaltic contact rocks, with large enclosures of sediments, passing up into 3. Coarse hyper-sthene dolerite (increasing size of ornament denotes increasing grain-size) 4. Zone of coarse xenolithic rock with dolerite fragments in quartz-porphyry matrix 5. Quartz-porphyry.

(Figure 26) Section across composite dyke at Cleiteadh nan Sgarbh, half a mile north of Drumadoon Point. Basaltic margins 2. Quartz-porphyry with xenolithic contact against basalt 3. Felsite, banded and sheeted at contact with basalt.

(Figure 27) Section across dykes on eastern slope of Sgiath Bhàn, between Glen Dubh and Glen Ormidale, Brodick. 1. Massive quartz-felsite becoming banded and pitchstone-like on its northern edge against 2. Thin strip of sandstone and conglomerate 3. Basaltic dyke, chilled edges shown by size of stippling 4. New Red Sandstone sediments.

(Figure 28) Sketch map of exposures in main western headwater of the Lag a' Bheith, 2 miles south-south-west of Brodick Pier. 1. Felsite sill 2. Basalt dyke 3. Shattery basaltic intrusion 4. Pitchstone dykes 5. Crushed basalt dyke along fault 6. Marls, cornstones, and sandstones of the Trias.

(Figure 29) Junction of felsite against Triassic sediments, Sliddery Water, just above Glenrie Bridge. I. Felsite, with slabby jointing 2. Triassic sediments.

(Figure 30) Map of dykes on Tormore shore, based on the map by J. W. Judd (Quart. Journ. Geol. Soc., vol. xlix., 1893, p. 552). 1. Tholeiite-pitchstone composite dyke (Judd's No. I. dyke), composite at south end, but only pitchstone at north end 2. Tholeiite-pitchstone composite dyke (Judd's No. II. dyke) 3. Tholeiite-pitchstone composite dyke (Judd's No. III. dyke) 4. Composite dyke of quartz-porphyry and tholeiite (Judd's No. IV. dyke), described p. 201 5. Trench with indurated

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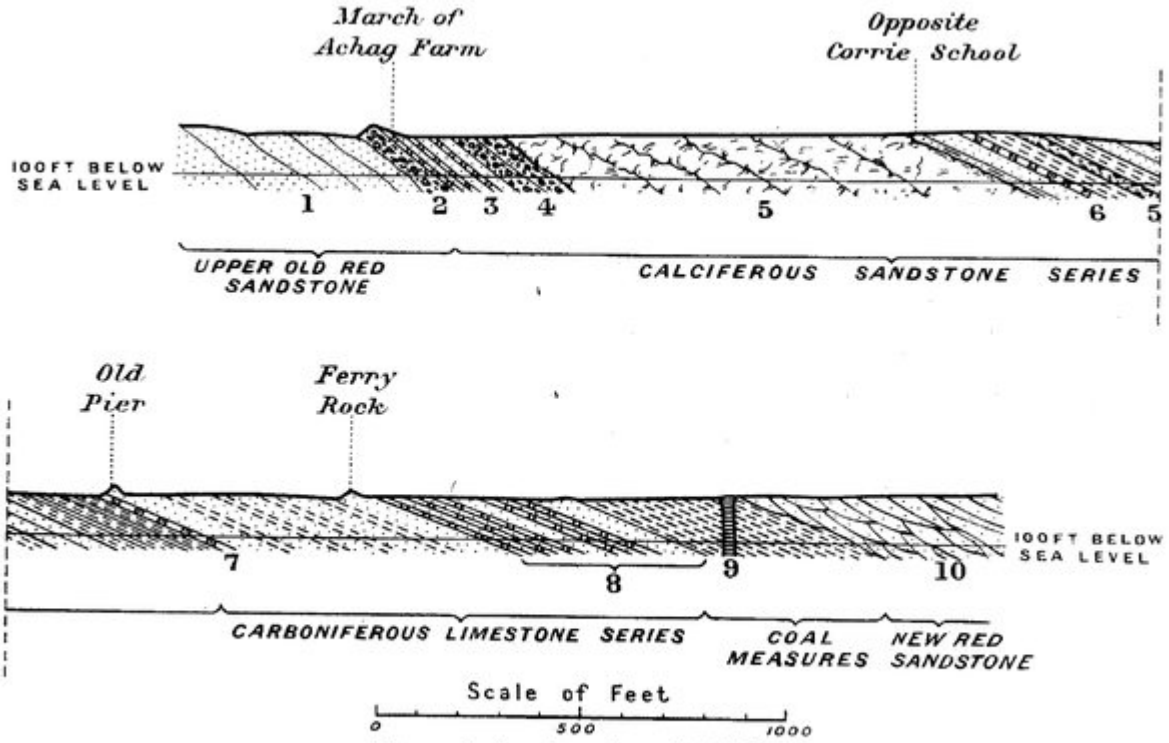

FIG. 1.—*Section along shore opposite Corrie.*

1. *Sandstones*; 2. *Conglomerate*; 3. *Cornstones*; 4. *Tuffs*; 5. *Lavas*; 6. *Limestone (red)*; 7. *Limestone ('Corrie')*; 8. *Upper Limestones*; 9. *Basalt*; 10. *Red Sandstone.*

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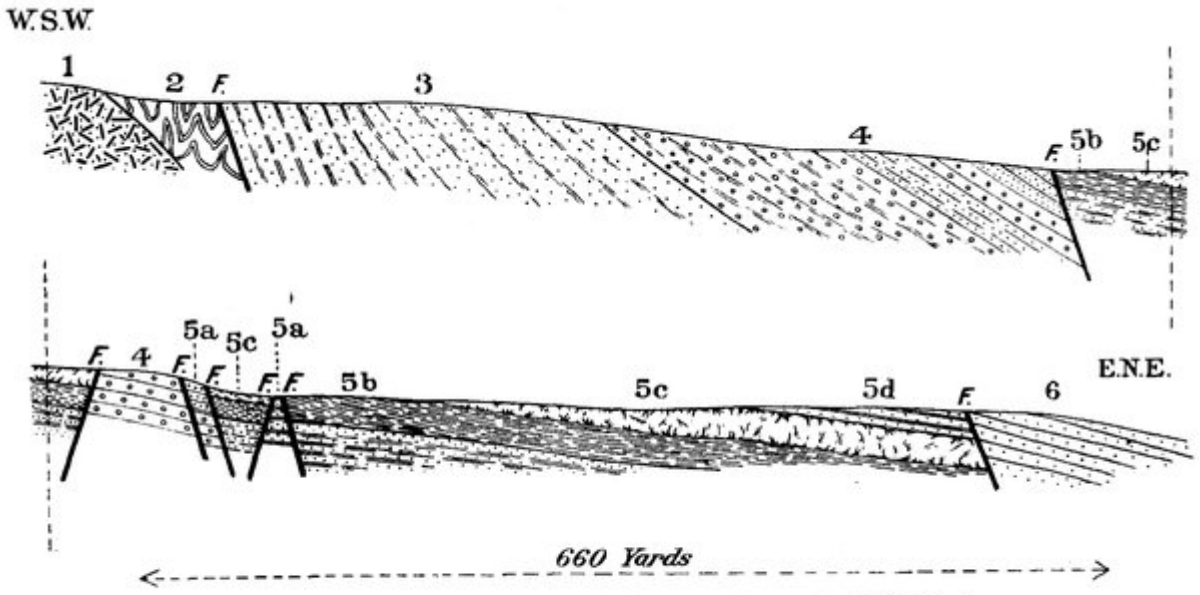

FIG. 2.—*Section along the Uisge nam Fear, half a mile south of High Corrie.*

1. *Granite*; 2. *Dalradian schists*; 3. *Lower Old Red Sandstone*; 4. *Upper Old Red Sandstone*; 5. *Calciferous Sandstone Series*; 5a. *Lower group of sandstones*; 5b. *Basaltic tuffs and red shales*; 5c. *Basalt lavas*; 5d. *Upper sandstones and marls*; 6. *New Red Sandstone (Corrie Sandstone)*; F. *Fault.*

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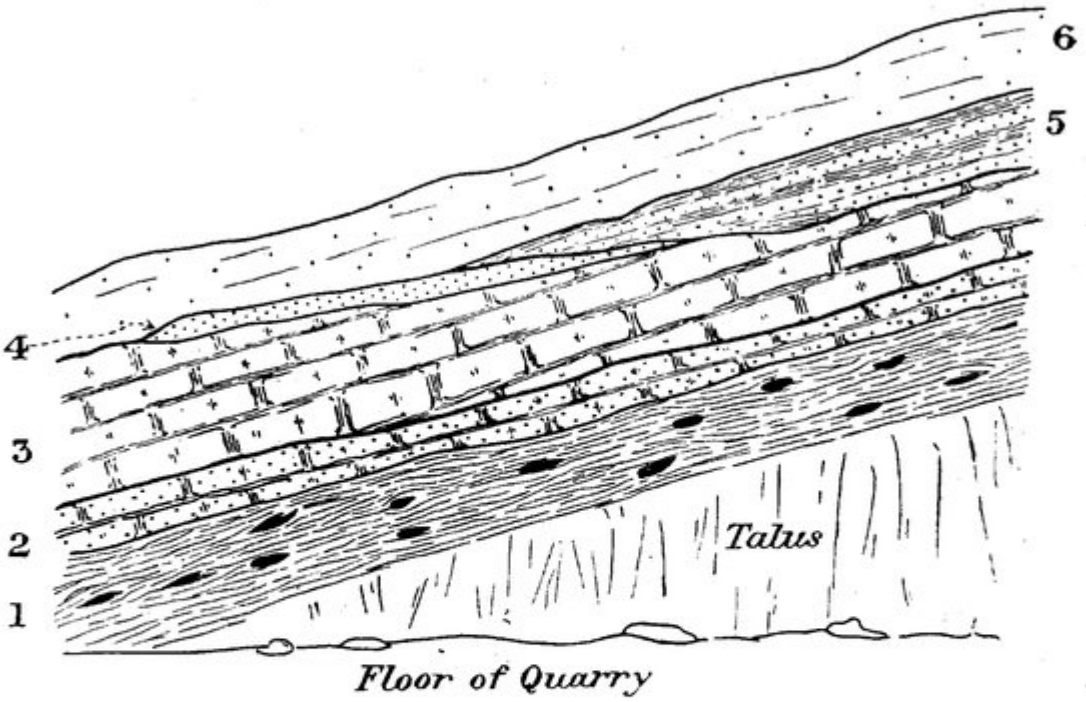

FIG. 3.—*Section in An Sgriob Quarry, Corrie.*

6. *Red sandstone, with plant remains (Coal Measures and Millstone Grit).*
5. *Thin-bedded red sandy shale with ribs of sandstone, 7½ feet.*
4. *Lens of coarse red gritty sandstone, 3¼ feet.*
3. *Limestone with partings of shale, 14 feet.*
2. *Sandy red limestone, with shale partings ; thickness uncertain.*
1. *Red and grey shale, calcareous at top, 17 feet.*

} *Carboniferous Limestone Series.*

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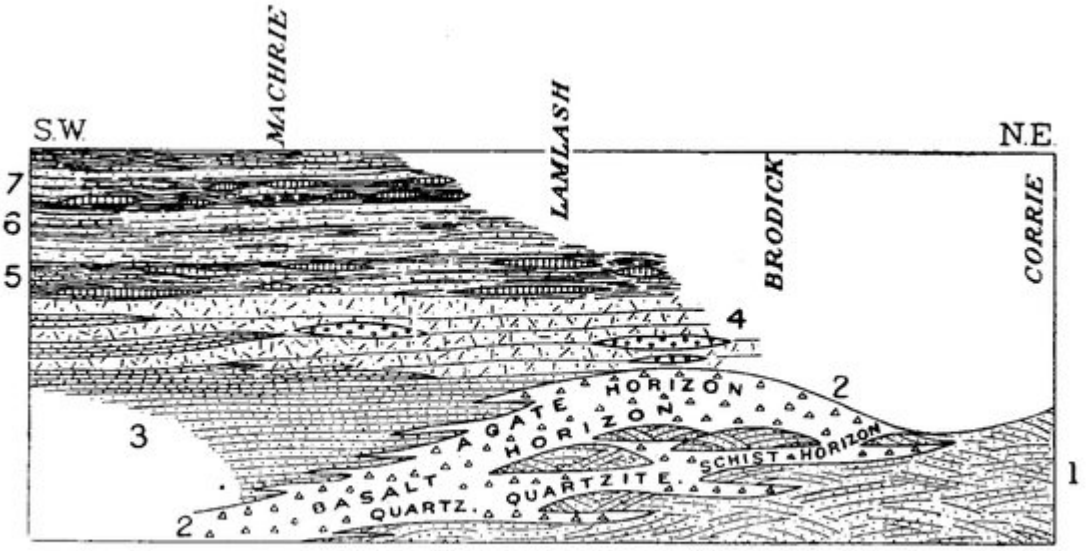

FIG. 4.—*Diagrammatic section showing the general structure and arrangement of the New Red Sandstone formations* (*c.f.* pp. 76–77)

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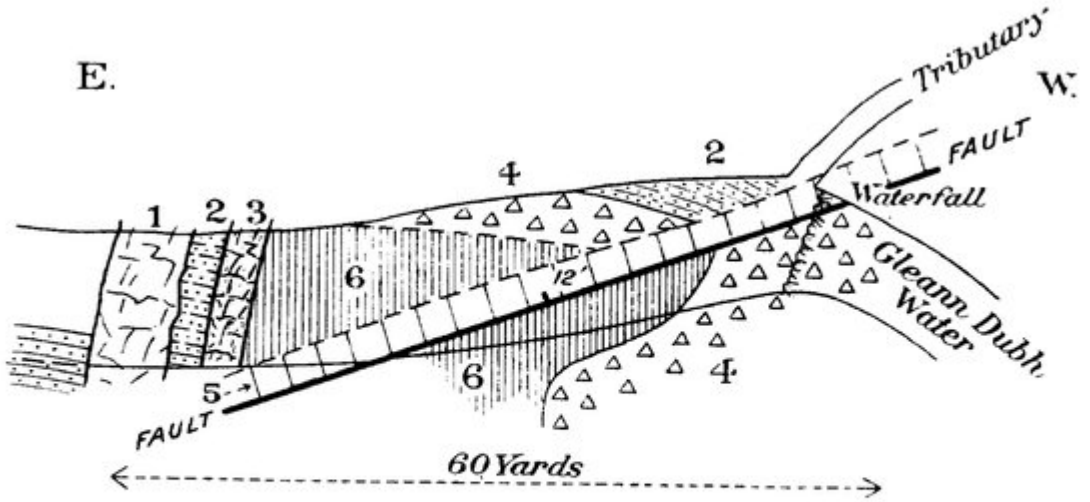

FIG. 5.—*Map of exposures in Gleann (or Glen) Dubh Water, one-eighth of a mile above confluence with Glen Ormidale.*

1. *Porphyritic basalt dyke*; 2. *New Red Sandstone*; 3. *Dyke of dense basalt*; 4. *New Red Sandstone volcanic breccia*; 5. *Crinanite dyke*; 6. *Felsite sill.*

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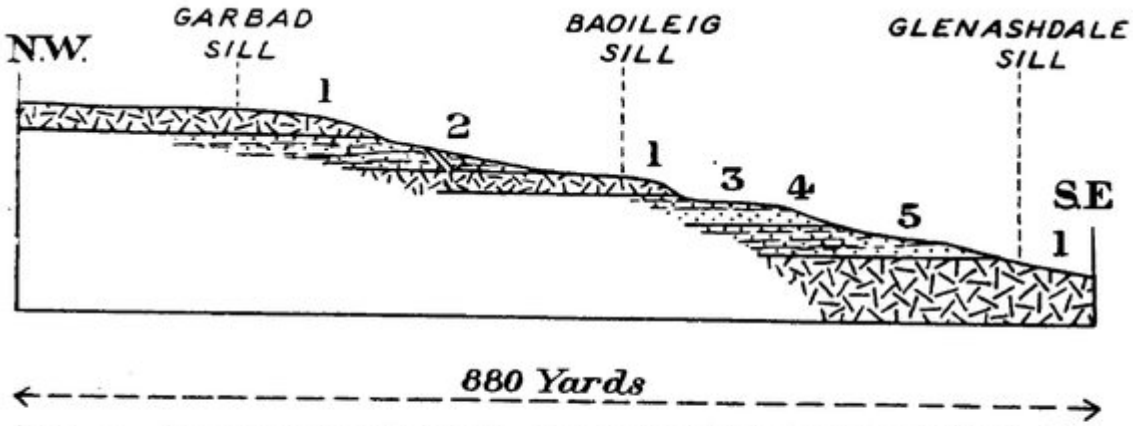

FIG. 6.—*Section along Burn B., one-third of a mile east of Cnoc Mòr, north of Glenashdale Wood.*

1. *Quartz-dolerite and craignurite sills*; 2. *Shales and marls*; 3. *Quartzitic sandstone*; 4. *Chocolate-coloured ferriferous sandstone*; 5. *Thin-bedded red sandstone.*

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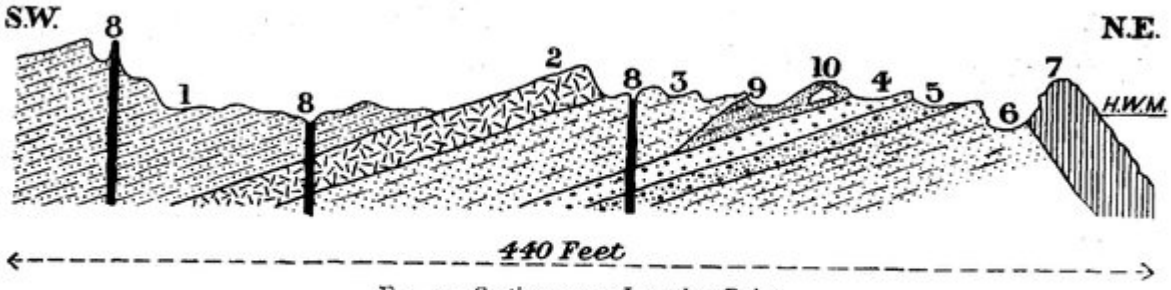

FIG. 7.—*Section across Largybeg Point.*

1. *Thin-bedded red sandstone ;* 2. *Quartz-dolerite sill ;* 3. *White sandstone ;* 4. *Coarse grit with bands of conglomerate ;* 5. *Conglomerate ;* 6. *Carious white sandstone ;* 7. *Thick dyke of craignurite-felsite ;* 8. *Basalt dykes ;* 9. *Line of local erosion ;* 10. *Rock-arch on raised beach.*

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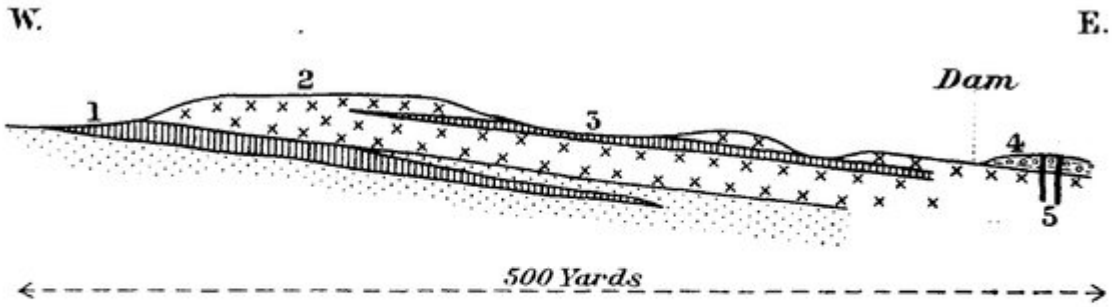

FIG. 8.—*Section along the Monamore Burn, west of Mill Dam.*

1. *Granophyre-felsite sill ;* 2. *Monamore crinanite sill ;* 3. *Felsite sill ;* 4. *New Red Sandstone conglomerate ;* 5. *Basaltic dykes.*

(Figure 8) Section along the Monamore Burn, west of Mill Dam. 1. Granophyre-felsite sill 2. Monamore crinanite sill 3. Felsite sill 4. New Red Sandstone conglomerate 5. Basaltic dykes.

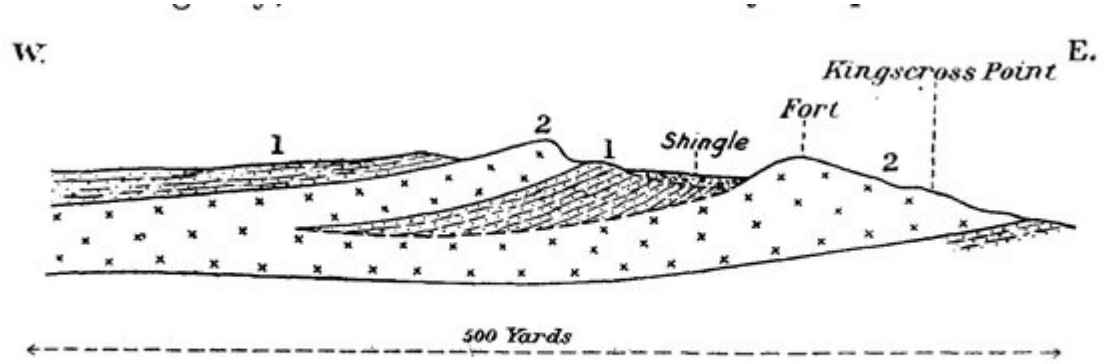

FIG. 9.—***Section across Kingscross Point, showing intercalation of sandstone*** (1) ***within the Kingscross crinanite sill*** (2).

(Figure 9) Section across Kingscross Point showing intercalations of sandstone (1) within the Kingscross crinanite sill (2).

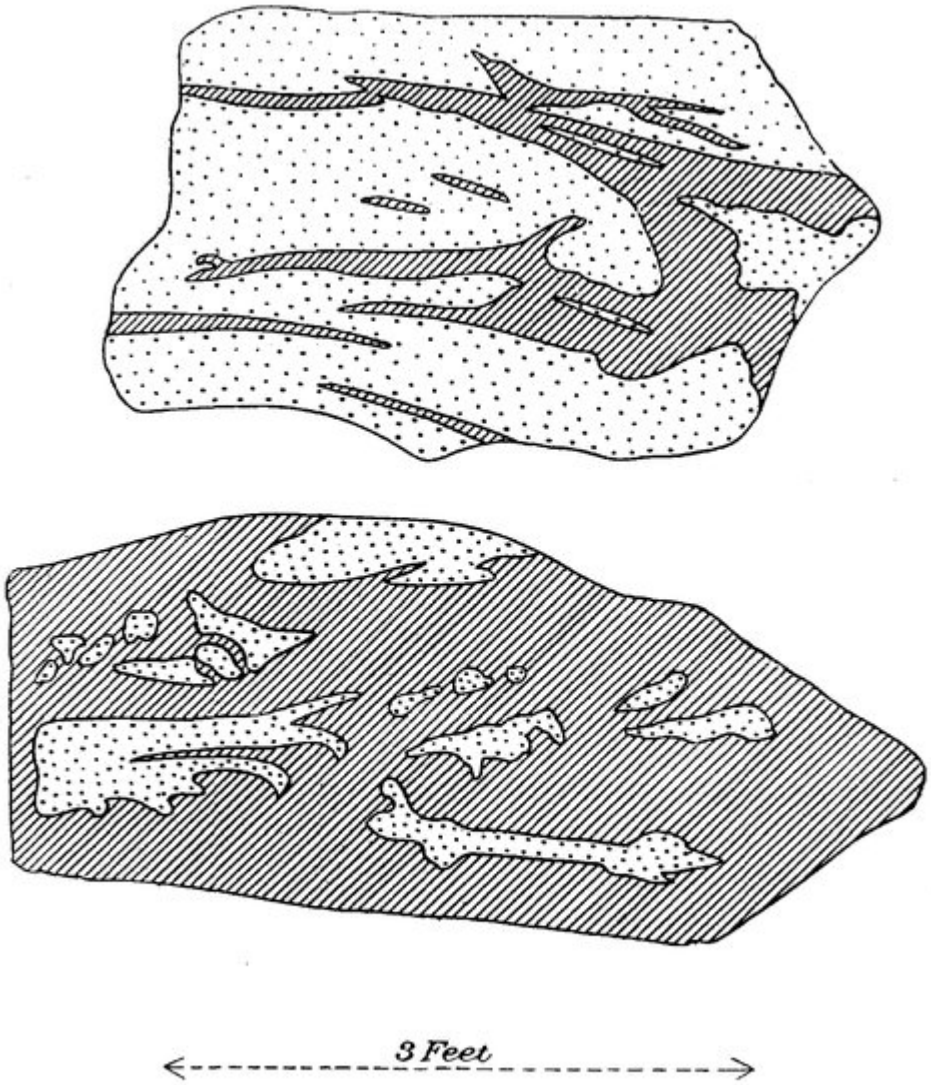

FIG. 10.—*Wave-washed surfaces of the Kingscross crinanite (dotted), showing its interpenetration by tachylytic basalt (line-shaded).*

(Figure 10) Wave-washed surfaces of the Kingscross crinanite sill (dotted), showing its interpenetration by tachylytic basalt (line-shaded).

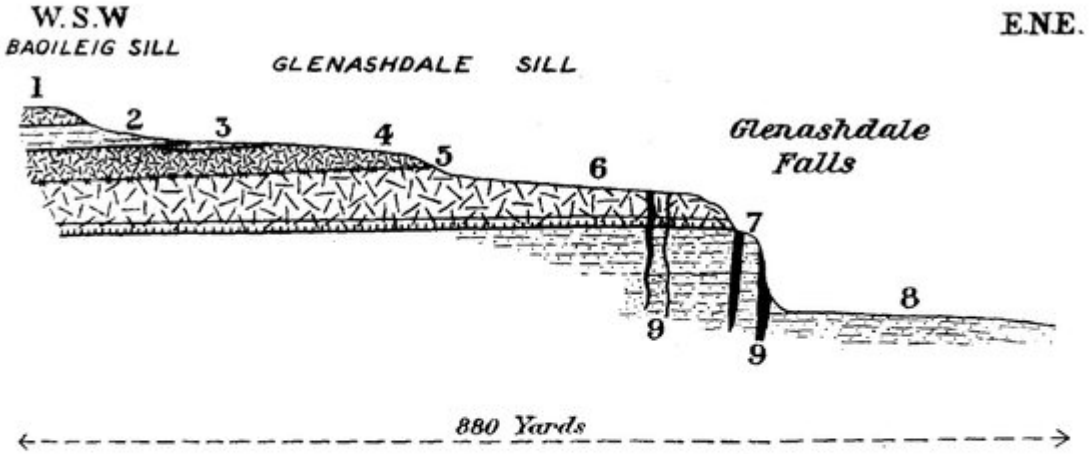

FIG. 11.—*Section along Glen Ashdale from the Falls to confluence with Baoileig Burn.*

1. *Quartz-dolerite ;* 2. *Shales and sandstones ;* 3. *Felsitic margin with intercalation of sandstone ;* 4. *Upper quartz-dolerite ;* 5. *Xenolithic interior contact ;* 6. *Lower quartz-dolerite ;* 7. *Felsitic margin ;* 8. *New Red Sandstone ;* 9. *Basalt dykes.*

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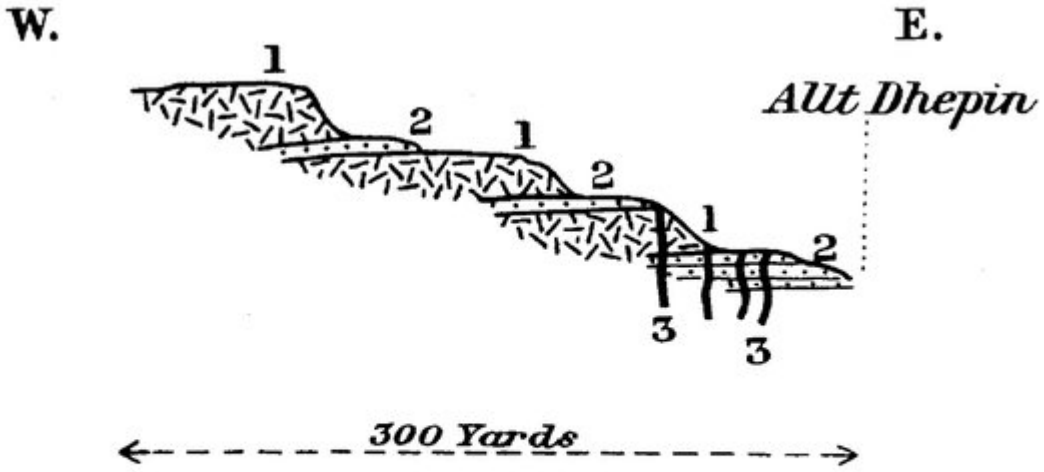

FIG. 12.—*Section along tributary to Allt Dhepin, north of Cnoc an Fheidh, showing intercalations of sandstone (2) within Garbad quartz-dolerite sill (1), and basaltic dykes (3). Vertical scale much exaggerated.*

(Figure 12) Section along tributary to Allt Dhepin, north of Cnoc an Fheidh, showing intercalations of sandstone (2) within Garbad quartz-dolerite sill (1), and basaltic dykes (3). Vertical scale much exaggerated.

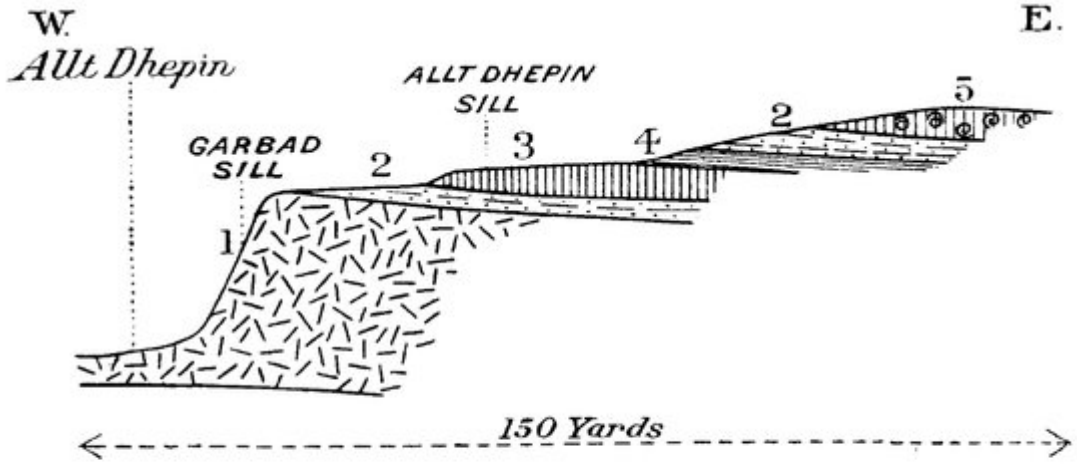

FIG. 13.—*Section in a gully entering the Allt Dhepin from the east, opposite 739 feet O.D.*

1. *Quartz-dolerite ; 2. Sandstone ; 3. Craignurite-felsite ; 4. Marls ; 5. Sill of spherulitic felsite. Vertical scale exaggerated.*

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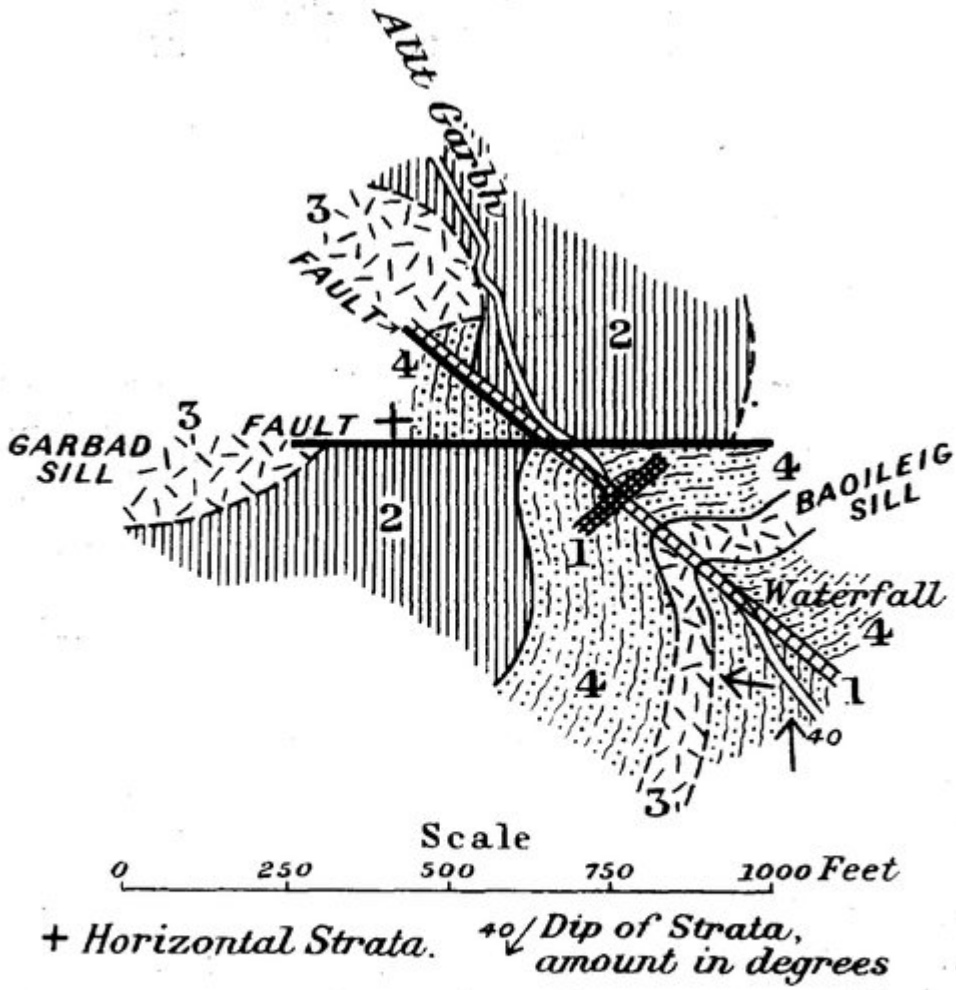

FIG. 14.—*Plan of exposures in Creag Bhan, Allt Garbh, Whiting Bay.*

1. *Basalt dyke ;* 2. *Felsite sill ;* 3. *Quartz-dolerite sills ;* 4. *Triassic sediments.*

(Figure 14) Plan of exposures in Creag Bhan, Allt Garbh, Whiting Bay 1. Basalt dyke 2. Felsite sill 3. Quartz-dolerite sills 4. Triassic sediments.

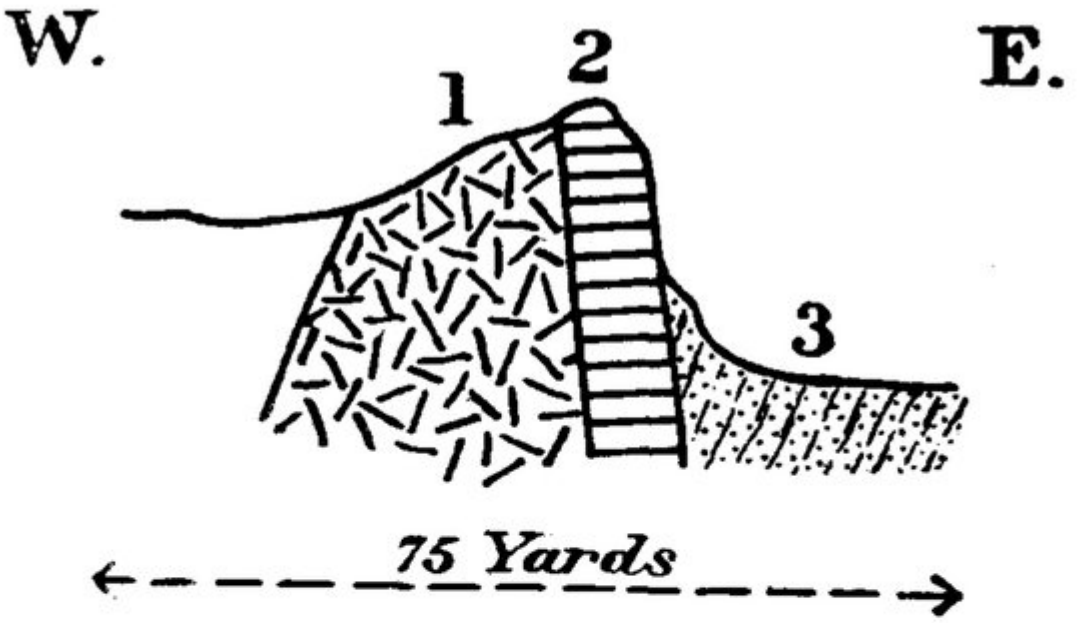

FIG. 15.—*Section in the Allt Crompucaidh, Largymeanoch, Whiting Bay.*

1. *Quartz-dolerite (Glenashdale Sill); 2. Basalt dyke; 3. New Red Sandstone. Vertical scale exaggerated.*

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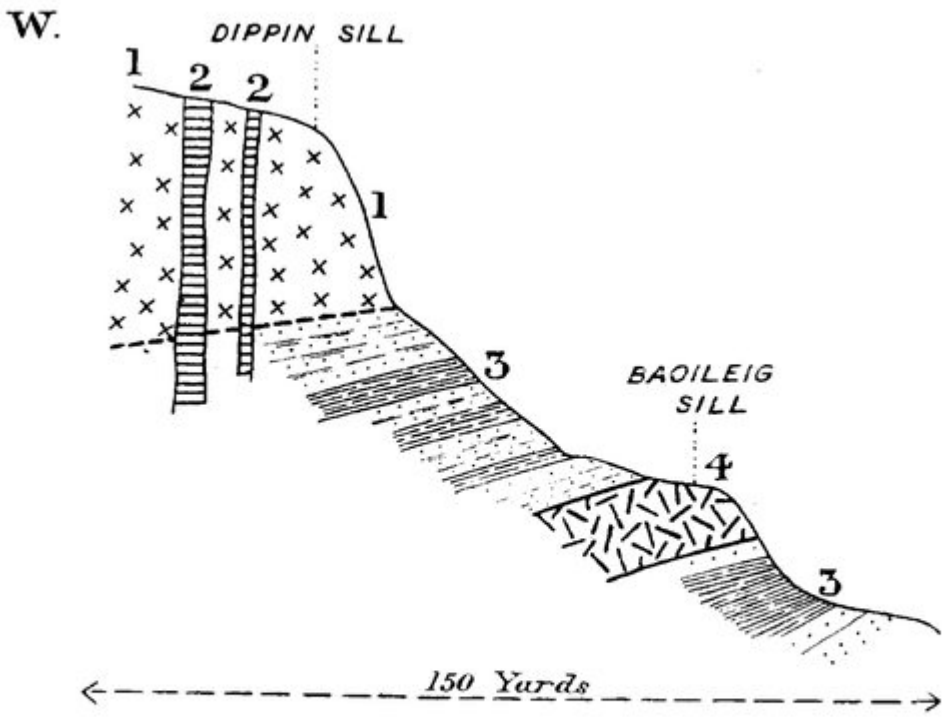

FIG. 16.—*Section in the southern headwater of the Allt Crompucaidh, Largymeanoch, Whiting Bay.*

1. *Dippin crinanite sill ; 2. N.N.W. Basalt dykes ; 3. Red Sandstones and shaly marls (New Red Sandstone) ; 4. Baoileig quartz-dolerite sill. Vertical scale exaggerated.*

(Figure 16) Section in the southern headwater of the Allt Crompucaidh, Largymeanoch, Whiting Bay. I. Dippin crinanite sill 2. N.N.W . Basalt dykes 3. Red Sandstones and shaly marls (New Red Sandstone) 4. Baoileig quartz-dolerite sill. Vertical scale exaggerated.

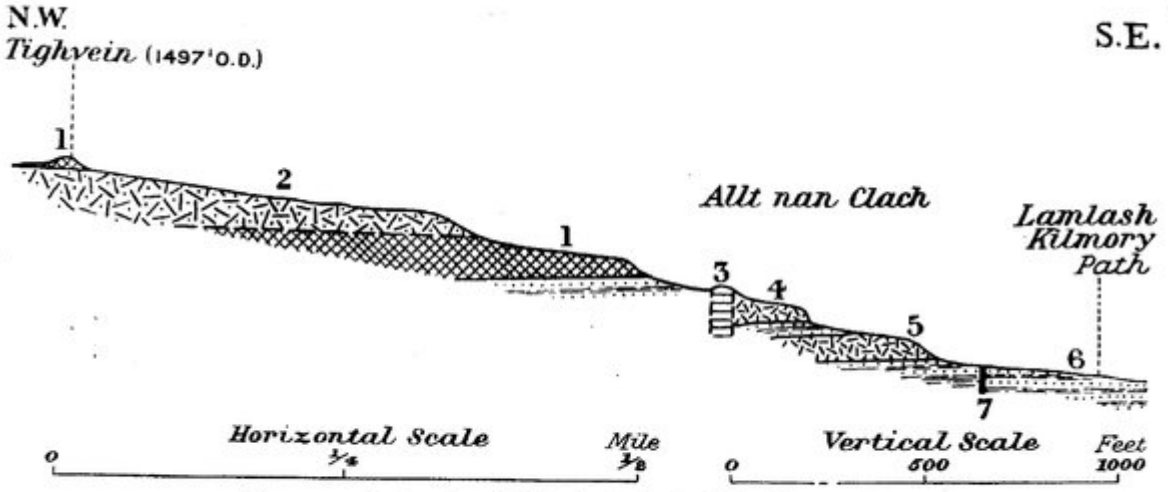

FIG. 17.—*Section from Tighvein to head of the Allt nan Clach.*

1. *Augite-diorite ; 2. Micro-granite ; 3. Pitchstone ; 4. Quartz-dolerite ; 5. Craignurite ; 6. Triassic sediments ; 7. Basaltic dyke.*

(Figure 17) Section from Tighvein to head of the Allt nan Clach. 1. Augite-diorite 2. Micro-granite 3. Pitchstone 4. Quartz-dolerite 5. Craignurite 6. Triassic sediments 7. Basaltic dyke.

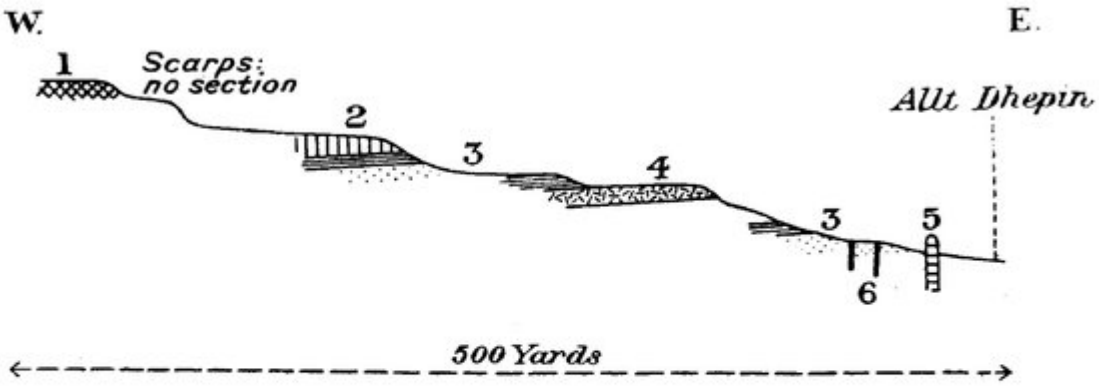

FIG. 18.—*Section in western headwater of the Allt Dhepin, one-third of a mile south of Urie Loch.*

1. *Augite-diorite ;* 2. *Craignurite-felsite sill ;* 3. *Red marls and sandstone ;* 4. *Quartz-dolerite sill ;* 5. *Quartz-porphyry dyke ;* 6. *Basaltic dykes. Vertical scale exaggerated.*

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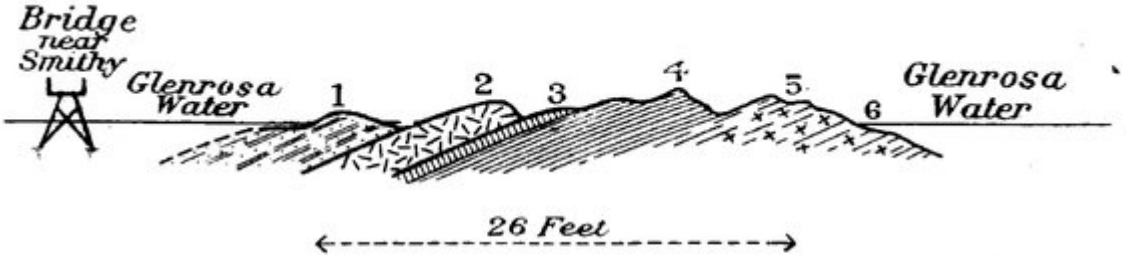

FIG. 19.—*Section across composite sill in the Glenrosa Water at bridge near Smithy, Brodick.*

1. *Fissile sandstone ;* 2. *Quartz-basalt ;* 3. *Dark top of felsite ;* 4. *Banded felsite ;* 5. *Xenolithic felsite ;* 6. *Base of sill, concealed.*

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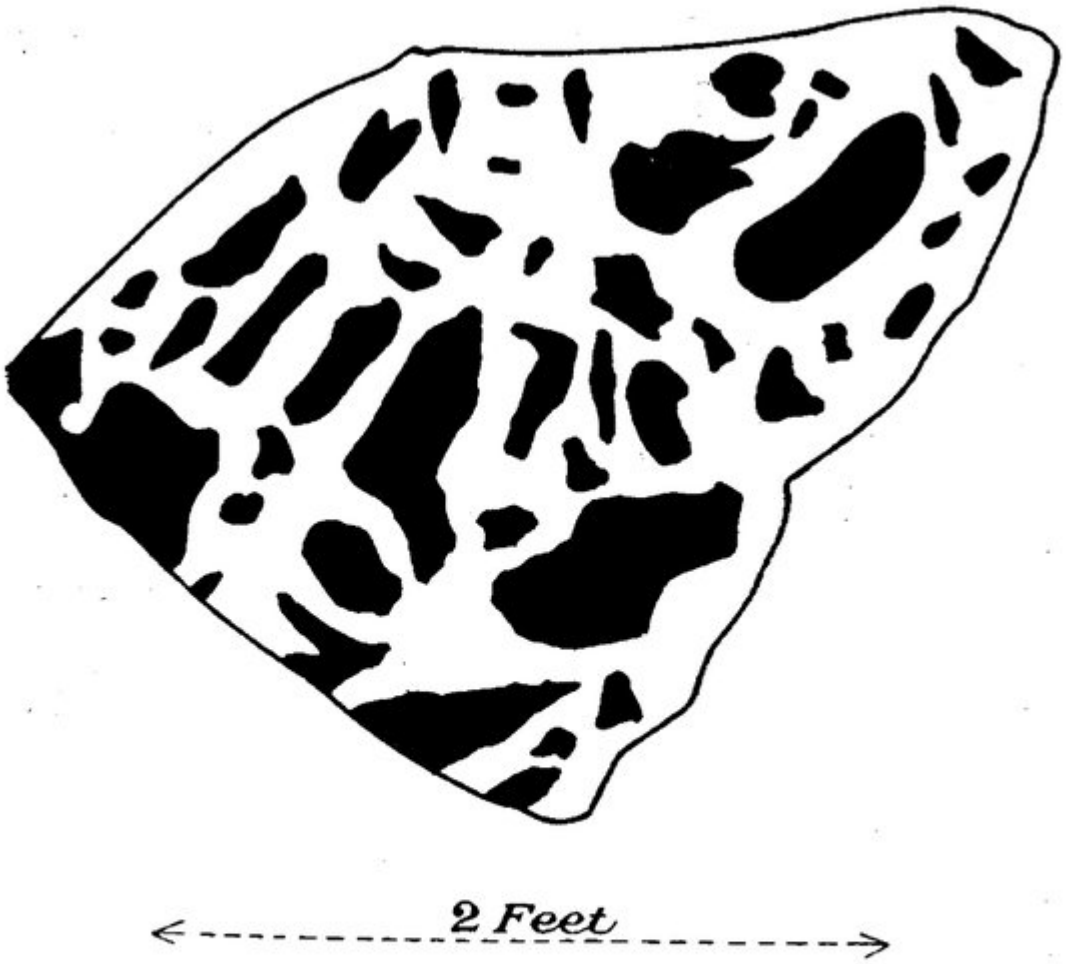


FIG. 20.—*Rock slab showing enclosure of basalt fragments (black) in a matrix of felsite (unshaded). Quarry near summit of Ross road, 3 miles west-south-west of Lamlash.*

(Figure 20) Rock slab showing enclosure of basalt fragments (black) in a matrix of felsite (unshaded). Quarry near summit of Ross road, 3 miles west-south-west of Lamlash.

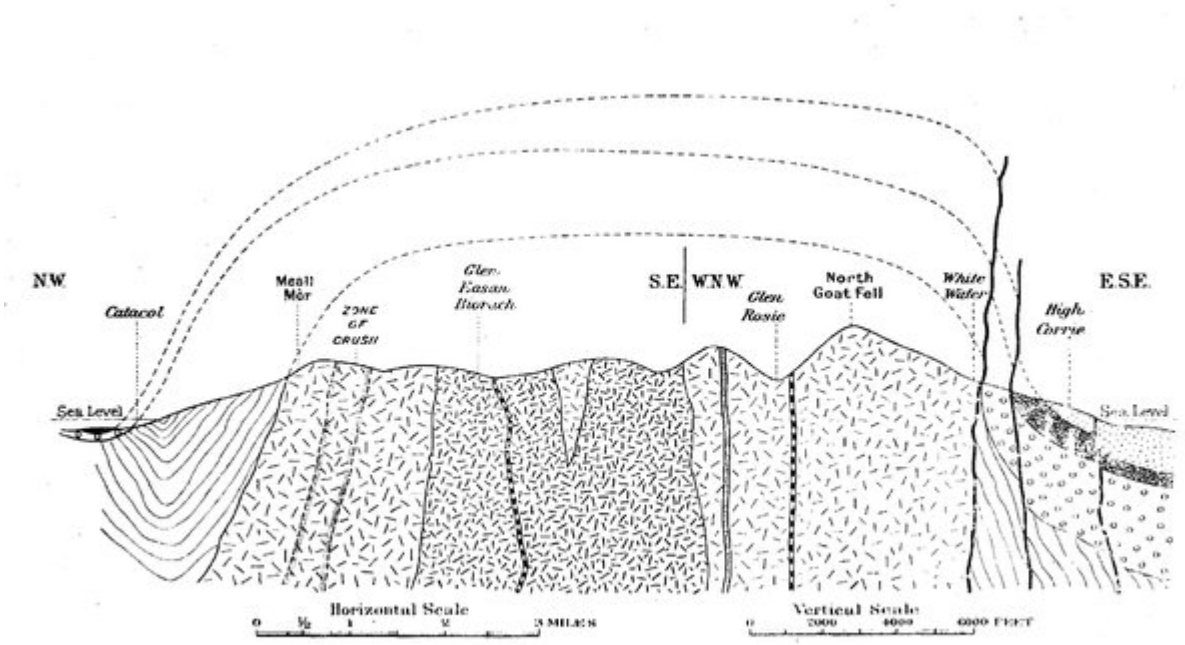
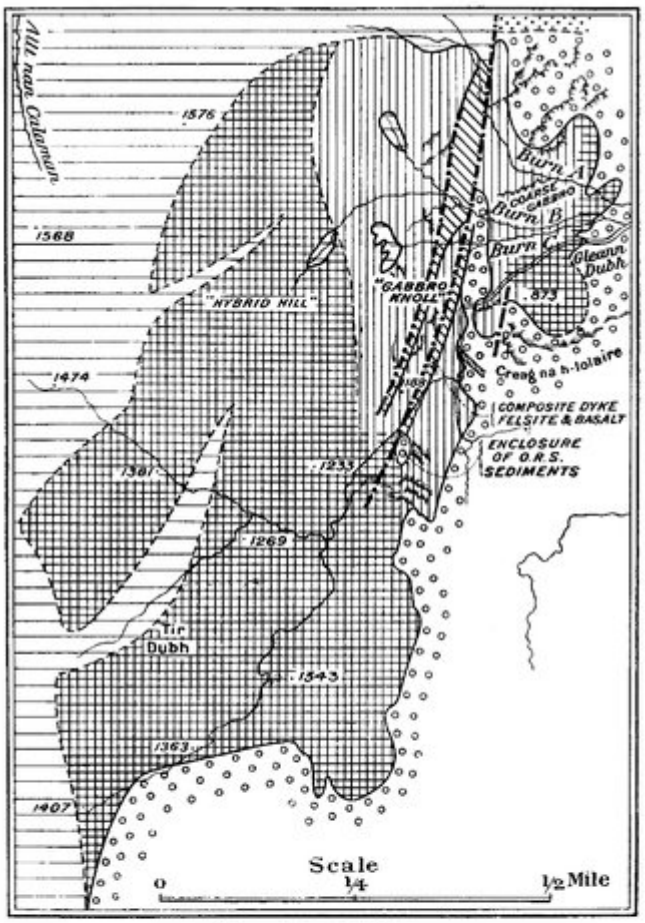


FIG. 21.—*Section across North Arran Granite. For explanation of ornaments see Plate III.*

(Figure 21) Section across North Arran Granite. For explanation of ornaments see Plate 3.



Explanation

POST BRECCIA FELSITES
GRANITE
DIORITES AND MIXTURE ROCKS
GABBRO AND OTHER BASIC PLUTONIC ROCKS
NEW RED SANDSTONE ON MARGIN OF RING COMPLEX
OLD RED SANDSTONE ON MARGIN OF RING COMPLEX
FAULT

FIG. 22.—*Geological map of head of Glen (Gleann) Dubh, illustrating the detail of the eastern edge of the Central Ring Complex.*

(Figure 22) Geological map of head of Glen (Gleann) Dubh, illustrating the detail of the eastern edge of the Central Ring Complex.

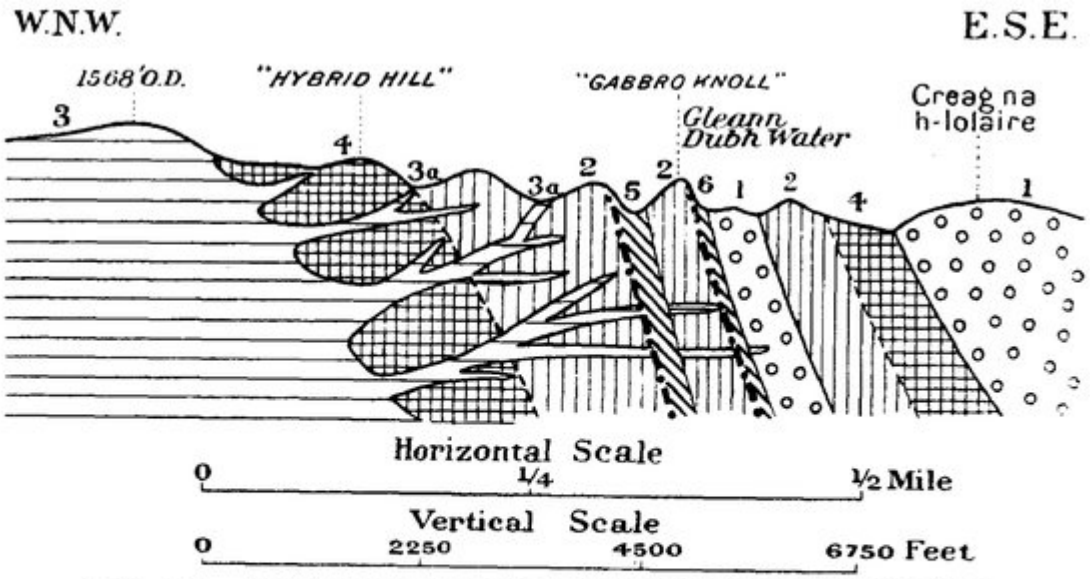


FIG. 23.—*Section across eastern edge of Central Ring Complex.*

1. *Lower Old Red Sandstone ; 2. Gabbro ; 3. Granite and granophyre, with 3a, veins and dykes ; 4. Granite-gabbro mélanges, hybrid rocks, diorite and quartz-diorite ; 5. Felsite intrusion ; 6. Fault, with composite dykes of felsite and basalt.*

(Figure 23) Section across eastern edge of Central Ring Complex. 1. Lower Old Red Sandstone 2. Gabbro 3. Granite and granophyre, with 3a, veins and dykes 4. Granite-gabbro melanges, hybrid rocks, diorite and quartz-diorite 5. Felsite intrusion 6. Fault, with composite dykes of felsite and basalt.

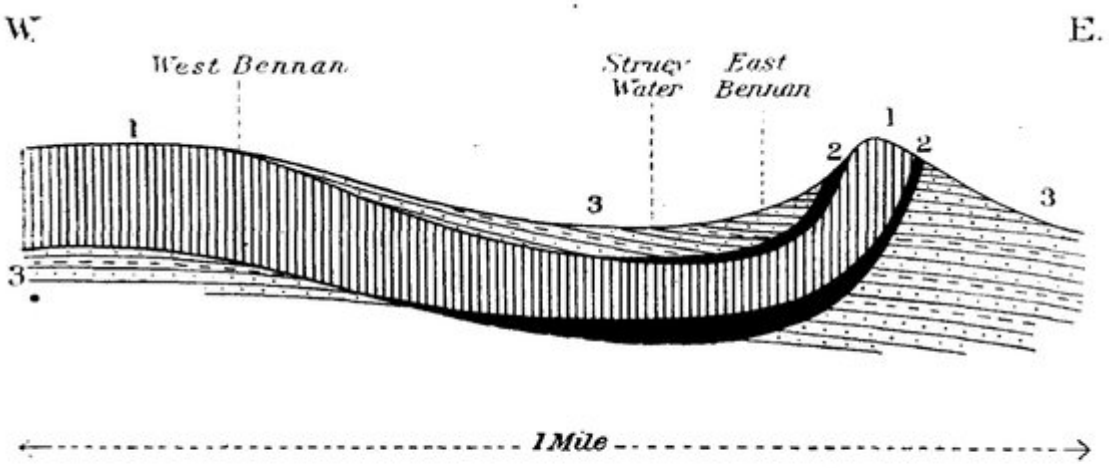


FIG. 24.—*Section across the Bennan composite sill.*

1. *Quartz-porphyry ; 2. Basalt and dolerite ;*
3. *Triassic sediments (sandstones and marls).*

(Figure 24) Section across the Bennan composite sill. 1. Quartz-porphyry 2. Basalt and dolerite 3. Triassic sediments (sandstones and marls).

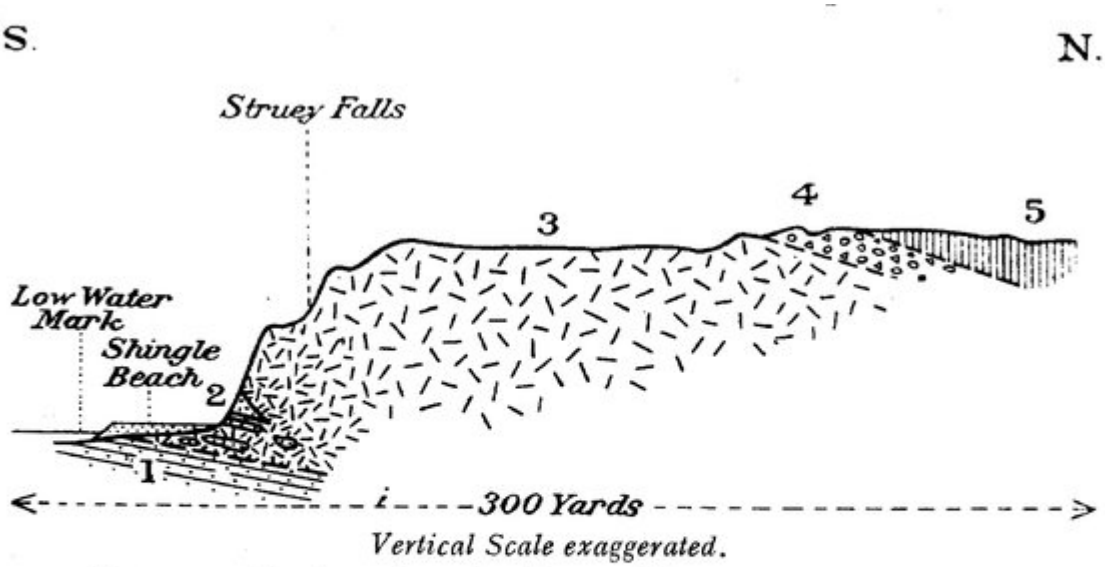


FIG. 25.—*Section along the Struey Water at Bennan Head.*

1. *Triassic sediments ; 2. Fine-grained basaltic contact rocks, with large enclosures of sediments, passing up into 3. Coarse hypersthene dolerite (increasing size of ornament denotes increasing grain-size) ; 4. Zone of coarse xenolithic rock with dolerite fragments in quartz-porphyry matrix ; 5. Quartz-porphyry.*

(Figure 25) Section along the Struey Water at Bennan Head. 1. Triassic sediments 2. Fine-grained basaltic contact rocks, with large enclosures of sediments, passing up into 3. Coarse hyper-sthene dolerite (increasing size of ornament denotes increasing grain-size) 4. Zone of coarse xenolithic rock with dolerite fragments in quartz-porphyry matrix 5. Quartz-porphyry.

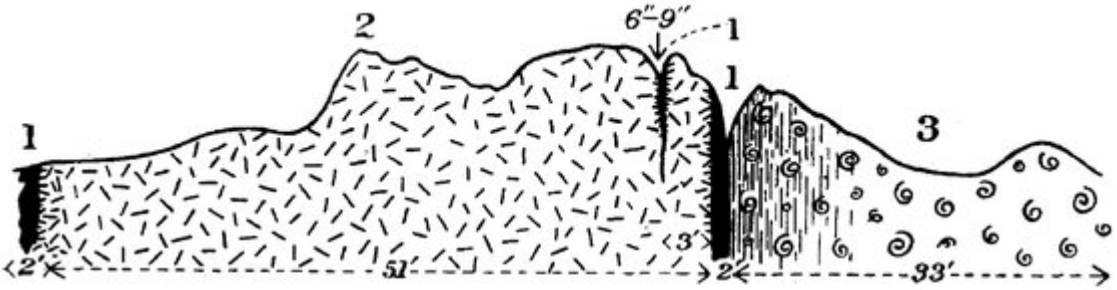


FIG. 26.—*Section across composite dyke at Cleiteadh nan Sgarbh, half a mile north of Drumadoon Point.*

1. *Basaltic margins ; 2. Quartz-porphyry with xenolithic contact against basalt ; 3. Felsite, banded and sheeted at contact with basalt.*

(Figure 26) Section across composite dyke at Cleiteadh nan Sgarbh, half a mile north of Drumadoon Point. Basaltic margins 2. Quartz-porphyry with xenolithic contact against basalt 3. Felsite, banded and sheeted at contact with basalt.

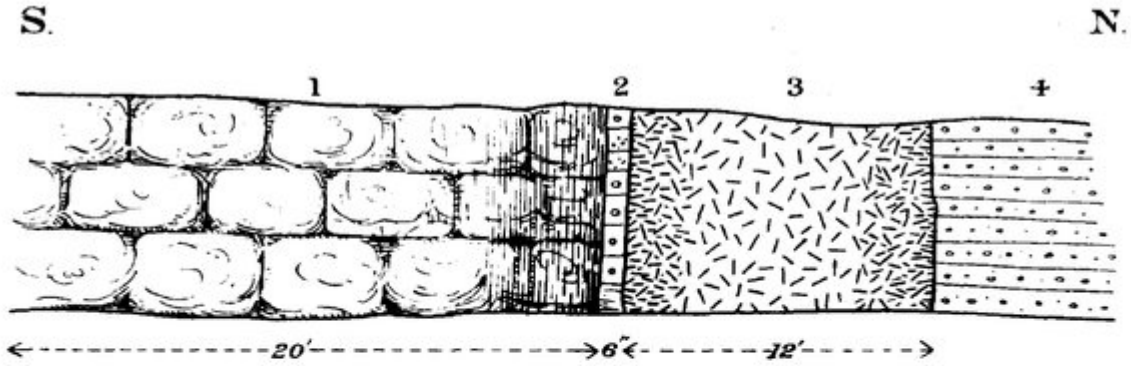


FIG. 27.—*Section across dykes on eastern slope of Sgiath Bhàn, between Glen Dubh and Glen Ormidale, Brodick.*

1. *Massive quartz-felsite becoming banded and pitchstone-like on its northern edge against* 2. *Thin strip of sandstone and conglomerate ;* 3. *Basaltic dyke, chilled edges shown by size of stippling ;* 4. *New Red Sandstone sediments.*

Petrography of the Quartz-Porphyries and Associated Rocks

(Figure 27) Section across dykes on eastern slope of Sgiath Bhàn, between Glen Dubh and Glen Ormidale, Brodick. 1. Massive quartz-felsite becoming banded and pitchstone-like on its northern edge against 2. Thin strip of sandstone and conglomerate 3. Basaltic dyke, chilled edges shown by size of stippling 4. New Red Sandstone sediments.

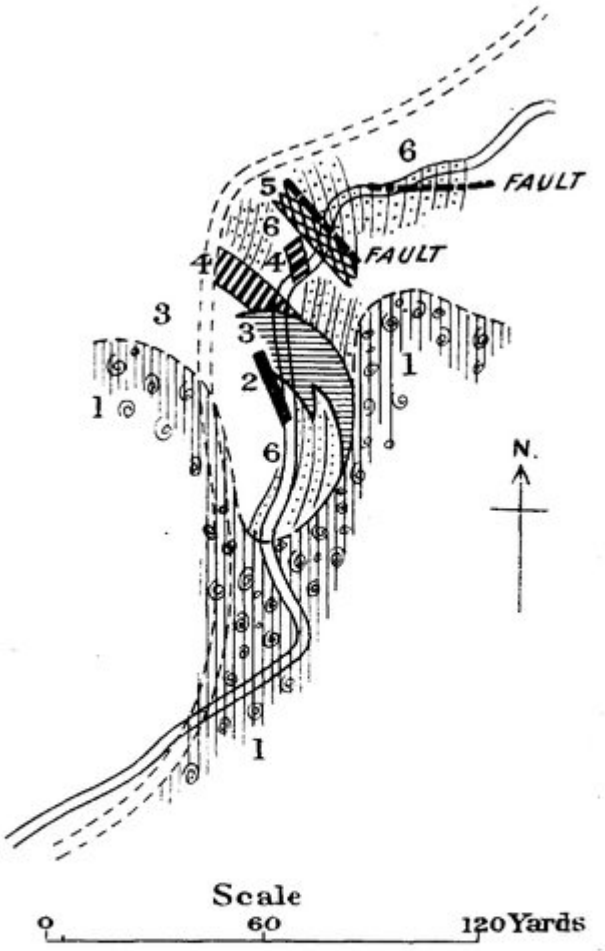


FIG. 28.—*Sketch-map of exposures in main western headwater of the Lag a' Bheith, 2 miles south-south-west of Brodick Pier.*

1. *Felsite sill ; 2. Basalt dyke ; 3. Shattery basaltic intrusion ; 4. Pitchstone dykes ; 5. Crushed basalt dyke along fault ; 6. Marls, cornstones, and sandstones of the Trias.*

(Figure 28) Sketch map of exposures in main western headwater of the Lag a' Bheith, 2 miles south-south-west of Brodick Pier. 1. Felsite sill 2. Basalt dyke 3. Shattery basaltic intrusion 4. Pitchstone dykes 5. Crushed basalt dyke along fault 6. Marls, cornstones, and sandstones of the Trias.

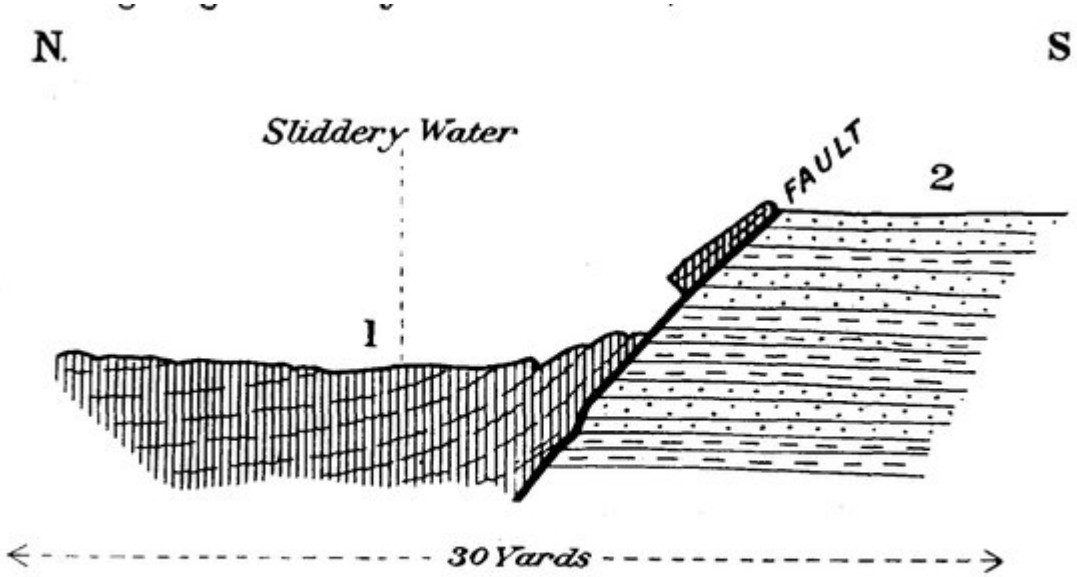


FIG. 29.—*Junction of felsite against Triassic sediments, Sliddery Water, just above Glenrie Bridge.*

1. *Felsite, with slabby jointing ; 2. Triassic sediments.*

(Figure 29) Junction of felsite against Triassic sediments, Sliddery Water, just above Glenrie Bridge. I. Felsite, with slabby jointing 2. Triassic sediments.

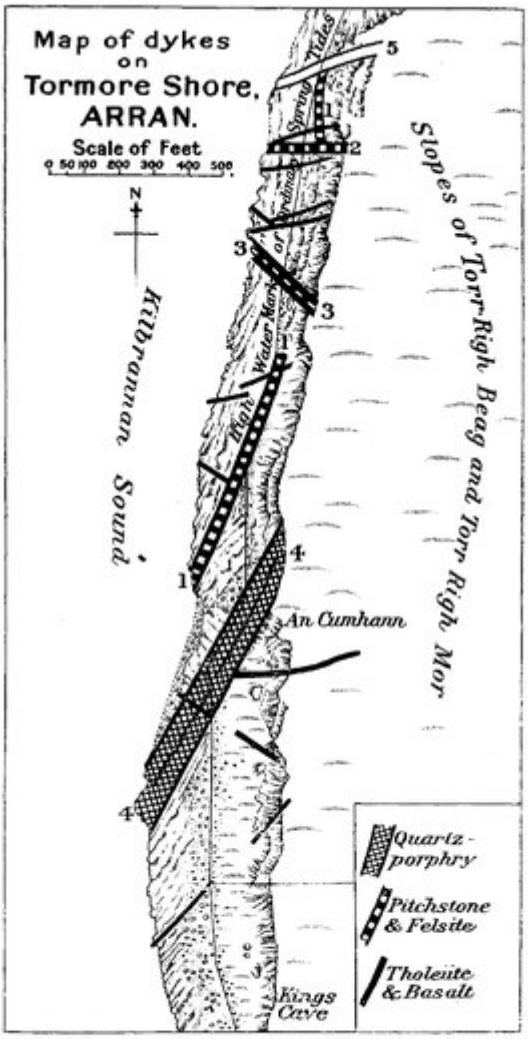


FIG. 30.—*Map of dykes on Tormore shore, based on the map by J. W. Judd (Quart. Journ. Geol. Soc., vol. xlix., 1893, p. 552).*

1. *Tholeiite-pitchstone composite dyke (Judd's No. I. dyke), composite at south end, but only pitchstone at north end ; 2. Tholeiite-pitchstone composite dyke (Judd's No. II. dyke) ; 3. Tholeiite-pitchstone composite dyke (Judd's No. III. dyke) ; 4. Composite dyke of quartz-porphyry and tholeiite (Judd's No. IV. dyke), described p. 201 ; 5. Trench with indurated edges ; no dyke seen.*

(Figure 30) Map of dykes on Tormore shore, based on the map by J. W. Judd (Quart. Journ. Geol. Soc., vol. xlix., 1893, p. 552). 1. Tholeiite-pitchstone composite dyke (Judd's No. I. dyke), composite at south end, but only pitchstone at north end 2. Tholeiite-pitchstone composite dyke (Judd's No. II. dyke) 3. Tholeiite-pitchstone composite dyke (Judd's No. III. dyke) 4. Composite dyke of quartz-porphyry and tholeiite (Judd's No. IV. dyke), described p. 201 5. Trench with indurated edges no dyke seen.

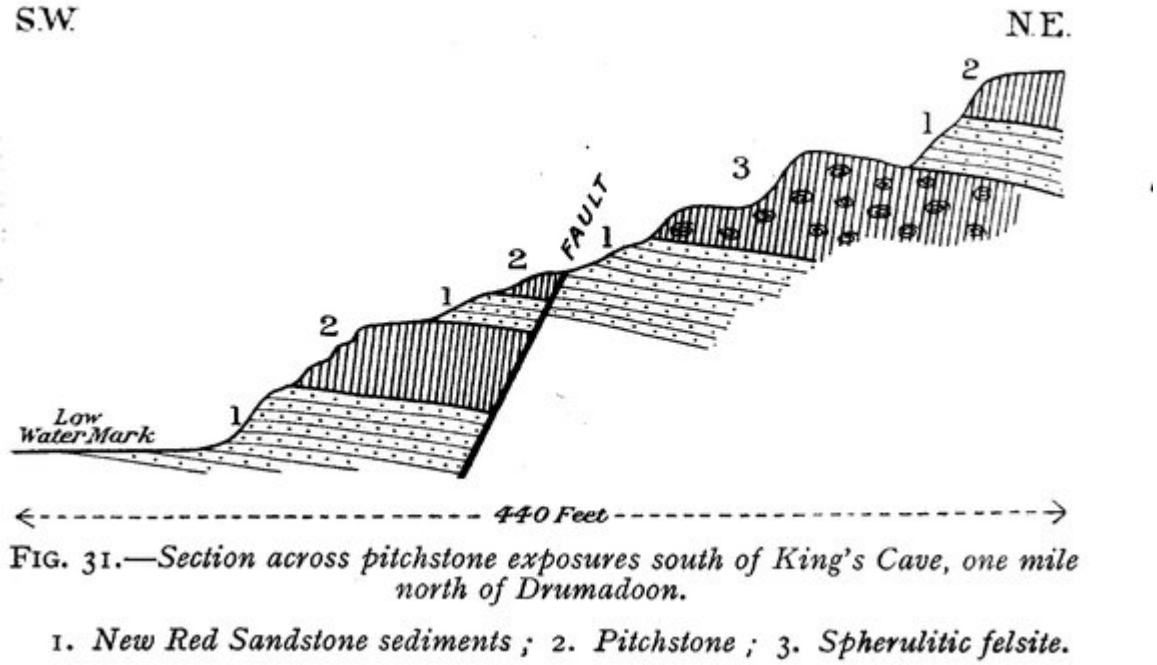


FIG. 31.—*Section across pitchstone exposures south of King's Cave, one mile north of Drumadoon.*

1. *New Red Sandstone sediments ;* 2. *Pitchstone ;* 3. *Spherulitic felsite.*

(Figure 31) Section across pitchstone exposures south of King's Cave, one mile north of Drumadoon. New Red Sandstone sediments 2. Pitchstone 3. Spherulitic felsite.

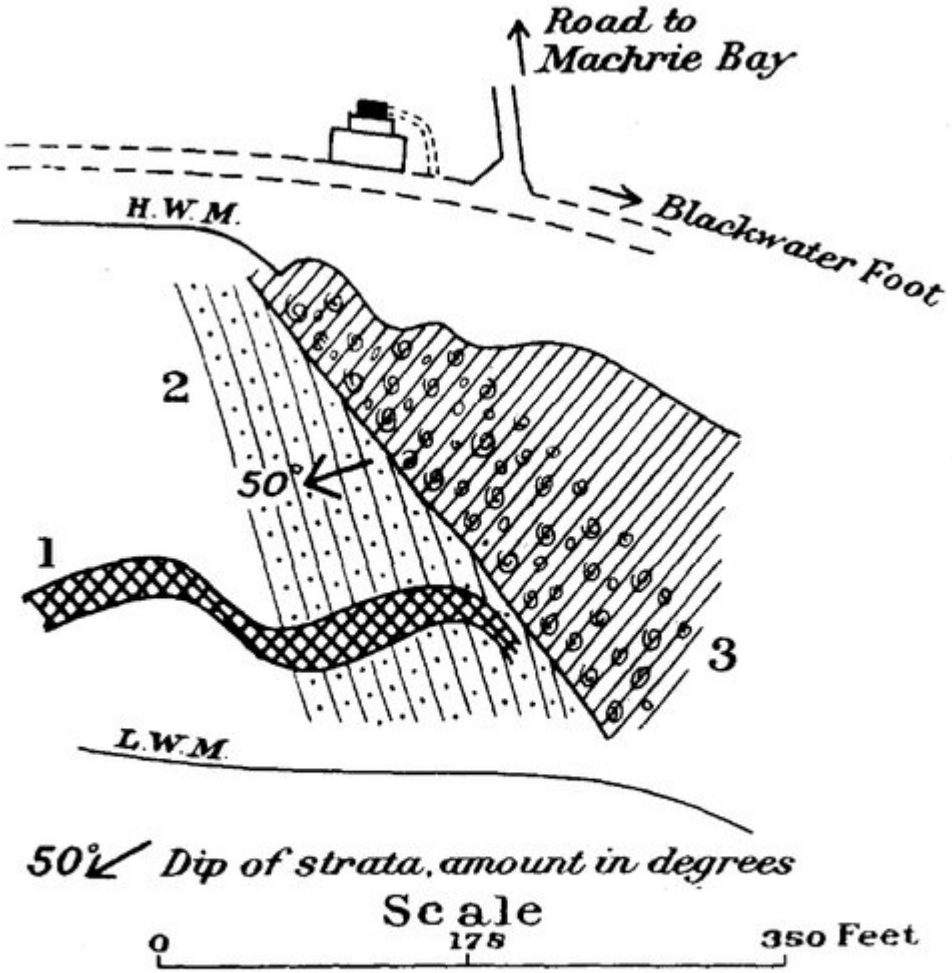


FIG. 32.—*Plan of exposures on shore, one-twelfth of a mile north-west of Blackwaterfoot.*

1. *Basalt dyke ; 2. Triassic sediments ; 3. Felsite.*

(Figure 32) Plan of exposures on shore, one-twelfth of a mile north-west of Blackwaterfoot. 1. Basalt dyke 2. Triassic sediments 3. Felsite.

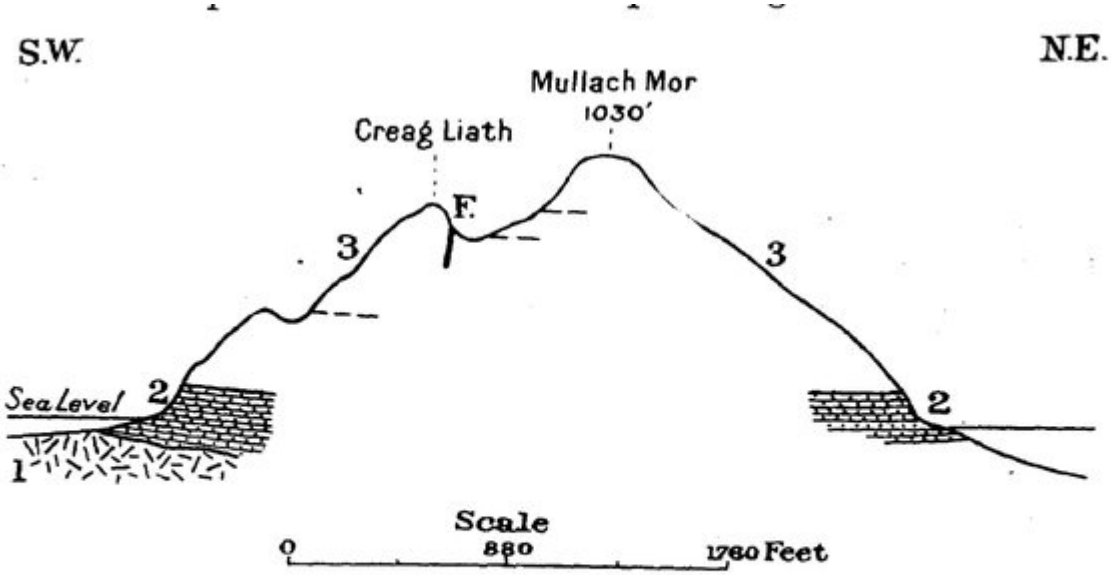


FIG. 33.—*Section across Holy Island, Lamlash Bay.*

1. *Kingscross crinanite sill;* 2. *New Red Sandstone sediments;* 3. *Riebeckite-ægirine–orthophyre sill;* F. *Zone of breccia;* ---- *Possible boundaries of supposed sheets.*

(Figure 33) Section across Holy Island, Lamlash Bay. T. Kingscross crinanite sill 2. New Red Sandstone sediments 3. Riebeckite-cegirine—orthophyre sill F. Zone of breccia ---- Possible boundaries of supposed sheets.

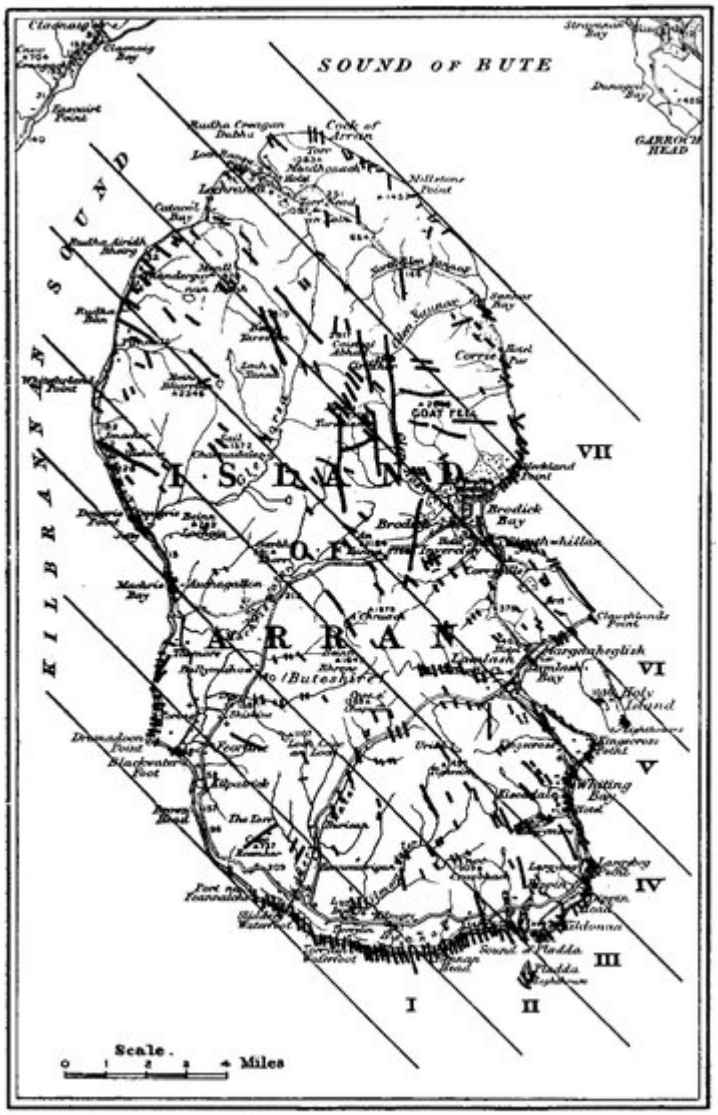


FIG. 34.—*Map showing distribution of the Arran Dyke Swarm, and the subdivision of the island into N.W.–S.E. strips* (see *p.* 241).

(Figure 34) Map showing distribution of the Aryan Dyke Swarm, and the subdivision of the island into N.W.—S.E. strips (see p. 241).

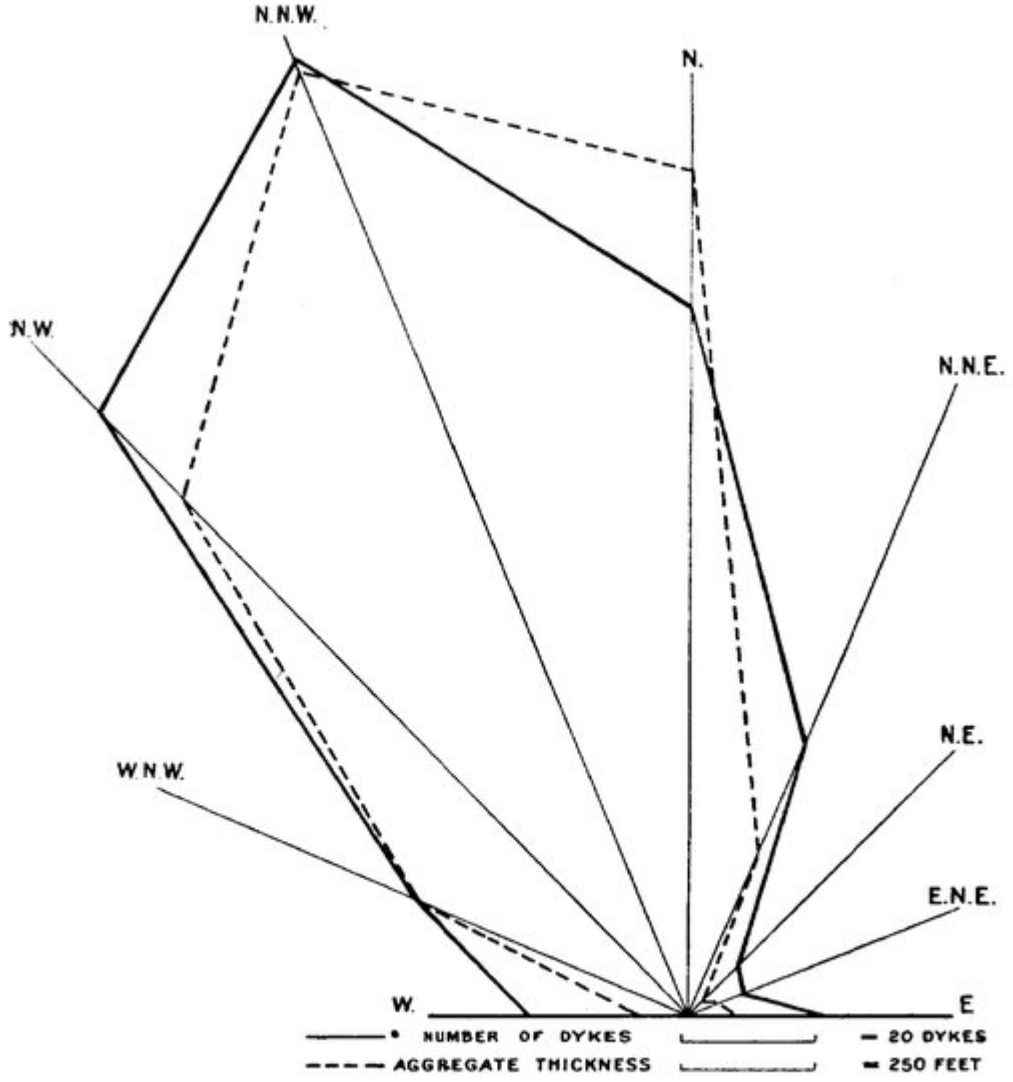


FIG. 35.—*Diagram illustrating relations between direction, number, and aggregate thickness of dykes in the Arran Swarm.*

(Figure 35) Diagram illustrating relations between direction, number, and aggregate thickness of dykes in the Arran Swarm.

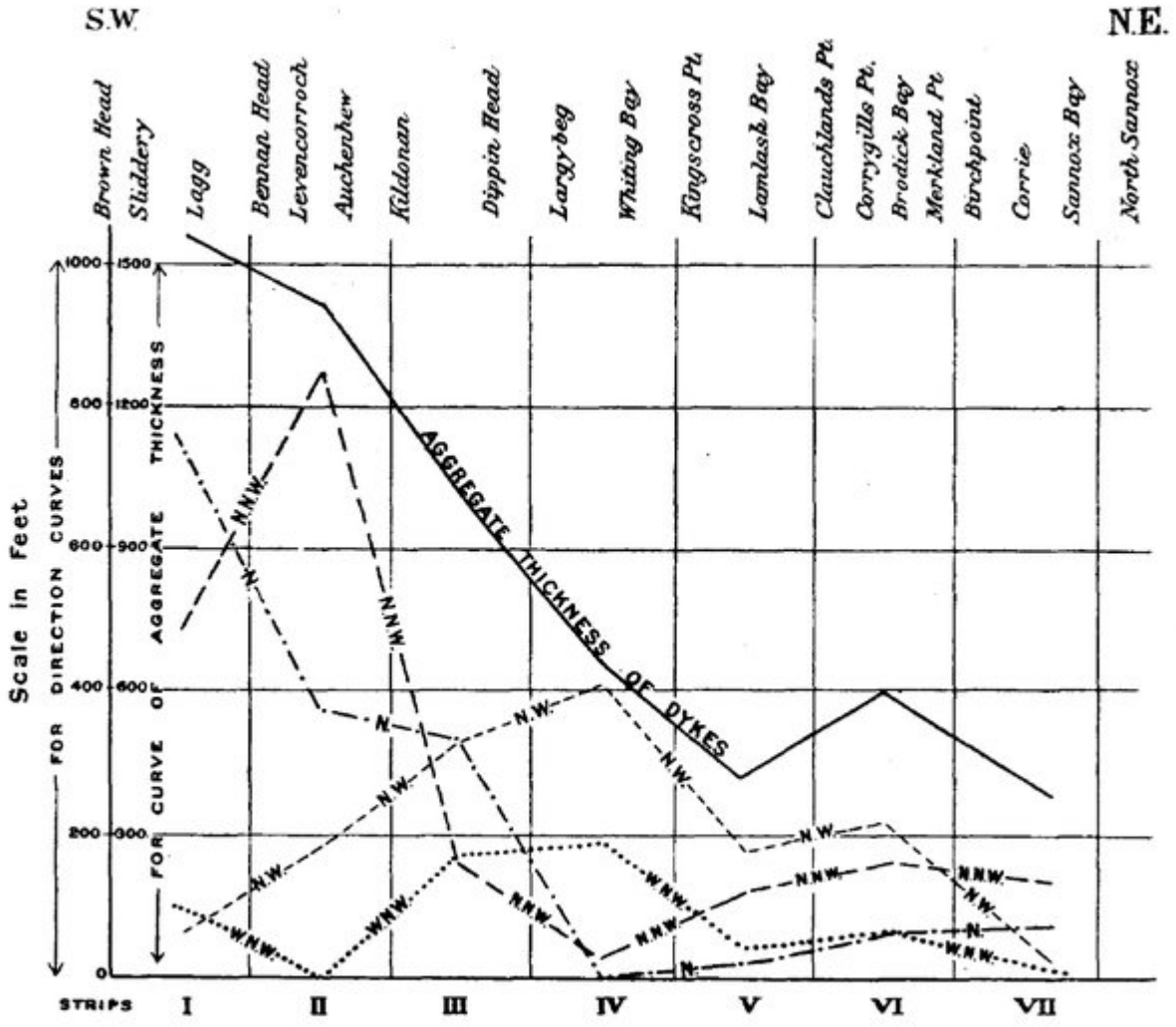
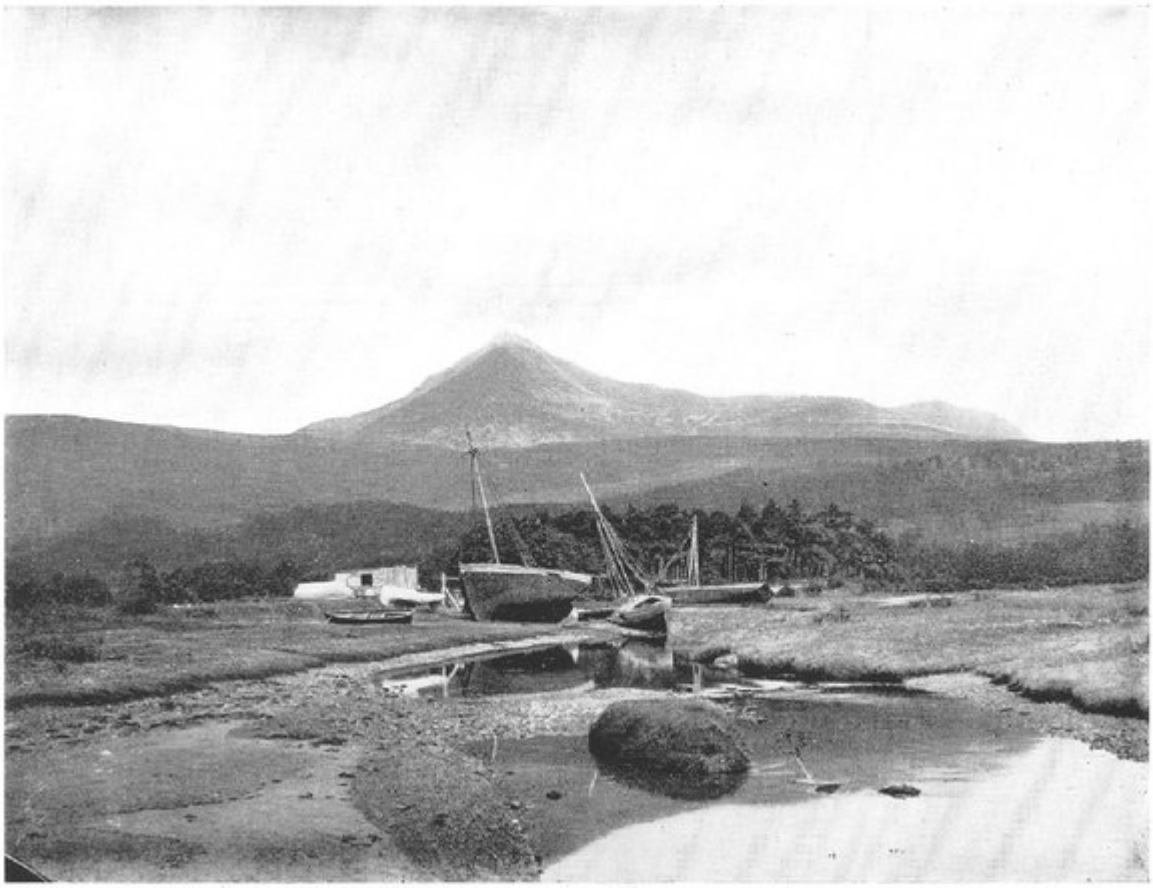


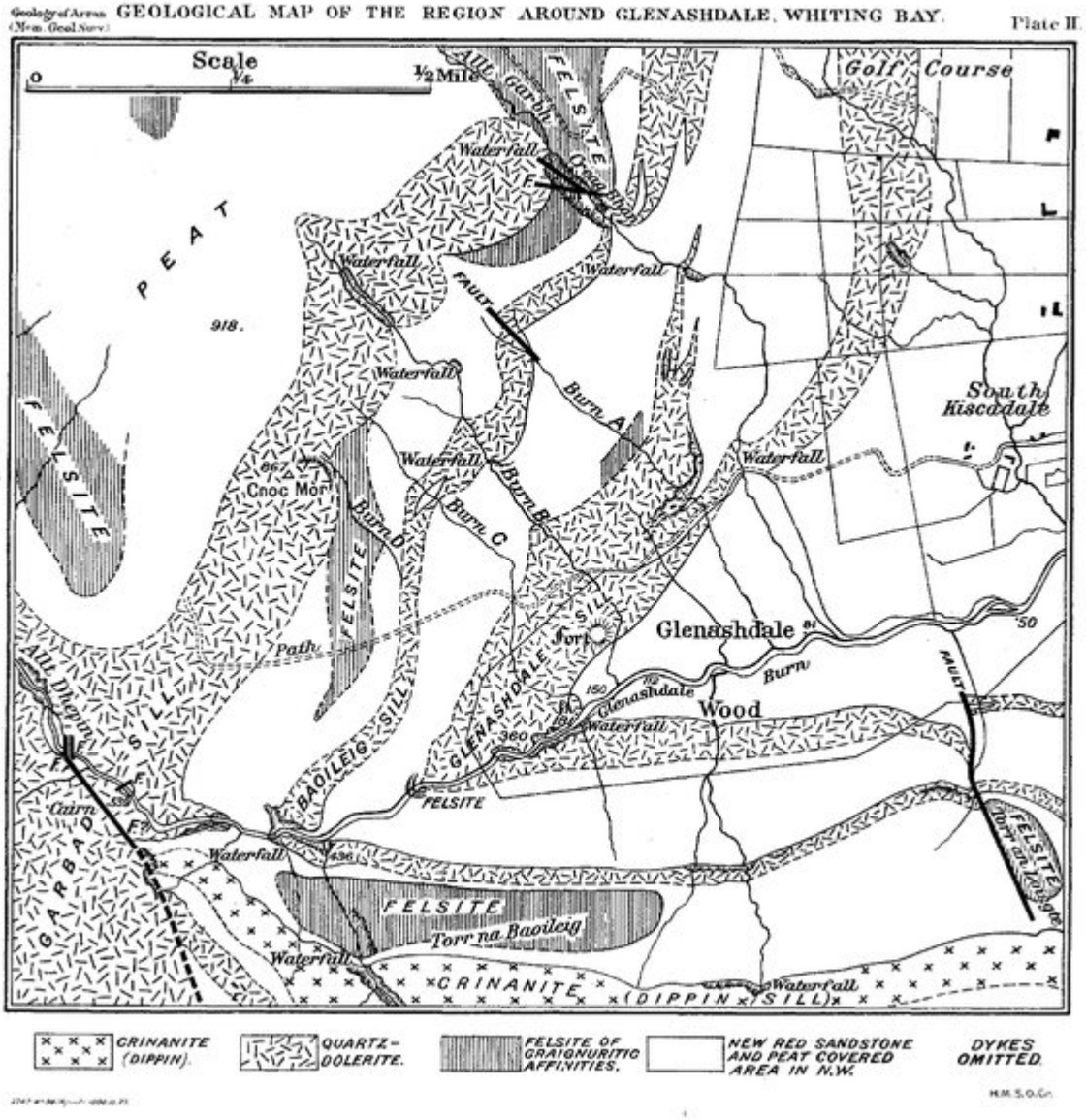
FIG. 36.—*Curves illustrating geographical distribution of dykes in the Arran Swarm* (*p.* 245).

(Figure 36) Curves illustrating geographical distribution of dykes in the Arran Swarm (p. 245).

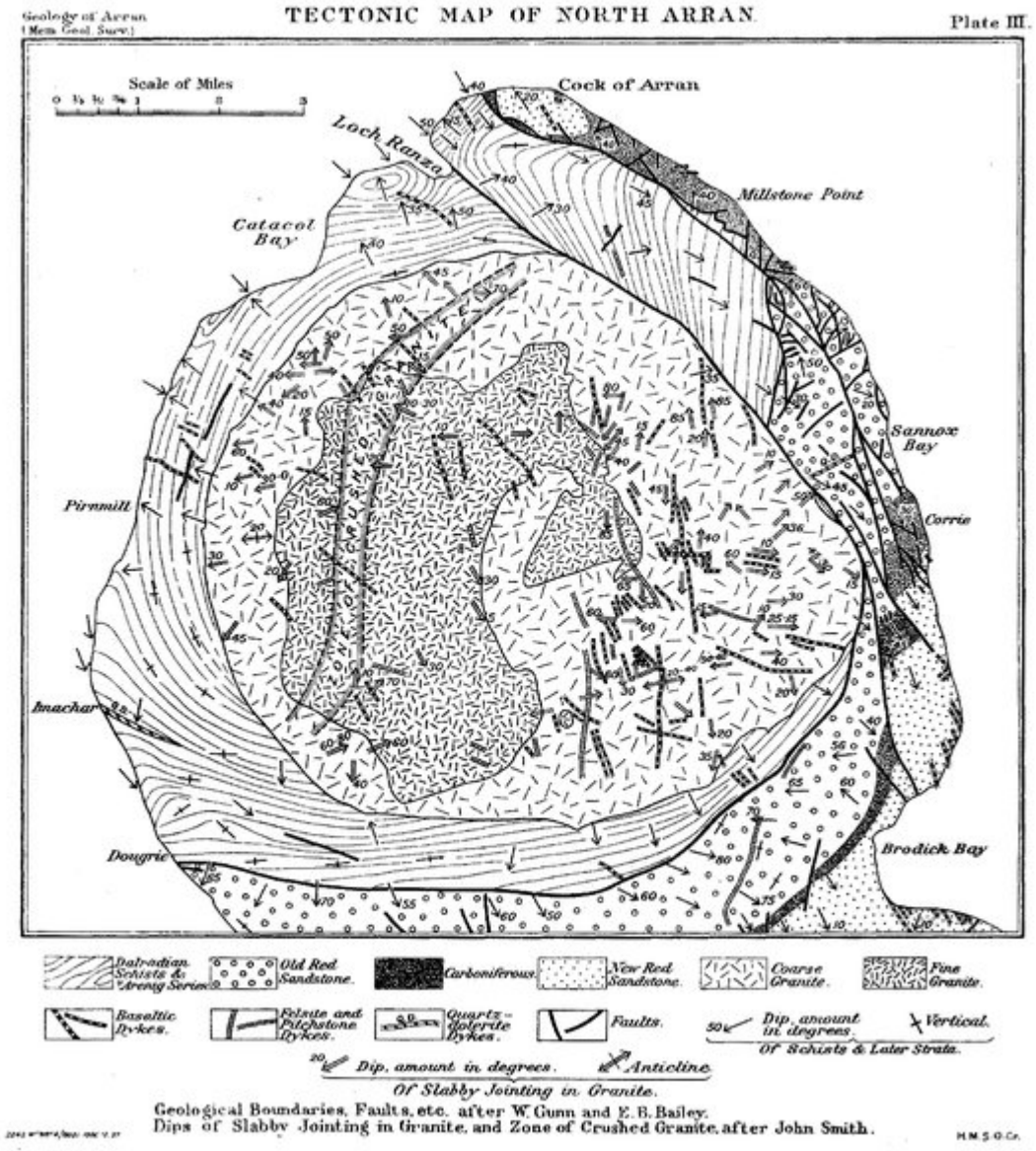


View of ' 1000-Foot Platform ' around Goatfell, from Brodick Bay. [*Frontispiece.*

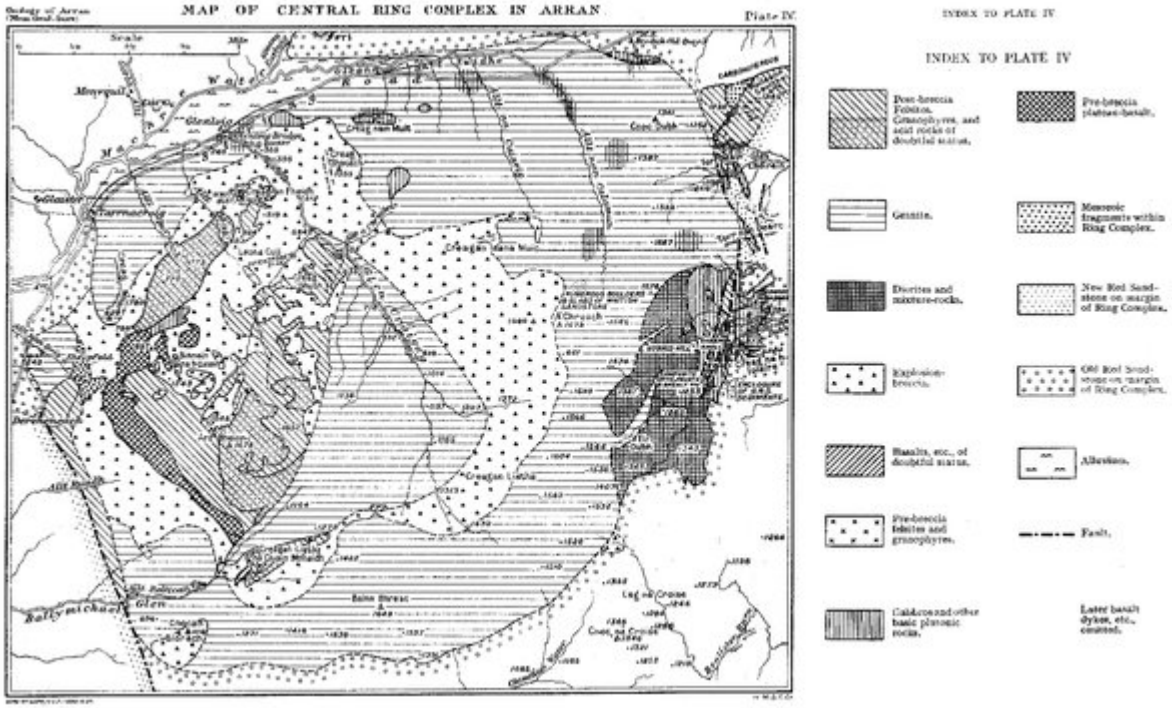
(Plate 1) View of 1000-Foot Platform around Goatfell from Brodick Bay. Frontispiece.



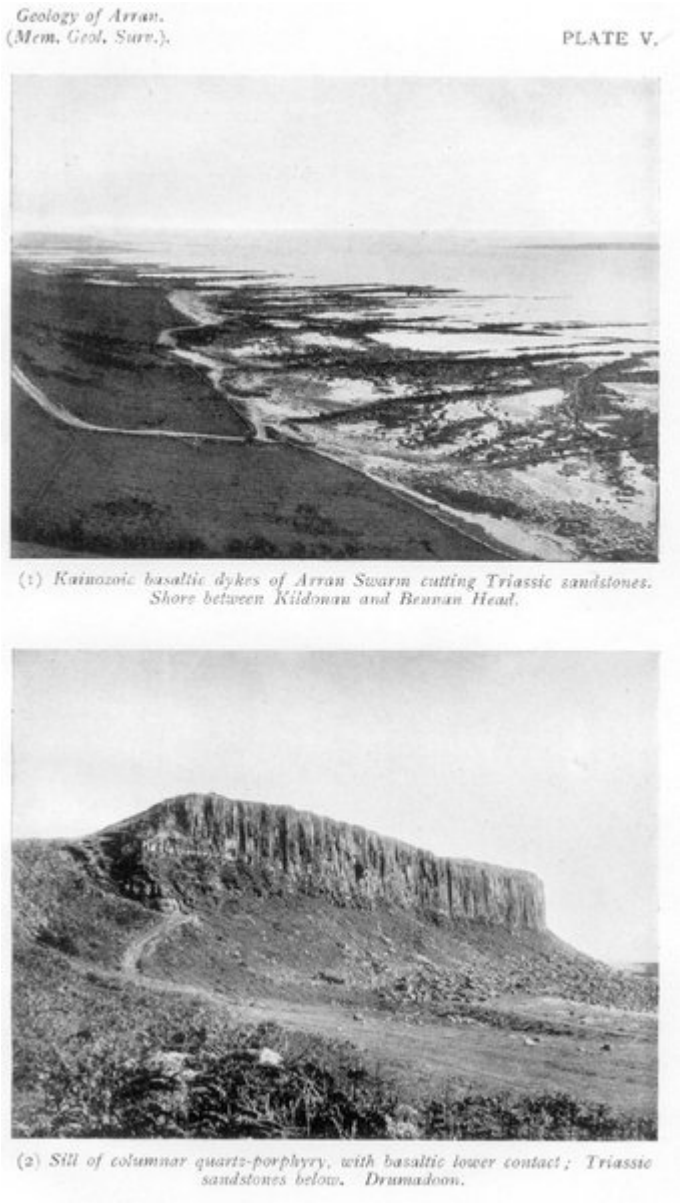
(Plate 2) Geological map of the region around Glenashdale, Whiting Bay.



(Plate 3) Tectonic map of North Arran.



(Plate 4) Map of Central Ring Complex in Arran.



(Plate 5) (1) Kainozoic basaltic dykes of Aryan Swarm cutting Triassic sandstones. Shore between Kildonan and Bennan Head. (2) Sill of columnar quartz-porphyry, wait basaltic lower contact,- Triassic sandstones below. Drumadoon.

U-shaped valley of Glen Rosa, looking north; Cir Mhòr at head of valley, and Ceum na Caillich (or Witch's Step) seen over the divide of The Saddle.

(Plate 6) U-shaped valley of Glen Rosa, looking north; Cir Mhòr at head of valley, and Ceura na Caillich (or Witch's Step) seen over the divide of The Saddle.

TABLE I

	1[1]	2	3	A	B	C	D
SiO_2	44·68	46·50	43·95	43·94	44·69	45·57	45·8
Al_2O_3 ..	16·37	22·86	17·60	14·03	14·17	14·95	15·0
Fe_2O_3 ..	4·31	3·30	1·43	1·95	3·35	2·82	3·8
FeO	8·11	4·63	11·89	11·65	10·86	7·35	9·5
MgO	6·59	2·52	6·95	10·46	6·41	6·19	8·2
CaO	8·70	9·50	8·54	8·99	10·28	8·27	9·4
Na_2O ..	3·28	4·53	3·66	2·68	3·64	4·33	2·5
K_2O	·21	·39	·35	·33	2·01	2·16	·5
$H_2O>105°$ ..	1·69	3·25	·82	2·31	2·53	3·93	1·8
$H_2O<105°$ ..	2·99	·80	·94	·85	1·05	·97	·9
TiO_2	2·51	1·30	3·42	2·45	·46	2·41	2·4
P_2O_5	·15	·26	·11	·20	·45	·67	·2
MnO	·32	tr.	·10	·32	·31	·31	·3
CO_2	·06	nt. fd.	nt. fd.	·16	nt. fd.	·18	—
S	—	nt. fd.	tr.	—	—	—	—
FeS_2	nt. fd.	—	—	·04	—	—	—
Fe_7S_8 ..	—	—	—	·06	—	—	—
(Ni, Co)O ..	·05	nt. fd.	nt. fd.	—	—	—	—
BaO	·02	—	—	nt. fd.	tr.	·07	—
Li_2O	nt. fd.	—	—	—	—	—	—
Cr_2O_3 ..	—	—	—	tr.	—	—	—
	100·04	99·84	99·76	100·42	100·21	100·18	100·3

[1] The Arran analyses are indicated by consecutive numerals. Other analyses tabulated for comparison are indicated by capital letters.

(Table 1) [no title].

TABLE II

	4	E	F	5	6	G	H
SiO_2	54·00	52·16	55·82	71·58	69·26	70·70	71·30
Al_2O_3 ..	13·09	11·95	11·47	12·20	11·60	11·78	11·24
Fe_2O_3 ..	3·53	4·86	3·68	1·51	1·31	1·32	1·80
FeO	8·45	9·92	7·66	1·77	2·57	3·45	2·84
MgO	3·49	3·77	4·08	·50	1·10	·53	·61
CaO	5·55	7·14	7·88	1·98	2·61	1·30	1·56
Na_2O ..	3·27	2·36	2·53	2·83	2·08	2·48	3·44
K_2O.. ..	1·80	1·74	2·00	3·86	3·88	4·71	4·66
$H_2O > 105°$ ..	1·71	1·95	1·88	·76	1·67	1·14	1·04
$H_2O < 105°$ ..	1·26	·56	·66	1·10	1·61	·50	·39
TiO_2	2·83	3·25	1·62	·44	·45	1·27	·58
P_2O_5	·31	·24	·23	·13	·10	·26	·22
MnO	·37	·18	·40	·31	·45	·07	·31
CO_2	·25	·18	·08	1·07	1·76	·51	—
S	—	·18	—	—	—	·08	—
FeS_2	·14	—	·09	nt. fd.	nt. fd.	—	nt. fd.
(Ni, Co)O ..	nt. fd.	—	·04	nt. fd.	nt. fd.	—	nt. fd.
BaO	·02	—	·03	nt. fd.	nt. fd.	—	·07
Li_2O	tr.	—	tr.	tr.	nt. fd.	—	? tr.
	100·07	100·44	100·18	100·04	100·45	100·10	100·06

(Table 2) [no title].

TABLE III

	7	I	J	K
SiO_2 ..	74·87	76·71	72·78	75·00
Al_2O_3 ..	11·24	—	—	13·24
Fe_2O_3 ..	·34	—	—	2·52
FeO ..	1·22	—	—	—
MgO ..	·22	—	—	—
CaO ..	1·30	·47	—	·69
Na_2O ..	3·31	—	4·08	3·07
K_2O ..	5·68	—	5·18	4·33
$H_2O>105°$	·49	—	—	·80
$H_2O<105°$	·29	·22	·34	—
TiO_2 ..	·26	—	—	—
P_2O_5 ..	·09	—	—	—
MnO ..	·05	—	—	—
CO_2 ..	·49	—	—	—
FeS_2 ..	·33	—	—	—
Cr_2O_3 ..	·02	—	—	—
BaO ..	·04	—	—	—
Li_2O ..	·00	—	—	—
F	nt. fd.	—	—	—
	100·24	—	—	99·65

(Table 3) [no title].

TABLE IV

	8.	L.	M.
SiO_2	52·43	51·32	50·04
Al_2O_3	13·50	13·96	13·32
Fe_2O_3	4·93	2·48	4·71
FeO	7·00	7·10	8·07
MgO	4·61	5·78	5·01
CaO	8·25	11·51	10·02
Na_2O	3·27	3·50	3·28
K_2O	1·08	1·16	1·08
$H_2O>105°$ ..	1·64	1·27	1·45
$H_2O<105°$ ..	·28	·36	·27
TiO_2	1·91	·98	2·56
P_2O_5	·21	·24	·28
MnO	·20	·34	·33
CO_2	·08	·09	·08
FeS_2	·44	nt. fd.	nt. fd.
(Ni, Co)O ..	—	nt. fd.	nt. fd.
BaO	·96	nt. fd.	nt. fd.
Li_2O	·00	nt. fd.	tr.
Cr_2O_3	·02	—	—
ZrO_2	·00	—	—
	99·91	100·09	100·50

(Table 4) [no title].

TABLE V

	9.	N.	10.	8.
SiO_2 ..	75·65	73.12	53·67	52·43
Al_2O_3 ..	11·89	12·44	15·47	13·50
Fe_2O_3 ..	1·19	2·09	3·24	4·93
FeO ..	1·02	1·65	7·25	7·00
MgO ..	·15	·14	4·90	4·61
CaO ..	·91	·88	8·28	8·25
Na_2O ..	3·44	3·90	2·77	3·27
K_2O ..	4·26	4·67	·80	1·08
$H_2O>105°$	·40	·24	·23	1·64
$H_2O<105°$	·41	·25	1·73	·28
TiO_2 ..	·28	·39	1·28	1·91
P_2O_5 ..	·16	·09	·21	·21
MnO ..	·26	·17	·31	·20
CO_2 ..	·09	·05	·04	·08
FeS_2 ..	nt. fd.	nt. fd.	nt. fd.	·44
(Ni,Co)O ..	·02	nt. fd.	·04	n. d.
BaO ..	·03	nt. fd.	·04	·06
Li_2O ..	nt. fd.	nt. fd.	nt. fd.	·00
Cr_2O_3 ..	—	—	—	·02
	100·16	100·08	100·26	99·91

(Table 5) [no title].

TABLE VI

	11.	O.	12.	P.	Q.	13.
SiO_2	75·22	71·98	54·83	53·97	54·11	55·79
Al_2O_3	12·22	13·13	14·10	14·65	11·65	15·97
Fe_2O_3	2·30	1·33	3·57	3·62	2·76	12·50
FeO	·22	1·64	5·87	6·32	7·02	—
MgO	·06	·56	4·88	4·49	5·30	2·22
CaO	·84	1·15	7·90	7·98	8·77	7·06
Na_2O	2·22	2·98	2·32	2·54	2·63	2·21
K_2O	4·94	4·93	1·73	1·52	1·75	1·86
$H_2O > 105°$ ..	·52	1·38	1·23	·94	·81	} Ign.
$H_2O < 105°$ ..	·72	·39	·48	1·92	·68	} 2·43
TiO_2	·28	·37	·74	1·24	3·37	—
P_2O_5	·18	·19	·24	·27	·58	—
MnO	·25	·14	·37	·30	·21	—
CO_2	·03	—	1·90	·51	·05	—
FeS_2	nt. fd.	—	nt. fd.	·09	·22	—
(Ni, Co)O ..	nt. fd.	—	·03	nt. fd.	—	—
BaO	nt. fd.	tr.	nt. fd.	·04	·03	—
Li_2O	tr.	nt. fd.	tr.	tr.	nt. fd.	—
Cr_2O_3	—	—	—	—	·03	—
Cl	—	·01	—	—	—	—
S	—	—	—	—	—	·45
	100·00	100·18	100·19	100·40	99·97	100·49

(Table 6) [no title].

TABLE VII

	14.	R.	15.	16.	S.	6.	17.
SiO_2	73·20	73·12	72·33	71·51	71·53	69·26	72·37
Al_2O_3.. ..	10·75	12·44	10·45	10·55	12·00	11·60	11·64
Fe_2O_3.. ..	·95	2·09	1·00	·79	2·90	1·31	1·42
FeO	1·02	1·65	2·14	2·22	2·02	2·57	1·08
MgO	·15	·14	·11	·52	·62	1·10	·52
CaO	·76	·88	1·44	1·52	2·33	2·61	1·30
Na_2O	3·78	3·90	4·09	4·12	4·27	2·08	4·15
K_2O	4·20	4·67	3·49	3·48	3·06	3·88	3·98
$H_2O > 105°$ ..	4·52	·24	4·02	4·07	·36	1·67	ign.
$H_2O < 105°$ ..	·18	·25	·16	·19	·13	1·61	4·86
TiO_2	·16	·39	·30	·33	·64	·45	—
P_2O_5	·19	·09	·16	·24	·17	·10	—
MnO	·37	·17	·50	·42	·36	·45	—
CO_2	—	·05	—	—	nt. fd.	1·76	—
FeS_2	—	nt. fd.	—	—	—	nt. fd.	—
(Ni, Co)O ..	nt. fd.	nt. fd.	nt. fd.	nt. fd.	·02	nt. fd.	—
BaO	·05	nt. fd.	·08	·08	·08	nt. fd.	—
Li_2O	nt. fd.	nt. fd.	tr.	nt. fd.	? tr.	nt. fd.	—
Cr_2O_3.. ..	—	—	—	—	nt. fd.	—	—
S	—	—	—	—	nt. fd.	—	—
V_2O_3	—	—	—	—	nt. fd.	—	—
	100·28	100·08	100·27	100·04	100·49	100·45	101·32

(Table 7) [no title].

TABLE VIII

	18.	T.	U.	V.	W.
SiO_2	68·38	71·56	69·40	63·12	66·62
Al_2O_3	15·87	14·02	15·73	15·44	11·96
Fe_2O_3	1·02	1·26	3·21	1·73	4·19
FeO	1·42	1·46	—	3·53	3·54
MgO	·04	·21	·00	·62	·31
CaO	1·04	·42	·21	1·31	1·32
Na_2O	5·70	6·46	4·75	5·81	6·20
K_2O	4·65	3·97	5·76	5·36	4·06
$H_2O>105°$ ..	·56	·43	—	·44	·22
$H_2O<105°$ ..	·30	·08	—	·14	·08
TiO_2	·24	·28	—	·51	·79
P_2O_5	·26	tr.	—	·25	·21
MnO	·37	—	—	·27	·10
CO_2	·04	—	—	1·89	—
ZrO_2	·06	—	—	—	·38
$(Ce,Y)_2O_3$ ..	—	—	—	—	·18
FeS_2	nt. fd.	—	—	nt. fd.	—
(Ni, Co)O	·03	—	—	nt. fd.	—
BaO	·03	—	—	nt. fd.	—
Li_2O	nt. fd.	—	—	nt. fd.	—
	100·01	100·15	99·06	100·42	100·16

(Table 8) [no title].

TABLE IX

	3.	19.	19A.	X.	20.	Y.	Z.	21.	13.
SiO_2 ..	43·95	42·55	46·6	47·35	48·60	47·24	51·53	54·52	55·79
Al_2O_3 ..	17·60	16·93	18·6	13·90	18·27	18·55	11·05	14·53	15·97
Fe_2O_3 ..	1·43	3·43	3·8	5·87	3·19	6·02	2·73	2·21	12·50
FeO ..	11·89	6·81	7·5	8·96	7·17	4·06	10·98	6·06	—
MgO ..	6·95	6·05	6·7	5·97	6·29	5·24	5·21	5·61	2·22
CaO ..	8·54	12·64	8·5	10·65	10·15	11·72	9·68	8·08	7·06
Na_2O ..	3·66	2·18	2·4	2·73	1·63	2·42	3·48	3·66	2·21
K_2O ..	·35	·32	·4	·54	·45	·15	·86	1·14	1·86
$H_2O>105°$	·82	1·30	1·4	1·16	1·65	2·24	1·26	·93	2·43
$H_2O<105°$	·94	1·78	1·9	1·04	1·60	·21	·71	1·95	—
TiO_2 ..	3·42	1·80	1·9	1·75	·70	1·46	1·57	·87	—
P_2O_5 ..	·11	·11	·1	·24	·09	·26	·22	·21	—
MnO ..	·10	·12	·1	·23	·24	·31	·45	·24	—
CO_2 ..	nt. fd.	3·85	—	·32	nil	·19	·08	—	—
FeS_2 ..	—	—	—	—	—	nt. fd.	·26	—	—
S ..	tr.	·13	·1	·23	tr.	—	—	—	·45
BaO ..	—	—	—	—	—	nt. fd.	nt. fd.	·03	—
Li_2O ..	—	—	—	—	—	nt. fd.	—	nt. fd.	—
(Ni,Co) O	nt. fd.	nil	—	nt. fd.	nil	·05	nt. fd.	nt. fd.	—
	99·76	100·00	100·0	100·94	100·03	100·12	100·07	100·04	100·49

(Table 9) [no title].